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Contents

1.1 re2 4244cd1cb492fa1d10986ec67f862964c073f844

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Dominic Battr <battre@chromium.org>
Doug Kwan <dougkwan@google.com>
Dmitriy Vyukov <dvyukov@google.com>
John Millikin <jmillikin@gmail.com>
Mike Nazarewicz <mpn@google.com>
Nico Weber <thakis@chromium.org>
```

Pawel Hajdan <phajdan.jr@gmail.com>
Rob Pike <r@google.com>
Russ Cox <rsc@swtch.com>
Sanjay Ghemawat <sanjay@google.com>
Stefano Rivera <stefano.rivera@gmail.com>
Srinivasan Venkatachary <vsri@google.com>
Viatcheslav Ostapenko <sl.ostapenko@samsung.com>

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object","webpack://onnxruntime-web/webpack/startup"],"names":["_scriptDir","e","document","currentScript","src","__filename","t","S","buffer","Y","Q","P","n","W","r","q","a","U","i","B","o","u","s","ready","Promise","c","f","hasOwnProperty","l","p","d","m","b","h","g","_","window","y","importScripts","w","process","versions","node","v","ENVIRONMENT_IS_PTHREAD","A","T","locateFile","O","__dirname","normalize","readFileSync","Uint8Array","F","readFile","argv","length","replace","slice","on","Gt","ce","re","exitCode","exit","inspect","console","error","global","Worker","self","location","href","indexOf","substr","lastIndexOf","XMLHttpRequest","open","send","responseText","responseType","response","onload","status","onerror","performance","k","E","x","print","log","bind","M","printErr","warn","thisProgram","quit","wasmBinary","D","noExitRuntime","WebAssembly","C","R","I","j","TextDecoder","this","decode","SharedArrayBuffer","call","G","H","subarray","String","fromCharCode","z","L","charCodeAt","N","V","X","ht","HEAP8","Int8Array","HEAP16","Int16Array","HEAP32","Int32Array","HEAPU8","HEAPU16","Uint16Array","HEAPU32","Uint32Array","HEAPF32","Float32Array","HEAPF64","Float64Array","J","INITIAL_MEMORY","wasmMemory","Memory","initial","maximum","shared","Error","byteLength","Z","$","K","ee","te","ne","ae","preRun","shift","unshift","ie","oe","ue","se","onAbort","RuntimeError","fe","startsWith","le","preloadedImages","preloadedAudios","pe","973748","de","Nb","ib","get","me","Atomics","load","Bt","compareExchange","notify","be","ge","cb","sb","worker","_emscripten_futex_wake","he","gb","fb","zb","xc","Rb","store","Dt","vt","Sb","receiveObjectTransfer","Xb","threadInit","hc","threadCancel","fc","threadExit","Hb","setExitStatus","Zb","yb","Eb","pop","Ct","Fb","yt","postMessage","cmd","Gb","terminate","bb","xb","eb","_t","wb","hb","Yb","push","splice","Ut","Ub","onmessage","data","Lb","targetThread","Dc","transferList","Ot","ve","thread","loaded","mb","threadId","text","alert","zt","returnCode","target","filename","lineno","message","urlOrBlob","mainScriptUrlOrBlob","wasmModule","Ib","Ob","nc","now","_e","Date","gt","ye","ze","we","lb","dc","ac","bc","$b","cc","Pb","rb","jb","detached","St","start_routine","ec","arg","threadInfoStruct","stackBase","stackSize","time","mc","Ae","exchange","wait","Te","establishStackSpace","Wt","Yt","invokeEntryPoint","hrtime","__performance_now_clock_drift","Oe","ke","Ee","xe","Me","rc","De","Se","Ce","Re","Ie","Fe","sc","je","Math","ceil","qt","fill","Wb","Tb","Jb","fd","Ac","flags","offset","Ye","Pe","We","tc","qe","Ue","Be","Ge","He","arguments","jt","Pt","kt","Le","Ne","Ve","querySelector","Xe","qb","Db","pc","Et","pb","ob","getParameter","width","height","viewport","Qe","Je","Ze","$e","Ke","USER","LOGNAME","PATH","PWD","HOME","LANG","navigator","languages","et","forEach","tt","nt","rt","at","vc","uc","it","ot","ut","toTimeString","match","Kb","getFullYear","getTimezoneOffset","max","Ft","It","Number","Rt","st","ct","ft","lt","pt","getTime","getMonth","getDate","setDate","setMonth","setFullYear","dt","toString","getDay","ab","vb","kc","jc","tb","nb","kb","ub","Ec","ic","lc","RegExp","split","substring","abs","includes","Array","set","mt","bt","Tt","oc","At","xt","da","ga","ea","apply","copyWithin","hardwareConcurrency","aa","min","grow","ba","setTimeout","stack","Mt","ca","alpha","depth","stencil","antialias","premultipliedAlpha","preserveDrawingBuffer","powerPreference","failIfMajorPerformanceCaveat","Vb","yc","Bb","Mb","Bc","Cc","Cb","getContext","WebGLRenderingContext","wc","attributes","version","canvas","Qb","getExtension","vertexAttribDivisor","vertexAttribDivisorANGLE","drawArraysInstanced","drawArraysInstancedANGLE","drawElementsInstanced","drawElementsInstancedANGLE","createVertexArray","createVertexArrayOES","deleteVertexArray","deleteVertexArrayOES","bindVertexArray","bindVertexArrayOES","isVertexArray","isVertexArrayOES","drawBuffers","drawBuffersWEBGL","qc","zc","getSupportedExtensions","ha","getUTCSeconds","getUTCMinutes","getUTCHours","getUTCDate","getUTCMonth","getUTCFullYear","getUTCDay","UTC","Ab","getSeconds","getMinutes","getHours","setTime","fa","asm","exports","Ca","ia","Ha","monitorRunDependencies","clearInterval","instance","module","fetch","credentials","then","ok","arrayBuffer","catch","resolve","instantiate","instantiateWasm","instantiateStreaming","___wasm_call_ctors","_OrtInit","ja","_OrtCreateSessionOptions","ka","_OrtAddSessionConfigEntry","la","_OrtReleaseSessionOptions","ma","_OrtCreateSession","na","_OrtReleaseSession","oa","_OrtGetInputCount","pa","_OrtGetOutputCount","qa","_OrtGetInputName","ra","_OrtGetOutputName","sa","_OrtFree","ta","_OrtCreateTensor","ua","_OrtGetTensorData","va","_OrtReleaseTensor","wa","_OrtCreateRunOptions","xa","_OrtAddRunConfigEntry","ya","_OrtReleaseRunOptions","za","_OrtRun","Aa","_OrtEndProfiling","Ba","_malloc","Da","___errno_location","Ea","_free","Fa","_pthread_self","Ga","_emscripten_tls_init","_emscripten_current_thread_process_queued_calls","Ia","wt","_emscripten_register_main_browser_thread_id","Ja","_emscripten_main_browser_thread_id","Ka","_emscripten_sync_run_in_main_thread_4","La","_emscripten_main_thread_process_queued_calls","Ma","_emscripten_run_in_main_runtime_threa d_js","Na","__emscripten_call_on_thread","Oa","_pthread_testcancel","Pa","_pthread_exit","Qa","__emscripten_thread_init","Ra","_emscripten_get_global_libc","Sa","___pthread_tsd_run_dtors","Ta","__get_tzname","Ua","__get_daylight","Va","__get_timezone","Wa","stackSave","Xa","stackRestore","Ya","stackAlloc","Za","_emscripten_stack_set_limits","_a","_memalign","$a","__emscripten_allow_main_runtime_queued_calls","__emscripten_main_thread_futex","name","Ht","calledRun","onRuntimeInitialized","postRun","setStatus","_fflush","onExit","UTF8ToString","stringToUTF8","lengthBytesUTF8","keepRuntimeAlive","PThread","ExitStatus","run","preInit","ortWasm","undefined","fn","ctx","params","index","pending","reject","err","base64","string","charAt","b64","s64","encode","start","end","parts","chunk","join","invalidEncoding","test","EventEmitter","_listeners","prototype","evt","off","listeners","emit","args","factory","f32","f8b","writeFloat_f32_cpy","val","buf","pos","writeFloat_f32_rev","readFloat_f32_cpy","readFloat_f32_rev","writeFloatLE","writeFloatBE","readFloatLE","readFloatBE","writeFloat_ieee754","writeUint","sign","isNaN","round","exponent","floor","LN2","pow","readFloat_ieee754","readUint","uint","mantissa","NaN","Infinity","writeUintLE","writeUintBE","readUintLE","readUintBE","f64","writeDouble_f64_cpy","writeDouble_f64_rev","readDouble_f64_cpy","readDouble_f64_rev","writeDoubleLE","writeDoubleBE","readDoubleLE","readDoubleBE","writeDouble_ieee754","off0","off1","readDouble_ieee754","lo","hi","inquire","moduleName","mod","eval","Object","keys","alloc","size","SIZE","MAX","slab","utf8","len","read","write","c1","c2","flatbuffers","Offset","Table","SIZEOF_SHORT","SIZEOF_INT","FILE_IDENTIFIER_LENGTH","SIZE_PREFIX_LENGTH","Encoding","UTF8_BYTES","UTF16_STRING","int32","float32","float64","isLittleEndian","Long","low","high","create","ZERO","toFloat64","equals","other","Builder","opt_initial_size","initial_size","ByteBuffer","allocate","space","minalign","vtable","vtable_in_use","isNested","object_start","vtables","vector_num_elems","force_defaults","clear","capacity","forceDefaults","dataBuffer","asUint8Array","bytes","position","prep","additional_bytes","align_size","old_buf_size","growByteBuffer","pad","byte_size","writeInt8","value","writeInt16","writeInt32","writeInt64","writeFloat32","writeFloat64","addInt8","addInt16","addInt32","addInt64","addFloat32","addFloat64","addFieldInt8","voffset","defaultValue","slot","addFieldInt16","addFieldInt32","addFieldInt64","addFieldFloat32","addFieldFloat64","addFieldOffset","addOffset","addFieldStruct","nested","obj","notNested","new_buf_size","nbb","setPosition","startObject","numfields","endObject","vtableloc","trimmed_size","existing_vtable","vt1","outer_loop","vt2","readInt16","finish","root_table","opt_file_identifier","opt_size_prefix","size_prefix","file_identifier","finishSizePrefixed","requiredField","table","field","table_start","vtable_start","readInt32","startVector","elem_size","num_elems","alignment","endVector","createString","codePoint","createLong","bytes_","position_","readInt8","readUint8","readUint16","readUint32","readInt64","readUint64","readFloat32","readFloat64","writeUint8","writeUint16","writeUint32","writeUint64","getBufferIdentifier","result","__offset","bb_pos","vtable_offset","__union","__string","opt_encoding","__indirect","__vector","__vector_len","__has_identifier","ident","__esModule","Guid","guid","TypeError","EMPTY","isGuid","validator","gen","createEmpty","parse","raw","count","out","random","isEmpty","toJSON","wasm","Instance","Module","unsigned","isLong","__isLong__","defineProperty","INT_CACHE","UINT_CACHE","fromInt","cachedObj","cache","fromBits","fromNumber","UZERO","TWO_PWR_64_DBL","MAX_UNSIGNED_VALUE","TWO_PWR_63_DBL","MIN_VALUE","MAX_VALUE","neg","TWO_PWR_32_DBL","lowBits","highBits","pow_dbl","fromString","str","radix","RangeError","radixToPower","parseInt","power","mul","add","fromValue","TWO_PWR_16_DBL","TWO_PWR_24","ONE","UONE","NEG_ONE","LongPrototype","toInt","toNumber","isZero","isNegative","eq","radixLong","div","rem1","sub","rem","remDiv","digits","getHighBits","getHighBitsUnsigned","getLowBits","getLowBitsUnsigned","getNumBitsAbs","bit","eqz","isPositive","isOdd","isEven","notEquals","neq","lessThan","comp","lessThanOrEqual","lte","greaterThan","greaterThanOrEqual","gte","compare","thisNeg","otherNeg","negate","not","addend","a48","a32","a16","a00","b48","b32","b16","c48","c32","c16","c00","subtract","subtrahend","multiply","multiplier","get_high","b00","divide","divisor","approx","res","div_u","div_s","toUnsigned","shru","shr","shl","log2","delta","approxRes","approxRem","modulo","rem_u","rem_s","and","or","xor","shiftLeft","numBits","shiftRight","shiftRightUnsigned","shr_u","toSigned","toBytes","toBytesLE","toBytesBE","fromBytes","fromBytesLE","fromBytesBE","valuesById","values","onnx","$protobuf","$Reader","Reader","$Writer","Writer","$util","util","$root","roots","Version","AttributeProto","properties","floats","ints",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String","isInteger","isArray","fromObject","object","LongBits","toObject","options","arrays","defaults","long","longs","enums","json","isFinite","AttributeType","constructor","toJSONOptions","ValueInfoProto","TypeProto","NodeProto","input","output","attribute","opType","domain","ModelProto","opsetImport","metadataProps","irVersion","producerName","producerVersion","modelVersion","graph","OperatorSetIdProto","StringStringEntryProto","key","TensorAnnotation","quantParameterTensorNames","tensorName","initializer","valueInfo","quantizationAnnotation","dims","floatData","int32Data","stringData","int64Data","externalData","doubleData","uint64Data","dataType","segment","rawData","dataLocation","Segment","double","uint64","DataLocation","DataType","begin","TensorShapeProto","dim","Dimension","$oneOfFields","dimValue","dimParam","denotation","oneOfGetter","oneOfSetter","oneofs","tensorType","Tensor","elemType","shape","protobuf","configure","_configure","BufferWriter","BufferReader","build","rpc","indexOutOfRange","writeLength","create_array","Buffer","isBuffer","readLongVarint","bits","readFixed32_end","readFixed64","_slice","sint32","bool","fixed32","sfixed32","skip","wireType","BufferReader_","merge","sint64","zzDecode","fixed64","sfixed64","utf8Slice","Service","rpcImpl","requestDelimited","responseDelimited","Boolean","rpcCall","method","requestCtor","responseCtor","request","callback","asPromise","endedByRPC","zero","zzEncode","zeroHash","from","toLong","fromHash","hash","toHash","mask","part0","part1","part2","dst","ifNotSet","newError","CustomError","captureStackTrace","pool","isNode","freeze","emptyObject","isObject","isset","isSet","prop","utf8Write","_Buffer_from","_Buffer_allocUnsafe","sizeOrArray","dcodeIO","key2Re","key32Re","key64Re","longToHash","longFromHash","lcFirst","toLowerCase","ProtocolError","fieldNames","fieldMap","encoding","allocUnsafe","Op","next","noop","State","head","tail","states","writeByte","VarintOp","writeVarint64","writeFixed32","_push","writeBytes","reset","BufferWriter_","writeStringBuffer","writeBytesBuffer","copy","init","createSessionHandler","pathOrBuffer","session","Session","loadModel","OnnxjsSessionHandler","onnxjsBackend","OnnxjsBackend","initializeFlags","env","initTimeout","simd","proxy","numThreads","numCpuLogicalCores","cpus","initWasm","promisify","handler","OnnxruntimeWebAssemblySessionHandler","wasmBackend","OnnxruntimeWebAssemblyBackend","registerBackend","assign","_cacheKey","getOwnPropertyNames","sort","map","createAttributeWithCacheKey","AttributeWithCacheKeyImpl","ortFbs","onnxruntime","experimental","fbs","_attributes","Map","attr","Attribute","getValue","getType","delete","getFloat","getInt","getString","getTensor","getFloats","getInts","getStrings","getTensors","valueAndType","FLOAT","INT","STRING","TENSOR","FLOATS","INTS","STRINGS","TENSORS","attrType","GRAPH","GRAPHS","getValueNoCheck","LongUtil","longToNumber","arr","numberValue","maybeLong","fromProto","fromOrtTensor","utf8String","byteOffset","getValueNoCheckFromOnnxFormat","getValueNoCheckFromOrtFormat","floatsArray","intsLength","stringsLength","tensorsLength","backendsCache","tryLoadBackend","backendHint","backendObj","backend","initialize","dispose","webgl","WebGLBackend","resolveBackend","hint","hints","contextId","matmulMaxBatchSize","textureCacheMode","pack","async","glContext","createWebGLContext","Logger","setWithEnv","verbose","warning","context","WebGLSessionHandler","getFunctions","offsetToCoords","coordsToOffset","toVec","valueFrom","getCommonUtilFuncs","getInputsSamplingSnippets","getOutputSamplingSnippet","getCustomTypes","GlslLibRoutine","outputLayout","outputTextureLayout","isPacked","getPackedOutputSamplingSnippet","getUnpackedOutputSamplingSnippet","outShape","unpackedShape","outTexShape","funcName","getOutputScalarCoords","getOutputPacked1DCoords","getOutputPacked2DCoords","getOutputPacked3DCoords","getOutputPackedNDCoords","floatTextureSetRGBASource","getGlsl","getOutputUnpacked1DCoords","getOutputUnpacked2DCoords","getOutputUnpacked3DCoords","getOutputUnpacked4DCoords","getOutputUnpacked5DCoords","getOutputUnpacked6DCoords","floatTextureSetRSource","texShape","packedTexShape","source","ArrayUtil","arraysEqual","texelsInLogicalRow","texelsInBatch","texelsInBatchN","batches","coords","rank","strides","coordsToCompute","coordsFromIndexSnippet","stride","glsl","texture2D","programInfo","inputNames","samplerName","inputLayout","inputTextureLayouts","generateShaderFuncNameFromInputSamplerName","getPackedSamplerFromInput","getUnpackedSamplerFromInput","outCoordFuncName","generateShaderFuncNameFromInputSamplerNameAtOutCoords","getPackedSamplerAtOutputCoords","getUnpackedSamplerAtOutputCoords","coordsSnippet","inShape","texName","texFuncSnippet","inRank","outRank","broadcastDims","BroadcastUtil","getBroadcastDims","getCoordsDataType","rankDiff","fields","getGlChannels","unpackedCoordsSnippet","isInputScalar","ShapeUtil","isOutputScalar","rows","cols","inTexShape","getPackedSamplerScalar","getPackedSampler1D","getPackedSampler2D","getPackedSampler3D","getPackedSamplerND","getUnpackedSamplerScalar","getUnpack

edSampler1D","getUnpackedSampler2D","getUnpackedSampler3D","getUnpackedSampler4D","getUnpackedSampler5D","getUnpackedSampler6D","texNumR","texNumC","valuesPerRow","squeezedShape","newInputShape","squeezeInputShape","newInputLayout","JSON","stringify","samplerRoutine","routineBody","getSqueezedParams","dependencies","tNumR","tNumC","squeezeShape","newShape","keptDims","stride0","stride1","routine","revDims","reverse","stride2","stride3","stride4","xScale","yScale","stridesBlock","body","layout","getValueFromSingle","varName","transpose","getPackedValueFrom","GlslLib","CoordsGlslLib","FunctionType","GlslContext","addDependency","GlslLibRoutineNode","returnOrderedNodes","nodes","cycleCheck","Set","alreadyTraversed","createOrderedNodes","graphNodes","dfsTraverse","root","has","TopologicalSortGlslRoutines","encodeFloat32","decodeFloat32","encodeUint8","endianness","EncodingGlslLib","decodeUint8","ArrayBuffer","setFragColor","getColorAsFloat","FragColorGlslLib","INLINE_FUNC_DEF_REGEX","script","inlineDefs","exec","tokens","trim","filter","regexString","regex","variable","declLine","newBody","paramRedecLine","replacement","libs","glslLibRoutineDependencyGraph","glslRegistry","lib","libName","routinesInLib","currentNode","preprocess","shaderSource","hasMain","getDefaultFragShaderMain","replaceInlines","getFragShaderPreamble","getUniforms","variables","getImports","routinesIncluded","selectGlslLibRoutinesToBeIncluded","routines","classAndRoutine","samplers","uniformLines","sampler","arrayLength","GlslPreprocessor","VecGlslLib","ShapeUtilsGlslLib","bcastIndex","bcastMatmulIndex","offsetToIndices","indicesToOffset","incrementIndices","outputRank","dimOffset","block","indexToOffsetSingle","offsetToIndicesSingle","shapeInit","GLSL_ES_2_0","varyingVertex","varyingFrag","outputDeclaration","GLSL_ES_3_0","outputShapeLength","binaryVecFunctions","copyVec","setVecItem","getVecItem","nameOp","fname","assignmentBlock","packedTextureDataCache","unpackedTextureDataCache","calculateTextureWidthAndHeight","textureType","layoutStrategy","executeProgram","program","inputs","inputTypes","inputTextureDatas","getOrCreateTextureData","texture","cacheHint","getProgramInfoUniqueKey","artifact","programManager","getArtifact","createTextureLayoutFromTextureType","outputTextureData","createTextureData","setArtifact","runProgram","tensor","TextureType","packed","td","getTextureData","dataId","unpack","packedLastDimension","adjustedKernelShape","adjustedLayout","numberData","numFeatureMaps","oldRowSize","newRowSize","oldOffset","newOffset","unpackedTextureLayout","createTextureLayoutFromShape","reverseWH","unpackedTextureData","createTextureDataFromLayoutBindTensor","usage","textureManager","createTextureFromLayout","createTextureDataFromTexture","reshapeUnpacked","reshapedDims","inputTD","unpacked","newTextureLayout","channels","computeStrides","reshapePacked","isReshapeCheap","squeezedInputShape","processDims3D","squeezedOutputShape","squeezedInputTensor","squeezedOutputTensor","createPackedReshape3DProgramInfoLoader","tensorId","textureData","_id","readTexture","readTextureAsync","setTextureData","isInitializer","isTextureLayoutCached","clearActiveTextures","releaseTexture","isFloat32DownloadSupported","readUint8TextureAsFloat","encodeAsUint8","createPackProgramInfoLoader","createUnpackProgramInfoLoader","WebGLInferenceHandler","WEBGL_OP_RESOLVE_RULES","unaryOps","acos","binaryOps","asin","atan","averagePool","parseAveragePoolAttributes","batchNormalization","parseBatchNormalizationAttributes","clip","parseClipAttributes","concat","parseConcatAttributes","conv","parseConvAttributes","cos","identity","depthToSpace","parseDepthToSpaceAttributes","equal","elu","parseEluAttributes","exp","flatten","parseFlattenAttributes","gather","parseGatherAttributes","gemm","parseGemmAttributesV7","parseGemmAttributesV11","globalAveragePool","parseGlobalAveragePoolAttributes","globalMaxPool","greater","imageScaler","parseImageScalerAttributes","instanceNormalization","parseInstanceNormalizationAttributes","leakyRelu","parseLeakyReluAttributes","less","matMul","parseMatMulAttributes","maxPool","parseMaxPoolAttributes","parsePadAttributes","pRelu","reduceLogSum","parseReduceAttributes","reduceMax","reduceMean","reduceMin","reduceProd","reduceSum","reduceLogSumSquare","relu","reshape","resize","parseResizeAttributesV10","parseResizeAttributesV11","sigmoid","sin","sliceV10","parseSliceAttributes","softmax","parseSoftmaxAttributes","parseSplitAttributes","sqrt","squeeze","parseSqueezeAttributes","sum","tan","tanh","tile","parseTransposeAttributes","upsample","parseUpsampleAttributesV7","parseUpsampleAttributesV9","unsqueeze","parseUnsqueezeAttributes","batchNormalizationProgramMetadata","inferenceHandler","validateInputs","cacheKey","createBatchNormalizationProgramInfo","epsilon","momentum","spatial","scale","mean","var_","glslAdd","ValueBased","glslDiv","glslMul","glslSub","glslEqual","glslGreater","glslLess","glslAnd","glslOr","glslXor","glslPow","glslBuiltinBinary","glslPRelu","createBinaryProgramInfoLoader","glslFunc","outputTensorType","createBinaryProgramInfo","isBroadcast","areEqual","outputShape","usePac

kedTexture","calculatedShape","calcShape","aRank","bRank","aBcast","bBcast","createPackedConcatProgramInfoLoader","inputCount","metadata","axis","inputShape","dataNShape","axisIndex","getChannels","dtype","unpackChannel","unpackFromChannel","shapes","offsets","channel","lastChannels","allChannels","getValueSnippet","getShiftedChannelsSnippet","lastIndex","createPackedConcatProgramInfo","channelIdx","idx","createUnpackedConcatProgramInfoLoader","sizeInConcatAxis","previousSum","getTextureIndexWhereDataResidesMethod","getTextureIndexWhereDataResidesLinearSearch","getTextureIndexWhereDataResidesBinarySearch","getFetchDataFromCorrectTextureMethod","getGetSizeInConcatAxisValueFromIndexMethod","createUnpackedConcatProgramInfo","numberOfTensors","tensorRank","codeLines","inputType","inputDimensionality","createUnpackedGroupedConvProgramInfoLoader","hasBias","processBias","xShape","wShape","outputChannelsPerGroup","group","autoPad","dilations","kernelShape","pads","calculateOutputShape","getActicationSnippet","activationFunction","applyActivation","createUnpackedGroupedConvProgramInfo","conv2DPackedPointwise","xshape","kshape","reshapedX","reshapedK","matmulInputs","matmulOutput","createPackedMatmulProgramInfoLoader","conv2DPacked","im2colOutput","createPackedIm2ColProgramInfoLoader","kernelReshaped","adjustPads","batchSize","inputSpatialShape","spatialRank","outChannels","dilatedKernelShape","outputSpatialShape","conv2d","adjustedAttributes","getAdjustedConvAttributes","packMode","isPointwise","conv2DUnpackedPointwise","conv2DUnpacked","createMatmulProgramInfoLoader","xIm2Col","createIm2ColProgramInfoLoader","dotProductInputs","createDotProductProgramInfoLoader","PoolConvUtil","adjustPadsBasedOnAutoPad","newAttributes","activationAttributes","parseInternalActivationAttributes","blocksize","blocksizeSqr","transposePerm","mode","firstReshapeShape","firstReshapedTensor","transposeAttributes","perm","transposeOutput","secondReshapeShape","activationCacheKey","createDotProductProgramMetadata","im2colShape","calculateIm2ColDims","kWidth","kHeight","im2colStrides","im2colWidth","im2colHeight","initValue","sharedDim","createDotProductProgramInfo","outputDims","flattenShape","func","activation","glslRelu","glslSigmoid","glslClip","clipMin","clipMax","activationName","createGatherProgramInfoLoader","gatherProgramMetadata","indexDataShape","normalizeAxis","indexCopyOps","createGatherProgramInfo","NUMBER_TYPES","createGemmProgramInfoLoader","parseGemmAttributes","isOptionalC","transA","transB","beta","createGemmProgramInfo","aShape","bShape","GemmUtil","getShapeOfGemmResult","line","wshape","kernelSize","unrolled","row","col","createPackedIm2ColProgramInfo","im2colDims","createIm2ColProgramInfo","createImageScalerProgramInfoLoader","bias","imageScalerProgramMetadata","createGetBiasMethod","createImageScalerProgramInfo","numChannels","meanAndVariance","createMeanAndVarianceProgramInfoLoader","createComputeOutputProgramInfoLoader","meanAndVarianceProgramMetadata","xDims","channelSize","createMeanAndVarianceProgramInfo","computeOutputProgramMetadata","meanAndVarianceShape","textureWidth","textureHeight","createComputeOutputProgramInfo","sharedDimIndex","coordsDataType","allGlChannels","getBiasForMatmulSnippet","getBiasForMatmul","getBcastedSamplerForMatmulSnippet","unpackedACoordsSnippet","unpackedBCoordsSnippet","inAShape","inBShape","inARank","inBRank","rankADiff","rankBDiff","broadcastADims","broadcastBDims","coordsASnippet","coordsBSnippet","swapDimSnippet","getBcastSamplerForMatmul","getSamplerAInLoopSnippet","getA","getSamplerBInLoopSnippet","getB","createPackedMatmulProgramInfo","arank","brank","createMatmulProgramInfo","packProgramMetadata","unpackedReversed","inputRank","setup","outOfBoundsCondition","cond","getOutOfBoundsCondition","getOutput","createPackProgramInfo","getVecChannels","padProgramMetadata","createPadProgramInfo","padShape","getPadFunction","getPadConstant","getPadReflect","getPadEdge","createAveragePoolProgramInfo","ceilMode","countIncludePad","isGlobalOperator","adjustPoolAttributes","computePoolOutputShape","op2","generatePoolingCode","createMaxPoolProgramInfo","storageOrder","globalMaxPoolAttributes","globalMaxPoolMetadata","inputDims","op1","codeW","kw","sw","pwStart","pwEnd","dimW","codeH","codeHEnd","kh","sh","phStart","phEnd","dimH","kernelStrides","stridesRank","padsRank","offsetToIndicesFunction","copyInputDims","copyArray","copyPads","copyKernelStrides","reduce","cur","array","arrayName","reduceOp","reduceProgramMetadata","createReduceProgramInfo","axes","keepDims","iRank","idxCopy","normalizeAxes","ops","reduceOps","idxZero","input3D","outputShape3D","createPackedReshape3DProgramMetadata","inputShape3D","mainLoop","outputCoords","getFlattenedIndexFrom3D","createPackedReshape3DProgramInfo","batch","calculateReshapedDims","integerData","resizeProgramMetadata","createPackedResizeProgramInfo","parseUpsampleAttributes","prepareInputs","scales","every","coordinateTransformMode","outputHeight","outputWidth","inputHeight","inputWidth","scalesHeight","scale

sWidth","getSourceFracIndex","outputSizes","scalesTensor","scalesInputIdx","sizesInputIdx","parseScalesData","isResize","sizesTensor","parseScalesDataFromOutputSize","yDims","scalesValidation","sliceProgramMetadata","createSliceProgramInfo","starts","ends","normalizedAxes","sliceOps","validateInputsV10","generateSliceAttributesFromInputs","some","softmaxComputeMaxProgramMetadata","softmaxComputeScaleProgramMetadata","softmaxProgramMetadata","sizeToDimension","sizeFromDimension","computeMaxProgramInfo","createComputeMaxProgramInfo","computeScaleProgramInfo","createComputScaleProgramInfo","softMaxProgramInfo","createSoftMaxProgramInfo","maxElementPerLogicalRow","normalizationPerLogicalRow","splitProgramMetadata","getProgramCount","createSplitProgramInfo","numOutputs","outputs","SplitUtil","splitShape","sumProgramMetadata","createSumProgramInfo","tileProgramMetadata","createTileProgramInfo","tileOps","transposeProgramMetadata","createTransposeProgramInfo","getAdjustedPerm","unpackedOutputShape","getOutputShape","getPermFunctionBody","sortBasedOnPerm","reverseFunc","downloadUint8AsFloat","glslAbs","glslBuiltinUnary","glslAcos","glslAsin","glslAtan","glslCeil","glslCos","glslElu","glslExp","glslFloor","glslIdentity","glslLeakyRelu","glslLog","glslNeg","glslNot","glslSin","glslSqrt","glslTan","glslTanh","createElementwiseProgramInfoLoader","createElementwiseProgramInfo","unpackProgramMetadata","createUnpackProgramInfo","innerDims","sourceCoords","getSourceCoords","unsqueezeShape","upsampleProgramMetadata","createUpsampleProgramInfo","opset","extrapolationValue","needRoiInput","useExtrapolation","nearestMode","cubicCoefficientA","excludeOutside","useNearest2xOptimization","roiInputIdx","outputPitches","inputPitches","precalculatedPitches","getInputFloatFunction","profiler","textureLayoutStrategy","repo","attributesBound","buildArtifact","event","gl","useProgram","bindOutput","bindAttributes","attribLocations","bindUniforms","uniformLocations","draw","vertexShader","deleteShader","deleteProgram","preprocessor","fragScript","compile","getUniformLocations","getAttribLocations","fragShaderScript","vertexShaderScript","getVertexShaderSource","compileShader","VERTEX_SHADER","debug","fragShader","FRAGMENT_SHADER","createProgram","attachFramebuffer","positionHandle","textureCoordHandle","textureCoord","setVertexAttributes","textures","texturePosition","find","bindTexture","uniform1fv","uniform1f","uniform1iv","uniform1i","uniformHandle","bindTextureToUniform","getAttribLocation","getUniformLocation","reference","ProgramManager","PreferLogicalStrategy","maxTextureSize","TextureManager","reuseTextures","pack2unpackMap","unpack2packMap","createInferenceHandler","onGraphInitialized","initializers","getValues","addInitializer","opsets","op","resolveOperator","impl","opImpl","opInit","internalFormat","R32F","format","RED","RGBA32F","RGBA","textureSize","dataSize","RedFloat32DataEncoder","dest","RGBAFloatDataEncoder","ALPHA","UNSIGNED_BYTE","_textureSize","Uint8DataEncoder","computeTextureWH","prefs","breakAxis","wsize","hsize","totalSize","AlwaysKeepOriginalSizeStrategy","wh","computeTexture","logShape","squeezeResult","sizeFromShape","sizeToSquarishShape","isEmptyArray","parseAxisParam","assert","ax","isInt","dimsToSkip","inferredDims","reversedWH","config","pendingRead","inUseTextures","idleTextures","textureLookup","textureDataType","toEncoderType","encoder","getEncoder","updateTexture","toTextureData","allocateTexture","toTensorData","createAndWaitForFence","tensorData","subscribers","deleteTexture","_dataType","checkFn","delayFn","maxCounter","_counter","tryCount","tryFn","nextBackoff","toUpperCase","createNewWebGLContext","createElement","createCanvas","WebGLContext","webgl2","isContextLost","disable","DEPTH_TEST","STENCIL_TEST","BLEND","DITHER","POLYGON_OFFSET_FILL","SAMPLE_COVERAGE","enable","SCISSOR_TEST","CULL_FACE","cullFace","BACK","linearSearchLastTrue","frameBufferBound","itemsToPoll","getExtensions","vertexbuffer","createVertexbuffer","framebuffer","createFramebuffer","queryVitalParameters","createTexture","TEXTURE_2D","texParameteri","TEXTURE_MIN_FILTER","NEAREST","TEXTURE_MAG_FILTER","TEXTURE_WRAP_S","CLAMP_TO_EDGE","TEXTURE_WRAP_T","texImage2D","checkError","texSubImage2D","bindFramebuffer","FRAMEBUFFER","framebufferTexture2D","COLOR_ATTACHMENT0","scissor","readPixels","isFramebufferReady","getActiveTexture","ACTIVE_TEXTURE","TEXTURE0","getTextureBinding","TEXTURE_BINDING_2D","getFramebufferBinding","FRAMEBUFFER_BINDING","vertexAttribPointer","enableVertexAttribArray","attachShader","linkProgram","shaderType","shader","createShader","getShaderParameter","COMPILE_STATUS","getShaderInfoLog","activeTexture","drawArrays","TRIANGLE_STRIP","getError","label","DataEncoders","isRenderFloat32Supported","textureHalfFloatExtension","HALF_FLOAT_OES","unit","maxTextureImageUnits","disposed","deleteFramebuffer","bindBuffer","ARRAY_BUFFER","deleteBuffer","ELEMENT_ARRAY_BUFFER","createDefaultGeometry","createBuffer","geometry","bufferData","STA

TIC_DRAW","isFloatTextureAttachableToFrameBuffer","checkFloatTextureAttachableToFrameBuffer","checkRenderFloat32","checkFloat32Download","isBlendSupported","checkFloat32Blend","MAX_TEXTURE_SIZE","MAX_TEXTURE_IMAGE_UNITS","colorBufferFloatExtension","disjointTimerQueryWebgl2Extension","textureFloatExtension","frameBuffer","isComplete","checkFramebufferStatus","FRAMEBUFFER_COMPLETE","fragmentShader","POINTS","NO_ERROR","beginTimer","gl2","ext","query","createQuery","beginQuery","TIME_ELAPSED_EXT","endTimer","endQuery","isTimerResultAvailable","available","disjoint","getQueryParameter","QUERY_RESULT_AVAILABLE","GPU_DISJOINT_EXT","getTimerResult","timeElapsed","QUERY_RESULT","deleteQuery","waitForQueryAndGetTime","repeatedTry","fenceContext","createFence","pollFence","fenceSync","SYNC_GPU_COMMANDS_COMPLETE","flush","isFencePassed","clientWaitSync","ALREADY_SIGNALED","CONDITION_SATISFIED","addItemToPoll","pollItems","isDoneFn","resolveFn","getNodes","_ops","KernelOp","_starter","resolved","_values","getInputIndices","execute","sessionHandler","modelInputs","graphInputs","sequence","graphValues","rear","thisOpIndex","thisOp","inputList","inputTensors","outputList","downstreamNodes","to","currentDownstreamNodeIndex","currentDownstreamNode","getOutputIndices","outputIndex","outputTensor","getData","ExecutionPlan","Graph","graphProto","GraphImpl","_from","_to","ProtoUtil","tensorValueTypeFromProto","_nodeProto","Node","tensorAttributesFromORTFormat","executeNode","graphInitializer","buildGraph","transformGraph","checkIsAcyclic","_allInputIndices","getInputNames","_allInputNames","_allOutputIndices","getOutputNames","_allOutputNames","_allData","_nodes","buildGraphFromOnnxFormat","buildGraphFromOrtFormat","dataIndices","nodesIndices","inputValueNames","currentIndex","Value","tensorDimsFromProto","tensorDataTypeFromProto","nodeProto","pick","dataIndex","inputsLength","inputName","nodeArgsLength","nodeArgs","valueType","TypeInfoValue","tensor_type","TensorTypeAndShape","dimLength","initializersLength","tensorDimsFromORTFormat","outputsLength","outputName","nodesLength","attributesLength","starters","nodesStack","nodesState","nodeIndex","outgoingEdgeIndex","downstreamNodeIndex","removeAllIdentityNodes","removeAllDropoutNodes","fuseConvActivationNodes","finalizeGraph","ind","deleteNode","inputValueIndex","outputValueIndex","nodesConsumingOutput","delIndex","replaceIndex","isActivation","child","_severity","_content","_category","severity","content","category","color","SEVERITY_VALUE","info","fatal","LOGGER_PROVIDER_MAP","NoOpLoggerProvider","ConsoleLoggerProvider","LOGGER_DEFAULT_CONFIG","provider","minimalSeverity","logDateTime","logSourceLocation","LOGGER_CONFIG_MAP","arg0","arg1","arg2","arg3","logInternal","toISOString","previousConfig","logLevel","startTime","endCallback","timer","checkTimer","endTime","maxNumberEvents","flushBatchSize","flushIntervalInMilliseconds","_started","_flushPointer","_maxNumberEvents","_flushBatchSize","_flushIntervalInMilliseconds","_timingEvents","_flushTime","stop","logOneEvent","isPromise","reason","Event","endSync","EventRecord","toFixed","currentTime","previousPointer","Profiler","isOrtFormat","loadFromOnnxFormat","loadFromOrtFormat","modelProto","_opsets","_graph","ortModel","InferenceSession","getRootAsInferenceSession","model","opsetImportLength","opsetId","Model","INT_TYPES","FLOAT_TYPES","matchSelector","selector","endsWith","rangeStart","pair","rangeEnd","rules","rule","versionSelector","DimensionValueType","TensorDataType","NodeType","__init","getRootAsShape","Shape","getSizePrefixedRootAsShape","startShape","builder","addDim","createDimVector","startDimVector","numElems","endShape","createShape","getRootAsDimension","getSizePrefixedRootAsDimension","DimensionValue","optionalEncoding","startDimension","addValue","valueOffset","addDenotation","denotationOffset","endDimension","createDimension","getRootAsDimensionValue","getSizePrefixedRootAsDimensionValue","dimType","UNKNOWN","startDimensionValue","addDimType","addDimValue","addDimParam","dimParamOffset","endDimensionValue","createDimensionValue","getRootAsTensorTypeAndShape","getSizePrefixedRootAsTensorTypeAndShape","UNDEFINED","startTensorTypeAndShape","addElemType","addShape","shapeOffset","endTensorTypeAndShape","createTensorTypeAndShape","getRootAsMapType","MapType","getSizePrefixedRootAsMapType","keyType","TypeInfo","startMapType","addKeyType","addValueType","valueTypeOffset","endMapType","createMapType","getRootAsSequenceType","SequenceType","getSizePrefixedRootAsSequenceType","startSequenceType","elemTypeOffset","endSequenceType","createSequenceType","srcArgIndex","dstArgIndex","createEdgeEnd","node_index","src_arg_index","dst_arg_index","EdgeEnd","getRootAsNodeEdge","NodeEdge","getSizePrefixedRootAsNodeEdge","inputEdges","inputEdgesLength","outputEdges","outputEdgesLength","startNodeEdge","addNodeIndex","addInputEdges","inputEdgesOffset","startInputEdgesVector","addOutputEdges","outputEdgesOffset","s

tartOutputEdgesVector","endNodeEdge","createNodeEdge","getRootAsNode","getSizePrefixedRootAsNode","sinceVersion","Primitive","executionProviderType","inputArgCounts","inputArgCountsLength","inputArgCountsArray","implicitInputs","implicitInputsLength","startNode","addName","nameOffset","addDocString","docStringOffset","addDomain","domainOffset","addSinceVersion","addIndex","addOpType","opTypeOffset","addType","addExecutionProviderType","executionProviderTypeOffset","addInputs","inputsOffset","createInputsVector","startInputsVector","addOutputs","outputsOffset","createOutputsVector","startOutputsVector","addAttributes","attributesOffset","createAttributesVector","startAttributesVector","addInputArgCounts","inputArgCountsOffset","createInputArgCountsVector","startInputArgCountsVector","addImplicitInputs","implicitInputsOffset","createImplicitInputsVector","startImplicitInputsVector","endNode","createNode","getRootAsValueInfo","ValueInfo","getSizePrefixedRootAsValueInfo","startValueInfo","typeOffset","endValueInfo","createValueInfo","getRootAsTypeInfo","getSizePrefixedRootAsTypeInfo","NONE","startTypeInfo","endTypeInfo","createTypeInfo","getRootAsOperatorSetId","OperatorSetId","getSizePrefixedRootAsOperatorSetId","startOperatorSetId","addVersion","endOperatorSetId","createOperatorSetId","getRootAsTensor","getSizePrefixedRootAsTensor","dimsLength","rawDataLength","rawDataArray","stringDataLength","startTensor","addDims","dimsOffset","createDimsVector","startDimsVector","addDataType","addRawData","rawDataOffset","createRawDataVector","startRawDataVector","addStringData","stringDataOffset","createStringDataVector","startStringDataVector","endTensor","createTensor","getRootAsSparseTensor","SparseTensor","getSizePrefixedRootAsSparseTensor","indices","startSparseTensor","addValues","valuesOffset","addIndices","indicesOffset","endSparseTensor","createSparseTensor","getRootAsAttribute","getSizePrefixedRootAsAttribute","floatsLength","graphsLength","startAttribute","addF","addI","addS","sOffset","addT","tOffset","addG","gOffset","addFloats","floatsOffset","createFloatsVector","startFloatsVector","addInts","intsOffset","createIntsVector","startIntsVector","addStrings","stringsOffset","createStringsVector","startStringsVector","addTensors","tensorsOffset","createTensorsVector","startTensorsVector","addGraphs","graphsOffset","createGraphsVector","startGraphsVector","endAttribute","createAttribute","getRootAsGraph","getSizePrefixedRootAsGraph","maxNodeIndex","nodeEdges","nodeEdgesLength","sparseInitializers","sparseInitializersLength","startGraph","addInitializers","initializersOffset","createInitializersVector","startInitializersVector","addNodeArgs","nodeArgsOffset","createNodeArgsVector","startNodeArgsVector","addNodes","nodesOffset","createNodesVector","startNodesVector","addMaxNodeIndex","addNodeEdges","nodeEdgesOffset","createNodeEdgesVector","startNodeEdgesVector","addSparseInitializers","sparseInitializersOffset","createSparseInitializersVector","startSparseInitializersVector","endGraph","createGraph","getRootAsModel","getSizePrefixedRootAsModel","graphDocString","startModel","addIrVersion","addOpsetImport","opsetImportOffset","createOpsetImportVector","startOpsetImportVector","addProducerName","producerNameOffset","addProducerVersion","producerVersionOffset","addModelVersion","addGraph","graphOffset","addGraphDocString","graphDocStringOffset","endModel","createModel","getRootAsKernelCreateInfos","KernelCreateInfos","getSizePrefixedRootAsKernelCreateInfos","nodeIndices","nodeIndicesLength","nodeIndicesArray","kernelDefHashes","kernelDefHashesLength","startKernelCreateInfos","addNodeIndices","nodeIndicesOffset","createNodeIndicesVector","startNodeIndicesVector","addKernelDefHashes","kernelDefHashesOffset","createKernelDefHashesVector","startKernelDefHashesVector","endKernelCreateInfos","createKernelCreateInfos","getRootAsSubGraphSessionState","SubGraphSessionState","getSizePrefixedRootAsSubGraphSessionState","graphId","sessionState","SessionState","startSubGraphSessionState","addGraphId","graphIdOffset","addSessionState","sessionStateOffset","endSubGraphSessionState","createSubGraphSessionState","getRootAsSessionState","getSizePrefixedRootAsSessionState","kernels","subGraphSessionStates","subGraphSessionStatesLength","startSessionState","addKernels","kernelsOffset","addSubGraphSessionStates","subGraphSessionStatesOffset","createSubGraphSessionStatesVector","startSubGraphSessionStatesVector","endSessionState","createSessionState","getSizePrefixedRootAsInferenceSession","bufferHasIdentifier","ortVersion","startInferenceSession","addOrtVersion","ortVersionOffset","addModel","modelOffset","endInferenceSession","finishInferenceSessionBuffer","finishSizePrefixedInferenceSessionBuffer","createInferenceSession","outputNames","feeds","_fetches","_options","inputMap","feed","outputMap","startProfiling","endProfiling","_initialized","graphInputTypes","graphInputDims","_model","isView","modelProtoBlob","initializeOps","_executionPlan","normalizeAndValidateInputs","outputTensors","createOutput","modelInputNames","sortedInputs","sortedInputsIndex","validateInputTensorDims","modelInputIndices","modelValues","graphInput","validateInputTensorTypes","givenInput

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7oE,EAA+B9P,eAAO,SAAEy/E,sBACzC3vE,OAAAOzP,EAEPs4E,GAAAe,EACfC,GAAAc,EACdC,GAAAU,K,wFC1
KC,SAAS6G,IACtB,OAAO,IAAO,qmuEAA42wE,cAAUr/E,OAAAWA,K,6BCCj5wEvH,EAAAOP,QAAU,SAAUs8
D,EAAS8qB,EAAmBC,EAAeC,GACpE,IAAIC,EAActhG,MAAQlC,OAE1B,IACE,IACE,IAAIyjG,EAEJ,IAEEA,
EAAO,IAAID,EAAYZ,KAAK,CAACrqB,IAC7B,MAAO16E,IAGP4lG,EAAO,IADWD,EAAYE,aAAeF,EAAYG,
mBAAqBH,EAAYI,gBAAkBJ,EAAYK,gBAEnHC,OAAOvrB,GACZkrB,EAAOA,EAAKM,UAGd,IAAIlB,EAA
MW,EAAYX,KAAOW,EAAYQ,UACrCC,EAAYpB,EAAIC,gBAAgBW,GAChCt6F,EAAS,IAAIq6F,EAAYH,G
AAmBY,EAAWX,GAE3D,OADAT,EAAIqB,gBAAgBD,GACb96F,EACP,MAAOtL,GACP,OAAO,IAAI2lG,EA
AYH,GAAmB,+BAA+BtgD,OAAOohD,mBAAmB5rB,IAAW+qB,IAEhH,MAAOzlG,GACP,IAAK0lG,EACH,M
AAM38F,MAAM,kCAGd,OAAO,IAAI48F,EAAYH,GAAmBE,EAAKD,M,8BCpCnD9mF,EAAOP,QAAUmoF,Q
AAQ,O,8BCAzB5nF,EAAOP,QAAUmoF,QAAQ,O,8BCAzB5nF,EAAOP,QAAUmoF,QAAQ,S,6BCAzB5nF,EA
AOP,QAAUmoF,QAAQ,e,8BCAzB5nF,EAAOP,QAAUmoF,QAAQ,S,8BCAzB5nF,EAAOP,QAAUmoF,QAAQ,
mB,8BCAzB5nF,EAAOP,QAAUmoF,QAAQ,wBCCrBC,yBAA2B,GAG/B,SAASC,oBAAoBC,GAE5B,IAAIC,E
AAeH,yBAAyBE,GAC5C,QAAqBxgF,IAAjBygF,EACH,OAAOA,EAAavoF,QAGrB,IAAIO,EAAS6nF,yBAAyB
E,GAAY,CAGjDtoF,QAAS,IAOV,OAHAwoF,oBAAoBF,GAAU9/F,KAAK+X,EAAOP,QAASO,EAAQA,EAAO
P,QAASqoF,qBAGpE9nF,EAAOP,QCpBfqoF,oBAAoB9lG,EAAI,SAASge,GAChC,IAAIkoF,EAASloF,GAAUA,
EAAOgW,WAC7B,WAAa,OAAOhW,EAAgB,SACpC,WAAa,OAAOA,GAErB,OADA8nF,oBAAoB5kG,EAAAEg
lG,EAAQ,CAAAE9lG,EAAG8lG,IAC5BA,GCLRJ,oBAAoB5kG,EAAI,SAASuc,EAAS0oF,GACzC,IAAI,IAAIxkE
,KAAAOwkE,EACXL,oBAAoBtlG,EAAE2lG,EAAYxkE,KAASmkE,oBAAoBtlG,EAAEid,EAASkkB,IAC5EnX,O
AAO8K,eAAe7X,EAASkkB,EAAK,CAAEykE,YAAY,EAAMp8F,IAAKm8F,EAAWxkE,MCJ3EmkE,oBAAoBtl
G,EAAI,SAASyvB,EAAKoY,GAAQ,OAAO7d,OAAO1D,UAAU/lB,eAAekF,KAAKgqB,EAAKoY,ICC/Fy9D,oB
AAoB5lG,EAAI,SAASud,GACX,oBAAX4oF,QAA0BA,OAAOC,aAC1C97E,OAAO8K,eAAe7X,EAAS4oF,OAA
OC,YAAa,CAAE93E,MAAO,WAE7DhE,OAAO8K,eAAe7X,EAAS,aAAc,CAAAE+Q,OAAO,KCFvD,IAAI+3E,o
BAAsBT,oBAAoB,M","file":"ort-web.node.js","sourcesContent":["var
_scriptDir,e=(_scriptDir=\"undefined\"!=typeof
document&&document.currentScript?document.currentScript.src:void 0,\"undefined\"!=typeof
__filename&&(_scriptDir=_scriptDir||__filename),function(e){function t(){return
S.buffer!=Y&&Q(S.buffer),P}function n(){return S.buffer!=Y&&Q(S.buffer),W}function r(){return
S.buffer!=Y&&Q(S.buffer),q}function a(){return S.buffer!=Y&&Q(S.buffer),U}function i(){return
S.buffer!=Y&&Q(S.buffer),B}var o,u,s;e=e||{},o||(o=void 0!==e?e:{}),o.ready=new
Promise((function(e,t){u=e,s=t}));var c,f={};for(c in o)o.hasOwnProperty(c)&&(f[c]=o[c]);var
l=\"./this.program\";function p(e,t){throw t}var d,m,b,h,g,_=\"object\"==typeof window,y=\"function\"==typeof
importScripts,w=\"object\"==typeof process&&\"object\"==typeof process.versions&&\"string\"==typeof
process.versions.node,v=o.ENVIRONMENT_IS_PTHREAD||!1,A=\"\";function T(e){return
o.locateFile?o.locateFile(e,A):A+e}if(w){var
O;A=y?require(\"path\").dirname(A)+\"/\":__dirname+\"/\",d=function(e,t){return

```
h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.readFileSync(e,t?null:\"utf8\")},b=function(e){retur
n(e=d(e,!0)).buffer||(e=new
Uint8Array(e)),F(e.buffer),e},m=function(e,t,n){h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.rea
dFile(e,(function(e,r){e?n(e):t(r.buffer)}))},1<process.argv.length&&(l=process.argv[1].replace(/\\\\/g,\"/\")),process
.argv.slice(2),process.on(\"uncaughtException\",(function(e){if(!(e instanceof Gt))throw
e})),process.on(\"unhandledRejection\",ce),p=function(e,t){if(re())throw
process.exitCode=e,t;process.exit(e)},o.inspect=function(){return\"[Emscripten Module
object]\"};try{O=require(\"worker_threads\")}catch(e){throw console.error('The \"worker_threads\" module is not
supported in this node.js build - perhaps a newer version is
needed?'),e}global.Worker=O.Worker}else(_||y)&&(y?A=self.location.href:\"undefined\"!=typeof
document&&document.currentScript&&(A=document.currentScript.src),_scriptDir&&(A=_scriptDir),A=0!==A.in
dexOf(\"blob:\")?A.substr(0,A.lastIndexOf(\"/\")+1):\"\",w?(d=function(e,t){return
h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.readFileSync(e,t?null:\"utf8\")},b=function(e){retur
n(e=d(e,!0)).buffer||(e=new
Uint8Array(e)),F(e.buffer),e},m=function(e,t,n){h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.rea
dFile(e,(function(e,r){e?n(e):t(r.buffer)}))}):(d=function(e){var t=new XMLHttpRequest;return
t.open(\"GET\",e,!1),t.send(null),t.responseText},y&&(b=function(e){var t=new XMLHttpRequest;return
t.open(\"GET\",e,!1),t.responseType=\"arraybuffer\",t.send(null),new
Uint8Array(t.response)}),m=function(e,t,n){var r=new
XMLHttpRequest;r.open(\"GET\",e,!0),r.responseType=\"arraybuffer\",r.onload=function(){200==r.status||0==r.stat
us&&r.response?t(r.response):n()},r.onerror=n,r.send(null)}));w&&\"undefined\"==typeof
performance&&(global.performance=require(\"perf_hooks\").performance);var
k,E,x=o.print||console.log.bind(console),M=o.printErr||console.warn.bind(console);for(c in
f)f.hasOwnProperty(c)&&(o[c]=f[c]);f=null,o.thisProgram&&(l=o.thisProgram),o.quit&&(p=o.quit),o.wasmBinary
&&(E=o.wasmBinary);var D=o.noExitRuntime||!1;\"object\"!=typeof WebAssembly&&ce(\"no native wasm
support detected\");var S,C,R,I=!1;function F(e,t){e||ce(\"Assertion failed: \"+t)}function j(e){var t=new
TextDecoder(e);this.decode=function(e){return e.buffer instanceof SharedArrayBuffer&&(e=new
Uint8Array(e)),t.decode.call(t,e)}}var Y,P,W,q,U,B,G=\"undefined\"!=typeof TextDecoder?new j(\"utf8\"):void
0;function H(e,t,n){var r=t+n;for(n=t;e[n]&&!(n>=r);)++n;if(16<n-t&&e.subarray&&G)return
G.decode(e.subarray(t,n));for(r=\"\";t<n;){var a=e[t++];if(128&a){var
i=63&e[t++];if(192==(224&a))r+=String.fromCharCode((31&a)<<6|i);else{var
o=63&e[t++];65536>(a=224==(240&a)?(15&a)<<12|i<<6|o:(7&a)<<18|i<<12|o<<6|63&e[t++])?r+=String.fromCh
arCode(a):(a-=65536,r+=String.fromCharCode(55296|a>>10,56320|1023&a))}}else
r+=String.fromCharCode(a)}return r}function z(e,t){return e?H(n(),e,t):\"\"}function L(e,t,n,r){if(!(0<r))return 0;var
a=n;r=n+r-1;for(var i=0;i<e.length;++i){var
o=e.charCodeAt(i);if(55296<=o&&57343>=o&&(o=65536+((1023&o)<<10)|1023&e.charCodeAt(++i)),127>=o){i
f(n>=r)break;t[n++]=o}else{if(2047>=o){if(n+1>=r)break;t[n++]=192|o>>6}else{if(65535>=o){if(n+2>=r)break;t[
n++]=224|o>>12}else{if(n+3>=r)break;t[n++]=240|o>>18,t[n++]=128|o>>12&63}t[n++]=128|o>>6&63}t[n++]=1
28|63&o}}return t[n]=0,n-a}function N(e,t,r){return L(e,n(),t,r)}function V(e){for(var t=0,n=0;n<e.length;++n){var
r=e.charCodeAt(n);55296<=r&&57343>=r&&(r=65536+((1023&r)<<10)|1023&e.charCodeAt(++n)),127>=r?++t:t
=2047>=r?t+2:65535>=r?t+3:t+4}return t}function X(e){var n=V(e)+1,r=ht(n);return r&&L(e,t(),r,n),r}function
Q(e){Y=e,o.HEAP8=P=new Int8Array(e),o.HEAP16=new Int16Array(e),o.HEAP32=q=new
Int32Array(e),o.HEAPU8=W=new Uint8Array(e),o.HEAPU16=new Uint16Array(e),o.HEAPU32=U=new
Uint32Array(e),o.HEAPF32=new Float32Array(e),o.HEAPF64=B=new Float64Array(e)}\"undefined\"!=typeof
TextDecoder&&new j(\"utf-16le\"),v&&(Y=o.buffer);var
J=o.INITIAL_MEMORY||16777216;if(v)S=o.wasmMemory,Y=o.buffer;else
if(o.wasmMemory)S=o.wasmMemory;else if(!((S=new
WebAssembly.Memory({initial:J/65536,maximum:32768,shared:!0})).buffer instanceof SharedArrayBuffer))throw
```

```
M(\"requested a shared WebAssembly.Memory but the returned buffer is not a SharedArrayBuffer, indicating that
while the browser has SharedArrayBuffer it does not have WebAssembly threads support - you may need to set a
flag\"),w&&console.log(\"(on node you may need: --experimental-wasm-threads --experimental-wasm-bulk-
memory and also use a recent version)\"),Error(\"bad memory\");S&&(Y=S.buffer),J=Y.byteLength,Q(Y);var
Z,$=[],K=[],ee=[],te=[],ne=0;function re(){return D||0<ne}function ae(){var e=o.preRun.shift();$.unshift(e)}var
ie,oe=0,ue=null,se=null;function ce(e){throw o.onAbort&&o.onAbort(e),F(!v),M(e),I=!0,R=1,e=new
WebAssembly.RuntimeError(\"abort(\"+e+\"). Build with -s ASSERTIONS=1 for more info.\"),s(e),e}function
fe(){return ie.startsWith(\"data:application/octet-stream;base64,\")}function le(){var e=ie;try{if(e==ie&&E)return
new Uint8Array(E);if(b)return b(e);throw\"both async and sync fetching of the wasm
failed\"}catch(e){ce(e)}}o.preloadedImages={},o.preloadedAudios={},ie=\"ort-wasm-
threaded.wasm\",fe()||(ie=T(ie));var pe={973748:function(){throw\"Canceled!\"}};function
de(e){for(;0<e.length;){var t=e.shift();if(\"function\"==typeof t)t(o);else{var n=t.Nb;\"number\"==typeof n?void
0===t.ib?Z.get(n)():Z.get(n)(t.ib):n(void 0===t.ib?null:t.ib)}}}function
me(e,n){if(0>=e||e>t().length||1&e||0>n)return-28;if(0==n)return 0;2147483647<=n&&(n=1/0);var
a=Atomics.load(r(),Bt>>2),i=0;if(a==e&&Atomics.compareExchange(r(),Bt>>2,a,0)==a&&(i=1,0>=--n))return
1;if(0<=(e=Atomics.notify(r(),e>>2,n)))return e+i;throw\"Atomics.notify returned an unexpected value
\"+e}function be(e){if(v)throw\"Internal Error! cleanupThread() can only ever be called from main application
thread!\";if(!e)throw\"Internal Error! Null pthread_ptr in cleanupThread!\";var
t=ge.cb[e];t&&(r()[e+12>>2]=0,ge.sb(t.worker))}o._emscripten_futex_wake=me;var
he,ge={gb:[],fb:[],zb:[],xc:function(){},Rb:function(){for(var
e=ht(228),t=0;57>t;++t)a()[e/4+t]=0;r()[e+12>>2]=e,t=e+152,r()[t>>2]=t;var
n=ht(512);for(t=0;128>t;++t)a()[n/4+t]=0;Atomics.store(a(),e+100>>2,n),Atomics.store(a(),e+40>>2,e),Dt(e,!y,1),v
t(e)},Sb:function(){ge.receiveObjectTransfer=ge.Xb,ge.threadInit=ge.hc,ge.threadCancel=ge.fc,ge.threadExit=ge.H
b,ge.setExitStatus=ge.Zb},cb:{},yb:[],Eb:function(){for(;0<ge.yb.length;)ge.yb.pop()();Ct()},Fb:function(e,t){Atom
ics.store(a(),e+56>>2,1),Atomics.store(a(),e+60>>2,0),ge.Eb(),Atomics.store(a(),e+4>>2,t),Atomics.store(a(),e+0>
>2,1),me(e+0,2147483647),Dt(0,0,0)},Zb:function(e){R=e},Hb:function(e){var
t=yt();t&&(ge.Fb(t,e),v&&postMessage({cmd:\"exit\"}))},fc:function(){ge.Fb(yt(),-
1),postMessage({cmd:\"cancelDone\"})},Gb:function(){for(var e in ge.cb){var
t=ge.cb[e];t&&t.worker&&ge.sb(t.worker)}for(ge.cb={},e=0;e<ge.gb.length;++e){var
n=ge.gb[e];n.terminate()}for(ge.gb=[],e=0;e<ge.fb.length;++e)t=(n=ge.fb[e]).bb,ge.xb(t),n.terminate();ge.fb=[]},xb:
function(e){if(e){if(e.eb){var
t=r()[e.eb+100>>2];r()[e.eb+100>>2]=0,_t(t),_t(e.eb)}e.eb=0,e.wb&&e.hb&&_t(e.hb),e.hb=0,e.worker&&(e.worke
r.bb=null)}},sb:function(e){ge.Yb((function(){delete
ge.cb[e.bb.eb],ge.gb.push(e),ge.fb.splice(ge.fb.indexOf(e),1),ge.xb(e.bb),e.bb=void
0}))},Yb:function(e){r()[Ut>>2]=0;try{e()}finally{r()[Ut>>2]=1}},Xb:function(){},hc:function(){for(var e in
ge.zb)ge.zb[e]()},Ub:function(e,t){e.onmessage=function(n){var
i=n.data,o=i.cmd;if(e.bb&&(ge.Lb=e.bb.eb),i.targetThread&&i.targetThread!=yt()){var
u=ge.cb[i.Dc];u?u.worker.postMessage(n.data,i.transferList):M('Internal error! Worker sent a message \"'+o+'\" to
target pthread '+i.targetThread+\", but that thread no longer exists!\")}else
if(\"processQueuedMainThreadWork\"===o)Ot();else if(\"spawnThread\"===o)ve(n.data);else
if(\"cleanupThread\"===o)be(i.thread);else if(\"killThread\"===o){if(n=i.thread,v)throw\"Internal Error!
killThread() can only ever be called from main application thread!\";if(!n)throw\"Internal Error! Null pthread_ptr in
killThread!\";r()[n+12>>2]=0,i=ge.cb[n],delete
ge.cb[n],i.worker.terminate(),ge.xb(i),ge.fb.splice(ge.fb.indexOf(i.worker),1),i.worker.bb=void 0}else
if(\"cancelThread\"===o){if(n=i.thread,v)throw\"Internal Error! cancelThread() can only ever be called from main
application thread!\";if(!n)throw\"Internal Error! Null pthread_ptr in
cancelThread!\";ge.cb[n].worker.postMessage({cmd:\"cancel\"})}else
if(\"loaded\"===o)e.loaded=!0,t&&t(e),e.mb&&(e.mb(),delete e.mb);else if(\"print\"===o)x(\"Thread
```

```
\"+i.threadId+\": \"+i.text);else if(\"printErr\"===o)M(\"Thread \"+i.threadId+\": \"+i.text);else
if(\"alert\"===o)alert(\"Thread \"+i.threadId+\": \"+i.text);else
if(\"exit\"===o)e.bb&&Atomics.load(a(),e.bb.eb+64>>2)&&ge.sb(e);else
if(\"exitProcess\"===o)try{zt(i.returnCode)}catch(e){if(e instanceof Gt)return;throw
e}else\"cancelDone\"===o?ge.sb(e):\"objectTransfer\"!==o&&(\"setimmediate\"===n.data.target?e.postMessage(n.
data):M(\"worker sent an unknown command \"+o));ge.Lb=void 0},e.onerror=function(e){M(\"pthread sent an
error! \"+e.filename+\":\"+e.lineno+\":
\"+e.message)},w&&(e.on(\"message\",(function(t){e.onmessage({data:t})})),e.on(\"error\",(function(t){e.onerror(t)
})),e.on(\"exit\",(function(){})),e.postMessage({cmd:\"load\",urlOrBlob:o.mainScriptUrlOrBlob||_scriptDir,wasm
Memory:S,wasmModule:C})},Ib:function(){var e=T(\"ort-wasm-threaded.worker.js\");ge.gb.push(new
Worker(e))},Ob:function(){return
0==ge.gb.length&&(ge.Ib(),ge.Ub(ge.gb[0])),ge.gb.pop()},nc:function(e){for(e=performance.now()+e;performance.
now()<e;);}};function _e(e,t){if(0===e)e=Date.now();else{if(1!==e&&4!==e)return r()[gt()>>2]=28,-
1;e=he()}return r()[t>>2]=e/1e3|0,r()[t+4>>2]=e%1e3*1e6|0,0}function ye(e,t){if(v)return
ze(1,1,e,t);ee.unshift({Nb:e,ib:t})}function we(e){this.lb=e-
16,this.dc=function(e){r()[this.lb+4>>2]=e},this.ac=function(e){r()[this.lb+8>>2]=e},this.bc=function(){r()[this.lb>
>2]=0},this.$b=function(){t()[this.lb+12>>0]=0},this.cc=function(){t()[this.lb+13>>0]=0},this.Pb=function(e,t){thi
s.dc(e),this.ac(t),this.bc(),this.$b(),this.cc()}}function ve(e){if(v)throw\"Internal Error! spawnThread() can only ever
be called from main application thread!\";var t=ge.Ob();if(!t)return 6;if(void 0!==t.bb)throw\"Internal
error!\";if(!e.rb)throw\"Internal error, no pthread ptr!\";ge.fb.push(t);for(var
n=ht(512),i=0;128>i;++i)r()[n+4*i>>2]=0;var
o=e.hb+e.jb,u=(i=ge.cb[e.rb]={worker:t,hb:e.hb,jb:e.jb,wb:e.wb,eb:e.rb}).eb>>2;Atomics.store(a(),u+16,e.detached)
,Atomics.store(a(),u+25,n),Atomics.store(a(),u+10,i.eb),Atomics.store(a(),u+20,e.jb),Atomics.store(a(),u+19,o),Ato
mics.store(a(),u+26,e.jb),Atomics.store(a(),u+28,o),Atomics.store(a(),u+29,e.detached),n=St()+40,Atomics.store(a()
,u+43,n),t.bb=i;var
s={cmd:\"run\",start_routine:e.ec,arg:e.ib,threadInfoStruct:e.rb,stackBase:e.hb,stackSize:e.jb};return
t.mb=function(){s.time=performance.now(),t.postMessage(s,e.mc)},t.loaded&&(t.mb(),delete t.mb),0}function
Ae(e,n,a){if(0>=e||e>t().length||1&e)return-28;if(_){if(Atomics.load(r(),e>>2)!=n)return-6;var
i=performance.now();for(a=i+a,Atomics.exchange(r(),Bt>>2,e);;){if((i=performance.now())>a)return
Atomics.exchange(r(),Bt>>2,0),-
73;if(0==(i=Atomics.exchange(r(),Bt>>2,0)))break;if(Ot(),Atomics.load(r(),e>>2)!=n)return-
6;Atomics.exchange(r(),Bt>>2,e)}return 0}if(\"timed-out\"===(e=Atomics.wait(r(),e>>2,n,a)))return-73;if(\"not-
equal\"===e)return-6;if(\"ok\"===e)return 0;throw\"Atomics.wait returned an unexpected value \"+e}function
Te(){w||y||(k||(k={}),k[\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-thread\"]||(k[\"Blocking on the
main thread is very dangerous, see https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-
browser-thread\"]=1,M(\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-
thread\")))}o.establishStackSpace=function(e,t){Wt(e,t),Yt(e)},o.invokeEntryPoint=function(e,t){return
Z.get(e)(t)},he=w?function(){var e=process.hrtime();return 1e3*e[0]+e[1]/1e6}:v?function(){return
performance.now()-o.__performance_now_clock_drift}:function(){return performance.now()};var
Oe={},ke=[null,[],[]];function Ee(e,t){var n=ke[e];0===t||10===t?((1===e?x:M)(H(n,0)),n.length=0):n.push(t)}var
xe={};function Me(e,t){return v?ze(2,1,e,t):(e=z(e),xe.rc(e,t))}function De(e,t,n){return v?ze(3,1,e,t,n):0}function
Se(e,t){if(v)return ze(4,1,e,t)}function Ce(e,t,n){if(v)return ze(5,1,e,t,n)}function Re(e,t,n){return
v?ze(6,1,e,t,n):0}function Ie(e,t){if(v)return ze(7,1,e,t)}function Fe(e,t){return
v?ze(8,1,e,t):(e=z(e),xe.sc(e,t))}function je(e,t,r,a,i,o){if(v)t=ze(9,1,e,t,r,a,i,o);else
if(o<<=12,0!=(16&a)&&0!=e%65536)t=-28;else if(0!=(32&a)){var
u=65536*Math.ceil(t/65536);(e=qt(65536,u))?n().fill(0,e,e+u):e=0,e?(Oe[e]={Wb:e,Tb:t,Jb:!0,fd:i,Ac:r,flags:a,offse
```

```
t:o},t=e):t=-48}else t=-52;return t}function Ye(e,t){if(v)e=ze(10,1,e,t);else{var
n=Oe[e];0!==t&&n?(t===n.Tb&&(Oe[e]=null,n.Jb&&_t(n.Wb)),e=0):e=-28}return e}function Pe(e,t,n){if(v)return
ze(11,1,e,t,n)}function We(e,t,n){return v?ze(12,1,e,t,n):(e=z(e),xe.tc(e,t,n))}function qe(e){if(v)return
ze(13,1,e)}function Ue(e,t){if(v)return ze(14,1,e,t)}function Be(e){if(v)return ze(15,1,e)}function Ge(){if(v)return
ze(16,1);ce()}var He=[];function ze(e,t){for(var n=arguments.length-2,r=jt(),a=Pt(8*n),o=a>>3,u=0;u<n;u++){var
s=arguments[2+u];i()[o+u]=s}return n=kt(e,n,a,t),Yt(r),n}var Le=[],Ne=[0,\"undefined\"!=typeof
document?document:0,\"undefined\"!=typeof window?window:0];function Ve(e){return
e=2<e?z(e):e,Ne[e]||(\"undefined\"!=typeof document?document.querySelector(e):void 0)}function Xe(e,t,n){var
a=Ve(e);if(!a)return-
4;if(a.qb&&(r()[a.qb>>2]=t,r()[a.qb+4>>2]=n),!a.Db&&a.pc){if(a.qb){a=r()[a.qb+8>>2],e=e?z(e):\"\";var
i=jt(),o=Pt(12),u=0;if(e){u=V(e)+1;var s=ht(u);N(e,s,u),u=s}return
r()[o>>2]=u,r()[o+4>>2]=t,r()[o+8>>2]=n,Et(0,a,657457152,0,u,o),Yt(i),1}return-4}return
a.Db&&(a=a.Db),e=!1,a.pb&&a.pb.ob&&(e=0===(e=a.pb.ob.getParameter(2978))[0]&&0===e[1]&&e[2]===a.wi
dth&&e[3]===a.height),a.width=t,a.height=n,e&&a.pb.ob.viewport(0,0,t,n),0}function Qe(e,t,n){return
v?ze(17,1,e,t,n):Xe(e,t,n)}var Je,Ze=[\"default\",\"low-power\",\"high-performance\"],$e={};function
Ke(){if(!Je){var
e,t={USER:\"web_user\",LOGNAME:\"web_user\",PATH:\"/\",PWD:\"/\",HOME:\"/home/web_user\",LANG:(\"ob
ject\"==typeof navigator&&navigator.languages&&navigator.languages[0]||\"C\").replace(\"-\",\"_\")+\".UTF-
8\",_:l||\"./this.program\"};for(e in $e)void 0===$e[e]?delete t[e]:t[e]=$e[e];var n=[];for(e in
t)n.push(e+\"=\"+t[e]);Je=n}return Je}function et(e,n){if(v)return ze(18,1,e,n);var a=0;return
Ke().forEach((function(i,o){var
u=n+a;for(o=r()[e+4*o>>2]=u,u=0;u<i.length;++u)t()[o++>>0]=i.charCodeAt(u);t()[o>>0]=0,a+=i.length+1})),0}f
unction tt(e,t){if(v)return ze(19,1,e,t);var n=Ke();r()[e>>2]=n.length;var a=0;return
n.forEach((function(e){a+=e.length+1})),r()[t>>2]=a,0}function nt(e){return v?ze(20,1,e):0}function rt(e,n){return
v?ze(21,1,e,n):(e=1==e||2==e?2:ce(),t()[n>>0]=e,0)}function at(e,t,n,a){return
v?ze(22,1,e,t,n,a):(e=xe.vc(e),t=xe.uc(e,t,n),r()[a>>2]=t,0)}function it(e,t,n,r,a){if(v)return
ze(23,1,e,t,n,r,a)}function ot(e,t,a,i){if(v)return ze(24,1,e,t,a,i);for(var o=0,u=0;u<a;u++){for(var
s=r()[t+8*u>>2],c=r()[t+(8*u+4)>>2],f=0;f<c;f++)Ee(e,n()[s+f]);o+=c}return r()[i>>2]=o,0}function ut(){function
e(e){return(e=e.toTimeString().match(/\\(([A-Za-z ]+)\\)$/))?e[1]:\"GMT\"}if(v)return
ze(25,1);if(!ut.Kb){ut.Kb=!0;var t=(new Date).getFullYear(),n=new Date(t,0,1),a=new
Date(t,6,1);t=n.getTimezoneOffset();var
i=a.getTimezoneOffset(),o=Math.max(t,i);r()[Ft()>>2]=60*o,r()[It()>>2]=Number(t!=i),n=e(n),a=e(a),n=X(n),a=X(
a),i<t?(r()[Rt()>>2]=n,r()[Rt()+4>>2]=a):(r()[Rt()>>2]=a,r()[Rt()+4>>2]=n)}}function st(e){return
0==e%4&&(0!=e%100||0==e%400)}function ct(e,t){for(var n=0,r=0;r<=t;n+=e[r++]);return n}var
ft=[31,29,31,30,31,30,31,31,30,31,30,31],lt=[31,28,31,30,31,30,31,31,30,31,30,31];function pt(e,t){for(e=new
Date(e.getTime());0<t;){var n=e.getMonth(),r=(st(e.getFullYear())?ft:lt)[n];if(!(t>r-
e.getDate())){e.setDate(e.getDate()+t);break}t-=r-
e.getDate()+1,e.setDate(1),11>n?e.setMonth(n+1):(e.setMonth(0),e.setFullYear(e.getFullYear()+1))}return
e}function dt(e,n,a,i){function o(e,t,n){for(e=\"number\"==typeof e?e.toString():e||\"\";e.length<t;)e=n[0]+e;return
e}function u(e,t){return o(e,t,\"0\")}function s(e,t){function n(e){return 0>e?-1:0<e?1:0}var r;return
0===(r=n(e.getFullYear()-t.getFullYear()))&&0===(r=n(e.getMonth()-t.getMonth()))&&(r=n(e.getDate()-
t.getDate())),r}function c(e){switch(e.getDay()){case 0:return new Date(e.getFullYear()-1,11,29);case 1:return
e;case 2:return new Date(e.getFullYear(),0,3);case 3:return new Date(e.getFullYear(),0,2);case 4:return new
Date(e.getFullYear(),0,1);case 5:return new Date(e.getFullYear()-1,11,31);case 6:return new Date(e.getFullYear()-
1,11,30)}}function f(e){e=pt(new Date(e.ab+1900,0,1),e.vb);var t=new Date(e.getFullYear()+1,0,4),n=c(new
Date(e.getFullYear(),0,4));return t=c(t),0>=s(n,e)?0>=s(t,e)?e.getFullYear()+1:e.getFullYear():e.getFullYear()-
1}var l=r()[i+40>>2];for(var p in
i={kc:r()[i>>2],jc:r()[i+4>>2],tb:r()[i+8>>2],nb:r()[i+12>>2],kb:r()[i+16>>2],ab:r()[i+20>>2],ub:r()[i+24>>2],vb:r(
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)[i+28>>2],Ec:r()[i+32>>2],ic:r()[i+36>>2],lc:l?z(l):\"\"},a=z(a),l={\"%c\":\"%a %b %d %H:%M:%S
%Y\",\"%D\":\"%m/%d/%y\",\"%F\":\"%Y-%m-%d\",\"%h\":\"%b\",\"%r\":\"%I:%M:%S
%p\",\"%R\":\"%H:%M\",\"%T\":\"%H:%M:%S\",\"%x\":\"%m/%d/%y\",\"%X\":\"%H:%M:%S\",\"%Ec\":\"%c\",\
"%EC\":\"%C\",\"%Ex\":\"%m/%d/%y\",\"%EX\":\"%H:%M:%S\",\"%Ey\":\"%y\",\"%EY\":\"%Y\",\"%Od\":\"%d
\",\"%Oe\":\"%e\",\"%OH\":\"%H\",\"%OI\":\"%I\",\"%Om\":\"%m\",\"%OM\":\"%M\",\"%OS\":\"%S\",\"%Ou\":\"
%u\",\"%OU\":\"%U\",\"%OV\":\"%V\",\"%Ow\":\"%w\",\"%OW\":\"%W\",\"%Oy\":\"%y\"})a=a.replace(new
RegExp(p,\"g\"),l[p]);var d=\"Sunday Monday Tuesday Wednesday Thursday Friday Saturday\".split(\"
\"),m=\"January February March April May June July August September October November December\".split(\"
\");for(p in l={\"%a\":function(e){return d[e.ub].substring(0,3)},\"%A\":function(e){return
d[e.ub]},\"%b\":function(e){return m[e.kb].substring(0,3)},\"%B\":function(e){return
m[e.kb]},\"%C\":function(e){return u((e.ab+1900)/100|0,2)},\"%d\":function(e){return
u(e.nb,2)},\"%e\":function(e){return o(e.nb,2,\" \")},\"%g\":function(e){return
f(e).toString().substring(2)},\"%G\":function(e){return f(e)},\"%H\":function(e){return
u(e.tb,2)},\"%I\":function(e){return 0==(e=e.tb)?e=12:12<e&&(e-=12),u(e,2)},\"%j\":function(e){return
u(e.nb+ct(st(e.ab+1900)?ft:lt,e.kb-1),3)},\"%m\":function(e){return u(e.kb+1,2)},\"%M\":function(e){return
u(e.jc,2)},\"%n\":function(){return\"\\n\"},\"%p\":function(e){return
0<=e.tb&&12>e.tb?\"AM\":\"PM\"},\"%S\":function(e){return
u(e.kc,2)},\"%t\":function(){return\"\\t\"},\"%u\":function(e){return e.ub||7},\"%U\":function(e){var t=new
Date(e.ab+1900,0,1),n=0===t.getDay()?t:pt(t,7-t.getDay());return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(ct(st(e.getFullYear())?ft:lt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\"01\":\"00\"},\"%V\":function(e){var t=new Date(e.ab+1901,0,4),n=c(new
Date(e.ab+1900,0,4));t=c(t);var r=pt(new Date(e.ab+1900,0,1),e.vb);return
0>s(r,n)?\"53\":0>=s(t,r)?\"01\":u(Math.ceil((n.getFullYear()<e.ab+1900?e.vb+32-n.getDate():e.vb+1-
n.getDate())/7),2)},\"%w\":function(e){return e.ub},\"%W\":function(e){var t=new
Date(e.ab,0,1),n=1===t.getDay()?t:pt(t,0===t.getDay()?1:7-t.getDay()+1);return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(ct(st(e.getFullYear())?ft:lt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\"01\":\"00\"},\"%y\":function(e){return(e.ab+1900).toString().substring(2)},\"%
Y\":function(e){return e.ab+1900},\"%z\":function(e){var t=0<=(e=e.ic);return e=Math.abs(e)/60,(t?\"+\":\"-
\")+String(\"0000\"+(e/60*100+e%60)).slice(-4)},\"%Z\":function(e){return
e.lc},\"%%\":function(){return\"%\"}})a.includes(p)&&(a=a.replace(new
RegExp(p,\"g\"),l[p](i)));return(p=function(e){var t=Array(V(e)+1);return
L(e,t,0,t.length),t}(a)).length>n?0:(function(e,n){t().set(e,n)}(p,e),p.length-1)}var
mt=[null,ye,Me,De,Se,Ce,Re,Ie,Fe,je,Ye,Pe,We,qe,Ue,Be,Ge,Qe,et,tt,nt,rt,at,it,ot,ut],bt={h:function(e,t,n,r){ce(\"As
sertion failed: \"+z(e)+\", at: \"+[t?z(t):\"unknown filename\",n,r?z(r):\"unknown
function\"])},M:function(e,t){return _e(e,t)},b:function(e){return ht(e+16)+16},d:function(e,t){return
ye(e,t)},e:function(e,t){ge.yb.push((function(){Z.get(e)(t)}))},c:function(e,t,n){throw new
we(e).Pb(t,n),e},Z:function(e,t,n,i){if(\"undefined\"==typeof SharedArrayBuffer)return M(\"Current environment
does not support SharedArrayBuffer, pthreads are not available!\"),6;if(!e)return M(\"pthread_create called with a
null thread pointer!\"),28;var o=[];if(v&&0===o.length)return Tt(687865856,e,t,n,i);var u=0,s=0;if(t&&-1!=t){var
c=r()[t>>2];c+=81920,u=r()[t+8>>2],s=0!==r()[t+12>>2]}else c=2097152;(t=0==u)?u=qt(16,c):F(0<(u-=c));for(var
f=ht(228),l=0;57>l;++l)a()[(f>>2)+l]=0;return
r()[e>>2]=f,r()[f+12>>2]=f,e=f+152,r()[e>>2]=e,n={hb:u,jb:c,wb:t,detached:s,ec:n,rb:f,ib:i,mc:o},v?(n.oc=\"spawn
Thread\",postMessage(n,o),0):ve(n)},X:function(e){throw
v?ge.Hb(e):(ge.Eb(),zt(e)),\"unwind\"},Y:function(e,t){return function(e,t){if(!e)return M(\"pthread_join attempted
on a null thread pointer!\"),71;if(v&&yt()==e)return M(\"PThread \"+e+\" is attempting to join to
itself!\"),16;if(!v&&At()==e)return M(\"Main thread \"+e+\" is attempting to join to
itself!\"),16;if(r()[e+12>>2]!==e)return M(\"pthread_join attempted on thread \"+e+\", which does not point to a
valid thread, or does not exist anymore!\"),71;if(Atomics.load(a(),e+64>>2))return M(\"Attempted to join thread
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\"+e+\", which was already detached!\"),28;for(Te();;){var n=Atomics.load(a(),e+0>>2);if(1==n)return
n=Atomics.load(a(),e+4>>2),t&&(r()[t>>2]=n),Atomics.store(a(),e+64>>2,1),v?postMessage({cmd:\"cleanupThrea
d\",thread:e}):be(e),0;xt(),v||Ot(),Ae(e+0,n,v?100:1)}}(e,t)},L:Me,s:De,S:Se,V:Ce,u:function(){return
42},F:Re,Q:Ie,P:Fe,U:je,T:Ye,q:Pe,K:We,N:qe,v:Ue,O:Be,da:function(e,t){if(e==t)postMessage({cmd:\"processQu
euedMainThreadWork\"});else
if(v)postMessage({targetThread:e,cmd:\"processThreadQueue\"});else{if(!(e=(e=ge.cb[e])&&e.worker))return;e.po
stMessage({cmd:\"processThreadQueue\"})}return 1},f:Ge,w:_e,ga:function(e,t){return e-t},A:function(){ce(\"To
use dlopen, you need to use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},l:function(){ce(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},C:function(){ce(\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},z:function(){ce(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},ea:function(e,t,a){var
o;for(He.length=0,a>>=2;o=n()[t++];)(o=105>o)&&1&a&&a++,He.push(o?i()[a++>>1]:r()[a]),++a;return
pe[e].apply(null,He)},G:Te,n:function(){},k:Ae,j:me,W:function(){return
2147483648},i:he,D:function(e,t,r){n().copyWithin(e,t,t+r)},o:function(){return
w?require(\"os\").cpus().length:navigator.hardwareConcurrency},aa:function(e,t,n){Le.length=t,n>>=3;for(var
r=0;r<t;r++)Le[r]=i()[n+r];return(0>e?pe[-e-1]:mt[e]).apply(null,Le)},E:function(e){var
t=n().length;if((e>>>=0)<=t||2147483648<e)return!1;for(var r=1;4>=r;r*=2){var
a=t*(1+.2/r);a=Math.min(a,e+100663296),0<(a=Math.max(e,a))%65536&&(a+=65536-
a%65536);e:{try{S.grow(Math.min(2147483648,a)-Y.byteLength+65535>>>16),Q(S.buffer);var i=1;break
e}catch(e){}i=void 0}if(i)return!0}return!1},ba:function(e,t,n){return
Ve(e)?Xe(e,t,n):Qe(e,t,n)},x:function(){},$:function(e,t,n){return ne+=1,setTimeout((function(){--
ne,function(e){if(!I){try{e()}catch(e){if(e instanceof Gt)return;if(\"unwind\"!==e)throw e&&\"object\"==typeof
e&&e.stack&&M(\"exception thrown: \"+[e,e.stack]),e}if(!re())try{v?Mt(R):zt(R)}catch(e){if(!(e instanceof
Gt))throw e}}}((function(){Z.get(e)(n)}))}),t)},ca:function(e,t){t>>=2;var n=r()[t+6];return
t={alpha:!!r()[t],depth:!!r()[t+1],stencil:!!r()[t+2],antialias:!!r()[t+3],premultipliedAlpha:!!r()[t+4],preserveDrawing
Buffer:!!r()[t+5],powerPreference:Ze[n],failIfMajorPerformanceCaveat:!!r()[t+7],Vb:r()[t+8],yc:r()[t+9],Bb:r()[t+10
],Mb:r()[t+11],Bc:r()[t+12],Cc:r()[t+13]},!(e=Ve(e))||t.Mb?0:function(e,t){e.Cb||(e.Cb=e.getContext,e.getContext=f
unction(t,n){return\"webgl\"==t==(n=e.Cb(t,n))instanceof WebGLRenderingContext?n:null});var
n=e.getContext(\"webgl\",t);return n?function(e,t){var n=ht(8);r()[n+4>>2]=yt();var
a={wc:n,attributes:t,version:t.Vb,ob:e};return e.canvas&&(e.canvas.pb=a),(void
0===t.Bb||t.Bb)&&function(e){if(e||(e=void 0),!e.Qb){e.Qb=!0;var t=e.ob;!function(e){var
t=e.getExtension(\"ANGLE_instanced_arrays\");t&&(e.vertexAttribDivisor=function(e,n){t.vertexAttribDivisorAN
GLE(e,n)},e.drawArraysInstanced=function(e,n,r,a){t.drawArraysInstancedANGLE(e,n,r,a)},e.drawElementsInstan
ced=function(e,n,r,a,i){t.drawElementsInstancedANGLE(e,n,r,a,i)})}(t),function(e){var
t=e.getExtension(\"OES_vertex_array_object\");t&&(e.createVertexArray=function(){return
t.createVertexArrayOES()},e.deleteVertexArray=function(e){t.deleteVertexArrayOES(e)},e.bindVertexArray=funct
ion(e){t.bindVertexArrayOES(e)},e.isVertexArray=function(e){return t.isVertexArrayOES(e)})}(t),function(e){var
t=e.getExtension(\"WEBGL_draw_buffers\");t&&(e.drawBuffers=function(e,n){t.drawBuffersWEBGL(e,n)})}(t),t.
qc=t.getExtension(\"EXT_disjoint_timer_query\"),t.zc=t.getExtension(\"WEBGL_multi_draw\"),(t.getSupportedExt
ensions()||[]).forEach((function(e){e.includes(\"lose_context\")||e.includes(\"debug\")||t.getExtension(e)}))}}(a),n}(n
,t):0}(e,t)},I:et,J:tt,m:nt,H:rt,t:at,B:it,p:ot,R:function(e){var t=Date.now();return
r()[e>>2]=t/1e3|0,r()[e+4>>2]=t%1e3*1e3|0,0},ha:function e(t,n){return t=new
Date(1e3*r()[t>>2]),r()[n>>2]=t.getUTCSeconds(),r()[n+4>>2]=t.getUTCMinutes(),r()[n+8>>2]=t.getUTCHours(),
r()[n+12>>2]=t.getUTCDate(),r()[n+16>>2]=t.getUTCMonth(),r()[n+20>>2]=t.getUTCFullYear()-
1900,r()[n+24>>2]=t.getUTCDay(),r()[n+36>>2]=0,r()[n+32>>2]=0,t=(t.getTime()-
Date.UTC(t.getUTCFullYear(),0,1,0,0,0,0))/864e5|0,r()[n+28>>2]=t,e.Ab||(e.Ab=X(\"GMT\")),r()[n+40>>2]=e.Ab,
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n},_:function(){ge.Rb()},r:function(e,t){ut(),e=new
Date(1e3*r()[e>>2]),r()[t>>2]=e.getSeconds(),r()[t+4>>2]=e.getMinutes(),r()[t+8>>2]=e.getHours(),r()[t+12>>2]=e
.getDate(),r()[t+16>>2]=e.getMonth(),r()[t+20>>2]=e.getFullYear()-1900,r()[t+24>>2]=e.getDay();var n=new
Date(e.getFullYear(),0,1),a=(e.getTime()-n.getTime())/864e5|0;return r()[t+28>>2]=a,r()[t+36>>2]=-
60*e.getTimezoneOffset(),a=new
Date(e.getFullYear(),6,1).getTimezoneOffset(),e=0|(a!=(n=n.getTimezoneOffset())&&e.getTimezoneOffset()==Mat
h.min(n,a)),r()[t+32>>2]=e,e=r()[Rt()+(e?4:0)>>2],r()[t+40>>2]=e,t},a:S||o.wasmMemory,y:function(e){ut();var
t=new
Date(r()[e+20>>2]+1900,r()[e+16>>2],r()[e+12>>2],r()[e+8>>2],r()[e+4>>2],r()[e>>2],0),n=r()[e+32>>2],a=t.getT
imezoneOffset(),i=new Date(t.getFullYear(),0,1),o=new
Date(t.getFullYear(),6,1).getTimezoneOffset(),u=i.getTimezoneOffset(),s=Math.min(u,o);return
0>n?r()[e+32>>2]=Number(o!=u&&s==a):0<n!=(s==a)&&(o=Math.max(u,o),t.setTime(t.getTime()+6e4*((0<n?s:o
)-a))),r()[e+24>>2]=t.getDay(),n=(t.getTime()-
i.getTime())/864e5|0,r()[e+28>>2]=n,r()[e>>2]=t.getSeconds(),r()[e+4>>2]=t.getMinutes(),r()[e+8>>2]=t.getHours(
),r()[e+12>>2]=t.getDate(),r()[e+16>>2]=t.getMonth(),t.getTime()/1e3|0},fa:dt,g:function(e,t,n,r){return
dt(e,t,n,r)}};!function(){function
e(e,t){o.asm=e.exports,Z=o.asm.Ca,K.unshift(o.asm.ia),ge.zb.push(o.asm.Ha),C=t,v||(oe--
,o.monitorRunDependencies&&o.monitorRunDependencies(oe),0==oe&&(null!==ue&&(clearInterval(ue),ue=null)
,se&&(e=se,se=null,e())))}function t(t){e(t.instance,t.module)}function n(e){return
function(){if(!E&&(_||y)){if(\"function\"==typeof fetch&&!ie.startsWith(\"file://\"))return
fetch(ie,{credentials:\"same-origin\"}).then((function(e){if(!e.ok)throw\"failed to load wasm binary file at
'\"+ie+\"'\";return e.arrayBuffer()})).catch((function(){return le()}));if(m)return new
Promise((function(e,t){m(ie,(function(t){e(new Uint8Array(t))}),t)}))}return
Promise.resolve().then((function(){return le()}))}().then((function(e){return
WebAssembly.instantiate(e,r)})).then(e,(function(e){M(\"failed to asynchronously prepare wasm: \"+e),ce(e)}))}var
r={a:bt};if(v||(oe++,o.monitorRunDependencies&&o.monitorRunDependencies(oe)),o.instantiateWasm)try{return
o.instantiateWasm(r,e)}catch(e){return M(\"Module.instantiateWasm callback failed with error:
\"+e),!1}(E||\"function\"!=typeof
WebAssembly.instantiateStreaming||fe()||ie.startsWith(\"file://\")||\"function\"!=typeof
fetch?n(t):fetch(ie,{credentials:\"same-origin\"}).then((function(e){return
WebAssembly.instantiateStreaming(e,r).then(t,(function(e){return M(\"wasm streaming compile failed:
\"+e),M(\"falling back to ArrayBuffer
instantiation\"),n(t)}))}))).catch(s)}(),o.___wasm_call_ctors=function(){return(o.___wasm_call_ctors=o.asm.ia).app
ly(null,arguments)},o._OrtInit=function(){return(o._OrtInit=o.asm.ja).apply(null,arguments)},o._OrtCreateSession
Options=function(){return(o._OrtCreateSessionOptions=o.asm.ka).apply(null,arguments)},o._OrtAddSessionConfig
Entry=function(){return(o._OrtAddSessionConfigEntry=o.asm.la).apply(null,arguments)},o._OrtReleaseSessionOpt
ions=function(){return(o._OrtReleaseSessionOptions=o.asm.ma).apply(null,arguments)},o._OrtCreateSession=funct
ion(){return(o._OrtCreateSession=o.asm.na).apply(null,arguments)},o._OrtReleaseSession=function(){return(o._Ort
ReleaseSession=o.asm.oa).apply(null,arguments)},o._OrtGetInputCount=function(){return(o._OrtGetInputCount=o.
asm.pa).apply(null,arguments)},o._OrtGetOutputCount=function(){return(o._OrtGetOutputCount=o.asm.qa).apply(
null,arguments)},o._OrtGetInputName=function(){return(o._OrtGetInputName=o.asm.ra).apply(null,arguments)},o.
_OrtGetOutputName=function(){return(o._OrtGetOutputName=o.asm.sa).apply(null,arguments)},o._OrtFree=funct
ion(){return(o._OrtFree=o.asm.ta).apply(null,arguments)},o._OrtCreateTensor=function(){return(o._OrtCreateTens
or=o.asm.ua).apply(null,arguments)},o._OrtGetTensorData=function(){return(o._OrtGetTensorData=o.asm.va).appl
y(null,arguments)},o._OrtReleaseTensor=function(){return(o._OrtReleaseTensor=o.asm.wa).apply(null,arguments)
},o._OrtCreateRunOptions=function(){return(o._OrtCreateRunOptions=o.asm.xa).apply(null,arguments)},o._OrtAd
dRunConfigEntry=function(){return(o._OrtAddRunConfigEntry=o.asm.ya).apply(null,arguments)},o._OrtReleaseR
unOptions=function(){return(o._OrtReleaseRunOptions=o.asm.za).apply(null,arguments)},o._OrtRun=function(){re
```

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turn(o._OrtRun=o.asm.Aa).apply(null,arguments)},o._OrtEndProfiling=function(){return(o._OrtEndProfiling=o.as
m.Ba).apply(null,arguments)};var
ht=o._malloc=function(){return(ht=o._malloc=o.asm.Da).apply(null,arguments)},gt=o.___errno_location=function(
){return(gt=o.___errno_location=o.asm.Ea).apply(null,arguments)},_t=o._free=function(){return(_t=o._free=o.asm.
Fa).apply(null,arguments)},yt=o._pthread_self=function(){return(yt=o._pthread_self=o.asm.Ga).apply(null,argumen
ts)};o._emscripten_tls_init=function(){return(o._emscripten_tls_init=o.asm.Ha).apply(null,arguments)},o._emscript
en_current_thread_process_queued_calls=function(){return(o._emscripten_current_thread_process_queued_calls=o.
asm.Ia).apply(null,arguments)};var
wt,vt=o._emscripten_register_main_browser_thread_id=function(){return(vt=o._emscripten_register_main_browser
_thread_id=o.asm.Ja).apply(null,arguments)},At=o._emscripten_main_browser_thread_id=function(){return(At=o._
emscripten_main_browser_thread_id=o.asm.Ka).apply(null,arguments)},Tt=o._emscripten_sync_run_in_main_thre
ad_4=function(){return(Tt=o._emscripten_sync_run_in_main_thread_4=o.asm.La).apply(null,arguments)},Ot=o._e
mscripten_main_thread_process_queued_calls=function(){return(Ot=o._emscripten_main_thread_process_queued_
calls=o.asm.Ma).apply(null,arguments)},kt=o._emscripten_run_in_main_runtime_thread_js=function(){return(kt=o.
_emscripten_run_in_main_runtime_thread_js=o.asm.Na).apply(null,arguments)},Et=o.__emscripten_call_on_threa
d=function(){return(Et=o.__emscripten_call_on_thread=o.asm.Oa).apply(null,arguments)},xt=o._pthread_testcance
l=function(){return(xt=o._pthread_testcancel=o.asm.Pa).apply(null,arguments)},Mt=o._pthread_exit=function(){ret
urn(Mt=o._pthread_exit=o.asm.Qa).apply(null,arguments)},Dt=o.__emscripten_thread_init=function(){return(Dt=o.
__emscripten_thread_init=o.asm.Ra).apply(null,arguments)},St=o._emscripten_get_global_libc=function(){return(S
t=o._emscripten_get_global_libc=o.asm.Sa).apply(null,arguments)},Ct=o.___pthread_tsd_run_dtors=function(){ret
urn(Ct=o.___pthread_tsd_run_dtors=o.asm.Ta).apply(null,arguments)},Rt=o.__get_tzname=function(){return(Rt=o.
__get_tzname=o.asm.Ua).apply(null,arguments)},It=o.__get_daylight=function(){return(It=o.__get_daylight=o.asm
.Va).apply(null,arguments)},Ft=o.__get_timezone=function(){return(Ft=o.__get_timezone=o.asm.Wa).apply(null,ar
guments)},jt=o.stackSave=function(){return(jt=o.stackSave=o.asm.Xa).apply(null,arguments)},Yt=o.stackRestore=f
unction(){return(Yt=o.stackRestore=o.asm.Ya).apply(null,arguments)},Pt=o.stackAlloc=function(){return(Pt=o.stac
kAlloc=o.asm.Za).apply(null,arguments)},Wt=o._emscripten_stack_set_limits=function(){return(Wt=o._emscripten
_stack_set_limits=o.asm._a).apply(null,arguments)},qt=o._memalign=function(){return(qt=o._memalign=o.asm.$a)
.apply(null,arguments)},Ut=o.__emscripten_allow_main_runtime_queued_calls=973296,Bt=o.__emscripten_main_
thread_futex=977204;function Gt(e){this.name=\"ExitStatus\",this.message=\"Program terminated with
exit(\"+e+\")\",this.status=e}function Ht(){function
e(){if(!wt&&(wt=!0,o.calledRun=!0,!I)&&(v||de(K),u(o),o.onRuntimeInitialized&&o.onRuntimeInitialized(),!v)){if
(o.postRun)for(\"function\"==typeof o.postRun&&(o.postRun=[o.postRun]);o.postRun.length;){var
e=o.postRun.shift();te.unshift(e)}de(te)}}if(!(0<oe))if(v)u(o),v||de(K),postMessage({cmd:\"loaded\"});else{if(!v){if
(o.preRun)for(\"function\"==typeof
o.preRun&&(o.preRun=[o.preRun]);o.preRun.length;)ae();de($)}0<oe||(o.setStatus?(o.setStatus(\"Running...\"),setT
imeout((function(){setTimeout((function(){o.setStatus(\"\")}),1),e()}),1)):e())}}function zt(e){if(R=e,v)throw
postMessage({cmd:\"exitProcess\",returnCode:e}),new Gt(e);re()||(ge.Gb(),v||(de(ee),\"undefined\"!=typeof
_fflush&&_fflush(0),ke[1].length&&Ee(1,10),ke[2].length&&Ee(2,10))),R=e,re()||(ge.Gb(),o.onExit&&o.onExit(e),
I=!0),p(e,new
Gt(e))}if(o.UTF8ToString=z,o.stringToUTF8=N,o.lengthBytesUTF8=V,o.keepRuntimeAlive=re,o.PThread=ge,o.st
ackSave=jt,o.stackRestore=Yt,o.stackAlloc=Pt,o.PThread=ge,o.wasmMemory=S,o.ExitStatus=Gt,se=function
e(){wt||Ht(),wt||(se=e)},o.run=Ht,o.preInit)for(\"function\"==typeof
o.preInit&&(o.preInit=[o.preInit]);0<o.preInit.length;)o.preInit.pop()();return
v&&(D=!1,ge.Sb()),Ht(),e.ready});\"object\"==typeof exports&&\"object\"==typeof
module?module.exports=e:\"function\"==typeof define&&define.amd?define([],(function(){return
e})):\"object\"==typeof exports&&(exports.ortWasmThreaded=e);\n","\r\nvar ortWasm = (function() {\r\n  var
_scriptDir = typeof document !== 'undefined' && document.currentScript ? document.currentScript.src :
undefined;\r\n  if (typeof __filename !== 'undefined') _scriptDir = _scriptDir || __filename;\r\n  return
```

```
(\r\nfunction(ortWasm) {\r\n  ortWasm = ortWasm || {};\r\n\r\n\r\nvar c;c||(c=typeof ortWasm !== 'undefined' ?
ortWasm : {});var aa,g;c.ready=new Promise(function(a,b){aa=a;g=b});var r={},t;for(t in
c)c.hasOwnProperty(t)&&(r[t]=c[t]);var v=\"./this.program\",ba=\"object\"===typeof
window,w=\"function\"===typeof importScripts,ca=\"object\"===typeof process&&\"object\"===typeof
process.versions&&\"string\"===typeof
process.versions.node,x=\"\",y,z,B,C,D;\r\nif(ca)x=w?require(\"path\").dirname(x)+\"/\":__dirname+\"/\",y=function
(a,b){C||(C=require(\"fs\"));D||(D=require(\"path\"));a=D.normalize(a);return
C.readFileSync(a,b?null:\"utf8\")},B=function(a){a=y(a,!0);a.buffer||(a=new Uint8Array(a));a.buffer||E(\"Assertion
failed: undefined\");return
a},z=function(a,b,e){C||(C=require(\"fs\"));D||(D=require(\"path\"));a=D.normalize(a);C.readFile(a,function(f,h){f?e
(f):b(h.buffer)})},1<process.argv.length&&(v=process.argv[1].replace(/\\\\/g,\"/\")),process.argv.slice(2),process.on(
\"uncaughtException\",\r\nfunction(a){throw
a;}),process.on(\"unhandledRejection\",E),c.inspect=function(){return\"[Emscripten Module object]\"};else
if(ba||w)w?x=self.location.href:\"undefined\"!==typeof
document&&document.currentScript&&(x=document.currentScript.src),_scriptDir&&(x=_scriptDir),0!==x.indexO
f(\"blob:\")?x=x.substr(0,x.lastIndexOf(\"/\")+1):x=\"\",y=function(a){var b=new
XMLHttpRequest;b.open(\"GET\",a,!1);b.send(null);return b.responseText},w&&(B=function(a){var b=new
XMLHttpRequest;b.open(\"GET\",a,!1);b.responseType=\"arraybuffer\";\r\nb.send(null);return new
Uint8Array(b.response)}),z=function(a,b,e){var f=new
XMLHttpRequest;f.open(\"GET\",a,!0);f.responseType=\"arraybuffer\";f.onload=function(){200==f.status||0==f.stat
us&&f.response?b(f.response):e()};f.onerror=e;f.send(null)};var
da=c.print||console.log.bind(console),F=c.printErr||console.warn.bind(console);for(t in
r)r.hasOwnProperty(t)&&(c[t]=r[t]);r=null;c.thisProgram&&(v=c.thisProgram);var
H;c.wasmBinary&&(H=c.wasmBinary);var noExitRuntime=c.noExitRuntime||!1;\r\n\"object\"!==typeof
WebAssembly&&E(\"no native wasm support detected\");var I,ea=!1,fa=\"undefined\"!==typeof TextDecoder?new
TextDecoder(\"utf8\"):void 0;\r\nfunction ha(a,b,e){var f=b+e;for(e=b;a[e]&&!(e>=f);)++e;if(16<e-
b&&a.subarray&&fa)return fa.decode(a.subarray(b,e));for(f=\"\";b<e;){var h=a[b++];if(h&128){var
k=a[b++]&63;if(192==(h&224))f+=String.fromCharCode((h&31)<<6|k);else{var
l=a[b++]&63;h=224==(h&240)?(h&15)<<12|k<<6|l:(h&7)<<18|k<<12|l<<6|a[b++]&63;65536>h?f+=String.fromC
harCode(h):(h-=65536,f+=String.fromCharCode(55296|h>>10,56320|h&1023))}}else
f+=String.fromCharCode(h)}return f}function J(a,b){return a?ha(K,a,b):\"\"}\r\nfunction L(a,b,e,f){if(!(0<f))return
0;var h=e;f=e+f-1;for(var k=0;k<a.length;++k){var l=a.charCodeAt(k);if(55296<=l&&57343>=l){var
q=a.charCodeAt(++k);l=65536+((l&1023)<<10)|q&1023}if(127>=l){if(e>=f)break;b[e++]=l}else{if(2047>=l){if(e
+1>=f)break;b[e++]=192|l>>6}else{if(65535>=l){if(e+2>=f)break;b[e++]=224|l>>12}else{if(e+3>=f)break;b[e++]
=240|l>>18;b[e++]=128|l>>12&63}b[e++]=128|l>>6&63}b[e++]=128|l&63}}b[e]=0;return e-h}\r\nfunction
ia(a){for(var b=0,e=0;e<a.length;++e){var
f=a.charCodeAt(e);55296<=f&&57343>=f&&(f=65536+((f&1023)<<10)|a.charCodeAt(++e)&1023);127>=f?++b:
b=2047>=f?b+2:65535>=f?b+3:b+4}return b}function ja(a){var b=ia(a)+1,e=ka(b);e&&L(a,M,e,b);return e}var
la,M,K,N;\r\nfunction ma(){var a=I.buffer;la=a;c.HEAP8=M=new Int8Array(a);c.HEAP16=new
Int16Array(a);c.HEAP32=N=new Int32Array(a);c.HEAPU8=K=new Uint8Array(a);c.HEAPU16=new
Uint16Array(a);c.HEAPU32=new Uint32Array(a);c.HEAPF32=new Float32Array(a);c.HEAPF64=new
Float64Array(a)}var na,oa=[],pa=[],qa=[],ra=[];function sa(){var a=c.preRun.shift();oa.unshift(a)}var
O=0,ta=null,P=null;c.preloadedImages={};c.preloadedAudios={};\r\nfunction
E(a){if(c.onAbort)c.onAbort(a);F(a);ea=!0;a=new WebAssembly.RuntimeError(\"abort(\"+a+\"). Build with -s
ASSERTIONS=1 for more info.\");g(a);throw a;}function ua(){return Q.startsWith(\"data:application/octet-
stream;base64,\")}var Q;Q=\"ort-wasm.wasm\";if(!ua()){var va=Q;Q=c.locateFile?c.locateFile(va,x):x+va}function
wa(){var a=Q;try{if(a==Q&&H)return new Uint8Array(H);if(B)return B(a);throw\"both async and sync fetching of
the wasm failed\";}catch(b){E(b)}}\r\nfunction xa(){if(!H&&(ba||w)){if(\"function\"===typeof
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fetch&&!Q.startsWith(\"file://\"))return fetch(Q,{credentials:\"same-
origin\"}).then(function(a){if(!a.ok)throw\"failed to load wasm binary file at '\"+Q+\"'\";return
a.arrayBuffer()}).catch(function(){return wa()});if(z)return new Promise(function(a,b){z(Q,function(e){a(new
Uint8Array(e))},b)})}return Promise.resolve().then(function(){return wa()})}\r\nfunction
ya(a){for(;0<a.length;){var b=a.shift();if(\"function\"==typeof b)b(c);else{var e=b.Ea;\"number\"===typeof e?void
0===b.xa?na.get(e)():na.get(e)(b.xa):e(void 0===b.xa?null:b.xa)}}}function za(a){this.ya=a-
16;this.Na=function(b){N[this.ya+4>>2]=b};this.Ka=function(b){N[this.ya+8>>2]=b};this.La=function(){N[this.ya
>>2]=0};this.Ja=function(){M[this.ya+12>>0]=0};this.Ma=function(){M[this.ya+13>>0]=0};this.Ga=function(b,e)
{this.Na(b);this.Ka(e);this.La();this.Ja();this.Ma()}}\r\nvar Aa=0,Ba={},Ca=[null,[],[]],R={},S;S=ca?function(){var
a=process.hrtime();return 1E3*a[0]+a[1]/1E6}:function(){return performance.now()};var Da={};function
Ea(){if(!Fa){var
a={USER:\"web_user\",LOGNAME:\"web_user\",PATH:\"/\",PWD:\"/\",HOME:\"/home/web_user\",LANG:(\"obj
ect\"===typeof navigator&&navigator.languages&&navigator.languages[0]||\"C\").replace(\"-\",\"_\")+\".UTF-
8\",_:v||\"./this.program\"},b;for(b in Da)void 0===Da[b]?delete a[b]:a[b]=Da[b];var e=[];for(b in
a)e.push(b+\"=\"+a[b]);Fa=e}return Fa}var Fa;\r\nfunction T(a,b){a=new
Date(1E3*N[a>>2]);N[b>>2]=a.getUTCSeconds();N[b+4>>2]=a.getUTCMinutes();N[b+8>>2]=a.getUTCHours();
N[b+12>>2]=a.getUTCDate();N[b+16>>2]=a.getUTCMonth();N[b+20>>2]=a.getUTCFullYear()-
1900;N[b+24>>2]=a.getUTCDay();N[b+36>>2]=0;N[b+32>>2]=0;N[b+28>>2]=(a.getTime()-
Date.UTC(a.getUTCFullYear(),0,1,0,0,0,0))/864E5|0;T.Da||(T.Da=ja(\"GMT\"));N[b+40>>2]=T.Da;return
b}\r\nfunction Ga(){function a(l){return(l=l.toTimeString().match(/\\(([A-Za-z
]+)\\)$/))?l[1]:\"GMT\"}if(!Ka){Ka=!0;var b=(new Date).getFullYear(),e=new Date(b,0,1),f=new
Date(b,6,1);b=e.getTimezoneOffset();var
h=f.getTimezoneOffset(),k=Math.max(b,h);N[La()>>2]=60*k;N[Ma()>>2]=Number(b!=h);e=a(e);f=a(f);e=ja(e);f=j
a(f);h<b?(N[U()>>2]=e,N[U()+4>>2]=f):(N[U()>>2]=f,N[U()+4>>2]=e)}}var Ka;function V(a){return
0===a%4&&(0!==a%100||0===a%400)}function Na(a,b){for(var e=0,f=0;f<=b;e+=a[f++]);return e}\r\nvar
W=[31,29,31,30,31,30,31,31,30,31,30,31],X=[31,28,31,30,31,30,31,31,30,31,30,31];function Y(a,b){for(a=new
Date(a.getTime());0<b;){var e=a.getMonth(),f=(V(a.getFullYear())?W:X)[e];if(b>f-a.getDate())b-=f-
a.getDate()+1,a.setDate(1),11>e?a.setMonth(e+1):(a.setMonth(0),a.setFullYear(a.getFullYear()+1));else{a.setDate(
a.getDate()+b);break}}return a}\r\nfunction Oa(a,b,e,f){function h(d,m,n){for(d=\"number\"===typeof
d?d.toString():d||\"\";d.length<m;)d=n[0]+d;return d}function k(d,m){return h(d,m,\"0\")}function l(d,m){function
n(Ha){return 0>Ha?-1:0<Ha?1:0}var A;0===(A=n(d.getFullYear()-m.getFullYear()))&&0===(A=n(d.getMonth()-
m.getMonth()))&&(A=n(d.getDate()-m.getDate()));return A}function q(d){switch(d.getDay()){case 0:return new
Date(d.getFullYear()-1,11,29);case 1:return d;case 2:return new Date(d.getFullYear(),0,3);case 3:return new
Date(d.getFullYear(),\r\n0,2);case 4:return new Date(d.getFullYear(),0,1);case 5:return new Date(d.getFullYear()-
1,11,31);case 6:return new Date(d.getFullYear()-1,11,30)}}function G(d){d=Y(new Date(d.va+1900,0,1),d.Ca);var
m=new Date(d.getFullYear()+1,0,4),n=q(new Date(d.getFullYear(),0,4));m=q(m);return
0>=l(n,d)?0>=l(m,d)?d.getFullYear()+1:d.getFullYear():d.getFullYear()-1}var
u=N[f+40>>2];f={Qa:N[f>>2],Pa:N[f+4>>2],Aa:N[f+8>>2],za:N[f+12>>2],wa:N[f+16>>2],va:N[f+20>>2],Ba:N[
f+24>>2],Ca:N[f+28>>2],Ya:N[f+32>>2],Oa:N[f+\r\n36>>2],Ra:u?J(u):\"\"};e=J(e);u={\"%c\":\"%a %b %d
%H:%M:%S %Y\",\"%D\":\"%m/%d/%y\",\"%F\":\"%Y-%m-%d\",\"%h\":\"%b\",\"%r\":\"%I:%M:%S
%p\",\"%R\":\"%H:%M\",\"%T\":\"%H:%M:%S\",\"%x\":\"%m/%d/%y\",\"%X\":\"%H:%M:%S\",\"%Ec\":\"%c\",\
"%EC\":\"%C\",\"%Ex\":\"%m/%d/%y\",\"%EX\":\"%H:%M:%S\",\"%Ey\":\"%y\",\"%EY\":\"%Y\",\"%Od\":\"%d
\",\"%Oe\":\"%e\",\"%OH\":\"%H\",\"%OI\":\"%I\",\"%Om\":\"%m\",\"%OM\":\"%M\",\"%OS\":\"%S\",\"%Ou\":\"
%u\",\"%OU\":\"%U\",\"%OV\":\"%V\",\"%Ow\":\"%w\",\"%OW\":\"%W\",\"%Oy\":\"%y\"};for(var p in
u)e=e.replace(new RegExp(p,\"g\"),u[p]);var Ia=\"Sunday Monday Tuesday Wednesday Thursday Friday
Saturday\".split(\" \"),\r\nJa=\"January February March April May June July August September October November
December\".split(\" \");u={\"%a\":function(d){return Ia[d.Ba].substring(0,3)},\"%A\":function(d){return
Ia[d.Ba]},\"%b\":function(d){return Ja[d.wa].substring(0,3)},\"%B\":function(d){return
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Ja[d.wa]},\"%C\":function(d){return k((d.va+1900)/100|0,2)},\"%d\":function(d){return
k(d.za,2)},\"%e\":function(d){return h(d.za,2,\" \")},\"%g\":function(d){return
G(d).toString().substring(2)},\"%G\":function(d){return G(d)},\"%H\":function(d){return
k(d.Aa,\r\n2)},\"%I\":function(d){d=d.Aa;0==d?d=12:12<d&&(d-=12);return k(d,2)},\"%j\":function(d){return
k(d.za+Na(V(d.va+1900)?W:X,d.wa-1),3)},\"%m\":function(d){return k(d.wa+1,2)},\"%M\":function(d){return
k(d.Pa,2)},\"%n\":function(){return\"\\n\"},\"%p\":function(d){return
0<=d.Aa&&12>d.Aa?\"AM\":\"PM\"},\"%S\":function(d){return
k(d.Qa,2)},\"%t\":function(){return\"\\t\"},\"%u\":function(d){return d.Ba||7},\"%U\":function(d){var m=new
Date(d.va+1900,0,1),n=0===m.getDay()?m:Y(m,7-m.getDay());d=new Date(d.va+1900,d.wa,d.za);return
0>\r\nl(n,d)?k(Math.ceil((31-n.getDate()+(Na(V(d.getFullYear())?W:X,d.getMonth()-1)-
31)+d.getDate())/7),2):0===l(n,m)?\"01\":\"00\"},\"%V\":function(d){var m=new Date(d.va+1901,0,4),n=q(new
Date(d.va+1900,0,4));m=q(m);var A=Y(new Date(d.va+1900,0,1),d.Ca);return
0>l(A,n)?\"53\":0>=l(m,A)?\"01\":k(Math.ceil((n.getFullYear()<d.va+1900?d.Ca+32-n.getDate():d.Ca+1-
n.getDate())/7),2)},\"%w\":function(d){return d.Ba},\"%W\":function(d){var m=new
Date(d.va,0,1),n=1===m.getDay()?m:Y(m,0===m.getDay()?1:7-m.getDay()+1);d=new
Date(d.va+\r\n1900,d.wa,d.za);return 0>l(n,d)?k(Math.ceil((31-
n.getDate()+(Na(V(d.getFullYear())?W:X,d.getMonth()-1)-
31)+d.getDate())/7),2):0===l(n,m)?\"01\":\"00\"},\"%y\":function(d){return(d.va+1900).toString().substring(2)},\"
%Y\":function(d){return d.va+1900},\"%z\":function(d){d=d.Oa;var m=0<=d;d=Math.abs(d)/60;return(m?\"+\":\"-
\")+String(\"0000\"+(d/60*100+d%60)).slice(-4)},\"%Z\":function(d){return
d.Ra},\"%%\":function(){return\"%\"}};for(p in u)e.includes(p)&&(e=e.replace(new
RegExp(p,\"g\"),u[p](f)));p=Pa(e);if(p.length>b)return 0;\r\nM.set(p,a);return p.length-1}function Pa(a){var
b=Array(ia(a)+1);L(a,b,0,b.length);return b}\r\nvar Ta={a:function(a){return
ka(a+16)+16},c:function(a,b){qa.unshift({Ea:a,xa:b})},d:function(a,b){qa.unshift({Ea:a,xa:b})},b:function(a,b,e){(
new za(a)).Ga(b,e);Aa++;throw a;},D:function(a,b){a=J(a);return R.Sa(a,b)},m:function(){return
0},I:function(){},L:function(){},o:function(){return 42},x:function(){return
0},H:function(){},G:function(a,b){a=J(a);return
R.Ta(a,b)},K:function(a,b,e,f,h,k){k<<=12;if(0!==(f&16)&&0!==a%65536)b=-28;else
if(0!==(f&32)){a=65536*Math.ceil(b/65536);var
l=Qa(65536,a);\r\nl?(K.fill(0,l,l+a),a=l):a=0;a?(Ba[a]={Ia:a,Ha:b,Fa:!0,fd:h,Xa:e,flags:f,offset:k},b=a):b=-48}else
b=-52;return b},J:function(a,b){var e=Ba[a];0!==b&&e?(b===e.Ha&&(Ba[a]=null,e.Fa&&Ra(e.Ia)),a=0):a=-
28;return a},j:function(){},C:function(a,b,e){a=J(a);return
R.Ua(a,b,e)},E:function(){},r:function(){},F:function(){},h:function(){E()},p:function(a,b){if(0===a)a=Date.now();
else if(1===a||4===a)a=S();else return N[Sa()>>2]=28,-1;N[b>>2]=a/1E3|0;N[b+4>>2]=a%1E3*1E6|0;return
0},s:function(a,b){return a-\r\nb},P:function(){E(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},g:function(){E(\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},Q:function(){E(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},O:function(){E(\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},\r\nM:function(){return
2147483648},v:function(a,b,e){K.copyWithin(a,b,b+e)},i:function(a){var
b=K.length;a>>>=0;if(2147483648<a)return!1;for(var e=1;4>=e;e*=2){var
f=b*(1+.2/e);f=Math.min(f,a+100663296);f=Math.max(a,f);0<f%65536&&(f+=65536-
f%65536);a:{try{I.grow(Math.min(2147483648,f)-la.byteLength+65535>>>16);ma();var h=1;break
a}catch(k){}h=void 0}if(h)return!0}return!1},B:function(a){for(var b=S();S()-b<a;);},z:function(a,b){var
e=0;Ea().forEach(function(f,h){var
k=b+e;h=N[a+4*h>>2]=k;for(k=0;k<f.length;++k)M[h++>>\r\n0]=f.charCodeAt(k);M[h>>0]=0;e+=f.length+1});re
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turn 0},A:function(a,b){var e=Ea();N[a>>2]=e.length;var
f=0;e.forEach(function(h){f+=h.length+1});N[b>>2]=f;return 0},f:function(){return
0},y:function(a,b){a=1==a||2==a?2:E();M[b>>0]=a;return
0},n:function(a,b,e,f){a=R.Wa(a);b=R.Va(a,b,e);N[f>>2]=b;return 0},u:function(){},q:function(a,b,e,f){for(var
h=0,k=0;k<e;k++){for(var l=N[b+8*k>>2],q=N[b+(8*k+4)>>2],G=0;G<q;G++){var
u=K[l+G],p=Ca[a];0===u||10===u?((1===a?da:F)(ha(p,0)),p.length=0):p.push(u)}h+=\r\nq}N[f>>2]=h;return
0},w:function(a){var b=Date.now();N[a>>2]=b/1E3|0;N[a+4>>2]=b%1E3*1E3|0;return
0},t:T,l:function(a,b){Ga();a=new
Date(1E3*N[a>>2]);N[b>>2]=a.getSeconds();N[b+4>>2]=a.getMinutes();N[b+8>>2]=a.getHours();N[b+12>>2]=a.
getDate();N[b+16>>2]=a.getMonth();N[b+20>>2]=a.getFullYear()-1900;N[b+24>>2]=a.getDay();var e=new
Date(a.getFullYear(),0,1);N[b+28>>2]=(a.getTime()-e.getTime())/864E5|0;N[b+36>>2]=-
(60*a.getTimezoneOffset());var f=(new
Date(a.getFullYear(),6,1)).getTimezoneOffset();e=\r\ne.getTimezoneOffset();a=(f!=e&&a.getTimezoneOffset()==
Math.min(e,f))|0;N[b+32>>2]=a;a=N[U()+(a?4:0)>>2];N[b+40>>2]=a;return b},k:function(a){Ga();var b=new
Date(N[a+20>>2]+1900,N[a+16>>2],N[a+12>>2],N[a+8>>2],N[a+4>>2],N[a>>2],0),e=N[a+32>>2],f=b.getTimez
oneOffset(),h=new Date(b.getFullYear(),0,1),k=(new
Date(b.getFullYear(),6,1)).getTimezoneOffset(),l=h.getTimezoneOffset(),q=Math.min(l,k);0>e?N[a+32>>2]=Numb
er(k!=l&&q==f):0<e!=(q==f)&&(k=Math.max(l,k),b.setTime(b.getTime()+6E4*((0<e?q:k)-
f)));N[a+\r\n24>>2]=b.getDay();N[a+28>>2]=(b.getTime()-
h.getTime())/864E5|0;N[a>>2]=b.getSeconds();N[a+4>>2]=b.getMinutes();N[a+8>>2]=b.getHours();N[a+12>>2]=
b.getDate();N[a+16>>2]=b.getMonth();return b.getTime()/1E3|0},N:Oa,e:function(a,b,e,f){return
Oa(a,b,e,f)}};\r\n(function(){function a(h){c.asm=h.exports;I=c.asm.R;ma();na=c.asm.ua;pa.unshift(c.asm.S);O--
;c.monitorRunDependencies&&c.monitorRunDependencies(O);0==O&&(null!==ta&&(clearInterval(ta),ta=null),P
&&(h=P,P=null,h()))}function b(h){a(h.instance)}function e(h){return xa().then(function(k){return
WebAssembly.instantiate(k,f)}).then(h,function(k){F(\"failed to asynchronously prepare wasm: \"+k);E(k)})}var
f={a:Ta};O++;c.monitorRunDependencies&&c.monitorRunDependencies(O);if(c.instantiateWasm)try{return
c.instantiateWasm(f,\r\na)}catch(h){return F(\"Module.instantiateWasm callback failed with error:
\"+h),!1}(function(){return H||\"function\"!==typeof
WebAssembly.instantiateStreaming||ua()||Q.startsWith(\"file://\")||\"function\"!==typeof
fetch?e(b):fetch(Q,{credentials:\"same-origin\"}).then(function(h){return
WebAssembly.instantiateStreaming(h,f).then(b,function(k){F(\"wasm streaming compile failed: \"+k);F(\"falling
back to ArrayBuffer instantiation\");return
e(b)})})})().catch(g);return{}})();\r\nc.___wasm_call_ctors=function(){return(c.___wasm_call_ctors=c.asm.S).appl
y(null,arguments)};c._OrtInit=function(){return(c._OrtInit=c.asm.T).apply(null,arguments)};c._OrtCreateSessionO
ptions=function(){return(c._OrtCreateSessionOptions=c.asm.U).apply(null,arguments)};c._OrtAddSessionConfigE
ntry=function(){return(c._OrtAddSessionConfigEntry=c.asm.V).apply(null,arguments)};c._OrtReleaseSessionOptio
ns=function(){return(c._OrtReleaseSessionOptions=c.asm.W).apply(null,arguments)};\r\nc._OrtCreateSession=func
tion(){return(c._OrtCreateSession=c.asm.X).apply(null,arguments)};c._OrtReleaseSession=function(){return(c._Ort
ReleaseSession=c.asm.Y).apply(null,arguments)};c._OrtGetInputCount=function(){return(c._OrtGetInputCount=c.a
sm.Z).apply(null,arguments)};c._OrtGetOutputCount=function(){return(c._OrtGetOutputCount=c.asm._).apply(null
,arguments)};c._OrtGetInputName=function(){return(c._OrtGetInputName=c.asm.$).apply(null,arguments)};\r\nc._
OrtGetOutputName=function(){return(c._OrtGetOutputName=c.asm.aa).apply(null,arguments)};c._OrtFree=functio
n(){return(c._OrtFree=c.asm.ba).apply(null,arguments)};c._OrtCreateTensor=function(){return(c._OrtCreateTensor
=c.asm.ca).apply(null,arguments)};c._OrtGetTensorData=function(){return(c._OrtGetTensorData=c.asm.da).apply(
null,arguments)};c._OrtReleaseTensor=function(){return(c._OrtReleaseTensor=c.asm.ea).apply(null,arguments)};\r\
nc._OrtCreateRunOptions=function(){return(c._OrtCreateRunOptions=c.asm.fa).apply(null,arguments)};c._OrtAdd
RunConfigEntry=function(){return(c._OrtAddRunConfigEntry=c.asm.ga).apply(null,arguments)};c._OrtReleaseRu
nOptions=function(){return(c._OrtReleaseRunOptions=c.asm.ha).apply(null,arguments)};c._OrtRun=function(){ret
```

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urn(c._OrtRun=c.asm.ia).apply(null,arguments)};c._OrtEndProfiling=function(){return(c._OrtEndProfiling=c.asm.j
a).apply(null,arguments)};\r\nvar
ka=c._malloc=function(){return(ka=c._malloc=c.asm.ka).apply(null,arguments)},Sa=c.___errno_location=function(
){return(Sa=c.___errno_location=c.asm.la).apply(null,arguments)},Ra=c._free=function(){return(Ra=c._free=c.asm
.ma).apply(null,arguments)},U=c.__get_tzname=function(){return(U=c.__get_tzname=c.asm.na).apply(null,argume
nts)},Ma=c.__get_daylight=function(){return(Ma=c.__get_daylight=c.asm.oa).apply(null,arguments)},La=c.__get_t
imezone=function(){return(La=c.__get_timezone=c.asm.pa).apply(null,\r\narguments)},Ua=c.stackSave=function()
{return(Ua=c.stackSave=c.asm.qa).apply(null,arguments)},Va=c.stackRestore=function(){return(Va=c.stackRestore
=c.asm.ra).apply(null,arguments)},Wa=c.stackAlloc=function(){return(Wa=c.stackAlloc=c.asm.sa).apply(null,argu
ments)},Qa=c._memalign=function(){return(Qa=c._memalign=c.asm.ta).apply(null,arguments)};c.UTF8ToString=J
;c.stringToUTF8=function(a,b,e){return
L(a,K,b,e)};c.lengthBytesUTF8=ia;c.stackSave=Ua;c.stackRestore=Va;c.stackAlloc=Wa;var Z;\r\nP=function
Xa(){Z||Ya();Z||(P=Xa)};\r\nfunction Ya(){function
a(){if(!Z&&(Z=!0,c.calledRun=!0,!ea)){ya(pa);aa(c);if(c.onRuntimeInitialized)c.onRuntimeInitialized();if(c.postRu
n)for(\"function\"==typeof c.postRun&&(c.postRun=[c.postRun]);c.postRun.length;){var
b=c.postRun.shift();ra.unshift(b)}ya(ra)}}if(!(0<O)){if(c.preRun)for(\"function\"==typeof
c.preRun&&(c.preRun=[c.preRun]);c.preRun.length;)sa();ya(oa);0<O||(c.setStatus?(c.setStatus(\"Running...\"),setTi
meout(function(){setTimeout(function(){c.setStatus(\"\")},1);a()},1)):a())}}c.run=Ya;\r\nif(c.preInit)for(\"function\"
==typeof c.preInit&&(c.preInit=[c.preInit]);0<c.preInit.length;)c.preInit.pop()();Ya();\r\n\r\n\r\n  return
ortWasm.ready\r\n}\r\n);\r\n})();\r\nif (typeof exports === 'object' && typeof module === 'object')\r\n
module.exports = ortWasm;\r\nelse if (typeof define === 'function' && define['amd'])\r\n  define([], function() {
return ortWasm; });\r\nelse if (typeof exports === 'object')\r\n  exports[\"ortWasm\"] = ortWasm;\r\n","\"use
strict\";\r\nmodule.exports = asPromise;\r\n\r\n/**\r\n * Callback as used by {@link util.asPromise}.\r\n * @typedef
asPromiseCallback\r\n * @type {function}\r\n * @param {Error|null} error Error, if any\r\n * @param {...*}
params Additional arguments\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n * Returns a promise from a node-style
callback function.\r\n * @memberof util\r\n * @param {asPromiseCallback} fn Function to call\r\n * @param {*}
ctx Function context\r\n * @param {...*} params Function arguments\r\n * @returns {Promise<*>} Promisified
function\r\n */\r\nfunction asPromise(fn, ctx/*, varargs */) {\r\n    var params  = new Array(arguments.length -
1),\r\n        offset  = 0,\r\n        index   = 2,\r\n        pending = true;\r\n    while (index < arguments.length)\r\n
params[offset++] = arguments[index++];\r\n    return new Promise(function executor(resolve, reject) {\r\n
params[offset] = function callback(err/*, varargs */) {\r\n            if (pending) {\r\n                pending = false;\r\n
      if (err)\r\n                    reject(err);\r\n                else {\r\n                    var params = new Array(arguments.length -
1),\r\n                        offset = 0;\r\n                    while (offset < params.length)\r\n                        params[offset++] =
arguments[offset];\r\n                    resolve.apply(null, params);\r\n                }\r\n            }\r\n        };\r\n        try {\r\n
          fn.apply(ctx || null, params);\r\n        } catch (err) {\r\n            if (pending) {\r\n                pending = false;\r\n
           reject(err);\r\n            }\r\n        }\r\n    });\r\n}\r\n","\"use strict\";\r\n\r\n/**\r\n * A minimal base64
implementation for number arrays.\r\n * @memberof util\r\n * @namespace\r\n */\r\nvar base64 =
exports;\r\n\r\n/**\r\n * Calculates the byte length of a base64 encoded string.\r\n * @param {string} string Base64
encoded string\r\n * @returns {number} Byte length\r\n */\r\nbase64.length = function length(string) {\r\n    var p =
string.length;\r\n    if (!p)\r\n        return 0;\r\n    var n = 0;\r\n    while (--p % 4 > 1 && string.charAt(p) ===
\"=\")\r\n        ++n;\r\n    return Math.ceil(string.length * 3) / 4 - n;\r\n};\r\n\r\n// Base64 encoding table\r\nvar b64 =
new Array(64);\r\n\r\n// Base64 decoding table\r\nvar s64 = new Array(123);\r\n\r\n// 65..90, 97..122, 48..57, 43,
47\r\nfor (var i = 0; i < 64;)\r\n    s64[b64[i] = i < 26 ? i + 65 : i < 52 ? i + 71 : i < 62 ? i - 4 : i - 59 | 43] =
i++;\r\n\r\n/**\r\n * Encodes a buffer to a base64 encoded string.\r\n * @param {Uint8Array} buffer Source
buffer\r\n * @param {number} start Source start\r\n * @param {number} end Source end\r\n * @returns {string}
Base64 encoded string\r\n */\r\nbase64.encode = function encode(buffer, start, end) {\r\n    var parts = null,\r\n
chunk = [];\r\n    var i = 0, // output index\r\n        j = 0, // goto index\r\n        t;     // temporary\r\n    while (start <
end) {\r\n        var b = buffer[start++];\r\n        switch (j) {\r\n            case 0:\r\n                chunk[i++] = b64[b >>
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2];\r\n t = (b & 3) << 4;\r\n j = 1;\r\n break;\r\n case 1:\r\n chunk[i++] = b64[t | b >> 4];\r\n t = (b & 15) << 2;\r\n j = 2;\r\n break;\r\n case 2:\r\n chunk[i++] = b64[t | b >> 6];\r\n chunk[i++] = b64[b & 63];\r\n j = 0;\r\n break;\r\n }\r\n if (i > 8191) {\r\n (parts || (parts = [])).push(String.fromCharCode.apply(String, chunk));\r\n i = 0;\r\n }\r\n }\r\n if (j) {\r\n chunk[i++] = b64[t];\r\n chunk[i++] = 61;\r\n if (j === 1)\r\n chunk[i++] = 61;\r\n }\r\n if (parts) {\r\n if (i)\r\n parts.push(String.fromCharCode.apply(String, chunk.slice(0, i)));\r\n return parts.join(\"\");\r\n }\r\n return String.fromCharCode.apply(String, chunk.slice(0, i));\r\n};\r\n\r\nvar invalidEncoding = \"invalid encoding\";\r\n\r\n/**\r\n * Decodes a base64 encoded string to a buffer.\r\n * @param {string} string Source string\r\n * @param {Uint8Array} buffer Destination buffer\r\n * @param {number} offset Destination offset\r\n * @returns {number} Number of bytes written\r\n * @throws {Error} If encoding is invalid\r\n */\r\nbase64.decode = function decode(string, buffer, offset) {\r\n var start = offset;\r\n var j = 0, // goto index\r\n t; // temporary\r\n for (var i = 0; i < string.length;) {\r\n var c = string.charCodeAt(i++);\r\n if (c === 61 && j > 1)\r\n break;\r\n if ((c = s64[c]) === undefined)\r\n throw Error(invalidEncoding);\r\n switch (j) {\r\n case 0:\r\n t = c;\r\n j = 1;\r\n break;\r\n case 1:\r\n buffer[offset++] = t << 2 | (c & 48) >> 4;\r\n t = c;\r\n j = 2;\r\n break;\r\n case 2:\r\n buffer[offset++] = (t & 15) << 4 | (c & 60) >> 2;\r\n t = c;\r\n j = 3;\r\n break;\r\n case 3:\r\n buffer[offset++] = (t & 3) << 6 | c;\r\n j = 0;\r\n break;\r\n }\r\n }\r\n if (j === 1)\r\n throw Error(invalidEncoding);\r\n return offset - start;\r\n};\r\n\r\n/**\r\n * Tests if the specified string appears to be base64 encoded.\r\n * @param {string} string String to test\r\n * @returns {boolean} `true` if probably base64 encoded, otherwise false\r\n */\r\nbase64.test = function test(string) {\r\n return /^(?:[A-Za-z0-9+/]{4})*(?:[A-Za-z0-9+/]{2}==|[A-Za-z0-9+/]{3}=)?$/.test(string);\r\n};\r\n","\"use strict\";\r\nmodule.exports = EventEmitter;\r\n\r\n/**\r\n * Constructs a new event emitter instance.\r\n * @classdesc A minimal event emitter.\r\n * @memberof util\r\n * @constructor\r\n */\r\nfunction EventEmitter() {\r\n\r\n /**\r\n * Registered listeners.\r\n * @type {Object.<string,*>}\r\n * @private\r\n */\r\n this._listeners = {};\r\n}\r\n\r\n/**\r\n * Registers an event listener.\r\n * @param {string} evt Event name\r\n * @param {function} fn Listener\r\n * @param {*} [ctx] Listener context\r\n * @returns {util.EventEmitter} `this`\r\n */\r\nEventEmitter.prototype.on = function on(evt, fn, ctx) {\r\n (this._listeners[evt] || (this._listeners[evt] = [])).push({\r\n fn : fn,\r\n ctx : ctx || this\r\n });\r\n return this;\r\n};\r\n\r\n/**\r\n * Removes an event listener or any matching listeners if arguments are omitted.\r\n * @param {string} [evt] Event name. Removes all listeners if omitted.\r\n * @param {function} [fn] Listener to remove. Removes all listeners of `evt` if omitted.\r\n * @returns {util.EventEmitter} `this`\r\n */\r\nEventEmitter.prototype.off = function off(evt, fn) {\r\n if (evt === undefined)\r\n this._listeners = {};\r\n else {\r\n if (fn === undefined)\r\n this._listeners[evt] = [];\r\n else {\r\n var listeners = this._listeners[evt];\r\n for (var i = 0; i < listeners.length;)\r\n if (listeners[i].fn === fn)\r\n listeners.splice(i, 1);\r\n else\r\n ++i;\r\n }\r\n }\r\n return this;\r\n};\r\n\r\n/**\r\n * Emits an event by calling its listeners with the specified arguments.\r\n * @param {string} evt Event name\r\n * @param {...*} args Arguments\r\n * @returns {util.EventEmitter} `this`\r\n */\r\nEventEmitter.prototype.emit = function emit(evt) {\r\n var listeners = this._listeners[evt];\r\n if (listeners) {\r\n var args = [],\r\n i = 1;\r\n for (; i < arguments.length;)\r\n args.push(arguments[i++]);\r\n for (i = 0; i < listeners.length;)\r\n listeners[i].fn.apply(listeners[i++].ctx, args);\r\n }\r\n return this;\r\n};\r\n","\"use strict\";\r\n\r\nmodule.exports = factory(factory);\r\n\r\n/**\r\n * Reads / writes floats / doubles from / to buffers.\r\n * @name util.float\r\n * @namespace\r\n */\r\n\r\n/**\r\n * Writes a 32 bit float to a buffer using little endian byte order.\r\n * @name util.float.writeFloatLE\r\n * @function\r\n * @param {number} val Value to write\r\n * @param {Uint8Array} buf Target buffer\r\n * @param {number} pos Target buffer offset\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n * Writes a 32 bit float to a buffer using big endian byte order.\r\n * @name util.float.writeFloatBE\r\n * @function\r\n * @param {number} val Value to write\r\n * @param {Uint8Array} buf Target buffer\r\n * @param {number} pos Target buffer offset\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n * Reads a 32 bit float from a buffer using little endian byte order.\r\n *

@name util.float.readFloatLE\r\n * @function\r\n * @param {Uint8Array} buf Source buffer\r\n * @param
{number} pos Source buffer offset\r\n * @returns {number} Value read\r\n */\r\n\r\n/**\r\n * Reads a 32 bit float
from a buffer using big endian byte order.\r\n * @name util.float.readFloatBE\r\n * @function\r\n * @param
{Uint8Array} buf Source buffer\r\n * @param {number} pos Source buffer offset\r\n * @returns {number} Value
read\r\n */\r\n\r\n/**\r\n * Writes a 64 bit double to a buffer using little endian byte order.\r\n * @name
util.float.writeDoubleLE\r\n * @function\r\n * @param {number} val Value to write\r\n * @param {Uint8Array}
buf Target buffer\r\n * @param {number} pos Target buffer offset\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n *
Writes a 64 bit double to a buffer using big endian byte order.\r\n * @name util.float.writeDoubleBE\r\n *
@function\r\n * @param {number} val Value to write\r\n * @param {Uint8Array} buf Target buffer\r\n * @param
{number} pos Target buffer offset\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n * Reads a 64 bit double from a
buffer using little endian byte order.\r\n * @name util.float.readDoubleLE\r\n * @function\r\n * @param
{Uint8Array} buf Source buffer\r\n * @param {number} pos Source buffer offset\r\n * @returns {number} Value
read\r\n */\r\n\r\n/**\r\n * Reads a 64 bit double from a buffer using big endian byte order.\r\n * @name
util.float.readDoubleBE\r\n * @function\r\n * @param {Uint8Array} buf Source buffer\r\n * @param {number}
pos Source buffer offset\r\n * @returns {number} Value read\r\n */\r\n\r\n// Factory function for the purpose of
node-based testing in modified global environments\r\nfunction factory(exports) {\r\n\r\n   // float: typed array\r\n
if (typeof Float32Array !== \"undefined\") (function() {\r\n\r\n   var f32 = new Float32Array([-0]),\r\n
f8b = new Uint8Array(f32.buffer),\r\n   le = f8b[3] === 128;\r\n\r\n   function writeFloat_f32_cpy(val, buf,
pos) {\r\n   f32[0] = val;\r\n   buf[pos   ] = f8b[0];\r\n   buf[pos + 1] = f8b[1];\r\n   buf[pos +
2] = f8b[2];\r\n   buf[pos + 3] = f8b[3];\r\n   }\r\n\r\n   function writeFloat_f32_rev(val, buf, pos) {\r\n
    f32[0] = val;\r\n   buf[pos   ] = f8b[3];\r\n   buf[pos + 1] = f8b[2];\r\n   buf[pos + 2] = f8b[1];\r\n
        buf[pos + 3] = f8b[0];\r\n   }\r\n\r\n   /* istanbul ignore next */\r\n   exports.writeFloatLE = le ?
writeFloat_f32_cpy : writeFloat_f32_rev;\r\n   /* istanbul ignore next */\r\n   exports.writeFloatBE = le ?
writeFloat_f32_rev : writeFloat_f32_cpy;\r\n\r\n   function readFloat_f32_cpy(buf, pos) {\r\n   f8b[0] =
buf[pos   ];\r\n   f8b[1] = buf[pos + 1];\r\n   f8b[2] = buf[pos + 2];\r\n   f8b[3] = buf[pos + 3];\r\n
    return f32[0];\r\n   }\r\n\r\n   function readFloat_f32_rev(buf, pos) {\r\n   f8b[3] = buf[pos   ];\r\n
  f8b[2] = buf[pos + 1];\r\n   f8b[1] = buf[pos + 2];\r\n   f8b[0] = buf[pos + 3];\r\n   return
f32[0];\r\n   }\r\n\r\n   /* istanbul ignore next */\r\n   exports.readFloatLE = le ? readFloat_f32_cpy :
readFloat_f32_rev;\r\n   /* istanbul ignore next */\r\n   exports.readFloatBE = le ? readFloat_f32_rev :
readFloat_f32_cpy;\r\n\r\n   // float: ieee754\r\n   })(); else (function() {\r\n\r\n   function
writeFloat_ieee754(writeUint, val, buf, pos) {\r\n   var sign = val < 0 ? 1 : 0;\r\n   if (sign)\r\n
val = -val;\r\n   if (val === 0)\r\n   writeUint(1 / val > 0 ? /* positive */ 0 : /* negative 0 */
2147483648, buf, pos);\r\n   else if (isNaN(val))\r\n   writeUint(2143289344, buf, pos);\r\n   else
if (val > 3.4028234663852886e+38) // +-Infinity\r\n   writeUint((sign << 31 | 2139095040) >>> 0, buf,
pos);\r\n   else if (val < 1.1754943508222875e-38) // denormal\r\n   writeUint((sign << 31 |
Math.round(val / 1.401298464324817e-45)) >>> 0, buf, pos);\r\n   else {\r\n   var exponent =
Math.floor(Math.log(val) / Math.LN2),\r\n   mantissa = Math.round(val * Math.pow(2, -exponent) *
8388608) & 8388607;\r\n   writeUint((sign << 31 | exponent + 127 << 23 | mantissa) >>> 0, buf, pos);\r\n
    }\r\n   }\r\n\r\n   exports.writeFloatLE = writeFloat_ieee754.bind(null, writeUintLE);\r\n
exports.writeFloatBE = writeFloat_ieee754.bind(null, writeUintBE);\r\n\r\n   function
readFloat_ieee754(readUint, buf, pos) {\r\n   var uint = readUint(buf, pos),\r\n   sign = (uint >> 31) * 2
+ 1,\r\n   exponent = uint >>> 23 & 255,\r\n   mantissa = uint & 8388607;\r\n   return exponent
=== 255\r\n   ? mantissa\r\n   ? NaN\r\n   : sign * Infinity\r\n   : exponent === 0 //
denormal\r\n   ? sign * 1.401298464324817e-45 * mantissa\r\n   : sign * Math.pow(2, exponent -
150) * (mantissa + 8388608);\r\n   }\r\n\r\n   exports.readFloatLE = readFloat_ieee754.bind(null,
readUintLE);\r\n   exports.readFloatBE = readFloat_ieee754.bind(null, readUintBE);\r\n\r\n   })();\r\n\r\n   //
double: typed array\r\n   if (typeof Float64Array !== \"undefined\") (function() {\r\n\r\n   var f64 = new
Float64Array([-0]),\r\n   f8b = new Uint8Array(f64.buffer),\r\n   le = f8b[7] === 128;\r\n\r\n

```
function writeDouble_f64_cpy(val, buf, pos) {\r\n        f64[0] = val;\r\n        buf[pos    ] = f8b[0];\r\n
buf[pos + 1] = f8b[1];\r\n        buf[pos + 2] = f8b[2];\r\n        buf[pos + 3] = f8b[3];\r\n        buf[pos + 4] =
f8b[4];\r\n        buf[pos + 5] = f8b[5];\r\n        buf[pos + 6] = f8b[6];\r\n        buf[pos + 7] = f8b[7];\r\n
}\r\n\r\n    function writeDouble_f64_rev(val, buf, pos) {\r\n        f64[0] = val;\r\n        buf[pos    ] =
f8b[7];\r\n        buf[pos + 1] = f8b[6];\r\n        buf[pos + 2] = f8b[5];\r\n        buf[pos + 3] = f8b[4];\r\n
buf[pos + 4] = f8b[3];\r\n        buf[pos + 5] = f8b[2];\r\n        buf[pos + 6] = f8b[1];\r\n        buf[pos + 7] =
f8b[0];\r\n    }\r\n\r\n    /* istanbul ignore next */\r\n    exports.writeDoubleLE = le ? writeDouble_f64_cpy :
writeDouble_f64_rev;\r\n    /* istanbul ignore next */\r\n    exports.writeDoubleBE = le ? writeDouble_f64_rev
: writeDouble_f64_cpy;\r\n\r\n    function readDouble_f64_cpy(buf, pos) {\r\n        f8b[0] = buf[pos    ];\r\n
    f8b[1] = buf[pos + 1];\r\n        f8b[2] = buf[pos + 2];\r\n        f8b[3] = buf[pos + 3];\r\n        f8b[4] =
buf[pos + 4];\r\n        f8b[5] = buf[pos + 5];\r\n        f8b[6] = buf[pos + 6];\r\n        f8b[7] = buf[pos + 7];\r\n
        return f64[0];\r\n    }\r\n\r\n    function readDouble_f64_rev(buf, pos) {\r\n        f8b[7] = buf[pos    ];\r\n
         f8b[6] = buf[pos + 1];\r\n        f8b[5] = buf[pos + 2];\r\n        f8b[4] = buf[pos + 3];\r\n        f8b[3] =
buf[pos + 4];\r\n        f8b[2] = buf[pos + 5];\r\n        f8b[1] = buf[pos + 6];\r\n        f8b[0] = buf[pos + 7];\r\n
        return f64[0];\r\n    }\r\n\r\n    /* istanbul ignore next */\r\n    exports.readDoubleLE = le ?
readDouble_f64_cpy : readDouble_f64_rev;\r\n    /* istanbul ignore next */\r\n    exports.readDoubleBE = le ?
readDouble_f64_rev : readDouble_f64_cpy;\r\n\r\n  // double: ieee754\r\n  })(); else (function() {\r\n\r\n
function writeDouble_ieee754(writeUint, off0, off1, val, buf, pos) {\r\n        var sign = val < 0 ? 1 : 0;\r\n        if
(sign)\r\n            val = -val;\r\n        if (val === 0) {\r\n            writeUint(0, buf, pos + off0);\r\n
writeUint(1 / val > 0 ? /* positive */ 0 : /* negative 0 */ 2147483648, buf, pos + off1);\r\n        } else if
(isNaN(val)) {\r\n            writeUint(0, buf, pos + off0);\r\n            writeUint(2146959360, buf, pos + off1);\r\n
        } else if (val > 1.7976931348623157e+308) { // +-Infinity\r\n            writeUint(0, buf, pos + off0);\r\n
 writeUint((sign << 31 | 2146435072) >>> 0, buf, pos + off1);\r\n        } else {\r\n            var mantissa;\r\n
      if (val < 2.2250738585072014e-308) { // denormal\r\n                mantissa = val / 5e-324;\r\n
writeUint(mantissa >>> 0, buf, pos + off0);\r\n                writeUint((sign << 31 | mantissa / 4294967296) >>> 0,
buf, pos + off1);\r\n            } else {\r\n                var exponent = Math.floor(Math.log(val) / Math.LN2);\r\n
          if (exponent === 1024)\r\n                    exponent = 1023;\r\n                mantissa = val * Math.pow(2, -
exponent);\r\n                writeUint(mantissa * 4503599627370496 >>> 0, buf, pos + off0);\r\n
writeUint((sign << 31 | exponent + 1023 << 20 | mantissa * 1048576 & 1048575) >>> 0, buf, pos + off1);\r\n
   }\r\n        }\r\n    }\r\n\r\n    exports.writeDoubleLE = writeDouble_ieee754.bind(null, writeUintLE, 0,
4);\r\n    exports.writeDoubleBE = writeDouble_ieee754.bind(null, writeUintBE, 4, 0);\r\n\r\n    function
readDouble_ieee754(readUint, off0, off1, buf, pos) {\r\n        var lo = readUint(buf, pos + off0),\r\n            hi =
readUint(buf, pos + off1);\r\n        var sign = (hi >> 31) * 2 + 1,\r\n            exponent = hi >>> 20 & 2047,\r\n
         mantissa = 4294967296 * (hi & 1048575) + lo;\r\n        return exponent === 2047\r\n            ?
mantissa\r\n            ? NaN\r\n            : sign * Infinity\r\n            : exponent === 0 // denormal\r\n            ?
sign * 5e-324 * mantissa\r\n            : sign * Math.pow(2, exponent - 1075) * (mantissa + 4503599627370496);\r\n
      }\r\n\r\n    exports.readDoubleLE = readDouble_ieee754.bind(null, readUintLE, 0, 4);\r\n
exports.readDoubleBE = readDouble_ieee754.bind(null, readUintBE, 4, 0);\r\n\r\n  })();\r\n\r\n  return
exports;\r\n}\r\n\r\n// uint helpers\r\n\r\nfunction writeUintLE(val, buf, pos) {\r\n  buf[pos    ] =  val      & 255;\r\n
  buf[pos + 1] =  val >>> 8  & 255;\r\n  buf[pos + 2] =  val >>> 16 & 255;\r\n  buf[pos + 3] =  val >>>
24;\r\n}\r\n\r\nfunction writeUintBE(val, buf, pos) {\r\n  buf[pos    ] =  val >>> 24;\r\n  buf[pos + 1] =  val >>>
16 & 255;\r\n  buf[pos + 2] =  val >>> 8  & 255;\r\n  buf[pos + 3] =  val      & 255;\r\n}\r\n\r\nfunction
readUintLE(buf, pos) {\r\n  return (buf[pos    ]\r\n      | buf[pos + 1] << 8\r\n      | buf[pos + 2] << 16\r\n      |
buf[pos + 3] << 24) >>> 0;\r\n}\r\n\r\nfunction readUintBE(buf, pos) {\r\n  return (buf[pos    ] << 24\r\n      |
buf[pos + 1] << 16\r\n      | buf[pos + 2] << 8\r\n      | buf[pos + 3]) >>> 0;\r\n}\r\n","\"use
strict\";\r\nmodule.exports = inquire;\r\n\r\n/**\r\n * Requires a module only if available.\r\n * @memberof util\r\n
* @param {string} moduleName Module to require\r\n * @returns {?Object} Required module if available and not
empty, otherwise `null`\r\n */\r\nfunction inquire(moduleName) {\r\n  try {\r\n    var mod =
```

eval(\"quire\".replace(/^/,\"re\"))(moduleName); // eslint-disable-line no-eval\r\n if (mod && (mod.length || Object.keys(mod).length))\r\n return mod;\r\n } catch (e) {} // eslint-disable-line no-empty\r\n return null;\r\n}\r\n","\"use strict\";\r\nmodule.exports = pool;\r\n\r\n/**\r\n * An allocator as used by {@link util.pool}.\r\n * @typedef PoolAllocator\r\n * @type {function}\r\n * @param {number} size Buffer size\r\n * @returns {Uint8Array} Buffer\r\n */\r\n\r\n/**\r\n * A slicer as used by {@link util.pool}.\r\n * @typedef PoolSlicer\r\n * @type {function}\r\n * @param {number} start Start offset\r\n * @param {number} end End offset\r\n * @returns {Uint8Array} Buffer slice\r\n * @this {Uint8Array}\r\n */\r\n\r\n/**\r\n * A general purpose buffer pool.\r\n * @memberof util\r\n * @function\r\n * @param {PoolAllocator} alloc Allocator\r\n * @param {PoolSlicer} slice Slicer\r\n * @param {number} [size=8192] Slab size\r\n * @returns {PoolAllocator} Pooled allocator\r\n */\r\nfunction pool(alloc, slice, size) {\r\n var SIZE = size || 8192;\r\n var MAX = SIZE >>> 1;\r\n var slab = null;\r\n var offset = SIZE;\r\n return function pool_alloc(size) {\r\n if (size < 1 || size > MAX)\r\n return alloc(size);\r\n if (offset + size > SIZE) {\r\n slab = alloc(SIZE);\r\n offset = 0;\r\n }\r\n var buf = slice.call(slab, offset, offset += size);\r\n if (offset & 7) // align to 32 bit\r\n offset = (offset | 7) + 1;\r\n return buf;\r\n };\r\n}\r\n","\"use strict\";\r\n\r\n/**\r\n * A minimal UTF8 implementation for number arrays.\r\n * @memberof util\r\n * @namespace\r\n */\r\nvar utf8 = exports;\r\n\r\n/**\r\n * Calculates the UTF8 byte length of a string.\r\n * @param {string} string String\r\n * @returns {number} Byte length\r\n */\r\nutf8.length = function utf8_length(string) {\r\n var len = 0,\r\n c = 0;\r\n for (var i = 0; i < string.length; ++i) {\r\n c = string.charCodeAt(i);\r\n if (c < 128)\r\n len += 1;\r\n else if (c < 2048)\r\n len += 2;\r\n else if ((c & 0xFC00) === 0xD800 && (string.charCodeAt(i + 1) & 0xFC00) === 0xDC00) {\r\n ++i;\r\n len += 4;\r\n } else\r\n len += 3;\r\n }\r\n return len;\r\n};\r\n\r\n/**\r\n * Reads UTF8 bytes as a string.\r\n * @param {Uint8Array} buffer Source buffer\r\n * @param {number} start Source start\r\n * @param {number} end Source end\r\n * @returns {string} String read\r\n */\r\nutf8.read = function utf8_read(buffer, start, end) {\r\n var len = end - start;\r\n if (len < 1)\r\n return \"\";\r\n var parts = null,\r\n chunk = [],\r\n i = 0, // char offset\r\n t; // temporary\r\n while (start < end) {\r\n t = buffer[start++];\r\n if (t < 128)\r\n chunk[i++] = t;\r\n else if (t > 191 && t < 224)\r\n chunk[i++] = (t & 31) << 6 | buffer[start++] & 63;\r\n else if (t > 239 && t < 365) {\r\n t = ((t & 7) << 18 | (buffer[start++] & 63) << 12 | (buffer[start++] & 63) << 6 | buffer[start++] & 63) - 0x10000;\r\n chunk[i++] = 0xD800 + (t >> 10);\r\n chunk[i++] = 0xDC00 + (t & 1023);\r\n } else\r\n chunk[i++] = (t & 15) << 12 | (buffer[start++] & 63) << 6 | buffer[start++] & 63;\r\n if (i > 8191) {\r\n (parts || (parts = [])).push(String.fromCharCode.apply(String, chunk));\r\n i = 0;\r\n }\r\n }\r\n if (parts) {\r\n if (i)\r\n parts.push(String.fromCharCode.apply(String, chunk.slice(0, i)));\r\n return parts.join(\"\");\r\n }\r\n return String.fromCharCode.apply(String, chunk.slice(0, i));\r\n};\r\n\r\n/**\r\n * Writes a string as UTF8 bytes.\r\n * @param {string} string Source string\r\n * @param {Uint8Array} buffer Destination buffer\r\n * @param {number} offset Destination offset\r\n * @returns {number} Bytes written\r\n */\r\nutf8.write = function utf8_write(string, buffer, offset) {\r\n var start = offset,\r\n c1, // character 1\r\n c2; // character 2\r\n for (var i = 0; i < string.length; ++i) {\r\n c1 = string.charCodeAt(i);\r\n if (c1 < 128) {\r\n buffer[offset++] = c1;\r\n } else if (c1 < 2048) {\r\n buffer[offset++] = c1 >> 6 | 192;\r\n buffer[offset++] = c1 & 63 | 128;\r\n } else if ((c1 & 0xFC00) === 0xD800 && ((c2 = string.charCodeAt(i + 1)) & 0xFC00) === 0xDC00) {\r\n c1 = 0x10000 + ((c1 & 0x03FF) << 10) + (c2 & 0x03FF);\r\n ++i;\r\n buffer[offset++] = c1 >> 18 | 240;\r\n buffer[offset++] = c1 >> 12 & 63 | 128;\r\n buffer[offset++] = c1 >> 6 & 63 | 128;\r\n buffer[offset++] = c1 & 63 | 128;\r\n } else {\r\n buffer[offset++] = c1 >> 12 | 224;\r\n buffer[offset++] = c1 >> 6 & 63 | 128;\r\n buffer[offset++] = c1 & 63 | 128;\r\n }\r\n }\r\n return offset - start;\r\n};\r\n","/// @file\n/// @addtogroup flatbuffers_javascript_api\n/// @{\n/// @cond FLATBUFFERS_INTERNAL\n\n/**\n * @fileoverview\n *\n * Need to suppress 'global this' error so the Node.js export line doesn't cause\n * closure compile to error out.\n * @suppress {globalThis}\n */\n\n/**\n * @const\n * @namespace\n */\nvar flatbuffers = {};\n\n/**\n * @typedef {number}\n */\nflatbuffers.Offset;\n\n/**\n * @typedef {{\n * bb: flatbuffers.ByteBuffer,\n * bb_pos: number\n * }}\n */\nflatbuffers.Table;\n\n/**\n * @type {number}\n * @const\n */\nflatbuffers.SIZEOF_SHORT = 2;\n\n/**\n

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* @type {number}\n * @const\n */\nflatbuffers.SIZEOF_INT = 4;\n\n/**\n * @type {number}\n * @const\n
*/\nflatbuffers.FILE_IDENTIFIER_LENGTH = 4;\n\n/**\n * @type {number}\n * @const\n
*/\nflatbuffers.SIZE_PREFIX_LENGTH = 4;\n\n/**\n * @enum {number}\n */\nflatbuffers.Encoding = {\n
UTF8_BYTES: 1,\n  UTF16_STRING: 2\n};\n\n/**\n * @type {Int32Array}\n * @const\n */\nflatbuffers.int32 =
new Int32Array(2);\n\n/**\n * @type {Float32Array}\n * @const\n */\nflatbuffers.float32 = new
Float32Array(flatbuffers.int32.buffer);\n\n/**\n * @type {Float64Array}\n * @const\n */\nflatbuffers.float64 = new
Float64Array(flatbuffers.int32.buffer);\n\n/**\n * @type {boolean}\n * @const\n */\nflatbuffers.isLittleEndian =
new Uint16Array(new Uint8Array([1, 0]).buffer)[0] ===
1;\n\n////////////////////////////////////////////////////////////////////////////////\n\n/**\n * @constructor\n * @param {number} low\n
* @param {number} high\n */\nflatbuffers.Long = function(low, high) {\n  /**\n   * @type {number}\n   *
@const\n   */\n  this.low = low | 0;\n\n  /**\n   * @type {number}\n   * @const\n   */\n  this.high = high |
0;\n};\n\n/**\n * @param {number} low\n * @param {number} high\n * @returns {!flatbuffers.Long}\n
*/\nflatbuffers.Long.create = function(low, high) {\n  // Special-case zero to avoid GC overhead for default values\n
return low == 0 && high == 0 ? flatbuffers.Long.ZERO : new flatbuffers.Long(low, high);\n};\n\n/**\n * @returns
{number}\n */\nflatbuffers.Long.prototype.toFloat64 = function() {\n  return (this.low >>> 0) + this.high *
0x100000000;\n};\n\n/**\n * @param {flatbuffers.Long} other\n * @returns {boolean}\n
*/\nflatbuffers.Long.prototype.equals = function(other) {\n  return this.low == other.low && this.high ==
other.high;\n};\n\n/**\n * @type {!flatbuffers.Long}\n * @const\n */\nflatbuffers.Long.ZERO = new
flatbuffers.Long(0, 0);\n\n/// @endcond\n////////////////////////////////////////////////////////////////////////////////\n/**\n * Create a
FlatBufferBuilder.\n *\n * @constructor\n * @param {number=} opt_initial_size\n */\nflatbuffers.Builder =
function(opt_initial_size) {\n  if (!opt_initial_size) {\n    var initial_size = 1024;\n  } else {\n    var initial_size =
opt_initial_size;\n  }\n\n  /**\n   * @type {flatbuffers.ByteBuffer}\n   * @private\n   */\n  this.bb =
flatbuffers.ByteBuffer.allocate(initial_size);\n\n  /**\n   * Remaining space in the ByteBuffer.\n   *\n   * @type
{number}\n   * @private\n   */\n  this.space = initial_size;\n\n  /**\n   * Minimum alignment encountered so far.\n
*\n   * @type {number}\n   * @private\n   */\n  this.minalign = 1;\n\n  /**\n   * The vtable for the current table.\n
*\n   * @type {Array.<number>}\n   * @private\n   */\n  this.vtable = null;\n\n  /**\n   * The amount of fields we're
actually using.\n   *\n   * @type {number}\n   * @private\n   */\n  this.vtable_in_use = 0;\n\n  /**\n   * Whether we
are currently serializing a table.\n   *\n   * @type {boolean}\n   * @private\n   */\n  this.isNested = false;\n\n  /**\n
* Starting offset of the current struct/table.\n   *\n   * @type {number}\n   * @private\n   */\n  this.object_start =
0;\n\n  /**\n   * List of offsets of all vtables.\n   *\n   * @type {Array.<number>}\n   * @private\n   */\n  this.vtables
= [];\n\n  /**\n   * For the current vector being built.\n   *\n   * @type {number}\n   * @private\n   */\n
this.vector_num_elems = 0;\n\n  /**\n   * False omits default values from the serialized data\n   *\n   * @type
{boolean}\n   * @private\n   */\n  this.force_defaults = false;\n};\n\nflatbuffers.Builder.prototype.clear = function()
{\n  this.bb.clear();\n  this.space = this.bb.capacity();\n  this.minalign = 1;\n  this.vtable = null;\n  this.vtable_in_use
= 0;\n  this.isNested = false;\n  this.object_start = 0;\n  this.vtables = [];\n  this.vector_num_elems = 0;\n
this.force_defaults = false;\n};\n\n/**\n * In order to save space, fields that are set to their default value\n * don't get
serialized into the buffer. Forcing defaults provides a\n * way to manually disable this optimization.\n *\n * @param
{boolean} forceDefaults true always serializes default values\n */\nflatbuffers.Builder.prototype.forceDefaults =
function(forceDefaults) {\n  this.force_defaults = forceDefaults;\n};\n\n/**\n * Get the ByteBuffer representing the
FlatBuffer. Only call this after you've\n * called finish(). The actual data starts at the ByteBuffer's current position,\n
* not necessarily at 0.\n *\n * @returns {flatbuffers.ByteBuffer}\n */\nflatbuffers.Builder.prototype.dataBuffer =
function() {\n  return this.bb;\n};\n\n/**\n * Get the bytes representing the FlatBuffer. Only call this after you've\n *
called finish().\n *\n * @returns {!Uint8Array}\n */\nflatbuffers.Builder.prototype.asUint8Array = function() {\n
return this.bb.bytes().subarray(this.bb.position(), this.bb.position() + this.offset());\n};\n\n/// @cond
FLATBUFFERS_INTERNAL\n/**\n * Prepare to write an element of `size` after `additional_bytes` have been\n *
written, e.g. if you write a string, you need to align such the int length\n * field is aligned to 4 bytes, and the string
data follows it directly. If all\n * you need to do is alignment, `additional_bytes` will be 0.\n *\n * @param
{number} size This is the of the new element to write\n * @param {number} additional_bytes The padding size\n
```

*/\nflatbuffers.Builder.prototype.prep = function(size, additional_bytes) {\n // Track the biggest thing we've ever aligned to.\n if (size > this.minalign) {\n   this.minalign = size;\n }\n\n // Find the amount of alignment needed such that `size` is properly\n // aligned after `additional_bytes`\n var align_size = ((~(this.bb.capacity() - this.space + additional_bytes)) + 1) & (size - 1);\n\n // Reallocate the buffer if needed.\n while (this.space < align_size + size + additional_bytes) {\n   var old_buf_size = this.bb.capacity();\n   this.bb = flatbuffers.Builder.growByteBuffer(this.bb);\n   this.space += this.bb.capacity() - old_buf_size;\n }\n\n this.pad(align_size);\n};\n\n/**\n * @param {number} byte_size\n */\nflatbuffers.Builder.prototype.pad = function(byte_size) {\n for (var i = 0; i < byte_size; i++) {\n   this.bb.writeInt8(--this.space, 0);\n }\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeInt8 = function(value) {\n this.bb.writeInt8(this.space -= 1, value);\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeInt16 = function(value) {\n this.bb.writeInt16(this.space -= 2, value);\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeInt32 = function(value) {\n this.bb.writeInt32(this.space -= 4, value);\n};\n\n/**\n * @param {flatbuffers.Long} value\n */\nflatbuffers.Builder.prototype.writeInt64 = function(value) {\n this.bb.writeInt64(this.space -= 8, value);\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeFloat32 = function(value) {\n this.bb.writeFloat32(this.space -= 4, value);\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeFloat64 = function(value) {\n this.bb.writeFloat64(this.space -= 8, value);\n};\n/// @endcond\n\n/**\n * Add an `int8` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `int8` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addInt8 = function(value) {\n this.prep(1, 0);\n this.writeInt8(value);\n};\n\n/**\n * Add an `int16` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `int16` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addInt16 = function(value) {\n this.prep(2, 0);\n this.writeInt16(value);\n};\n\n/**\n * Add an `int32` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `int32` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addInt32 = function(value) {\n this.prep(4, 0);\n this.writeInt32(value);\n};\n\n/**\n * Add an `int64` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {flatbuffers.Long} value The `int64` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addInt64 = function(value) {\n this.prep(8, 0);\n this.writeInt64(value);\n};\n\n/**\n * Add a `float32` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `float32` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addFloat32 = function(value) {\n this.prep(4, 0);\n this.writeFloat32(value);\n};\n\n/**\n * Add a `float64` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `float64` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addFloat64 = function(value) {\n this.prep(8, 0);\n this.writeFloat64(value);\n};\n\n/// @cond FLATBUFFERS_INTERNAL\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt8 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addInt8(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt16 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addInt16(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt32 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addInt32(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {flatbuffers.Long} value\n * @param {flatbuffers.Long} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt64 = function(voffset, value, defaultValue) {\n if (this.force_defaults || !value.equals(defaultValue)) {\n   this.addInt64(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldFloat32 = function(voffset, value, defaultValue) {\n if (this.force_defaults

|| value != defaultValue) {\n   this.addFloat32(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldFloat64 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addFloat64(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {flatbuffers.Offset} value\n * @param {flatbuffers.Offset} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldOffset = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addOffset(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * Structs are stored inline, so nothing additional is being added. `d` is always 0.\n *\n * @param {number} voffset\n * @param {flatbuffers.Offset} value\n * @param {flatbuffers.Offset} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldStruct = function(voffset, value, defaultValue) {\n if (value != defaultValue) {\n   this.nested(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * Structures are always stored inline, they need to be created right\n * where they're used. You'll get this assertion failure if you\n * created it elsewhere.\n *\n * @param {flatbuffers.Offset} obj The offset of the created object\n */\nflatbuffers.Builder.prototype.nested = function(obj) {\n if (obj != this.offset()) {\n   throw new Error('FlatBuffers: struct must be serialized inline.');\n }\n};\n\n/**\n * Should not be creating any other object, string or vector\n * while an object is being constructed\n */\nflatbuffers.Builder.prototype.notNested = function() {\n if (this.isNested) {\n   throw new Error('FlatBuffers: object serialization must not be nested.');\n }\n};\n\n/**\n * Set the current vtable at `voffset` to the current location in the buffer.\n *\n * @param {number} voffset\n */\nflatbuffers.Builder.prototype.slot = function(voffset) {\n this.vtable[voffset] = this.offset();\n};\n\n/**\n * @returns {flatbuffers.Offset} Offset relative to the end of the buffer.\n */\nflatbuffers.Builder.prototype.offset = function() {\n return this.bb.capacity() - this.space;\n};\n\n/**\n * Doubles the size of the backing ByteBuffer and copies the old data towards\n * the end of the new buffer (since we build the buffer backwards).\n *\n * @param {flatbuffers.ByteBuffer} bb The current buffer with the existing data\n * @returns {!flatbuffers.ByteBuffer} A new byte buffer with the old data copied\n * to it. The data is located at the end of the buffer.\n *\n * uint8Array.set() formally takes {Array<number>|ArrayBufferView}, so to pass\n * it a uint8Array we need to suppress the type check:\n * @suppress {checkTypes}\n */\nflatbuffers.Builder.growByteBuffer = function(bb) {\n var old_buf_size = bb.capacity();\n\n // Ensure we don't grow beyond what fits in an int.\n if (old_buf_size & 0xC0000000) {\n   throw new Error('FlatBuffers: cannot grow buffer beyond 2 gigabytes.');\n }\n\n var new_buf_size = old_buf_size << 1;\n var nbb = flatbuffers.ByteBuffer.allocate(new_buf_size);\n nbb.setPosition(new_buf_size - old_buf_size);\n nbb.bytes().set(bb.bytes(), new_buf_size - old_buf_size);\n return nbb;\n};\n/// @endcond\n\n/**\n * Adds on offset, relative to where it will be written.\n *\n * @param {flatbuffers.Offset} offset The offset to add.\n */\nflatbuffers.Builder.prototype.addOffset = function(offset) {\n this.prep(flatbuffers.SIZEOF_INT, 0); // Ensure alignment is already done.\n this.writeInt32(this.offset() - offset + flatbuffers.SIZEOF_INT);\n};\n\n/// @cond FLATBUFFERS_INTERNAL\n/**\n * Start encoding a new object in the buffer. Users will not usually need to\n * call this directly. The FlatBuffers compiler will generate helper methods\n * that call this method internally.\n *\n * @param {number} numfields\n */\nflatbuffers.Builder.prototype.startObject = function(numfields) {\n this.notNested();\n if (this.vtable == null) {\n   this.vtable = [];\n }\n this.vtable_in_use = numfields;\n for (var i = 0; i < numfields; i++) {\n   this.vtable[i] = 0; // This will push additional elements as needed\n }\n this.isNested = true;\n this.object_start = this.offset();\n};\n\n/**\n * Finish off writing the object that is under construction.\n *\n * @returns {flatbuffers.Offset} The offset to the object inside `dataBuffer`\n */\nflatbuffers.Builder.prototype.endObject = function() {\n if (this.vtable == null || !this.isNested) {\n   throw new Error('FlatBuffers: endObject called without startObject');\n }\n\n this.addInt32(0);\n var vtableloc = this.offset();\n\n // Trim trailing zeroes.\n var i = this.vtable_in_use - 1;\n for (; i >= 0 && this.vtable[i] == 0; i--) {}\n var trimmed_size = i + 1;\n\n // Write out the current vtable.\n for (; i >= 0; i--) {\n   // Offset relative to the start of the table.\n   this.addInt16(this.vtable[i] != 0 ? vtableloc - this.vtable[i] : 0);\n }\n\n var standard_fields = 2; // The fields below:\n this.addInt16(vtableloc - this.object_start);\n var len = (trimmed_size + standard_fields) * flatbuffers.SIZEOF_SHORT;\n this.addInt16(len);\n\n // Search for an existing vtable that matches the current one.\n var existing_vtable = 0;\n

var vt1 = this.space;\nouter_loop:\n for (i = 0; i < this.vtables.length; i++) {\n   var vt2 = this.bb.capacity() - this.vtables[i];\n   if (len == this.bb.readInt16(vt2)) {\n   for (var j = flatbuffers.SIZEOF_SHORT; j < len; j += flatbuffers.SIZEOF_SHORT) {\n   if (this.bb.readInt16(vt1 + j) != this.bb.readInt16(vt2 + j)) {\n   continue outer_loop;\n   }\n   }\n   existing_vtable = this.vtables[i];\n   break;\n   }\n }\n\n if (existing_vtable) {\n   // Found a match:\n   // Remove the current vtable.\n   this.space = this.bb.capacity() - vtableloc;\n\n   // Point table to existing vtable.\n   this.bb.writeInt32(this.space, existing_vtable - vtableloc);\n } else {\n   // No match:\n   // Add the location of the current vtable to the list of vtables.\n   this.vtables.push(this.offset());\n\n   // Point table to current vtable.\n   this.bb.writeInt32(this.bb.capacity() - vtableloc, this.offset() - vtableloc);\n }\n\n this.isNested = false;\n return vtableloc;\n};\n/// @endcond\n\n/**\n * Finalize a buffer, poiting to the given `root_table`.\n *\n * @param {flatbuffers.Offset} root_table\n * @param {string=} opt_file_identifier\n * @param {boolean=} opt_size_prefix\n */\nflatbuffers.Builder.prototype.finish = function(root_table, opt_file_identifier, opt_size_prefix) {\n var size_prefix = opt_size_prefix ? flatbuffers.SIZE_PREFIX_LENGTH : 0;\n if (opt_file_identifier) {\n   var file_identifier = opt_file_identifier;\n   this.prep(this.minalign, flatbuffers.SIZEOF_INT +\n   flatbuffers.FILE_IDENTIFIER_LENGTH + size_prefix);\n   if (file_identifier.length != flatbuffers.FILE_IDENTIFIER_LENGTH) {\n   throw new Error('FlatBuffers: file identifier must be length ' +\n   flatbuffers.FILE_IDENTIFIER_LENGTH);\n   }\n   for (var i = flatbuffers.FILE_IDENTIFIER_LENGTH - 1; i >= 0; i--) {\n   this.writeInt8(file_identifier.charCodeAt(i));\n   }\n }\n this.prep(this.minalign, flatbuffers.SIZEOF_INT + size_prefix);\n this.addOffset(root_table);\n if (size_prefix) {\n   this.addInt32(this.bb.capacity() - this.space);\n }\n this.bb.setPosition(this.space);\n};\n\n/**\n * Finalize a size prefixed buffer, pointing to the given `root_table`.\n *\n * @param {flatbuffers.Offset} root_table\n * @param {string=} opt_file_identifier\n */\nflatbuffers.Builder.prototype.finishSizePrefixed = function (root_table, opt_file_identifier) {\n this.finish(root_table, opt_file_identifier, true);\n};\n\n/// @cond FLATBUFFERS_INTERNAL\n/**\n * This checks a required field has been set in a given table that has\n * just been constructed.\n *\n * @param {flatbuffers.Offset} table\n * @param {number} field\n */\nflatbuffers.Builder.prototype.requiredField = function(table, field) {\n var table_start = this.bb.capacity() - table;\n var vtable_start = table_start - this.bb.readInt32(table_start);\n var ok = this.bb.readInt16(vtable_start + field) != 0;\n\n // If this fails, the caller will show what field needs to be set.\n if (!ok) {\n   throw new Error('FlatBuffers: field ' + field + ' must be set');\n }\n};\n\n/**\n * Start a new array/vector of objects. Users usually will not call\n * this directly. The FlatBuffers compiler will create a start/end\n * method for vector types in generated code.\n *\n * @param {number} elem_size The size of each element in the array\n * @param {number} num_elems The number of elements in the array\n * @param {number} alignment The alignment of the array\n */\nflatbuffers.Builder.prototype.startVector = function(elem_size, num_elems, alignment) {\n this.notNested();\n this.vector_num_elems = num_elems;\n this.prep(flatbuffers.SIZEOF_INT, elem_size * num_elems);\n this.prep(alignment, elem_size * num_elems); // Just in case alignment > int.\n};\n\n/**\n * Finish off the creation of an array and all its elements. The array must be\n * created with `startVector`.\n *\n * @returns {flatbuffers.Offset} The offset at which the newly created array\n * starts.\n */\nflatbuffers.Builder.prototype.endVector = function() {\n this.writeInt32(this.vector_num_elems);\n return this.offset();\n};\n/// @endcond\n\n/**\n * Encode the string `s` in the buffer using UTF-8. If a Uint8Array is passed\n * instead of a string, it is assumed to contain valid UTF-8 encoded data.\n *\n * @param {string|Uint8Array} s The string to encode\n * @return {flatbuffers.Offset} The offset in the buffer where the encoded string starts\n */\nflatbuffers.Builder.prototype.createString = function(s) {\n if (s instanceof Uint8Array) {\n   var utf8 = s;\n } else {\n   var utf8 = [];\n   var i = 0;\n\n   while (i < s.length) {\n   var codePoint;\n\n   // Decode UTF-16\n   var a = s.charCodeAt(i++);\n   if (a < 0xD800 || a >= 0xDC00) {\n   codePoint = a;\n   } else {\n   var b = s.charCodeAt(i++);\n   codePoint = (a << 10) + b + (0x10000 - (0xD800 << 10) - 0xDC00);\n   }\n\n   // Encode UTF-8\n   if (codePoint < 0x80) {\n   utf8.push(codePoint);\n   } else {\n   if (codePoint < 0x800) {\n   utf8.push(((codePoint >> 6) & 0x1F) | 0xC0);\n   } else {\n   if (codePoint < 0x10000) {\n   utf8.push(((codePoint >> 12) & 0x0F) | 0xE0);\n   } else {\n   utf8.push(\n   ((codePoint >> 18) & 0x07) | 0xF0,\n   ((codePoint >> 12) & 0x3F) | 0x80);\n   }\n

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utf8.push(((codePoint >> 6) & 0x3F) | 0x80);\n        }\n        utf8.push((codePoint & 0x3F) | 0x80);\n      }\n    }\n
}\n\n  this.addInt8(0);\n  this.startVector(1, utf8.length, 1);\n  this.bb.setPosition(this.space -= utf8.length);\n  for
(var i = 0, offset = this.space, bytes = this.bb.bytes(); i < utf8.length; i++) {\n    bytes[offset++] = utf8[i];\n  }\n
return this.endVector();\n};\n\n/**\n * A helper function to avoid generated code depending on this file directly.\n
*\n * @param {number} low\n * @param {number} high\n * @returns {!flatbuffers.Long}\n
*/\nflatbuffers.Builder.prototype.createLong = function(low, high) {\n  return flatbuffers.Long.create(low,
high);\n};\n////////////////////////////////////////////////////////////////////////////////\n/// @cond
FLATBUFFERS_INTERNAL\n/**\n * Create a new ByteBuffer with a given array of bytes (`Uint8Array`).\n *\n *
@constructor\n * @param {Uint8Array} bytes\n */\nflatbuffers.ByteBuffer = function(bytes) {\n  /**\n   * @type
{Uint8Array}\n   * @private\n   */\n  this.bytes_ = bytes;\n\n  /**\n   * @type {number}\n   * @private\n   */\n
this.position_ = 0;\n};\n\n/**\n * Create and allocate a new ByteBuffer with a given size.\n *\n * @param {number}
byte_size\n * @returns {!flatbuffers.ByteBuffer}\n */\nflatbuffers.ByteBuffer.allocate = function(byte_size) {\n
return new flatbuffers.ByteBuffer(new Uint8Array(byte_size));\n};\n\nflatbuffers.ByteBuffer.prototype.clear =
function() {\n  this.position_ = 0;\n};\n\n/**\n * Get the underlying `Uint8Array`.\n *\n * @returns {Uint8Array}\n
*/\nflatbuffers.ByteBuffer.prototype.bytes = function() {\n  return this.bytes_;\n};\n\n/**\n * Get the buffer's
position.\n *\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.position = function() {\n  return
this.position_;\n};\n\n/**\n * Set the buffer's position.\n *\n * @param {number} position\n
*/\nflatbuffers.ByteBuffer.prototype.setPosition = function(position) {\n  this.position_ = position;\n};\n\n/**\n *
Get the buffer's capacity.\n *\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.capacity = function()
{\n  return this.bytes_.length;\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n
*/\nflatbuffers.ByteBuffer.prototype.readInt8 = function(offset) {\n  return this.readUint8(offset) << 24 >>
24;\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n
*/\nflatbuffers.ByteBuffer.prototype.readUint8 = function(offset) {\n  return this.bytes_[offset];\n};\n\n/**\n *
@param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readInt16 =
function(offset) {\n  return this.readUint16(offset) << 16 >> 16;\n};\n\n/**\n * @param {number} offset\n *
@returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readUint16 = function(offset) {\n  return
this.bytes_[offset] | this.bytes_[offset + 1] << 8;\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n
*/\nflatbuffers.ByteBuffer.prototype.readInt32 = function(offset) {\n  return this.bytes_[offset] | this.bytes_[offset +
1] << 8 | this.bytes_[offset + 2] << 16 | this.bytes_[offset + 3] << 24;\n};\n\n/**\n * @param {number} offset\n *
@returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readUint32 = function(offset) {\n  return
this.readInt32(offset) >>> 0;\n};\n\n/**\n * @param {number} offset\n * @returns {!flatbuffers.Long}\n
*/\nflatbuffers.ByteBuffer.prototype.readInt64 = function(offset) {\n  return new
flatbuffers.Long(this.readInt32(offset), this.readInt32(offset + 4));\n};\n\n/**\n * @param {number} offset\n *
@returns {!flatbuffers.Long}\n */\nflatbuffers.ByteBuffer.prototype.readUint64 = function(offset) {\n  return new
flatbuffers.Long(this.readUint32(offset), this.readUint32(offset + 4));\n};\n\n/**\n * @param {number} offset\n *
@returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readFloat32 = function(offset) {\n  flatbuffers.int32[0] =
this.readInt32(offset);\n  return flatbuffers.float32[0];\n};\n\n/**\n * @param {number} offset\n * @returns
{number}\n */\nflatbuffers.ByteBuffer.prototype.readFloat64 = function(offset) {\n
flatbuffers.int32[flatbuffers.isLittleEndian ? 0 : 1] = this.readInt32(offset);\n
flatbuffers.int32[flatbuffers.isLittleEndian ? 1 : 0] = this.readInt32(offset + 4);\n  return
flatbuffers.float64[0];\n};\n\n/**\n * @param {number} offset\n * @param {number|boolean} value\n
*/\nflatbuffers.ByteBuffer.prototype.writeInt8 = function(offset, value) {\n  this.bytes_[offset] = /** @type
{number} */(value);\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n
*/\nflatbuffers.ByteBuffer.prototype.writeUint8 = function(offset, value) {\n  this.bytes_[offset] =
value;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n
*/\nflatbuffers.ByteBuffer.prototype.writeInt16 = function(offset, value) {\n  this.bytes_[offset] = value;\n
this.bytes_[offset + 1] = value >> 8;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n
*/\nflatbuffers.ByteBuffer.prototype.writeUint16 = function(offset, value) {\n    this.bytes_[offset] = value;\n
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this.bytes_[offset + 1] = value >> 8;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeInt32 = function(offset, value) {\n this.bytes_[offset] = value;\n this.bytes_[offset + 1] = value >> 8;\n this.bytes_[offset + 2] = value >> 16;\n this.bytes_[offset + 3] = value >> 24;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeUint32 = function(offset, value) {\n   this.bytes_[offset] = value;\n   this.bytes_[offset + 1] = value >> 8;\n   this.bytes_[offset + 2] = value >> 16;\n   this.bytes_[offset + 3] = value >> 24;\n};\n\n/**\n * @param {number} offset\n * @param {flatbuffers.Long} value\n */\nflatbuffers.ByteBuffer.prototype.writeInt64 = function(offset, value) {\n this.writeInt32(offset, value.low);\n this.writeInt32(offset + 4, value.high);\n};\n\n/**\n * @param {number} offset\n * @param {flatbuffers.Long} value\n */\nflatbuffers.ByteBuffer.prototype.writeUint64 = function(offset, value) {\n   this.writeUint32(offset, value.low);\n   this.writeUint32(offset + 4, value.high);\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeFloat32 = function(offset, value) {\n flatbuffers.float32[0] = value;\n this.writeInt32(offset, flatbuffers.int32[0]);\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeFloat64 = function(offset, value) {\n flatbuffers.float64[0] = value;\n this.writeInt32(offset, flatbuffers.int32[flatbuffers.isLittleEndian ? 0 : 1]);\n this.writeInt32(offset + 4, flatbuffers.int32[flatbuffers.isLittleEndian ? 1 : 0]);\n};\n\n/**\n * Return the file identifier.   Behavior is undefined for FlatBuffers whose\n * schema does not include a file_identifier (likely points at padding or the\n * start of a the root vtable).\n * @returns {string}\n */\nflatbuffers.ByteBuffer.prototype.getBufferIdentifier = function() {\n if (this.bytes_.length < this.position_ + flatbuffers.SIZEOF_INT +\n   flatbuffers.FILE_IDENTIFIER_LENGTH) {\n   throw new Error(\n   'FlatBuffers: ByteBuffer is too short to contain an identifier.');\n }\n var result = \"\";\n for (var i = 0; i < flatbuffers.FILE_IDENTIFIER_LENGTH; i++) {\n   result += String.fromCharCode(\n   this.readInt8(this.position_ + flatbuffers.SIZEOF_INT + i));\n }\n return result;\n};\n\n/**\n * Look up a field in the vtable, return an offset into the object, or 0 if the\n * field is not present.\n *\n * @param {number} bb_pos\n * @param {number} vtable_offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__offset = function(bb_pos, vtable_offset) {\n var vtable = bb_pos - this.readInt32(bb_pos);\n return vtable_offset < this.readInt16(vtable) ? this.readInt16(vtable + vtable_offset) : 0;\n};\n\n/**\n * Initialize any Table-derived type to point to the union at the given offset.\n *\n * @param {flatbuffers.Table} t\n * @param {number} offset\n * @returns {flatbuffers.Table}\n */\nflatbuffers.ByteBuffer.prototype.__union = function(t, offset) {\n t.bb_pos = offset + this.readInt32(offset);\n t.bb = this;\n return t;\n};\n\n/**\n * Create a JavaScript string from UTF-8 data stored inside the FlatBuffer.\n * This allocates a new string and converts to wide chars upon each access.\n *\n * To avoid the conversion to UTF-16, pass flatbuffers.Encoding.UTF8_BYTES as\n * the \"optionalEncoding\" argument. This is useful for avoiding conversion to\n * and from UTF-16 when the data will just be packaged back up in another\n * FlatBuffer later on.\n *\n * @param {number} offset\n * @param {flatbuffers.Encoding=} opt_encoding Defaults to UTF16_STRING\n * @returns {string|!Uint8Array}\n */\nflatbuffers.ByteBuffer.prototype.__string = function(offset, opt_encoding) {\n offset += this.readInt32(offset);\n\n var length = this.readInt32(offset);\n var result = '';\n var i = 0;\n\n offset += flatbuffers.SIZEOF_INT;\n\n if (opt_encoding === flatbuffers.Encoding.UTF8_BYTES) {\n   return this.bytes_.subarray(offset, offset + length);\n }\n\n while (i < length) {\n   var codePoint;\n\n   // Decode UTF-8\n   var a = this.readUint8(offset + i++);\n   if (a < 0xC0) {\n   codePoint = a;\n   } else {\n   var b = this.readUint8(offset + i++);\n   if (a < 0xE0) {\n   codePoint =\n   ((a & 0x1F) << 6) |\n   (b & 0x3F);\n   } else {\n   var c = this.readUint8(offset + i++);\n   if (a < 0xF0) {\n   codePoint =\n   ((a & 0x0F) << 12) |\n   ((b & 0x3F) << 6) |\n   (c & 0x3F);\n   } else {\n   var d = this.readUint8(offset + i++);\n   codePoint =\n   ((a & 0x07) << 18) |\n   ((b & 0x3F) << 12) |\n   ((c & 0x3F) << 6) |\n   (d & 0x3F);\n   }\n   }\n   }\n\n   // Encode UTF-16\n   if (codePoint < 0x10000) {\n   result += String.fromCharCode(codePoint);\n   } else {\n   codePoint -= 0x10000;\n   result += String.fromCharCode(\n   (codePoint >> 10) + 0xD800,\n   (codePoint & ((1 << 10) - 1)) + 0xDC00);\n   }\n }\n\n return result;\n};\n\n/**\n * Retrieve the relative offset stored at \"offset\"\n * @param {number} offset\n *

@returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__indirect = function(offset) {\n return offset + this.readInt32(offset);\n};\n\n/**\n * Get the start of data of a vector whose offset is stored at \"offset\" in this object.\n *\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__vector = function(offset) {\n return offset + this.readInt32(offset) + flatbuffers.SIZEOF_INT; // data starts after the length\n};\n\n/**\n * Get the length of a vector whose offset is stored at \"offset\" in this object.\n *\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__vector_len = function(offset) {\n return this.readInt32(offset + this.readInt32(offset));\n};\n\n/**\n * @param {string} ident\n * @returns {boolean}\n */\nflatbuffers.ByteBuffer.prototype.__has_identifier = function(ident) {\n if (ident.length != flatbuffers.FILE_IDENTIFIER_LENGTH) {\n   throw new Error('FlatBuffers: file identifier must be length ' +\n   flatbuffers.FILE_IDENTIFIER_LENGTH);\n }\n for (var i = 0; i < flatbuffers.FILE_IDENTIFIER_LENGTH; i++) {\n   if (ident.charCodeAt(i) != this.readInt8(this.position_ + flatbuffers.SIZEOF_INT + i)) {\n   return false;\n   }\n }\n return true;\n};\n\n/**\n * A helper function to avoid generated code depending on this file directly.\n *\n * @param {number} low\n * @param {number} high\n * @returns {!flatbuffers.Long}\n */\nflatbuffers.ByteBuffer.prototype.createLong = function(low, high) {\n return flatbuffers.Long.create(low, high);\n};\n\n// Exports for Node.js and RequireJS\nexport { flatbuffers };\n\n/// @endcond\n/// @}\n","\"use strict\";\r\nexports.__esModule = true;\r\nvar Guid = /** @class */ (function () {\r\n   function Guid(guid) {\r\n   if (!guid) {\r\n   throw new TypeError(\"Invalid argument; `value` has no value.\");\r\n   }\r\n   this.value = Guid.EMPTY;\r\n   if (guid && Guid.isGuid(guid)) {\r\n   this.value = guid;\r\n   }\r\n   }\r\n   Guid.isGuid = function (guid) {\r\n   var value = guid.toString();\r\n   return guid && (guid instanceof Guid || Guid.validator.test(value));\r\n   };\r\n   Guid.create = function () {\r\n   return new Guid([Guid.gen(2), Guid.gen(1), Guid.gen(1), Guid.gen(1), Guid.gen(3)].join(\"-\"));\r\n   };\r\n   Guid.createEmpty = function () {\r\n   return new Guid(\"emptyguid\");\r\n   };\r\n   Guid.parse = function (guid) {\r\n   return new Guid(guid);\r\n   };\r\n   Guid.raw = function () {\r\n   return [Guid.gen(2), Guid.gen(1), Guid.gen(1), Guid.gen(1), Guid.gen(3)].join(\"-\");\r\n   };\r\n   Guid.gen = function (count) {\r\n   var out = \"\";\r\n   for (var i = 0; i < count; i++) {\r\n   // tslint:disable-next-line:no-bitwise\r\n   out += (((1 + Math.random()) * 0x10000) | 0).toString(16).substring(1);\r\n   }\r\n   return out;\r\n   };\r\n   Guid.prototype.equals = function (other) {\r\n   // Comparing string `value` against provided `guid` will auto-call\r\n   // toString on `guid` for comparison\r\n   return Guid.isGuid(other) && this.value === other.toString();\r\n   };\r\n   Guid.prototype.isEmpty = function () {\r\n   return this.value === Guid.EMPTY;\r\n   };\r\n   Guid.prototype.toString = function () {\r\n   return this.value;\r\n   };\r\n   Guid.prototype.toJSON = function () {\r\n   return {\r\n   value: this.value\r\n   };\r\n   };\r\n   Guid.validator = new RegExp(\"^[a-z0-9]{8}-[a-z0-9]{4}-[a-z0-9]{4}-[a-z0-9]{4}-[a-z0-9]{12}$\", \"i\");\r\n   Guid.EMPTY = \"00000000-0000-0000-0000-000000000000\";\r\n   return Guid;\r\n}());\r\nexports.Guid = Guid;\r\n","module.exports = Long;\r\n\r\n/**\r\n * wasm optimizations, to do native i64 multiplication and divide\r\n */\r\nvar wasm = null;\r\n\r\ntry {\r\n wasm = new WebAssembly.Instance(new WebAssembly.Module(new Uint8Array([\r\n   0, 97, 115, 109, 1, 0, 0, 0, 1, 13, 2, 96, 0, 1, 127, 96, 4, 127, 127, 127, 127, 1, 127, 3, 7, 6, 0, 1, 1, 1, 1, 1, 6, 6, 1, 127, 1, 65, 0, 11, 7, 50, 6, 3, 109, 117, 108, 0, 1, 5, 100, 105, 118, 95, 115, 0, 2, 5, 100, 105, 118, 95, 117, 0, 3, 5, 114, 101, 109, 95, 115, 0, 4, 5, 114, 101, 109, 95, 117, 0, 5, 8, 103, 101, 116, 95, 104, 105, 103, 104, 0, 0, 10, 191, 1, 6, 4, 0, 35, 0, 11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132, 32, 2, 173, 32, 3, 173, 66, 32, 134, 132, 126, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167, 11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132, 32, 2, 173, 32, 3, 173, 66, 32, 134, 132, 127, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167, 11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132, 32, 2, 173, 32, 3, 173, 66, 32, 134, 132, 128, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167, 11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132, 32, 2, 173, 32, 3, 173, 66, 32, 134, 132, 129, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167, 11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132, 32, 2, 173, 32, 3, 173, 66, 32, 134, 132, 130, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167, 11\r\n])), {}).exports;\r\n} catch (e) {\r\n // no wasm support :(\r\n}\r\n\r\n/**\r\n * Constructs a 64 bit two's-complement integer, given its low and high 32 bit values as *signed* integers.\r\n * See the from* functions below for more convenient ways of constructing Longs.\r\n * @exports Long\r\n * @class A Long class for representing a 64 bit two's-complement integer value.\r\n * @param {number} low The low (signed) 32 bits of the long\r\n * @param {number} high The high (signed) 32 bits of the long\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @constructor\r\n */\r\nfunction Long(low, high, unsigned) {\r\n\r\n /**\r\n * The low 32 bits as a signed value.\r\n * @type {number}\r\n */\r\n this.low = low | 0;\r\n\r\n /**\r\n * The high 32 bits as a signed value.\r\n * @type {number}\r\n */\r\n this.high = high | 0;\r\n\r\n /**\r\n * Whether unsigned or not.\r\n * @type {boolean}\r\n */\r\n this.unsigned = !!unsigned;\r\n}\r\n\r\n// The internal representation of a long is the two given signed, 32-bit values.\r\n// We use 32-bit pieces because these are the size of integers on which\r\n// Javascript performs bit-operations. For operations like addition and\r\n// multiplication, we split each number into 16 bit pieces, which can easily be\r\n// multiplied within Javascript's floating-point representation without overflow\r\n// or change in sign.\r\n//\r\n// In the algorithms below, we frequently reduce the negative case to the\r\n// positive case by negating the input(s) and then post-processing the result.\r\n// Note that we must ALWAYS check specially whether those values are MIN_VALUE\r\n// (-2^63) because -MIN_VALUE == MIN_VALUE (since 2^63 cannot be represented as\r\n// a positive number, it overflows back into a negative). Not handling this\r\n// case would often result in infinite recursion.\r\n//\r\n// Common constant values ZERO, ONE, NEG_ONE, etc. are defined below the from*\r\n// methods on which they depend.\r\n\r\n/**\r\n * An indicator used to reliably determine if an object is a Long or not.\r\n * @type {boolean}\r\n * @const\r\n * @private\r\n */\r\nLong.prototype.__isLong__;\r\n\r\nObject.defineProperty(Long.prototype, \"__isLong__\", { value: true });\r\n\r\n/**\r\n * @function\r\n * @param {*} obj Object\r\n * @returns {boolean}\r\n * @inner\r\n */\r\nfunction isLong(obj) {\r\n return (obj && obj[\"__isLong__\"]) === true;\r\n}\r\n\r\n/**\r\n * Tests if the specified object is a Long.\r\n * @function\r\n * @param {*} obj Object\r\n * @returns {boolean}\r\n */\r\nLong.isLong = isLong;\r\n\r\n/**\r\n * A cache of the Long representations of small integer values.\r\n * @type {!Object}\r\n * @inner\r\n */\r\nvar INT_CACHE = {};\r\n\r\n/**\r\n * A cache of the Long representations of small unsigned integer values.\r\n * @type {!Object}\r\n * @inner\r\n */\r\nvar UINT_CACHE = {};\r\n\r\n/**\r\n * @param {number} value\r\n * @param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromInt(value, unsigned) {\r\n var obj, cachedObj, cache;\r\n if (unsigned) {\r\n value >>>= 0;\r\n if (cache = (0 <= value && value < 256)) {\r\n cachedObj = UINT_CACHE[value];\r\n if (cachedObj)\r\n return cachedObj;\r\n }\r\n obj = fromBits(value, (value | 0) < 0 ? -1 : 0, true);\r\n if (cache)\r\n UINT_CACHE[value] = obj;\r\n return obj;\r\n } else {\r\n value |= 0;\r\n if (cache = (-128 <= value && value < 128)) {\r\n cachedObj = INT_CACHE[value];\r\n if (cachedObj)\r\n return cachedObj;\r\n }\r\n obj = fromBits(value, value < 0 ? -1 : 0, false);\r\n if (cache)\r\n INT_CACHE[value] = obj;\r\n return obj;\r\n }\r\n}\r\n\r\n/**\r\n * Returns a Long representing the given 32 bit integer value.\r\n * @function\r\n * @param {number} value The 32 bit integer in question\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long} The corresponding Long value\r\n */\r\nLong.fromInt = fromInt;\r\n\r\n/**\r\n * @param {number} value\r\n * @param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromNumber(value, unsigned) {\r\n if (isNaN(value))\r\n return unsigned ? UZERO : ZERO;\r\n if (unsigned) {\r\n if (value < 0)\r\n return UZERO;\r\n if (value >= TWO_PWR_64_DBL)\r\n return MAX_UNSIGNED_VALUE;\r\n } else {\r\n if (value <= -TWO_PWR_63_DBL)\r\n return MIN_VALUE;\r\n if (value + 1 >= TWO_PWR_63_DBL)\r\n return MAX_VALUE;\r\n }\r\n if (value < 0)\r\n return fromNumber(-value, unsigned).neg();\r\n return fromBits((value % TWO_PWR_32_DBL) | 0, (value / TWO_PWR_32_DBL) | 0, unsigned);\r\n}\r\n\r\n/**\r\n * Returns a Long representing the given value, provided that it is a finite number. Otherwise, zero is returned.\r\n * @function\r\n * @param {number} value The number in question\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long} The corresponding Long value\r\n */\r\nLong.fromNumber = fromNumber;\r\n\r\n/**\r\n * @param {number} lowBits\r\n * @param {number} highBits\r\n * @param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromBits(lowBits, highBits, unsigned) {\r\n return new Long(lowBits, highBits, unsigned);\r\n}\r\n\r\n/**\r\n * Returns a Long representing the 64 bit integer that comes by concatenating the given low and high bits. Each is\r\n * assumed to use 32 bits.\r\n *

```
@function\r\n * @param {number} lowBits The low 32 bits\r\n * @param {number} highBits The high 32 bits\r\n
 * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long} The
corresponding Long value\r\n */\r\nLong.fromBits = fromBits;\r\n\r\n/**\r\n * @function\r\n * @param {number}
base\r\n * @param {number} exponent\r\n * @returns {number}\r\n * @inner\r\n */\r\nvar pow_dbl = Math.pow; //
Used 4 times (4*8 to 15+4)\r\n\r\n/**\r\n * @param {string} str\r\n * @param {(boolean|number)=} unsigned\r\n *
@param {number=} radix\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromString(str, unsigned, radix)
{\r\n    if (str.length === 0)\r\n        throw Error('empty string');\r\n    if (str === \"NaN\" || str === \"Infinity\" || str
=== \"+Infinity\" || str === \"-Infinity\")\r\n        return ZERO;\r\n    if (typeof unsigned === 'number') {\r\n        //
For goog.math.long compatibility\r\n        radix = unsigned,\r\n        unsigned = false;\r\n    } else {\r\n        unsigned
= !! unsigned;\r\n    }\r\n    radix = radix || 10;\r\n    if (radix < 2 || 36 < radix)\r\n        throw
RangeError('radix');\r\n\r\n    var p;\r\n    if ((p = str.indexOf('-')) > 0)\r\n        throw Error('interior hyphen');\r\n
else if (p === 0) {\r\n        return fromString(str.substring(1), unsigned, radix).neg();\r\n    }\r\n\r\n    // Do several
(8) digits each time through the loop, so as to\r\n    // minimize the calls to the very expensive emulated div.\r\n    var
radixToPower = fromNumber(pow_dbl(radix, 8));\r\n\r\n    var result = ZERO;\r\n    for (var i = 0; i < str.length; i
+= 8) {\r\n        var size = Math.min(8, str.length - i),\r\n            value = parseInt(str.substring(i, i + size), radix);\r\n
    if (size < 8) {\r\n            var power = fromNumber(pow_dbl(radix, size));\r\n            result =
result.mul(power).add(fromNumber(value));\r\n        } else {\r\n            result = result.mul(radixToPower);\r\n
result = result.add(fromNumber(value));\r\n        }\r\n    }\r\n    result.unsigned = unsigned;\r\n    return
result;\r\n}\r\n\r\n/**\r\n * Returns a Long representation of the given string, written using the specified radix.\r\n *
@function\r\n * @param {string} str The textual representation of the Long\r\n * @param {(boolean|number)=}
unsigned Whether unsigned or not, defaults to signed\r\n * @param {number=} radix The radix in which the text is
written (2-36), defaults to 10\r\n * @returns {!Long} The corresponding Long value\r\n */\r\nLong.fromString =
fromString;\r\n\r\n/**\r\n * @function\r\n * @param {!Long|number|string|!{low: number, high: number, unsigned:
boolean}} val\r\n * @param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction
fromValue(val, unsigned) {\r\n    if (typeof val === 'number')\r\n        return fromNumber(val, unsigned);\r\n    if
(typeof val === 'string')\r\n        return fromString(val, unsigned);\r\n    // Throws for non-objects, converts non-
instanceof Long:\r\n    return fromBits(val.low, val.high, typeof unsigned === 'boolean' ? unsigned :
val.unsigned);\r\n}\r\n\r\n/**\r\n * Converts the specified value to a Long using the appropriate from* function for
its type.\r\n * @function\r\n * @param {!Long|number|string|!{low: number, high: number, unsigned: boolean}} val
Value\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long}\r\n
*/\r\nLong.fromValue = fromValue;\r\n\r\n// NOTE: the compiler should inline these constant values below and
then remove these variables, so there should be\r\n// no runtime penalty for these.\r\n\r\n/**\r\n * @type
{number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_16_DBL = 1 << 16;\r\n\r\n/**\r\n * @type
{number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_24_DBL = 1 << 24;\r\n\r\n/**\r\n * @type
{number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_32_DBL = TWO_PWR_16_DBL *
TWO_PWR_16_DBL;\r\n\r\n/**\r\n * @type {number}\r\n * @const\r\n * @inner\r\n */\r\nvar
TWO_PWR_64_DBL = TWO_PWR_32_DBL * TWO_PWR_32_DBL;\r\n\r\n/**\r\n * @type {number}\r\n *
@const\r\n * @inner\r\n */\r\nvar TWO_PWR_63_DBL = TWO_PWR_64_DBL / 2;\r\n\r\n/**\r\n * @type
{!Long}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_24 = fromInt(TWO_PWR_24_DBL);\r\n\r\n/**\r\n *
@type {!Long}\r\n * @inner\r\n */\r\nvar ZERO = fromInt(0);\r\n\r\n/**\r\n * Signed zero.\r\n * @type {!Long}\r\n
*/\r\nLong.ZERO = ZERO;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar UZERO = fromInt(0,
true);\r\n\r\n/**\r\n * Unsigned zero.\r\n * @type {!Long}\r\n */\r\nLong.UZERO = UZERO;\r\n\r\n/**\r\n * @type
{!Long}\r\n * @inner\r\n */\r\nvar ONE = fromInt(1);\r\n\r\n/**\r\n * Signed one.\r\n * @type {!Long}\r\n
*/\r\nLong.ONE = ONE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar UONE = fromInt(1,
true);\r\n\r\n/**\r\n * Unsigned one.\r\n * @type {!Long}\r\n */\r\nLong.UONE = UONE;\r\n\r\n/**\r\n * @type
{!Long}\r\n * @inner\r\n */\r\nvar NEG_ONE = fromInt(-1);\r\n\r\n/**\r\n * Signed negative one.\r\n * @type
{!Long}\r\n */\r\nLong.NEG_ONE = NEG_ONE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar
MAX_VALUE = fromBits(0xFFFFFFFF|0, 0x7FFFFFFF|0, false);\r\n\r\n/**\r\n * Maximum signed value.\r\n *
```

@type {!Long}\r\n */\r\nLong.MAX_VALUE = MAX_VALUE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar MAX_UNSIGNED_VALUE = fromBits(0xFFFFFFFF|0, 0xFFFFFFFF|0, true);\r\n\r\n/**\r\n * Maximum unsigned value.\r\n * @type {!Long}\r\n */\r\nLong.MAX_UNSIGNED_VALUE = MAX_UNSIGNED_VALUE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar MIN_VALUE = fromBits(0, 0x80000000|0, false);\r\n\r\n/**\r\n * Minimum signed value.\r\n * @type {!Long}\r\n */\r\nLong.MIN_VALUE = MIN_VALUE;\r\n\r\n/**\r\n * @alias Long.prototype\r\n * @inner\r\n */\r\nvar LongPrototype = Long.prototype;\r\n\r\n/**\r\n * Converts the Long to a 32 bit integer, assuming it is a 32 bit integer.\r\n * @returns {number}\r\n */\r\nLongPrototype.toInt = function toInt() {\r\n   return this.unsigned ? this.low >>> 0 : this.low;\r\n};\r\n\r\n/**\r\n * Converts the Long to a the nearest floating-point representation of this value (double, 53 bit mantissa).\r\n * @returns {number}\r\n */\r\nLongPrototype.toNumber = function toNumber() {\r\n   if (this.unsigned)\r\n   return ((this.high >>> 0) * TWO_PWR_32_DBL) + (this.low >>> 0);\r\n   return this.high * TWO_PWR_32_DBL + (this.low >>> 0);\r\n};\r\n\r\n/**\r\n * Converts the Long to a string written in the specified radix.\r\n * @param {number=} radix Radix (2-36), defaults to 10\r\n * @returns {string}\r\n * @override\r\n * @throws {RangeError} If `radix` is out of range\r\n */\r\nLongPrototype.toString = function toString(radix) {\r\n   radix = radix || 10;\r\n   if (radix < 2 || 36 < radix)\r\n   throw RangeError('radix');\r\n   if (this.isZero())\r\n   return '0';\r\n   if (this.isNegative()) { // Unsigned Longs are never negative\r\n   if (this.eq(MIN_VALUE)) {\r\n   // We need to change the Long value before it can be negated, so we remove\r\n   // the bottom-most digit in this base and then recurse to do the rest.\r\n   var radixLong = fromNumber(radix),\r\n   div = this.div(radixLong),\r\n   rem1 = div.mul(radixLong).sub(this);\r\n   return div.toString(radix) + rem1.toInt().toString(radix);\r\n   } else\r\n   return '-' + this.neg().toString(radix);\r\n   }\r\n\r\n   // Do several (6) digits each time through the loop, so as to\r\n   // minimize the calls to the very expensive emulated div.\r\n   var radixToPower = fromNumber(pow_dbl(radix, 6), this.unsigned),\r\n   rem = this;\r\n   var result = '';\r\n   while (true) {\r\n   var remDiv = rem.div(radixToPower),\r\n   intval = rem.sub(remDiv.mul(radixToPower)).toInt() >>> 0,\r\n   digits = intval.toString(radix);\r\n   rem = remDiv;\r\n   if (rem.isZero())\r\n   return digits + result;\r\n   else {\r\n   while (digits.length < 6)\r\n   digits = '0' + digits;\r\n   result = '' + digits + result;\r\n   }\r\n   }\r\n};\r\n\r\n/**\r\n * Gets the high 32 bits as a signed integer.\r\n * @returns {number} Signed high bits\r\n */\r\nLongPrototype.getHighBits = function getHighBits() {\r\n   return this.high;\r\n};\r\n\r\n/**\r\n * Gets the high 32 bits as an unsigned integer.\r\n * @returns {number} Unsigned high bits\r\n */\r\nLongPrototype.getHighBitsUnsigned = function getHighBitsUnsigned() {\r\n   return this.high >>> 0;\r\n};\r\n\r\n/**\r\n * Gets the low 32 bits as a signed integer.\r\n * @returns {number} Signed low bits\r\n */\r\nLongPrototype.getLowBits = function getLowBits() {\r\n   return this.low;\r\n};\r\n\r\n/**\r\n * Gets the low 32 bits as an unsigned integer.\r\n * @returns {number} Unsigned low bits\r\n */\r\nLongPrototype.getLowBitsUnsigned = function getLowBitsUnsigned() {\r\n   return this.low >>> 0;\r\n};\r\n\r\n/**\r\n * Gets the number of bits needed to represent the absolute value of this Long.\r\n * @returns {number}\r\n */\r\nLongPrototype.getNumBitsAbs = function getNumBitsAbs() {\r\n   if (this.isNegative()) // Unsigned Longs are never negative\r\n   return this.eq(MIN_VALUE) ? 64 : this.neg().getNumBitsAbs();\r\n   var val = this.high != 0 ? this.high : this.low;\r\n   for (var bit = 31; bit > 0; bit--)\r\n   if ((val & (1 << bit)) != 0)\r\n   break;\r\n   return this.high != 0 ? bit + 33 : bit + 1;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value equals zero.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isZero = function isZero() {\r\n   return this.high === 0 && this.low === 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value equals zero. This is an alias of {@link Long#isZero}.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.eqz = LongPrototype.isZero;\r\n\r\n/**\r\n * Tests if this Long's value is negative.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isNegative = function isNegative() {\r\n   return !this.unsigned && this.high < 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is positive.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isPositive = function isPositive() {\r\n   return this.unsigned || this.high >= 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is odd.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isOdd = function isOdd() {\r\n   return (this.low & 1) === 1;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is even.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isEven = function isEven() {\r\n   return (this.low & 1) === 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value equals the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.equals = function equals(other) {\r\n   if (!isLong(other))\r\n   other = fromValue(other);\r\n   if (this.unsigned !== other.unsigned && (this.high >>> 31) === 1 && (other.high >>> 31) === 1)\r\n   return false;\r\n   return this.high === other.high && this.low === other.low;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value equals the specified's. This is an alias of {@link Long#equals}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.eq = LongPrototype.equals;\r\n\r\n/**\r\n * Tests if this Long's value differs from the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.notEquals = function notEquals(other) {\r\n   return !this.eq(/* validates */ other);\r\n};\r\n\r\n/**\r\n * Tests if this Long's value differs from the specified's. This is an alias of {@link Long#notEquals}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.neq = LongPrototype.notEquals;\r\n\r\n/**\r\n * Tests if this Long's value differs from the specified's. This is an alias of {@link Long#notEquals}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.ne = LongPrototype.notEquals;\r\n\r\n/**\r\n * Tests if this Long's value is less than the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.lessThan = function lessThan(other) {\r\n   return this.comp(/* validates */ other) < 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is less than the specified's. This is an alias of {@link Long#lessThan}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.lt = LongPrototype.lessThan;\r\n\r\n/**\r\n * Tests if this Long's value is less than or equal the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.lessThanOrEqual = function lessThanOrEqual(other) {\r\n   return this.comp(/* validates */ other) <= 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is less than or equal the specified's. This is an alias of {@link Long#lessThanOrEqual}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.lte = LongPrototype.lessThanOrEqual;\r\n\r\n/**\r\n * Tests if this Long's value is less than or equal the specified's. This is an alias of {@link Long#lessThanOrEqual}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.le = LongPrototype.lessThanOrEqual;\r\n\r\n/**\r\n * Tests if this Long's value is greater than the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.greaterThan = function greaterThan(other) {\r\n   return this.comp(/* validates */ other) > 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is greater than the specified's. This is an alias of {@link Long#greaterThan}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.gt = LongPrototype.greaterThan;\r\n\r\n/**\r\n * Tests if this Long's value is greater than or equal the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.greaterThanOrEqual = function greaterThanOrEqual(other) {\r\n   return this.comp(/* validates */ other) >= 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is greater than or equal the specified's. This is an alias of {@link Long#greaterThanOrEqual}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.gte = LongPrototype.greaterThanOrEqual;\r\n\r\n/**\r\n * Tests if this Long's value is greater than or equal the specified's. This is an alias of {@link Long#greaterThanOrEqual}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.ge = LongPrototype.greaterThanOrEqual;\r\n\r\n/**\r\n * Compares this Long's value with the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {number} 0 if they are the same, 1 if the this is greater and -1\r\n * if the given one is greater\r\n */\r\nLongPrototype.compare = function compare(other) {\r\n   if (!isLong(other))\r\n   other = fromValue(other);\r\n   if (this.eq(other))\r\n   return 0;\r\n   var thisNeg = this.isNegative(),\r\n   otherNeg = other.isNegative();\r\n   if (thisNeg && !otherNeg)\r\n   return -1;\r\n   if (!thisNeg && otherNeg)\r\n   return 1;\r\n   // At this point the sign bits are the same\r\n   if (!this.unsigned)\r\n   return this.sub(other).isNegative() ? -1 : 1;\r\n   // Both are positive if at least one is unsigned\r\n   return (other.high >>> 0) > (this.high >>> 0) || (other.high === this.high && (other.low

>>> 0) > (this.low >>> 0)) ? -1 : 1;\r\n};\r\n\r\n/**\r\n * Compares this Long's value with the specified's. This is an alias of {@link Long#compare}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {number} 0 if they are the same, 1 if the this is greater and -1\r\n * if the given one is greater\r\n */\r\nLongPrototype.comp = LongPrototype.compare;\r\n\r\n/**\r\n * Negates this Long's value.\r\n * @returns {!Long} Negated Long\r\n */\r\nLongPrototype.negate = function negate() {\r\n   if (!this.unsigned && this.eq(MIN_VALUE))\r\n   return MIN_VALUE;\r\n   return this.not().add(ONE);\r\n};\r\n\r\n/**\r\n * Negates this Long's value. This is an alias of {@link Long#negate}.\r\n * @function\r\n * @returns {!Long} Negated Long\r\n */\r\nLongPrototype.neg = LongPrototype.negate;\r\n\r\n/**\r\n * Returns the sum of this and the specified Long.\r\n * @param {!Long|number|string} addend Addend\r\n * @returns {!Long} Sum\r\n */\r\nLongPrototype.add = function add(addend) {\r\n   if (!isLong(addend))\r\n   addend = fromValue(addend);\r\n\r\n   // Divide each number into 4 chunks of 16 bits, and then sum the chunks.\r\n\r\n   var a48 = this.high >>> 16;\r\n   var a32 = this.high & 0xFFFF;\r\n   var a16 = this.low >>> 16;\r\n   var a00 = this.low & 0xFFFF;\r\n\r\n   var b48 = addend.high >>> 16;\r\n   var b32 = addend.high & 0xFFFF;\r\n   var b16 = addend.low >>> 16;\r\n   var b00 = addend.low & 0xFFFF;\r\n\r\n   var c48 = 0, c32 = 0, c16 = 0, c00 = 0;\r\n   c00 += a00 + b00;\r\n   c16 += c00 >>> 16;\r\n   c00 &= 0xFFFF;\r\n   c16 += a16 + b16;\r\n   c32 += c16 >>> 16;\r\n   c16 &= 0xFFFF;\r\n   c32 += a32 + b32;\r\n   c48 += c32 >>> 16;\r\n   c32 &= 0xFFFF;\r\n   c48 += a48 + b48;\r\n   c48 &= 0xFFFF;\r\n   return fromBits((c16 << 16) | c00, (c48 << 16) | c32, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the difference of this and the specified Long.\r\n * @param {!Long|number|string} subtrahend Subtrahend\r\n * @returns {!Long} Difference\r\n */\r\nLongPrototype.subtract = function subtract(subtrahend) {\r\n   if (!isLong(subtrahend))\r\n   subtrahend = fromValue(subtrahend);\r\n   return this.add(subtrahend.neg());\r\n};\r\n\r\n/**\r\n * Returns the difference of this and the specified Long. This is an alias of {@link Long#subtract}.\r\n * @function\r\n * @param {!Long|number|string} subtrahend Subtrahend\r\n * @returns {!Long} Difference\r\n */\r\nLongPrototype.sub = LongPrototype.subtract;\r\n\r\n/**\r\n * Returns the product of this and the specified Long.\r\n * @param {!Long|number|string} multiplier Multiplier\r\n * @returns {!Long} Product\r\n */\r\nLongPrototype.multiply = function multiply(multiplier) {\r\n   if (this.isZero())\r\n   return ZERO;\r\n   if (!isLong(multiplier))\r\n   multiplier = fromValue(multiplier);\r\n\r\n   // use wasm support if present\r\n   if (wasm) {\r\n   var low = wasm.mul(this.low,\r\n   this.high,\r\n   multiplier.low,\r\n   multiplier.high);\r\n   return fromBits(low, wasm.get_high(), this.unsigned);\r\n   }\r\n\r\n   if (multiplier.isZero())\r\n   return ZERO;\r\n   if (this.eq(MIN_VALUE))\r\n   return multiplier.isOdd() ? MIN_VALUE : ZERO;\r\n   if (multiplier.eq(MIN_VALUE))\r\n   return this.isOdd() ? MIN_VALUE : ZERO;\r\n\r\n   if (this.isNegative()) {\r\n   if (multiplier.isNegative())\r\n   return this.neg().mul(multiplier.neg());\r\n   else\r\n   return this.neg().mul(multiplier).neg();\r\n   } else if (multiplier.isNegative())\r\n   return this.mul(multiplier.neg()).neg();\r\n\r\n   // If both longs are small, use float multiplication\r\n   if (this.lt(TWO_PWR_24) && multiplier.lt(TWO_PWR_24))\r\n   return fromNumber(this.toNumber() * multiplier.toNumber(), this.unsigned);\r\n\r\n   // Divide each long into 4 chunks of 16 bits, and then add up 4x4 products.\r\n   // We can skip products that would overflow.\r\n\r\n   var a48 = this.high >>> 16;\r\n   var a32 = this.high & 0xFFFF;\r\n   var a16 = this.low >>> 16;\r\n   var a00 = this.low & 0xFFFF;\r\n\r\n   var b48 = multiplier.high >>> 16;\r\n   var b32 = multiplier.high & 0xFFFF;\r\n   var b16 = multiplier.low >>> 16;\r\n   var b00 = multiplier.low & 0xFFFF;\r\n\r\n   var c48 = 0, c32 = 0, c16 = 0, c00 = 0;\r\n   c00 += a00 * b00;\r\n   c16 += c00 >>> 16;\r\n   c00 &= 0xFFFF;\r\n   c16 += a16 * b00;\r\n   c32 += c16 >>> 16;\r\n   c16 &= 0xFFFF;\r\n   c16 += a00 * b16;\r\n   c32 += c16 >>> 16;\r\n   c16 &= 0xFFFF;\r\n   c32 += a32 * b00;\r\n   c48 += c32 >>> 16;\r\n   c32 &= 0xFFFF;\r\n   c32 += a16 * b16;\r\n   c48 += c32 >>> 16;\r\n   c32 &= 0xFFFF;\r\n   c32 += a00 * b32;\r\n   c48 += c32 >>> 16;\r\n   c32 &= 0xFFFF;\r\n   c48 += a48 * b00 + a32 * b16 + a16 * b32 + a00 * b48;\r\n   c48 &= 0xFFFF;\r\n   return fromBits((c16 << 16) | c00, (c48 << 16) | c32, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the product of this and the specified Long. This is an alias of {@link Long#multiply}.\r\n * @function\r\n * @param {!Long|number|string} multiplier Multiplier\r\n * @returns {!Long} Product\r\n */\r\nLongPrototype.mul = LongPrototype.multiply;\r\n\r\n/**\r\n * Returns this Long divided by the specified. The result is signed if this Long is signed or\r\n * unsigned if this Long is unsigned.\r\n * @param

{!Long|number|string} divisor Divisor\r\n * @returns {!Long} Quotient\r\n */\r\nLongPrototype.divide = function divide(divisor) {\r\n   if (!isLong(divisor))\r\n   divisor = fromValue(divisor);\r\n   if (divisor.isZero())\r\n   throw Error('division by zero');\r\n\r\n   // use wasm support if present\r\n   if (wasm) {\r\n   // guard against signed division overflow: the largest\r\n   // negative number / -1 would be 1 larger than the largest\r\n   // positive number, due to two's complement.\r\n   if (!this.unsigned &&\r\n   this.high === -0x80000000 &&\r\n   divisor.low === -1 && divisor.high === -1) {\r\n   // be consistent with non-wasm code path\r\n   return this;\r\n   }\r\n   var low = (this.unsigned ? wasm.div_u : wasm.div_s)(\r\n   this.low,\r\n   this.high,\r\n   divisor.low,\r\n   divisor.high\r\n   );\r\n   return fromBits(low, wasm.get_high(), this.unsigned);\r\n   }\r\n\r\n   if (this.isZero())\r\n   return this.unsigned ? UZERO : ZERO;\r\n   var approx, rem, res;\r\n   if (!this.unsigned) {\r\n   // This section is only relevant for signed longs and is derived from the\r\n   // closure library as a whole.\r\n   if (this.eq(MIN_VALUE)) {\r\n   if (divisor.eq(ONE) || divisor.eq(NEG_ONE))\r\n   return MIN_VALUE; // recall that -MIN_VALUE == MIN_VALUE\r\n   else if (divisor.eq(MIN_VALUE))\r\n   return ONE;\r\n   else {\r\n   // At this point, we have |other| >= 2, so |this/other| < |MIN_VALUE|.\r\n   var halfThis = this.shr(1);\r\n   approx = halfThis.div(divisor).shl(1);\r\n   if (approx.eq(ZERO)) {\r\n   return divisor.isNegative() ? ONE : NEG_ONE;\r\n   } else {\r\n   rem = this.sub(divisor.mul(approx));\r\n   res = approx.add(rem.div(divisor));\r\n   return res;\r\n   }\r\n   }\r\n   } else if (divisor.eq(MIN_VALUE))\r\n   return this.unsigned ? UZERO : ZERO;\r\n   if (this.isNegative()) {\r\n   if (divisor.isNegative())\r\n   return this.neg().div(divisor.neg());\r\n   return this.neg().div(divisor).neg();\r\n   } else if (divisor.isNegative())\r\n   return this.div(divisor.neg()).neg();\r\n   res = ZERO;\r\n   } else {\r\n   // The algorithm below has not been made for unsigned longs. It's therefore\r\n   // required to take special care of the MSB prior to running it.\r\n   if (!divisor.unsigned)\r\n   divisor = divisor.toUnsigned();\r\n   if (divisor.gt(this))\r\n   return UZERO;\r\n   if (divisor.gt(this.shru(1))) // 15 >>> 1 = 7 ; with divisor = 8 ; true\r\n   return UONE;\r\n   res = UZERO;\r\n   }\r\n\r\n   // Repeat the following until the remainder is less than other: find a\r\n   // floating-point that approximates remainder / other *from below*, add this\r\n   // into the result, and subtract it from the remainder. It is critical that\r\n   // the approximate value is less than or equal to the real value so that the\r\n   // remainder never becomes negative.\r\n   rem = this;\r\n   while (rem.gte(divisor)) {\r\n   // Approximate the result of division. This may be a little greater or\r\n   // smaller than the actual value.\r\n   approx = Math.max(1, Math.floor(rem.toNumber() / divisor.toNumber()));\r\n\r\n   // We will tweak the approximate result by changing it in the 48-th digit or\r\n   // the smallest non-fractional digit, whichever is larger.\r\n   var log2 = Math.ceil(Math.log(approx) / Math.LN2),\r\n   delta = (log2 <= 48) ? 1 : pow_dbl(2, log2 - 48),\r\n\r\n   // Decrease the approximation until it is smaller than the remainder. Note\r\n   // that if it is too large, the product overflows and is negative.\r\n   approxRes = fromNumber(approx),\r\n   approxRem = approxRes.mul(divisor);\r\n   while (approxRem.isNegative() || approxRem.gt(rem)) {\r\n   approx -= delta;\r\n   approxRes = fromNumber(approx, this.unsigned);\r\n   approxRem = approxRes.mul(divisor);\r\n   }\r\n\r\n   // We know the answer can't be zero... and actually, zero would cause\r\n   // infinite recursion since we would make no progress.\r\n   if (approxRes.isZero())\r\n   approxRes = ONE;\r\n\r\n   res = res.add(approxRes);\r\n   rem = rem.sub(approxRem);\r\n   }\r\n   return res;\r\n};\r\n\r\n/**\r\n * Returns this Long divided by the specified. This is an alias of {@link Long#divide}.\r\n * @function\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Quotient\r\n */\r\nLongPrototype.div = LongPrototype.divide;\r\n\r\n/**\r\n * Returns this Long modulo the specified.\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Remainder\r\n */\r\nLongPrototype.modulo = function modulo(divisor) {\r\n   if (!isLong(divisor))\r\n   divisor = fromValue(divisor);\r\n\r\n   // use wasm support if present\r\n   if (wasm) {\r\n   var low = (this.unsigned ? wasm.rem_u : wasm.rem_s)(\r\n   this.low,\r\n   this.high,\r\n   divisor.low,\r\n   divisor.high\r\n   );\r\n   return fromBits(low, wasm.get_high(), this.unsigned);\r\n   }\r\n\r\n   return this.sub(this.div(divisor).mul(divisor));\r\n};\r\n\r\n/**\r\n * Returns this Long modulo the specified. This is an alias of {@link Long#modulo}.\r\n * @function\r\n * @param

{!Long|number|string} divisor Divisor\r\n * @returns {!Long} Remainder\r\n */\r\nLongPrototype.mod = LongPrototype.modulo;\r\n\r\n/**\r\n * Returns this Long modulo the specified. This is an alias of {@link Long#modulo}.\r\n * @function\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Remainder\r\n */\r\nLongPrototype.rem = LongPrototype.modulo;\r\n\r\n/**\r\n * Returns the bitwise NOT of this Long.\r\n * @returns {!Long}\r\n */\r\nLongPrototype.not = function not() {\r\n   return fromBits(~this.low, ~this.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the bitwise AND of this Long and the specified.\r\n * @param {!Long|number|string} other Other Long\r\n * @returns {!Long}\r\n */\r\nLongPrototype.and = function and(other) {\r\n   if (!isLong(other))\r\n   other = fromValue(other);\r\n   return fromBits(this.low & other.low, this.high & other.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the bitwise OR of this Long and the specified.\r\n * @param {!Long|number|string} other Other Long\r\n * @returns {!Long}\r\n */\r\nLongPrototype.or = function or(other) {\r\n   if (!isLong(other))\r\n   other = fromValue(other);\r\n   return fromBits(this.low | other.low, this.high | other.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the bitwise XOR of this Long and the given one.\r\n * @param {!Long|number|string} other Other Long\r\n * @returns {!Long}\r\n */\r\nLongPrototype.xor = function xor(other) {\r\n   if (!isLong(other))\r\n   other = fromValue(other);\r\n   return fromBits(this.low ^ other.low, this.high ^ other.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns this Long with bits shifted to the left by the given amount.\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shiftLeft = function shiftLeft(numBits) {\r\n   if (isLong(numBits))\r\n   numBits = numBits.toInt();\r\n   if ((numBits &= 63) === 0)\r\n   return this;\r\n   else if (numBits < 32)\r\n   return fromBits(this.low << numBits, (this.high << numBits) | (this.low >>> (32 - numBits)), this.unsigned);\r\n   else\r\n   return fromBits(0, this.low << (numBits - 32), this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns this Long with bits shifted to the left by the given amount. This is an alias of {@link Long#shiftLeft}.\r\n * @function\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shl = LongPrototype.shiftLeft;\r\n\r\n/**\r\n * Returns this Long with bits arithmetically shifted to the right by the given amount.\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shiftRight = function shiftRight(numBits) {\r\n   if (isLong(numBits))\r\n   numBits = numBits.toInt();\r\n   if ((numBits &= 63) === 0)\r\n   return this;\r\n   else if (numBits < 32)\r\n   return fromBits((this.low >>> numBits) | (this.high << (32 - numBits)), this.high >> numBits, this.unsigned);\r\n   else\r\n   return fromBits(this.high >> (numBits - 32), this.high >= 0 ? 0 : -1, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns this Long with bits arithmetically shifted to the right by the given amount. This is an alias of {@link Long#shiftRight}.\r\n * @function\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shr = LongPrototype.shiftRight;\r\n\r\n/**\r\n * Returns this Long with bits logically shifted to the right by the given amount.\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shiftRightUnsigned = function shiftRightUnsigned(numBits) {\r\n   if (isLong(numBits))\r\n   numBits = numBits.toInt();\r\n   numBits &= 63;\r\n   if (numBits === 0)\r\n   return this;\r\n   else {\r\n   var high = this.high;\r\n   if (numBits < 32) {\r\n   var low = this.low;\r\n   return fromBits((low >>> numBits) | (high << (32 - numBits)), high >>> numBits, this.unsigned);\r\n   } else if (numBits === 32)\r\n   return fromBits(high, 0, this.unsigned);\r\n   else\r\n   return fromBits(high >>> (numBits - 32), 0, this.unsigned);\r\n   }\r\n};\r\n\r\n/**\r\n * Returns this Long with bits logically shifted to the right by the given amount. This is an alias of {@link Long#shiftRightUnsigned}.\r\n * @function\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shru = LongPrototype.shiftRightUnsigned;\r\n\r\n/**\r\n * Returns this Long with bits logically shifted to the right by the given amount. This is an alias of {@link Long#shiftRightUnsigned}.\r\n * @function\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shr_u = LongPrototype.shiftRightUnsigned;\r\n\r\n/**\r\n * Converts this Long to signed.\r\n * @returns {!Long} Signed long\r\n */\r\nLongPrototype.toSigned = function toSigned() {\r\n   if (!this.unsigned)\r\n   return this;\r\n   return fromBits(this.low, this.high, false);\r\n};\r\n\r\n/**\r\n * Converts this Long to unsigned.\r\n * @returns {!Long} Unsigned long\r\n */\r\nLongPrototype.toUnsigned = function toUnsigned() {\r\n   if (this.unsigned)\r\n return this;\r\n return fromBits(this.low, this.high, true);\r\n};\r\n\r\n/**\r\n * Converts this Long to its byte representation.\r\n * @param {boolean=} le Whether little or big endian, defaults to big endian\r\n * @returns {!Array.<number>} Byte representation\r\n */\r\nLongPrototype.toBytes = function toBytes(le) {\r\n return le ? this.toBytesLE() : this.toBytesBE();\r\n};\r\n\r\n/**\r\n * Converts this Long to its little endian byte representation.\r\n * @returns {!Array.<number>} Little endian byte representation\r\n */\r\nLongPrototype.toBytesLE = function toBytesLE() {\r\n var hi = this.high,\r\n lo = this.low;\r\n return [\r\n lo & 0xff,\r\n lo >>> 8 & 0xff,\r\n lo >>> 16 & 0xff,\r\n lo >>> 24 ,\r\n hi & 0xff,\r\n hi >>> 8 & 0xff,\r\n hi >>> 16 & 0xff,\r\n hi >>> 24\r\n];\r\n};\r\n\r\n/**\r\n * Converts this Long to its big endian byte representation.\r\n * @returns {!Array.<number>} Big endian byte representation\r\n */\r\nLongPrototype.toBytesBE = function toBytesBE() {\r\n var hi = this.high,\r\n lo = this.low;\r\n return [\r\n hi >>> 24 ,\r\n hi >>> 16 & 0xff,\r\n hi >>> 8 & 0xff,\r\n hi & 0xff,\r\n lo >>> 24 ,\r\n lo >>> 16 & 0xff,\r\n lo >>> 8 & 0xff,\r\n lo & 0xff\r\n];\r\n};\r\n\r\n/**\r\n * Creates a Long from its byte representation.\r\n * @param {!Array.<number>} bytes Byte representation\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @param {boolean=} le Whether little or big endian, defaults to big endian\r\n * @returns {Long} The corresponding Long value\r\n */\r\nLong.fromBytes = function fromBytes(bytes, unsigned, le) {\r\n return le ? Long.fromBytesLE(bytes, unsigned) : Long.fromBytesBE(bytes, unsigned);\r\n};\r\n\r\n/**\r\n * Creates a Long from its little endian byte representation.\r\n * @param {!Array.<number>} bytes Little endian byte representation\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {Long} The corresponding Long value\r\n */\r\nLong.fromBytesLE = function fromBytesLE(bytes, unsigned) {\r\n return new Long(\r\n bytes[0] |\r\n bytes[1] << 8 |\r\n bytes[2] << 16 |\r\n bytes[3] << 24,\r\n bytes[4] |\r\n bytes[5] << 8 |\r\n bytes[6] << 16 |\r\n bytes[7] << 24,\r\n unsigned\r\n);\r\n};\r\n\r\n/**\r\n * Creates a Long from its big endian byte representation.\r\n * @param {!Array.<number>} bytes Big endian byte representation\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {Long} The corresponding Long value\r\n */\r\nLong.fromBytesBE = function fromBytesBE(bytes, unsigned) {\r\n return new Long(\r\n bytes[4] << 24 |\r\n bytes[5] << 16 |\r\n bytes[6] << 8 |\r\n bytes[7],\r\n bytes[0] << 24 |\r\n bytes[1] << 16 |\r\n bytes[2] << 8 |\r\n bytes[3],\r\n unsigned\r\n);\r\n};\r\n","/*eslint-disable block-scoped-var, id-length, no-control-regex, no-magic-numbers, no-prototype-builtins, no-redeclare, no-shadow, no-var, sort-vars*/\n\"use strict\";\n\nvar $protobuf = require(\"protobufjs/minimal\");\n\n// Common aliases\nvar $Reader = $protobuf.Reader, $Writer = $protobuf.Writer, $util = $protobuf.util;\n\n// Exported root namespace\nvar $root = $protobuf.roots[\"default\"] || ($protobuf.roots[\"default\"] = {});\n\n$root.onnx = (function() {\n\n /**\n * Namespace onnx.\n * @exports onnx\n * @namespace\n */\n var onnx = {};\n\n /**\n * Version enum.\n * @name onnx.Version\n * @enum {string}\n * @property {number} _START_VERSION=0 _START_VERSION value\n * @property {number} IR_VERSION_2017_10_10=1 IR_VERSION_2017_10_10 value\n * @property {number} IR_VERSION_2017_10_30=2 IR_VERSION_2017_10_30 value\n * @property {number} IR_VERSION_2017_11_3=3 IR_VERSION_2017_11_3 value\n * @property {number} IR_VERSION_2019_1_22=4 IR_VERSION_2019_1_22 value\n * @property {number} IR_VERSION=5 IR_VERSION value\n */\n onnx.Version = (function() {\n var valuesById = {}, values = Object.create(valuesById);\n values[valuesById[0] = \"_START_VERSION\"] = 0;\n values[valuesById[1] = \"IR_VERSION_2017_10_10\"] = 1;\n values[valuesById[2] = \"IR_VERSION_2017_10_30\"] = 2;\n values[valuesById[3] = \"IR_VERSION_2017_11_3\"] = 3;\n values[valuesById[4] = \"IR_VERSION_2019_1_22\"] = 4;\n values[valuesById[5] = \"IR_VERSION\"] = 5;\n return values;\n })();\n\n onnx.AttributeProto = (function() {\n\n /**\n * Properties of an AttributeProto.\n * @memberof onnx\n * @interface IAttributeProto\n * @property {string|null} [name] AttributeProto name\n * @property {string|null} [refAttrName] AttributeProto refAttrName\n * @property {string|null} [docString] AttributeProto docString\n * @property {onnx.AttributeProto.AttributeType|null} [type] AttributeProto type\n * @property {number|null} [f] AttributeProto f\n * @property {number|Long|null}

[i] AttributeProto i\n * @property {Uint8Array|null} [s] AttributeProto s\n * @property {onnx.ITensorProto|null} [t] AttributeProto t\n * @property {onnx.IGraphProto|null} [g] AttributeProto g\n * @property {Array.<number>|null} [floats] AttributeProto floats\n * @property {Array.<number|Long>|null} [ints] AttributeProto ints\n * @property {Array.<Uint8Array>|null} [strings] AttributeProto strings\n * @property {Array.<onnx.ITensorProto>|null} [tensors] AttributeProto tensors\n * @property {Array.<onnx.IGraphProto>|null} [graphs] AttributeProto graphs\n */\n\n /**\n * Constructs a new AttributeProto.\n * @memberof onnx\n * @classdesc Represents an AttributeProto.\n * @implements IAttributeProto\n * @constructor\n * @param {onnx.IAttributeProto=} [properties] Properties to set\n */\n function AttributeProto(properties) {\n this.floats = [];\n this.ints = [];\n this.strings = [];\n this.tensors = [];\n this.graphs = [];\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * AttributeProto name.\n * @member {string} name\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.name = \"\";\n\n /**\n * AttributeProto refAttrName.\n * @member {string} refAttrName\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.refAttrName = \"\";\n\n /**\n * AttributeProto docString.\n * @member {string} docString\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.docString = \"\";\n\n /**\n * AttributeProto type.\n * @member {onnx.AttributeProto.AttributeType} type\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.type = 0;\n\n /**\n * AttributeProto f.\n * @member {number} f\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.f = 0;\n\n /**\n * AttributeProto i.\n * @member {number|Long} i\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.i = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n /**\n * AttributeProto s.\n * @member {Uint8Array} s\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.s = $util.newBuffer([]);\n\n /**\n * AttributeProto t.\n * @member {onnx.ITensorProto|null|undefined} t\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.t = null;\n\n /**\n * AttributeProto g.\n * @member {onnx.IGraphProto|null|undefined} g\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.g = null;\n\n /**\n * AttributeProto floats.\n * @member {Array.<number>} floats\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.floats = $util.emptyArray;\n\n /**\n * AttributeProto ints.\n * @member {Array.<number|Long>} ints\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.ints = $util.emptyArray;\n\n /**\n * AttributeProto strings.\n * @member {Array.<Uint8Array>} strings\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.strings = $util.emptyArray;\n\n /**\n * AttributeProto tensors.\n * @member {Array.<onnx.ITensorProto>} tensors\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.tensors = $util.emptyArray;\n\n /**\n * AttributeProto graphs.\n * @member {Array.<onnx.IGraphProto>} graphs\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.graphs = $util.emptyArray;\n\n /**\n * Creates a new AttributeProto instance using the specified properties.\n * @function create\n * @memberof onnx.AttributeProto\n * @static\n * @param {onnx.IAttributeProto=} [properties] Properties to set\n * @returns {onnx.AttributeProto} AttributeProto instance\n */\n AttributeProto.create = function create(properties) {\n return new AttributeProto(properties);\n };\n\n /**\n * Encodes the specified AttributeProto message. Does not implicitly {@link onnx.AttributeProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.AttributeProto\n * @static\n * @param {onnx.IAttributeProto} message AttributeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n AttributeProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.name != null &&

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message.hasOwnProperty(\"name\"))\n                writer.uint32(/* id 1, wireType 2 =*/10).string(message.name);\n
        if (message.f != null && message.hasOwnProperty(\"f\"))\n                writer.uint32(/* id 2, wireType 5
=*/21).float(message.f);\n            if (message.i != null && message.hasOwnProperty(\"i\"))\n
writer.uint32(/* id 3, wireType 0 =*/24).int64(message.i);\n            if (message.s != null &&
message.hasOwnProperty(\"s\"))\n                writer.uint32(/* id 4, wireType 2 =*/34).bytes(message.s);\n            if
(message.t != null && message.hasOwnProperty(\"t\"))\n                $root.onnx.TensorProto.encode(message.t,
writer.uint32(/* id 5, wireType 2 =*/42).fork()).ldelim();\n            if (message.g != null &&
message.hasOwnProperty(\"g\"))\n                $root.onnx.GraphProto.encode(message.g, writer.uint32(/* id 6,
wireType 2 =*/50).fork()).ldelim();\n            if (message.floats != null && message.floats.length) {\n
writer.uint32(/* id 7, wireType 2 =*/58).fork();\n                for (var i = 0; i < message.floats.length; ++i)\n
 writer.float(message.floats[i]);\n                writer.ldelim();\n            }\n            if (message.ints != null &&
message.ints.length) {\n                writer.uint32(/* id 8, wireType 2 =*/66).fork();\n                for (var i = 0; i <
message.ints.length; ++i)\n                    writer.int64(message.ints[i]);\n                writer.ldelim();\n            }\n
if (message.strings != null && message.strings.length)\n                for (var i = 0; i < message.strings.length; ++i)\n
            writer.uint32(/* id 9, wireType 2 =*/74).bytes(message.strings[i]);\n            if (message.tensors != null &&
message.tensors.length)\n                for (var i = 0; i < message.tensors.length; ++i)\n
$root.onnx.TensorProto.encode(message.tensors[i], writer.uint32(/* id 10, wireType 2 =*/82).fork()).ldelim();\n
   if (message.graphs != null && message.graphs.length)\n                for (var i = 0; i < message.graphs.length; ++i)\n
              $root.onnx.GraphProto.encode(message.graphs[i], writer.uint32(/* id 11, wireType 2
=*/90).fork()).ldelim();\n            if (message.docString != null && message.hasOwnProperty(\"docString\"))\n
    writer.uint32(/* id 13, wireType 2 =*/106).string(message.docString);\n            if (message.type != null &&
message.hasOwnProperty(\"type\"))\n                writer.uint32(/* id 20, wireType 0 =*/160).int32(message.type);\n
      if (message.refAttrName != null && message.hasOwnProperty(\"refAttrName\"))\n                writer.uint32(/* id
21, wireType 2 =*/170).string(message.refAttrName);\n            return writer;\n        };\n\n        /**\n         * Encodes
the specified AttributeProto message, length delimited. Does not implicitly {@link
onnx.AttributeProto.verify|verify} messages.\n         * @function encodeDelimited\n         * @memberof
onnx.AttributeProto\n         * @static\n         * @param {onnx.IAttributeProto} message AttributeProto message or
plain object to encode\n         * @param {$protobuf.Writer} [writer] Writer to encode to\n         * @returns
{$protobuf.Writer} Writer\n         */\n        AttributeProto.encodeDelimited = function encodeDelimited(message,
writer) {\n            return this.encode(message, writer).ldelim();\n        };\n\n        /**\n         * Decodes an
AttributeProto message from the specified reader or buffer.\n         * @function decode\n         * @memberof
onnx.AttributeProto\n         * @static\n         * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to
decode from\n         * @param {number} [length] Message length if known beforehand\n         * @returns
{onnx.AttributeProto} AttributeProto\n         * @throws {Error} If the payload is not a reader or valid buffer\n
* @throws {$protobuf.util.ProtocolError} If required fields are missing\n         */\n        AttributeProto.decode =
function decode(reader, length) {\n            if (!(reader instanceof $Reader))\n                reader =
$Reader.create(reader);\n            var end = length === undefined ? reader.len : reader.pos + length, message = new
$root.onnx.AttributeProto();\n            while (reader.pos < end) {\n                var tag = reader.uint32();\n
switch (tag >>> 3) {\n                case 1:\n                    message.name = reader.string();\n                    break;\n
 case 21:\n                    message.refAttrName = reader.string();\n                    break;\n                case 13:\n
message.docString = reader.string();\n                    break;\n                case 20:\n                    message.type =
reader.int32();\n                    break;\n                case 2:\n                    message.f = reader.float();\n
break;\n                case 3:\n                    message.i = reader.int64();\n                    break;\n                case 4:\n
    message.s = reader.bytes();\n                    break;\n                case 5:\n                    message.t =
$root.onnx.TensorProto.decode(reader, reader.uint32());\n                    break;\n                case 6:\n
message.g = $root.onnx.GraphProto.decode(reader, reader.uint32());\n                    break;\n                case 7:\n
        if (!(message.floats && message.floats.length))\n                        message.floats = [];\n                    if ((tag & 7)
=== 2) {\n                        var end2 = reader.uint32() + reader.pos;\n                        while (reader.pos < end2)\n
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message.floats.push(reader.float());\n } else\n message.floats.push(reader.float());\n break;\n case 8:\n if (!(message.ints && message.ints.length))\n message.ints = [];\n if ((tag & 7) === 2) {\n var end2 = reader.uint32() + reader.pos;\n while (reader.pos < end2)\n message.ints.push(reader.int64());\n } else\n message.ints.push(reader.int64());\n break;\n case 9:\n if (!(message.strings && message.strings.length))\n message.strings = [];\n message.strings.push(reader.bytes());\n break;\n case 10:\n if (!(message.tensors && message.tensors.length))\n message.tensors = [];\n message.tensors.push($root.onnx.TensorProto.decode(reader, reader.uint32()));\n break;\n case 11:\n if (!(message.graphs && message.graphs.length))\n message.graphs = [];\n message.graphs.push($root.onnx.GraphProto.decode(reader, reader.uint32()));\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes an AttributeProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.AttributeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.AttributeProto} AttributeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n AttributeProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies an AttributeProto message.\n * @function verify\n * @memberof onnx.AttributeProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n AttributeProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.name != null && message.hasOwnProperty(\"name\"))\n if (!$util.isString(message.name))\n return \"name: string expected\";\n if (message.refAttrName != null && message.hasOwnProperty(\"refAttrName\"))\n if (!$util.isString(message.refAttrName))\n return \"refAttrName: string expected\";\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n if (!$util.isString(message.docString))\n return \"docString: string expected\";\n if (message.type != null && message.hasOwnProperty(\"type\"))\n switch (message.type) {\n default:\n return \"type: enum value expected\";\n case 0:\n case 1:\n case 2:\n case 3:\n case 4:\n case 5:\n case 6:\n case 7:\n case 8:\n case 9:\n case 10:\n break;\n }\n if (message.f != null && message.hasOwnProperty(\"f\"))\n if (typeof message.f !== \"number\")\n return \"f: number expected\";\n if (message.i != null && message.hasOwnProperty(\"i\"))\n if (!$util.isInteger(message.i) && !(message.i && $util.isInteger(message.i.low) && $util.isInteger(message.i.high)))\n return \"i: integer|Long expected\";\n if (message.s != null && message.hasOwnProperty(\"s\"))\n if (!(message.s && typeof message.s.length === \"number\" || $util.isString(message.s)))\n return \"s: buffer expected\";\n if (message.t != null && message.hasOwnProperty(\"t\")) {\n var error = $root.onnx.TensorProto.verify(message.t);\n if (error)\n return \"t.\" + error;\n }\n if (message.g != null && message.hasOwnProperty(\"g\")) {\n var error = $root.onnx.GraphProto.verify(message.g);\n if (error)\n return \"g.\" + error;\n }\n if (message.floats != null && message.hasOwnProperty(\"floats\")) {\n if (!Array.isArray(message.floats))\n return \"floats: array expected\";\n for (var i = 0; i < message.floats.length; ++i)\n if (typeof message.floats[i] !== \"number\")\n return \"floats: number[] expected\";\n }\n if (message.ints != null && message.hasOwnProperty(\"ints\")) {\n if (!Array.isArray(message.ints))\n return \"ints: array expected\";\n for (var i = 0; i < message.ints.length; ++i)\n if (!$util.isInteger(message.ints[i]) && !(message.ints[i] && $util.isInteger(message.ints[i].low) &&

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$util.isInteger(message.ints[i].high)))\n                    return \"ints: integer|Long[] expected\";\n            }\n            if
(message.strings != null && message.hasOwnProperty(\"strings\")) {\n                if
(!Array.isArray(message.strings))\n                    return \"strings: array expected\";\n                for (var i = 0; i <
message.strings.length; ++i)\n                    if (!(message.strings[i] && typeof message.strings[i].length ===
\"number\" || $util.isString(message.strings[i])))\n                        return \"strings: buffer[] expected\";\n            }\n
    if (message.tensors != null && message.hasOwnProperty(\"tensors\")) {\n                if
(!Array.isArray(message.tensors))\n                    return \"tensors: array expected\";\n                for (var i = 0; i <
message.tensors.length; ++i) {\n                    var error = $root.onnx.TensorProto.verify(message.tensors[i]);\n
      if (error)\n                        return \"tensors.\" + error;\n                }\n            }\n            if (message.graphs != null
&& message.hasOwnProperty(\"graphs\")) {\n                if (!Array.isArray(message.graphs))\n                    return
\"graphs: array expected\";\n                for (var i = 0; i < message.graphs.length; ++i) {\n                    var error =
$root.onnx.GraphProto.verify(message.graphs[i]);\n                    if (error)\n                        return \"graphs.\" +
error;\n                }\n            }\n            return null;\n        };\n\n        /**\n         * Creates an AttributeProto message
from a plain object. Also converts values to their respective internal types.\n         * @function fromObject\n         *
@memberof onnx.AttributeProto\n         * @static\n         * @param {Object.<string,*>} object Plain object\n
* @returns {onnx.AttributeProto} AttributeProto\n         */\n        AttributeProto.fromObject = function
fromObject(object) {\n            if (object instanceof $root.onnx.AttributeProto)\n                return object;\n            var
message = new $root.onnx.AttributeProto();\n            if (object.name != null)\n                message.name =
String(object.name);\n            if (object.refAttrName != null)\n                message.refAttrName =
String(object.refAttrName);\n            if (object.docString != null)\n                message.docString =
String(object.docString);\n            switch (object.type) {\n            case \"UNDEFINED\":\n            case 0:\n
message.type = 0;\n                break;\n            case \"FLOAT\":\n            case 1:\n                message.type = 1;\n
    break;\n            case \"INT\":\n            case 2:\n                message.type = 2;\n                break;\n            case
\"STRING\":\n            case 3:\n                message.type = 3;\n                break;\n            case \"TENSOR\":\n
case 4:\n                message.type = 4;\n                break;\n            case \"GRAPH\":\n            case 5:\n
message.type = 5;\n                break;\n            case \"FLOATS\":\n            case 6:\n                message.type = 6;\n
      break;\n            case \"INTS\":\n            case 7:\n                message.type = 7;\n                break;\n            case
\"STRINGS\":\n            case 8:\n                message.type = 8;\n                break;\n            case \"TENSORS\":\n
case 9:\n                message.type = 9;\n                break;\n            case \"GRAPHS\":\n            case 10:\n
message.type = 10;\n                break;\n            }\n            if (object.f != null)\n                message.f =
Number(object.f);\n            if (object.i != null)\n                if ($util.Long)\n                    (message.i =
$util.Long.fromValue(object.i)).unsigned = false;\n                else if (typeof object.i === \"string\")\n
message.i = parseInt(object.i, 10);\n                else if (typeof object.i === \"number\")\n                    message.i =
object.i;\n                else if (typeof object.i === \"object\")\n                    message.i = new $util.LongBits(object.i.low
>>> 0, object.i.high >>> 0).toNumber();\n            if (object.s != null)\n                if (typeof object.s === \"string\")\n
                $util.base64.decode(object.s, message.s = $util.newBuffer($util.base64.length(object.s)), 0);\n
else if (object.s.length)\n                    message.s = object.s;\n            if (object.t != null) {\n                if (typeof
object.t !== \"object\")\n                    throw TypeError(\".onnx.AttributeProto.t: object expected\");\n
message.t = $root.onnx.TensorProto.fromObject(object.t);\n            }\n            if (object.g != null) {\n                if
(typeof object.g !== \"object\")\n                    throw TypeError(\".onnx.AttributeProto.g: object expected\");\n
   message.g = $root.onnx.GraphProto.fromObject(object.g);\n            }\n            if (object.floats) {\n                if
(!Array.isArray(object.floats))\n                    throw TypeError(\".onnx.AttributeProto.floats: array expected\");\n
      message.floats = [];\n                for (var i = 0; i < object.floats.length; ++i)\n                    message.floats[i] =
Number(object.floats[i]);\n            }\n            if (object.ints) {\n                if (!Array.isArray(object.ints))\n
 throw TypeError(\".onnx.AttributeProto.ints: array expected\");\n                message.ints = [];\n                for (var i =
0; i < object.ints.length; ++i)\n                    if ($util.Long)\n                        (message.ints[i] =
$util.Long.fromValue(object.ints[i])).unsigned = false;\n                    else if (typeof object.ints[i] === \"string\")\n
                message.ints[i] = parseInt(object.ints[i], 10);\n                    else if (typeof object.ints[i] === \"number\")\n
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message.ints[i] = object.ints[i];\n   else if (typeof object.ints[i] === \"object\")\n   message.ints[i] = new $util.LongBits(object.ints[i].low >>> 0, object.ints[i].high >>> 0).toNumber();\n   }\n   if (object.strings) {\n   if (!Array.isArray(object.strings))\n   throw TypeError(\".onnx.AttributeProto.strings: array expected\");\n   message.strings = [];\n   for (var i = 0; i < object.strings.length; ++i)\n   if (typeof object.strings[i] === \"string\")\n $util.base64.decode(object.strings[i], message.strings[i] = $util.newBuffer($util.base64.length(object.strings[i])), 0);\n   else if (object.strings[i].length)\n   message.strings[i] = object.strings[i];\n   }\n   if (object.tensors) {\n   if (!Array.isArray(object.tensors))\n   throw TypeError(\".onnx.AttributeProto.tensors: array expected\");\n   message.tensors = [];\n   for (var i = 0; i < object.tensors.length; ++i) {\n   if (typeof object.tensors[i] !== \"object\")\n   throw TypeError(\".onnx.AttributeProto.tensors: object expected\");\n   message.tensors[i] = $root.onnx.TensorProto.fromObject(object.tensors[i]);\n   }\n   }\n   if (object.graphs) {\n   if (!Array.isArray(object.graphs))\n   throw TypeError(\".onnx.AttributeProto.graphs: array expected\");\n   message.graphs = [];\n   for (var i = 0; i < object.graphs.length; ++i) {\n   if (typeof object.graphs[i] !== \"object\")\n   throw TypeError(\".onnx.AttributeProto.graphs: object expected\");\n   message.graphs[i] = $root.onnx.GraphProto.fromObject(object.graphs[i]);\n   }\n   }\n   return message;\n   };\n\n   /**\n   * Creates a plain object from an AttributeProto message. Also converts values to other types if specified.\n   * @function toObject\n   * @memberof onnx.AttributeProto\n   * @static\n   * @param {onnx.AttributeProto} message AttributeProto\n   * @param {$protobuf.IConversionOptions} [options] Conversion options\n   * @returns {Object.<string,*>} Plain object\n   */\n   AttributeProto.toObject = function toObject(message, options) {\n   if (!options)\n   options = {};\n   var object = {};\n   if (options.arrays || options.defaults) {\n   object.floats = [];\n   object.ints = [];\n   object.strings = [];\n   object.tensors = [];\n   object.graphs = [];\n   }\n   if (options.defaults) {\n   object.name = \"\";\n   object.f = 0;\n   if ($util.Long) {\n   var long = new $util.Long(0, 0, false);\n   object.i = options.longs === String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n   } else\n   object.i = options.longs === String ? \"0\" : 0;\n   if (options.bytes === String)\n   object.s = \"\";\n   else {\n   object.s = [];\n   if (options.bytes !== Array)\n   object.s = $util.newBuffer(object.s);\n   }\n   object.t = null;\n   object.g = null;\n   object.docString = \"\";\n   object.type = options.enums === String ? \"UNDEFINED\" : 0;\n   object.refAttrName = \"\";\n   }\n   if (message.name != null && message.hasOwnProperty(\"name\"))\n   object.name = message.name;\n   if (message.f != null && message.hasOwnProperty(\"f\"))\n   object.f = options.json && !isFinite(message.f) ? String(message.f) : message.f;\n   if (message.i != null && message.hasOwnProperty(\"i\"))\n   if (typeof message.i === \"number\")\n   object.i = options.longs === String ? String(message.i) : message.i;\n   else\n   object.i = options.longs === String ? $util.Long.prototype.toString.call(message.i) : options.longs === Number ? new $util.LongBits(message.i.low >>> 0, message.i.high >>> 0).toNumber() : message.i;\n   if (message.s != null && message.hasOwnProperty(\"s\"))\n   object.s = options.bytes === String ? $util.base64.encode(message.s, 0, message.s.length) : options.bytes === Array ? Array.prototype.slice.call(message.s) : message.s;\n   if (message.t != null && message.hasOwnProperty(\"t\"))\n   object.t = $root.onnx.TensorProto.toObject(message.t, options);\n   if (message.g != null && message.hasOwnProperty(\"g\"))\n   object.g = $root.onnx.GraphProto.toObject(message.g, options);\n   if (message.floats && message.floats.length) {\n   object.floats = [];\n   for (var j = 0; j < message.floats.length; ++j)\n   object.floats[j] = options.json && !isFinite(message.floats[j]) ? String(message.floats[j]) : message.floats[j];\n   }\n   if (message.ints && message.ints.length) {\n   object.ints = [];\n   for (var j = 0; j < message.ints.length; ++j)\n   if (typeof message.ints[j] === \"number\")\n   object.ints[j] = options.longs === String ? String(message.ints[j]) : message.ints[j];\n   else\n   object.ints[j]

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= options.longs === String ? $util.Long.prototype.toString.call(message.ints[j]) : options.longs === Number ? new
$util.LongBits(message.ints[j].low >>> 0, message.ints[j].high >>> 0).toNumber() : message.ints[j];\n            }\n
    if (message.strings && message.strings.length) {\n                object.strings = [];\n                for (var j = 0; j <
message.strings.length; ++j)\n                    object.strings[j] = options.bytes === String ?
$util.base64.encode(message.strings[j], 0, message.strings[j].length) : options.bytes === Array ?
Array.prototype.slice.call(message.strings[j]) : message.strings[j];\n            }\n            if (message.tensors &&
message.tensors.length) {\n                object.tensors = [];\n                for (var j = 0; j < message.tensors.length; ++j)\n
                    object.tensors[j] = $root.onnx.TensorProto.toObject(message.tensors[j], options);\n            }\n            if
(message.graphs && message.graphs.length) {\n                object.graphs = [];\n                for (var j = 0; j <
message.graphs.length; ++j)\n                    object.graphs[j] = $root.onnx.GraphProto.toObject(message.graphs[j],
options);\n            }\n            if (message.docString != null && message.hasOwnProperty(\"docString\"))\n
object.docString = message.docString;\n            if (message.type != null && message.hasOwnProperty(\"type\"))\n
            object.type = options.enums === String ? $root.onnx.AttributeProto.AttributeType[message.type] :
message.type;\n            if (message.refAttrName != null && message.hasOwnProperty(\"refAttrName\"))\n
object.refAttrName = message.refAttrName;\n            return object;\n        };\n\n        /**\n         * Converts this
AttributeProto to JSON.\n         * @function toJSON\n         * @memberof onnx.AttributeProto\n         *
@instance\n         * @returns {Object.<string,*>} JSON object\n         */\n        AttributeProto.prototype.toJSON =
function toJSON() {\n            return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n        };\n\n
/**\n         * AttributeType enum.\n         * @name onnx.AttributeProto.AttributeType\n         * @enum {string}\n
   * @property {number} UNDEFINED=0 UNDEFINED value\n         * @property {number} FLOAT=1 FLOAT
value\n         * @property {number} INT=2 INT value\n         * @property {number} STRING=3 STRING value\n
    * @property {number} TENSOR=4 TENSOR value\n         * @property {number} GRAPH=5 GRAPH value\n
    * @property {number} FLOATS=6 FLOATS value\n         * @property {number} INTS=7 INTS value\n         *
@property {number} STRINGS=8 STRINGS value\n         * @property {number} TENSORS=9 TENSORS
value\n         * @property {number} GRAPHS=10 GRAPHS value\n         */\n        AttributeProto.AttributeType =
(function() {\n            var valuesById = {}, values = Object.create(valuesById);\n            values[valuesById[0] =
\"UNDEFINED\"] = 0;\n            values[valuesById[1] = \"FLOAT\"] = 1;\n            values[valuesById[2] = \"INT\"]
= 2;\n            values[valuesById[3] = \"STRING\"] = 3;\n            values[valuesById[4] = \"TENSOR\"] = 4;\n
values[valuesById[5] = \"GRAPH\"] = 5;\n            values[valuesById[6] = \"FLOATS\"] = 6;\n
values[valuesById[7] = \"INTS\"] = 7;\n            values[valuesById[8] = \"STRINGS\"] = 8;\n
values[valuesById[9] = \"TENSORS\"] = 9;\n            values[valuesById[10] = \"GRAPHS\"] = 10;\n            return
values;\n        })();\n\n        return AttributeProto;\n    })();\n\n    onnx.ValueInfoProto = (function() {\n\n        /**\n
    * Properties of a ValueInfoProto.\n         * @memberof onnx\n         * @interface IValueInfoProto\n         *
@property {string|null} [name] ValueInfoProto name\n         * @property {onnx.ITypeProto|null} [type]
ValueInfoProto type\n         * @property {string|null} [docString] ValueInfoProto docString\n         */\n\n        /**\n
      * Constructs a new ValueInfoProto.\n         * @memberof onnx\n         * @classdesc Represents a
ValueInfoProto.\n         * @implements IValueInfoProto\n         * @constructor\n         * @param
{onnx.IValueInfoProto=} [properties] Properties to set\n         */\n        function ValueInfoProto(properties) {\n
 if (properties)\n                for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n                    if
(properties[keys[i]] != null)\n                        this[keys[i]] = properties[keys[i]];\n        }\n\n        /**\n         *
ValueInfoProto name.\n         * @member {string} name\n         * @memberof onnx.ValueInfoProto\n         *
@instance\n         */\n        ValueInfoProto.prototype.name = \"\";\n\n        /**\n         * ValueInfoProto type.\n         *
@member {onnx.ITypeProto|null|undefined} type\n         * @memberof onnx.ValueInfoProto\n         * @instance\n
      */\n        ValueInfoProto.prototype.type = null;\n\n        /**\n         * ValueInfoProto docString.\n         *
@member {string} docString\n         * @memberof onnx.ValueInfoProto\n         * @instance\n         */\n
ValueInfoProto.prototype.docString = \"\";\n\n        /**\n         * Creates a new ValueInfoProto instance using the
specified properties.\n         * @function create\n         * @memberof onnx.ValueInfoProto\n         * @static\n         *
@param {onnx.IValueInfoProto=} [properties] Properties to set\n         * @returns {onnx.ValueInfoProto}
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ValueInfoProto instance\n */\n ValueInfoProto.create = function create(properties) {\n return new ValueInfoProto(properties);\n };\n\n /**\n * Encodes the specified ValueInfoProto message. Does not implicitly {@link onnx.ValueInfoProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {onnx.IValueInfoProto} message ValueInfoProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n ValueInfoProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.name != null && message.hasOwnProperty(\"name\"))\n writer.uint32(/* id 1, wireType 2 =*/10).string(message.name);\n if (message.type != null && message.hasOwnProperty(\"type\"))\n $root.onnx.TypeProto.encode(message.type, writer.uint32(/* id 2, wireType 2 =*/18).fork()).ldelim();\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n writer.uint32(/* id 3, wireType 2 =*/26).string(message.docString);\n return writer;\n };\n\n /**\n * Encodes the specified ValueInfoProto message, length delimited. Does not implicitly {@link onnx.ValueInfoProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {onnx.IValueInfoProto} message ValueInfoProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n ValueInfoProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a ValueInfoProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.ValueInfoProto} ValueInfoProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n ValueInfoProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.ValueInfoProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.name = reader.string();\n break;\n case 2:\n message.type = $root.onnx.TypeProto.decode(reader, reader.uint32());\n break;\n case 3:\n message.docString = reader.string();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a ValueInfoProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.ValueInfoProto} ValueInfoProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n ValueInfoProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a ValueInfoProto message.\n * @function verify\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n ValueInfoProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.name != null && message.hasOwnProperty(\"name\"))\n if (!$util.isString(message.name))\n return \"name: string expected\";\n if (message.type != null && message.hasOwnProperty(\"type\")) {\n var error = $root.onnx.TypeProto.verify(message.type);\n if (error)\n return \"type.\" + error;\n }\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n if (!$util.isString(message.docString))\n return \"docString: string expected\";\n return null;\n };\n\n /**\n * Creates a ValueInfoProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.ValueInfoProto\n *

@static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.ValueInfoProto} ValueInfoProto\n */\n ValueInfoProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.ValueInfoProto)\n return object;\n var message = new $root.onnx.ValueInfoProto();\n if (object.name != null)\n message.name = String(object.name);\n if (object.type != null) {\n if (typeof object.type !== \"object\")\n throw TypeError(\".onnx.ValueInfoProto.type: object expected\");\n message.type = $root.onnx.TypeProto.fromObject(object.type);\n }\n if (object.docString != null)\n message.docString = String(object.docString);\n return message;\n };\n\n /**\n * Creates a plain object from a ValueInfoProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {onnx.ValueInfoProto} message ValueInfoProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n ValueInfoProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.defaults) {\n object.name = \"\";\n object.type = null;\n object.docString = \"\";\n }\n if (message.name != null && message.hasOwnProperty(\"name\"))\n object.name = message.name;\n if (message.type != null && message.hasOwnProperty(\"type\"))\n object.type = $root.onnx.TypeProto.toObject(message.type, options);\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n object.docString = message.docString;\n return object;\n };\n\n /**\n * Converts this ValueInfoProto to JSON.\n * @function toJSON\n * @memberof onnx.ValueInfoProto\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n ValueInfoProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return ValueInfoProto;\n })();\n\n onnx.NodeProto = (function() {\n\n /**\n * Properties of a NodeProto.\n * @memberof onnx\n * @interface INodeProto\n * @property {Array.<string>|null} [input] NodeProto input\n * @property {Array.<string>|null} [output] NodeProto output\n * @property {string|null} [name] NodeProto name\n * @property {string|null} [opType] NodeProto opType\n * @property {string|null} [domain] NodeProto domain\n * @property {Array.<onnx.IAttributeProto>|null} [attribute] NodeProto attribute\n * @property {string|null} [docString] NodeProto docString\n */\n\n /**\n * Constructs a new NodeProto.\n * @memberof onnx\n * @classdesc Represents a NodeProto.\n * @implements INodeProto\n * @constructor\n * @param {onnx.INodeProto=} [properties] Properties to set\n */\n function NodeProto(properties) {\n this.input = [];\n this.output = [];\n this.attribute = [];\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * NodeProto input.\n * @member {Array.<string>} input\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.input = $util.emptyArray;\n\n /**\n * NodeProto output.\n * @member {Array.<string>} output\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.output = $util.emptyArray;\n\n /**\n * NodeProto name.\n * @member {string} name\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.name = \"\";\n\n /**\n * NodeProto opType.\n * @member {string} opType\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.opType = \"\";\n\n /**\n * NodeProto domain.\n * @member {string} domain\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.domain = \"\";\n\n /**\n * NodeProto attribute.\n * @member {Array.<onnx.IAttributeProto>} attribute\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.attribute = $util.emptyArray;\n\n /**\n * NodeProto docString.\n * @member {string} docString\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.docString = \"\";\n\n /**\n * Creates a new NodeProto instance using the specified properties.\n * @function create\n * @memberof onnx.NodeProto\n * @static\n * @param {onnx.INodeProto=} [properties] Properties to set\n * @returns {onnx.NodeProto} NodeProto instance\n

*/\n NodeProto.create = function create(properties) {\n return new NodeProto(properties);\n };\n\n /**\n * Encodes the specified NodeProto message. Does not implicitly {@link onnx.NodeProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.NodeProto\n * @static\n * @param {onnx.INodeProto} message NodeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n NodeProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.input != null && message.input.length)\n for (var i = 0; i < message.input.length; ++i)\n writer.uint32(/* id 1, wireType 2 =*/10).string(message.input[i]);\n if (message.output != null && message.output.length)\n for (var i = 0; i < message.output.length; ++i)\n writer.uint32(/* id 2, wireType 2 =*/18).string(message.output[i]);\n if (message.name != null && message.hasOwnProperty(\"name\"))\n writer.uint32(/* id 3, wireType 2 =*/26).string(message.name);\n if (message.opType != null && message.hasOwnProperty(\"opType\"))\n writer.uint32(/* id 4, wireType 2 =*/34).string(message.opType);\n if (message.attribute != null && message.attribute.length)\n for (var i = 0; i < message.attribute.length; ++i)\n $root.onnx.AttributeProto.encode(message.attribute[i], writer.uint32(/* id 5, wireType 2 =*/42).fork()).ldelim();\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n writer.uint32(/* id 6, wireType 2 =*/50).string(message.docString);\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n writer.uint32(/* id 7, wireType 2 =*/58).string(message.domain);\n return writer;\n };\n\n /**\n * Encodes the specified NodeProto message, length delimited. Does not implicitly {@link onnx.NodeProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.NodeProto\n * @static\n * @param {onnx.INodeProto} message NodeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n NodeProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a NodeProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.NodeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.NodeProto} NodeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n NodeProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.NodeProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n if (!(message.input && message.input.length))\n message.input = [];\n message.input.push(reader.string());\n break;\n case 2:\n if (!(message.output && message.output.length))\n message.output = [];\n message.output.push(reader.string());\n break;\n case 3:\n message.name = reader.string();\n break;\n case 4:\n message.opType = reader.string();\n break;\n case 7:\n message.domain = reader.string();\n break;\n case 5:\n if (!(message.attribute && message.attribute.length))\n message.attribute = [];\n message.attribute.push($root.onnx.AttributeProto.decode(reader, reader.uint32()));\n break;\n case 6:\n message.docString = reader.string();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a NodeProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.NodeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.NodeProto} NodeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n NodeProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new

$Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a NodeProto message.\n * @function verify\n * @memberof onnx.NodeProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n NodeProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.input != null && message.hasOwnProperty(\"input\")) {\n if (!Array.isArray(message.input))\n return \"input: array expected\";\n for (var i = 0; i < message.input.length; ++i)\n if (!$util.isString(message.input[i]))\n return \"input: string[] expected\";\n }\n if (message.output != null && message.hasOwnProperty(\"output\")) {\n if (!Array.isArray(message.output))\n return \"output: array expected\";\n for (var i = 0; i < message.output.length; ++i)\n if (!$util.isString(message.output[i]))\n return \"output: string[] expected\";\n }\n if (message.name != null && message.hasOwnProperty(\"name\"))\n if (!$util.isString(message.name))\n return \"name: string expected\";\n if (message.opType != null && message.hasOwnProperty(\"opType\"))\n if (!$util.isString(message.opType))\n return \"opType: string expected\";\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n if (!$util.isString(message.domain))\n return \"domain: string expected\";\n if (message.attribute != null && message.hasOwnProperty(\"attribute\")) {\n if (!Array.isArray(message.attribute))\n return \"attribute: array expected\";\n for (var i = 0; i < message.attribute.length; ++i) {\n var error = $root.onnx.AttributeProto.verify(message.attribute[i]);\n if (error)\n return \"attribute.\" + error;\n }\n }\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n if (!$util.isString(message.docString))\n return \"docString: string expected\";\n return null;\n };\n\n /**\n * Creates a NodeProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.NodeProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.NodeProto} NodeProto\n */\n NodeProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.NodeProto)\n return object;\n var message = new $root.onnx.NodeProto();\n if (object.input) {\n if (!Array.isArray(object.input))\n throw TypeError(\".onnx.NodeProto.input: array expected\");\n message.input = [];\n for (var i = 0; i < object.input.length; ++i)\n message.input[i] = String(object.input[i]);\n }\n if (object.output) {\n if (!Array.isArray(object.output))\n throw TypeError(\".onnx.NodeProto.output: array expected\");\n message.output = [];\n for (var i = 0; i < object.output.length; ++i)\n message.output[i] = String(object.output[i]);\n }\n if (object.name != null)\n message.name = String(object.name);\n if (object.opType != null)\n message.opType = String(object.opType);\n if (object.domain != null)\n message.domain = String(object.domain);\n if (object.attribute) {\n if (!Array.isArray(object.attribute))\n throw TypeError(\".onnx.NodeProto.attribute: array expected\");\n message.attribute = [];\n for (var i = 0; i < object.attribute.length; ++i) {\n if (typeof object.attribute[i] !== \"object\")\n throw TypeError(\".onnx.NodeProto.attribute: object expected\");\n message.attribute[i] = $root.onnx.AttributeProto.fromObject(object.attribute[i]);\n }\n }\n if (object.docString != null)\n message.docString = String(object.docString);\n return message;\n };\n\n /**\n * Creates a plain object from a NodeProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.NodeProto\n * @static\n * @param {onnx.NodeProto} message NodeProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n NodeProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.arrays || options.defaults) {\n object.input = [];\n object.output = [];\n object.attribute = [];\n }\n if (options.defaults) {\n object.name = \"\";\n object.opType = \"\";\n object.docString = \"\";\n object.domain = \"\";\n }\n if (message.input &&

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message.input.length) {\n            object.input = [];\n            for (var j = 0; j < message.input.length; ++j)\n
        object.input[j] = message.input[j];\n        }\n        if (message.output && message.output.length) {\n
   object.output = [];\n            for (var j = 0; j < message.output.length; ++j)\n                object.output[j] =
message.output[j];\n        }\n        if (message.name != null && message.hasOwnProperty(\"name\"))\n
object.name = message.name;\n        if (message.opType != null && message.hasOwnProperty(\"opType\"))\n
        object.opType = message.opType;\n        if (message.attribute && message.attribute.length) {\n
object.attribute = [];\n            for (var j = 0; j < message.attribute.length; ++j)\n                object.attribute[j] =
$root.onnx.AttributeProto.toObject(message.attribute[j], options);\n        }\n        if (message.docString != null
&& message.hasOwnProperty(\"docString\"))\n            object.docString = message.docString;\n        if
(message.domain != null && message.hasOwnProperty(\"domain\"))\n            object.domain =
message.domain;\n        return object;\n    };\n\n    /**\n     * Converts this NodeProto to JSON.\n     *
@function toJSON\n     * @memberof onnx.NodeProto\n     * @instance\n     * @returns
{Object.<string,*>} JSON object\n     */\n    NodeProto.prototype.toJSON = function toJSON() {\n
return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n    };\n\n    return NodeProto;\n
})();\n\n  onnx.ModelProto = (function() {\n\n    /**\n     * Properties of a ModelProto.\n     * @memberof
onnx\n     * @interface IModelProto\n     * @property {number|Long|null} [irVersion] ModelProto irVersion\n
      * @property {Array.<onnx.IOperatorSetIdProto>|null} [opsetImport] ModelProto opsetImport\n     *
@property {string|null} [producerName] ModelProto producerName\n     * @property {string|null}
[producerVersion] ModelProto producerVersion\n     * @property {string|null} [domain] ModelProto domain\n
   * @property {number|Long|null} [modelVersion] ModelProto modelVersion\n     * @property {string|null}
[docString] ModelProto docString\n     * @property {onnx.IGraphProto|null} [graph] ModelProto graph\n     *
@property {Array.<onnx.IStringStringEntryProto>|null} [metadataProps] ModelProto metadataProps\n     */\n\n
    /**\n     * Constructs a new ModelProto.\n     * @memberof onnx\n     * @classdesc Represents a
ModelProto.\n     * @implements IModelProto\n     * @constructor\n     * @param {onnx.IModelProto=}
[properties] Properties to set\n     */\n    function ModelProto(properties) {\n        this.opsetImport = [];\n
  this.metadataProps = [];\n        if (properties)\n            for (var keys = Object.keys(properties), i = 0; i <
keys.length; ++i)\n                if (properties[keys[i]] != null)\n                    this[keys[i]] = properties[keys[i]];\n
  }\n\n    /**\n     * ModelProto irVersion.\n     * @member {number|Long} irVersion\n     * @memberof
onnx.ModelProto\n     * @instance\n     */\n    ModelProto.prototype.irVersion = $util.Long ?
$util.Long.fromBits(0,0,false) : 0;\n\n    /**\n     * ModelProto opsetImport.\n     * @member
{Array.<onnx.IOperatorSetIdProto>} opsetImport\n     * @memberof onnx.ModelProto\n     * @instance\n
*/\n    ModelProto.prototype.opsetImport = $util.emptyArray;\n\n    /**\n     * ModelProto producerName.\n
      * @member {string} producerName\n     * @memberof onnx.ModelProto\n     * @instance\n     */\n
ModelProto.prototype.producerName = \"\";\n\n    /**\n     * ModelProto producerVersion.\n     * @member
{string} producerVersion\n     * @memberof onnx.ModelProto\n     * @instance\n     */\n
ModelProto.prototype.producerVersion = \"\";\n\n    /**\n     * ModelProto domain.\n     * @member
{string} domain\n     * @memberof onnx.ModelProto\n     * @instance\n     */\n
ModelProto.prototype.domain = \"\";\n\n    /**\n     * ModelProto modelVersion.\n     * @member
{number|Long} modelVersion\n     * @memberof onnx.ModelProto\n     * @instance\n     */\n
ModelProto.prototype.modelVersion = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n    /**\n     *
ModelProto docString.\n     * @member {string} docString\n     * @memberof onnx.ModelProto\n     *
@instance\n     */\n    ModelProto.prototype.docString = \"\";\n\n    /**\n     * ModelProto graph.\n     *
@member {onnx.IGraphProto|null|undefined} graph\n     * @memberof onnx.ModelProto\n     * @instance\n
    */\n    ModelProto.prototype.graph = null;\n\n    /**\n     * ModelProto metadataProps.\n     * @member
{Array.<onnx.IStringStringEntryProto>} metadataProps\n     * @memberof onnx.ModelProto\n     *
@instance\n     */\n    ModelProto.prototype.metadataProps = $util.emptyArray;\n\n    /**\n     * Creates a
new ModelProto instance using the specified properties.\n     * @function create\n     * @memberof
onnx.ModelProto\n     * @static\n     * @param {onnx.IModelProto=} [properties] Properties to set\n     *
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@returns {onnx.ModelProto} ModelProto instance\n         */\n        ModelProto.create = function create(properties)
{\n            return new ModelProto(properties);\n        };\n\n        /**\n         * Encodes the specified ModelProto
message. Does not implicitly {@link onnx.ModelProto.verify|verify} messages.\n         * @function encode\n         *
@memberof onnx.ModelProto\n         * @static\n         * @param {onnx.IModelProto} message ModelProto
message or plain object to encode\n         * @param {$protobuf.Writer} [writer] Writer to encode to\n         *
@returns {$protobuf.Writer} Writer\n         */\n        ModelProto.encode = function encode(message, writer) {\n
  if (!writer)\n                writer = $Writer.create();\n            if (message.irVersion != null &&
message.hasOwnProperty(\"irVersion\"))\n                writer.uint32(/* id 1, wireType 0
=*/8).int64(message.irVersion);\n            if (message.producerName != null &&
message.hasOwnProperty(\"producerName\"))\n                writer.uint32(/* id 2, wireType 2
=*/18).string(message.producerName);\n            if (message.producerVersion != null &&
message.hasOwnProperty(\"producerVersion\"))\n                writer.uint32(/* id 3, wireType 2
=*/26).string(message.producerVersion);\n            if (message.domain != null &&
message.hasOwnProperty(\"domain\"))\n                writer.uint32(/* id 4, wireType 2
=*/34).string(message.domain);\n            if (message.modelVersion != null &&
message.hasOwnProperty(\"modelVersion\"))\n                writer.uint32(/* id 5, wireType 0
=*/40).int64(message.modelVersion);\n            if (message.docString != null &&
message.hasOwnProperty(\"docString\"))\n                writer.uint32(/* id 6, wireType 2
=*/50).string(message.docString);\n            if (message.graph != null && message.hasOwnProperty(\"graph\"))\n
      $root.onnx.GraphProto.encode(message.graph, writer.uint32(/* id 7, wireType 2 =*/58).fork()).ldelim();\n
  if (message.opsetImport != null && message.opsetImport.length)\n                for (var i = 0; i <
message.opsetImport.length; ++i)\n                    $root.onnx.OperatorSetIdProto.encode(message.opsetImport[i],
writer.uint32(/* id 8, wireType 2 =*/66).fork()).ldelim();\n            if (message.metadataProps != null &&
message.metadataProps.length)\n                for (var i = 0; i < message.metadataProps.length; ++i)\n
$root.onnx.StringStringEntryProto.encode(message.metadataProps[i], writer.uint32(/* id 14, wireType 2
=*/114).fork()).ldelim();\n            return writer;\n        };\n\n        /**\n         * Encodes the specified ModelProto
message, length delimited. Does not implicitly {@link onnx.ModelProto.verify|verify} messages.\n         *
@function encodeDelimited\n         * @memberof onnx.ModelProto\n         * @static\n         * @param
{onnx.IModelProto} message ModelProto message or plain object to encode\n         * @param {$protobuf.Writer}
[writer] Writer to encode to\n         * @returns {$protobuf.Writer} Writer\n         */\n
ModelProto.encodeDelimited = function encodeDelimited(message, writer) {\n            return this.encode(message,
writer).ldelim();\n        };\n\n        /**\n         * Decodes a ModelProto message from the specified reader or buffer.\n
     * @function decode\n         * @memberof onnx.ModelProto\n         * @static\n         * @param
{$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @param {number} [length]
Message length if known beforehand\n         * @returns {onnx.ModelProto} ModelProto\n         * @throws {Error}
If the payload is not a reader or valid buffer\n         * @throws {$protobuf.util.ProtocolError} If required fields are
missing\n         */\n        ModelProto.decode = function decode(reader, length) {\n            if (!(reader instanceof
$Reader))\n                reader = $Reader.create(reader);\n            var end = length === undefined ? reader.len :
reader.pos + length, message = new $root.onnx.ModelProto();\n            while (reader.pos < end) {\n                var tag
= reader.uint32();\n                switch (tag >>> 3) {\n                case 1:\n                    message.irVersion =
reader.int64();\n                    break;\n                case 8:\n                    if (!(message.opsetImport &&
message.opsetImport.length))\n                        message.opsetImport = [];\n
message.opsetImport.push($root.onnx.OperatorSetIdProto.decode(reader, reader.uint32()));\n                    break;\n
         case 2:\n                    message.producerName = reader.string();\n                    break;\n                case 3:\n
       message.producerVersion = reader.string();\n                    break;\n                case 4:\n
message.domain = reader.string();\n                    break;\n                case 5:\n                    message.modelVersion =
reader.int64();\n                    break;\n                case 6:\n                    message.docString = reader.string();\n
  break;\n                case 7:\n                    message.graph = $root.onnx.GraphProto.decode(reader, reader.uint32());\n
```

```
        break;\n        case 14:\n          if (!(message.metadataProps &&
message.metadataProps.length))\n            message.metadataProps = [];\n
message.metadataProps.push($root.onnx.StringStringEntryProto.decode(reader, reader.uint32()));\n
break;\n      default:\n          reader.skipType(tag & 7);\n          break;\n        }\n      }\n
  return message;\n    };\n\n    /**\n     * Decodes a ModelProto message from the specified reader or buffer,
length delimited.\n     * @function decodeDelimited\n     * @memberof onnx.ModelProto\n     * @static\n
  * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n     * @returns
{onnx.ModelProto} ModelProto\n     * @throws {Error} If the payload is not a reader or valid buffer\n     *
@throws {$protobuf.util.ProtocolError} If required fields are missing\n     */\n    ModelProto.decodeDelimited
= function decodeDelimited(reader) {\n      if (!(reader instanceof $Reader))\n        reader = new
$Reader(reader);\n      return this.decode(reader, reader.uint32());\n    };\n\n    /**\n     * Verifies a
ModelProto message.\n     * @function verify\n     * @memberof onnx.ModelProto\n     * @static\n     *
@param {Object.<string,*>} message Plain object to verify\n     * @returns {string|null} `null` if valid, otherwise
the reason why it is not\n     */\n    ModelProto.verify = function verify(message) {\n      if (typeof message
!== \"object\" || message === null)\n        return \"object expected\";\n      if (message.irVersion != null &&
message.hasOwnProperty(\"irVersion\"))\n        if (!$util.isInteger(message.irVersion) && !(message.irVersion
&& $util.isInteger(message.irVersion.low) && $util.isInteger(message.irVersion.high)))\n          return
\"irVersion: integer|Long expected\";\n      if (message.opsetImport != null &&
message.hasOwnProperty(\"opsetImport\")) {\n        if (!Array.isArray(message.opsetImport))\n
return \"opsetImport: array expected\";\n        for (var i = 0; i < message.opsetImport.length; ++i) {\n
var error = $root.onnx.OperatorSetIdProto.verify(message.opsetImport[i]);\n          if (error)\n
return \"opsetImport.\" + error;\n        }\n      }\n      if (message.producerName != null &&
message.hasOwnProperty(\"producerName\"))\n        if (!$util.isString(message.producerName))\n
return \"producerName: string expected\";\n      if (message.producerVersion != null &&
message.hasOwnProperty(\"producerVersion\"))\n        if (!$util.isString(message.producerVersion))\n
  return \"producerVersion: string expected\";\n      if (message.domain != null &&
message.hasOwnProperty(\"domain\"))\n        if (!$util.isString(message.domain))\n          return
\"domain: string expected\";\n      if (message.modelVersion != null &&
message.hasOwnProperty(\"modelVersion\"))\n        if (!$util.isInteger(message.modelVersion) &&
!(message.modelVersion && $util.isInteger(message.modelVersion.low) &&
$util.isInteger(message.modelVersion.high)))\n          return \"modelVersion: integer|Long expected\";\n
if (message.docString != null && message.hasOwnProperty(\"docString\"))\n        if
(!$util.isString(message.docString))\n          return \"docString: string expected\";\n      if (message.graph
!= null && message.hasOwnProperty(\"graph\")) {\n        var error =
$root.onnx.GraphProto.verify(message.graph);\n        if (error)\n          return \"graph.\" + error;\n
}\n      if (message.metadataProps != null && message.hasOwnProperty(\"metadataProps\")) {\n        if
(!Array.isArray(message.metadataProps))\n          return \"metadataProps: array expected\";\n        for
(var i = 0; i < message.metadataProps.length; ++i) {\n          var error =
$root.onnx.StringStringEntryProto.verify(message.metadataProps[i]);\n          if (error)\n          return
\"metadataProps.\" + error;\n        }\n      }\n      return null;\n    };\n\n    /**\n     * Creates a
ModelProto message from a plain object. Also converts values to their respective internal types.\n     * @function
fromObject\n     * @memberof onnx.ModelProto\n     * @static\n     * @param {Object.<string,*>} object
Plain object\n     * @returns {onnx.ModelProto} ModelProto\n     */\n    ModelProto.fromObject = function
fromObject(object) {\n      if (object instanceof $root.onnx.ModelProto)\n        return object;\n      var
message = new $root.onnx.ModelProto();\n      if (object.irVersion != null)\n        if ($util.Long)\n
 (message.irVersion = $util.Long.fromValue(object.irVersion)).unsigned = false;\n        else if (typeof
object.irVersion === \"string\")\n          message.irVersion = parseInt(object.irVersion, 10);\n        else if
(typeof object.irVersion === \"number\")\n          message.irVersion = object.irVersion;\n        else if
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(typeof object.irVersion === \"object\")\n message.irVersion = new $util.LongBits(object.irVersion.low >>> 0, object.irVersion.high >>> 0).toNumber();\n if (object.opsetImport) {\n if (!Array.isArray(object.opsetImport))\n throw TypeError(\".onnx.ModelProto.opsetImport: array expected\");\n message.opsetImport = [];\n for (var i = 0; i < object.opsetImport.length; ++i) {\n if (typeof object.opsetImport[i] !== \"object\")\n throw TypeError(\".onnx.ModelProto.opsetImport: object expected\");\n message.opsetImport[i] = $root.onnx.OperatorSetIdProto.fromObject(object.opsetImport[i]);\n }\n }\n if (object.producerName != null)\n message.producerName = String(object.producerName);\n if (object.producerVersion != null)\n message.producerVersion = String(object.producerVersion);\n if (object.domain != null)\n message.domain = String(object.domain);\n if (object.modelVersion != null)\n if ($util.Long)\n (message.modelVersion = $util.Long.fromValue(object.modelVersion)).unsigned = false;\n else if (typeof object.modelVersion === \"string\")\n message.modelVersion = parseInt(object.modelVersion, 10);\n else if (typeof object.modelVersion === \"number\")\n message.modelVersion = object.modelVersion;\n else if (typeof object.modelVersion === \"object\")\n message.modelVersion = new $util.LongBits(object.modelVersion.low >>> 0, object.modelVersion.high >>> 0).toNumber();\n if (object.docString != null)\n message.docString = String(object.docString);\n if (object.graph != null) {\n if (typeof object.graph !== \"object\")\n throw TypeError(\".onnx.ModelProto.graph: object expected\");\n message.graph = $root.onnx.GraphProto.fromObject(object.graph);\n }\n if (object.metadataProps) {\n if (!Array.isArray(object.metadataProps))\n throw TypeError(\".onnx.ModelProto.metadataProps: array expected\");\n message.metadataProps = [];\n for (var i = 0; i < object.metadataProps.length; ++i) {\n if (typeof object.metadataProps[i] !== \"object\")\n throw TypeError(\".onnx.ModelProto.metadataProps: object expected\");\n message.metadataProps[i] = $root.onnx.StringStringEntryProto.fromObject(object.metadataProps[i]);\n }\n }\n return message;\n };\n\n /**\n * Creates a plain object from a ModelProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.ModelProto\n * @static\n * @param {onnx.ModelProto} message ModelProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n ModelProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.arrays || options.defaults) {\n object.opsetImport = [];\n object.metadataProps = [];\n }\n if (options.defaults) {\n if ($util.Long) {\n var long = new $util.Long(0, 0, false);\n object.irVersion = options.longs === String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n } else\n object.irVersion = options.longs === String ? \"0\" : 0;\n object.producerName = \"\";\n object.producerVersion = \"\";\n object.domain = \"\";\n if ($util.Long) {\n var long = new $util.Long(0, 0, false);\n object.modelVersion = options.longs === String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n } else\n object.modelVersion = options.longs === String ? \"0\" : 0;\n object.docString = \"\";\n object.graph = null;\n }\n if (message.irVersion != null && message.hasOwnProperty(\"irVersion\"))\n if (typeof message.irVersion === \"number\")\n object.irVersion = options.longs === String ? String(message.irVersion) : message.irVersion;\n else\n object.irVersion = options.longs === String ? $util.Long.prototype.toString.call(message.irVersion) : options.longs === Number ? new $util.LongBits(message.irVersion.low >>> 0, message.irVersion.high >>> 0).toNumber() : message.irVersion;\n if (message.producerName != null && message.hasOwnProperty(\"producerName\"))\n object.producerName = message.producerName;\n if (message.producerVersion != null && message.hasOwnProperty(\"producerVersion\"))\n object.producerVersion = message.producerVersion;\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n object.domain = message.domain;\n if (message.modelVersion != null && message.hasOwnProperty(\"modelVersion\"))\n if (typeof

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message.modelVersion === \"number\")\n            object.modelVersion = options.longs === String ?
String(message.modelVersion) : message.modelVersion;\n          else\n            object.modelVersion =
options.longs === String ? $util.Long.prototype.toString.call(message.modelVersion) : options.longs === Number ?
new $util.LongBits(message.modelVersion.low >>> 0, message.modelVersion.high >>> 0).toNumber() :
message.modelVersion;\n        if (message.docString != null && message.hasOwnProperty(\"docString\"))\n
    object.docString = message.docString;\n        if (message.graph != null &&
message.hasOwnProperty(\"graph\"))\n          object.graph = $root.onnx.GraphProto.toObject(message.graph,
options);\n        if (message.opsetImport && message.opsetImport.length) {\n          object.opsetImport = [];\n
          for (var j = 0; j < message.opsetImport.length; ++j)\n            object.opsetImport[j] =
$root.onnx.OperatorSetIdProto.toObject(message.opsetImport[j], options);\n        }\n        if
(message.metadataProps && message.metadataProps.length) {\n          object.metadataProps = [];\n          for
(var j = 0; j < message.metadataProps.length; ++j)\n            object.metadataProps[j] =
$root.onnx.StringStringEntryProto.toObject(message.metadataProps[j], options);\n        }\n        return object;\n
      };\n\n      /**\n       * Converts this ModelProto to JSON.\n       * @function toJSON\n       * @memberof
onnx.ModelProto\n       * @instance\n       * @returns {Object.<string,*>} JSON object\n       */\n
ModelProto.prototype.toJSON = function toJSON() {\n        return this.constructor.toObject(this,
$protobuf.util.toJSONOptions);\n      };\n\n      return ModelProto;\n    })();\n\n    onnx.StringStringEntryProto =
(function() {\n\n      /**\n       * Properties of a StringStringEntryProto.\n       * @memberof onnx\n       *
@interface IStringStringEntryProto\n       * @property {string|null} [key] StringStringEntryProto key\n       *
@property {string|null} [value] StringStringEntryProto value\n       */\n\n      /**\n       * Constructs a new
StringStringEntryProto.\n       * @memberof onnx\n       * @classdesc Represents a StringStringEntryProto.\n
* @implements IStringStringEntryProto\n       * @constructor\n       * @param {onnx.IStringStringEntryProto=}
[properties] Properties to set\n       */\n      function StringStringEntryProto(properties) {\n        if (properties)\n
          for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n            if (properties[keys[i]] !=
null)\n              this[keys[i]] = properties[keys[i]];\n      }\n\n      /**\n       * StringStringEntryProto key.\n
    * @member {string} key\n       * @memberof onnx.StringStringEntryProto\n       * @instance\n       */\n
StringStringEntryProto.prototype.key = \"\";\n\n      /**\n       * StringStringEntryProto value.\n       * @member
{string} value\n       * @memberof onnx.StringStringEntryProto\n       * @instance\n       */\n
StringStringEntryProto.prototype.value = \"\";\n\n      /**\n       * Creates a new StringStringEntryProto instance
using the specified properties.\n       * @function create\n       * @memberof onnx.StringStringEntryProto\n       *
@static\n       * @param {onnx.IStringStringEntryProto=} [properties] Properties to set\n       * @returns
{onnx.StringStringEntryProto} StringStringEntryProto instance\n       */\n      StringStringEntryProto.create =
function create(properties) {\n        return new StringStringEntryProto(properties);\n      };\n\n      /**\n       *
Encodes the specified StringStringEntryProto message. Does not implicitly {@link
onnx.StringStringEntryProto.verify|verify} messages.\n       * @function encode\n       * @memberof
onnx.StringStringEntryProto\n       * @static\n       * @param {onnx.IStringStringEntryProto} message
StringStringEntryProto message or plain object to encode\n       * @param {$protobuf.Writer} [writer] Writer to
encode to\n       * @returns {$protobuf.Writer} Writer\n       */\n      StringStringEntryProto.encode = function
encode(message, writer) {\n        if (!writer)\n          writer = $Writer.create();\n        if (message.key != null
&& message.hasOwnProperty(\"key\"))\n          writer.uint32(/* id 1, wireType 2 =*/10).string(message.key);\n
        if (message.value != null && message.hasOwnProperty(\"value\"))\n          writer.uint32(/* id 2, wireType
2 =*/18).string(message.value);\n        return writer;\n      };\n\n      /**\n       * Encodes the specified
StringStringEntryProto message, length delimited. Does not implicitly {@link
onnx.StringStringEntryProto.verify|verify} messages.\n       * @function encodeDelimited\n       * @memberof
onnx.StringStringEntryProto\n       * @static\n       * @param {onnx.IStringStringEntryProto} message
StringStringEntryProto message or plain object to encode\n       * @param {$protobuf.Writer} [writer] Writer to
encode to\n       * @returns {$protobuf.Writer} Writer\n       */\n      StringStringEntryProto.encodeDelimited =
function encodeDelimited(message, writer) {\n        return this.encode(message, writer).ldelim();\n      };\n\n
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/**\n         * Decodes a StringStringEntryProto message from the specified reader or buffer.\n         * @function
decode\n         * @memberof onnx.StringStringEntryProto\n         * @static\n         * @param
{$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @param {number} [length]
Message length if known beforehand\n         * @returns {onnx.StringStringEntryProto} StringStringEntryProto\n
  * @throws {Error} If the payload is not a reader or valid buffer\n         * @throws {$protobuf.util.ProtocolError} If
required fields are missing\n         */\n        StringStringEntryProto.decode = function decode(reader, length) {\n
  if (!(reader instanceof $Reader))\n                reader = $Reader.create(reader);\n            var end = length ===
undefined ? reader.len : reader.pos + length, message = new $root.onnx.StringStringEntryProto();\n            while
(reader.pos < end) {\n                var tag = reader.uint32();\n                switch (tag >>> 3) {\n                case 1:\n
        message.key = reader.string();\n                    break;\n                case 2:\n                    message.value =
reader.string();\n                    break;\n                default:\n                    reader.skipType(tag & 7);\n
break;\n                }\n            }\n            return message;\n        };\n\n        /**\n         * Decodes a
StringStringEntryProto message from the specified reader or buffer, length delimited.\n         * @function
decodeDelimited\n         * @memberof onnx.StringStringEntryProto\n         * @static\n         * @param
{$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @returns
{onnx.StringStringEntryProto} StringStringEntryProto\n         * @throws {Error} If the payload is not a reader or
valid buffer\n         * @throws {$protobuf.util.ProtocolError} If required fields are missing\n         */\n
StringStringEntryProto.decodeDelimited = function decodeDelimited(reader) {\n            if (!(reader instanceof
$Reader))\n                reader = new $Reader(reader);\n            return this.decode(reader, reader.uint32());\n
};\n\n        /**\n         * Verifies a StringStringEntryProto message.\n         * @function verify\n         * @memberof
onnx.StringStringEntryProto\n         * @static\n         * @param {Object.<string,*>} message Plain object to
verify\n         * @returns {string|null} `null` if valid, otherwise the reason why it is not\n         */\n
StringStringEntryProto.verify = function verify(message) {\n            if (typeof message !== \"object\" || message
=== null)\n                return \"object expected\";\n            if (message.key != null &&
message.hasOwnProperty(\"key\"))\n                if (!$util.isString(message.key))\n                    return \"key: string
expected\";\n            if (message.value != null && message.hasOwnProperty(\"value\"))\n                if
(!$util.isString(message.value))\n                    return \"value: string expected\";\n            return null;\n        };\n\n
/**\n         * Creates a StringStringEntryProto message from a plain object. Also converts values to their respective
internal types.\n         * @function fromObject\n         * @memberof onnx.StringStringEntryProto\n         * @static\n
       * @param {Object.<string,*>} object Plain object\n         * @returns {onnx.StringStringEntryProto}
StringStringEntryProto\n         */\n        StringStringEntryProto.fromObject = function fromObject(object) {\n
if (object instanceof $root.onnx.StringStringEntryProto)\n                return object;\n            var message = new
$root.onnx.StringStringEntryProto();\n            if (object.key != null)\n                message.key = String(object.key);\n
        if (object.value != null)\n                message.value = String(object.value);\n            return message;\n        };\n\n
      /**\n         * Creates a plain object from a StringStringEntryProto message. Also converts values to other types if
specified.\n         * @function toObject\n         * @memberof onnx.StringStringEntryProto\n         * @static\n         *
@param {onnx.StringStringEntryProto} message StringStringEntryProto\n         * @param
{$protobuf.IConversionOptions} [options] Conversion options\n         * @returns {Object.<string,*>} Plain object\n
       */\n        StringStringEntryProto.toObject = function toObject(message, options) {\n            if (!options)\n
   options = {};\n            var object = {};\n            if (options.defaults) {\n                object.key = \"\";\n
object.value = \"\";\n            }\n            if (message.key != null && message.hasOwnProperty(\"key\"))\n
object.key = message.key;\n            if (message.value != null && message.hasOwnProperty(\"value\"))\n
object.value = message.value;\n            return object;\n        };\n\n        /**\n         * Converts this
StringStringEntryProto to JSON.\n         * @function toJSON\n         * @memberof onnx.StringStringEntryProto\n
    * @instance\n         * @returns {Object.<string,*>} JSON object\n         */\n
StringStringEntryProto.prototype.toJSON = function toJSON() {\n            return this.constructor.toObject(this,
$protobuf.util.toJSONOptions);\n        };\n\n        return StringStringEntryProto;\n    })();\n\n
onnx.TensorAnnotation = (function() {\n\n        /**\n         * Properties of a TensorAnnotation.\n         * @memberof
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onnx\n * @interface ITensorAnnotation\n * @property {string|null} [tensorName] TensorAnnotation tensorName\n * @property {Array.<onnx.IStringStringEntryProto>|null} [quantParameterTensorNames] TensorAnnotation quantParameterTensorNames\n */\n\n /**\n * Constructs a new TensorAnnotation.\n * @memberof onnx\n * @classdesc Represents a TensorAnnotation.\n * @implements ITensorAnnotation\n * @constructor\n * @param {onnx.ITensorAnnotation=} [properties] Properties to set\n */\n function TensorAnnotation(properties) {\n this.quantParameterTensorNames = [];\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * TensorAnnotation tensorName.\n * @member {string} tensorName\n * @memberof onnx.TensorAnnotation\n * @instance\n */\n TensorAnnotation.prototype.tensorName = \"\";\n\n /**\n * TensorAnnotation quantParameterTensorNames.\n * @member {Array.<onnx.IStringStringEntryProto>} quantParameterTensorNames\n * @memberof onnx.TensorAnnotation\n * @instance\n */\n TensorAnnotation.prototype.quantParameterTensorNames = $util.emptyArray;\n\n /**\n * Creates a new TensorAnnotation instance using the specified properties.\n * @function create\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {onnx.ITensorAnnotation=} [properties] Properties to set\n * @returns {onnx.TensorAnnotation} TensorAnnotation instance\n */\n TensorAnnotation.create = function create(properties) {\n return new TensorAnnotation(properties);\n };\n\n /**\n * Encodes the specified TensorAnnotation message. Does not implicitly {@link onnx.TensorAnnotation.verify|verify} messages.\n * @function encode\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {onnx.ITensorAnnotation} message TensorAnnotation message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n TensorAnnotation.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.tensorName != null && message.hasOwnProperty(\"tensorName\"))\n writer.uint32(/* id 1, wireType 2 =*/10).string(message.tensorName);\n if (message.quantParameterTensorNames != null && message.quantParameterTensorNames.length)\n for (var i = 0; i < message.quantParameterTensorNames.length; ++i)\n $root.onnx.StringStringEntryProto.encode(message.quantParameterTensorNames[i], writer.uint32(/* id 2, wireType 2 =*/18).fork()).ldelim();\n return writer;\n };\n\n /**\n * Encodes the specified TensorAnnotation message, length delimited. Does not implicitly {@link onnx.TensorAnnotation.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {onnx.ITensorAnnotation} message TensorAnnotation message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n TensorAnnotation.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a TensorAnnotation message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.TensorAnnotation} TensorAnnotation\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n TensorAnnotation.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.TensorAnnotation();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.tensorName = reader.string();\n break;\n case 2:\n if (!(message.quantParameterTensorNames && message.quantParameterTensorNames.length))\n message.quantParameterTensorNames = [];\n message.quantParameterTensorNames.push($root.onnx.StringStringEntryProto.decode(reader,

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reader.uint32()));\n                    break;\n                default:\n                    reader.skipType(tag & 7);\n
break;\n                }\n            }\n            return message;\n        };\n\n        /**\n         * Decodes a TensorAnnotation
message from the specified reader or buffer, length delimited.\n         * @function decodeDelimited\n         *
@memberof onnx.TensorAnnotation\n         * @static\n         * @param {$protobuf.Reader|Uint8Array} reader
Reader or buffer to decode from\n         * @returns {onnx.TensorAnnotation} TensorAnnotation\n         * @throws
{Error} If the payload is not a reader or valid buffer\n         * @throws {$protobuf.util.ProtocolError} If required
fields are missing\n         */\n        TensorAnnotation.decodeDelimited = function decodeDelimited(reader) {\n
if (!(reader instanceof $Reader))\n                reader = new $Reader(reader);\n            return this.decode(reader,
reader.uint32());\n        };\n\n        /**\n         * Verifies a TensorAnnotation message.\n         * @function verify\n
  * @memberof onnx.TensorAnnotation\n         * @static\n         * @param {Object.<string,*>} message Plain
object to verify\n         * @returns {string|null} `null` if valid, otherwise the reason why it is not\n         */\n
TensorAnnotation.verify = function verify(message) {\n            if (typeof message !== \"object\" || message ===
null)\n                return \"object expected\";\n            if (message.tensorName != null &&
message.hasOwnProperty(\"tensorName\"))\n                if (!$util.isString(message.tensorName))\n                    return
\"tensorName: string expected\";\n            if (message.quantParameterTensorNames != null &&
message.hasOwnProperty(\"quantParameterTensorNames\")) {\n                if
(!Array.isArray(message.quantParameterTensorNames))\n                    return \"quantParameterTensorNames: array
expected\";\n                for (var i = 0; i < message.quantParameterTensorNames.length; ++i) {\n                    var error
= $root.onnx.StringStringEntryProto.verify(message.quantParameterTensorNames[i]);\n                    if (error)\n
        return \"quantParameterTensorNames.\" + error;\n                }\n            }\n            return null;\n        };\n\n
  /**\n         * Creates a TensorAnnotation message from a plain object. Also converts values to their respective
internal types.\n         * @function fromObject\n         * @memberof onnx.TensorAnnotation\n         * @static\n
* @param {Object.<string,*>} object Plain object\n         * @returns {onnx.TensorAnnotation} TensorAnnotation\n
    */\n        TensorAnnotation.fromObject = function fromObject(object) {\n            if (object instanceof
$root.onnx.TensorAnnotation)\n                return object;\n            var message = new
$root.onnx.TensorAnnotation();\n            if (object.tensorName != null)\n                message.tensorName =
String(object.tensorName);\n            if (object.quantParameterTensorNames) {\n                if
(!Array.isArray(object.quantParameterTensorNames))\n                    throw
TypeError(\".onnx.TensorAnnotation.quantParameterTensorNames: array expected\");\n
message.quantParameterTensorNames = [];\n                for (var i = 0; i < object.quantParameterTensorNames.length;
++i) {\n                    if (typeof object.quantParameterTensorNames[i] !== \"object\")\n                        throw
TypeError(\".onnx.TensorAnnotation.quantParameterTensorNames: object expected\");\n
message.quantParameterTensorNames[i] =
$root.onnx.StringStringEntryProto.fromObject(object.quantParameterTensorNames[i]);\n                }\n            }\n
   return message;\n        };\n\n        /**\n         * Creates a plain object from a TensorAnnotation message. Also
converts values to other types if specified.\n         * @function toObject\n         * @memberof
onnx.TensorAnnotation\n         * @static\n         * @param {onnx.TensorAnnotation} message TensorAnnotation\n
   * @param {$protobuf.IConversionOptions} [options] Conversion options\n         * @returns {Object.<string,*>}
Plain object\n         */\n        TensorAnnotation.toObject = function toObject(message, options) {\n            if
(!options)\n                options = {};\n            var object = {};\n            if (options.arrays || options.defaults)\n
object.quantParameterTensorNames = [];\n            if (options.defaults)\n                object.tensorName = \"\";\n
if (message.tensorName != null && message.hasOwnProperty(\"tensorName\"))\n                object.tensorName =
message.tensorName;\n            if (message.quantParameterTensorNames &&
message.quantParameterTensorNames.length) {\n                object.quantParameterTensorNames = [];\n                for
(var j = 0; j < message.quantParameterTensorNames.length; ++j)\n
object.quantParameterTensorNames[j] =
$root.onnx.StringStringEntryProto.toObject(message.quantParameterTensorNames[j], options);\n            }\n
return object;\n        };\n\n        /**\n         * Converts this TensorAnnotation to JSON.\n         * @function toJSON\n
```

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    * @memberof onnx.TensorAnnotation\n        * @instance\n        * @returns {Object.<string,*>} JSON
object\n        */\n        TensorAnnotation.prototype.toJSON = function toJSON() {\n            return
this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n        };\n\n        return TensorAnnotation;\n
})();\n\n    onnx.GraphProto = (function() {\n\n        /**\n        * Properties of a GraphProto.\n        * @memberof
onnx\n        * @interface IGraphProto\n        * @property {Array.<onnx.INodeProto>|null} [node] GraphProto
node\n        * @property {string|null} [name] GraphProto name\n        * @property
{Array.<onnx.ITensorProto>|null} [initializer] GraphProto initializer\n        * @property {string|null} [docString]
GraphProto docString\n        * @property {Array.<onnx.IValueInfoProto>|null} [input] GraphProto input\n        *
@property {Array.<onnx.IValueInfoProto>|null} [output] GraphProto output\n        * @property
{Array.<onnx.IValueInfoProto>|null} [valueInfo] GraphProto valueInfo\n        * @property
{Array.<onnx.ITensorAnnotation>|null} [quantizationAnnotation] GraphProto quantizationAnnotation\n        */\n\n
    /**\n        * Constructs a new GraphProto.\n        * @memberof onnx\n        * @classdesc Represents a
GraphProto.\n        * @implements IGraphProto\n        * @constructor\n        * @param {onnx.IGraphProto=}
[properties] Properties to set\n        */\n        function GraphProto(properties) {\n            this.node = [];\n
this.initializer = [];\n            this.input = [];\n            this.output = [];\n            this.valueInfo = [];\n
this.quantizationAnnotation = [];\n            if (properties)\n                for (var keys = Object.keys(properties), i = 0; i <
keys.length; ++i)\n                    if (properties[keys[i]] != null)\n                        this[keys[i]] = properties[keys[i]];\n
  }\n\n        /**\n        * GraphProto node.\n        * @member {Array.<onnx.INodeProto>} node\n        *
@memberof onnx.GraphProto\n        * @instance\n        */\n        GraphProto.prototype.node =
$util.emptyArray;\n\n        /**\n        * GraphProto name.\n        * @member {string} name\n        * @memberof
onnx.GraphProto\n        * @instance\n        */\n        GraphProto.prototype.name = \"\";\n\n        /**\n        *
GraphProto initializer.\n        * @member {Array.<onnx.ITensorProto>} initializer\n        * @memberof
onnx.GraphProto\n        * @instance\n        */\n        GraphProto.prototype.initializer = $util.emptyArray;\n\n
/**\n        * GraphProto docString.\n        * @member {string} docString\n        * @memberof onnx.GraphProto\n
    * @instance\n        */\n        GraphProto.prototype.docString = \"\";\n\n        /**\n        * GraphProto input.\n
 * @member {Array.<onnx.IValueInfoProto>} input\n        * @memberof onnx.GraphProto\n        * @instance\n
   */\n        GraphProto.prototype.input = $util.emptyArray;\n\n        /**\n        * GraphProto output.\n        *
@member {Array.<onnx.IValueInfoProto>} output\n        * @memberof onnx.GraphProto\n        * @instance\n
  */\n        GraphProto.prototype.output = $util.emptyArray;\n\n        /**\n        * GraphProto valueInfo.\n        *
@member {Array.<onnx.IValueInfoProto>} valueInfo\n        * @memberof onnx.GraphProto\n        * @instance\n
    */\n        GraphProto.prototype.valueInfo = $util.emptyArray;\n\n        /**\n        * GraphProto
quantizationAnnotation.\n        * @member {Array.<onnx.ITensorAnnotation>} quantizationAnnotation\n        *
@memberof onnx.GraphProto\n        * @instance\n        */\n        GraphProto.prototype.quantizationAnnotation =
$util.emptyArray;\n\n        /**\n        * Creates a new GraphProto instance using the specified properties.\n        *
@function create\n        * @memberof onnx.GraphProto\n        * @static\n        * @param {onnx.IGraphProto=}
[properties] Properties to set\n        * @returns {onnx.GraphProto} GraphProto instance\n        */\n
GraphProto.create = function create(properties) {\n            return new GraphProto(properties);\n        };\n\n
/**\n        * Encodes the specified GraphProto message. Does not implicitly {@link onnx.GraphProto.verify|verify}
messages.\n        * @function encode\n        * @memberof onnx.GraphProto\n        * @static\n        * @param
{onnx.IGraphProto} message GraphProto message or plain object to encode\n        * @param {$protobuf.Writer}
[writer] Writer to encode to\n        * @returns {$protobuf.Writer} Writer\n        */\n        GraphProto.encode =
function encode(message, writer) {\n            if (!writer)\n                writer = $Writer.create();\n            if
(message.node != null && message.node.length)\n                for (var i = 0; i < message.node.length; ++i)\n
  $root.onnx.NodeProto.encode(message.node[i], writer.uint32(/* id 1, wireType 2 =*/10).fork()).ldelim();\n
if (message.name != null && message.hasOwnProperty(\"name\"))\n                writer.uint32(/* id 2, wireType 2
=*/18).string(message.name);\n            if (message.initializer != null && message.initializer.length)\n                for
(var i = 0; i < message.initializer.length; ++i)\n                    $root.onnx.TensorProto.encode(message.initializer[i],
writer.uint32(/* id 5, wireType 2 =*/42).fork()).ldelim();\n            if (message.docString != null &&
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message.hasOwnProperty(\"docString\"))\n writer.uint32(/* id 10, wireType 2 =*/82).string(message.docString);\n if (message.input != null && message.input.length)\n for (var i = 0; i < message.input.length; ++i)\n $root.onnx.ValueInfoProto.encode(message.input[i], writer.uint32(/* id 11, wireType 2 =*/90).fork()).ldelim();\n if (message.output != null && message.output.length)\n for (var i = 0; i < message.output.length; ++i)\n $root.onnx.ValueInfoProto.encode(message.output[i], writer.uint32(/* id 12, wireType 2 =*/98).fork()).ldelim();\n if (message.valueInfo != null && message.valueInfo.length)\n for (var i = 0; i < message.valueInfo.length; ++i)\n $root.onnx.ValueInfoProto.encode(message.valueInfo[i], writer.uint32(/* id 13, wireType 2 =*/106).fork()).ldelim();\n if (message.quantizationAnnotation != null && message.quantizationAnnotation.length)\n for (var i = 0; i < message.quantizationAnnotation.length; ++i)\n $root.onnx.TensorAnnotation.encode(message.quantizationAnnotation[i], writer.uint32(/* id 14, wireType 2 =*/114).fork()).ldelim();\n return writer;\n };\n\n /**\n * Encodes the specified GraphProto message, length delimited. Does not implicitly {@link onnx.GraphProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.GraphProto\n * @static\n * @param {onnx.IGraphProto} message GraphProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n GraphProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a GraphProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.GraphProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.GraphProto} GraphProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n GraphProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.GraphProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n if (!(message.node && message.node.length))\n message.node = [];\n message.node.push($root.onnx.NodeProto.decode(reader, reader.uint32()));\n break;\n case 2:\n message.name = reader.string();\n break;\n case 5:\n if (!(message.initializer && message.initializer.length))\n message.initializer = [];\n message.initializer.push($root.onnx.TensorProto.decode(reader, reader.uint32()));\n break;\n case 10:\n message.docString = reader.string();\n break;\n case 11:\n if (!(message.input && message.input.length))\n message.input = [];\n message.input.push($root.onnx.ValueInfoProto.decode(reader, reader.uint32()));\n break;\n case 12:\n if (!(message.output && message.output.length))\n message.output = [];\n message.output.push($root.onnx.ValueInfoProto.decode(reader, reader.uint32()));\n break;\n case 13:\n if (!(message.valueInfo && message.valueInfo.length))\n message.valueInfo = [];\n message.valueInfo.push($root.onnx.ValueInfoProto.decode(reader, reader.uint32()));\n break;\n case 14:\n if (!(message.quantizationAnnotation && message.quantizationAnnotation.length))\n message.quantizationAnnotation = [];\n message.quantizationAnnotation.push($root.onnx.TensorAnnotation.decode(reader, reader.uint32()));\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a GraphProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.GraphProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.GraphProto} GraphProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n GraphProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new

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$Reader(reader);\n            return this.decode(reader, reader.uint32());\n        };\n\n        /**\n         * Verifies a
GraphProto message.\n         * @function verify\n         * @memberof onnx.GraphProto\n         * @static\n         *
@param {Object.<string,*>} message Plain object to verify\n         * @returns {string|null} `null` if valid, otherwise
the reason why it is not\n         */\n        GraphProto.verify = function verify(message) {\n            if (typeof message
!== \"object\" || message === null)\n                return \"object expected\";\n            if (message.node != null &&
message.hasOwnProperty(\"node\")) {\n                if (!Array.isArray(message.node))\n                    return \"node:
array expected\";\n                for (var i = 0; i < message.node.length; ++i) {\n                    var error =
$root.onnx.NodeProto.verify(message.node[i]);\n                    if (error)\n                        return \"node.\" + error;\n
        }\n            }\n            if (message.name != null && message.hasOwnProperty(\"name\"))\n                if
(!$util.isString(message.name))\n                    return \"name: string expected\";\n            if (message.initializer !=
null && message.hasOwnProperty(\"initializer\")) {\n                if (!Array.isArray(message.initializer))\n
return \"initializer: array expected\";\n                for (var i = 0; i < message.initializer.length; ++i) {\n                    var
error = $root.onnx.TensorProto.verify(message.initializer[i]);\n                    if (error)\n                        return
\"initializer.\" + error;\n                }\n            }\n            if (message.docString != null &&
message.hasOwnProperty(\"docString\"))\n                if (!$util.isString(message.docString))\n                    return
\"docString: string expected\";\n            if (message.input != null && message.hasOwnProperty(\"input\")) {\n
   if (!Array.isArray(message.input))\n                    return \"input: array expected\";\n                for (var i = 0; i <
message.input.length; ++i) {\n                    var error = $root.onnx.ValueInfoProto.verify(message.input[i]);\n
      if (error)\n                        return \"input.\" + error;\n                }\n            }\n            if (message.output != null &&
message.hasOwnProperty(\"output\")) {\n                if (!Array.isArray(message.output))\n                    return
\"output: array expected\";\n                for (var i = 0; i < message.output.length; ++i) {\n                    var error =
$root.onnx.ValueInfoProto.verify(message.output[i]);\n                    if (error)\n                        return \"output.\" +
error;\n                }\n            }\n            if (message.valueInfo != null && message.hasOwnProperty(\"valueInfo\"))
{\n                if (!Array.isArray(message.valueInfo))\n                    return \"valueInfo: array expected\";\n
for (var i = 0; i < message.valueInfo.length; ++i) {\n                    var error =
$root.onnx.ValueInfoProto.verify(message.valueInfo[i]);\n                    if (error)\n                        return
\"valueInfo.\" + error;\n                }\n            }\n            if (message.quantizationAnnotation != null &&
message.hasOwnProperty(\"quantizationAnnotation\")) {\n                if
(!Array.isArray(message.quantizationAnnotation))\n                    return \"quantizationAnnotation: array
expected\";\n                for (var i = 0; i < message.quantizationAnnotation.length; ++i) {\n                    var error =
$root.onnx.TensorAnnotation.verify(message.quantizationAnnotation[i]);\n                    if (error)\n
return \"quantizationAnnotation.\" + error;\n                }\n            }\n            return null;\n        };\n\n        /**\n         *
Creates a GraphProto message from a plain object. Also converts values to their respective internal types.\n         *
@function fromObject\n         * @memberof onnx.GraphProto\n         * @static\n         * @param
{Object.<string,*>} object Plain object\n         * @returns {onnx.GraphProto} GraphProto\n         */\n
GraphProto.fromObject = function fromObject(object) {\n            if (object instanceof $root.onnx.GraphProto)\n
      return object;\n            var message = new $root.onnx.GraphProto();\n            if (object.node) {\n                if
(!Array.isArray(object.node))\n                    throw TypeError(\".onnx.GraphProto.node: array expected\");\n
message.node = [];\n                for (var i = 0; i < object.node.length; ++i) {\n                    if (typeof object.node[i]
!== \"object\")\n                        throw TypeError(\".onnx.GraphProto.node: object expected\");\n
message.node[i] = $root.onnx.NodeProto.fromObject(object.node[i]);\n                }\n            }\n            if
(object.name != null)\n                message.name = String(object.name);\n            if (object.initializer) {\n                if
(!Array.isArray(object.initializer))\n                    throw TypeError(\".onnx.GraphProto.initializer: array
expected\");\n                message.initializer = [];\n                for (var i = 0; i < object.initializer.length; ++i) {\n
      if (typeof object.initializer[i] !== \"object\")\n                        throw TypeError(\".onnx.GraphProto.initializer:
object expected\");\n                    message.initializer[i] = $root.onnx.TensorProto.fromObject(object.initializer[i]);\n
            }\n            }\n            if (object.docString != null)\n                message.docString =
String(object.docString);\n            if (object.input) {\n                if (!Array.isArray(object.input))\n                    throw
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TypeError(\".onnx.GraphProto.input: array expected\");\n          message.input = [];\n          for (var i = 0; i <
object.input.length; ++i) {\n            if (typeof object.input[i] !== \"object\")\n              throw
TypeError(\".onnx.GraphProto.input: object expected\");\n            message.input[i] =
$root.onnx.ValueInfoProto.fromObject(object.input[i]);\n          }\n        }\n        if (object.output) {\n
  if (!Array.isArray(object.output))\n            throw TypeError(\".onnx.GraphProto.output: array expected\");\n
      message.output = [];\n          for (var i = 0; i < object.output.length; ++i) {\n            if (typeof
object.output[i] !== \"object\")\n              throw TypeError(\".onnx.GraphProto.output: object expected\");\n
        message.output[i] = $root.onnx.ValueInfoProto.fromObject(object.output[i]);\n          }\n        }\n
  if (object.valueInfo) {\n          if (!Array.isArray(object.valueInfo))\n            throw
TypeError(\".onnx.GraphProto.valueInfo: array expected\");\n          message.valueInfo = [];\n          for (var i
= 0; i < object.valueInfo.length; ++i) {\n            if (typeof object.valueInfo[i] !== \"object\")\n
throw TypeError(\".onnx.GraphProto.valueInfo: object expected\");\n            message.valueInfo[i] =
$root.onnx.ValueInfoProto.fromObject(object.valueInfo[i]);\n          }\n        }\n        if
(object.quantizationAnnotation) {\n          if (!Array.isArray(object.quantizationAnnotation))\n            throw
TypeError(\".onnx.GraphProto.quantizationAnnotation: array expected\");\n
message.quantizationAnnotation = [];\n          for (var i = 0; i < object.quantizationAnnotation.length; ++i) {\n
        if (typeof object.quantizationAnnotation[i] !== \"object\")\n              throw
TypeError(\".onnx.GraphProto.quantizationAnnotation: object expected\");\n
message.quantizationAnnotation[i] = $root.onnx.TensorAnnotation.fromObject(object.quantizationAnnotation[i]);\n
        }\n        }\n        return message;\n      };\n\n      /**\n       * Creates a plain object from a
GraphProto message. Also converts values to other types if specified.\n       * @function toObject\n       *
@memberof onnx.GraphProto\n       * @static\n       * @param {onnx.GraphProto} message GraphProto\n       *
@param {$protobuf.IConversionOptions} [options] Conversion options\n       * @returns {Object.<string,*>}
Plain object\n       */\n      GraphProto.toObject = function toObject(message, options) {\n        if (!options)\n
     options = {};\n        var object = {};\n        if (options.arrays || options.defaults) {\n          object.node =
[];\n          object.initializer = [];\n          object.input = [];\n          object.output = [];\n
object.valueInfo = [];\n          object.quantizationAnnotation = [];\n        }\n        if (options.defaults) {\n
     object.name = \"\";\n          object.docString = \"\";\n        }\n        if (message.node &&
message.node.length) {\n          object.node = [];\n          for (var j = 0; j < message.node.length; ++j)\n
     object.node[j] = $root.onnx.NodeProto.toObject(message.node[j], options);\n        }\n        if
(message.name != null && message.hasOwnProperty(\"name\"))\n          object.name = message.name;\n
if (message.initializer && message.initializer.length) {\n          object.initializer = [];\n          for (var j = 0; j
< message.initializer.length; ++j)\n            object.initializer[j] =
$root.onnx.TensorProto.toObject(message.initializer[j], options);\n        }\n        if (message.docString != null
&& message.hasOwnProperty(\"docString\"))\n          object.docString = message.docString;\n        if
(message.input && message.input.length) {\n          object.input = [];\n          for (var j = 0; j <
message.input.length; ++j)\n            object.input[j] = $root.onnx.ValueInfoProto.toObject(message.input[j],
options);\n        }\n        if (message.output && message.output.length) {\n          object.output = [];\n
  for (var j = 0; j < message.output.length; ++j)\n            object.output[j] =
$root.onnx.ValueInfoProto.toObject(message.output[j], options);\n        }\n        if (message.valueInfo &&
message.valueInfo.length) {\n          object.valueInfo = [];\n          for (var j = 0; j <
message.valueInfo.length; ++j)\n            object.valueInfo[j] =
$root.onnx.ValueInfoProto.toObject(message.valueInfo[j], options);\n        }\n        if
(message.quantizationAnnotation && message.quantizationAnnotation.length) {\n
object.quantizationAnnotation = [];\n          for (var j = 0; j < message.quantizationAnnotation.length; ++j)\n
     object.quantizationAnnotation[j] =
$root.onnx.TensorAnnotation.toObject(message.quantizationAnnotation[j], options);\n        }\n        return
object;\n      };\n\n      /**\n       * Converts this GraphProto to JSON.\n       * @function toJSON\n       *
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@memberof onnx.GraphProto\n         * @instance\n         * @returns {Object.<string,*>} JSON object\n         */\n
   GraphProto.prototype.toJSON = function toJSON() {\n            return this.constructor.toObject(this,
$protobuf.util.toJSONOptions);\n        };\n\n        return GraphProto;\n    })();\n\n    onnx.TensorProto = (function()
{\n\n        /**\n         * Properties of a TensorProto.\n         * @memberof onnx\n         * @interface ITensorProto\n
    * @property {Array.<number|Long>|null} [dims] TensorProto dims\n         * @property {number|null}
[dataType] TensorProto dataType\n         * @property {onnx.TensorProto.ISegment|null} [segment] TensorProto
segment\n         * @property {Array.<number>|null} [floatData] TensorProto floatData\n         * @property
{Array.<number>|null} [int32Data] TensorProto int32Data\n         * @property {Array.<Uint8Array>|null}
[stringData] TensorProto stringData\n         * @property {Array.<number|Long>|null} [int64Data] TensorProto
int64Data\n         * @property {string|null} [name] TensorProto name\n         * @property {string|null} [docString]
TensorProto docString\n         * @property {Uint8Array|null} [rawData] TensorProto rawData\n         * @property
{Array.<onnx.IStringStringEntryProto>|null} [externalData] TensorProto externalData\n         * @property
{onnx.TensorProto.DataLocation|null} [dataLocation] TensorProto dataLocation\n         * @property
{Array.<number>|null} [doubleData] TensorProto doubleData\n         * @property {Array.<number|Long>|null}
[uint64Data] TensorProto uint64Data\n         */\n\n        /**\n         * Constructs a new TensorProto.\n         *
@memberof onnx\n         * @classdesc Represents a TensorProto.\n         * @implements ITensorProto\n         *
@constructor\n         * @param {onnx.ITensorProto=} [properties] Properties to set\n         */\n        function
TensorProto(properties) {\n            this.dims = [];\n            this.floatData = [];\n            this.int32Data = [];\n
this.stringData = [];\n            this.int64Data = [];\n            this.externalData = [];\n            this.doubleData = [];\n
  this.uint64Data = [];\n            if (properties)\n                for (var keys = Object.keys(properties), i = 0; i <
keys.length; ++i)\n                    if (properties[keys[i]] != null)\n                        this[keys[i]] = properties[keys[i]];\n
  }\n\n        /**\n         * TensorProto dims.\n         * @member {Array.<number|Long>} dims\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.dims = $util.emptyArray;\n\n
/**\n         * TensorProto dataType.\n         * @member {number} dataType\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.dataType = 0;\n\n        /**\n         *
TensorProto segment.\n         * @member {onnx.TensorProto.ISegment|null|undefined} segment\n         *
@memberof onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.segment = null;\n\n
/**\n         * TensorProto floatData.\n         * @member {Array.<number>} floatData\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.floatData = $util.emptyArray;\n\n
/**\n         * TensorProto int32Data.\n         * @member {Array.<number>} int32Data\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.int32Data = $util.emptyArray;\n\n
/**\n         * TensorProto stringData.\n         * @member {Array.<Uint8Array>} stringData\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.stringData = $util.emptyArray;\n\n
/**\n         * TensorProto int64Data.\n         * @member {Array.<number|Long>} int64Data\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.int64Data = $util.emptyArray;\n\n
/**\n         * TensorProto name.\n         * @member {string} name\n         * @memberof onnx.TensorProto\n         *
@instance\n         */\n        TensorProto.prototype.name = \"\";\n\n        /**\n         * TensorProto docString.\n         *
@member {string} docString\n         * @memberof onnx.TensorProto\n         * @instance\n         */\n
TensorProto.prototype.docString = \"\";\n\n        /**\n         * TensorProto rawData.\n         * @member
{Uint8Array} rawData\n         * @memberof onnx.TensorProto\n         * @instance\n         */\n
TensorProto.prototype.rawData = $util.newBuffer([]);\n\n        /**\n         * TensorProto externalData.\n         *
@member {Array.<onnx.IStringStringEntryProto>} externalData\n         * @memberof onnx.TensorProto\n         *
@instance\n         */\n        TensorProto.prototype.externalData = $util.emptyArray;\n\n        /**\n         *
TensorProto dataLocation.\n         * @member {onnx.TensorProto.DataLocation} dataLocation\n         *
@memberof onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.dataLocation = 0;\n\n
/**\n         * TensorProto doubleData.\n         * @member {Array.<number>} doubleData\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.doubleData = $util.emptyArray;\n\n
 /**\n         * TensorProto uint64Data.\n         * @member {Array.<number|Long>} uint64Data\n         *
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@memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.uint64Data = $util.emptyArray;\n\n /**\n * Creates a new TensorProto instance using the specified properties.\n * @function create\n * @memberof onnx.TensorProto\n * @static\n * @param {onnx.ITensorProto=} [properties] Properties to set\n * @returns {onnx.TensorProto} TensorProto instance\n */\n TensorProto.create = function create(properties) {\n return new TensorProto(properties);\n };\n\n /**\n * Encodes the specified TensorProto message. Does not implicitly {@link onnx.TensorProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.TensorProto\n * @static\n * @param {onnx.ITensorProto} message TensorProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n TensorProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.dims != null && message.dims.length) {\n writer.uint32(/* id 1, wireType 2 =*/10).fork();\n for (var i = 0; i < message.dims.length; ++i)\n writer.int64(message.dims[i]);\n writer.ldelim();\n }\n if (message.dataType != null && message.hasOwnProperty(\"dataType\"))\n writer.uint32(/* id 2, wireType 0 =*/16).int32(message.dataType);\n if (message.segment != null && message.hasOwnProperty(\"segment\"))\n $root.onnx.TensorProto.Segment.encode(message.segment, writer.uint32(/* id 3, wireType 2 =*/26).fork()).ldelim();\n if (message.floatData != null && message.floatData.length) {\n writer.uint32(/* id 4, wireType 2 =*/34).fork();\n for (var i = 0; i < message.floatData.length; ++i)\n writer.float(message.floatData[i]);\n writer.ldelim();\n }\n if (message.int32Data != null && message.int32Data.length) {\n writer.uint32(/* id 5, wireType 2 =*/42).fork();\n for (var i = 0; i < message.int32Data.length; ++i)\n writer.int32(message.int32Data[i]);\n writer.ldelim();\n }\n if (message.stringData != null && message.stringData.length)\n for (var i = 0; i < message.stringData.length; ++i)\n writer.uint32(/* id 6, wireType 2 =*/50).bytes(message.stringData[i]);\n if (message.int64Data != null && message.int64Data.length) {\n writer.uint32(/* id 7, wireType 2 =*/58).fork();\n for (var i = 0; i < message.int64Data.length; ++i)\n writer.int64(message.int64Data[i]);\n writer.ldelim();\n }\n if (message.name != null && message.hasOwnProperty(\"name\"))\n writer.uint32(/* id 8, wireType 2 =*/66).string(message.name);\n if (message.rawData != null && message.hasOwnProperty(\"rawData\"))\n writer.uint32(/* id 9, wireType 2 =*/74).bytes(message.rawData);\n if (message.doubleData != null && message.doubleData.length) {\n writer.uint32(/* id 10, wireType 2 =*/82).fork();\n for (var i = 0; i < message.doubleData.length; ++i)\n writer.double(message.doubleData[i]);\n writer.ldelim();\n }\n if (message.uint64Data != null && message.uint64Data.length) {\n writer.uint32(/* id 11, wireType 2 =*/90).fork();\n for (var i = 0; i < message.uint64Data.length; ++i)\n writer.uint64(message.uint64Data[i]);\n writer.ldelim();\n }\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n writer.uint32(/* id 12, wireType 2 =*/98).string(message.docString);\n if (message.externalData != null && message.externalData.length)\n for (var i = 0; i < message.externalData.length; ++i)\n $root.onnx.StringStringEntryProto.encode(message.externalData[i], writer.uint32(/* id 13, wireType 2 =*/106).fork()).ldelim();\n if (message.dataLocation != null && message.hasOwnProperty(\"dataLocation\"))\n writer.uint32(/* id 14, wireType 0 =*/112).int32(message.dataLocation);\n return writer;\n };\n\n /**\n * Encodes the specified TensorProto message, length delimited. Does not implicitly {@link onnx.TensorProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.TensorProto\n * @static\n * @param {onnx.ITensorProto} message TensorProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n TensorProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a TensorProto message from the specified reader or buffer.\n

* @function decode\n * @memberof onnx.TensorProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.TensorProto} TensorProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n TensorProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.TensorProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n if (!(message.dims && message.dims.length))\n message.dims = [];\n if ((tag & 7) === 2) {\n var end2 = reader.uint32() + reader.pos;\n while (reader.pos < end2)\n message.dims.push(reader.int64());\n } else\n message.dims.push(reader.int64());\n break;\n case 2:\n message.dataType = reader.int32();\n break;\n case 3:\n message.segment = $root.onnx.TensorProto.Segment.decode(reader, reader.uint32());\n break;\n case 4:\n if (!(message.floatData && message.floatData.length))\n message.floatData = [];\n if ((tag & 7) === 2) {\n var end2 = reader.uint32() + reader.pos;\n while (reader.pos < end2)\n message.floatData.push(reader.float());\n } else\n message.floatData.push(reader.float());\n break;\n case 5:\n if (!(message.int32Data && message.int32Data.length))\n message.int32Data = [];\n if ((tag & 7) === 2) {\n var end2 = reader.uint32() + reader.pos;\n while (reader.pos < end2)\n message.int32Data.push(reader.int32());\n } else\n message.int32Data.push(reader.int32());\n break;\n case 6:\n if (!(message.stringData && message.stringData.length))\n message.stringData = [];\n message.stringData.push(reader.bytes());\n break;\n case 7:\n if (!(message.int64Data && message.int64Data.length))\n message.int64Data = [];\n if ((tag & 7) === 2) {\n var end2 = reader.uint32() + reader.pos;\n while (reader.pos < end2)\n message.int64Data.push(reader.int64());\n } else\n message.int64Data.push(reader.int64());\n break;\n case 8:\n message.name = reader.string();\n break;\n case 12:\n message.docString = reader.string();\n break;\n case 9:\n message.rawData = reader.bytes();\n break;\n case 13:\n if (!(message.externalData && message.externalData.length))\n message.externalData = [];\n message.externalData.push($root.onnx.StringStringEntryProto.decode(reader, reader.uint32()));\n break;\n case 14:\n message.dataLocation = reader.int32();\n break;\n case 10:\n if (!(message.doubleData && message.doubleData.length))\n message.doubleData = [];\n if ((tag & 7) === 2) {\n var end2 = reader.uint32() + reader.pos;\n while (reader.pos < end2)\n message.doubleData.push(reader.double());\n } else\n message.doubleData.push(reader.double());\n break;\n case 11:\n if (!(message.uint64Data && message.uint64Data.length))\n message.uint64Data = [];\n if ((tag & 7) === 2) {\n var end2 = reader.uint32() + reader.pos;\n while (reader.pos < end2)\n message.uint64Data.push(reader.uint64());\n } else\n message.uint64Data.push(reader.uint64());\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a TensorProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TensorProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TensorProto} TensorProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n TensorProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new

$Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a TensorProto message.\n * @function verify\n * @memberof onnx.TensorProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n TensorProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.dims != null && message.hasOwnProperty(\"dims\")) {\n if (!Array.isArray(message.dims))\n return \"dims: array expected\";\n for (var i = 0; i < message.dims.length; ++i)\n if (!$util.isInteger(message.dims[i]) && !(message.dims[i] && $util.isInteger(message.dims[i].low) && $util.isInteger(message.dims[i].high)))\n return \"dims: integer|Long[] expected\";\n }\n if (message.dataType != null && message.hasOwnProperty(\"dataType\"))\n if (!$util.isInteger(message.dataType))\n return \"dataType: integer expected\";\n if (message.segment != null && message.hasOwnProperty(\"segment\")) {\n var error = $root.onnx.TensorProto.Segment.verify(message.segment);\n if (error)\n return \"segment.\" + error;\n }\n if (message.floatData != null && message.hasOwnProperty(\"floatData\")) {\n if (!Array.isArray(message.floatData))\n return \"floatData: array expected\";\n for (var i = 0; i < message.floatData.length; ++i)\n if (typeof message.floatData[i] !== \"number\")\n return \"floatData: number[] expected\";\n }\n if (message.int32Data != null && message.hasOwnProperty(\"int32Data\")) {\n if (!Array.isArray(message.int32Data))\n return \"int32Data: array expected\";\n for (var i = 0; i < message.int32Data.length; ++i)\n if (!$util.isInteger(message.int32Data[i]))\n return \"int32Data: integer[] expected\";\n }\n if (message.stringData != null && message.hasOwnProperty(\"stringData\")) {\n if (!Array.isArray(message.stringData))\n return \"stringData: array expected\";\n for (var i = 0; i < message.stringData.length; ++i)\n if (!(message.stringData[i] && typeof message.stringData[i].length === \"number\" || $util.isString(message.stringData[i])))\n return \"stringData: buffer[] expected\";\n }\n if (message.int64Data != null && message.hasOwnProperty(\"int64Data\")) {\n if (!Array.isArray(message.int64Data))\n return \"int64Data: array expected\";\n for (var i = 0; i < message.int64Data.length; ++i)\n if (!$util.isInteger(message.int64Data[i]) && !(message.int64Data[i] && $util.isInteger(message.int64Data[i].low) && $util.isInteger(message.int64Data[i].high)))\n return \"int64Data: integer|Long[] expected\";\n }\n if (message.name != null && message.hasOwnProperty(\"name\"))\n if (!$util.isString(message.name))\n return \"name: string expected\";\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n if (!$util.isString(message.docString))\n return \"docString: string expected\";\n if (message.rawData != null && message.hasOwnProperty(\"rawData\"))\n if (!(message.rawData && typeof message.rawData.length === \"number\" || $util.isString(message.rawData)))\n return \"rawData: buffer expected\";\n if (message.externalData != null && message.hasOwnProperty(\"externalData\")) {\n if (!Array.isArray(message.externalData))\n return \"externalData: array expected\";\n for (var i = 0; i < message.externalData.length; ++i) {\n var error = $root.onnx.StringStringEntryProto.verify(message.externalData[i]);\n if (error)\n return \"externalData.\" + error;\n }\n }\n if (message.dataLocation != null && message.hasOwnProperty(\"dataLocation\"))\n switch (message.dataLocation) {\n default:\n return \"dataLocation: enum value expected\";\n case 0:\n case 1:\n break;\n }\n if (message.doubleData != null && message.hasOwnProperty(\"doubleData\")) {\n if (!Array.isArray(message.doubleData))\n return \"doubleData: array expected\";\n for (var i = 0; i < message.doubleData.length; ++i)\n if (typeof message.doubleData[i] !== \"number\")\n return \"doubleData: number[] expected\";\n }\n if (message.uint64Data != null && message.hasOwnProperty(\"uint64Data\")) {\n if (!Array.isArray(message.uint64Data))\n return \"uint64Data: array expected\";\n for (var i = 0; i < message.uint64Data.length; ++i)\n if (!$util.isInteger(message.uint64Data[i]) && !(message.uint64Data[i] && $util.isInteger(message.uint64Data[i].low)

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&& $util.isInteger(message.uint64Data[i].high)))\n            return \"uint64Data: integer|Long[] expected\";\n
    }\n        return null;\n    };\n\n    /**\n     * Creates a TensorProto message from a plain object. Also
converts values to their respective internal types.\n     * @function fromObject\n     * @memberof
onnx.TensorProto\n     * @static\n     * @param {Object.<string,*>} object Plain object\n     * @returns
{onnx.TensorProto} TensorProto\n     */\n    TensorProto.fromObject = function fromObject(object) {\n
if (object instanceof $root.onnx.TensorProto)\n            return object;\n        var message = new
$root.onnx.TensorProto();\n        if (object.dims) {\n            if (!Array.isArray(object.dims))\n
throw TypeError(\".onnx.TensorProto.dims: array expected\");\n            message.dims = [];\n            for (var i =
0; i < object.dims.length; ++i)\n                if ($util.Long)\n                    (message.dims[i] =
$util.Long.fromValue(object.dims[i])).unsigned = false;\n                else if (typeof object.dims[i] === \"string\")\n
                    message.dims[i] = parseInt(object.dims[i], 10);\n                else if (typeof object.dims[i] ===
\"number\")\n                    message.dims[i] = object.dims[i];\n                else if (typeof object.dims[i] ===
\"object\")\n                    message.dims[i] = new $util.LongBits(object.dims[i].low >>> 0, object.dims[i].high >>>
0).toNumber();\n        }\n        if (object.dataType != null)\n            message.dataType = object.dataType |
0;\n        if (object.segment != null) {\n            if (typeof object.segment !== \"object\")\n                throw
TypeError(\".onnx.TensorProto.segment: object expected\");\n            message.segment =
$root.onnx.TensorProto.Segment.fromObject(object.segment);\n        }\n        if (object.floatData) {\n
if (!Array.isArray(object.floatData))\n                throw TypeError(\".onnx.TensorProto.floatData: array
expected\");\n            message.floatData = [];\n            for (var i = 0; i < object.floatData.length; ++i)\n
  message.floatData[i] = Number(object.floatData[i]);\n        }\n        if (object.int32Data) {\n            if
(!Array.isArray(object.int32Data))\n                throw TypeError(\".onnx.TensorProto.int32Data: array
expected\");\n            message.int32Data = [];\n            for (var i = 0; i < object.int32Data.length; ++i)\n
    message.int32Data[i] = object.int32Data[i] | 0;\n        }\n        if (object.stringData) {\n            if
(!Array.isArray(object.stringData))\n                throw TypeError(\".onnx.TensorProto.stringData: array
expected\");\n            message.stringData = [];\n            for (var i = 0; i < object.stringData.length; ++i)\n
      if (typeof object.stringData[i] === \"string\")\n                    $util.base64.decode(object.stringData[i],
message.stringData[i] = $util.newBuffer($util.base64.length(object.stringData[i])), 0);\n                else if
(object.stringData[i].length)\n                    message.stringData[i] = object.stringData[i];\n        }\n        if
(object.int64Data) {\n            if (!Array.isArray(object.int64Data))\n                throw
TypeError(\".onnx.TensorProto.int64Data: array expected\");\n            message.int64Data = [];\n            for (var
i = 0; i < object.int64Data.length; ++i)\n                if ($util.Long)\n                    (message.int64Data[i] =
$util.Long.fromValue(object.int64Data[i])).unsigned = false;\n                else if (typeof object.int64Data[i] ===
\"string\")\n                    message.int64Data[i] = parseInt(object.int64Data[i], 10);\n                else if (typeof
object.int64Data[i] === \"number\")\n                    message.int64Data[i] = object.int64Data[i];\n                else
if (typeof object.int64Data[i] === \"object\")\n                    message.int64Data[i] = new
$util.LongBits(object.int64Data[i].low >>> 0, object.int64Data[i].high >>> 0).toNumber();\n        }\n        if
(object.name != null)\n            message.name = String(object.name);\n        if (object.docString != null)\n
  message.docString = String(object.docString);\n        if (object.rawData != null)\n            if (typeof
object.rawData === \"string\")\n                $util.base64.decode(object.rawData, message.rawData =
$util.newBuffer($util.base64.length(object.rawData)), 0);\n            else if (object.rawData.length)\n
message.rawData = object.rawData;\n        if (object.externalData) {\n            if
(!Array.isArray(object.externalData))\n                throw TypeError(\".onnx.TensorProto.externalData: array
expected\");\n            message.externalData = [];\n            for (var i = 0; i < object.externalData.length; ++i) {\n
                if (typeof object.externalData[i] !== \"object\")\n                    throw
TypeError(\".onnx.TensorProto.externalData: object expected\");\n                message.externalData[i] =
$root.onnx.StringStringEntryProto.fromObject(object.externalData[i]);\n            }\n        }\n        switch
(object.dataLocation) {\n        case \"DEFAULT\":\n        case 0:\n            message.dataLocation = 0;\n
  break;\n        case \"EXTERNAL\":\n        case 1:\n            message.dataLocation = 1;\n            break;\n
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    }\n            if (object.doubleData) {\n                if (!Array.isArray(object.doubleData))\n                    throw
TypeError(\".onnx.TensorProto.doubleData: array expected\");\n                message.doubleData = [];\n                for
(var i = 0; i < object.doubleData.length; ++i)\n                    message.doubleData[i] =
Number(object.doubleData[i]);\n            }\n            if (object.uint64Data) {\n                if
(!Array.isArray(object.uint64Data))\n                    throw TypeError(\".onnx.TensorProto.uint64Data: array
expected\");\n                message.uint64Data = [];\n                for (var i = 0; i < object.uint64Data.length; ++i)\n
    if ($util.Long)\n                        (message.uint64Data[i] =
$util.Long.fromValue(object.uint64Data[i])).unsigned = true;\n                    else if (typeof object.uint64Data[i] ===
\"string\")\n                        message.uint64Data[i] = parseInt(object.uint64Data[i], 10);\n                    else if (typeof
object.uint64Data[i] === \"number\")\n                        message.uint64Data[i] = object.uint64Data[i];\n
else if (typeof object.uint64Data[i] === \"object\")\n                        message.uint64Data[i] = new
$util.LongBits(object.uint64Data[i].low >>> 0, object.uint64Data[i].high >>> 0).toNumber(true);\n            }\n
return message;\n        };\n\n        /**\n         * Creates a plain object from a TensorProto message. Also converts
values to other types if specified.\n         * @function toObject\n         * @memberof onnx.TensorProto\n         *
@static\n         * @param {onnx.TensorProto} message TensorProto\n         * @param
{$protobuf.IConversionOptions} [options] Conversion options\n         * @returns {Object.<string,*>} Plain object\n
    */\n        TensorProto.toObject = function toObject(message, options) {\n            if (!options)\n                options
= {};\n            var object = {};\n            if (options.arrays || options.defaults) {\n                object.dims = [];\n
object.floatData = [];\n                object.int32Data = [];\n                object.stringData = [];\n
object.int64Data = [];\n                object.doubleData = [];\n                object.uint64Data = [];\n
object.externalData = [];\n            }\n            if (options.defaults) {\n                object.dataType = 0;\n
object.segment = null;\n                object.name = \"\";\n                if (options.bytes === String)\n
object.rawData = \"\";\n                else {\n                    object.rawData = [];\n                    if (options.bytes !==
Array)\n                        object.rawData = $util.newBuffer(object.rawData);\n                }\n                object.docString
= \"\";\n                object.dataLocation = options.enums === String ? \"DEFAULT\" : 0;\n            }\n            if
(message.dims && message.dims.length) {\n                object.dims = [];\n                for (var j = 0; j <
message.dims.length; ++j)\n                    if (typeof message.dims[j] === \"number\")\n                        object.dims[j]
= options.longs === String ? String(message.dims[j]) : message.dims[j];\n                    else\n
object.dims[j] = options.longs === String ? $util.Long.prototype.toString.call(message.dims[j]) : options.longs ===
Number ? new $util.LongBits(message.dims[j].low >>> 0, message.dims[j].high >>> 0).toNumber() :
message.dims[j];\n            }\n            if (message.dataType != null && message.hasOwnProperty(\"dataType\"))\n
     object.dataType = message.dataType;\n            if (message.segment != null &&
message.hasOwnProperty(\"segment\"))\n                object.segment =
$root.onnx.TensorProto.Segment.toObject(message.segment, options);\n            if (message.floatData &&
message.floatData.length) {\n                object.floatData = [];\n                for (var j = 0; j < message.floatData.length;
++j)\n                    object.floatData[j] = options.json && !isFinite(message.floatData[j]) ?
String(message.floatData[j]) : message.floatData[j];\n            }\n            if (message.int32Data &&
message.int32Data.length) {\n                object.int32Data = [];\n                for (var j = 0; j <
message.int32Data.length; ++j)\n                    object.int32Data[j] = message.int32Data[j];\n            }\n            if
(message.stringData && message.stringData.length) {\n                object.stringData = [];\n                for (var j = 0; j
< message.stringData.length; ++j)\n                    object.stringData[j] = options.bytes === String ?
$util.base64.encode(message.stringData[j], 0, message.stringData[j].length) : options.bytes === Array ?
Array.prototype.slice.call(message.stringData[j]) : message.stringData[j];\n            }\n            if (message.int64Data
&& message.int64Data.length) {\n                object.int64Data = [];\n                for (var j = 0; j <
message.int64Data.length; ++j)\n                    if (typeof message.int64Data[j] === \"number\")\n
object.int64Data[j] = options.longs === String ? String(message.int64Data[j]) : message.int64Data[j];\n
else\n                        object.int64Data[j] = options.longs === String ?
$util.Long.prototype.toString.call(message.int64Data[j]) : options.longs === Number ? new
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$util.LongBits(message.int64Data[j].low >>> 0, message.int64Data[j].high >>> 0).toNumber() :
message.int64Data[j];\n            }\n            if (message.name != null && message.hasOwnProperty(\"name\"))\n
    object.name = message.name;\n            if (message.rawData != null &&
message.hasOwnProperty(\"rawData\"))\n                object.rawData = options.bytes === String ?
$util.base64.encode(message.rawData, 0, message.rawData.length) : options.bytes === Array ?
Array.prototype.slice.call(message.rawData) : message.rawData;\n            if (message.doubleData &&
message.doubleData.length) {\n                object.doubleData = [];\n                for (var j = 0; j <
message.doubleData.length; ++j)\n                    object.doubleData[j] = options.json &&
!isFinite(message.doubleData[j]) ? String(message.doubleData[j]) : message.doubleData[j];\n            }\n            if
(message.uint64Data && message.uint64Data.length) {\n                object.uint64Data = [];\n                for (var j = 0;
j < message.uint64Data.length; ++j)\n                    if (typeof message.uint64Data[j] === \"number\")\n
object.uint64Data[j] = options.longs === String ? String(message.uint64Data[j]) : message.uint64Data[j];\n
    else\n                        object.uint64Data[j] = options.longs === String ?
$util.Long.prototype.toString.call(message.uint64Data[j]) : options.longs === Number ? new
$util.LongBits(message.uint64Data[j].low >>> 0, message.uint64Data[j].high >>> 0).toNumber(true) :
message.uint64Data[j];\n            }\n            if (message.docString != null &&
message.hasOwnProperty(\"docString\"))\n                object.docString = message.docString;\n            if
(message.externalData && message.externalData.length) {\n                object.externalData = [];\n                for (var j
= 0; j < message.externalData.length; ++j)\n                    object.externalData[j] =
$root.onnx.StringStringEntryProto.toObject(message.externalData[j], options);\n            }\n            if
(message.dataLocation != null && message.hasOwnProperty(\"dataLocation\"))\n                object.dataLocation =
options.enums === String ? $root.onnx.TensorProto.DataLocation[message.dataLocation] :
message.dataLocation;\n            return object;\n        };\n\n        /**\n         * Converts this TensorProto to JSON.\n
   * @function toJSON\n         * @memberof onnx.TensorProto\n         * @instance\n         * @returns
{Object.<string,*>} JSON object\n         */\n        TensorProto.prototype.toJSON = function toJSON() {\n
return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n        };\n\n        /**\n         * DataType
enum.\n         * @name onnx.TensorProto.DataType\n         * @enum {string}\n         * @property {number}
UNDEFINED=0 UNDEFINED value\n         * @property {number} FLOAT=1 FLOAT value\n         * @property
{number} UINT8=2 UINT8 value\n         * @property {number} INT8=3 INT8 value\n         * @property {number}
UINT16=4 UINT16 value\n         * @property {number} INT16=5 INT16 value\n         * @property {number}
INT32=6 INT32 value\n         * @property {number} INT64=7 INT64 value\n         * @property {number}
STRING=8 STRING value\n         * @property {number} BOOL=9 BOOL value\n         * @property {number}
FLOAT16=10 FLOAT16 value\n         * @property {number} DOUBLE=11 DOUBLE value\n         * @property
{number} UINT32=12 UINT32 value\n         * @property {number} UINT64=13 UINT64 value\n         *
@property {number} COMPLEX64=14 COMPLEX64 value\n         * @property {number} COMPLEX128=15
COMPLEX128 value\n         * @property {number} BFLOAT16=16 BFLOAT16 value\n         */\n
TensorProto.DataType = (function() {\n            var valuesById = {}, values = Object.create(valuesById);\n
values[valuesById[0] = \"UNDEFINED\"] = 0;\n            values[valuesById[1] = \"FLOAT\"] = 1;\n
values[valuesById[2] = \"UINT8\"] = 2;\n            values[valuesById[3] = \"INT8\"] = 3;\n
values[valuesById[4] = \"UINT16\"] = 4;\n            values[valuesById[5] = \"INT16\"] = 5;\n
values[valuesById[6] = \"INT32\"] = 6;\n            values[valuesById[7] = \"INT64\"] = 7;\n
values[valuesById[8] = \"STRING\"] = 8;\n            values[valuesById[9] = \"BOOL\"] = 9;\n
values[valuesById[10] = \"FLOAT16\"] = 10;\n            values[valuesById[11] = \"DOUBLE\"] = 11;\n
values[valuesById[12] = \"UINT32\"] = 12;\n            values[valuesById[13] = \"UINT64\"] = 13;\n
values[valuesById[14] = \"COMPLEX64\"] = 14;\n            values[valuesById[15] = \"COMPLEX128\"] = 15;\n
   values[valuesById[16] = \"BFLOAT16\"] = 16;\n            return values;\n        })();\n\n        TensorProto.Segment
= (function() {\n\n            /**\n             * Properties of a Segment.\n             * @memberof onnx.TensorProto\n
  * @interface ISegment\n             * @property {number|Long|null} [begin] Segment begin\n             * @property
```

{number|Long|null} [end] Segment end\n */\n\n /**\n * Constructs a new Segment.\n * @memberof onnx.TensorProto\n * @classdesc Represents a Segment.\n * @implements ISegment\n * @constructor\n * @param {onnx.TensorProto.ISegment=} [properties] Properties to set\n */\n function Segment(properties) {\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * Segment begin.\n * @member {number|Long} begin\n * @memberof onnx.TensorProto.Segment\n * @instance\n */\n Segment.prototype.begin = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n /**\n * Segment end.\n * @member {number|Long} end\n * @memberof onnx.TensorProto.Segment\n * @instance\n */\n Segment.prototype.end = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n /**\n * Creates a new Segment instance using the specified properties.\n * @function create\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {onnx.TensorProto.ISegment=} [properties] Properties to set\n * @returns {onnx.TensorProto.Segment} Segment instance\n */\n Segment.create = function create(properties) {\n return new Segment(properties);\n };\n\n /**\n * Encodes the specified Segment message. Does not implicitly {@link onnx.TensorProto.Segment.verify|verify} messages.\n * @function encode\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {onnx.TensorProto.ISegment} message Segment message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n Segment.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.begin != null && message.hasOwnProperty(\"begin\"))\n writer.uint32(/* id 1, wireType 0 =*/8).int64(message.begin);\n if (message.end != null && message.hasOwnProperty(\"end\"))\n writer.uint32(/* id 2, wireType 0 =*/16).int64(message.end);\n return writer;\n };\n\n /**\n * Encodes the specified Segment message, length delimited. Does not implicitly {@link onnx.TensorProto.Segment.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {onnx.TensorProto.ISegment} message Segment message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n Segment.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a Segment message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.TensorProto.Segment} Segment\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Segment.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.TensorProto.Segment();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.begin = reader.int64();\n break;\n case 2:\n message.end = reader.int64();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a Segment message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TensorProto.Segment} Segment\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Segment.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a Segment message.\n * @function verify\n

```
     * @memberof onnx.TensorProto.Segment\n          * @static\n          * @param {Object.<string,*>} message
Plain object to verify\n          * @returns {string|null} `null` if valid, otherwise the reason why it is not\n
*/\n          Segment.verify = function verify(message) {\n              if (typeof message !== \"object\" || message ===
null)\n                 return \"object expected\";\n              if (message.begin != null &&
message.hasOwnProperty(\"begin\"))\n                 if (!$util.isInteger(message.begin) && !(message.begin &&
$util.isInteger(message.begin.low) && $util.isInteger(message.begin.high)))\n                    return \"begin:
integer|Long expected\";\n              if (message.end != null && message.hasOwnProperty(\"end\"))\n                 if
(!$util.isInteger(message.end) && !(message.end && $util.isInteger(message.end.low) &&
$util.isInteger(message.end.high)))\n                    return \"end: integer|Long expected\";\n            return null;\n
      };\n\n          /**\n          * Creates a Segment message from a plain object. Also converts values to their
respective internal types.\n          * @function fromObject\n          * @memberof onnx.TensorProto.Segment\n
      * @static\n          * @param {Object.<string,*>} object Plain object\n          * @returns
{onnx.TensorProto.Segment} Segment\n          */\n          Segment.fromObject = function fromObject(object) {\n
           if (object instanceof $root.onnx.TensorProto.Segment)\n                 return object;\n              var message =
new $root.onnx.TensorProto.Segment();\n              if (object.begin != null)\n                 if ($util.Long)\n
     (message.begin = $util.Long.fromValue(object.begin)).unsigned = false;\n                 else if (typeof
object.begin === \"string\")\n                    message.begin = parseInt(object.begin, 10);\n                 else if (typeof
object.begin === \"number\")\n                    message.begin = object.begin;\n                 else if (typeof
object.begin === \"object\")\n                    message.begin = new $util.LongBits(object.begin.low >>> 0,
object.begin.high >>> 0).toNumber();\n              if (object.end != null)\n                 if ($util.Long)\n
(message.end = $util.Long.fromValue(object.end)).unsigned = false;\n                 else if (typeof object.end ===
\"string\")\n                    message.end = parseInt(object.end, 10);\n                 else if (typeof object.end ===
\"number\")\n                    message.end = object.end;\n                 else if (typeof object.end === \"object\")\n
             message.end = new $util.LongBits(object.end.low >>> 0, object.end.high >>> 0).toNumber();\n
return message;\n          };\n\n          /**\n          * Creates a plain object from a Segment message. Also converts
values to other types if specified.\n          * @function toObject\n          * @memberof
onnx.TensorProto.Segment\n          * @static\n          * @param {onnx.TensorProto.Segment} message
Segment\n          * @param {$protobuf.IConversionOptions} [options] Conversion options\n          * @returns
{Object.<string,*>} Plain object\n          */\n          Segment.toObject = function toObject(message, options) {\n
         if (!options)\n                 options = {};\n              var object = {};\n              if (options.defaults) {\n
      if ($util.Long) {\n                    var long = new $util.Long(0, 0, false);\n                    object.begin =
options.longs === String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n                 }
else\n                    object.begin = options.longs === String ? \"0\" : 0;\n                 if ($util.Long) {\n
  var long = new $util.Long(0, 0, false);\n                    object.end = options.longs === String ? long.toString() :
options.longs === Number ? long.toNumber() : long;\n                 } else\n                    object.end = options.longs
=== String ? \"0\" : 0;\n              }\n              if (message.begin != null && message.hasOwnProperty(\"begin\"))\n
              if (typeof message.begin === \"number\")\n                    object.begin = options.longs === String ?
String(message.begin) : message.begin;\n                 else\n                    object.begin = options.longs === String ?
$util.Long.prototype.toString.call(message.begin) : options.longs === Number ? new
$util.LongBits(message.begin.low >>> 0, message.begin.high >>> 0).toNumber() : message.begin;\n              if
(message.end != null && message.hasOwnProperty(\"end\"))\n                 if (typeof message.end ===
\"number\")\n                    object.end = options.longs === String ? String(message.end) : message.end;\n
  else\n                    object.end = options.longs === String ? $util.Long.prototype.toString.call(message.end) :
options.longs === Number ? new $util.LongBits(message.end.low >>> 0, message.end.high >>> 0).toNumber() :
message.end;\n              return object;\n          };\n\n          /**\n          * Converts this Segment to JSON.\n
  * @function toJSON\n          * @memberof onnx.TensorProto.Segment\n          * @instance\n          *
@returns {Object.<string,*>} JSON object\n          */\n          Segment.prototype.toJSON = function toJSON()
{\n              return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n          };\n\n          return
```

Segment;\n })();\n\n /**\n * DataLocation enum.\n * @name onnx.TensorProto.DataLocation\n * @enum {string}\n * @property {number} DEFAULT=0 DEFAULT value\n * @property {number} EXTERNAL=1 EXTERNAL value\n */\n TensorProto.DataLocation = (function() {\n var valuesById = {}, values = Object.create(valuesById);\n values[valuesById[0] = \"DEFAULT\"] = 0;\n values[valuesById[1] = \"EXTERNAL\"] = 1;\n return values;\n })();\n\n return TensorProto;\n })();\n\n onnx.TensorShapeProto = (function() {\n\n /**\n * Properties of a TensorShapeProto.\n * @memberof onnx\n * @interface ITensorShapeProto\n * @property {Array.<onnx.TensorShapeProto.IDimension>|null} [dim] TensorShapeProto dim\n */\n\n /**\n * Constructs a new TensorShapeProto.\n * @memberof onnx\n * @classdesc Represents a TensorShapeProto.\n * @implements ITensorShapeProto\n * @constructor\n * @param {onnx.ITensorShapeProto=} [properties] Properties to set\n */\n function TensorShapeProto(properties) {\n this.dim = [];\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * TensorShapeProto dim.\n * @member {Array.<onnx.TensorShapeProto.IDimension>} dim\n * @memberof onnx.TensorShapeProto\n * @instance\n */\n TensorShapeProto.prototype.dim = $util.emptyArray;\n\n /**\n * Creates a new TensorShapeProto instance using the specified properties.\n * @function create\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {onnx.ITensorShapeProto=} [properties] Properties to set\n * @returns {onnx.TensorShapeProto} TensorShapeProto instance\n */\n TensorShapeProto.create = function create(properties) {\n return new TensorShapeProto(properties);\n };\n\n /**\n * Encodes the specified TensorShapeProto message. Does not implicitly {@link onnx.TensorShapeProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {onnx.ITensorShapeProto} message TensorShapeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n TensorShapeProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.dim != null && message.dim.length)\n for (var i = 0; i < message.dim.length; ++i)\n $root.onnx.TensorShapeProto.Dimension.encode(message.dim[i], writer.uint32(/* id 1, wireType 2 =*/10).fork()).ldelim();\n return writer;\n };\n\n /**\n * Encodes the specified TensorShapeProto message, length delimited. Does not implicitly {@link onnx.TensorShapeProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {onnx.ITensorShapeProto} message TensorShapeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n TensorShapeProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a TensorShapeProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.TensorShapeProto} TensorShapeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n TensorShapeProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.TensorShapeProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n if (!(message.dim && message.dim.length))\n message.dim = [];\n message.dim.push($root.onnx.TensorShapeProto.Dimension.decode(reader, reader.uint32()));\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a TensorShapeProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader

Reader or buffer to decode from\n * @returns {onnx.TensorShapeProto} TensorShapeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n TensorShapeProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a TensorShapeProto message.\n * @function verify\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n TensorShapeProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.dim != null && message.hasOwnProperty(\"dim\")) {\n if (!Array.isArray(message.dim))\n return \"dim: array expected\";\n for (var i = 0; i < message.dim.length; ++i) {\n var error = $root.onnx.TensorShapeProto.Dimension.verify(message.dim[i]);\n if (error)\n return \"dim.\" + error;\n }\n }\n return null;\n };\n\n /**\n * Creates a TensorShapeProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.TensorShapeProto} TensorShapeProto\n */\n TensorShapeProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.TensorShapeProto)\n return object;\n var message = new $root.onnx.TensorShapeProto();\n if (object.dim) {\n if (!Array.isArray(object.dim))\n throw TypeError(\".onnx.TensorShapeProto.dim: array expected\");\n message.dim = [];\n for (var i = 0; i < object.dim.length; ++i) {\n if (typeof object.dim[i] !== \"object\")\n throw TypeError(\".onnx.TensorShapeProto.dim: object expected\");\n message.dim[i] = $root.onnx.TensorShapeProto.Dimension.fromObject(object.dim[i]);\n }\n }\n return message;\n };\n\n /**\n * Creates a plain object from a TensorShapeProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {onnx.TensorShapeProto} message TensorShapeProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n TensorShapeProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.arrays || options.defaults)\n object.dim = [];\n if (message.dim && message.dim.length) {\n object.dim = [];\n for (var j = 0; j < message.dim.length; ++j)\n object.dim[j] = $root.onnx.TensorShapeProto.Dimension.toObject(message.dim[j], options);\n }\n return object;\n };\n\n /**\n * Converts this TensorShapeProto to JSON.\n * @function toJSON\n * @memberof onnx.TensorShapeProto\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n TensorShapeProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n TensorShapeProto.Dimension = (function() {\n\n /**\n * Properties of a Dimension.\n * @memberof onnx.TensorShapeProto\n * @interface IDimension\n * @property {number|Long|null} [dimValue] Dimension dimValue\n * @property {string|null} [dimParam] Dimension dimParam\n * @property {string|null} [denotation] Dimension denotation\n */\n\n /**\n * Constructs a new Dimension.\n * @memberof onnx.TensorShapeProto\n * @classdesc Represents a Dimension.\n * @implements IDimension\n * @constructor\n * @param {onnx.TensorShapeProto.IDimension=} [properties] Properties to set\n */\n function Dimension(properties) {\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * Dimension dimValue.\n * @member {number|Long} dimValue\n * @memberof onnx.TensorShapeProto.Dimension\n * @instance\n */\n Dimension.prototype.dimValue = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n /**\n * Dimension dimParam.\n * @member {string} dimParam\n * @memberof onnx.TensorShapeProto.Dimension\n * @instance\n */\n Dimension.prototype.dimParam = \"\";\n\n /**\n * Dimension denotation.\n * @member {string} denotation\n * @memberof onnx.TensorShapeProto.Dimension\n * @instance\n */\n Dimension.prototype.denotation = \"\";\n\n // OneOf field names bound to virtual getters and setters\n var $oneOfFields;\n\n /**\n * Dimension value.\n * @member {\"dimValue\"|\"dimParam\"|undefined} value\n * @memberof onnx.TensorShapeProto.Dimension\n * @instance\n */\n Object.defineProperty(Dimension.prototype, \"value\", {\n get: $util.oneOfGetter($oneOfFields = [\"dimValue\", \"dimParam\"]),\n set: $util.oneOfSetter($oneOfFields)\n });\n\n /**\n * Creates a new Dimension instance using the specified properties.\n * @function create\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {onnx.TensorShapeProto.IDimension=} [properties] Properties to set\n * @returns {onnx.TensorShapeProto.Dimension} Dimension instance\n */\n Dimension.create = function create(properties) {\n return new Dimension(properties);\n };\n\n /**\n * Encodes the specified Dimension message. Does not implicitly {@link onnx.TensorShapeProto.Dimension.verify|verify} messages.\n * @function encode\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {onnx.TensorShapeProto.IDimension} message Dimension message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n Dimension.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.dimValue != null && message.hasOwnProperty(\"dimValue\"))\n writer.uint32(/* id 1, wireType 0 =*/8).int64(message.dimValue);\n if (message.dimParam != null && message.hasOwnProperty(\"dimParam\"))\n writer.uint32(/* id 2, wireType 2 =*/18).string(message.dimParam);\n if (message.denotation != null && message.hasOwnProperty(\"denotation\"))\n writer.uint32(/* id 3, wireType 2 =*/26).string(message.denotation);\n return writer;\n };\n\n /**\n * Encodes the specified Dimension message, length delimited. Does not implicitly {@link onnx.TensorShapeProto.Dimension.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {onnx.TensorShapeProto.IDimension} message Dimension message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n Dimension.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a Dimension message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.TensorShapeProto.Dimension} Dimension\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Dimension.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.TensorShapeProto.Dimension();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.dimValue = reader.int64();\n break;\n case 2:\n message.dimParam = reader.string();\n break;\n case 3:\n message.denotation = reader.string();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a Dimension message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TensorShapeProto.Dimension} Dimension\n *

@throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Dimension.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a Dimension message.\n * @function verify\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n Dimension.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n var properties = {};\n if (message.dimValue != null && message.hasOwnProperty(\"dimValue\")) {\n properties.value = 1;\n if (!$util.isInteger(message.dimValue) && !(message.dimValue && $util.isInteger(message.dimValue.low) && $util.isInteger(message.dimValue.high)))\n return \"dimValue: integer|Long expected\";\n }\n if (message.dimParam != null && message.hasOwnProperty(\"dimParam\")) {\n if (properties.value === 1)\n return \"value: multiple values\";\n properties.value = 1;\n if (!$util.isString(message.dimParam))\n return \"dimParam: string expected\";\n }\n if (message.denotation != null && message.hasOwnProperty(\"denotation\"))\n if (!$util.isString(message.denotation))\n return \"denotation: string expected\";\n return null;\n };\n\n /**\n * Creates a Dimension message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.TensorShapeProto.Dimension} Dimension\n */\n Dimension.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.TensorShapeProto.Dimension)\n return object;\n var message = new $root.onnx.TensorShapeProto.Dimension();\n if (object.dimValue != null)\n if ($util.Long)\n (message.dimValue = $util.Long.fromValue(object.dimValue)).unsigned = false;\n else if (typeof object.dimValue === \"string\")\n message.dimValue = parseInt(object.dimValue, 10);\n else if (typeof object.dimValue === \"number\")\n message.dimValue = object.dimValue;\n else if (typeof object.dimValue === \"object\")\n message.dimValue = new $util.LongBits(object.dimValue.low >>> 0, object.dimValue.high >>> 0).toNumber();\n if (object.dimParam != null)\n message.dimParam = String(object.dimParam);\n if (object.denotation != null)\n message.denotation = String(object.denotation);\n return message;\n };\n\n /**\n * Creates a plain object from a Dimension message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {onnx.TensorShapeProto.Dimension} message Dimension\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n Dimension.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.defaults)\n object.denotation = \"\";\n if (message.dimValue != null && message.hasOwnProperty(\"dimValue\")) {\n if (typeof message.dimValue === \"number\")\n object.dimValue = options.longs === String ? String(message.dimValue) : message.dimValue;\n else\n object.dimValue = options.longs === String ? $util.Long.prototype.toString.call(message.dimValue) : options.longs === Number ? new $util.LongBits(message.dimValue.low >>> 0, message.dimValue.high >>> 0).toNumber() : message.dimValue;\n if (options.oneofs)\n object.value = \"dimValue\";\n }\n if (message.dimParam != null && message.hasOwnProperty(\"dimParam\")) {\n object.dimParam = message.dimParam;\n if (options.oneofs)\n object.value = \"dimParam\";\n }\n if (message.denotation != null && message.hasOwnProperty(\"denotation\"))\n object.denotation = message.denotation;\n return object;\n };\n\n /**\n * Converts this Dimension to JSON.\n * @function toJSON\n * @memberof onnx.TensorShapeProto.Dimension\n *

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@instance\n         * @returns {Object.<string,*>} JSON object\n         */\n        Dimension.prototype.toJSON
= function toJSON() {\n            return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n
};\n\n        return Dimension;\n    })();\n\n    return TensorShapeProto;\n  })();\n\n  onnx.TypeProto =
(function() {\n\n    /**\n     * Properties of a TypeProto.\n     * @memberof onnx\n     * @interface
ITypeProto\n     * @property {onnx.TypeProto.ITensor|null} [tensorType] TypeProto tensorType\n     *
@property {string|null} [denotation] TypeProto denotation\n     */\n\n    /**\n     * Constructs a new
TypeProto.\n     * @memberof onnx\n     * @classdesc Represents a TypeProto.\n     * @implements
ITypeProto\n     * @constructor\n     * @param {onnx.ITypeProto=} [properties] Properties to set\n     */\n
 function TypeProto(properties) {\n        if (properties)\n            for (var keys = Object.keys(properties), i = 0; i
< keys.length; ++i)\n                if (properties[keys[i]] != null)\n                    this[keys[i]] = properties[keys[i]];\n
   }\n\n    /**\n     * TypeProto tensorType.\n     * @member {onnx.TypeProto.ITensor|null|undefined}
tensorType\n     * @memberof onnx.TypeProto\n     * @instance\n     */\n
TypeProto.prototype.tensorType = null;\n\n    /**\n     * TypeProto denotation.\n     * @member {string}
denotation\n     * @memberof onnx.TypeProto\n     * @instance\n     */\n
TypeProto.prototype.denotation = \"\";\n\n    // OneOf field names bound to virtual getters and setters\n    var
$oneOfFields;\n\n    /**\n     * TypeProto value.\n     * @member {\"tensorType\"|undefined} value\n     *
@memberof onnx.TypeProto\n     * @instance\n     */\n    Object.defineProperty(TypeProto.prototype,
\"value\", {\n        get: $util.oneOfGetter($oneOfFields = [\"tensorType\"]),\n        set:
$util.oneOfSetter($oneOfFields)\n    });\n\n    /**\n     * Creates a new TypeProto instance using the
specified properties.\n     * @function create\n     * @memberof onnx.TypeProto\n     * @static\n     *
@param {onnx.ITypeProto=} [properties] Properties to set\n     * @returns {onnx.TypeProto} TypeProto
instance\n     */\n    TypeProto.create = function create(properties) {\n        return new
TypeProto(properties);\n    };\n\n    /**\n     * Encodes the specified TypeProto message. Does not implicitly
{@link onnx.TypeProto.verify|verify} messages.\n     * @function encode\n     * @memberof
onnx.TypeProto\n     * @static\n     * @param {onnx.ITypeProto} message TypeProto message or plain object
to encode\n     * @param {$protobuf.Writer} [writer] Writer to encode to\n     * @returns {$protobuf.Writer}
Writer\n     */\n    TypeProto.encode = function encode(message, writer) {\n        if (!writer)\n
writer = $Writer.create();\n        if (message.tensorType != null && message.hasOwnProperty(\"tensorType\"))\n
        $root.onnx.TypeProto.Tensor.encode(message.tensorType, writer.uint32(/* id 1, wireType 2
=*/10).fork()).ldelim();\n        if (message.denotation != null && message.hasOwnProperty(\"denotation\"))\n
     writer.uint32(/* id 6, wireType 2 =*/50).string(message.denotation);\n        return writer;\n    };\n\n
/**\n     * Encodes the specified TypeProto message, length delimited. Does not implicitly {@link
onnx.TypeProto.verify|verify} messages.\n     * @function encodeDelimited\n     * @memberof
onnx.TypeProto\n     * @static\n     * @param {onnx.ITypeProto} message TypeProto message or plain object
to encode\n     * @param {$protobuf.Writer} [writer] Writer to encode to\n     * @returns {$protobuf.Writer}
Writer\n     */\n    TypeProto.encodeDelimited = function encodeDelimited(message, writer) {\n        return
this.encode(message, writer).ldelim();\n    };\n\n    /**\n     * Decodes a TypeProto message from the
specified reader or buffer.\n     * @function decode\n     * @memberof onnx.TypeProto\n     * @static\n
* @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n     * @param {number}
[length] Message length if known beforehand\n     * @returns {onnx.TypeProto} TypeProto\n     * @throws
{Error} If the payload is not a reader or valid buffer\n     * @throws {$protobuf.util.ProtocolError} If required
fields are missing\n     */\n    TypeProto.decode = function decode(reader, length) {\n        if (!(reader
instanceof $Reader))\n            reader = $Reader.create(reader);\n        var end = length === undefined ?
reader.len : reader.pos + length, message = new $root.onnx.TypeProto();\n        while (reader.pos < end) {\n
  var tag = reader.uint32();\n            switch (tag >>> 3) {\n            case 1:\n                message.tensorType =
$root.onnx.TypeProto.Tensor.decode(reader, reader.uint32());\n                break;\n            case 6:\n
message.denotation = reader.string();\n                break;\n            default:\n                reader.skipType(tag &
7);\n                break;\n            }\n        }\n        return message;\n    };\n\n    /**\n     * Decodes a
```

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TypeProto message from the specified reader or buffer, length delimited.\n         * @function decodeDelimited\n
 * @memberof onnx.TypeProto\n         * @static\n         * @param {$protobuf.Reader|Uint8Array} reader Reader or
buffer to decode from\n         * @returns {onnx.TypeProto} TypeProto\n         * @throws {Error} If the payload is
not a reader or valid buffer\n         * @throws {$protobuf.util.ProtocolError} If required fields are missing\n
*/\n        TypeProto.decodeDelimited = function decodeDelimited(reader) {\n            if (!(reader instanceof
$Reader))\n                reader = new $Reader(reader);\n            return this.decode(reader, reader.uint32());\n
};\n\n        /**\n         * Verifies a TypeProto message.\n         * @function verify\n         * @memberof
onnx.TypeProto\n         * @static\n         * @param {Object.<string,*>} message Plain object to verify\n         *
@returns {string|null} `null` if valid, otherwise the reason why it is not\n         */\n        TypeProto.verify = function
verify(message) {\n            if (typeof message !== \"object\" || message === null)\n                return \"object
expected\";\n            var properties = {};\n            if (message.tensorType != null &&
message.hasOwnProperty(\"tensorType\")) {\n                properties.value = 1;\n                {\n                    var error =
$root.onnx.TypeProto.Tensor.verify(message.tensorType);\n                    if (error)\n                        return
\"tensorType.\" + error;\n                }\n            }\n            if (message.denotation != null &&
message.hasOwnProperty(\"denotation\"))\n                if (!$util.isString(message.denotation))\n                    return
\"denotation: string expected\";\n            return null;\n        };\n\n        /**\n         * Creates a TypeProto message
from a plain object. Also converts values to their respective internal types.\n         * @function fromObject\n         *
@memberof onnx.TypeProto\n         * @static\n         * @param {Object.<string,*>} object Plain object\n         *
@returns {onnx.TypeProto} TypeProto\n         */\n        TypeProto.fromObject = function fromObject(object) {\n
    if (object instanceof $root.onnx.TypeProto)\n                return object;\n            var message = new
$root.onnx.TypeProto();\n            if (object.tensorType != null) {\n                if (typeof object.tensorType !==
\"object\")\n                    throw TypeError(\".onnx.TypeProto.tensorType: object expected\");\n
message.tensorType = $root.onnx.TypeProto.Tensor.fromObject(object.tensorType);\n            }\n            if
(object.denotation != null)\n                message.denotation = String(object.denotation);\n            return message;\n
 };\n\n        /**\n         * Creates a plain object from a TypeProto message. Also converts values to other types if
specified.\n         * @function toObject\n         * @memberof onnx.TypeProto\n         * @static\n         * @param
{onnx.TypeProto} message TypeProto\n         * @param {$protobuf.IConversionOptions} [options] Conversion
options\n         * @returns {Object.<string,*>} Plain object\n         */\n        TypeProto.toObject = function
toObject(message, options) {\n            if (!options)\n                options = {};\n            var object = {};\n            if
(options.defaults)\n                object.denotation = \"\";\n            if (message.tensorType != null &&
message.hasOwnProperty(\"tensorType\")) {\n                object.tensorType =
$root.onnx.TypeProto.Tensor.toObject(message.tensorType, options);\n                if (options.oneofs)\n
object.value = \"tensorType\";\n            }\n            if (message.denotation != null &&
message.hasOwnProperty(\"denotation\"))\n                object.denotation = message.denotation;\n            return
object;\n        };\n\n        /**\n         * Converts this TypeProto to JSON.\n         * @function toJSON\n         *
@memberof onnx.TypeProto\n         * @instance\n         * @returns {Object.<string,*>} JSON object\n         */\n
 TypeProto.prototype.toJSON = function toJSON() {\n            return this.constructor.toObject(this,
$protobuf.util.toJSONOptions);\n        };\n\n        TypeProto.Tensor = (function() {\n\n            /**\n             *
Properties of a Tensor.\n             * @memberof onnx.TypeProto\n             * @interface ITensor\n             *
@property {number|null} [elemType] Tensor elemType\n             * @property {onnx.ITensorShapeProto|null}
[shape] Tensor shape\n             */\n\n            /**\n             * Constructs a new Tensor.\n             * @memberof
onnx.TypeProto\n             * @classdesc Represents a Tensor.\n             * @implements ITensor\n             *
@constructor\n             * @param {onnx.TypeProto.ITensor=} [properties] Properties to set\n             */\n
function Tensor(properties) {\n                if (properties)\n                    for (var keys = Object.keys(properties), i = 0; i
< keys.length; ++i)\n                        if (properties[keys[i]] != null)\n                            this[keys[i]] =
properties[keys[i]];\n            }\n\n            /**\n             * Tensor elemType.\n             * @member {number}
elemType\n             * @memberof onnx.TypeProto.Tensor\n             * @instance\n             */\n
Tensor.prototype.elemType = 0;\n\n            /**\n             * Tensor shape.\n             * @member
```

{onnx.ITensorShapeProto|null|undefined} shape\n * @memberof onnx.TypeProto.Tensor\n * @instance\n */\n Tensor.prototype.shape = null;\n\n /**\n * Creates a new Tensor instance using the specified properties.\n * @function create\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {onnx.TypeProto.ITensor=} [properties] Properties to set\n * @returns {onnx.TypeProto.Tensor} Tensor instance\n */\n Tensor.create = function create(properties) {\n return new Tensor(properties);\n };\n\n /**\n * Encodes the specified Tensor message. Does not implicitly {@link onnx.TypeProto.Tensor.verify|verify} messages.\n * @function encode\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {onnx.TypeProto.ITensor} message Tensor message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n Tensor.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.elemType != null && message.hasOwnProperty(\"elemType\"))\n writer.uint32(/* id 1, wireType 0 =*/8).int32(message.elemType);\n if (message.shape != null && message.hasOwnProperty(\"shape\"))\n $root.onnx.TensorShapeProto.encode(message.shape, writer.uint32(/* id 2, wireType 2 =*/18).fork()).ldelim();\n return writer;\n };\n\n /**\n * Encodes the specified Tensor message, length delimited. Does not implicitly {@link onnx.TypeProto.Tensor.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {onnx.TypeProto.ITensor} message Tensor message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n Tensor.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a Tensor message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.TypeProto.Tensor} Tensor\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Tensor.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.TypeProto.Tensor();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.elemType = reader.int32();\n break;\n case 2:\n message.shape = $root.onnx.TensorShapeProto.decode(reader, reader.uint32());\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a Tensor message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TypeProto.Tensor} Tensor\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Tensor.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a Tensor message.\n * @function verify\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n Tensor.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.elemType != null && message.hasOwnProperty(\"elemType\"))\n if (!$util.isInteger(message.elemType))\n return \"elemType: integer expected\";\n if (message.shape != null && message.hasOwnProperty(\"shape\")) {\n var error = $root.onnx.TensorShapeProto.verify(message.shape);\n if (error)\n return \"shape.\" +

error;\n }\n return null;\n };\n\n /**\n * Creates a Tensor message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.TypeProto.Tensor} Tensor\n */\n Tensor.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.TypeProto.Tensor)\n return object;\n var message = new $root.onnx.TypeProto.Tensor();\n if (object.elemType != null)\n message.elemType = object.elemType | 0;\n if (object.shape != null) {\n if (typeof object.shape !== \"object\")\n throw TypeError(\".onnx.TypeProto.Tensor.shape: object expected\");\n message.shape = $root.onnx.TensorShapeProto.fromObject(object.shape);\n }\n return message;\n };\n\n /**\n * Creates a plain object from a Tensor message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {onnx.TypeProto.Tensor} message Tensor\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n Tensor.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.defaults) {\n object.elemType = 0;\n object.shape = null;\n }\n if (message.elemType != null && message.hasOwnProperty(\"elemType\"))\n object.elemType = message.elemType;\n if (message.shape != null && message.hasOwnProperty(\"shape\"))\n object.shape = $root.onnx.TensorShapeProto.toObject(message.shape, options);\n return object;\n };\n\n /**\n * Converts this Tensor to JSON.\n * @function toJSON\n * @memberof onnx.TypeProto.Tensor\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n Tensor.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return Tensor;\n })();\n\n return TypeProto;\n })();\n\n onnx.OperatorSetIdProto = (function() {\n\n /**\n * Properties of an OperatorSetIdProto.\n * @memberof onnx\n * @interface IOperatorSetIdProto\n * @property {string|null} [domain] OperatorSetIdProto domain\n * @property {number|Long|null} [version] OperatorSetIdProto version\n */\n\n /**\n * Constructs a new OperatorSetIdProto.\n * @memberof onnx\n * @classdesc Represents an OperatorSetIdProto.\n * @implements IOperatorSetIdProto\n * @constructor\n * @param {onnx.IOperatorSetIdProto=} [properties] Properties to set\n */\n function OperatorSetIdProto(properties) {\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * OperatorSetIdProto domain.\n * @member {string} domain\n * @memberof onnx.OperatorSetIdProto\n * @instance\n */\n OperatorSetIdProto.prototype.domain = \"\";\n\n /**\n * OperatorSetIdProto version.\n * @member {number|Long} version\n * @memberof onnx.OperatorSetIdProto\n * @instance\n */\n OperatorSetIdProto.prototype.version = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n /**\n * Creates a new OperatorSetIdProto instance using the specified properties.\n * @function create\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {onnx.IOperatorSetIdProto=} [properties] Properties to set\n * @returns {onnx.OperatorSetIdProto} OperatorSetIdProto instance\n */\n OperatorSetIdProto.create = function create(properties) {\n return new OperatorSetIdProto(properties);\n };\n\n /**\n * Encodes the specified OperatorSetIdProto message. Does not implicitly {@link onnx.OperatorSetIdProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {onnx.IOperatorSetIdProto} message OperatorSetIdProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n OperatorSetIdProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n writer.uint32(/* id 1, wireType 2 =*/10).string(message.domain);\n if (message.version != null && message.hasOwnProperty(\"version\"))\n writer.uint32(/* id 2, wireType 0

=*/16).int64(message.version);\n return writer;\n };\n\n /**\n * Encodes the specified OperatorSetIdProto message, length delimited. Does not implicitly {@link onnx.OperatorSetIdProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {onnx.IOperatorSetIdProto} message OperatorSetIdProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n OperatorSetIdProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes an OperatorSetIdProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.OperatorSetIdProto} OperatorSetIdProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n OperatorSetIdProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.OperatorSetIdProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.domain = reader.string();\n break;\n case 2:\n message.version = reader.int64();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes an OperatorSetIdProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.OperatorSetIdProto} OperatorSetIdProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n OperatorSetIdProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies an OperatorSetIdProto message.\n * @function verify\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n OperatorSetIdProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n if (!$util.isString(message.domain))\n return \"domain: string expected\";\n if (message.version != null && message.hasOwnProperty(\"version\"))\n if (!$util.isInteger(message.version) && !(message.version && $util.isInteger(message.version.low) && $util.isInteger(message.version.high)))\n return \"version: integer|Long expected\";\n return null;\n };\n\n /**\n * Creates an OperatorSetIdProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.OperatorSetIdProto} OperatorSetIdProto\n */\n OperatorSetIdProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.OperatorSetIdProto)\n return object;\n var message = new $root.onnx.OperatorSetIdProto();\n if (object.domain != null)\n message.domain = String(object.domain);\n if (object.version != null)\n if ($util.Long)\n (message.version = $util.Long.fromValue(object.version)).unsigned = false;\n else if (typeof object.version === \"string\")\n message.version = parseInt(object.version, 10);\n else if (typeof object.version === \"number\")\n message.version = object.version;\n else if (typeof object.version === \"object\")\n message.version = new $util.LongBits(object.version.low >>> 0, object.version.high >>> 0).toNumber();\n return message;\n };\n\n /**\n * Creates a plain object from an OperatorSetIdProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {onnx.OperatorSetIdProto} message

OperatorSetIdProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n *
@returns {Object.<string,*>} Plain object\n */\n OperatorSetIdProto.toObject = function
toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if
(options.defaults) {\n object.domain = \"\";\n if ($util.Long) {\n var long = new
$util.Long(0, 0, false);\n object.version = options.longs === String ? long.toString() : options.longs ===
Number ? long.toNumber() : long;\n } else\n object.version = options.longs === String ? \"0\" :
0;\n }\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n
object.domain = message.domain;\n if (message.version != null && message.hasOwnProperty(\"version\"))\n
if (typeof message.version === \"number\")\n object.version = options.longs === String ?
String(message.version) : message.version;\n else\n object.version = options.longs === String
? $util.Long.prototype.toString.call(message.version) : options.longs === Number ? new
$util.LongBits(message.version.low >>> 0, message.version.high >>> 0).toNumber() : message.version;\n
return object;\n };\n\n /**\n * Converts this OperatorSetIdProto to JSON.\n * @function
toJSON\n * @memberof onnx.OperatorSetIdProto\n * @instance\n * @returns {Object.<string,*>}
JSON object\n */\n OperatorSetIdProto.prototype.toJSON = function toJSON() {\n return
this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return OperatorSetIdProto;\n
})();\n\n return onnx;\n})();\n\nmodule.exports = $root;\n","// minimal library entry point.\n\n\"use
strict\";\nmodule.exports = require(\"./src/index-minimal\");\n","\"use strict\";\nvar protobuf = exports;\n\n/**\n *
Build type, one of `\"full\"`, `\"light\"` or `\"minimal\"`.\n * @name build\n * @type {string}\n * @const\n
*/\nprotobuf.build = \"minimal\";\n\n// Serialization\nprotobuf.Writer =
require(\"./writer\");\nprotobuf.BufferWriter = require(\"./writer_buffer\");\nprotobuf.Reader =
require(\"./reader\");\nprotobuf.BufferReader = require(\"./reader_buffer\");\n\n// Utility\nprotobuf.util =
require(\"./util/minimal\");\nprotobuf.rpc = require(\"./rpc\");\nprotobuf.roots =
require(\"./roots\");\nprotobuf.configure = configure;\n\n/* istanbul ignore next */\n/**\n * Reconfigures the
library according to the environment.\n * @returns {undefined}\n */\nfunction configure() {\n
protobuf.util._configure();\n protobuf.Writer._configure(protobuf.BufferWriter);\n
protobuf.Reader._configure(protobuf.BufferReader);\n}\n\n// Set up buffer utility according to the
environment\nconfigure();\n","\"use strict\";\nmodule.exports = Reader;\n\nvar util =
require(\"./util/minimal\");\n\nvar BufferReader; // cyclic\n\nvar LongBits = util.LongBits,\n utf8 =
util.utf8;\n\n/* istanbul ignore next */\nfunction indexOutOfRange(reader, writeLength) {\n return
RangeError(\"index out of range: \" + reader.pos + \" + \" + (writeLength || 1) + \" > \" + reader.len);\n}\n\n/**\n *
Constructs a new reader instance using the specified buffer.\n * @classdesc Wire format reader using `Uint8Array`
if available, otherwise `Array`.\n * @constructor\n * @param {Uint8Array} buffer Buffer to read from\n
*/\nfunction Reader(buffer) {\n\n /**\n * Read buffer.\n * @type {Uint8Array}\n */\n this.buf =
buffer;\n\n /**\n * Read buffer position.\n * @type {number}\n */\n this.pos = 0;\n\n /**\n * Read
buffer length.\n * @type {number}\n */\n this.len = buffer.length;\n}\n\nvar create_array = typeof
Uint8Array !== \"undefined\"\n ? function create_typed_array(buffer) {\n if (buffer instanceof Uint8Array ||
Array.isArray(buffer))\n return new Reader(buffer);\n throw Error(\"illegal buffer\");\n }\n /* istanbul
ignore next */\n : function create_array(buffer) {\n if (Array.isArray(buffer))\n return new
Reader(buffer);\n throw Error(\"illegal buffer\");\n };\n\nvar create = function create() {\n return
util.Buffer\n ? function create_buffer_setup(buffer) {\n return (Reader.create = function
create_buffer(buffer) {\n return util.Buffer.isBuffer(buffer)\n ? new BufferReader(buffer)\n
/* istanbul ignore next */\n : create_array(buffer);\n })(buffer);\n }\n /* istanbul
ignore next */\n : create_array;\n};\n\n/**\n * Creates a new reader using the specified buffer.\n * @function\n
* @param {Uint8Array|Buffer} buffer Buffer to read from\n * @returns {Reader|BufferReader} A {@link
BufferReader} if `buffer` is a Buffer, otherwise a {@link Reader}\n * @throws {Error} If `buffer` is not a valid
buffer\n */\nReader.create = create();\n\nReader.prototype._slice = util.Array.prototype.subarray || /* istanbul ignore
next */ util.Array.prototype.slice;\n\n/**\n * Reads a varint as an unsigned 32 bit value.\n * @function\n * @returns

{number} Value read\n */\nReader.prototype.uint32 = (function read_uint32_setup() {\n   var value = 4294967295; // optimizer type-hint, tends to deopt otherwise (?!)\n   return function read_uint32() {\n   value = (this.buf[this.pos] & 127   ) >>> 0; if (this.buf[this.pos++] < 128) return value;\n   value = (value | (this.buf[this.pos] & 127) << 7) >>> 0; if (this.buf[this.pos++] < 128) return value;\n   value = (value | (this.buf[this.pos] & 127) << 14) >>> 0; if (this.buf[this.pos++] < 128) return value;\n   value = (value | (this.buf[this.pos] & 127) << 21) >>> 0; if (this.buf[this.pos++] < 128) return value;\n   value = (value | (this.buf[this.pos] & 15) << 28) >>> 0; if (this.buf[this.pos++] < 128) return value;\n\n   /* istanbul ignore if */\n   if ((this.pos += 5) > this.len) {\n   this.pos = this.len;\n   throw indexOutOfRange(this, 10);\n   }\n   return value;\n   };\n})();\n\n/**\n * Reads a varint as a signed 32 bit value.\n * @returns {number} Value read\n */\nReader.prototype.int32 = function read_int32() {\n   return this.uint32() | 0;\n};\n\n/**\n * Reads a zig-zag encoded varint as a signed 32 bit value.\n * @returns {number} Value read\n */\nReader.prototype.sint32 = function read_sint32() {\n   var value = this.uint32();\n   return value >>> 1 ^ -(value & 1) | 0;\n};\n\n/* eslint-disable no-invalid-this */\n\nfunction readLongVarint() {\n   // tends to deopt with local vars for octet etc.\n   var bits = new LongBits(0, 0);\n   var i = 0;\n   if (this.len - this.pos > 4) { // fast route (lo)\n   for (; i < 4; ++i) {\n   // 1st..4th\n   bits.lo = (bits.lo | (this.buf[this.pos] & 127) << i * 7) >>> 0;\n   if (this.buf[this.pos++] < 128)\n   return bits;\n   }\n   // 5th\n   bits.lo = (bits.lo | (this.buf[this.pos] & 127) << 28) >>> 0;\n   bits.hi = (bits.hi | (this.buf[this.pos] & 127) >> 4) >>> 0;\n   if (this.buf[this.pos++] < 128)\n   return bits;\n   i = 0;\n   } else {\n   for (; i < 3; ++i) {\n   /* istanbul ignore if */\n   if (this.pos >= this.len)\n   throw indexOutOfRange(this);\n   // 1st..3th\n   bits.lo = (bits.lo | (this.buf[this.pos] & 127) << i * 7) >>> 0;\n   if (this.buf[this.pos++] < 128)\n   return bits;\n   }\n   // 4th\n   bits.lo = (bits.lo | (this.buf[this.pos++] & 127) << i * 7) >>> 0;\n   return bits;\n   }\n   if (this.len - this.pos > 4) { // fast route (hi)\n   for (; i < 5; ++i) {\n   // 6th..10th\n   bits.hi = (bits.hi | (this.buf[this.pos] & 127) << i * 7 + 3) >>> 0;\n   if (this.buf[this.pos++] < 128)\n   return bits;\n   }\n   } else {\n   for (; i < 5; ++i) {\n   /* istanbul ignore if */\n   if (this.pos >= this.len)\n   throw indexOutOfRange(this);\n   // 6th..10th\n   bits.hi = (bits.hi | (this.buf[this.pos] & 127) << i * 7 + 3) >>> 0;\n   if (this.buf[this.pos++] < 128)\n   return bits;\n   }\n   }\n   /* istanbul ignore next */\n   throw Error(\"invalid varint encoding\");\n}\n\n/* eslint-enable no-invalid-this */\n\n/**\n * Reads a varint as a signed 64 bit value.\n * @name Reader#int64\n * @function\n * @returns {Long} Value read\n */\n\n/**\n * Reads a varint as an unsigned 64 bit value.\n * @name Reader#uint64\n * @function\n * @returns {Long} Value read\n */\n\n/**\n * Reads a zig-zag encoded varint as a signed 64 bit value.\n * @name Reader#sint64\n * @function\n * @returns {Long} Value read\n */\n\n/**\n * Reads a varint as a boolean.\n * @returns {boolean} Value read\n */\nReader.prototype.bool = function read_bool() {\n   return this.uint32() !== 0;\n};\n\nfunction readFixed32_end(buf, end) { // note that this uses `end`, not `pos`\n   return (buf[end - 4]\n | buf[end - 3] << 8\n | buf[end - 2] << 16\n | buf[end - 1] << 24) >>> 0;\n}\n\n/**\n * Reads fixed 32 bits as an unsigned 32 bit integer.\n * @returns {number} Value read\n */\nReader.prototype.fixed32 = function read_fixed32() {\n\n   /* istanbul ignore if */\n   if (this.pos + 4 > this.len)\n   throw indexOutOfRange(this, 4);\n\n   return readFixed32_end(this.buf, this.pos += 4);\n};\n\n/**\n * Reads fixed 32 bits as a signed 32 bit integer.\n * @returns {number} Value read\n */\nReader.prototype.sfixed32 = function read_sfixed32() {\n\n   /* istanbul ignore if */\n   if (this.pos + 4 > this.len)\n   throw indexOutOfRange(this, 4);\n\n   return readFixed32_end(this.buf, this.pos += 4) | 0;\n};\n\n/* eslint-disable no-invalid-this */\n\nfunction readFixed64(/* this: Reader */) {\n\n   /* istanbul ignore if */\n   if (this.pos + 8 > this.len)\n   throw indexOutOfRange(this, 8);\n\n   return new LongBits(readFixed32_end(this.buf, this.pos += 4), readFixed32_end(this.buf, this.pos += 4));\n}\n\n/* eslint-enable no-invalid-this */\n\n/**\n * Reads fixed 64 bits.\n * @name Reader#fixed64\n * @function\n * @returns {Long} Value read\n */\n\n/**\n * Reads zig-zag encoded fixed 64 bits.\n * @name Reader#sfixed64\n * @function\n * @returns {Long} Value read\n */\n\n/**\n * Reads a float (32 bit) as a number.\n * @function\n * @returns {number} Value read\n */\nReader.prototype.float = function read_float() {\n\n   /* istanbul ignore if */\n   if (this.pos + 4 > this.len)\n   throw indexOutOfRange(this, 4);\n\n   var value = util.float.readFloatLE(this.buf, this.pos);\n   this.pos += 4;\n   return value;\n};\n\n/**\n * Reads a double (64 bit float) as a number.\n *

@function\n * @returns {number} Value read\n */\nReader.prototype.double = function read_double() {\n\n   /* istanbul ignore if */\n   if (this.pos + 8 > this.len)\n   throw indexOutOfRange(this, 4);\n\n   var value = util.float.readDoubleLE(this.buf, this.pos);\n   this.pos += 8;\n   return value;\n};\n\n/**\n * Reads a sequence of bytes preceeded by its length as a varint.\n * @returns {Uint8Array} Value read\n */\nReader.prototype.bytes = function read_bytes() {\n   var length = this.uint32(),\n   start = this.pos,\n   end   = this.pos + length;\n\n   /* istanbul ignore if */\n   if (end > this.len)\n   throw indexOutOfRange(this, length);\n\n   this.pos += length;\n   if (Array.isArray(this.buf)) // plain array\n   return this.buf.slice(start, end);\n   return start === end // fix for IE 10/Win8 and others' subarray returning array of size 1\n   ? new this.buf.constructor(0)\n   : this._slice.call(this.buf, start, end);\n};\n\n/**\n * Reads a string preceeded by its byte length as a varint.\n * @returns {string} Value read\n */\nReader.prototype.string = function read_string() {\n   var bytes = this.bytes();\n   return utf8.read(bytes, 0, bytes.length);\n};\n\n/**\n * Skips the specified number of bytes if specified, otherwise skips a varint.\n * @param {number} [length] Length if known, otherwise a varint is assumed\n * @returns {Reader} `this`\n */\nReader.prototype.skip = function skip(length) {\n   if (typeof length === \"number\") {\n   /* istanbul ignore if */\n   if (this.pos + length > this.len)\n   throw indexOutOfRange(this, length);\n   this.pos += length;\n   } else {\n   do {\n   /* istanbul ignore if */\n   if (this.pos >= this.len)\n   throw indexOutOfRange(this);\n   } while (this.buf[this.pos++] & 128);\n   }\n   return this;\n};\n\n/**\n * Skips the next element of the specified wire type.\n * @param {number} wireType Wire type received\n * @returns {Reader} `this`\n */\nReader.prototype.skipType = function(wireType) {\n   switch (wireType) {\n   case 0:\n   this.skip();\n   break;\n   case 1:\n   this.skip(8);\n   break;\n   case 2:\n   this.skip(this.uint32());\n   break;\n   case 3:\n   while ((wireType = this.uint32() & 7) !== 4) {\n   this.skipType(wireType);\n   }\n   break;\n   case 5:\n   this.skip(4);\n   break;\n\n   /* istanbul ignore next */\n   default:\n   throw Error(\"invalid wire type \" + wireType + \" at offset \" + this.pos);\n   }\n   return this;\n};\n\nReader._configure = function(BufferReader_) {\n   BufferReader = BufferReader_;\n   Reader.create = create();\n   BufferReader._configure();\n\n   var fn = util.Long ? \"toLong\" : /* istanbul ignore next */ \"toNumber\";\n   util.merge(Reader.prototype, {\n\n   int64: function read_int64() {\n   return readLongVarint.call(this)[fn](false);\n   },\n\n   uint64: function read_uint64() {\n   return readLongVarint.call(this)[fn](true);\n   },\n\n   sint64: function read_sint64() {\n   return readLongVarint.call(this).zzDecode()[fn](false);\n   },\n\n   fixed64: function read_fixed64() {\n   return readFixed64.call(this)[fn](true);\n   },\n\n   sfixed64: function read_sfixed64() {\n   return readFixed64.call(this)[fn](false);\n   }\n\n   });\n};\n","\"use strict\";\nmodule.exports = BufferReader;\n\n// extends Reader\nvar Reader = require(\"./reader\");\n(BufferReader.prototype = Object.create(Reader.prototype)).constructor = BufferReader;\n\nvar util = require(\"./util/minimal\");\n\n/**\n * Constructs a new buffer reader instance.\n * @classdesc Wire format reader using node buffers.\n * @extends Reader\n * @constructor\n * @param {Buffer} buffer Buffer to read from\n */\nfunction BufferReader(buffer) {\n   Reader.call(this, buffer);\n\n   /**\n   * Read buffer.\n   * @name BufferReader#buf\n   * @type {Buffer}\n   */\n}\n\nBufferReader._configure = function () {\n   /* istanbul ignore else */\n   if (util.Buffer)\n   BufferReader.prototype._slice = util.Buffer.prototype.slice;\n};\n\n\n/**\n * @override\n */\nBufferReader.prototype.string = function read_string_buffer() {\n   var len = this.uint32(); // modifies pos\n   return this.buf.utf8Slice\n   ? this.buf.utf8Slice(this.pos, this.pos = Math.min(this.pos + len, this.len))\n   : this.buf.toString(\"utf-8\", this.pos, this.pos = Math.min(this.pos + len, this.len));\n};\n\n/**\n * Reads a sequence of bytes preceeded by its length as a varint.\n * @name BufferReader#bytes\n * @function\n * @returns {Buffer} Value read\n */\n\nBufferReader._configure();\n","\"use strict\";\nmodule.exports = {};\n\n/**\n * Named roots.\n * This is where pbjs stores generated structures (the option `-r, --root` specifies a name).\n * Can also be used manually to make roots available accross modules.\n * @name roots\n * @type {Object.<string,Root>}\n * @example\n * // pbjs -r myroot -o compiled.js ...\n *\n * // in another module:\n * require(\"./compiled.js\");\n *\n * // in any subsequent module:\n * var root = protobuf.roots[\"myroot\"];\n */\n","\"use strict\";\n\n/**\n * Streaming RPC helpers.\n * @namespace\n */\nvar rpc = exports;\n\n/**\n * RPC implementation passed to {@link Service#create} performing a service request on network level, i.e. by utilizing http requests or websockets.\n *

```
@typedef RPCImpl\n * @type {function}\n * @param
{Method|rpc.ServiceMethod<Message<{}>,Message<{}>>} method Reflected or static method being called\n *
@param {Uint8Array} requestData Request data\n * @param {RPCImplCallback} callback Callback function\n *
@returns {undefined}\n * @example\n * function rpcImpl(method, requestData, callback) {\n *     if
(protobuf.util.lcFirst(method.name) !== \"myMethod\") // compatible with static code\n *         throw Error(\"no
such method\");\n *     asynchronouslyObtainAResponse(requestData, function(err, responseData) {\n *
callback(err, responseData);\n *     });\n * }\n */\n\n/**\n * Node-style callback as used by {@link RPCImpl}.\n *
@typedef RPCImplCallback\n * @type {function}\n * @param {Error|null} error Error, if any, otherwise `null`\n *
@param {Uint8Array|null} [response] Response data or `null` to signal end of stream, if there hasn't been an error\n
* @returns {undefined}\n */\n\nrpc.Service = require(\"./rpc/service\");\n","\"use strict\";\nmodule.exports =
Service;\n\nvar util = require(\"../util/minimal\");\n\n// Extends EventEmitter\n(Service.prototype =
Object.create(util.EventEmitter.prototype)).constructor = Service;\n\n/**\n * A service method callback as used by
{@link rpc.ServiceMethod|ServiceMethod}.\n *\n * Differs from {@link RPCImplCallback} in that it is an actual
callback of a service method which may not return `response = null`.\n * @typedef rpc.ServiceMethodCallback\n *
@template TRes extends Message<TRes>\n * @type {function}\n * @param {Error|null} error Error, if any\n *
@param {TRes} [response] Response message\n * @returns {undefined}\n */\n\n/**\n * A service method part of a
{@link rpc.Service} as created by {@link Service.create}.\n * @typedef rpc.ServiceMethod\n * @template TReq
extends Message<TReq>\n * @template TRes extends Message<TRes>\n * @type {function}\n * @param
{TReq|Properties<TReq>} request Request message or plain object\n * @param
{rpc.ServiceMethodCallback<TRes>} [callback] Node-style callback called with the error, if any, and the response
message\n * @returns {Promise<Message<TRes>>} Promise if `callback` has been omitted, otherwise
`undefined`\n */\n\n/**\n * Constructs a new RPC service instance.\n * @classdesc An RPC service as returned by
{@link Service#create}.\n * @exports rpc.Service\n * @extends util.EventEmitter\n * @constructor\n * @param
{RPCImpl} rpcImpl RPC implementation\n * @param {boolean} [requestDelimited=false] Whether requests are
length-delimited\n * @param {boolean} [responseDelimited=false] Whether responses are length-delimited\n
*/\nfunction Service(rpcImpl, requestDelimited, responseDelimited) {\n\n    if (typeof rpcImpl !== \"function\")\n
  throw TypeError(\"rpcImpl must be a function\");\n\n    util.EventEmitter.call(this);\n\n    /**\n     * RPC
implementation. Becomes `null` once the service is ended.\n     * @type {RPCImpl|null}\n     */\n    this.rpcImpl =
rpcImpl;\n\n    /**\n     * Whether requests are length-delimited.\n     * @type {boolean}\n     */\n
this.requestDelimited = Boolean(requestDelimited);\n\n    /**\n     * Whether responses are length-delimited.\n     *
@type {boolean}\n     */\n    this.responseDelimited = Boolean(responseDelimited);\n}\n\n/**\n * Calls a service
method through {@link rpc.Service#rpcImpl|rpcImpl}.\n * @param {Method|rpc.ServiceMethod<TReq,TRes>}
method Reflected or static method\n * @param {Constructor<TReq>} requestCtor Request constructor\n * @param
{Constructor<TRes>} responseCtor Response constructor\n * @param {TReq|Properties<TReq>} request Request
message or plain object\n * @param {rpc.ServiceMethodCallback<TRes>} callback Service callback\n * @returns
{undefined}\n * @template TReq extends Message<TReq>\n * @template TRes extends Message<TRes>\n
*/\nService.prototype.rpcCall = function rpcCall(method, requestCtor, responseCtor, request, callback) {\n\n    if
(!request)\n        throw TypeError(\"request must be specified\");\n\n    var self = this;\n    if (!callback)\n        return
util.asPromise(rpcCall, self, method, requestCtor, responseCtor, request);\n\n    if (!self.rpcImpl) {\n
setTimeout(function() { callback(Error(\"already ended\")); }, 0);\n        return undefined;\n    }\n\n    try {\n
return self.rpcImpl(\n            method,\n            requestCtor[self.requestDelimited ? \"encodeDelimited\" :
\"encode\"](request).finish(),\n            function rpcCallback(err, response) {\n\n                if (err) {\n
self.emit(\"error\", err, method);\n                    return callback(err);\n                }\n\n                if (response === null)
{\n                    self.end(/* endedByRPC */ true);\n                    return undefined;\n                }\n\n                if
(!(response instanceof responseCtor)) {\n                    try {\n                        response =
responseCtor[self.responseDelimited ? \"decodeDelimited\" : \"decode\"](response);\n                    } catch (err) {\n
                self.emit(\"error\", err, method);\n                        return callback(err);\n                    }\n                }\n\n
        self.emit(\"data\", response, method);\n                return callback(null, response);\n            }\n        );\n    } catch
```

(err) {\n   self.emit(\"error\", err, method);\n   setTimeout(function() { callback(err); }, 0);\n   return undefined;\n   }\n};\n\n/**\n * Ends this service and emits the `end` event.\n * @param {boolean} [endedByRPC=false] Whether the service has been ended by the RPC implementation.\n * @returns {rpc.Service} `this`\n */\nService.prototype.end = function end(endedByRPC) {\n   if (this.rpcImpl) {\n   if (!endedByRPC) // signal end to rpcImpl\n   this.rpcImpl(null, null, null);\n   this.rpcImpl = null;\n   this.emit(\"end\").off();\n   }\n   return this;\n};\n","\"use strict\";\nmodule.exports = LongBits;\n\nvar util = require(\"../util/minimal\");\n\n/**\n * Constructs new long bits.\n * @classdesc Helper class for working with the low and high bits of a 64 bit value.\n * @memberof util\n * @constructor\n * @param {number} lo Low 32 bits, unsigned\n * @param {number} hi High 32 bits, unsigned\n */\nfunction LongBits(lo, hi) {\n\n   // note that the casts below are theoretically unnecessary as of today, but older statically\n   // generated converter code might still call the ctor with signed 32bits. kept for compat.\n\n   /**\n   * Low bits.\n   * @type {number}\n   */\n   this.lo = lo >>> 0;\n\n   /**\n   * High bits.\n   * @type {number}\n   */\n   this.hi = hi >>> 0;\n}\n\n/**\n * Zero bits.\n * @memberof util.LongBits\n * @type {util.LongBits}\n */\nvar zero = LongBits.zero = new LongBits(0, 0);\n\nzero.toNumber = function() { return 0; };\nzero.zzEncode = zero.zzDecode = function() { return this; };\nzero.length = function() { return 1; };\n\n/**\n * Zero hash.\n * @memberof util.LongBits\n * @type {string}\n */\nvar zeroHash = LongBits.zeroHash = \"\\0\\0\\0\\0\\0\\0\\0\\0\";\n\n/**\n * Constructs new long bits from the specified number.\n * @param {number} value Value\n * @returns {util.LongBits} Instance\n */\nLongBits.fromNumber = function fromNumber(value) {\n   if (value === 0)\n   return zero;\n   var sign = value < 0;\n   if (sign)\n   value = -value;\n   var lo = value >>> 0,\n   hi = (value - lo) / 4294967296 >>> 0;\n   if (sign) {\n   hi = ~hi >>> 0;\n   lo = ~lo >>> 0;\n   if (++lo > 4294967295) {\n   lo = 0;\n   if (++hi > 4294967295)\n   hi = 0;\n   }\n   }\n   return new LongBits(lo, hi);\n};\n\n/**\n * Constructs new long bits from a number, long or string.\n * @param {Long|number|string} value Value\n * @returns {util.LongBits} Instance\n */\nLongBits.from = function from(value) {\n   if (typeof value === \"number\")\n   return LongBits.fromNumber(value);\n   if (util.isString(value)) {\n   /* istanbul ignore else */\n   if (util.Long)\n   value = util.Long.fromString(value);\n   else\n   return LongBits.fromNumber(parseInt(value, 10));\n   }\n   return value.low || value.high ? new LongBits(value.low >>> 0, value.high >>> 0) : zero;\n};\n\n/**\n * Converts this long bits to a possibly unsafe JavaScript number.\n * @param {boolean} [unsigned=false] Whether unsigned or not\n * @returns {number} Possibly unsafe number\n */\nLongBits.prototype.toNumber = function toNumber(unsigned) {\n   if (!unsigned && this.hi >>> 31) {\n   var lo = ~this.lo + 1 >>> 0,\n   hi = ~this.hi   >>> 0;\n   if (!lo)\n   hi = hi + 1 >>> 0;\n   return -(lo + hi * 4294967296);\n   }\n   return this.lo + this.hi * 4294967296;\n};\n\n/**\n * Converts this long bits to a long.\n * @param {boolean} [unsigned=false] Whether unsigned or not\n * @returns {Long} Long\n */\nLongBits.prototype.toLong = function toLong(unsigned) {\n   return util.Long\n   ? new util.Long(this.lo | 0, this.hi | 0, Boolean(unsigned))\n   /* istanbul ignore next */\n   : { low: this.lo | 0, high: this.hi | 0, unsigned: Boolean(unsigned) };\n};\n\nvar charCodeAt = String.prototype.charCodeAt;\n\n/**\n * Constructs new long bits from the specified 8 characters long hash.\n * @param {string} hash Hash\n * @returns {util.LongBits} Bits\n */\nLongBits.fromHash = function fromHash(hash) {\n   if (hash === zeroHash)\n   return zero;\n   return new LongBits(\n   (charCodeAt.call(hash, 0)\n | charCodeAt.call(hash, 1) << 8\n | charCodeAt.call(hash, 2) << 16\n | charCodeAt.call(hash, 3) << 24) >>> 0\n   ,\n   (charCodeAt.call(hash, 4)\n | charCodeAt.call(hash, 5) << 8\n | charCodeAt.call(hash, 6) << 16\n | charCodeAt.call(hash, 7) << 24) >>> 0\n   );\n};\n\n/**\n * Converts this long bits to a 8 characters long hash.\n * @returns {string} Hash\n */\nLongBits.prototype.toHash = function toHash() {\n   return String.fromCharCode(\n   this.lo   & 255,\n   this.lo >>> 8 & 255,\n   this.lo >>> 16 & 255,\n   this.lo >>> 24   ,\n   this.hi   & 255,\n   this.hi >>> 8 & 255,\n   this.hi >>> 16 & 255,\n   this.hi >>> 24\n   );\n};\n\n/**\n * Zig-zag encodes this long bits.\n * @returns {util.LongBits} `this`\n */\nLongBits.prototype.zzEncode = function zzEncode() {\n   var mask =   this.hi >> 31;\n   this.hi = ((this.hi << 1 | this.lo >>> 31) ^ mask) >>> 0;\n   this.lo = (this.lo << 1   ^ mask) >>> 0;\n   return this;\n};\n\n/**\n * Zig-zag decodes this long bits.\n * @returns {util.LongBits} `this`\n */\nLongBits.prototype.zzDecode = function zzDecode() {\n   var mask = -(this.lo & 1);\n   this.lo = ((this.lo >>>

```
1 | this.hi << 31) ^ mask) >>> 0;\n    this.hi  = ( this.hi >>> 1                  ^ mask) >>> 0;\n    return this;\n};\n\n/**\n
* Calculates the length of this longbits when encoded as a varint.\n * @returns {number} Length\n
*/\nLongBits.prototype.length = function length() {\n    var part0 =  this.lo,\n        part1 = (this.lo >>> 28 | this.hi <<
4) >>> 0,\n        part2 =  this.hi >>> 24;\n    return part2 === 0\n         ? part1 === 0\n           ? part0 < 16384\n
 ? part0 < 128 ? 1 : 2\n             : part0 < 2097152 ? 3 : 4\n           : part1 < 16384\n             ? part1 < 128 ? 5 : 6\n
   : part1 < 2097152 ? 7 : 8\n         : part2 < 128 ? 9 : 10;\n};\n","\"use strict\";\nvar util = exports;\n\n// used to return
a Promise where callback is omitted\nutil.asPromise = require(\"@protobufjs/aspromise\");\n\n// converts to / from
base64 encoded strings\nutil.base64 = require(\"@protobufjs/base64\");\n\n// base class of
rpc.Service\nutil.EventEmitter = require(\"@protobufjs/eventemitter\");\n\n// float handling accross
browsers\nutil.float = require(\"@protobufjs/float\");\n\n// requires modules optionally and hides the call from
bundlers\nutil.inquire = require(\"@protobufjs/inquire\");\n\n// converts to / from utf8 encoded strings\nutil.utf8 =
require(\"@protobufjs/utf8\");\n\n// provides a node-like buffer pool in the browser\nutil.pool =
require(\"@protobufjs/pool\");\n\n// utility to work with the low and high bits of a 64 bit value\nutil.LongBits =
require(\"./longbits\");\n\n/**\n * Whether running within node or not.\n * @memberof util\n * @type {boolean}\n
*/\nutil.isNode = Boolean(typeof global !== \"undefined\"\n                   && global\n                   &&
global.process\n                   && global.process.versions\n                   && global.process.versions.node);\n\n/**\n *
Global object reference.\n * @memberof util\n * @type {Object}\n */\nutil.global = util.isNode && global\n
|| typeof window !== \"undefined\" && window\n           || typeof self   !== \"undefined\" && self\n           || this; //
eslint-disable-line no-invalid-this\n\n/**\n * An immuable empty array.\n * @memberof util\n * @type
{Array.<*>}\n * @const\n */\nutil.emptyArray = Object.freeze ? Object.freeze([]) : /* istanbul ignore next */ []; //
used on prototypes\n\n/**\n * An immutable empty object.\n * @type {Object}\n * @const\n */\nutil.emptyObject
= Object.freeze ? Object.freeze({}) : /* istanbul ignore next */ {}; // used on prototypes\n\n/**\n * Tests if the
specified value is an integer.\n * @function\n * @param {*} value Value to test\n * @returns {boolean} `true` if the
value is an integer\n */\nutil.isInteger = Number.isInteger || /* istanbul ignore next */ function isInteger(value) {\n
return typeof value === \"number\" && isFinite(value) && Math.floor(value) === value;\n};\n\n/**\n * Tests if the
specified value is a string.\n * @param {*} value Value to test\n * @returns {boolean} `true` if the value is a
string\n */\nutil.isString = function isString(value) {\n    return typeof value === \"string\" || value instanceof
String;\n};\n\n/**\n * Tests if the specified value is a non-null object.\n * @param {*} value Value to test\n *
@returns {boolean} `true` if the value is a non-null object\n */\nutil.isObject = function isObject(value) {\n    return
value && typeof value === \"object\";\n};\n\n/**\n * Checks if a property on a message is considered to be
present.\n * This is an alias of {@link util.isSet}.\n * @function\n * @param {Object} obj Plain object or message
instance\n * @param {string} prop Property name\n * @returns {boolean} `true` if considered to be present,
otherwise `false`\n */\nutil.isset =\n\n/**\n * Checks if a property on a message is considered to be present.\n *
@param {Object} obj Plain object or message instance\n * @param {string} prop Property name\n * @returns
{boolean} `true` if considered to be present, otherwise `false`\n */\nutil.isSet = function isSet(obj, prop) {\n    var
value = obj[prop];\n    if (value != null && obj.hasOwnProperty(prop)) // eslint-disable-line eqeqeq, no-prototype-
builtins\n        return typeof value !== \"object\" || (Array.isArray(value) ? value.length : Object.keys(value).length)
> 0;\n    return false;\n};\n\n/**\n * Any compatible Buffer instance.\n * This is a minimal stand-alone definition of
a Buffer instance. The actual type is that exported by node's typings.\n * @interface Buffer\n * @extends
Uint8Array\n */\n\n/**\n * Node's Buffer class if available.\n * @type {Constructor<Buffer>}\n */\nutil.Buffer =
(function() {\n    try {\n        var Buffer = util.inquire(\"buffer\").Buffer;\n        // refuse to use non-node buffers if
not explicitly assigned (perf reasons):\n        return Buffer.prototype.utf8Write ? Buffer : /* istanbul ignore next */
null;\n    } catch (e) {\n        /* istanbul ignore next */\n        return null;\n    }\n})();\n\n// Internal alias of or polyfull
for Buffer.from.\nutil._Buffer_from = null;\n\n// Internal alias of or polyfill for
Buffer.allocUnsafe.\nutil._Buffer_allocUnsafe = null;\n\n/**\n * Creates a new buffer of whatever type supported
by the environment.\n * @param {number|number[]} [sizeOrArray=0] Buffer size or number array\n * @returns
{Uint8Array|Buffer} Buffer\n */\nutil.newBuffer = function newBuffer(sizeOrArray) {\n    /* istanbul ignore next
*/\n    return typeof sizeOrArray === \"number\"\n        ? util.Buffer\n            ?
```

util._Buffer_allocUnsafe(sizeOrArray)\n : new util.Array(sizeOrArray)\n : util.Buffer\n ? util._Buffer_from(sizeOrArray)\n : typeof Uint8Array === \"undefined\"\n ? sizeOrArray\n : new Uint8Array(sizeOrArray);\n};\n\n/**\n * Array implementation used in the browser. `Uint8Array` if supported, otherwise `Array`.\n * @type {Constructor<Uint8Array>}\n */\nutil.Array = typeof Uint8Array !== \"undefined\" ? Uint8Array /* istanbul ignore next */ : Array;\n\n/**\n * Any compatible Long instance.\n * This is a minimal stand-alone definition of a Long instance. The actual type is that exported by long.js.\n * @interface Long\n * @property {number} low Low bits\n * @property {number} high High bits\n * @property {boolean} unsigned Whether unsigned or not\n */\n\n/**\n * Long.js's Long class if available.\n * @type {Constructor<Long>}\n */\nutil.Long = /* istanbul ignore next */ util.global.dcodeIO && /* istanbul ignore next */ util.global.dcodeIO.Long\n || /* istanbul ignore next */ util.global.Long\n || util.inquire(\"long\");\n\n/**\n * Regular expression used to verify 2 bit (`bool`) map keys.\n * @type {RegExp}\n * @const\n */\nutil.key2Re = /^true|false|0|1$/;\n\n/**\n * Regular expression used to verify 32 bit (`int32` etc.) map keys.\n * @type {RegExp}\n * @const\n */\nutil.key32Re = /^-?(?:0|[1-9][0-9]*)$/;\n\n/**\n * Regular expression used to verify 64 bit (`int64` etc.) map keys.\n * @type {RegExp}\n * @const\n */\nutil.key64Re = /^(?:[\\\\x00-\\\\xff]{8}|-?(?:0|[1-9][0-9]*))$/;\n\n/**\n * Converts a number or long to an 8 characters long hash string.\n * @param {Long|number} value Value to convert\n * @returns {string} Hash\n */\nutil.longToHash = function longToHash(value) {\n return value\n ? util.LongBits.from(value).toHash()\n : util.LongBits.zeroHash;\n};\n\n/**\n * Converts an 8 characters long hash string to a long or number.\n * @param {string} hash Hash\n * @param {boolean} [unsigned=false] Whether unsigned or not\n * @returns {Long|number} Original value\n */\nutil.longFromHash = function longFromHash(hash, unsigned) {\n var bits = util.LongBits.fromHash(hash);\n if (util.Long)\n return util.Long.fromBits(bits.lo, bits.hi, unsigned);\n return bits.toNumber(Boolean(unsigned));\n};\n\n/**\n * Merges the properties of the source object into the destination object.\n * @memberof util\n * @param {Object.<string,*>} dst Destination object\n * @param {Object.<string,*>} src Source object\n * @param {boolean} [ifNotSet=false] Merges only if the key is not already set\n * @returns {Object.<string,*>} Destination object\n */\nfunction merge(dst, src, ifNotSet) { // used by converters\n for (var keys = Object.keys(src), i = 0; i < keys.length; ++i)\n if (dst[keys[i]] === undefined || !ifNotSet)\n dst[keys[i]] = src[keys[i]];\n return dst;\n}\n\nutil.merge = merge;\n\n/**\n * Converts the first character of a string to lower case.\n * @param {string} str String to convert\n * @returns {string} Converted string\n */\nutil.lcFirst = function lcFirst(str) {\n return str.charAt(0).toLowerCase() + str.substring(1);\n};\n\n/**\n * Creates a custom error constructor.\n * @memberof util\n * @param {string} name Error name\n * @returns {Constructor<Error>} Custom error constructor\n */\nfunction newError(name) {\n\n function CustomError(message, properties) {\n\n if (!(this instanceof CustomError))\n return new CustomError(message, properties);\n\n // Error.call(this, message);\n // ^ just returns a new error instance because the ctor can be called as a function\n\n Object.defineProperty(this, \"message\", { get: function() { return message; } });\n\n /* istanbul ignore next */\n if (Error.captureStackTrace) // node\n Error.captureStackTrace(this, CustomError);\n else\n Object.defineProperty(this, \"stack\", { value: new Error().stack || \"\" });\n\n if (properties)\n merge(this, properties);\n }\n\n (CustomError.prototype = Object.create(Error.prototype)).constructor = CustomError;\n\n Object.defineProperty(CustomError.prototype, \"name\", { get: function() { return name; } });\n\n CustomError.prototype.toString = function toString() {\n return this.name + \": \" + this.message;\n };\n\n return CustomError;\n}\n\nutil.newError = newError;\n\n/**\n * Constructs a new protocol error.\n * @classdesc Error subclass indicating a protocol specifc error.\n * @memberof util\n * @extends Error\n * @template T extends Message<T>\n * @constructor\n * @param {string} message Error message\n * @param {Object.<string,*>} [properties] Additional properties\n * @example\n * try {\n * MyMessage.decode(someBuffer); // throws if required fields are missing\n * } catch (e) {\n * if (e instanceof ProtocolError && e.instance)\n * console.log(\"decoded so far: \" + JSON.stringify(e.instance));\n * }\n */\nutil.ProtocolError = newError(\"ProtocolError\");\n\n/**\n * So far decoded message instance.\n * @name util.ProtocolError#instance\n * @type {Message<T>}\n */\n\n/**\n * A OneOf getter as returned by {@link util.oneOfGetter}.\n * @typedef OneOfGetter\n * @type {function}\n * @returns {string|undefined} Set field name, if any\n */\n\n/**\n * Builds a getter for a oneof's present field name.\n * @param {string[]} fieldNames Field names\n * @returns {OneOfGetter} Unbound getter\n */\nutil.oneOfGetter = function getOneOf(fieldNames) {\n   var fieldMap = {};\n   for (var i = 0; i < fieldNames.length; ++i)\n   fieldMap[fieldNames[i]] = 1;\n\n   /**\n   * @returns {string|undefined} Set field name, if any\n   * @this Object\n   * @ignore\n   */\n   return function() { // eslint-disable-line consistent-return\n   for (var keys = Object.keys(this), i = keys.length - 1; i > -1; --i)\n   if (fieldMap[keys[i]] === 1 && this[keys[i]] !== undefined && this[keys[i]] !== null)\n   return keys[i];\n   };\n};\n\n/**\n * A OneOf setter as returned by {@link util.oneOfSetter}.\n * @typedef OneOfSetter\n * @type {function}\n * @param {string|undefined} value Field name\n * @returns {undefined}\n */\n\n/**\n * Builds a setter for a oneof's present field name.\n * @param {string[]} fieldNames Field names\n * @returns {OneOfSetter} Unbound setter\n */\nutil.oneOfSetter = function setOneOf(fieldNames) {\n\n   /**\n   * @param {string} name Field name\n   * @returns {undefined}\n   * @this Object\n   * @ignore\n   */\n   return function(name) {\n   for (var i = 0; i < fieldNames.length; ++i)\n   if (fieldNames[i] !== name)\n   delete this[fieldNames[i]];\n   };\n};\n\n/**\n * Default conversion options used for {@link Message#toJSON} implementations.\n *\n * These options are close to proto3's JSON mapping with the exception that internal types like Any are handled just like messages. More precisely:\n *\n * - Longs become strings\n * - Enums become string keys\n * - Bytes become base64 encoded strings\n * - (Sub-)Messages become plain objects\n * - Maps become plain objects with all string keys\n * - Repeated fields become arrays\n * - NaN and Infinity for float and double fields become strings\n *\n * @type {IConversionOptions}\n * @see https://developers.google.com/protocol-buffers/docs/proto3?hl=en#json\n */\nutil.toJSONOptions = {\n   longs: String,\n   enums: String,\n   bytes: String,\n   json: true\n};\n\n// Sets up buffer utility according to the environment (called in index-minimal)\nutil._configure = function() {\n   var Buffer = util.Buffer;\n   /* istanbul ignore if */\n   if (!Buffer) {\n   util._Buffer_from = util._Buffer_allocUnsafe = null;\n   return;\n   }\n   // because node 4.x buffers are incompatible & immutable\n   // see: https://github.com/dcodeIO/protobuf.js/pull/665\n   util._Buffer_from = Buffer.from !== Uint8Array.from && Buffer.from ||\n   /* istanbul ignore next */\n   function Buffer_from(value, encoding) {\n   return new Buffer(value, encoding);\n   };\n   util._Buffer_allocUnsafe = Buffer.allocUnsafe ||\n   /* istanbul ignore next */\n   function Buffer_allocUnsafe(size) {\n   return new Buffer(size);\n   };\n};\n","\"use strict\";\nmodule.exports = Writer;\n\nvar util   = require(\"./util/minimal\");\n\nvar BufferWriter; // cyclic\n\nvar LongBits = util.LongBits,\n   base64   = util.base64,\n   utf8   = util.utf8;\n\n/**\n * Constructs a new writer operation instance.\n * @classdesc Scheduled writer operation.\n * @constructor\n * @param {function(*, Uint8Array, number)} fn Function to call\n * @param {number} len Value byte length\n * @param {*} val Value to write\n * @ignore\n */\nfunction Op(fn, len, val) {\n\n   /**\n   * Function to call.\n   * @type {function(Uint8Array, number, *)}\n   */\n   this.fn = fn;\n\n   /**\n   * Value byte length.\n   * @type {number}\n   */\n   this.len = len;\n\n   /**\n   * Next operation.\n   * @type {Writer.Op|undefined}\n   */\n   this.next = undefined;\n\n   /**\n   * Value to write.\n   * @type {*}\n   */\n   this.val = val; // type varies\n}\n\n/* istanbul ignore next */\nfunction noop() {} // eslint-disable-line no-empty-function\n\n/**\n * Constructs a new writer state instance.\n * @classdesc Copied writer state.\n * @memberof Writer\n * @constructor\n * @param {Writer} writer Writer to copy state from\n * @ignore\n */\nfunction State(writer) {\n\n   /**\n   * Current head.\n   * @type {Writer.Op}\n   */\n   this.head = writer.head;\n\n   /**\n   * Current tail.\n   * @type {Writer.Op}\n   */\n   this.tail = writer.tail;\n\n   /**\n   * Current buffer length.\n   * @type {number}\n   */\n   this.len = writer.len;\n\n   /**\n   * Next state.\n   * @type {State|null}\n   */\n   this.next = writer.states;\n}\n\n/**\n * Constructs a new writer instance.\n * @classdesc Wire format writer using `Uint8Array` if available, otherwise `Array`.\n * @constructor\n */\nfunction Writer() {\n\n   /**\n   * Current length.\n   * @type {number}\n   */\n   this.len = 0;\n\n   /**\n   * Operations head.\n   * @type {Object}\n   */\n   this.head = new Op(noop, 0, 0);\n\n   /**\n   * Operations tail\n   * @type {Object}\n   */\n   this.tail = this.head;\n\n   /**\n   * Linked forked states.\n   * @type {Object|null}\n   */\n   this.states = null;\n\n   // When a value is written, the writer calculates its byte length and puts it into a linked\n   // list of operations to perform when finish() is called. This both allows us to allocate\n   // buffers of the exact required size and reduces the amount of work we have to do compared\n   // to first calculating over objects and then encoding over objects.

```
In our case, the encoding\n    // part is just a linked list walk calling operations with already prepared
values.\n}\n\nvar create = function create() {\n    return util.Buffer\n        ? function create_buffer_setup() {\n
return (Writer.create = function create_buffer() {\n                return new BufferWriter();\n            })();\n        }\n
/* istanbul ignore next */\n        : function create_array() {\n            return new Writer();\n        };\n};\n\n/**\n *
Creates a new writer.\n * @function\n * @returns {BufferWriter|Writer} A {@link BufferWriter} when Buffers are
supported, otherwise a {@link Writer}\n */\nWriter.create = create();\n\n/**\n * Allocates a buffer of the specified
size.\n * @param {number} size Buffer size\n * @returns {Uint8Array} Buffer\n */\nWriter.alloc = function
alloc(size) {\n    return new util.Array(size);\n};\n\n// Use Uint8Array buffer pool in the browser, just like node does
with buffers\n/* istanbul ignore else */\nif (util.Array !== Array)\n    Writer.alloc = util.pool(Writer.alloc,
util.Array.prototype.subarray);\n\n/**\n * Pushes a new operation to the queue.\n * @param {function(Uint8Array,
number, *)} fn Function to call\n * @param {number} len Value byte length\n * @param {number} val Value to
write\n * @returns {Writer} `this`\n * @private\n */\nWriter.prototype._push = function push(fn, len, val) {\n
this.tail = this.tail.next = new Op(fn, len, val);\n    this.len += len;\n    return this;\n};\n\nfunction writeByte(val, buf,
pos) {\n    buf[pos] = val & 255;\n}\n\nfunction writeVarint32(val, buf, pos) {\n    while (val > 127) {\n
buf[pos++] = val & 127 | 128;\n        val >>>= 7;\n    }\n    buf[pos] = val;\n}\n\n/**\n * Constructs a new varint
writer operation instance.\n * @classdesc Scheduled varint writer operation.\n * @extends Op\n * @constructor\n *
@param {number} len Value byte length\n * @param {number} val Value to write\n * @ignore\n */\nfunction
VarintOp(len, val) {\n    this.len = len;\n    this.next = undefined;\n    this.val = val;\n}\n\nVarintOp.prototype =
Object.create(Op.prototype);\nVarintOp.prototype.fn = writeVarint32;\n\n/**\n * Writes an unsigned 32 bit value as
a varint.\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.uint32 =
function write_uint32(value) {\n    // here, the call to this.push has been inlined and a varint specific Op subclass is
used.\n    // uint32 is by far the most frequently used operation and benefits significantly from this.\n    this.len +=
(this.tail = this.tail.next = new VarintOp(\n        (value = value >>> 0)\n                < 128       ? 1\n        : value <
16384     ? 2\n        : value < 2097152   ? 3\n        : value < 268435456 ? 4\n        :                   5,\n    value)).len;\n
return this;\n};\n\n/**\n * Writes a signed 32 bit value as a varint.\n * @function\n * @param {number} value
Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.int32 = function write_int32(value) {\n    return
value < 0\n        ? this._push(writeVarint64, 10, LongBits.fromNumber(value)) // 10 bytes per spec\n        :
this.uint32(value);\n};\n\n/**\n * Writes a 32 bit value as a varint, zig-zag encoded.\n * @param {number} value
Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.sint32 = function write_sint32(value) {\n    return
this.uint32((value << 1 ^ value >> 31) >>> 0);\n};\n\nfunction writeVarint64(val, buf, pos) {\n    while (val.hi) {\n
   buf[pos++] = val.lo & 127 | 128;\n        val.lo = (val.lo >>> 7 | val.hi << 25) >>> 0;\n        val.hi >>>= 7;\n    }\n
while (val.lo > 127) {\n        buf[pos++] = val.lo & 127 | 128;\n        val.lo = val.lo >>> 7;\n    }\n    buf[pos++] =
val.lo;\n}\n\n/**\n * Writes an unsigned 64 bit value as a varint.\n * @param {Long|number|string} value Value to
write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n
*/\nWriter.prototype.uint64 = function write_uint64(value) {\n    var bits = LongBits.from(value);\n    return
this._push(writeVarint64, bits.length(), bits);\n};\n\n/**\n * Writes a signed 64 bit value as a varint.\n * @function\n
* @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If
`value` is a string and no long library is present.\n */\nWriter.prototype.int64 = Writer.prototype.uint64;\n\n/**\n *
Writes a signed 64 bit value as a varint, zig-zag encoded.\n * @param {Long|number|string} value Value to write\n
* @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n
*/\nWriter.prototype.sint64 = function write_sint64(value) {\n    var bits = LongBits.from(value).zzEncode();\n
return this._push(writeVarint64, bits.length(), bits);\n};\n\n/**\n * Writes a boolish value as a varint.\n * @param
{boolean} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.bool = function
write_bool(value) {\n    return this._push(writeByte, 1, value ? 1 : 0);\n};\n\nfunction writeFixed32(val, buf, pos) {\n
  buf[pos    ] =  val         & 255;\n    buf[pos + 1] =  val >>> 8   & 255;\n    buf[pos + 2] =  val >>> 16  & 255;\n
buf[pos + 3] =  val >>> 24;\n}\n\n/**\n * Writes an unsigned 32 bit value as fixed 32 bits.\n * @param {number}
value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.fixed32 = function write_fixed32(value)
{\n    return this._push(writeFixed32, 4, value >>> 0);\n};\n\n/**\n * Writes a signed 32 bit value as fixed 32 bits.\n
```

* @function\n * @param {number} value Value to write\n * @returns {Writer} `this`\n
*/\nWriter.prototype.sfixed32 = Writer.prototype.fixed32;\n\n/**\n * Writes an unsigned 64 bit value as fixed 64
bits.\n * @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError}
If `value` is a string and no long library is present.\n */\nWriter.prototype.fixed64 = function write_fixed64(value)
{\n   var bits = LongBits.from(value);\n   return this._push(writeFixed32, 4, bits.lo)._push(writeFixed32, 4,
bits.hi);\n};\n\n/**\n * Writes a signed 64 bit value as fixed 64 bits.\n * @function\n * @param
{Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a
string and no long library is present.\n */\nWriter.prototype.sfixed64 = Writer.prototype.fixed64;\n\n/**\n * Writes a
float (32 bit).\n * @function\n * @param {number} value Value to write\n * @returns {Writer} `this`\n
*/\nWriter.prototype.float = function write_float(value) {\n   return this._push(util.float.writeFloatLE, 4,
value);\n};\n\n/**\n * Writes a double (64 bit float).\n * @function\n * @param {number} value Value to write\n *
@returns {Writer} `this`\n */\nWriter.prototype.double = function write_double(value) {\n   return
this._push(util.float.writeDoubleLE, 8, value);\n};\n\nvar writeBytes = util.Array.prototype.set\n   ? function
writeBytes_set(val, buf, pos) {\n   buf.set(val, pos); // also works for plain array values\n   }\n   /* istanbul
ignore next */\n   : function writeBytes_for(val, buf, pos) {\n   for (var i = 0; i < val.length; ++i)\n   buf[pos
+ i] = val[i];\n   };\n\n/**\n * Writes a sequence of bytes.\n * @param {Uint8Array|string} value Buffer or base64
encoded string to write\n * @returns {Writer} `this`\n */\nWriter.prototype.bytes = function write_bytes(value) {\n
var len = value.length >>> 0;\n   if (!len)\n   return this._push(writeByte, 1, 0);\n   if (util.isString(value)) {\n
var buf = Writer.alloc(len = base64.length(value));\n   base64.decode(value, buf, 0);\n   value = buf;\n   }\n
return this.uint32(len)._push(writeBytes, len, value);\n};\n\n/**\n * Writes a string.\n * @param {string} value
Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.string = function write_string(value) {\n   var len
= utf8.length(value);\n   return len\n   ? this.uint32(len)._push(utf8.write, len, value)\n   :
this._push(writeByte, 1, 0);\n};\n\n/**\n * Forks this writer's state by pushing it to a stack.\n * Calling {@link
Writer#reset|reset} or {@link Writer#ldelim|ldelim} resets the writer to the previous state.\n * @returns {Writer}
`this`\n */\nWriter.prototype.fork = function fork() {\n   this.states = new State(this);\n   this.head = this.tail = new
Op(noop, 0, 0);\n   this.len = 0;\n   return this;\n};\n\n/**\n * Resets this instance to the last state.\n * @returns
{Writer} `this`\n */\nWriter.prototype.reset = function reset() {\n   if (this.states) {\n   this.head   =
this.states.head;\n   this.tail   = this.states.tail;\n   this.len   = this.states.len;\n   this.states =
this.states.next;\n   } else {\n   this.head = this.tail = new Op(noop, 0, 0);\n   this.len = 0;\n   }\n   return
this;\n};\n\n/**\n * Resets to the last state and appends the fork state's current write length as a varint followed by its
operations.\n * @returns {Writer} `this`\n */\nWriter.prototype.ldelim = function ldelim() {\n   var head =
this.head,\n   tail = this.tail,\n   len = this.len;\n   this.reset().uint32(len);\n   if (len) {\n   this.tail.next =
head.next; // skip noop\n   this.tail = tail;\n   this.len += len;\n   }\n   return this;\n};\n\n/**\n * Finishes the
write operation.\n * @returns {Uint8Array} Finished buffer\n */\nWriter.prototype.finish = function finish() {\n
var head = this.head.next, // skip noop\n   buf = this.constructor.alloc(this.len),\n   pos = 0;\n   while (head)
{\n   head.fn(head.val, buf, pos);\n   pos += head.len;\n   head = head.next;\n   }\n   // this.head = this.tail
= null;\n   return buf;\n};\n\nWriter._configure = function(BufferWriter_) {\n   BufferWriter = BufferWriter_;\n
Writer.create = create();\n   BufferWriter._configure();\n};\n","\"use strict\";\nmodule.exports = BufferWriter;\n\n//
extends Writer\nvar Writer = require(\"./writer\");\n(BufferWriter.prototype =
Object.create(Writer.prototype)).constructor = BufferWriter;\n\nvar util = require(\"./util/minimal\");\n\n/**\n *
Constructs a new buffer writer instance.\n * @classdesc Wire format writer using node buffers.\n * @extends
Writer\n * @constructor\n */\nfunction BufferWriter() {\n   Writer.call(this);\n}\n\nBufferWriter._configure =
function () {\n   /**\n   * Allocates a buffer of the specified size.\n   * @function\n   * @param {number} size
Buffer size\n   * @returns {Buffer} Buffer\n   */\n   BufferWriter.alloc = util._Buffer_allocUnsafe;\n\n
BufferWriter.writeBytesBuffer = util.Buffer && util.Buffer.prototype instanceof Uint8Array &&
util.Buffer.prototype.set.name === \"set\"\n   ? function writeBytesBuffer_set(val, buf, pos) {\n   buf.set(val,
pos); // faster than copy (requires node >= 4 where Buffers extend Uint8Array and set is properly inherited)\n
// also works for plain array values\n   }\n   /* istanbul ignore next */\n   : function

writeBytesBuffer_copy(val, buf, pos) {\n   if (val.copy) // Buffer values\n   val.copy(buf, pos, 0, val.length);\n   else for (var i = 0; i < val.length;) // plain array values\n   buf[pos++] = val[i++];\n };\n};\n\n\n/**\n * @override\n */\nBufferWriter.prototype.bytes = function write_bytes_buffer(value) {\n   if (util.isString(value))\n   value = util._Buffer_from(value, \"base64\");\n   var len = value.length >>> 0;\n   this.uint32(len);\n   if (len)\n   this._push(BufferWriter.writeBytesBuffer, len, value);\n   return this;\n};\n\nfunction writeStringBuffer(val, buf, pos) {\n   if (val.length < 40) // plain js is faster for short strings (probably due to redundant assertions)\n   util.utf8.write(val, buf, pos);\n   else if (buf.utf8Write)\n   buf.utf8Write(val, pos);\n   else\n   buf.write(val, pos);\n}\n\n/**\n * @override\n */\nBufferWriter.prototype.string = function write_string_buffer(value) {\n   var len = util.Buffer.byteLength(value);\n   this.uint32(len);\n   if (len)\n   this._push(writeStringBuffer, len, value);\n   return this;\n};\n\n\n/**\n * Finishes the write operation.\n * @name BufferWriter#finish\n * @function\n * @returns {Buffer} Finished buffer\n */\n\nBufferWriter._configure();\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\n/* eslint-disable import/no-internal-modules */\r\nimport {Backend, InferenceSession, SessionHandler} from 'onnxruntime-common';\r\nimport {Session} from './onnxjs/session';\r\nimport {OnnxjsSessionHandler} from './onnxjs/session-handler';\r\n\r\nclass OnnxjsBackend implements Backend {\r\n // eslint-disable-next-line @typescript-eslint/no-empty-function\r\n async init(): Promise<void> {}\r\n\r\n async createSessionHandler(pathOrBuffer: string|Uint8Array, options?: InferenceSession.SessionOptions):\r\n   Promise<SessionHandler> {\r\n   // NOTE: Session.Config(from onnx.js) is not compatible with InferenceSession.SessionOptions(from\r\n   // onnxruntime-common).\r\n   //   In future we should remove Session.Config and use InferenceSession.SessionOptions.\r\n   //   Currently we allow this to happen to make test runner work.\r\n   const session = new Session(options as unknown as Session.Config);\r\n\r\n   // typescript cannot merge method override correctly (so far in 4.2.3). need if-else to call the method.\r\n   if (typeof pathOrBuffer === 'string') {\r\n   await session.loadModel(pathOrBuffer);\r\n   } else {\r\n   await session.loadModel(pathOrBuffer);\r\n   }\r\n\r\n   return new OnnxjsSessionHandler(session);\r\n }\r\n}\r\n\r\nexport const onnxjsBackend = new OnnxjsBackend();\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {readFile} from 'fs';\r\nimport {Backend, env, InferenceSession, SessionHandler} from 'onnxruntime-common';\r\nimport {cpus} from 'os';\r\nimport {promisify} from 'util';\r\nimport {initWasm} from './wasm/proxy-wrapper';\r\n\r\nimport {OnnxruntimeWebAssemblySessionHandler} from './wasm/session-handler';\r\n\r\n/**\r\n * This function initializes all flags for WebAssembly.\r\n *\r\n * Those flags are accessible from `ort.env.wasm`. Users are allow to set those flags before the first inference session\r\n * being created, to override default value.\r\n */\r\nexport const initializeFlags = (): void => {\r\n if (typeof env.wasm.initTimeout !== 'number' || env.wasm.initTimeout < 0) {\r\n   env.wasm.initTimeout = 0;\r\n }\r\n\r\n if (typeof env.wasm.simd !== 'boolean') {\r\n   env.wasm.simd = true;\r\n }\r\n\r\n if (typeof env.wasm.proxy !== 'boolean') {\r\n   env.wasm.proxy = false;\r\n }\r\n\r\n if (typeof env.wasm.numThreads !== 'number' || !Number.isInteger(env.wasm.numThreads) || env.wasm.numThreads <= 0) {\r\n   const numCpuLogicalCores = typeof navigator === 'undefined' ? cpus().length : navigator.hardwareConcurrency;\r\n   env.wasm.numThreads = Math.min(4, Math.ceil((numCpuLogicalCores || 1) / 2));\r\n }\r\n};\r\n\r\nclass OnnxruntimeWebAssemblyBackend implements Backend {\r\n async init(): Promise<void> {\r\n   // populate wasm flags\r\n   initializeFlags();\r\n\r\n   // init wasm\r\n   await initWasm();\r\n }\r\n createSessionHandler(path: string, options?: InferenceSession.SessionOptions): Promise<SessionHandler>;\r\n createSessionHandler(buffer: Uint8Array, options?: InferenceSession.SessionOptions): Promise<SessionHandler>;\r\n async createSessionHandler(pathOrBuffer: string|Uint8Array, options?: InferenceSession.SessionOptions):\r\n   Promise<SessionHandler> {\r\n   let buffer: Uint8Array;\r\n   if (typeof pathOrBuffer === 'string') {\r\n   if (typeof fetch === 'undefined') {\r\n   // node\r\n   buffer = await promisify(readFile)(pathOrBuffer);\r\n   } else {\r\n   // browser\r\n   const response = await fetch(pathOrBuffer);\r\n   const arrayBuffer = await response.arrayBuffer();\r\n   buffer = new Uint8Array(arrayBuffer);\r\n   }\r\n   } else {\r\n   buffer = pathOrBuffer;\r\n   }\r\n\r\n   const handler = new OnnxruntimeWebAssemblySessionHandler();\r\n   await handler.loadModel(buffer, options);\r\n   return

Promise.resolve(handler);\r\n }\r\n}\r\n\r\nexport const wasmBackend = new OnnxruntimeWebAssemblyBackend();\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nexport * from 'onnxruntime-common';\r\nimport {registerBackend} from 'onnxruntime-common';\r\nimport {onnxjsBackend} from './backend-onnxjs';\r\nimport {wasmBackend} from './backend-wasm';\r\n\r\nregisterBackend('webgl', onnxjsBackend, 1);\r\nregisterBackend('wasm', wasmBackend, 2);\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nclass AttributeWithCacheKeyImpl {\r\n constructor(attribute: Record<string, unknown>) {\r\n   Object.assign(this, attribute);\r\n }\r\n\r\n private _cacheKey: string;\r\n public get cacheKey(): string {\r\n   if (!this._cacheKey) {\r\n   this._cacheKey =\r\n   Object.getOwnPropertyNames(this).sort().map(name => `${(this as Record<string, unknown>)[name]}`).join(';');\r\n   }\r\n   return this._cacheKey;\r\n }\r\n}\r\n\r\nexport interface AttributeWithCacheKey {\r\n readonly cacheKey: string;\r\n}\r\n\r\nexport const createAttributeWithCacheKey = <T extends Record<string, unknown>>(attribute: T): T&AttributeWithCacheKey =>\r\n   new AttributeWithCacheKeyImpl(attribute) as unknown as T & AttributeWithCacheKey;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport Long from 'long';\r\nimport {onnx} from 'onnx-proto';\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\n\r\nimport {Tensor} from './tensor';\r\nimport {LongUtil} from './util';\r\n\r\nexport declare namespace Attribute {\r\n export interface DataTypeMap {\r\n   float: number;\r\n   int: number;\r\n   string: string;\r\n   tensor: Tensor;\r\n   floats: number[];\r\n   ints: number[];\r\n   strings: string[];\r\n   tensors: Tensor[];\r\n }\r\n\r\n export type DataType = keyof DataTypeMap;\r\n}\r\n\r\ntype ValueTypes = Attribute.DataTypeMap[Attribute.DataType];\r\n\r\ntype Value = [ValueTypes, Attribute.DataType];\r\n\r\nexport class Attribute {\r\n constructor(attributes: onnx.IAttributeProto[]|ortFbs.Attribute[]|null|undefined) {\r\n   this._attributes = new Map();\r\n   if (attributes !== null && attributes !== undefined) {\r\n   for (const attr of attributes) {\r\n   if (attr instanceof onnx.AttributeProto) {\r\n   this._attributes.set(attr.name, [Attribute.getValue(attr), Attribute.getType(attr)]);\r\n   } else if (attr instanceof ortFbs.Attribute) {\r\n   this._attributes.set(attr.name()!, [Attribute.getValue(attr), Attribute.getType(attr)]);\r\n   }\r\n   }\r\n   if (this._attributes.size < attributes.length) {\r\n   throw new Error('duplicated attribute names');\r\n   }\r\n   }\r\n }\r\n\r\n set(key: string, type: Attribute.DataType, value: ValueTypes): void {\r\n   this._attributes.set(key, [value, type]);\r\n }\r\n delete(key: string): void {\r\n   this._attributes.delete(key);\r\n }\r\n getFloat(key: string, defaultValue?: Attribute.DataTypeMap['float']) {\r\n   return this.get(key, 'float', defaultValue);\r\n }\r\n\r\n getInt(key: string, defaultValue?: Attribute.DataTypeMap['int']) {\r\n   return this.get(key, 'int', defaultValue);\r\n }\r\n\r\n getString(key: string, defaultValue?: Attribute.DataTypeMap['string']) {\r\n   return this.get(key, 'string', defaultValue);\r\n }\r\n\r\n getTensor(key: string, defaultValue?: Attribute.DataTypeMap['tensor']) {\r\n   return this.get(key, 'tensor', defaultValue);\r\n }\r\n\r\n getFloats(key: string, defaultValue?: Attribute.DataTypeMap['floats']) {\r\n   return this.get(key, 'floats', defaultValue);\r\n }\r\n\r\n getInts(key: string, defaultValue?: Attribute.DataTypeMap['ints']) {\r\n   return this.get(key, 'ints', defaultValue);\r\n }\r\n\r\n getStrings(key: string, defaultValue?: Attribute.DataTypeMap['strings']) {\r\n   return this.get(key, 'strings', defaultValue);\r\n }\r\n\r\n getTensors(key: string, defaultValue?: Attribute.DataTypeMap['tensors']) {\r\n   return this.get(key, 'tensors', defaultValue);\r\n }\r\n\r\n private get<V extends Attribute.DataTypeMap[Attribute.DataType]>(\r\n   key: string, type: Attribute.DataType, defaultValue?: V): V {\r\n   const valueAndType = this._attributes.get(key);\r\n   if (valueAndType === undefined) {\r\n   if (defaultValue !== undefined) {\r\n   return defaultValue;\r\n   }\r\n   throw new Error(`required attribute not found: ${key}`);\r\n   }\r\n   if (valueAndType[1] !== type) {\r\n   throw new Error(`type mismatch: expected ${type} but got ${valueAndType[1]}`);\r\n   }\r\n   return valueAndType[0] as V;\r\n }\r\n\r\n private static getType(attr: onnx.IAttributeProto|ortFbs.Attribute): Attribute.DataType {\r\n   const type = attr instanceof onnx.AttributeProto ? (attr).type : (attr as ortFbs.Attribute).type();\r\n   switch (type) {\r\n   case onnx.AttributeProto.AttributeType.FLOAT:\r\n   return 'float';\r\n   case onnx.AttributeProto.AttributeType.INT:\r\n   return 'int';\r\n   case onnx.AttributeProto.AttributeType.STRING:\r\n   return 'string';\r\n   case onnx.AttributeProto.AttributeType.TENSOR:\r\n return 'tensor';\r\n case onnx.AttributeProto.AttributeType.FLOATS:\r\n return 'floats';\r\n case onnx.AttributeProto.AttributeType.INTS:\r\n return 'ints';\r\n case onnx.AttributeProto.AttributeType.STRINGS:\r\n return 'strings';\r\n case onnx.AttributeProto.AttributeType.TENSORS:\r\n return 'tensors';\r\n default:\r\n throw new Error(`attribute type is not supported yet: ${onnx.AttributeProto.AttributeType[type]}`);\r\n }\r\n }\r\n\r\n private static getValue(attr: onnx.IAttributeProto|ortFbs.Attribute) {\r\n const attrType = attr instanceof onnx.AttributeProto ? attr.type : (attr as ortFbs.Attribute).type();\r\n if (attrType === onnx.AttributeProto.AttributeType.GRAPH || attrType === onnx.AttributeProto.AttributeType.GRAPHS) {\r\n throw new Error('graph attribute is not supported yet');\r\n }\r\n\r\n const value = this.getValueNoCheck(attr);\r\n\r\n // cast LONG to number\r\n if (attrType === onnx.AttributeProto.AttributeType.INT && LongUtil.isLong(value)) {\r\n return LongUtil.longToNumber(value as Long | flatbuffers.Long);\r\n }\r\n\r\n // cast LONG[] to number[]\r\n if (attrType === onnx.AttributeProto.AttributeType.INTS) {\r\n const arr = (value as Array<number|Long|flatbuffers.Long>);\r\n const numberValue: number[] = new Array<number>(arr.length);\r\n\r\n for (let i = 0; i < arr.length; i++) {\r\n const maybeLong = arr[i];\r\n numberValue[i] = LongUtil.longToNumber(maybeLong);\r\n }\r\n\r\n return numberValue;\r\n }\r\n\r\n // cast onnx.TensorProto to onnxjs.Tensor\r\n if (attrType === onnx.AttributeProto.AttributeType.TENSOR) {\r\n return attr instanceof onnx.AttributeProto ? Tensor.fromProto(value as onnx.ITensorProto) :\r\n Tensor.fromOrtTensor(value as ortFbs.Tensor);\r\n }\r\n\r\n // cast onnx.TensorProto[] to onnxjs.Tensor[]\r\n if (attrType === onnx.AttributeProto.AttributeType.TENSORS) {\r\n if (attr instanceof onnx.AttributeProto) {\r\n const tensorProtos = value as onnx.ITensorProto[];\r\n return tensorProtos.map(value => Tensor.fromProto(value));\r\n } else if (attr instanceof ortFbs.Attribute) {\r\n const tensorProtos = value as ortFbs.Tensor[];\r\n return tensorProtos.map(value => Tensor.fromOrtTensor(value));\r\n }\r\n }\r\n\r\n // cast Uint8Array to string\r\n if (attrType === onnx.AttributeProto.AttributeType.STRING) {\r\n // string in onnx attribute is of uint8array type, so we need to convert it to string below. While in ort format,\r\n // string attributes are returned as string, so no conversion is needed.\r\n if (attr instanceof onnx.AttributeProto) {\r\n const utf8String = value as Uint8Array;\r\n return Buffer.from(utf8String.buffer, utf8String.byteOffset, utf8String.byteLength).toString();\r\n }\r\n }\r\n\r\n // cast Uint8Array[] to string[]\r\n if (attrType === onnx.AttributeProto.AttributeType.STRINGS) {\r\n // strings in onnx attribute is returned as uint8array[], so we need to convert it to string[] below. While in ort\r\n // format strings attributes are returned as string[], so no conversion is needed.\r\n if (attr instanceof onnx.AttributeProto) {\r\n const utf8Strings = value as Uint8Array[];\r\n return utf8Strings.map(\r\n utf8String => Buffer.from(utf8String.buffer, utf8String.byteOffset, utf8String.byteLength).toString());\r\n }\r\n }\r\n\r\n return value as ValueTypes;\r\n }\r\n\r\n private static getValueNoCheck(attr: onnx.IAttributeProto|ortFbs.Attribute) {\r\n return attr instanceof (onnx.AttributeProto) ? this.getValueNoCheckFromOnnxFormat(attr) :\r\n this.getValueNoCheckFromOrtFormat(attr as ortFbs.Attribute);\r\n }\r\n\r\n private static getValueNoCheckFromOnnxFormat(attr: onnx.IAttributeProto) {\r\n switch (attr.type!) {\r\n case onnx.AttributeProto.AttributeType.FLOAT:\r\n return attr.f;\r\n case onnx.AttributeProto.AttributeType.INT:\r\n return attr.i;\r\n case onnx.AttributeProto.AttributeType.STRING:\r\n return attr.s;\r\n case onnx.AttributeProto.AttributeType.TENSOR:\r\n return attr.t;\r\n case onnx.AttributeProto.AttributeType.GRAPH:\r\n return attr.g;\r\n case onnx.AttributeProto.AttributeType.FLOATS:\r\n return attr.floats;\r\n case onnx.AttributeProto.AttributeType.INTS:\r\n return attr.ints;\r\n case onnx.AttributeProto.AttributeType.STRINGS:\r\n return attr.strings;\r\n case onnx.AttributeProto.AttributeType.TENSORS:\r\n return attr.tensors;\r\n case onnx.AttributeProto.AttributeType.GRAPHS:\r\n return attr.graphs;\r\n default:\r\n throw new

```
Error(`unsupported attribute type: ${onnx.AttributeProto.AttributeType[attr.type!]}`);\r\n    }\r\n  }\r\n\r\n  private
static getValueNoCheckFromOrtFormat(attr: ortFbs.Attribute) {\r\n    switch (attr.type()) {\r\n      case
ortFbs.AttributeType.FLOAT:\r\n        return attr.f();\r\n      case ortFbs.AttributeType.INT:\r\n        return
attr.i();\r\n      case ortFbs.AttributeType.STRING:\r\n        return attr.s();\r\n      case
ortFbs.AttributeType.TENSOR:\r\n        return attr.t();\r\n      case ortFbs.AttributeType.GRAPH:\r\n        return
attr.g();\r\n      case ortFbs.AttributeType.FLOATS:\r\n        return attr.floatsArray();\r\n      case
ortFbs.AttributeType.INTS: {\r\n        const ints = [];\r\n        for (let i = 0; i < attr.intsLength(); i++) {\r\n
ints.push(attr.ints(i)!);\r\n        }\r\n        return ints;\r\n      }\r\n      case ortFbs.AttributeType.STRINGS: {\r\n
const strings = [];\r\n        for (let i = 0; i < attr.stringsLength(); i++) {\r\n          strings.push(attr.strings(i));\r\n
}\r\n        return strings;\r\n      }\r\n      case ortFbs.AttributeType.TENSORS: {\r\n        const tensors = [];\r\n
for (let i = 0; i < attr.tensorsLength(); i++) {\r\n          tensors.push(attr.tensors(i)!);\r\n        }\r\n        return
tensors;\r\n      }\r\n      // case ortFbs.AttributeType.GRAPHS:\r\n      // TODO: Subgraph not supported yet.\r\n
// const graphs = [];\r\n      // for (let i = 0; i < attr.graphsLength(); i++) {\r\n      //   graphs.push(attr.graphs(i)!);\r\n
 // }\r\n      // return graphs;\r\n      default:\r\n        throw new Error(`unsupported attribute type:
${ortFbs.AttributeType[attr.type()]}`);\r\n    }\r\n  }\r\n\r\n  protected _attributes: Map<string, Value>;\r\n}\r\n","//
Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{WebGLBackend} from './backends/backend-webgl';\r\nimport {Graph} from './graph';\r\nimport {Operator} from
'./operators';\r\nimport {OpSet} from './opset';\r\nimport {Session} from './session';\r\n\r\nexport interface
InferenceHandler {\r\n  /**\r\n   * dispose the inference handler. it will be called as the last step in Session.run()\r\n
*/\r\n  dispose(): void;\r\n}\r\n\r\nexport interface SessionHandler {\r\n  /**\r\n   * transform the graph at
initialization time\r\n   * @param graphTransformer the graph transformer to manipulate the model graph\r\n   */\r\n
transformGraph?(graphTransformer: Graph.Transformer): void;\r\n\r\n  /**\r\n   * create an instance of
InferenceHandler to use in a Session.run() call\r\n   */\r\n  createInferenceHandler(): InferenceHandler;\r\n\r\n
/**\r\n   * dispose the session handler. it will be called when a session is being disposed explicitly\r\n   */\r\n
dispose(): void;\r\n\r\n  /**\r\n   * Resolves the operator from the name and opset version; backend specific\r\n   *
@param node the node to resolve\r\n   * @param opsets a list of opsets that exported from the model\r\n   * @param
graph the completely initialized graph\r\n   */\r\n  resolve(node: Graph.Node, opsets: readonly OpSet[], graph:
Graph): Operator;\r\n\r\n  /**\r\n   * This method let's the sessionHandler know that the graph initialization is
complete\r\n   * @param graph the completely initialized graph\r\n   */\r\n  onGraphInitialized?(graph: Graph):
void;\r\n\r\n  /**\r\n   * a reference to the corresponding backend\r\n   */\r\n  readonly backend: Backend;\r\n\r\n
/**\r\n   * a reference to the session context\r\n   */\r\n  readonly context: Session.Context;\r\n}\r\n\r\nexport
interface Backend {\r\n  /**\r\n   * initialize the backend. will be called only once, when the first time the\r\n   *
backend it to be used\r\n   */\r\n  initialize(): boolean|Promise<boolean>;\r\n\r\n  /**\r\n   * create an instance of
SessionHandler to use in a Session object's lifecycle\r\n   */\r\n  createSessionHandler(context: Session.Context):
SessionHandler;\r\n\r\n  /**\r\n   * dispose the backend. currently this will not be called\r\n   */\r\n  dispose():
void;\r\n}\r\n\r\n// caches all initialized backend instances\r\nconst backendsCache: Map<string, Backend> = new
Map();\r\n\r\nexport const backend: {[name: string]: Backend} = {\r\n  webgl: new
WebGLBackend(),\r\n};\r\n\r\n/**\r\n * Resolve a reference to the backend. If a hint is specified, the
corresponding\r\n * backend will be used.\r\n */\r\nexport async function resolveBackend(hint?: string|readonly
string[]): Promise<Backend> {\r\n  if (!hint) {\r\n    return resolveBackend(['webgl']);\r\n  } else {\r\n    const hints =
typeof hint === 'string' ? [hint] : hint;\r\n\r\n    for (const backendHint of hints) {\r\n      const cache =
backendsCache.get(backendHint);\r\n      if (cache) {\r\n        return cache;\r\n      }\r\n\r\n      const backend = await
tryLoadBackend(backendHint);\r\n      if (backend) {\r\n        return backend;\r\n      }\r\n    }\r\n  }\r\n\r\n  throw
new Error('no available backend to use');\r\n}\r\n\r\nasync function tryLoadBackend(backendHint: string):
Promise<Backend|undefined> {\r\n  const backendObj = backend;\r\n\r\n  if (typeof backendObj[backendHint] !==
'undefined' && isBackend(backendObj[backendHint])) {\r\n    const backend = backendObj[backendHint];\r\n    let
init = backend.initialize();\r\n    if (typeof init === 'object' && 'then' in init) {\r\n      init = await init;\r\n    }\r\n    if
(init) {\r\n      backendsCache.set(backendHint, backend);\r\n      return backend;\r\n    }\r\n  }\r\n\r\n  return
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undefined;\r\n}\r\n\r\nfunction isBackend(obj: unknown) {\r\n // eslint-disable-next-line @typescript-eslint/no-explicit-any\r\n const o = obj as any;\r\n\r\n // check if an object is a Backend instance\r\n if (\r\n 'initialize' in o && typeof o.initialize === 'function' && // initialize()\r\n 'createSessionHandler' in o && typeof o.createSessionHandler === 'function' && // createSessionHandler()\r\n 'dispose' in o && typeof o.dispose === 'function' // dispose()\r\n) {\r\n return true;\r\n }\r\n\r\n return false;\r\n}\r\n\r\nexport type BackendType = Backend;\r\nexport type SessionHandlerType = ReturnType<BackendType['createSessionHandler']>;\r\nexport type InferenceHandlerType = ReturnType<SessionHandlerType['createInferenceHandler']>;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env} from 'onnxruntime-common';\r\nimport {Backend, SessionHandler} from '../backend';\r\nimport {Logger} from '../instrument';\r\nimport {Session} from '../session';\r\n\r\nimport {WebGLSessionHandler} from './webgl/session-handler';\r\nimport {WebGLContext} from './webgl/webgl-context';\r\nimport {createWebGLContext} from './webgl/webgl-context-factory';\r\n\r\n/**\r\n * WebGLBackend is the entry point for all WebGL opeartions\r\n * When it starts it created the WebGLRenderingContext\r\n * and other main framework components such as Program and Texture Managers\r\n */\r\nexport class WebGLBackend implements Backend {\r\n glContext: WebGLContext;\r\n\r\n get contextId(): 'webgl'|'webgl2'|undefined {\r\n return env.webgl.contextId;\r\n }\r\n set contextId(value: 'webgl'|'webgl2'|undefined) {\r\n env.webgl.contextId = value;\r\n }\r\n\r\n get matmulMaxBatchSize(): number|undefined {\r\n return env.webgl.matmulMaxBatchSize;\r\n }\r\n set matmulMaxBatchSize(value: number|undefined) {\r\n env.webgl.matmulMaxBatchSize = value;\r\n }\r\n\r\n get textureCacheMode(): 'initializerOnly'|'full'|undefined {\r\n return env.webgl.textureCacheMode;\r\n }\r\n set textureCacheMode(value: 'initializerOnly'|'full'|undefined) {\r\n env.webgl.textureCacheMode = value;\r\n }\r\n\r\n get pack(): boolean|undefined {\r\n return env.webgl.pack;\r\n }\r\n set pack(value: boolean|undefined) {\r\n env.webgl.pack = value;\r\n }\r\n\r\n get async(): boolean|undefined {\r\n return env.webgl.async;\r\n }\r\n set async(value: boolean|undefined) {\r\n env.webgl.async = value;\r\n }\r\n\r\n initialize(): boolean {\r\n try {\r\n this.glContext = createWebGLContext(this.contextId);\r\n if (typeof this.matmulMaxBatchSize !== 'number') {\r\n this.matmulMaxBatchSize = 16;\r\n }\r\n if (typeof this.textureCacheMode !== 'string') {\r\n this.textureCacheMode = 'full';\r\n }\r\n if (typeof this.pack !== 'boolean') {\r\n this.pack = false;\r\n }\r\n if (typeof this.async !== 'boolean') {\r\n this.async = false;\r\n }\r\n\r\n Logger.setWithEnv(env);\r\n\r\n Logger.verbose(\r\n 'WebGLBackend',\r\n `Created WebGLContext: ${typeof this.glContext} with matmulMaxBatchSize: ${\r\n this.matmulMaxBatchSize}; textureCacheMode: ${this.textureCacheMode}; pack: ${this.pack}; async: ${\r\n this.async}.`);\r\n return true;\r\n } catch (e) {\r\n Logger.warning('WebGLBackend', `Unable to initialize WebGLBackend. ${e}`);\r\n return false;\r\n }\r\n }\r\n createSessionHandler(context: Session.Context): SessionHandler {\r\n return new WebGLSessionHandler(this, context);\r\n }\r\n dispose(): void {\r\n this.glContext.dispose();\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {ArrayUtil, BroadcastUtil, ShapeUtil} from '../../util';\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\nimport {getGlsl} from './glsl-source';\r\nimport {squeezeShape} from './texture-layout-strategy';\r\nimport {TextureLayout} from './types';\r\nimport {generateShaderFuncNameFromInputSamplerName, generateShaderFuncNameFromInputSamplerNameAtOutCoords, getCoordsDataType, getGlChannels, getSqueezedParams, squeezeInputShape} from './utils';\r\n\r\n/**\r\n * GLSL Library responsible for data types and routines for manipulating\r\n * coordinates and mapping to/from tensor indices\r\n */\r\nexport class CoordsGlslLib extends GlslLib {\r\n returnType: string;\r\n\r\n constructor(context: GlslContext) {\r\n super(context);\r\n }\r\n getFunctions(): {[name: string]: GlslLibRoutine} {\r\n return {\r\n ...this.offsetToCoords(),\r\n ...this.coordsToOffset(),\r\n ...this.toVec(),\r\n ...this.valueFrom(),\r\n // TODO return these only when packing is enabled.\r\n ...this.getCommonUtilFuncs(),\r\n ...this.getInputsSamplingSnippets(),\r\n ...this.getOutputSamplingSnippet()\r\n };\r\n }\r\n getCustomTypes() {\r\n return {};\r\n }\r\n /**\r\n * Produces a function that can map from\r\n * 2D normalzied coordinates (s,t) to a flat offset\r\n */\r\n protected offsetToCoords(): {[name: string]: GlslLibRoutine} {\r\n   const funcName = 'offsetToCoords';\r\n   return {\r\n   offsetToCoords: new GlslLibRoutine(`\r\n      vec2 ${funcName}(int offset, int width, int height) {\r\n        int t = offset / width;\r\n        int s = offset - t*width;\r\n        vec2 coords = (vec2(s,t) + vec2(0.5,0.5)) / vec2(width, height);\r\n        return coords;\r\n      }\r\n      `)\r\n   };\r\n }\r\n\r\n /**\r\n   * Produces a function that can map from\r\n   * 2D normalzied coordinates (s,t) to a flat offset\r\n   */\r\n protected coordsToOffset(): {[name: string]: GlslLibRoutine} {\r\n   const funcName = 'coordsToOffset';\r\n   return {\r\n   coordsToOffset: new GlslLibRoutine(`\r\n      int ${funcName}(vec2 coords, int width, int height) {\r\n        float s = coords.s * float(width);\r\n        float t = coords.t * float(height);\r\n        int offset = int(t) * width + int(s);\r\n        return offset;\r\n      }\r\n      `)\r\n   };\r\n }\r\n\r\n /**\r\n   * Generates code for output sampler.\r\n   */\r\n\r\n protected getOutputSamplingSnippet(): {[name: string]: GlslLibRoutine} {\r\n   const outputLayout = this.context.outputTextureLayout;\r\n   if (outputLayout.isPacked) {\r\n   return this.getPackedOutputSamplingSnippet(outputLayout);\r\n   } else {\r\n   return this.getUnpackedOutputSamplingSnippet(outputLayout);\r\n   }\r\n }\r\n\r\n /**\r\n   * Generates code for packed output sampler.\r\n   */\r\n protected getPackedOutputSamplingSnippet(outputLayout: TextureLayout): {[name: string]: GlslLibRoutine} {\r\n   const outShape = outputLayout.unpackedShape;\r\n   const outTexShape = [outputLayout.width, outputLayout.height];\r\n   const result: {[name: string]: GlslLibRoutine} = {};\r\n   const funcName = 'getOutputCoords';\r\n   switch (outShape.length) {\r\n   case 0:\r\n   result[funcName] = this.getOutputScalarCoords();\r\n   break;\r\n   case 1:\r\n   result[funcName] = this.getOutputPacked1DCoords(outShape as [number], outTexShape as [number, number]);\r\n   break;\r\n   case 2:\r\n   result[funcName] = this.getOutputPacked2DCoords(outShape as [number, number], outTexShape as [number, number]);\r\n   break;\r\n   case 3:\r\n   result[funcName] =\r\n   this.getOutputPacked3DCoords(outShape as [number, number, number], outTexShape as [number, number]);\r\n   break;\r\n   default:\r\n   result[funcName] = this.getOutputPackedNDCoords(outShape, outTexShape as [number, number]);\r\n   }\r\n   const glsl = getGlsl(this.context.glContext.version);\r\n   // TODO we need this to properly return a packed vec4 from kernels.\r\n   // Replace all '{glsl.output} = result' with 'setOutput(result)' in all kernels.\r\n   const floatTextureSetRGBASource = `\r\n      void setOutput(vec4 val) {\r\n        ${glsl.output} = val;\r\n      }\r\n    `;\r\n   const floatTextureSetRGBAFuncName = 'floatTextureSetRGBA';\r\n   result[floatTextureSetRGBAFuncName] = new GlslLibRoutine(floatTextureSetRGBASource);\r\n   return result;\r\n }\r\n\r\n /**\r\n   * Generates code for unpacked output sampler.\r\n   */\r\n protected getUnpackedOutputSamplingSnippet(outputLayout: TextureLayout): {[name: string]: GlslLibRoutine} {\r\n   const outShape = outputLayout.unpackedShape;\r\n   const outTexShape = [outputLayout.width, outputLayout.height];\r\n   const result: {[name: string]: GlslLibRoutine} = {};\r\n   const funcName = 'getOutputCoords';\r\n   switch (outShape.length) {\r\n   case 0:\r\n   result[funcName] = this.getOutputScalarCoords();\r\n   break;\r\n   case 1:\r\n   result[funcName] = this.getOutputUnpacked1DCoords(outShape as [number], outTexShape as [number, number]);\r\n   break;\r\n   case 2:\r\n   result[funcName] =\r\n   this.getOutputUnpacked2DCoords(outShape as [number, number], outTexShape as [number, number]);\r\n   break;\r\n   case 3:\r\n   result[funcName] =\r\n   this.getOutputUnpacked3DCoords(outShape as [number, number, number], outTexShape as [number, number]);\r\n   break;\r\n   case 4:\r\n   result[funcName] = this.getOutputUnpacked4DCoords(\r\n   outShape as [number, number, number, number], outTexShape as [number, number]);\r\n   break;\r\n   case 5:\r\n   result[funcName] = this.getOutputUnpacked5DCoords(\r\n   outShape as [number, number, number, number, number], outTexShape as [number, number]);\r\n   break;\r\n   case 6:\r\n   result[funcName] = this.getOutputUnpacked6DCoords(\r\n   outShape as [number, number, number, number, number, number], outTexShape as [number, number]);\r\n   break;\r\n   default:\r\n   throw new Error(`Unsupported output dimensionality: ${outShape.length}`);\r\n   }\r\n   const glsl = getGlsl(this.context.glContext.version);\r\n   // TODO we need this to properly return a packed vec4 from kernels.\r\n   // Replace all '{glsl.output} = result' with 'setOutput(result)' in all kernels.\r\n   const floatTextureSetRSource = `\r\n        void setOutput(float val) {\r\n          ${glsl.output} = vec4(val, 0, 0, 0);\r\n        }\r\n    `;\r\n   const floatTextureSetRFuncName = 'floatTextureSetR';\r\n

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  result[floatTextureSetRFuncName] = new GlslLibRoutine(floatTextureSetRSource);\r\n    return result;\r\n
}\r\n\r\n  /**\r\n   * Scalar output coordinates.\r\n   */\r\n  protected getOutputScalarCoords(): GlslLibRoutine {\r\n
return new GlslLibRoutine(`\r\n      int getOutputCoords() {\r\n        return 0;\r\n      }\r\n    `);\r\n  }\r\n\r\n  /**\r\n
* 1D packed output coordinates.\r\n   */\r\n  protected getOutputPacked1DCoords(shape: [number], texShape:
[number, number]): GlslLibRoutine {\r\n    const packedTexShape = texShape;\r\n    let source = '';\r\n    if
(packedTexShape[0] === 1) {\r\n      source = `\r\n          int getOutputCoords() {\r\n            return 2 *
int(TexCoords.y * ${packedTexShape[1]}.0);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source);\r\n
}\r\n\r\n    if (packedTexShape[1] === 1) {\r\n      source = `\r\n          int getOutputCoords() {\r\n            return 2 *
int(TexCoords.x * ${packedTexShape[0]}.0);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source);\r\n
}\r\n\r\n    source = `\r\n        int getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
              vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n          return 2 * (resTexRC.y *
${packedTexShape[0]} + resTexRC.x);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n
/**\r\n   * 2D packed output coordinates.\r\n   */\r\n  protected getOutputPacked2DCoords(shape: [number,
number], texShape: [number, number]): GlslLibRoutine {\r\n    let source = '';\r\n    if (ArrayUtil.arraysEqual(shape,
texShape)) {\r\n      source = `\r\n        ivec2 getOutputCoords() {\r\n          return 2 * ivec2(TexCoords.xy *
vec2(${texShape[0]}, ${texShape[1]}));\r\n        }\r\n      `;\r\n      return new GlslLibRoutine(source);\r\n    }\r\n\r\n
 const packedTexShape = texShape;\r\n    // texels needed to accommodate a logical row\r\n    const
texelsInLogicalRow = Math.ceil(shape[1] / 2);\r\n\r\n    /**\r\n     * getOutputCoords\r\n     *\r\n     * resTexRC: The
rows and columns of the texels. If you move over one\r\n     * texel to the right in the packed texture, you are
moving over one column\r\n     * (not two).\r\n     *\r\n     * index: The texel index\r\n     */\r\n    source = `\r\n
ivec2 getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n\r\n          int index = resTexRC.y *
${packedTexShape[0]} + resTexRC.x;\r\n\r\n          // reverse r and c order for packed texture\r\n          int r =
imod(index, ${texelsInLogicalRow}) * 2;\r\n          int c = 2 * (index / ${texelsInLogicalRow});\r\n\r\n          return
ivec2(r, c);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * 3D packed output
coordinates.\r\n   */\r\n  protected getOutputPacked3DCoords(shape: [number, number, number], texShape:
[number, number]): GlslLibRoutine {\r\n    const packedTexShape = [texShape[0], texShape[1]];\r\n    const
texelsInLogicalRow = Math.ceil(shape[2] / 2);\r\n    const texelsInBatch = texelsInLogicalRow * Math.ceil(shape[1]
/ 2);\r\n    const source = `\r\n        ivec3 getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                              vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n          int index = resTexRC.y *
${packedTexShape[0]} + resTexRC.x;\r\n\r\n          int b = index / ${texelsInBatch};\r\n          index -= b *
${texelsInBatch};\r\n\r\n          // reverse r and c order for packed texture\r\n          int r = imod(index,
${texelsInLogicalRow}) * 2;\r\n          int c = 2 * (index / ${texelsInLogicalRow});\r\n\r\n          return ivec3(b, r,
c);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * ND packed output
coordinates.\r\n   */\r\n  protected getOutputPackedNDCoords(shape: readonly number[], texShape: [number,
number]): GlslLibRoutine {\r\n    const packedTexShape = [texShape[0], texShape[1]];\r\n\r\n    const
texelsInLogicalRow = Math.ceil(shape[shape.length - 1] / 2);\r\n    const texelsInBatch = texelsInLogicalRow *
Math.ceil(shape[shape.length - 2] / 2);\r\n    let texelsInBatchN = texelsInBatch;\r\n    let batches = '';\r\n    let coords
= 'b, r, c';\r\n\r\n    for (let b = 2; b < shape.length - 1; b++) {\r\n      texelsInBatchN *= shape[shape.length - b -
1];\r\n      batches = `\r\n      int b${b} = index / ${texelsInBatchN};\r\n      index -= b${b} * ${texelsInBatchN};\r\n
 ` + batches;\r\n      coords = `b${b}, ` + coords;\r\n    }\r\n    const source = `\r\n      ivec${shape.length}
getOutputCoords() {\r\n        ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n        int index = resTexRC.y * ${packedTexShape[0]} +
resTexRC.x;\r\n\r\n        ${batches}\r\n\r\n        int b = index / ${texelsInBatch};\r\n        index -= b *
${texelsInBatch};\r\n\r\n        // reverse r and c order for packed texture\r\n        int r = imod(index,
${texelsInLogicalRow}) * 2;\r\n        int c = 2 * (index / ${texelsInLogicalRow});\r\n\r\n        return
ivec${shape.length}(${coords});\r\n      }\r\n    `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   *
Unpacked 1D output coordinates.\r\n   */\r\n  protected getOutputUnpacked1DCoords(shape: [number], texShape:
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[number, number]): GlslLibRoutine {\r\n    const source = `\r\n        int getOutputCoords() {\r\n          ivec2
resTexRC = ivec2(TexCoords.xy *\r\n                              vec2(${texShape[0]}, ${texShape[1]}));\r\n          return
resTexRC.y * ${texShape[0]} + resTexRC.x;\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n
}\r\n\r\n  /**\r\n   * Unpacked 2D output coordinates.\r\n   */\r\n  protected getOutputUnpacked2DCoords(shape:
[number, number], texShape: [number, number]): GlslLibRoutine {\r\n    const source = `\r\n      ivec2
getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
vec2(${texShape[0]}, ${texShape[1]}));\r\n          int index = resTexRC.y * ${texShape[0]} + resTexRC.x;\r\n
int r = index / ${shape[1]};\r\n          int c = index - r * ${shape[1]};\r\n          return ivec2(r, c);\r\n        }\r\n
`;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 3D output coordinates.\r\n   */\r\n
protected getOutputUnpacked3DCoords(shape: [number, number, number], texShape: [number, number]):
GlslLibRoutine {\r\n    let source = '';\r\n    const rank = shape.length;\r\n\r\n    let strides = null;\r\n    if (rank < 2)
{\r\n      strides = [];\r\n    }\r\n\r\n    strides = new Array(rank - 1);\r\n    strides[rank - 2] = shape[rank - 1];\r\n    for
(let i = rank - 3; i >= 0; --i) {\r\n      strides[i] = strides[i + 1] * shape[i + 1];\r\n    }\r\n    const coordsToCompute =
['r', 'c', 'd'];\r\n    const coordsFromIndexSnippet =\r\n        strides\r\n            .map((stride, i) => {\r\n              const
line1 = `int ${coordsToCompute[i]} = index / ${stride}`;\r\n              const line2 = i === strides.length - 1 ?\r\n
      `int ${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} * ${stride}` :\r\n                  `index -=
${coordsToCompute[i]} * ${stride}`;\r\n              return `${line1}; ${line2};`;\r\n            })\r\n
.join('');\r\n\r\n    source = `\r\n        ivec3 getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                              vec2(${texShape[0]}, ${texShape[1]}));\r\n          int index = resTexRC.y * ${texShape[0]} +
resTexRC.x;\r\n          ${coordsFromIndexSnippet}\r\n          return ivec3(r, c, d);\r\n        }\r\n      `;\r\n    return new
GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 4D output coordinates.\r\n   */\r\n  protected
getOutputUnpacked4DCoords(shape: [number, number, number, number], texShape: [number, number]):\r\n
GlslLibRoutine {\r\n    let source = '';\r\n    const rank = shape.length;\r\n\r\n    let strides = null;\r\n    if (rank < 2)
{\r\n      strides = [];\r\n    }\r\n\r\n    strides = new Array(rank - 1);\r\n    strides[rank - 2] = shape[rank - 1];\r\n    for
(let i = rank - 3; i >= 0; --i) {\r\n      strides[i] = strides[i + 1] * shape[i + 1];\r\n    }\r\n    const coordsToCompute =
['r', 'c', 'd', 'd2'];\r\n    const coordsFromIndexSnippet =\r\n        strides\r\n            .map((stride, i) => {\r\n
const line1 = `int ${coordsToCompute[i]} = index / ${stride}`;\r\n              const line2 = i === strides.length - 1
?\r\n                  `int ${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} * ${stride}` :\r\n
`index -= ${coordsToCompute[i]} * ${stride}`;\r\n              return `${line1}; ${line2};`;\r\n            })\r\n
.join('');\r\n\r\n    source = `\r\n      ivec4 getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                              vec2(${texShape[0]}, ${texShape[1]}));\r\n          int index = resTexRC.y * ${texShape[0]} +
resTexRC.x;\r\n          ${coordsFromIndexSnippet}\r\n          return ivec4(r, c, d, d2);\r\n        }\r\n      `;\r\n    return
new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 5D output coordinates.\r\n   */\r\n  protected
getOutputUnpacked5DCoords(shape: [number, number, number, number, number], texShape: [number,
number]):\r\n      GlslLibRoutine {\r\n    let source = '';\r\n    const rank = shape.length;\r\n\r\n    let strides = null;\r\n
  if (rank < 2) {\r\n      strides = [];\r\n    }\r\n\r\n    strides = new Array(rank - 1);\r\n    strides[rank - 2] = shape[rank
- 1];\r\n    for (let i = rank - 3; i >= 0; --i) {\r\n      strides[i] = strides[i + 1] * shape[i + 1];\r\n    }\r\n    const
coordsToCompute = ['r', 'c', 'd', 'd2', 'd3'];\r\n    const coordsFromIndexSnippet =\r\n        strides\r\n
.map((stride, i) => {\r\n              const line1 = `int ${coordsToCompute[i]} = index / ${stride}`;\r\n              const
line2 = i === strides.length - 1 ?\r\n                  `int ${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} *
${stride}` :\r\n                  `index -= ${coordsToCompute[i]} * ${stride}`;\r\n              return `${line1};
${line2};`;\r\n            })\r\n            .join('');\r\n\r\n    source = `\r\n      ivec5 getOutputCoords() {\r\n          ivec2
resTexRC = ivec2(TexCoords.xy *\r\n                              vec2(${texShape[0]}, ${texShape[1]}));\r\n          int
index = resTexRC.y * ${texShape[0]} + resTexRC.x;\r\n          ${coordsFromIndexSnippet}\r\n          return ivec5(r,
c, d, d2, d3);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 6D
output coordinates.\r\n   */\r\n  protected getOutputUnpacked6DCoords(shape: [number, number, number, number,
number, number], texShape: [\r\n    number, number\r\n  ]): GlslLibRoutine {\r\n    let source = '';\r\n    const rank =
shape.length;\r\n\r\n    let strides = null;\r\n    if (rank < 2) {\r\n      strides = [];\r\n    }\r\n\r\n    strides = new
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Array(rank - 1);\r\n    strides[rank - 2] = shape[rank - 1];\r\n    for (let i = rank - 3; i >= 0; --i) {\r\n      strides[i] =
strides[i + 1] * shape[i + 1];\r\n    }\r\n    const coordsToCompute = ['r', 'c', 'd', 'd2', 'd3', 'd4'];\r\n    const
coordsFromIndexSnippet =\r\n        strides\r\n            .map((stride, i) => {\r\n              const line1 = `int
${coordsToCompute[i]} = index / ${stride}`;\r\n              const line2 = i === strides.length - 1 ?\r\n                  `int
${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} * ${stride}` :\r\n                  `index -=
${coordsToCompute[i]} * ${stride}`;\r\n              return `${line1}; ${line2};`;\r\n            })\r\n
.join('');\r\n\r\n    source = `\r\n      ivec6 getOutputCoords() {\r\n        ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                      vec2(${texShape[0]}, ${texShape[1]}));\r\n        int index = resTexRC.y * ${texShape[0]} +
resTexRC.x;\r\n        ${coordsFromIndexSnippet}\r\n        return ivec6(r, c, d, d2, d3, d4);\r\n      }\r\n    `;\r\n
return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Generates code for common UV coords computation
utility functions.\r\n   */\r\n  protected getCommonUtilFuncs(): {[name: string]: GlslLibRoutine} {\r\n    const
result: {[name: string]: GlslLibRoutine} = {};\r\n    let funcName = 'uvFromFlat';\r\n    result[funcName] = new
GlslLibRoutine(`\r\n    vec2 uvFromFlat(int texNumR, int texNumC, int index) {\r\n      int texC = index /
texNumR;\r\n      int texR = index - texC * texNumR;\r\n      // TODO: swap texR, texC order in following function
so row is corresponding to u and column is corresponding to\r\n      //       v.\r\n      return (vec2(texR, texC) +
halfCR) / vec2(texNumR, texNumC);\r\n    }\r\n    `);\r\n    funcName = 'packedUVfrom1D';\r\n    result[funcName]
= new GlslLibRoutine(`\r\n      vec2 packedUVfrom1D(int texNumR, int texNumC, int index) {\r\n        int
texelIndex = index / 2;\r\n        int texR = texelIndex / texNumC;\r\n        int texC = texelIndex - texR *
texNumC;\r\n        return (vec2(texC, texR) + halfCR) / vec2(texNumC, texNumR);\r\n      }\r\n      `);\r\n
funcName = 'packedUVfrom2D';\r\n    result[funcName] = new GlslLibRoutine(`\r\n      vec2 packedUVfrom2D(int
texNumR, int texNumC, int texelsInLogicalRow, int row, int col) {\r\n        int texelIndex = (row / 2) *
texelsInLogicalRow + (col / 2);\r\n        int texR = texelIndex / texNumC;\r\n        int texC = texelIndex - texR *
texNumC;\r\n        return (vec2(texC, texR) + halfCR) / vec2(texNumC, texNumR);\r\n      }\r\n      `);\r\n
funcName = 'packedUVfrom3D';\r\n    result[funcName] = new GlslLibRoutine(`\r\n      vec2 packedUVfrom3D(int
texNumR, int texNumC,\r\n          int texelsInBatch, int texelsInLogicalRow, int b,\r\n          int row, int col) {\r\n
int index = b * texelsInBatch + (row / 2) * texelsInLogicalRow + (col / 2);\r\n        int texR = index / texNumC;\r\n
  int texC = index - texR * texNumC;\r\n        return (vec2(texC, texR) + halfCR) / vec2(texNumC, texNumR);\r\n
 }\r\n      `);\r\n    funcName = 'sampleTexture';\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n
result[funcName] = new GlslLibRoutine(`\r\n        float sampleTexture(sampler2D textureSampler, vec2 uv) {\r\n
    return ${glsl.texture2D}(textureSampler, uv).r;\r\n        }`);\r\n    return result;\r\n  }\r\n\r\n  /**\r\n   *
Constructing snippets for inputs\r\n   */\r\n  protected getInputsSamplingSnippets(): {[name: string]:
GlslLibRoutine} {\r\n    const result: {[name: string]: GlslLibRoutine} = {};\r\n    const outputLayout =
this.context.outputTextureLayout;\r\n    this.context.programInfo.inputNames.forEach((samplerName, i) => {\r\n
const inputLayout = this.context.inputTextureLayouts[i];\r\n      const funcName =
generateShaderFuncNameFromInputSamplerName(samplerName);\r\n      if (inputLayout.isPacked) {\r\n
result[funcName] = this.getPackedSamplerFromInput(funcName, samplerName, inputLayout);\r\n      } else {\r\n
 result[funcName] = this.getUnpackedSamplerFromInput(funcName, samplerName, inputLayout);\r\n      }\r\n\r\n
const outCoordFuncName = generateShaderFuncNameFromInputSamplerNameAtOutCoords(samplerName);\r\n
if (inputLayout.unpackedShape.length <= outputLayout.unpackedShape.length) {\r\n        if (inputLayout.isPacked)
{\r\n          result[outCoordFuncName] =\r\n              this.getPackedSamplerAtOutputCoords(outCoordFuncName,
inputLayout, outputLayout, samplerName);\r\n        } else {\r\n          result[outCoordFuncName] =\r\n
this.getUnpackedSamplerAtOutputCoords(outCoordFuncName, inputLayout, outputLayout, samplerName);\r\n
}\r\n      }\r\n    });\r\n\r\n    return result;\r\n  }\r\n\r\n  /**\r\n   * Constructing snippets for output coordinates of
samplers\r\n   */\r\n  protected getPackedSamplerAtOutputCoords(\r\n      funcName: string, inputLayout:
TextureLayout, outputLayout: TextureLayout, name: string): GlslLibRoutine {\r\n    const inShape =
inputLayout.unpackedShape;\r\n    const outShape = outputLayout.unpackedShape;\r\n    const texName = name;\r\n
  const texFuncSnippet = generateShaderFuncNameFromInputSamplerName(texName);\r\n\r\n    const inRank =
inShape.length;\r\n    const outRank = outShape.length;\r\n\r\n    const broadcastDims =
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BroadcastUtil.getBroadcastDims(inShape, outShape);\r\n\r\n    const type = getCoordsDataType(outRank);\r\n
const rankDiff = outRank - inRank;\r\n    let coordsSnippet: string;\r\n    const fields = getGlChannels();\r\n\r\n    if
(inRank === 0) {\r\n      coordsSnippet = '';\r\n    } else if (outRank < 2 && broadcastDims.length >= 1) {\r\n
coordsSnippet = 'coords = 0;';\r\n    } else {\r\n      coordsSnippet = broadcastDims.map(d => `coords.${fields[d +
rankDiff]} = 0;`).join('\\n');\r\n    }\r\n    let unpackedCoordsSnippet = '';\r\n    if (outRank < 2 && inRank > 0) {\r\n
   unpackedCoordsSnippet = 'coords';\r\n    } else {\r\n      unpackedCoordsSnippet = inShape.map((s, i) =>
`coords.${fields[i + rankDiff]}`).join(', ');\r\n    }\r\n\r\n    let output = 'return outputValue;';\r\n    const inSize =
ShapeUtil.size(inShape);\r\n    const isInputScalar = inSize === 1;\r\n    const outSize =
ShapeUtil.size(outShape);\r\n    const isOutputScalar = outSize === 1;\r\n\r\n    if (inRank === 1 && !isInputScalar
&& !isOutputScalar) {\r\n      output = `\r\n        return vec4(outputValue.xy, outputValue.xy);\r\n      `;\r\n    } else if
(isInputScalar && !isOutputScalar) {\r\n      if (outRank === 1) {\r\n        output = `\r\n          return
vec4(outputValue.x, outputValue.x, 0., 0.);\r\n        `;\r\n      } else {\r\n        output = `\r\n          return
vec4(outputValue.x);\r\n        `;\r\n      }\r\n    } else if (broadcastDims.length) {\r\n      const rows = inRank - 2;\r\n
 const cols = inRank - 1;\r\n\r\n      if (broadcastDims.indexOf(rows) > -1 && broadcastDims.indexOf(cols) > -1)
{\r\n        output = 'return vec4(outputValue.x);';\r\n      } else if (broadcastDims.indexOf(rows) > -1) {\r\n
output = 'return vec4(outputValue.x, outputValue.y, ' +\r\n            'outputValue.x, outputValue.y);';\r\n      } else if
(broadcastDims.indexOf(cols) > -1) {\r\n        output = 'return vec4(outputValue.xx, outputValue.zz);';\r\n      }\r\n
}\r\n\r\n    const swapLastDimsSnippet = `\r\n        int lastDim = coords.${fields[outRank - 1]};\r\n
coords.${fields[outRank - 1]} = coords.${fields[outRank - 2]};\r\n        coords.${fields[outRank - 2]} = lastDim;\r\n
    `;\r\n    const source = `\r\n      vec4 ${funcName}() {\r\n        ${type} coords = getOutputCoords();\r\n
${swapLastDimsSnippet}\r\n        ${coordsSnippet}\r\n        vec4 outputValue =
${texFuncSnippet}(${unpackedCoordsSnippet});\r\n        ${output}\r\n      }\r\n    `;\r\n    return new
GlslLibRoutine(source, ['coordinates.getOutputCoords']);\r\n  }\r\n\r\n  /**\r\n   * Constructing snippets for
unpacked output coordinates of samplers\r\n   */\r\n  protected getUnpackedSamplerAtOutputCoords(\r\n
funcName: string, inputLayout: TextureLayout, outputLayout: TextureLayout, name: string): GlslLibRoutine {\r\n
const outTexShape = [outputLayout.width, outputLayout.height];\r\n    const inTexShape = [inputLayout.width,
inputLayout.height];\r\n    const inRank = inputLayout.unpackedShape.length;\r\n    const outRank =
outputLayout.unpackedShape.length;\r\n    const inShape = inputLayout.unpackedShape;\r\n    const outShape =
outputLayout.unpackedShape;\r\n    const texFuncSnippet =
generateShaderFuncNameFromInputSamplerName(name);\r\n\r\n    if (inRank === outRank &&
ArrayUtil.arraysEqual(inTexShape, outTexShape)) {\r\n      const source = `\r\n          float ${funcName}() {\r\n
   return sampleTexture(${name}, TexCoords);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source,
['coordinates.sampleTexture']);\r\n    }\r\n\r\n    const type = getCoordsDataType(outRank);\r\n    const
broadcastDims = BroadcastUtil.getBroadcastDims(inShape, outShape);\r\n    const rankDiff = outRank - inRank;\r\n
  let coordsSnippet: string;\r\n    const fields = getGlChannels();\r\n\r\n    if (inRank === 0) {\r\n      coordsSnippet =
'';\r\n    } else if (outRank < 2 && broadcastDims.length >= 1) {\r\n      coordsSnippet = 'coords = 0;';\r\n    } else
{\r\n      coordsSnippet = broadcastDims.map(d => `coords.${fields[d + rankDiff]} = 0;`).join('\\n');\r\n    }\r\n    let
unpackedCoordsSnippet = '';\r\n    if (outRank < 2 && inRank > 0) {\r\n      unpackedCoordsSnippet = 'coords';\r\n
} else {\r\n      unpackedCoordsSnippet = inputLayout.unpackedShape.map((s, i) => `coords.${fields[i +
rankDiff]}`).join(', ');\r\n    }\r\n    const source = `\r\n        float ${funcName}() {\r\n          ${type} coords =
getOutputCoords();\r\n          ${coordsSnippet}\r\n          return ${texFuncSnippet}(${unpackedCoordsSnippet});\r\n
      }\r\n      `;\r\n    return new GlslLibRoutine(source, ['coordinates.getOutputCoords']);\r\n  }\r\n\r\n  /**\r\n   *
Constructing snippets for packed operations.\r\n   */\r\n  protected getPackedSamplerFromInput(funcName: string,
name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    switch (inputLayout.unpackedShape.length)
{\r\n      case 0:\r\n        return this.getPackedSamplerScalar(funcName, name);\r\n      case 1:\r\n        return
this.getPackedSampler1D(funcName, name, inputLayout);\r\n      case 2:\r\n        return
this.getPackedSampler2D(funcName, name, inputLayout);\r\n      case 3:\r\n        return
this.getPackedSampler3D(funcName, name, inputLayout);\r\n      default:\r\n        return
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this.getPackedSamplerND(funcName, name, inputLayout);\r\n   }\r\n }\r\n\r\n /**\r\n   * Constructing snippets for unpacked operations.\r\n   */\r\n protected getUnpackedSamplerFromInput(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n   const shape = inputLayout.unpackedShape;\r\n   switch (shape.length) {\r\n   case 0:\r\n   return this.getUnpackedSamplerScalar(funcName, name, inputLayout);\r\n   case 1:\r\n   return this.getUnpackedSampler1D(funcName, name, inputLayout);\r\n   case 2:\r\n   return this.getUnpackedSampler2D(funcName, name, inputLayout);\r\n   case 3:\r\n   return this.getUnpackedSampler3D(funcName, name, inputLayout);\r\n   case 4:\r\n   return this.getUnpackedSampler4D(funcName, name, inputLayout);\r\n   case 5:\r\n   return this.getUnpackedSampler5D(funcName, name, inputLayout);\r\n   case 6:\r\n   return this.getUnpackedSampler6D(funcName, name, inputLayout);\r\n   default:\r\n   // TODO support more dimensionalities\r\n   throw new Error(`Unsupported dimension ${shape.length}-D`);\r\n   }\r\n }\r\n\r\n /**\r\n   * Packed scalar snippet.\r\n   */\r\n protected getPackedSamplerScalar(funcName: string, name: string): GlslLibRoutine {\r\n   const glsl = getGlsl(this.context.glContext.version);\r\n   const source = `\r\n          vec4 ${funcName}() {\r\n            return ${glsl.texture2D}(${name}, halfCR);\r\n          }\r\n        `;\r\n   return new GlslLibRoutine(source);\r\n }\r\n\r\n /**\r\n   * Packed 1D snippet.\r\n   */\r\n protected getPackedSampler1D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n   const texShape = [inputLayout.width, inputLayout.height];\r\n   const packedTexShape = [texShape[1], texShape[0]];\r\n   const glsl = getGlsl(this.context.glContext.version);\r\n\r\n   const packedSampler = `vec4 ${funcName}(int index) {\r\n      vec2 uv = packedUVfrom1D(\r\n      ${packedTexShape[0]}, ${packedTexShape[1]}, index);\r\n      return ${glsl.texture2D}(${name}, uv);\r\n    }`;\r\n   const source = packedSampler;\r\n   return new GlslLibRoutine(source, ['coordinates.packedUVfrom1D']);\r\n }\r\n\r\n /**\r\n   * Packed 2D snippet.\r\n   */\r\n protected getPackedSampler2D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n   const shape = inputLayout.unpackedShape;\r\n   const texShape = [inputLayout.width, inputLayout.height];\r\n   const glsl = getGlsl(this.context.glContext.version);\r\n   const texNumR = texShape[0];\r\n   const texNumC = texShape[1];\r\n\r\n   if (texShape != null && ArrayUtil.arraysEqual(shape, texShape)) {\r\n   const packedSampler = `vec4 ${funcName}(int row, int col) {\r\n        vec2 uv = (vec2(col, row) + halfCR) / vec2(${texNumC}.0, ${texNumR}.0);\r\n        return ${glsl.texture2D}(${name}, uv);\r\n      }`;\r\n\r\n   return new GlslLibRoutine(packedSampler);\r\n   }\r\n   const packedTexShape = texShape;\r\n   const valuesPerRow = Math.ceil(shape[1] / 2);\r\n   const packedSampler = `vec4 ${funcName}(int row, int col) {\r\n      vec2 uv = packedUVfrom2D(${packedTexShape[1]}, ${packedTexShape[0]}, ${valuesPerRow}, row, col);\r\n      return ${glsl.texture2D}(${name}, uv);\r\n    }`;\r\n   const source = packedSampler;\r\n   return new GlslLibRoutine(source, ['coordinates.packedUVfrom2D']);\r\n }\r\n\r\n /**\r\n   * Packed 3D snippet.\r\n   */\r\n protected getPackedSampler3D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n   const shape = inputLayout.unpackedShape;\r\n   const texShape = [inputLayout.width, inputLayout.height];\r\n   const packedTexShape = [texShape[0], texShape[1]];\r\n   const glsl = getGlsl(this.context.glContext.version);\r\n\r\n   if (shape[0] === 1) {\r\n   const squeezedShape = shape.slice(1);\r\n   const keptDims = [1, 2];\r\n   const newInputShape = squeezeInputShape(shape, squeezedShape);\r\n   const params = ['b', 'row', 'col'];\r\n   // Deep copy of input texture layout.\r\n   const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n   newInputLayout.unpackedShape = newInputShape;\r\n   const samplerRoutine = this.getPackedSamplerFromInput(funcName, name, newInputLayout);\r\n   const packedSampler = `${samplerRoutine.routineBody}\r\n      vec4 ${funcName}(int b, int row, int col) {\r\n        return ${funcName}(${getSqueezedParams(params, keptDims)});\r\n      } `;\r\n   const source = packedSampler;\r\n   return new GlslLibRoutine(source, samplerRoutine.dependencies);\r\n   }\r\n   const texNumR = packedTexShape[0];\r\n   const texNumC = packedTexShape[1];\r\n\r\n   const valuesPerRow = Math.ceil(shape[2] / 2);\r\n   const texelsInBatch = valuesPerRow * Math.ceil(shape[1] / 2);\r\n\r\n   const packedSampler = `vec4 ${funcName}(int b, int row, int col) {\r\n   vec2 uv = packedUVfrom3D(\r\n ${texNumC}, ${texNumR}, ${texelsInBatch}, ${valuesPerRow}, b, row, col);\r\n   return

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${glsl.texture2D}(${name}, uv);}`;\r\n    const source = packedSampler;\r\n    return new GlslLibRoutine(source,
['coordinates.packedUVfrom3D']);\r\n  }\r\n  /*\r\n   * Packed ND snippet.\r\n   */\r\n  protected
getPackedSamplerND(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    const
shape = inputLayout.unpackedShape;\r\n    const rank = shape.length;\r\n    const texShape = [inputLayout.width,
inputLayout.height];\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n\r\n    const packedTexShape =
[texShape[0], texShape[1]];\r\n    const texNumR = packedTexShape[1];\r\n    const texNumC =
packedTexShape[0];\r\n    const valuesPerRow = Math.ceil(shape[rank - 1] / 2);\r\n    let texelsInBatch =
valuesPerRow * Math.ceil(shape[rank - 2] / 2);\r\n    let params = 'int b, int row, int col';\r\n    let index = `b *
${texelsInBatch} + (row / 2) * ${valuesPerRow} + (col / 2)`;\r\n    for (let b = 2; b < rank - 1; b++) {\r\n      params
= `int b${b}, ` + params;\r\n      texelsInBatch *= shape[rank - b - 1];\r\n      index = `b${b} * ${texelsInBatch} + ` +
index;\r\n    }\r\n    const packedSampler = `vec4 ${funcName}(${params}) {\r\n      int index = ${index};\r\n      int
texR = index / ${texNumC};\r\n      int texC = index - texR * ${texNumC};\r\n      vec2 uv = (vec2(texC, texR) +
halfCR) / vec2(${texNumC}, ${texNumR});\r\n      return ${glsl.texture2D}(${name}, uv);\r\n    }`;\r\n    const
source = packedSampler;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked scalar
snippet.\r\n   */\r\n  protected getUnpackedSamplerScalar(funcName: string, name: string, inputLayout:
TextureLayout): GlslLibRoutine {\r\n    const [texNumR, texNumC] = [inputLayout.width, inputLayout.height];\r\n
 if (texNumR === 1 && texNumC === 1) {\r\n      const source = `\r\n          float ${funcName}() {\r\n            return
sampleTexture(${name}, halfCR);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source,
['coordinates.sampleTexture']);\r\n    }\r\n\r\n    const source = `\r\n        float ${funcName}() {\r\n          int
offset_${name} = coordsToOffset(TexCoords, ${texNumR}, ${texNumC});\r\n          vec2 uv =
uvFromFlat(${texNumR}, ${texNumC}, offset_${name});\r\n          return sampleTexture(${name}, uv);\r\n
}\r\n      `;\r\n    return new GlslLibRoutine(\r\n        source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture',
'coordinates.coordsToOffset']);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 1D snippet.\r\n   */\r\n  protected
getUnpackedSampler1D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    const
tNumR = inputLayout.width;\r\n    const tNumC = inputLayout.height;\r\n\r\n    if (tNumC === 1 && tNumR ===
1) {\r\n      const source = `\r\n        float ${funcName}(int index) {\r\n          return sampleTexture(${name},
halfCR);\r\n        }\r\n      `;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n\r\n
if (tNumC === 1) {\r\n      const source = `\r\n          float ${funcName}(int index) {\r\n            vec2 uv =
vec2((float(index) + 0.5) / ${tNumR}.0, 0.5);\r\n            return sampleTexture(${name}, uv);\r\n          }\r\n
`;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n    if (tNumR === 1) {\r\n
const source = `\r\n          float ${funcName}(int index) {\r\n            vec2 uv = vec2(0.5, (float(index) + 0.5) /
${tNumC}.0);\r\n            return sampleTexture(${name}, uv);\r\n          }\r\n        `;\r\n      return new
GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n    const source = `\r\n        float ${funcName}(int
index) {\r\n          vec2 uv = uvFromFlat(${tNumR}, ${tNumC}, index);\r\n          return sampleTexture(${name},
uv);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source, ['coordinates.uvFromFlat',
'coordinates.sampleTexture']);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 2D snippet.\r\n   */\r\n\r\n  protected
getUnpackedSampler2D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    const
shape = inputLayout.unpackedShape;\r\n\r\n    // TODO: modify row/col order for other dimensions.\r\n    const
texShape = [inputLayout.height, inputLayout.width];\r\n\r\n    if (texShape != null && ArrayUtil.arraysEqual(shape,
texShape)) {\r\n      const texNumR = texShape[1];\r\n      const texNumC = texShape[0];\r\n      const source = `\r\n
      float ${funcName}(int row, int col) {\r\n            vec2 uv = (vec2(row, col) + halfCR) / vec2(${texNumR}.0,
${texNumC}.0);\r\n            return sampleTexture(${name}, uv);\r\n          }\r\n        `;\r\n      return new
GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n\r\n    const {newShape, keptDims} =
squeezeShape(shape as number[]);\r\n    const squeezedShape = newShape;\r\n    if (squeezedShape.length <
shape.length) {\r\n      const newInputShape = squeezeInputShape(shape, squeezedShape);\r\n      // Deep copy of
input texture layout.\r\n      const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
  newInputLayout.unpackedShape = newInputShape;\r\n\r\n      const params = ['col', 'row'];\r\n      const source =
`\r\n          ${this.getUnpackedSamplerFromInput(funcName, name, newInputLayout).routineBody}\r\n          float
```

${funcName}(int row, int col) {\r\n return ${funcName}(${getSqueezedParams(params, keptDims)});\r\n }\r\n `;\r\n return new GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n }\r\n\r\n const texNumR = texShape[1];\r\n const texNumC = texShape[0];\r\n if (texNumC === 1) {\r\n const source = `\r\n float ${funcName}(int row, int col) {\r\n int offset_${name} = coordsToOffset(TexCoords, ${texNumR}, ${texNumC});\r\n float index = dot(vec3(row, col, offset_${name}), vec3(${shape[1]}, 1, 1));\r\n vec2 uv = vec2(0.5, (index + 0.5) / ${texNumR}.0);\r\n return sampleTexture(${name}, uv);\r\n }\r\n `;\r\n return new GlslLibRoutine(source, ['coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n }\r\n\r\n if (texNumR === 1) {\r\n const source = `\r\n float ${funcName}(int row, int col) {\r\n int offset_${name} = coordsToOffset(TexCoords, ${texNumR}, ${texNumC});\r\n float index = dot(vec3(row, col, offset_${name}), vec3(${shape[1]}, 1, 1));\r\n vec2 uv = vec2((index + 0.5) / ${texNumC}.0, 0.5);\r\n return sampleTexture(${name}, uv);\r\n }\r\n `;\r\n return new GlslLibRoutine(source, ['coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n }\r\n\r\n const source = `\r\n float ${funcName}(int row, int col) {\r\n int index = col * ${shape[1]} + row;\r\n vec2 uv = uvFromFlat(${texNumR}, ${texNumC}, index);\r\n return sampleTexture(${name}, uv);\r\n }\r\n `;\r\n return new GlslLibRoutine(\r\n source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n }\r\n\r\n /**\r\n * Unpacked 3D snippet.\r\n */\r\n\r\n protected getUnpackedSampler3D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n const shape = inputLayout.unpackedShape;\r\n const stride0 = shape[1] * shape[2];\r\n const stride1 = shape[2];\r\n\r\n const {newShape, keptDims} = squeezeShape(shape as number[]);\r\n const squeezedShape = newShape;\r\n if (squeezedShape.length < shape.length) {\r\n const newInputShape = squeezeInputShape(shape, squeezedShape);\r\n const params = ['batch', 'col', 'row'];\r\n // Deep copy of input texture layout.\r\n const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n newInputLayout.unpackedShape = newInputShape;\r\n const routine = this.getUnpackedSamplerFromInput(funcName, name, newInputLayout);\r\n // TODO: revisit the logic here to make it simpler\r\n const revDims = keptDims.reverse();\r\n const source = `\r\n ${routine.routineBody}\r\n float ${funcName}(int batch, int row, int col) {\r\n return ${funcName}(${getSqueezedParams(params, revDims)});\r\n }\r\n `;\r\n return new GlslLibRoutine(source, routine.dependencies);\r\n }\r\n\r\n const texNumR = inputLayout.width;\r\n const texNumC = inputLayout.height;\r\n const source = `\r\n float ${funcName}(int depth, int row, int col) {\r\n // Explicitly use integer operations as dot() only works on floats.\r\n int index = depth * ${stride0} + col * ${stride1} + row;\r\n vec2 uv = uvFromFlat(${texNumR}, ${texNumC}, index);\r\n return sampleTexture(${name}, uv);\r\n }\r\n `;\r\n return new GlslLibRoutine(\r\n source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n }\r\n\r\n /**\r\n * Unpacked 4D snippet.\r\n */\r\n\r\n protected getUnpackedSampler4D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n const shape = inputLayout.unpackedShape;\r\n const stride2 = shape[3];\r\n const stride1 = shape[2] * stride2;\r\n const stride0 = shape[1] * stride1;\r\n\r\n //\r\n // TODO: re-enable this shortcut once the index calculation bug is fixed.\r\n //\r\n // const {newShape, keptDims} = squeezeShape(shape as number[]);\r\n // if (newShape.length < shape.length) {\r\n // const newInputShape = squeezeInputShape(shape, newShape);\r\n // const params = ['row', 'col', 'depth', 'depth2'];\r\n // // Deep copy of input texture layout.\r\n // const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n // newInputLayout.unpackedShape = newInputShape;\r\n // const source = `\r\n // ${this.getUnpackedSamplerFromInput(funcName, name, newInputLayout).routineBody}\r\n // float ${funcName}(int row, int col, int depth, int depth2) {\r\n // return ${funcName}(${getSqueezedParams(params, keptDims)});\r\n // }\r\n // `;\r\n // return new GlslLibRoutine(\r\n // source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n // }\r\n\r\n const texNumR = inputLayout.width;\r\n const texNumC = inputLayout.height;\r\n const source = `\r\n float ${funcName}(int row, int col, int depth, int depth2) {\r\n int index = row * ${stride0} + col * ${stride1} +\r\n depth2 * ${stride2} + depth;\r\n vec2 uv =

```
uvFromFlat(${texNumR}, ${texNumC}, index);\r\n        return sampleTexture(${name}, uv);\r\n      }\r\n
`;\r\n    return new GlslLibRoutine(source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture']);\r\n  }\r\n\r\n
/**\r\n   * Unpacked 5D snippet.\r\n   */\r\n  protected getUnpackedSampler5D(funcName: string, name: string,
inputLayout: TextureLayout): GlslLibRoutine {\r\n    const shape = inputLayout.unpackedShape;\r\n    const stride3
= shape[4];\r\n    const stride2 = shape[3] * stride3;\r\n    const stride1 = shape[2] * stride2;\r\n    const stride0 =
shape[1] * stride1;\r\n\r\n    const {newShape, keptDims} = squeezeShape(shape as number[]);\r\n    if
(newShape.length < shape.length) {\r\n      const newInputShape = squeezeInputShape(shape, newShape);\r\n
const params = ['row', 'col', 'depth', 'depth2', 'depth3'];\r\n      // Deep copy of input texture layout.\r\n      const
newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
newInputLayout.unpackedShape = newInputShape;\r\n\r\n      const source = `\r\n
${this.getUnpackedSamplerFromInput(funcName, name, newInputLayout).routineBody}\r\n          float
${funcName}(int row, int col, int depth, int depth2, int depth3) {\r\n            return
${funcName}(${getSqueezedParams(params, keptDims)});\r\n          }\r\n        `;\r\n      return new
GlslLibRoutine(source, ['coordinates.sampleTexture', 'coordinates.uvFromFlat']);\r\n    }\r\n\r\n    const texNumR =
inputLayout.width;\r\n    const texNumC = inputLayout.height;\r\n    const source = `\r\n        float ${funcName}(int
row, int col, int depth, int depth2, int depth3) {\r\n          int index = row * ${stride0} + col * ${stride1} + depth *
${stride2} +\r\n          depth3 * ${stride3} + depth2;\r\n          vec2 uv = uvFromFlat(${texNumR}, ${texNumC},
index);\r\n          return sampleTexture(${name}, uv);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source,
['coordinates.sampleTexture', 'coordinates.uvFromFlat']);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 6D snippet.\r\n   */\r\n
protected getUnpackedSampler6D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine
{\r\n    const shape = inputLayout.unpackedShape;\r\n    const stride4 = shape[5];\r\n    const stride3 = shape[4] *
stride4;\r\n    const stride2 = shape[3] * stride3;\r\n    const stride1 = shape[2] * stride2;\r\n    const stride0 =
shape[1] * stride1;\r\n\r\n    const {newShape, keptDims} = squeezeShape(shape as number[]);\r\n    if
(newShape.length < shape.length) {\r\n      const newInputShape = squeezeInputShape(shape, newShape);\r\n
const params = ['row', 'col', 'depth', 'depth2', 'depth3', 'depth4'];\r\n      // Deep copy of input texture layout.\r\n
const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
newInputLayout.unpackedShape = newInputShape;\r\n\r\n      const source = `\r\n
${this.getUnpackedSamplerFromInput(funcName, name, newInputLayout).routineBody}\r\n            float
${funcName}(int row, int col, int depth,\r\n              int depth2, int depth3, int depth4) {\r\n              return
${funcName}(${getSqueezedParams(params, keptDims)});\r\n            }\r\n          `;\r\n      return new
GlslLibRoutine(source, ['coordinates.sampleTexture', 'coordinates.uvFromFlat']);\r\n    }\r\n\r\n    const texNumR =
inputLayout.width;\r\n    const texNumC = inputLayout.height;\r\n    const source = `\r\n          float
${funcName}(int row, int col, int depth,\r\n            int depth2, int depth3, int depth4) {\r\n            int index = row *
${stride0} + col * ${stride1} + depth * ${stride2} +\r\n            depth2 * ${stride3} + depth3 * ${stride4} +
depth4;\r\n            vec2 uv = uvFromFlat(${texNumR}, ${texNumC}, index);\r\n            return
sampleTexture(${name}, uv);\r\n          }\r\n        `;\r\n    return new GlslLibRoutine(\r\n        source,
['coordinates.uvFromFlat', 'coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n  }\r\n\r\n  /**\r\n   * This
is the main function to map from the given texture coordiantes (s,t)\r\n   * to logical indices for the output\r\n   *
There will only be one single variation of this\r\n   * Also see coordsToOffset and offsetToIndices for input-specific
versions\r\n   */\r\n  protected toVec(): {[name: string]: GlslLibRoutine} {\r\n    const output =
this.context.outputTextureLayout;\r\n    const rank = output.shape.length;\r\n    const strides = output.strides;\r\n
const xScale = output.width;\r\n    const yScale = output.height;\r\n\r\n    const stridesBlock = [];\r\n    for (let i = 0; i
< rank - 1; ++i) {\r\n      stridesBlock.push(`\r\n        c[${i}] = offset / ${strides[i]};`);\r\n      stridesBlock.push(`\r\n
    offset -= c[${i}] * ${strides[i]};`);\r\n    }\r\n    stridesBlock.push(`\r\n        c[${rank - 1}] = offset;`);\r\n    const
body = `\r\n      void toVec(vec2 texCoords, out int c[${rank}]) {\r\n        int offset = coordsToOffset(texCoords,
${xScale}, ${yScale});\r\n        ${stridesBlock.join('')}\r\n      }\r\n      void toVec(int offset, out int c[${rank}]) {\r\n
      ${stridesBlock.join('')}\r\n      }\r\n    `;\r\n    return {toVec: new GlslLibRoutine(body,
['coordinates.coordsToOffset'])};\r\n  }\r\n  /**\r\n   * These are value getter functions generated for each input\r\n
```

* Each function is hardwired to the name and dimensions of the input\r\n * An '_T' variation is also produced which accesses values as if the\r\n * input was transposed\r\n */\r\n protected valueFrom(): {[name: string]: GlslLibRoutine} {\r\n const result: {[name: string]: GlslLibRoutine} = {};\r\n this.context.programInfo.inputNames.forEach((name, i) => {\r\n const layout = this.context.inputTextureLayouts[i];\r\n const shape = layout.unpackedShape.length > 0 ? layout.unpackedShape : layout.shape;\r\n const rank = shape.length;\r\n let funcName = `_${name}`;\r\n result[funcName] = new GlslLibRoutine(\r\n this.getValueFromSingle(name, rank, layout.width, layout.height, false),\r\n [`shapeUtils.indicesToOffset${funcName}`, 'coordinates.offsetToCoords', 'fragcolor.getColorAsFloat']);\r\n funcName = funcName + '_T';\r\n result[funcName] = new GlslLibRoutine(\r\n this.getValueFromSingle(name, rank, layout.width, layout.height, true),\r\n [`shapeUtils.indicesToOffset${funcName}`, 'coordinates.offsetToCoords', 'fragcolor.getColorAsFloat']);\r\n });\r\n return result;\r\n }\r\n /**\r\n * Produces one value getter function for the name and rank given\r\n * If a transpose is set proper offsetToCoords mapping will be used\r\n * @param name name of the function\r\n * @param rank rank of the input\r\n * @param transpose whether or not should generate a transpose variation\r\n */\r\n protected getValueFromSingle(varName: string, rank: number, width: number, height: number, transpose: boolean):\r\n string {\r\n let name = `_${varName}`;\r\n if (transpose) {\r\n name = name + '_T';\r\n }\r\n const glsl = getGlsl(this.context.glContext.version);\r\n return `\r\n float ${name}(int m[${rank}]) {\r\n int offset = indicesToOffset${name}(m);\r\n vec2 coords = offsetToCoords(offset, ${width}, ${height});\r\n float value = getColorAsFloat(${glsl.texture2D}(${varName}, coords));\r\n return value;\r\n }\r\n `;\r\n }\r\n\r\n /**\r\n * Produces a packed value getter function for the name and rank given\r\n * If a transpose is set proper offsetToCoords mapping will be used\r\n * @param name name of the function\r\n * @param rank rank of the input\r\n * @param transpose whether or not should generate a transpose variation\r\n */\r\n protected getPackedValueFrom(varName: string, rank: number, width: number, height: number, transpose: boolean):\r\n string {\r\n let name = `_${varName}_Pack`;\r\n if (transpose) {\r\n name = name + '_T';\r\n }\r\n const glsl = getGlsl(this.context.glContext.version);\r\n return `\r\n vec4 ${name}(int m[${rank}]) {\r\n int offset = indicesToOffset_${varName}(m);\r\n vec2 coords = offsetToCoords(offset, ${width}, ${height});\r\n return ${glsl.texture2D}(${varName}, coords);\r\n }\r\n `;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {ProgramInfo, TextureLayout} from './types';\r\nimport {WebGLContext} from './webgl-context';\r\n\r\n/* eslint-disable @typescript-eslint/naming-convention */\r\nexport enum FunctionType {\r\n ValueBased,\r\n Positional\r\n}\r\nexport interface GlslFunction<T extends FunctionType> {\r\n body: string;\r\n name: string;\r\n type: T;\r\n}\r\nexport type GlslValueFunction = GlslFunction<FunctionType.ValueBased>;\r\nexport interface GlslPositionalFunction extends GlslFunction<FunctionType.Positional> {\r\n inputShape: readonly number[];\r\n outputShape: readonly number[];\r\n}\r\n\r\nexport class GlslContext {\r\n constructor(\r\n public glContext: WebGLContext, public programInfo: ProgramInfo, public inputTextureLayouts: TextureLayout[],\r\n public outputTextureLayout: TextureLayout) {}\r\n}\r\nexport abstract class GlslLib {\r\n constructor(public context: GlslContext) {}\r\n abstract getFunctions(): {[name: string]: GlslLibRoutine};\r\n abstract getCustomTypes(): {[name: string]: string};\r\n}\r\n\r\n// abstraction to represent a GLSL library routine and it's dependencies\r\nexport class GlslLibRoutine {\r\n constructor(public routineBody: string, public dependencies?: string[]) {}\r\n}\r\n\r\n// abstraction to represent a GLSL library routine and it's dependencies AS GRAPH Nodes\r\n// this level of abstraction is used to topologically sort routines before fragment shade inclusion\r\nexport class GlslLibRoutineNode {\r\n dependencies: GlslLibRoutineNode[];\r\n routineBody: string;\r\n constructor(public name: string, routineBody?: string, dependencies?: GlslLibRoutineNode[]) {\r\n if (dependencies) {\r\n this.dependencies = dependencies;\r\n } else {\r\n this.dependencies = [];\r\n }\r\n\r\n if (routineBody) {\r\n this.routineBody = routineBody;\r\n }\r\n }\r\n addDependency(node: GlslLibRoutineNode) {\r\n if (node) {\r\n this.dependencies.push(node);\r\n }\r\n }\r\n}\r\n\r\n// topologically sort GLSL library routines (graph nodes abstraction) before shader script inclusion\r\nexport class TopologicalSortGlslRoutines {\r\n static

```
returnOrderedNodes(nodes: GlslLibRoutineNode[]): GlslLibRoutineNode[] {\r\n    if (!nodes || nodes.length === 0)
{\r\n      return [];\r\n    }\r\n\r\n    if (nodes.length === 1) {\r\n      return nodes;\r\n    }\r\n\r\n    const cycleCheck =
new Set<string>();\r\n    const alreadyTraversed = new Set<string>();\r\n    const result = new
Array<GlslLibRoutineNode>();\r\n\r\n    this.createOrderedNodes(nodes, cycleCheck, alreadyTraversed, result);\r\n
 return result;\r\n  }\r\n\r\n  private static createOrderedNodes(\r\n      graphNodes: GlslLibRoutineNode[],
cycleCheck: Set<string>, alreadyTraversed: Set<string>,\r\n      result: GlslLibRoutineNode[]) {\r\n    for (let i = 0; i
< graphNodes.length; ++i) {\r\n      this.dfsTraverse(graphNodes[i], cycleCheck, alreadyTraversed, result);\r\n
}\r\n  }\r\n\r\n  private static dfsTraverse(\r\n      root: GlslLibRoutineNode, cycleCheck: Set<string>,
alreadyTraversed: Set<string>, result: GlslLibRoutineNode[]) {\r\n    // if this root has already been traversed
return\r\n    if (!root || alreadyTraversed.has(root.name)) {\r\n      return;\r\n    }\r\n\r\n    // cyclic dependency has
been detected\r\n    if (cycleCheck.has(root.name)) {\r\n      throw new Error('Cyclic dependency detected. Can\\'t
topologically sort routines needed for shader.');\r\n    }\r\n\r\n    // hold this node to detect cycles if any\r\n
cycleCheck.add(root.name);\r\n\r\n    // traverse children in a dfs fashion\r\n    const dependencies =
root.dependencies;\r\n    if (dependencies && dependencies.length > 0) {\r\n      for (let i = 0; i <
dependencies.length; ++i) {\r\n        this.dfsTraverse(dependencies[i], cycleCheck, alreadyTraversed, result);\r\n
}\r\n    }\r\n\r\n    // add to result holder\r\n    result.push(root);\r\n\r\n    // mark this node as traversed so that we
don't traverse from this again\r\n    alreadyTraversed.add(root.name);\r\n\r\n    // release the hold\r\n
cycleCheck.delete(root.name);\r\n  }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n//
Licensed under the MIT License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutine} from './glsl-
definitions';\r\n\r\n/**\r\n * This GLSL library handles routines converting\r\n * float32 to/from Unsigned byte or
float 16\r\n */\r\nexport class EncodingGlslLib extends GlslLib {\r\n  constructor(context: GlslContext) {\r\n
super(context);\r\n  }\r\n  getFunctions(): {[name: string]: GlslLibRoutine} {\r\n    return {...this.encodeFloat32(),
...this.decodeFloat32()};\r\n  }\r\n  getCustomTypes(): {[name: string]: string} {\r\n    return {};\r\n  }\r\n  protected
encodeFloat32(): {[name: string]: GlslLibRoutine} {\r\n    return {\r\n      encode: new GlslLibRoutine(`highp vec4
encode(highp float f) {\r\n        return vec4(f, 0.0, 0.0, 0.0);\r\n      }\r\n        `)\r\n    };\r\n  }\r\n  protected
decodeFloat32(): {[name: string]: GlslLibRoutine} {\r\n    return {\r\n      decode: new GlslLibRoutine(`highp float
decode(highp vec4 rgba) {\r\n        return rgba.r;\r\n      }\r\n        `)\r\n    };\r\n  }\r\n  /**\r\n   * returns the routine to
encode encode a 32bit float to a vec4 (of unsigned bytes)\r\n   * @credit:
https://stackoverflow.com/questions/7059962/how-do-i-convert-a-vec4-rgba-value-to-a-float\r\n   */\r\n  protected
encodeUint8(): {[name: string]: GlslLibRoutine} {\r\n    const endianness = EncodingGlslLib.isLittleEndian() ?
'rgba.rgba=rgba.abgr;' : '';\r\n    return {\r\n      encode: new GlslLibRoutine(`\r\n      highp vec4 encode(highp float f)
{\r\n        highp float F = abs(f);\r\n        highp float Sign = step(0.0,-f);\r\n        highp float Exponent =
floor(log2(F));\r\n        highp float Mantissa = (exp2(- Exponent) * F);\r\n        Exponent = floor(log2(F) + 127.0) +
floor(log2(Mantissa));\r\n        highp vec4 rgba;\r\n        rgba[0] = 128.0 * Sign  + floor(Exponent*exp2(-1.0));\r\n
  rgba[1] = 128.0 * mod(Exponent,2.0) + mod(floor(Mantissa*128.0),128.0);\r\n        rgba[2] =
floor(mod(floor(Mantissa*exp2(23.0 -8.0)),exp2(8.0)));\r\n        rgba[3] = floor(exp2(23.0)*mod(Mantissa,exp2(-
15.0)));\r\n        ${endianness}\r\n        rgba = rgba / 255.0; // values need to be normalized to [0,1]\r\n        return
rgba;\r\n    }\r\n        `)\r\n    };\r\n  }\r\n  /**\r\n   * returns the routine to encode a vec4 of unsigned bytes to
float32\r\n   * @credit: https://stackoverflow.com/questions/7059962/how-do-i-convert-a-vec4-rgba-value-to-a-
float\r\n   */\r\n  protected decodeUint8(): {[name: string]: GlslLibRoutine} {\r\n    const endianness =
EncodingGlslLib.isLittleEndian() ? 'rgba.rgba=rgba.abgr;' : '';\r\n    return {\r\n      decode: new GlslLibRoutine(`\r\n
      highp float decode(highp vec4 rgba) {\r\n          rgba = rgba * 255.0; // values need to be de-normalized from
[0,1] to [0,255]\r\n          ${endianness}\r\n          highp float Sign = 1.0 - step(128.0,rgba[0])*2.0;\r\n          highp
float Exponent = 2.0 * mod(rgba[0],128.0) + step(128.0,rgba[1]) - 127.0;\r\n          highp float Mantissa =
mod(rgba[1],128.0)*65536.0 + rgba[2]*256.0 +rgba[3] + float(0x800000);\r\n          highp float Result =  Sign *
exp2(Exponent) * (Mantissa * exp2(-23.0 ));\r\n          return Result;\r\n      }\r\n        `)\r\n    };\r\n  }\r\n  /**\r\n   *
Determines if the machine is little endian or not\r\n   * @credit: https://gist.github.com/TooTallNate/4750953\r\n
*/\r\n  static isLittleEndian(): boolean {\r\n    const b = new ArrayBuffer(4);\r\n    const a = new Uint32Array(b);\r\n
```

const c = new Uint8Array(b);\r\n a[0] = 0xdeadbeef;\r\n if (c[0] === 0xef) {\r\n return true;\r\n }\r\n if (c[0] === 0xde) {\r\n return false;\r\n }\r\n throw new Error('unknown endianness');\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\nimport {getGlsl} from './glsl-source';\r\n\r\n/**\r\n * This GLSL library handles routines around reading a texlet and writing to it\r\n * Reading and writing could be more than just dealing with one channel\r\n * It may require encoding/decoding to/from 4 channels into one\r\n */\r\nexport class FragColorGlslLib extends GlslLib {\r\n constructor(context: GlslContext) {\r\n super(context);\r\n }\r\n getFunctions(): {[name: string]: GlslLibRoutine} {\r\n return {...this.setFragColor(), ...this.getColorAsFloat()};\r\n }\r\n getCustomTypes(): {[name: string]: string} {\r\n return {};\r\n }\r\n protected setFragColor(): {[name: string]: GlslLibRoutine} {\r\n const glsl = getGlsl(this.context.glContext.version);\r\n return {\r\n setFragColor: new GlslLibRoutine(\r\n `\r\n void setFragColor(float value) {\r\n ${glsl.output} = encode(value);\r\n }\r\n `,\r\n ['encoding.encode'])\r\n };\r\n }\r\n protected getColorAsFloat(): {[name: string]: GlslLibRoutine} {\r\n return {\r\n getColorAsFloat: new GlslLibRoutine(\r\n `\r\n float getColorAsFloat(vec4 color) {\r\n return decode(color);\r\n }\r\n `,\r\n ['encoding.decode'])\r\n };\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nconst INLINE_FUNC_DEF_REGEX = /@inline[\\s\\n\\r]+(\\w+)[\\s\\n\\r]+([0-9a-zA-Z_]+)\\s*\\(([^)]*)\\)\\s*{(([^}]|[\\n\\r])*)}/gm;\r\nconst FUNC_CALL_REGEX = '(\\\\w+)?\\\\s+([_0-9a-zA-Z]+)\\\\s+=\\\\s+__FUNC__\\\\((.*)\\\\)\\\\s*;';\r\n/**\r\n * GLSL preprocessor responsible for resolving @inline directives\r\n */\r\nexport function replaceInlines(script: string): string {\r\n const inlineDefs: {[name: string]: {params: Array<{type: string; name: string}|null>; body: string}} = {};\r\n let match;\r\n while ((match = INLINE_FUNC_DEF_REGEX.exec(script)) !== null) {\r\n const params = match[3]\r\n .split(',')\r\n .map(s => {\r\n const tokens = s.trim().split(' ');\r\n if (tokens && tokens.length === 2) {\r\n return {type: tokens[0], name: tokens[1]};\r\n }\r\n return null;\r\n })\r\n .filter(v => v !== null);\r\n inlineDefs[match[2]] = {params, body: match[4]};\r\n }\r\n for (const name in inlineDefs) {\r\n const regexString = FUNC_CALL_REGEX.replace('__FUNC__', name);\r\n const regex = new RegExp(regexString, 'gm');\r\n while ((match = regex.exec(script)) !== null) {\r\n const type = match[1];\r\n const variable = match[2];\r\n const params = match[3].split(',');\r\n const declLine = (type) ? `${type} ${variable};` : '';\r\n let newBody: string = inlineDefs[name].body;\r\n let paramRedecLine = '';\r\n inlineDefs[name].params.forEach((v, i) => {\r\n if (v) {\r\n paramRedecLine += `${v.type} ${v.name} = ${params[i]};\\n`;\r\n }\r\n });\r\n newBody = `${paramRedecLine}\\n ${newBody}`;\r\n newBody = newBody.replace('return', `${variable} = `);\r\n const replacement = `\r\n ${declLine}\r\n {\r\n ${newBody}\r\n }\r\n `;\r\n script = script.replace(match[0], replacement);\r\n }\r\n }\r\n script = script.replace(INLINE_FUNC_DEF_REGEX, '');\r\n return script;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutineNode, TopologicalSortGlslRoutines} from './glsl-definitions';\r\nimport {replaceInlines} from './glsl-function-inliner';\r\nimport {glslRegistry} from './glsl-registered-libs';\r\nimport {getDefaultFragShaderMain, getFragShaderPreamble} from './glsl-source';\r\nimport {ProgramInfo, TextureLayout, VariableInfo} from './types';\r\nimport {WebGLContext} from './webgl-context';\r\n\r\n/**\r\n * Preprocessor for the additions to the GLSL language\r\n * It deals with:\r\n * @include directives\r\n * @inline\r\n * Loop unrolling (not implemented)\r\n * Macro resolution (not implemented)\r\n */\r\nexport class GlslPreprocessor {\r\n readonly context: GlslContext;\r\n readonly libs: {[name: string]: GlslLib} = {};\r\n readonly glslLibRoutineDependencyGraph: {[routineName: string]: GlslLibRoutineNode} = {};\r\n\r\n constructor(\r\n glContext: WebGLContext, programInfo: ProgramInfo, inputTextureLayouts: TextureLayout[],\r\n outputTextureLayout: TextureLayout) {\r\n this.context = new GlslContext(glContext, programInfo, inputTextureLayouts, outputTextureLayout);\r\n\r\n // construct GlslLibs\r\n Object.keys(glslRegistry).forEach((name: string) => {\r\n const lib = new glslRegistry[name](this.context);\r\n this.libs[name] = lib;\r\n });\r\n\r\n // construct GlslRoutineDependencyGraph\r\n const map =

```
this.glslLibRoutineDependencyGraph;\r\n    for (const libName in this.libs) {\r\n      const lib =
this.libs[libName];\r\n      const routinesInLib = lib.getFunctions();\r\n      for (const routine in routinesInLib) {\r\n
  const key = libName + '.' + routine;\r\n        let currentNode: GlslLibRoutineNode;\r\n        if (map[key]) {\r\n
currentNode = map[key];\r\n          currentNode.routineBody = routinesInLib[routine].routineBody;\r\n        } else
{\r\n          currentNode = new GlslLibRoutineNode(key, routinesInLib[routine].routineBody);\r\n          map[key] =
currentNode;\r\n        }\r\n        const dependencies = routinesInLib[routine].dependencies;\r\n        if (dependencies)
{\r\n          for (let i = 0; i < dependencies.length; ++i) {\r\n            if (!map[dependencies[i]]) {\r\n              const
node = new GlslLibRoutineNode(dependencies[i]);\r\n              map[dependencies[i]] = node;\r\n
currentNode.addDependency(node);\r\n            } else {\r\n
currentNode.addDependency(map[dependencies[i]]);\r\n            }\r\n          }\r\n        }\r\n      }\r\n    }\r\n  }\r\n\r\n
preprocess(): string {\r\n    const programInfo = this.context.programInfo;\r\n    let source =
programInfo.shaderSource;\r\n\r\n    // append main() function\r\n    if (!this.context.programInfo.hasMain) {\r\n
source = `${source}\r\n      ${getDefaultFragShaderMain(this.context.glContext.version,
this.context.outputTextureLayout.shape.length)}`;\r\n    }\r\n    // replace inlines\r\n    source =
replaceInlines(source);\r\n\r\n    // concat final source string\r\n    return
`${getFragShaderPreamble(this.context.glContext.version)}\r\n    ${this.getUniforms(programInfo.inputNames,
programInfo.variables)}\r\n    ${this.getImports(source)}\r\n    ${source}`;\r\n  }\r\n\r\n  protected getImports(script:
string): string {\r\n    const routinesIncluded = this.selectGlslLibRoutinesToBeIncluded(script);\r\n\r\n    if
(routinesIncluded.length === 0) {\r\n      return '';\r\n    }\r\n\r\n    let routines = '';\r\n    for (let i = 0; i <
routinesIncluded.length; ++i) {\r\n      if (routinesIncluded[i].routineBody) {\r\n        routines +=
routinesIncluded[i].routineBody + '\\n';\r\n      } else {\r\n        throw new Error(`Missing body for the Glsl Library
routine: ${routinesIncluded[i].name}`);\r\n      }\r\n    }\r\n\r\n    return routines;\r\n  }\r\n  private
selectGlslLibRoutinesToBeIncluded(script: string): GlslLibRoutineNode[] {\r\n    const nodes:
GlslLibRoutineNode[] = [];\r\n\r\n    Object.keys(this.glslLibRoutineDependencyGraph).forEach(classAndRoutine
=> {\r\n      const routine = classAndRoutine.split('.')[1];\r\n      if (script.indexOf(routine) !== -1) {\r\n
nodes.push(this.glslLibRoutineDependencyGraph[classAndRoutine]);\r\n      }\r\n    });\r\n\r\n    return
TopologicalSortGlslRoutines.returnOrderedNodes(nodes);\r\n  }\r\n\r\n  protected getUniforms(samplers?: string[],
variables?: VariableInfo[]): string {\r\n    const uniformLines: string[] = [];\r\n    if (samplers) {\r\n      for (const
sampler of samplers) {\r\n        uniformLines.push(`uniform sampler2D ${sampler};`);\r\n      }\r\n    }\r\n    if
(variables) {\r\n      for (const variable of variables) {\r\n        uniformLines.push(\r\n            `uniform
${variable.type} ${variable.name}${variable.arrayLength ? `[${variable.arrayLength}]` : ''};`);\r\n      }\r\n    }\r\n
return uniformLines.join('\\n');\r\n  }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n//
Licensed under the MIT License.\r\n\r\nimport {CoordsGlslLib} from './glsl-coordinate-lib';\r\nimport {GlslContext,
GlslLib} from './glsl-definitions';\r\nimport {EncodingGlslLib} from './glsl-encoding-lib';\r\nimport
{FragColorGlslLib} from './glsl-fragcolor-lib';\r\nimport {ShapeUtilsGlslLib} from './glsl-shape-utils-lib';\r\nimport
{VecGlslLib} from './glsl-vec-lib';\r\n\r\nexport const glslRegistry: {[name: string]: new (context: GlslContext) =>
GlslLib} = {\r\n  'encoding': EncodingGlslLib,\r\n  'fragcolor': FragColorGlslLib,\r\n  'vec': VecGlslLib,\r\n
'shapeUtils': ShapeUtilsGlslLib,\r\n  'coordinates': CoordsGlslLib,\r\n  //  'arrays': ArrayGlslSLib\r\n};\r\n","//
Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\n\r\n/**\r\n * GLSL Library responsible for data
types and routines for manipulating\r\n * coordinates and mapping to/from tensor indices\r\n */\r\nexport class
ShapeUtilsGlslLib extends GlslLib {\r\n  constructor(context: GlslContext) {\r\n    super(context);\r\n  }\r\n
getFunctions(): {[name: string]: GlslLibRoutine} {\r\n    return {\r\n      ...this.bcastIndex(),\r\n
...this.bcastMatmulIndex(),\r\n      ...this.offsetToIndices(),\r\n      ...this.indicesToOffset(),\r\n
...this.incrementIndices()\r\n    };\r\n  }\r\n  getCustomTypes() {\r\n    return {};\r\n  }\r\n  protected bcastIndex():
{[name: string]: GlslLibRoutine} {\r\n    const outputRank = this.context.outputTextureLayout.shape.length;\r\n
const result: {[name: string]: GlslLibRoutine} = {};\r\n    this.context.programInfo.inputNames.forEach((name, i)
=> {\r\n      const shape = this.context.inputTextureLayouts[i].unpackedShape;\r\n      if (shape.length <=
```

outputRank) {\r\n const rank = shape.length;\r\n const dimOffset = outputRank - rank;\r\n const funcName = `bcastIndices_${name}`;\r\n let block = '';\r\n for (let i = 0; i < rank; ++i) {\r\n block += `\r\n realIndices[${i}] = int( mod(float(bcastedIndices[${dimOffset + i}]), ${shape[i]}.0) );\r\n `;\r\n }\r\n const body = `\r\n void ${funcName} (int bcastedIndices[${outputRank}], out int realIndices[${rank}]) {\r\n ${block}\r\n }\r\n `;\r\n result[funcName] = new GlslLibRoutine(body);\r\n }\r\n });\r\n return result;\r\n }\r\n protected bcastMatmulIndex(): {[name: string]: GlslLibRoutine} {\r\n const outputRank = this.context.outputTextureLayout.shape.length;\r\n const result: {[name: string]: GlslLibRoutine} = {};\r\n this.context.programInfo.inputNames.forEach((name, i) => {\r\n const shape = this.context.inputTextureLayouts[i].shape;\r\n if (!(shape.length < 2 || shape.length > outputRank)) {\r\n const rank = shape.length;\r\n const dimOffset = outputRank - rank;\r\n const funcName = `bcastMatmulIndices_${name}`;\r\n let block = '';\r\n for (let i = 0; i < rank - 2; ++i) {\r\n block += `\r\n realIndices[${i}] = int( mod(float(bcastedIndices[${dimOffset + i}]), ${shape[i]}.0) );\r\n `;\r\n }\r\n const body = `\r\n void ${funcName}(int bcastedIndices[${outputRank}], out int realIndices[${rank}]) {\r\n ${block}\r\n realIndices[${rank - 1}] = bcastedIndices[${outputRank - 1}];\r\n realIndices[${rank - 2}] = bcastedIndices[${outputRank - 2}];\r\n }\r\n `;\r\n result[funcName] = new GlslLibRoutine(body);\r\n }\r\n });\r\n return result;\r\n }\r\n protected indicesToOffset(): {[name: string]: GlslLibRoutine} {\r\n const result: {[name: string]: GlslLibRoutine} = {};\r\n this.context.programInfo.inputNames.forEach((name, i) => {\r\n const shape = this.context.inputTextureLayouts[i].shape;\r\n const strides = this.context.inputTextureLayouts[i].strides;\r\n const rank = shape.length;\r\n let funcName = `indicesToOffset_${name}`;\r\n result[funcName] = new GlslLibRoutine(ShapeUtilsGlslLib.indexToOffsetSingle(funcName, rank, strides));\r\n funcName = `indicesToOffset_${name}_T`;\r\n result[funcName] =\r\n new GlslLibRoutine(ShapeUtilsGlslLib.indexToOffsetSingle(funcName, rank, strides.slice().reverse()));\r\n });\r\n return result;\r\n }\r\n static indexToOffsetSingle(name: string, rank: number, strides: readonly number[]): string {\r\n let block = '';\r\n for (let i = rank - 1; i >= 0; --i) {\r\n block += `\r\n offset += indices[${i}] * ${strides[i]};\r\n `;\r\n }\r\n return `\r\n int ${name}(int indices[${rank}]) {\r\n int offset = 0;\r\n ${block}\r\n return offset;\r\n }\r\n `;\r\n }\r\n protected offsetToIndices(): {[name: string]: GlslLibRoutine} {\r\n const result: {[name: string]: GlslLibRoutine} = {};\r\n this.context.programInfo.inputNames.forEach((name, i) => {\r\n const shape = this.context.inputTextureLayouts[i].shape;\r\n const strides = this.context.inputTextureLayouts[i].strides;\r\n const rank = shape.length;\r\n let funcName = `offsetToIndices_${name}`;\r\n result[funcName] = new GlslLibRoutine(ShapeUtilsGlslLib.offsetToIndicesSingle(funcName, rank, strides));\r\n funcName = `offsetToIndices_${name}_T`;\r\n result[funcName] =\r\n new GlslLibRoutine(ShapeUtilsGlslLib.offsetToIndicesSingle(funcName, rank, strides.slice().reverse()));\r\n });\r\n return result;\r\n }\r\n static offsetToIndicesSingle(name: string, rank: number, strides: readonly number[]): string {\r\n const stridesBlock = [];\r\n for (let i = 0; i < rank - 1; ++i) {\r\n stridesBlock.push(`\r\n indices[${i}] = offset / ${strides[i]};`);\r\n stridesBlock.push(`\r\n offset -= indices[${i}] * ${strides[i]};`);\r\n }\r\n stridesBlock.push(`\r\n indices[${rank - 1}] = offset;`);\r\n return `\r\n void ${name}(int offset, out int indices[${rank}]) {\r\n ${stridesBlock.join('')}\r\n }\r\n `;\r\n }\r\n protected incrementIndices(): {[name: string]: GlslLibRoutine} {\r\n const result: {[name: string]: GlslLibRoutine} = {};\r\n this.context.programInfo.inputNames.forEach((name, i) => {\r\n const shape = this.context.inputTextureLayouts[i].shape;\r\n const rank = shape.length;\r\n const funcName = `incrementIndices_${name}`;\r\n let shapeInit = '';\r\n for (let i = 0; i < rank; ++i) {\r\n shapeInit += `\r\n shape[${i}] = ${shape[i]};`;\r\n }\r\n const body = `\r\n void ${funcName}(int axis, out int indices[${rank}]) {\r\n int shape[${rank}];\r\n ${shapeInit};\r\n for(int i = ${rank} -1 ; i >= 0; --i) {\r\n if(i > axis) continue;\r\n indices[i] += 1;\r\n if(indices[i] < shape[i]) {\r\n break;\r\n }\r\n indices[i] = 0;\r\n }\r\n }\r\n `;\r\n result[funcName] = new GlslLibRoutine(body);\r\n });\r\n return result;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights

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reserved.\r\n// Licensed under the MIT License.\r\n\r\n/**\r\n * represent a version irrelevant abstraction of for
GLSL source code\r\n */\r\nexport interface Glsl {\r\n  readonly version: string;\r\n  readonly attribute: string;\r\n
readonly varyingVertex: string;\r\n  readonly varyingFrag: string;\r\n  readonly texture2D: string;\r\n  readonly
output: string;\r\n  readonly outputDeclaration: string;\r\n}\r\n\r\nconst GLSL_ES_2_0: Glsl = {\r\n  version: '',\r\n
attribute: 'attribute',\r\n  varyingVertex: 'varying',\r\n  varyingFrag: 'varying',\r\n  texture2D: 'texture2D',\r\n  output:
'gl_FragColor',\r\n  outputDeclaration: '',\r\n};\r\nconst GLSL_ES_3_0: Glsl = {\r\n  version: '#version 300 es',\r\n
attribute: 'in',\r\n  varyingVertex: 'out',\r\n  varyingFrag: 'in',\r\n  texture2D: 'texture',\r\n  output: 'outputColor',\r\n
outputDeclaration: 'out vec4 outputColor;',\r\n};\r\n\r\nexport function getGlsl(version: 1|2) {\r\n  return version
=== 1 ? GLSL_ES_2_0 : GLSL_ES_3_0;\r\n}\r\n\r\nexport function getVertexShaderSource(version: 1|2): string
{\r\n  const glsl = getGlsl(version);\r\n  return `${glsl.version}\r\n      precision highp float;\r\n      ${glsl.attribute}
vec3 position;\r\n      ${glsl.attribute} vec2 textureCoord;\r\n\r\n      ${glsl.varyingVertex} vec2 TexCoords;\r\n\r\n
  void main()\r\n      {\r\n          gl_Position = vec4(position, 1.0);\r\n          TexCoords = textureCoord;\r\n
}`;\r\n}\r\n\r\nexport function getFragShaderPreamble(version: 1|2): string {\r\n  const glsl = getGlsl(version);\r\n
return `${glsl.version}\r\n    precision highp float;\r\n    precision highp int;\r\n    precision highp sampler2D;\r\n
${glsl.varyingFrag} vec2 TexCoords;\r\n    ${glsl.outputDeclaration}\r\n    const vec2 halfCR = vec2(0.5,
0.5);\r\n\r\n    // Custom vector types to handle higher dimenalities.\r\n    struct ivec5\r\n    {\r\n      int x;\r\n      int
y;\r\n      int z;\r\n      int w;\r\n      int u;\r\n    };\r\n\r\n    struct ivec6\r\n    {\r\n      int x;\r\n      int y;\r\n      int z;\r\n
   int w;\r\n      int u;\r\n      int v;\r\n    };\r\n\r\n    int imod(int x, int y) {\r\n      return x - y * (x / y);\r\n    }\r\n\r\n
`;\r\n}\r\n\r\nexport function getDefaultFragShaderMain(version: 1|2, outputShapeLength: number): string {\r\n
const glsl = getGlsl(version);\r\n  return `\r\n  void main() {\r\n    int indices[${outputShapeLength}];\r\n
toVec(TexCoords, indices);\r\n    vec4 result = vec4(process(indices));\r\n    ${glsl.output} = result;\r\n  }\r\n
`;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\n\r\n/**\r\n * GLSL
Library responsible for vec routines\r\n * Vec is an varible length int array. The length is fixed at the time of\r\n *
generating the library functions from the dimensions of the output.\r\n */\r\nexport class VecGlslLib extends GlslLib
{\r\n  constructor(context: GlslContext) {\r\n    super(context);\r\n  }\r\n  getCustomTypes(): {[name: string]: string}
{\r\n    return {};\r\n  }\r\n  getFunctions(): {[name: string]: GlslLibRoutine} {\r\n    return
{...this.binaryVecFunctions(), ...this.copyVec(), ...this.setVecItem(), ...this.getVecItem()};\r\n  }\r\n  protected
binaryVecFunctions(): {[name: string]: GlslLibRoutine} {\r\n    const outputLayout =
this.context.outputTextureLayout;\r\n    const rank = outputLayout.shape.length;\r\n    const nameOp: {[name:
string]: string} = {add: '+=', sub: '-=', mul: '*=', div: '/='};\r\n    const result: {[name: string]: GlslLibRoutine} =
{};\r\n    for (const name in nameOp) {\r\n      const fname = `${name}Vec`;\r\n      let assignmentBlock = '';\r\n
for (let i = 0; i < rank; ++i) {\r\n        assignmentBlock += `\r\n          dest[${i}] ${nameOp[name]} src[${i}];\r\n
 `;\r\n      }\r\n      const body = `\r\n        void ${fname}(int src[${rank}], out int dest[${rank}]) {\r\n
${assignmentBlock}\r\n        }\r\n        `;\r\n      result[fname] = new GlslLibRoutine(body);\r\n    }\r\n\r\n    return
result;\r\n  }\r\n  protected copyVec(): {[name: string]: GlslLibRoutine} {\r\n    const outputLayout =
this.context.outputTextureLayout;\r\n    const rank = outputLayout.shape.length;\r\n    let assignmentBlock = '';\r\n
for (let i = 0; i < rank; ++i) {\r\n      assignmentBlock += `\r\n        dest[${i}] = src[${i}];\r\n        `;\r\n    }\r\n
const body = `\r\n      void copyVec(int src[${rank}], out int dest[${rank}]) {\r\n        ${assignmentBlock}\r\n
}\r\n      `;\r\n    return {copyVec: new GlslLibRoutine(body)};\r\n  }\r\n\r\n  protected setVecItem(): {[name:
string]: GlslLibRoutine} {\r\n    const outputLayout = this.context.outputTextureLayout;\r\n    const rank =
outputLayout.shape.length;\r\n    let block = `\r\n        if(index < 0)\r\n            index =${rank} + index;\r\n        if
(index == 0)\r\n            m[0] = value;\r\n        `;\r\n    for (let i = 1; i < rank - 1; ++i) {\r\n      block += `\r\n        else
if (index == ${i})\r\n            m[${i}] = value;\r\n            `;\r\n    }\r\n    block += `\r\n        else\r\n            m[${rank -
1}] = value;\r\n        `;\r\n    const body = `\r\n      void setVecItem(out int m[${rank}], int index, int value) {\r\n
${block}\r\n      }\r\n        `;\r\n    return {setVecItem: new GlslLibRoutine(body)};\r\n  }\r\n  protected
getVecItem(): {[name: string]: GlslLibRoutine} {\r\n    const outputLayout = this.context.outputTextureLayout;\r\n
const rank = outputLayout.shape.length;\r\n    let block = `\r\n        if(index < 0)\r\n            index = ${rank} +
```

index;\r\n if (index == 0)\r\n return m[0];\r\n `;\r\n for (let i = 1; i < rank - 1; ++i) {\r\n block += `\r\n else if (index == ${i})\r\n return m[${i}];\r\n `;\r\n }\r\n block += `\r\n else\r\n return m[${rank - 1}];\r\n `;\r\n const body = `\r\n int getVecItem(int m[${rank}], int index) {\r\n ${block}\r\n }\r\n `;\r\n return {getVecItem: new GlslLibRoutine(body)};\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceHandler} from '../../backend';\r\nimport {Logger} from '../../instrument';\r\nimport {Tensor} from '../../tensor';\r\nimport {ShapeUtil} from '../../util';\r\nimport {createPackProgramInfoLoader} from './ops/pack';\r\nimport {createPackedReshape3DProgramInfoLoader, isReshapeCheap, processDims3D} from './ops/reshape-packed';\r\n\r\nimport {encodeAsUint8} from './ops/uint8-encode';\r\nimport {createUnpackProgramInfoLoader} from './ops/unpack';\r\nimport {WebGLSessionHandler} from './session-handler';\r\nimport {Encoder} from './texture-data-encoder';\r\nimport {calculateTextureWidthAndHeight, createTextureLayoutFromShape, createTextureLayoutFromTextureType} from './texture-layout';\r\nimport {Artifact, ProgramInfo, ProgramInfoLoader, TextureData, TextureLayout, TextureType} from './types';\r\n\r\nconst getProgramInfoUniqueKey =\r\n (programInfo: ProgramInfo|ProgramInfoLoader, inputTextureDatas: TextureData[]): string => {\r\n const inputs =\r\n inputTextureDatas.map(texture => `${texture.unpackedShape.join(',')};${texture.width}x${texture.height}`)\r\n .join('_');\r\n let key = programInfo.name;\r\n if (programInfo.cacheHint) {\r\n key += '[' + programInfo.cacheHint + ']';\r\n }\r\n key += ':' + inputs;\r\n return key;\r\n };\r\n\r\nexport class WebGLInferenceHandler implements InferenceHandler {\r\n private packedTextureDataCache: Map<Tensor.Id, TextureData>;\r\n private unpackedTextureDataCache: Map<Tensor.Id, TextureData>;\r\n constructor(public session: WebGLSessionHandler) {\r\n this.packedTextureDataCache = new Map();\r\n this.unpackedTextureDataCache = new Map();\r\n }\r\n\r\n /**\r\n * @returns [width, height]\r\n */\r\n calculateTextureWidthAndHeight(shape: readonly number[], textureType: TextureType): [number, number] {\r\n return calculateTextureWidthAndHeight(this.session.layoutStrategy, shape, textureType);\r\n }\r\n\r\n executeProgram(program: ProgramInfo|ProgramInfoLoader, inputs: readonly Tensor[]): TextureData {\r\n if (inputs.length < program.inputNames.length) {\r\n throw new Error(`Input size mustn't be less than ${program.inputNames.length}.`);\r\n }\r\n if (program.inputNames.length !== program.inputTypes.length) {\r\n throw new Error('input names size does not match input types');\r\n }\r\n\r\n // create texture info for input\r\n const inputTextureDatas: TextureData[] = [];\r\n for (let i = 0; i < program.inputNames.length; ++i) {\r\n inputTextureDatas[i] = this.getOrCreateTextureData(inputs[i], program.inputTypes[i]);\r\n }\r\n\r\n const key = getProgramInfoUniqueKey(program, inputTextureDatas);\r\n let artifact = this.session.programManager.getArtifact(key);\r\n const programInfo = artifact ?\r\n artifact.programInfo :\r\n (typeof (program as ProgramInfoLoader).get === 'function' ? (program as ProgramInfoLoader).get() :\r\n (program as ProgramInfo));\r\n\r\n // create texture info for output\r\n const outputTextureLayout = createTextureLayoutFromTextureType(\r\n this.session.layoutStrategy, programInfo.output.dims, programInfo.output.textureType);\r\n const outputTextureData = this.createTextureData(outputTextureLayout, programInfo.output.type);\r\n\r\n if (!artifact) {\r\n artifact = this.session.programManager.build(programInfo, inputTextureDatas, outputTextureData);\r\n this.session.programManager.setArtifact(key, artifact);\r\n }\r\n\r\n this.runProgram(artifact, inputTextureDatas, outputTextureData);\r\n return outputTextureData;\r\n }\r\n\r\n run(program: ProgramInfoLoader, inputs: readonly Tensor[]): Tensor {\r\n const outputTextureData = this.executeProgram(program, inputs);\r\n return outputTextureData.tensor;\r\n }\r\n\r\n private runProgram(artifact: Artifact, inputs: TextureData[], output: TextureData): void {\r\n // input should match\r\n for (let i = 0; i < inputs.length; ++i) {\r\n if (!!inputs[i].isPacked !== (artifact.programInfo.inputTypes[i] === TextureType.packed)) {\r\n throw new Error(`input[${i}] property packed inconsistent`);\r\n }\r\n }\r\n\r\n // output should match\r\n if (!!output.isPacked !== (artifact.programInfo.output.textureType === TextureType.packed)) {\r\n throw new Error('output property packed inconsistent');\r\n }\r\n\r\n this.session.programManager.run(artifact, inputs, output);\r\n }\r\n\r\n /**\r\n * Create a TextureData object from a tensor.\r\n * Usage =

Encoder.Usage.UploadOnly.\r\n * If a related texture data is found in cache, returns it;\r\n * Otherwise:\r\n * Creates a new texture layout if not provided;\r\n * Creates WebGLTexture with the layout;\r\n * Upload tensor data to the texture;\r\n * Creates a texture data object associated with the given tensor.\r\n * @param tensor the tensor with data to upload\r\n */\r\n private getOrCreateTextureData(tensor: Tensor, textureType: TextureType) {\r\n let td = this.getTextureData(tensor.dataId, textureType === TextureType.packed);\r\n\r\n if (!td) {\r\n // check if we have texture data in different type\r\n td = this.getTextureData(tensor.dataId, textureType !== TextureType.packed);\r\n if (td) {\r\n if (textureType === TextureType.packed) {\r\n return this.pack(td);\r\n } else {\r\n return this.unpack(td);\r\n }\r\n }\r\n }\r\n\r\n if (!td) {\r\n const layout = createTextureLayoutFromTextureType(this.session.layoutStrategy, tensor.dims, textureType);\r\n\r\n if (textureType === TextureType.packedLastDimension) {\r\n const group = 1;\r\n const channels = 4;\r\n const shape = tensor.dims;\r\n if (shape.length === 4) {\r\n // pre-processing for kernel data of Conv.\r\n //\r\n // TODO: currently this is a hacking to overwrite Conv's weight. The correct way to do this should be:\r\n // 1. implement texture based const-folding\r\n // 2. create a WebGL program \"preprocessConvWeight\" to do the same work as below\r\n // 3. run the program before dotProduct.\r\n //\r\n const adjustedKernelShape = [shape[0], Math.ceil((shape[1] * shape[2] * shape[3]) / channels)];\r\n const adjustedLayout =\r\n createTextureLayoutFromTextureType(this.session.layoutStrategy, adjustedKernelShape, textureType);\r\n let buffer = tensor.numberData;\r\n if (shape[1] * shape[2] * shape[3] % channels !== 0) {\r\n const numFeatureMaps = shape[0];\r\n const oldRowSize = shape[1] * shape[2] * shape[3];\r\n const newRowSize = Math.ceil(oldRowSize * group / channels) * channels;\r\n const newSize = numFeatureMaps * newRowSize;\r\n buffer = new Float32Array(newSize);\r\n for (let f = 0; f < numFeatureMaps; ++f) {\r\n const oldOffset = f * oldRowSize;\r\n const newOffset = f * newRowSize + f % group * oldRowSize;\r\n buffer.set(tensor.numberData.subarray(oldOffset, oldOffset + oldRowSize), newOffset);\r\n }\r\n }\r\n return this.createTextureData(adjustedLayout, tensor.type, buffer, tensor, Encoder.Usage.UploadOnly);\r\n }\r\n }\r\n\r\n if (textureType === TextureType.packed) {\r\n const unpackedTextureLayout =\r\n createTextureLayoutFromShape(this.session.layoutStrategy, tensor.dims, 1, [], {reverseWH: true});\r\n const unpackedTextureData = this.createTextureData(\r\n unpackedTextureLayout, tensor.type, tensor.numberData, tensor, Encoder.Usage.UploadOnly);\r\n td = this.pack(unpackedTextureData);\r\n } else {\r\n td = this.createTextureData(layout, tensor.type, tensor.numberData, tensor, Encoder.Usage.UploadOnly);\r\n }\r\n }\r\n return td;\r\n }\r\n\r\n /**\r\n * Create a TextureData object using the given data and bind to the given tensor.\r\n * Usage = Encoder.Usage.UploadOnly.\r\n * NOTE: this function is a hack for Conv implementation. should remove this function, after rewriting Conv\r\n * implementation by Graph.Transformer\r\n * @param dataType the tensor data type\r\n * @param data the actual data to upload\r\n * @param tensor the tensor to bind. tensor's data is ignored.\r\n */\r\n createTextureDataFromLayoutBindTensor(\r\n layout: TextureLayout, dataType: Tensor.DataType, data: Tensor.NumberType, tensor: Tensor): TextureData {\r\n return this.createTextureData(layout, dataType, data, tensor, Encoder.Usage.UploadOnly);\r\n }\r\n\r\n private createTextureData(\r\n layout: TextureLayout, dataType: Tensor.DataType, data?: Tensor.NumberType, tensor?: Tensor,\r\n usage?: Encoder.Usage): TextureData {\r\n Logger.verbose('InferenceHandler', `Creating TextureData: layout:[${JSON.stringify(layout)}]`);\r\n const texture = this.session.textureManager.createTextureFromLayout(dataType, layout, data, usage);\r\n return this.createTextureDataFromTexture(layout, dataType, texture, tensor);\r\n }\r\n\r\n reshapeUnpacked(input: Tensor, reshapedDims: readonly number[]): Tensor {\r\n const inputTD = this.getOrCreateTextureData(input, TextureType.unpacked);\r\n const newTextureLayout: TextureLayout = {\r\n channels: inputTD.channels,\r\n height: inputTD.height,\r\n width: inputTD.width,\r\n // handle reshaping into scalar Tensors\r\n shape: reshapedDims.length !== 0 ? reshapedDims : [1],\r\n strides: ShapeUtil.computeStrides(reshapedDims),\r\n unpackedShape: reshapedDims,\r\n };\r\n const newTextureData = this.createTextureDataFromTexture(newTextureLayout, input.type, inputTD.texture);\r\n return newTextureData.tensor;\r\n }\r\n\r\n reshapePacked(input: Tensor, reshapedDims: readonly number[]): Tensor

{\r\n const inputTD = this.getOrCreateTextureData(input, TextureType.packed);\r\n\r\n // check if the reshape is 'cheap'\r\n if (isReshapeCheap(input.dims, reshapedDims)) {\r\n const newTextureLayout: TextureLayout = {\r\n channels: inputTD.channels,\r\n height: inputTD.height,\r\n width: inputTD.width,\r\n // handle reshaping into scalar Tensors\r\n shape: reshapedDims.length !== 0 ? reshapedDims : [1],\r\n strides: ShapeUtil.computeStrides(reshapedDims),\r\n unpackedShape: reshapedDims,\r\n isPacked: true\r\n };\r\n const newTextureData = this.createTextureDataFromTexture(newTextureLayout, input.type, inputTD.texture);\r\n return newTextureData.tensor;\r\n }\r\n\r\n const squeezedInputShape = processDims3D(input.dims);\r\n const squeezedOutputShape = processDims3D(reshapedDims);\r\n\r\n const squeezedInputTensor = this.reshapePacked(input, squeezedInputShape);\r\n const squeezedOutputTensor = this.run(\r\n createPackedReshape3DProgramInfoLoader(this, squeezedInputTensor, squeezedOutputShape), [squeezedInputTensor]);\r\n const outputTensor = this.reshapePacked(squeezedOutputTensor, reshapedDims);\r\n return outputTensor;\r\n }\r\n\r\n private createTextureDataFromTexture(\r\n layout: TextureLayout, dataType: Tensor.DataType, texture: WebGLTexture, tensor?: Tensor, tensorId?: Tensor.Id) {\r\n const textureData: TextureData = {\r\n ...layout,\r\n tensor: tensor ||\r\n new Tensor(\r\n layout.unpackedShape, dataType, (_id: Tensor.Id) => this.readTexture(textureData),\r\n async (_id: Tensor.Id) => this.readTextureAsync(textureData), undefined, tensorId),\r\n texture\r\n };\r\n this.setTextureData(textureData.tensor.dataId, textureData, layout.isPacked);\r\n return textureData;\r\n }\r\n\r\n private getTextureData(tensorId: Tensor.Id, isPacked = false): TextureData|undefined {\r\n return this.session.isInitializer(tensorId) ?\r\n this.session.getTextureData(tensorId, isPacked) :\r\n isPacked ? this.packedTextureDataCache.get(tensorId) : this.unpackedTextureDataCache.get(tensorId);\r\n }\r\n setTextureData(tensorId: Tensor.Id, td: TextureData, isPacked = false): void {\r\n if (this.session.isInitializer(tensorId)) {\r\n this.session.setTextureData(tensorId, td, isPacked);\r\n } else {\r\n (isPacked ? this.packedTextureDataCache : this.unpackedTextureDataCache).set(tensorId, td);\r\n }\r\n }\r\n isTextureLayoutCached(tensor: Tensor, isPacked = false): boolean {\r\n return !!this.getTextureData(tensor.dataId, isPacked);\r\n }\r\n\r\n dispose(): void {\r\n this.session.textureManager.clearActiveTextures();\r\n this.packedTextureDataCache.forEach(td => this.session.textureManager.releaseTexture(td));\r\n this.packedTextureDataCache = new Map();\r\n this.unpackedTextureDataCache.forEach(td => this.session.textureManager.releaseTexture(td));\r\n this.unpackedTextureDataCache = new Map();\r\n }\r\n\r\n readTexture(textureData: TextureData): Tensor.NumberType {\r\n if (textureData.isPacked) {\r\n return this.readTexture(this.unpack(textureData));\r\n }\r\n if (!this.session.backend.glContext.isFloat32DownloadSupported) {\r\n return this.session.textureManager.readUint8TextureAsFloat(encodeAsUint8(this, textureData));\r\n }\r\n return this.session.textureManager.readTexture(textureData, textureData.tensor.type, textureData.channels);\r\n }\r\n\r\n async readTextureAsync(textureData: TextureData): Promise<Tensor.NumberType> {\r\n if (textureData.isPacked) {\r\n return this.readTextureAsync(this.unpack(textureData));\r\n }\r\n if (!this.session.backend.glContext.isFloat32DownloadSupported) {\r\n return this.session.textureManager.readUint8TextureAsFloat(encodeAsUint8(this, textureData));\r\n }\r\n return this.session.textureManager.readTextureAsync(textureData, textureData.tensor.type, textureData.channels);\r\n }\r\n\r\n pack(input: TextureData): TextureData {\r\n const outputTextureData = this.executeProgram(createPackProgramInfoLoader(this, input.tensor), [input.tensor]);\r\n return outputTextureData;\r\n }\r\n\r\n unpack(input: TextureData): TextureData {\r\n const outputTextureData = this.executeProgram(createUnpackProgramInfoLoader(this, input.tensor), [input.tensor]);\r\n return outputTextureData;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {OpSet} from '../../opset';\r\n\r\nimport {batchNormalization, parseBatchNormalizationAttributes} from './ops/batch-normalization';\r\nimport * as binaryOps from './ops/binary-op';\r\nimport {concat, parseConcatAttributes} from './ops/concat';\r\nimport {conv, parseConvAttributes} from './ops/conv';\r\nimport {depthToSpace, parseDepthToSpaceAttributes} from './ops/depth-to-space';\r\nimport {flatten, parseFlattenAttributes} from './ops/flatten';\r\nimport {gather, parseGatherAttributes} from

'./ops/gather';\r\nimport {gemm, parseGemmAttributesV11, parseGemmAttributesV7} from './ops/gemm';\r\nimport {imageScaler, parseImageScalerAttributes} from './ops/image-scaler';\r\nimport {instanceNormalization, parseInstanceNormalizationAttributes} from './ops/instance-normalization';\r\nimport {matMul, parseMatMulAttributes} from './ops/matmul';\r\nimport {pad, parsePadAttributes} from './ops/pad';\r\nimport {averagePool, parseAveragePoolAttributes} from './ops/pool';\r\nimport {globalAveragePool, parseGlobalAveragePoolAttributes} from './ops/pool';\r\nimport {maxPool, parseMaxPoolAttributes} from './ops/pool';\r\nimport {globalMaxPool} from './ops/pool';\r\nimport {reduceLogSum, reduceLogSumSquare, reduceMax, reduceMean, reduceMin, reduceProd, reduceSum} from './ops/reduce';\r\nimport {parseReduceAttributes} from './ops/reduce';\r\nimport {reshape} from './ops/reshape';\r\nimport {parseResizeAttributesV10, parseResizeAttributesV11, resize} from './ops/resize-packed';\r\nimport {shape} from './ops/shape';\r\nimport {parseSliceAttributes, slice, sliceV10} from './ops/slice';\r\nimport {parseSoftmaxAttributes, softmax} from './ops/softmax';\r\nimport {parseSplitAttributes, split} from './ops/split';\r\nimport {parseSqueezeAttributes, squeeze} from './ops/squeeze';\r\nimport {sum} from './ops/sum';\r\nimport {tile} from './ops/tile';\r\nimport {parseTransposeAttributes, transpose} from './ops/transpose';\r\nimport * as unaryOps from './ops/unary-op';\r\nimport {parseUnsqueezeAttributes, unsqueeze} from './ops/unsqueeze';\r\nimport {parseUpsampleAttributesV7, parseUpsampleAttributesV9, upsample} from './ops/upsample';\r\n\r\nexport const WEBGL_OP_RESOLVE_RULES: readonly OpSet.ResolveRule[] = [\r\n ['Abs', ", '6+', unaryOps.abs],\r\n ['Acos', ", '7+', unaryOps.acos],\r\n ['Add', ", '7+', binaryOps.add],\r\n ['And', ", '7+', binaryOps.and],\r\n ['Asin', ", '7+', unaryOps.asin],\r\n ['Atan', ", '7+', unaryOps.atan],\r\n // TODO: support new attributes for AveragePool-10\r\n ['AveragePool', ", '7-10', averagePool, parseAveragePoolAttributes],\r\n ['BatchNormalization', ", '7+', batchNormalization, parseBatchNormalizationAttributes],\r\n ['Ceil', ", '6+', unaryOps.ceil],\r\n ['Clip', ", '6-10', unaryOps.clip, unaryOps.parseClipAttributes],\r\n ['Concat', ", '4+', concat, parseConcatAttributes],\r\n ['Conv', ", '1+', conv, parseConvAttributes],\r\n ['Cos', ", '7+', unaryOps.cos],\r\n ['Div', ", '7+', binaryOps.div],\r\n ['Dropout', ", '7+', unaryOps.identity],\r\n ['DepthToSpace', ", '1+', depthToSpace, parseDepthToSpaceAttributes],\r\n ['Equal', ", '7+', binaryOps.equal],\r\n ['Elu', ", '6+', unaryOps.elu, unaryOps.parseEluAttributes],\r\n ['Exp', ", '6+', unaryOps.exp],\r\n ['Flatten', ", '1+', flatten, parseFlattenAttributes],\r\n ['Floor', ", '6+', unaryOps.floor],\r\n ['Gather', ", '1+', gather, parseGatherAttributes],\r\n ['Gemm', ", '7-10', gemm, parseGemmAttributesV7],\r\n ['Gemm', ", '11+', gemm, parseGemmAttributesV11],\r\n ['GlobalAveragePool', ", '1+', globalAveragePool, parseGlobalAveragePoolAttributes],\r\n ['GlobalMaxPool', ", '1+', globalMaxPool],\r\n ['Greater', ", '7+', binaryOps.greater],\r\n ['Identity', ", '1+', unaryOps.identity],\r\n ['ImageScaler', ", '1+', imageScaler, parseImageScalerAttributes],\r\n ['InstanceNormalization', ", '6+', instanceNormalization, parseInstanceNormalizationAttributes],\r\n ['LeakyRelu', ", '6+', unaryOps.leakyRelu, unaryOps.parseLeakyReluAttributes],\r\n ['Less', ", '7+', binaryOps.less],\r\n ['Log', ", '6+', unaryOps.log],\r\n ['MatMul', ", '1+', matMul, parseMatMulAttributes],\r\n // TODO: support new attributes for MaxPool-8 and MaxPool-10\r\n ['MaxPool', ", '1-9', maxPool, parseMaxPoolAttributes],\r\n ['Mul', ", '7+', binaryOps.mul],\r\n ['Neg', ", '6+', unaryOps.neg],\r\n ['Not', ", '1+', unaryOps.not],\r\n ['Or', ", '7+', binaryOps.or],\r\n ['Pad', ", '2-10', pad, parsePadAttributes],\r\n ['Pow', ", '7+', binaryOps.pow],\r\n ['PRelu', ", '7+', binaryOps.pRelu],\r\n ['ReduceLogSum', ", '1+', reduceLogSum, parseReduceAttributes],\r\n ['ReduceMax', ", '1+', reduceMax, parseReduceAttributes],\r\n ['ReduceMean', ", '1+', reduceMean, parseReduceAttributes],\r\n ['ReduceMin', ", '1+', reduceMin, parseReduceAttributes],\r\n ['ReduceProd', ", '1+', reduceProd, parseReduceAttributes],\r\n ['ReduceSum', ", '1+', reduceSum, parseReduceAttributes],\r\n ['ReduceSumSquare', ", '1+', reduceLogSumSquare, parseReduceAttributes],\r\n ['Relu', ", '6+', unaryOps.relu],\r\n ['Reshape', ", '5+', reshape],\r\n ['Resize', ", '10', resize, parseResizeAttributesV10],\r\n ['Resize', ", '11+', resize, parseResizeAttributesV11],\r\n ['Shape', ", '1+', shape],\r\n ['Sigmoid', ", '6+', unaryOps.sigmoid],\r\n ['Sin', ", '7+', unaryOps.sin],\r\n ['Slice', ", '10+', sliceV10], // TODO: support 'steps' for Slice-10\r\n ['Slice', ", '1-9', slice, parseSliceAttributes],\r\n ['Softmax', ", '1+', softmax, parseSoftmaxAttributes],\r\n // 'Split' operator has an optional attribute 'split'\r\n // this attribute determines how the specified axis of input data is split.\r\n // When the attribute is missing, we need the count of number of outputs\r\n // so that we can determine the 'split' attribute from the runtime input to the Operator\r\n ['Split', ", '2+', split, parseSplitAttributes],\r\n ['Sqrt', '', '6+', unaryOps.sqrt],\r\n ['Squeeze', '', '1+', squeeze, parseSqueezeAttributes],\r\n ['Sub', '', '7+', binaryOps.sub],\r\n ['Sum', '', '6+', sum],\r\n ['Tan', '', '7+', unaryOps.tan],\r\n ['Tanh', '', '6+', unaryOps.tanh],\r\n ['Tile', '', '6+', tile],\r\n ['Transpose', '', '1+', transpose, parseTransposeAttributes],\r\n ['Upsample', '', '7-8', upsample, parseUpsampleAttributesV7],\r\n ['Upsample', '', '9', upsample, parseUpsampleAttributesV9],\r\n ['Unsqueeze', '', '1+', unsqueeze, parseUnsqueezeAttributes],\r\n ['Xor', '', '7+', binaryOps.xor],\r\n];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface BatchNormalizationAttributes extends AttributeWithCacheKey {\r\n epsilon: number;\r\n momentum: number;\r\n spatial: number;\r\n}\r\n\r\nconst batchNormalizationProgramMetadata = {\r\n name: 'BatchNormalization',\r\n inputNames: ['A', 'Scale', 'B', 'Mean', 'Variance'],\r\n inputTypes:\r\n [TextureType.unpacked, TextureType.unpacked, TextureType.unpacked, TextureType.unpacked, TextureType.unpacked]\r\n};\r\n\r\nexport const batchNormalization: OperatorImplementation<BatchNormalizationAttributes> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: BatchNormalizationAttributes): Tensor[] => {\r\n   validateInputs(inputs);\r\n   const output = inferenceHandler.run(\r\n   {\r\n   ...batchNormalizationProgramMetadata,\r\n   cacheHint: attributes.cacheKey,\r\n   get: () => createBatchNormalizationProgramInfo(inferenceHandler, inputs, attributes)\r\n   },\r\n   inputs);\r\n   return [output];\r\n   };\r\n\r\nexport const parseBatchNormalizationAttributes: OperatorInitialization<BatchNormalizationAttributes> =\r\n   (node: Graph.Node): BatchNormalizationAttributes => {\r\n   const epsilon = node.attributes.getFloat('epsilon', 1e-5);\r\n   const momentum = node.attributes.getFloat('momentum', 0.9);\r\n   const spatial = node.attributes.getInt('spatial', 1);\r\n   return createAttributeWithCacheKey({epsilon, momentum, spatial});\r\n   };\r\n\r\nconst createBatchNormalizationProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: BatchNormalizationAttributes):\r\n   ProgramInfo => {\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const rank = inputs[0].dims.length;\r\n   const [scaleWidth, scaleHeight] =\r\n   inferenceHandler.calculateTextureWidthAndHeight(inputs[1].dims, TextureType.unpacked);\r\n   const shaderSource = `\r\n float process(int[${rank}] indices) {\r\n   vec2 position = offsetToCoords(indices[1], ${scaleWidth}, ${scaleHeight});\r\n   float scale = getColorAsFloat(${glsl.texture2D}(Scale, position));\r\n   float mean = getColorAsFloat(${glsl.texture2D}(Mean, position));\r\n   float variance = getColorAsFloat(${glsl.texture2D}(Variance, position));\r\n   float b = getColorAsFloat(${glsl.texture2D}(B, position));\r\n\r\n   return scale * ((_A(indices) - mean) / sqrt(variance + float(${attributes.epsilon}))) + b;\r\n }`;\r\n   return {\r\n   ...batchNormalizationProgramMetadata,\r\n   output: {dims: inputs[0].dims, type: inputs[0].type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 5) {\r\n   throw new Error('BatchNormalization requires 5 inputs.');\r\n }\r\n\r\n const X = inputs[0];\r\n const scale = inputs[1];\r\n const B = inputs[2];\r\n const mean = inputs[3];\r\n const var_ = inputs[4];\r\n\r\n // input should atleast have three dimensions - N,C,dim1,...,dimn\r\n // other inputs can have only one dimensions\r\n if (X.dims.length < 3 || scale.dims.length !== 1 || B.dims.length !== 1 || mean.dims.length !== 1 ||\r\n   var_.dims.length !== 1) {\r\n   throw new Error('invalid input shape.');\r\n }\r\n if (scale.dims[0] !== X.dims[1] || B.dims[0] !== X.dims[1] || mean.dims[0] !== X.dims[1] ||\r\n   var_.dims[0] !== X.dims[1]) {\r\n   throw new Error('invalid input shape.');\r\n }\r\n if ((X.type !== 'float32' && X.type !== 'float64') || (scale.type !== 'float32' && scale.type !== 'float64') ||\r\n   (B.type !== 'float32' && B.type !== 'float64') || (mean.type !== 'float32' && mean.type !== 'float64') ||\r\n   (var_.type !== 'float32' && var_.type !== 'float64')) {\r\n   throw new Error('invalid input tensor types.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {BroadcastUtil, ShapeUtil} from '../../../util';\r\nimport {FunctionType, GlslValueFunction} from '../glsl-definitions';\r\nimport {getGlsl} from

'../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, TextureType} from '../types';\r\n\r\nexport function glslAdd(): GlslValueFunction {\r\n const name = 'add_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return a + b;\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n return v1 + v2;\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslDiv(): GlslValueFunction {\r\n const name = 'div_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return a / b;\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n return v1 / v2;\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslMul(): GlslValueFunction {\r\n const name = 'mul_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return a * b;\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n return v1 * v2;\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslSub(): GlslValueFunction {\r\n const name = 'sub_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return a - b;\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n return v1 - v2;\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslEqual(): GlslValueFunction {\r\n const name = 'equal_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return float(a == b);\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n return vec4(equal(v1, v2));\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslGreater(): GlslValueFunction {\r\n const name = 'greater_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return float(a > b);\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n return vec4( v1.r > v2.r ,\r\n v1.g > v2.g,\r\n v1.b > v2.b,\r\n v1.a > v2.a );\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslLess(): GlslValueFunction {\r\n const name = 'less_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return float(a < b);\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n return vec4( v1.r < v2.r ,\r\n v1.g < v2.g,\r\n v1.b < v2.b,\r\n v1.a < v2.a );\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslAnd(): GlslValueFunction {\r\n const name = 'and_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return float( bool(a) && bool(b) );\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n bvec4 b1 = bvec4(v1);\r\n bvec4 b2 = bvec4(v2);\r\n return vec4( b1.r && b2.r ,\r\n b1.g && b2.g,\r\n b1.b && b2.b,\r\n b1.a && b2.a );\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslOr(): GlslValueFunction {\r\n const name = 'or_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return float( bool(a) || bool(b) );\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n bvec4 b1 = bvec4(v1);\r\n bvec4 b2 = bvec4(v2);\r\n return vec4( b1.r || b2.r ,\r\n b1.g || b2.g,\r\n b1.b || b2.b,\r\n b1.a || b2.a );\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslXor(): GlslValueFunction {\r\n const name = 'xor_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return float( bool(a) ^^ bool(b) );\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n bvec4 b1 = bvec4(v1);\r\n bvec4 b2 = bvec4(v2);\r\n return vec4( b1.r ^^ b2.r ,\r\n b1.g ^^ b2.g,\r\n b1.b ^^ b2.b,\r\n b1.a ^^ b2.a );\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslPow(): GlslValueFunction {\r\n return glslBuiltinBinary('pow');\r\n}\r\nexport function glslPRelu(): GlslValueFunction {\r\n const name = 'prelu_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return a < 0.0 ? a * b: a;\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n return vec4(\r\n v1.r < 0.0 ? v1.r * v2.r: v1.r,\r\n v1.g < 0.0 ? v1.g * v2.g: v1.g,\r\n v1.b < 0.0 ? v1.b * v2.b: v1.b,\r\n v1.a < 0.0 ? v1.a * v2.a: v1.a\r\n );\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\n\r\nfunction glslBuiltinBinary(fname: string): GlslValueFunction {\r\n const name = `${fname}_`;\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return ${fname}(a, b);\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n return ${fname}(v1, v2);\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\n\r\nconst createBinaryProgramInfoLoader =\r\n (handler: WebGLInferenceHandler, inputs: Tensor[], glslFunc: GlslValueFunction,\r\n outputTensorType: Tensor.DataType = inputs[0].type, cacheKey?: string): ProgramInfoLoader => {\r\n const textureType = handler.session.pack ? TextureType.packed : TextureType.unpacked;\r\n return {\r\n name: glslFunc.name,\r\n inputNames: ['A', 'B'],\r\n inputTypes: [textureType, textureType],\r\n cacheHint: cacheKey,\r\n get: () => createBinaryProgramInfo(handler, inputs, glslFunc, outputTensorType)\r\n };\r\n

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};\r\n\r\nconst createBinaryProgramInfo =\r\n    (handler: WebGLInferenceHandler, inputs: Tensor[], glslFunc:
GlslValueFunction,\r\n     outputTensorType: Tensor.DataType = inputs[0].type): ProgramInfo => {\r\n      const
textureType = handler.session.pack ? TextureType.packed : TextureType.unpacked;\r\n      const isBroadcast =
!ShapeUtil.areEqual(inputs[0].dims, inputs[1].dims);\r\n      let outputShape = inputs[0].dims;\r\n\r\n      const
usePackedTexture = handler.session.pack;\r\n\r\n      if (isBroadcast) {\r\n        const calculatedShape =
BroadcastUtil.calcShape(inputs[0].dims, inputs[1].dims, false);\r\n        if (!calculatedShape) {\r\n          throw new
Error('Can\\'t perform binary op on the given tensors');\r\n        }\r\n        outputShape = calculatedShape;\r\n
const outputRank = outputShape.length;\r\n        const aRank = inputs[0].dims.length !== 0 ? inputs[0].dims.length :
1;\r\n        const bRank = inputs[1].dims.length !== 0 ? inputs[1].dims.length : 1;\r\n        const aBcast =
inputs[0].dims.length !== 0 ? 'bcastIndices_A(indices, aindices);' : 'aindices[0] = 0;';\r\n        const bBcast =
inputs[1].dims.length !== 0 ? 'bcastIndices_B(indices, bindices);' : 'bindices[0] = 0;';\r\n\r\n        const glsl =
getGlsl(handler.session.backend.glContext.version);\r\n        const shaderSource = usePackedTexture ? `\r\n
${glslFunc.body}\r\n      void main() {\r\n        vec4 a = getAAtOutCoords();\r\n        vec4 b =
getBAtOutCoords();\r\n        vec4 result = ${glslFunc.name}(a, b);\r\n        ${glsl.output} = result;\r\n      }` :\r\n
                                    `\r\n      ${glslFunc.body}\r\n      float process(int indices[${outputRank}]) {\r\n        int
aindices[${aRank}];\r\n        int bindices[${bRank}];\r\n        ${aBcast}\r\n        ${bBcast}\r\n        return
${glslFunc.name}(_A(aindices), _B(bindices));\r\n      }`;\r\n\r\n        return {\r\n          name: glslFunc.name,\r\n
  inputNames: ['A', 'B'],\r\n          inputTypes: [textureType, textureType],\r\n          output: {dims: outputShape,
type: outputTensorType, textureType},\r\n          shaderSource,\r\n          hasMain: usePackedTexture\r\n        };\r\n
 }\r\n      const glsl = getGlsl(handler.session.backend.glContext.version);\r\n      const shaderSource = `\r\n
${glslFunc.body}\r\n    void main() {\r\n      vec4 v1 = ${glsl.texture2D}(A, TexCoords);\r\n      vec4 v2 =
${glsl.texture2D}(B, TexCoords);\r\n      vec4 result = ${glslFunc.name}(v1, v2);\r\n      ${glsl.output} = result;\r\n
 }\r\n    `;\r\n\r\n      return {\r\n        name: glslFunc.name,\r\n        inputNames: ['A', 'B'],\r\n        inputTypes:
[textureType, textureType],\r\n        output: {dims: inputs[0].dims, type: outputTensorType, textureType},\r\n
shaderSource,\r\n        hasMain: true\r\n      };\r\n    };\r\n\r\nexport const add = (handler: WebGLInferenceHandler,
inputs: Tensor[]):\r\n    Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslAdd()),
inputs)];\r\n\r\nexport const and = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslAnd(), 'bool'), inputs)];\r\n\r\nexport const div =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslDiv()), inputs)];\r\n\r\nexport const equal =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslEqual(), 'bool'), inputs)];\r\n\r\nexport const
greater = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslGreater(), 'bool'), inputs)];\r\n\r\nexport const less
= (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslLess(), 'bool'), inputs)];\r\n\r\nexport const mul =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslMul()), inputs)];\r\n\r\nexport const or = (handler:
WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslOr(), 'bool'), inputs)];\r\n\r\nexport const pow =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslPow()), inputs)];\r\n\r\nexport const pRelu =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslPRelu()), inputs)];\r\n\r\nexport const sub =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslSub()), inputs)];\r\n\r\nexport const xor =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslXor(), 'bool'), inputs)];\r\n","// Copyright (c)
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Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from
'../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-
handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport
{getCoordsDataType, getGlChannels} from '../utils';\r\nimport {ConcatAttributes} from './concat';\r\n\r\nimport
{getChannels, unpackFromChannel} from './packing-utils';\r\n\r\nconst createPackedConcatProgramMetadata =
(inputCount: number, cacheHint: string) => ({\r\n  name: 'Concat (packed)',\r\n  inputNames: Array.from({length:
inputCount}, (v, i) => `X${i}`),\r\n  inputTypes: Array(inputCount).fill(TextureType.packed),\r\n
cacheHint\r\n});\r\n\r\nconst createPackedConcatProgramInfo =\r\n    (handler: WebGLInferenceHandler, metadata:
ProgramMetadata, inputs: Tensor[], axis: number): ProgramInfo => {\r\n      const inputShape =
inputs[0].dims.slice();\r\n      if (axis >= inputShape.length || axis < (-1 * inputShape.length)) {\r\n        throw new
Error('axis specified for concat doesn\\'t match input dimensionality');\r\n      }\r\n      if (axis < 0) {\r\n        axis =
inputShape.length + axis;\r\n      }\r\n      // ensure all of the non-concatenated axes match each other\r\n      //
calculate the shape of the output tensor while we do that\r\n      const outputShape = inputShape.slice(0);\r\n      for
(let i = 1; i < inputs.length; i++) {\r\n        const dataNShape = inputs[i].dims.slice();\r\n        for (let axisIndex = 0;
axisIndex < inputShape.length; axisIndex++) {\r\n          // add to the placeholder for computing output shape\r\n
 if (axisIndex === axis) {\r\n            outputShape[axis] += dataNShape[axisIndex];\r\n          }\r\n          // ensure all
non-cancatenated axes match each other\r\n          else if (inputShape[axisIndex] !== dataNShape[axisIndex]) {\r\n
      throw new Error('non concat dimensions must match');\r\n          }\r\n        }\r\n      }\r\n\r\n      const rank =
outputShape.length;\r\n      const coords = getChannels('coords', rank);\r\n      const dtype =
getCoordsDataType(rank);\r\n      const unpackChannel = unpackFromChannel();\r\n\r\n      const shapes =
inputs.map(i => i.dims);\r\n      const channels = getGlChannels(rank);\r\n      const offsets: number[] = new
Array(shapes.length - 1);\r\n\r\n      offsets[0] = shapes[0][axis];\r\n      for (let i = 1; i < offsets.length; i++) {\r\n
offsets[i] = offsets[i - 1] + shapes[i][axis];\r\n      }\r\n\r\n      const channel = channels[axis];\r\n      const
lastChannels = channels.slice(-2);\r\n      const allChannels = channels.join();\r\n\r\n      let getValueSnippet = `if
(${channel} < ${offsets[0]}) {\r\n        return getChannel(\r\n            getX0(${allChannels}),
vec2(${lastChannels.join()}));\r\n        }`;\r\n      for (let i = 1; i < offsets.length; i++) {\r\n        const shift = offsets[i
- 1];\r\n        getValueSnippet += `\r\n            if (${channel} < ${offsets[i]}  && ${channel} >= ${offsets[i - 1]})
{\r\n              return getChannel(\r\n                getX${i}(${getShiftedChannelsSnippet(channels, channel, shift)}),\r\n
              vec2(${getShiftedChannelsSnippet(lastChannels, channel, shift)}));\r\n            }`;\r\n      }\r\n      const
lastIndex = offsets.length;\r\n      const shift = offsets[offsets.length - 1];\r\n      getValueSnippet += `\r\n
return getChannel(\r\n              getX${lastIndex}(${getShiftedChannelsSnippet(channels, channel, shift)}),\r\n
  vec2(${getShiftedChannelsSnippet(lastChannels, channel, shift)}));`;\r\n\r\n      const glsl =
getGlsl(handler.session.backend.glContext.version);\r\n\r\n      const shaderSource = `\r\n
${unpackChannel}\r\n          float getValue(${channels.map(x => 'int ' + x)}) {\r\n            ${getValueSnippet}\r\n
   }\r\n\r\n          void main() {\r\n            ${dtype} coords = getOutputCoords();\r\n            int lastDim =
coords.${channels[rank - 1]};\r\n            coords.${channels[rank - 1]} = coords.${channels[rank - 2]};\r\n
coords.${channels[rank - 2]} = lastDim;\r\n\r\n            vec4 result = vec4(getValue(${coords}), 0., 0., 0.);\r\n\r\n
    ${coords[rank - 1]} = ${coords[rank - 1]} + 1;\r\n            if (${coords[rank - 1]} < ${outputShape[rank - 1]})
{\r\n              result.g = getValue(${coords});\r\n            }\r\n\r\n            ${coords[rank - 2]} = ${coords[rank - 2]} +
1;\r\n            if (${coords[rank - 2]} < ${outputShape[rank - 2]}) {\r\n              result.a = getValue(${coords});\r\n
      }\r\n\r\n            ${coords[rank - 1]} = ${coords[rank - 1]} - 1;\r\n            if (${coords[rank - 2]} <
${outputShape[rank - 2]} &&\r\n                ${coords[rank - 1]} < ${outputShape[rank - 1]}) {\r\n              result.b =
getValue(${coords});\r\n            }\r\n            ${glsl.output} = result;\r\n          }\r\n        `;\r\n\r\n      return {\r\n
...metadata,\r\n        output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.packed},\r\n
shaderSource,\r\n        hasMain: true,\r\n      };\r\n    };\r\n\r\nexport const createPackedConcatProgramInfoLoader
=\r\n    (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: ConcatAttributes): ProgramInfoLoader =>
{\r\n      const metadata = createPackedConcatProgramMetadata(inputs.length, attributes.cacheKey);\r\n      return
{...metadata, get: () => createPackedConcatProgramInfo(handler, metadata, inputs, attributes.axis)};\r\n
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};\r\n\r\nconst getShiftedChannelsSnippet = (channels: string[], channel: string, shift: number): string => {\r\n  const
channelIdx = channels.indexOf(channel);\r\n  const res = channels.map((c, idx) => {\r\n    if (idx === channelIdx)
{\r\n      return `${c} - ${shift}`;\r\n    } else {\r\n      return c;\r\n    }\r\n  });\r\n  return res.join();\r\n};\r\n","//
Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph}
from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport
{Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport
{ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nimport
{createPackedConcatProgramInfoLoader} from './concat-packed';\r\n\r\nexport interface ConcatAttributes extends
AttributeWithCacheKey {\r\n  readonly axis: number;\r\n}\r\n\r\nexport const concat:
OperatorImplementation<ConcatAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: ConcatAttributes): Tensor[] => {\r\n      validateInputs(inputs);\r\n      if (inferenceHandler.session.pack
&& inputs[0].dims.length > 1) {\r\n        const output =\r\n
inferenceHandler.run(createPackedConcatProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n
return [output];\r\n      } else {\r\n        const output =\r\n
inferenceHandler.run(createUnpackedConcatProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n
  return [output];\r\n      }\r\n    };\r\n\r\nconst createUnpackedConcatProgramMetadata = (inputCount: number,
cacheHint: string) => ({\r\n  name: 'Concat',\r\n  inputNames: Array.from({length: inputCount}, (v, i) =>
`X${i}`),\r\n  inputTypes: Array(inputCount).fill(TextureType.unpacked),\r\n  cacheHint\r\n});\r\n\r\nconst
createUnpackedConcatProgramInfo =\r\n    (handler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs:
Tensor[], axis: number): ProgramInfo => {\r\n      const inputShape = inputs[0].dims.slice();\r\n      if (axis >=
inputShape.length || axis < (-1 * inputShape.length)) {\r\n        throw new Error('axis specified for concat doesn\\'t
match input dimensionality');\r\n      }\r\n      if (axis < 0) {\r\n        axis = inputShape.length + axis;\r\n      }\r\n      //
ensure all of the non-concatenated axes match each other\r\n      // calculate the shape of the output tensor while we
do that\r\n      const outputShape = inputShape.slice(0);\r\n      for (let i = 1; i < inputs.length; i++) {\r\n        const
dataNShape = inputs[i].dims.slice();\r\n        for (let axisIndex = 0; axisIndex < inputShape.length; axisIndex++)
{\r\n          // add to the placeholder for computing output shape\r\n          if (axisIndex === axis) {\r\n
outputShape[axis] += dataNShape[axisIndex];\r\n          }\r\n          // ensure all non-cancatenated axes match each
other\r\n          else if (inputShape[axisIndex] !== dataNShape[axisIndex]) {\r\n            throw new Error('non concat
dimensions must match');\r\n          }\r\n        }\r\n      }\r\n\r\n      const rank = outputShape.length;\r\n\r\n      const
sizeInConcatAxis = new Array<number>(inputs.length);\r\n      let previousSum = 0;\r\n      for (let i = 0; i <
sizeInConcatAxis.length; ++i) {\r\n        previousSum += inputs[i].dims[axis];\r\n        sizeInConcatAxis[i] =
previousSum;\r\n      }\r\n\r\n      let getTextureIndexWhereDataResidesMethod = '';\r\n      // in most cases linear
search is sufficient, as in most scenarios, only 2 tensors are concatenated\r\n      if (inputs.length < 5) {\r\n
getTextureIndexWhereDataResidesMethod =
getTextureIndexWhereDataResidesLinearSearch(sizeInConcatAxis);\r\n      } else {\r\n
getTextureIndexWhereDataResidesMethod =
getTextureIndexWhereDataResidesBinarySearch(sizeInConcatAxis);\r\n      }\r\n\r\n      const
fetchDataFromCorrectTextureMethod = getFetchDataFromCorrectTextureMethod(inputs.length, rank);\r\n      const
getSizeInConcatAxisValueFromIndexMethod =
getGetSizeInConcatAxisValueFromIndexMethod(sizeInConcatAxis);\r\n      const shaderSource = `\r\n
${fetchDataFromCorrectTextureMethod}\r\n        ${getSizeInConcatAxisValueFromIndexMethod}\r\n
${getTextureIndexWhereDataResidesMethod}\r\n        float process(int indices[${rank}]) {\r\n          int
textureIndex = getTextureWhereDataResides (indices[${axis}]);\r\n\r\n          if(textureIndex != 0) {\r\n
indices[${axis}] = indices[${axis}] - int(getSizeInConcatAxisValueFromIndex(textureIndex-int(1)));\r\n
}\r\n\r\n          return fetchDataFromCorrectTexture(textureIndex, indices);\r\n        }`;\r\n      return {\r\n
...metadata,\r\n        output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n
shaderSource,\r\n      };\r\n    };\r\n\r\nconst createUnpackedConcatProgramInfoLoader =\r\n    (handler:
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WebGLInferenceHandler, inputs: Tensor[], attributes: ConcatAttributes): ProgramInfoLoader => {\r\n   const metadata = createUnpackedConcatProgramMetadata(inputs.length, attributes.cacheKey);\r\n   return {...metadata, get: () => createUnpackedConcatProgramInfo(handler, metadata, inputs, attributes.axis)};\r\n   };\r\n\r\nconst getTextureIndexWhereDataResidesLinearSearch = (sizeInConcatAxis: number[]): string => {\r\n const searchAxis = sizeInConcatAxis.map((size, i) => `if(index<${size}) {return ${i};}\r\n`);\r\n return `int getTextureWhereDataResides(int index) {\r\n      ${searchAxis.join('')}\r\n    }`;\r\n};\r\n\r\n// TODO: Implement BinarySearch in GLSL\r\nconst getTextureIndexWhereDataResidesBinarySearch = (sizeInConcatAxis: number[]): string =>\r\n   getTextureIndexWhereDataResidesLinearSearch(sizeInConcatAxis);\r\n\r\nconst getFetchDataFromCorrectTextureMethod = (numberOfTensors: number, tensorRank: number) => {\r\n const codeLines: string[] = [`float fetchDataFromCorrectTexture(int textureIndex, int indices[${tensorRank}]) {`];\r\n for (let i = 0; i < numberOfTensors; ++i) {\r\n   if (i === 0) {\r\n   codeLines.push(\r\n   '\\t' +\r\n   `if (textureIndex == ${i}) { return _X${i}(indices); }`);\r\n   } else if (i === numberOfTensors - 1) {\r\n   codeLines.push(\r\n   '\\t' +\r\n   `else { return _X${i}(indices); }`);\r\n   } else {\r\n   codeLines.push(\r\n   '\\t' +\r\n   `else if (textureIndex == ${i}) { return _X${i}(indices); }`);\r\n   }\r\n }\r\n codeLines.push(\r\n   '\\t' +\r\n   '}');\r\n return codeLines.join('\\n');\r\n};\r\n\r\nconst getGetSizeInConcatAxisValueFromIndexMethod = (sizeInConcatAxis: number[]): string => {\r\n const codeLines: string[] = ['int getSizeInConcatAxisValueFromIndex(int index) {'];\r\n for (let i = 0; i < sizeInConcatAxis.length; ++i) {\r\n   if (i === 0) {\r\n   codeLines.push(\r\n   '\\t' +\r\n   `if (index == ${i}) { return ${sizeInConcatAxis[i]}; }`);\r\n   } else if (i === sizeInConcatAxis.length - 1) {\r\n   codeLines.push(\r\n   '\\t' +\r\n   `else { return ${sizeInConcatAxis[i]}; }`);\r\n   } else {\r\n   codeLines.push(\r\n   '\\t' +\r\n   `else if (index == ${i}) { return ${sizeInConcatAxis[i]}; }`);\r\n   }\r\n }\r\n codeLines.push(\r\n   '\\t' +\r\n   '}');\r\n\r\n return codeLines.join('\\n');\r\n};\r\n\r\nexport const parseConcatAttributes: OperatorInitialization<ConcatAttributes> = (node: Graph.Node): ConcatAttributes =>\r\n   createAttributeWithCacheKey({axis: node.attributes.getInt('axis')});\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length < 1) {\r\n   throw new Error('too few inputs');\r\n }\r\n\r\n const inputType = inputs[0].type;\r\n const inputDimensionality = inputs[0].dims.length;\r\n\r\n // TODO: Support string concat\r\n if (inputType === 'string') {\r\n   throw new Error('string tensor is not supported yet');\r\n }\r\n\r\n for (const input of inputs) {\r\n   // make sure types of all inputs match\r\n   if (input.type !== inputType) {\r\n   throw new Error('input tensors should be one type');\r\n   }\r\n\r\n   // make sure the dimensionality of all inputs are the same\r\n   if (input.dims.length !== inputDimensionality) {\r\n   throw new Error('input tensors should have the same shape');\r\n   }\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Logger} from '../../../instrument';\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nimport {calculateOutputShape, ConvAttributes} from './conv';\r\nimport {getActicationSnippet} from './fuse-utils';\r\n\r\nconst createUnpackedGroupedConvProgramMetadata = (hasBias: boolean, cacheHint: string): ProgramMetadata => ({\r\n name: 'GroupedConv',\r\n inputNames: hasBias ? ['X', 'W', 'Bias'] : ['X', 'W'],\r\n inputTypes: hasBias ? [TextureType.unpacked, TextureType.unpacked, TextureType.unpacked] :\r\n   [TextureType.unpacked, TextureType.unpacked],\r\n cacheHint\r\n});\r\n\r\nconst createUnpackedGroupedConvProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], metadata: ProgramMetadata,\r\n   attributes: ConvAttributes): ProgramInfo => {\r\n   const hasBias = inputs.length > 2;\r\n   const processBias = hasBias ? 'value += getBias(output_channel);' : '';\r\n   const xShape = inputs[0].dims.slice();\r\n   const wShape = inputs[1].dims.slice();\r\n   const outputChannelsPerGroup = wShape[0] / attributes.group;\r\n   Logger.verbose(\r\n   'GroupedConv',\r\n   `autpPad:${attributes.autoPad}, dilations:${attributes.dilations}, group:${attributes.group}, kernelShape:${\r\n              attributes.kernelShape}, pads:${attributes.pads}, strides:${attributes.strides}`);\r\n   const outputShape =\r\n   calculateOutputShape(xShape, wShape, attributes.dilations, attributes.pads, attributes.strides);\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const {activationFunction, applyActivation} =

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getActicationSnippet(attributes);\r\n\r\n      const shaderSource = `\r\n  const ivec2 strides =
ivec2(${attributes.strides[0]}, ${attributes.strides[1]});\r\n  const ivec2 pads = ivec2(${attributes.pads[0]},
${attributes.pads[1]});\r\n  ${activationFunction}\r\n  void main() {\r\n    ivec4 coords = getOutputCoords();\r\n
int batch = coords.x;\r\n    int output_channel = coords.y;\r\n    ivec2 xRCCorner = coords.zw * strides - pads;\r\n
int group_id = output_channel / ${outputChannelsPerGroup};\r\n\r\n    float value = 0.0;\r\n    for (int wInChannel =
0; wInChannel < ${wShape[1]}; wInChannel++) {\r\n      int input_channel = group_id * ${wShape[1]} +
wInChannel;\r\n      for (int wHeight = 0; wHeight < ${wShape[2]}; wHeight++) {\r\n        int xHeight =
xRCCorner.x + wHeight * ${attributes.dilations[0]};\r\n\r\n        if (xHeight < 0 || xHeight >= ${xShape[2]}) {\r\n
    continue;\r\n        }\r\n\r\n        for (int wWidth = 0; wWidth < ${wShape[3]}; wWidth++) {\r\n          int xWidth =
xRCCorner.y + wWidth * ${attributes.dilations[1]};\r\n          if (xWidth < 0 || xWidth >= ${xShape[3]}) {\r\n
continue;\r\n          }\r\n\r\n          float xVal = getX(batch, input_channel, xWidth, xHeight);\r\n          float wVal =
getW(output_channel, wInChannel, wWidth, wHeight);\r\n          value += xVal*wVal;\r\n        }\r\n      }\r\n    }\r\n
 ${processBias}\r\n    ${applyActivation}\r\n    ${glsl.output} = vec4(value, .0, .0, .0);\r\n  }\r\n`;\r\n      return {\r\n
     ...metadata,\r\n        output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n
   shaderSource,\r\n        hasMain: true,\r\n      };\r\n    };\r\n\r\nexport const
createUnpackedGroupedConvProgramInfoLoader =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs:
readonly Tensor[], attributes: ConvAttributes):\r\n        ProgramInfoLoader => {\r\n          const metadata =
createUnpackedGroupedConvProgramMetadata(inputs.length > 2, attributes.cacheKey);\r\n          return {\r\n
...metadata,\r\n            get: () => createUnpackedGroupedConvProgramInfo(inferenceHandler, inputs, metadata,
attributes)\r\n          };\r\n        };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed
under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from
'../inference-handler';\r\nimport {calculateOutputShape, ConvAttributes} from './conv';\r\nimport
{createPackedIm2ColProgramInfoLoader} from './im2col-pack';\r\nimport
{createPackedMatmulProgramInfoLoader} from './matmul-pack';\r\n\r\nexport const conv2DPackedPointwise =\r\n
 (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes): Tensor =>
{\r\n      const xshape = inputs[0].dims;\r\n      const kshape = inputs[1].dims;\r\n      const outputShape =\r\n
calculateOutputShape(xshape, kshape, attributes.dilations, attributes.pads, attributes.strides);\r\n      const reshapedX
= inferenceHandler.reshapePacked(inputs[0], [xshape[1], xshape[2] * xshape[3]]);\r\n      const reshapedK =
inferenceHandler.reshapePacked(inputs[1], [kshape[0], kshape[1]]);\r\n\r\n      const matmulInputs = inputs.length >
2 ? [reshapedK, reshapedX, inputs[2]] : [reshapedK, reshapedX];\r\n      const matmulOutput =
inferenceHandler.run(\r\n          createPackedMatmulProgramInfoLoader(inferenceHandler, matmulInputs,
attributes), matmulInputs);\r\n      return inferenceHandler.reshapePacked(matmulOutput, outputShape);\r\n
};\r\n\r\nexport const conv2DPacked =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: readonly
Tensor[], attributes: ConvAttributes): Tensor => {\r\n      const xshape = inputs[0].dims;\r\n      const kshape =
inputs[1].dims;\r\n      const outputShape =\r\n          calculateOutputShape(xshape, kshape, attributes.dilations,
attributes.pads, attributes.strides);\r\n\r\n      // run im2col\r\n      const im2colOutput = inferenceHandler.run(\r\n
  createPackedIm2ColProgramInfoLoader(inferenceHandler, inputs[0], inputs[1], outputShape, attributes),\r\n
[inputs[0]]);\r\n\r\n      // reshape kernel\r\n      const kernelReshaped = inferenceHandler.reshapePacked(inputs[1],
[kshape[0], kshape[1] * kshape[2] * kshape[3]]);\r\n\r\n      // run matmul\r\n      const matmulInputs =\r\n
(inputs.length === 3) ? [kernelReshaped, im2colOutput, inputs[2]] : [kernelReshaped, im2colOutput];\r\n      const
matmulOutput = inferenceHandler.run(\r\n          createPackedMatmulProgramInfoLoader(inferenceHandler,
matmulInputs, attributes), matmulInputs);\r\n\r\n      // reshape output\r\n      const outputReshaped =
inferenceHandler.reshapePacked(matmulOutput, outputShape);\r\n      return outputReshaped;\r\n    };\r\n","//
Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport
{InferenceHandler} from '../../../backend';\r\nimport {Graph} from '../../../graph';\r\nimport
{OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from
'../../../tensor';\r\nimport {PoolConvUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-
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handler';\r\n\r\nimport {createUnpackedGroupedConvProgramInfoLoader} from './conv-grouped';\r\nimport
{conv2DPacked} from './conv-pack';\r\nimport {createDotProductProgramInfoLoader} from './dot-
product';\r\nimport {InternalActivationAttributes, parseInternalActivationAttributes} from './fuse-utils';\r\nimport
{createIm2ColProgramInfoLoader} from './im2col';\r\nimport {createMatmulProgramInfoLoader} from
'./matmul';\r\n\r\n\r\n\r\nexport const calculateOutputShape =\r\n    (inputShape: readonly number[], kernelShape:
readonly number[], dilations: readonly number[],\r\n     adjustPads: readonly number[], strides: readonly number[]):
number[] => {\r\n      const batchSize = inputShape[0];\r\n      const inputSpatialShape = inputShape.slice(2);\r\n
const spatialRank = inputSpatialShape.length;\r\n      const outChannels = kernelShape[0];\r\n      const
kernelSpatialShape = kernelShape.slice(2);\r\n      const dilatedKernelShape = kernelSpatialShape.map((v, i) => v +
(v - 1) * (dilations[i] - 1));\r\n      const inputSpatialShapeWithPad = inputSpatialShape.map((v, i) => v +
adjustPads[i] + adjustPads[i + spatialRank]);\r\n      const outputSpatialShape =\r\n
inputSpatialShapeWithPad.map((v, i) => Math.floor((v - dilatedKernelShape[i] + strides[i]) / strides[i]));\r\n
const outputShape = [batchSize, outChannels].concat(...outputSpatialShape);\r\n      return outputShape;\r\n
};\r\n\r\nexport interface ConvAttributes extends InternalActivationAttributes, AttributeWithCacheKey {\r\n
readonly autoPad: string;\r\n  readonly dilations: readonly number[];\r\n  readonly group: number;\r\n  readonly
kernelShape: readonly number[];\r\n  readonly pads: readonly number[];\r\n  readonly strides: readonly
number[];\r\n}\r\n\r\nexport const conv: OperatorImplementation<ConvAttributes> =\r\n    (inferenceHandler:
InferenceHandler, inputs: Tensor[], attributes: ConvAttributes): Tensor[] => {\r\n      validateInputs(inputs,
attributes);  // currently will fail if not conv2D\r\n      return conv2d(inferenceHandler, inputs, attributes);\r\n
};\r\n\r\nconst conv2d: OperatorImplementation<ConvAttributes> =\r\n    (inferenceHandler:
WebGLInferenceHandler, inputs: Tensor[], attributes: ConvAttributes): Tensor[] => {\r\n      const
adjustedAttributes = getAdjustedConvAttributes(attributes, inputs);\r\n      const packMode =
inferenceHandler.session.pack;\r\n      const isPointwise = adjustedAttributes.kernelShape[0] === 1 &&
adjustedAttributes.kernelShape[1] === 1;\r\n      if (adjustedAttributes.group > 1) {\r\n        const result =
inferenceHandler.run(\r\n            createUnpackedGroupedConvProgramInfoLoader(inferenceHandler, inputs,
adjustedAttributes), inputs);\r\n        return [result];\r\n      } else if (isPointwise && packMode) {\r\n        return
[conv2DUnpackedPointwise(inferenceHandler, inputs, adjustedAttributes)];\r\n      } else if (packMode &&
inputs[0].dims.length === 4 && inputs[0].dims[0] === 1 && !isPointwise) {\r\n        return
[conv2DPacked(inferenceHandler, inputs, adjustedAttributes)];\r\n      } else {\r\n        return
[conv2DUnpacked(inferenceHandler, inputs, adjustedAttributes)];\r\n      }\r\n    };\r\n\r\nconst
conv2DUnpackedPointwise =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[],
attributes: ConvAttributes): Tensor => {\r\n      const xshape = inputs[0].dims;\r\n      const kshape =
inputs[1].dims;\r\n      const outputShape =\r\n          calculateOutputShape(xshape, kshape, attributes.dilations,
attributes.pads, attributes.strides);\r\n      const reshapedX = inferenceHandler.reshapeUnpacked(inputs[0],
[xshape[1], xshape[2] * xshape[3]]);\r\n      const reshapedK = inferenceHandler.reshapeUnpacked(inputs[1],
[kshape[0], kshape[1]]);\r\n\r\n      const matmulInputs = inputs.length > 2 ? [reshapedK, reshapedX, inputs[2]] :
[reshapedK, reshapedX];\r\n      const matmulOutput =
inferenceHandler.run(createMatmulProgramInfoLoader(matmulInputs, attributes), matmulInputs);\r\n      return
inferenceHandler.reshapeUnpacked(matmulOutput, outputShape);\r\n    };\r\n\r\nconst conv2DUnpacked =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes): Tensor => {\r\n
    const xshape = inputs[0].dims;\r\n      const kshape = inputs[1].dims;\r\n      const outputShape =\r\n
calculateOutputShape(xshape, kshape, attributes.dilations, attributes.pads, attributes.strides);\r\n      const xIm2Col =
inferenceHandler.run(\r\n          createIm2ColProgramInfoLoader(inferenceHandler, inputs[0], inputs[1],
outputShape, attributes), [inputs[0]]);\r\n\r\n      const dotProductInputs = inputs.length === 3 ? [xIm2Col, inputs[1],
inputs[2]] : [xIm2Col, inputs[1]];\r\n      const output = inferenceHandler.run(\r\n
createDotProductProgramInfoLoader(inferenceHandler, inputs, outputShape, attributes), dotProductInputs);\r\n
return output;\r\n    };\r\n\r\nconst getAdjustedConvAttributes = <T extends ConvAttributes>(attributes: T, inputs:
Tensor[]): T => {\r\n  const kernelShape = attributes.kernelShape.slice();\r\n  // if kernelShape is not specified in the
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attributes of this op, infer it from the weight tensor dims\r\n  if (attributes.kernelShape.length === 0) {\r\n    for (let i
= 2; i < inputs[1].dims.length; ++i) {\r\n      kernelShape.push(inputs[1].dims[i]);\r\n    }\r\n  }\r\n  const pads =
attributes.pads.slice();\r\n  PoolConvUtil.adjustPadsBasedOnAutoPad(\r\n      inputs[0].dims, attributes.strides,
attributes.dilations, kernelShape, pads, attributes.autoPad);\r\n\r\n  // always return a new object so does not modify
the original attributes\r\n  const newAttributes: T = Object.assign({}, attributes);\r\n  Object.assign(newAttributes,
{kernelShape, pads, cacheKey: attributes.cacheKey});\r\n  return newAttributes;\r\n};\r\n\r\nexport const
parseConvAttributes: OperatorInitialization<ConvAttributes> = (node: Graph.Node): ConvAttributes => {\r\n  const
attributes = node.attributes;\r\n  const activationAttributes = parseInternalActivationAttributes(attributes);\r\n  //
TODO : Make this generic enough to compute default attributes for multi-dimensional conv\r\n  const autoPad =
attributes.getString('auto_pad', 'NOTSET');\r\n  const dilations = attributes.getInts('dilations', [1, 1]);\r\n  const group
= attributes.getInt('group', 1);\r\n  const kernelShape = attributes.getInts('kernel_shape', []);\r\n  const pads =
attributes.getInts('pads', [0, 0, 0, 0]);\r\n  const strides = attributes.getInts('strides', [1, 1]);\r\n\r\n  return
createAttributeWithCacheKey({autoPad, dilations, group, kernelShape, pads, strides,
...activationAttributes});\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[], attributes: ConvAttributes): void =>
{\r\n  // Refer to the below link for all input checks\r\n  //
https://github.com/onnx/onnx/blob/master/docs/Operators.md#Conv\r\n  if (!inputs || (inputs.length !== 2 &&
inputs.length !== 3)) {\r\n    throw new Error('Conv requires 2 or 3 inputs');\r\n  }\r\n\r\n  // TODO : Need to add
support for multi-dimensional conv\r\n  if (inputs[0].dims.length !== 4 || inputs[1].dims.length !== 4) {\r\n    throw
new Error('currently only support 2-dimensional conv');\r\n  }\r\n\r\n  // FILTER_IN_CHANNEL should be equal to
DATA_CHANNEL\r\n  const dataChannel = inputs[0].dims[1];\r\n  const filterInChannel = inputs[1].dims[1] *
attributes.group;\r\n  if (dataChannel !== filterInChannel) {\r\n    throw new Error('FILTER_IN_CHANNEL should
be equal to DATA_CHANNEL');\r\n  }\r\n\r\n  // if bias is provided it should be 1D and the number of elements
should be equal to the number of feature maps\r\n  if (inputs.length === 3 && (inputs[2].dims.length !== 1 ||
inputs[1].dims[0] !== inputs[2].dims[0])) {\r\n    throw new Error('invalid bias');\r\n  }\r\n\r\n  const spatialRank =
inputs[0].dims.length - 2;\r\n  // wrong dilations dimension\r\n  if (attributes.dilations.length !== spatialRank) {\r\n
throw new Error(`dilations should be ${spatialRank}D`);\r\n  }\r\n\r\n  // Wrong strides dimension\r\n  if
(attributes.strides.length !== spatialRank) {\r\n    throw new Error(`strides should be ${spatialRank}D`);\r\n
}\r\n\r\n  // Wrong pads dimension\r\n  if (attributes.pads.length !== spatialRank * 2) {\r\n    throw new Error(`pads
should be ${spatialRank * 2}D`);\r\n  }\r\n\r\n  // if kernelShape is specified, it's data length must be 2 less than
dims length of the weights tensor\r\n  // (the first 2 dims are batch_size and channels)\r\n  if
(attributes.kernelShape.length !== 0 && attributes.kernelShape.length !== inputs[1].dims.length - 2) {\r\n    throw
new Error('invalid kernel shape');\r\n  }\r\n\r\n  // TODO : Need to add support for float64\r\n  if (inputs[0].type !==
'float32' || inputs[1].type !== 'float32') {\r\n    throw new Error('Conv input(X,W) should be float tensor');\r\n
}\r\n\r\n  if (inputs.length === 3 && inputs[2].type !== 'float32') {\r\n    throw new Error('Conv input(bias) should
be float tensor');\r\n  }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under
the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation,
OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\n\r\nimport {transpose, TransposeAttributes} from
'./transpose';\r\n\r\nexport interface DepthToSpaceAttributes {\r\n  mode: 'DCR'|'CRD';\r\n  blocksize:
number;\r\n}\r\n\r\nexport const depthToSpace: OperatorImplementation<DepthToSpaceAttributes> =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: DepthToSpaceAttributes): Tensor[] =>
{\r\n      validateInputs(inputs);\r\n      const blocksize = attributes.blocksize;\r\n      const blocksizeSqr = blocksize *
blocksize;\r\n      const transposePerm = attributes.mode === 'DCR' ? [0, 3, 4, 1, 5, 2] : [0, 1, 4, 2, 5, 3];\r\n      const
firstReshapeShape = attributes.mode === 'DCR' ?\r\n          [\r\n            inputs[0].dims[0], blocksize, blocksize,
inputs[0].dims[1] / blocksizeSqr, inputs[0].dims[2],\r\n            inputs[0].dims[3]\r\n          ] :\r\n          [\r\n
inputs[0].dims[0], inputs[0].dims[1] / blocksizeSqr, blocksize, blocksize, inputs[0].dims[2],\r\n
inputs[0].dims[3]\r\n          ];\r\n\r\n      // const transpose = new WebGLTranspose();\r\n      // const attributes = new
Attribute(undefined);\r\n      // attributes.set('perm', 'ints', transposePerm);\r\n      //
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transpose.initialize(attributes);\r\n\r\n      // First reshape\r\n      const firstReshapedTensor =
inferenceHandler.reshapeUnpacked(inputs[0], firstReshapeShape);\r\n\r\n      // transpose\r\n      const
transposeAttributes: TransposeAttributes = {perm: transposePerm, cacheKey: `${transposePerm}`};\r\n      const
[transposeOutput] = transpose(inferenceHandler, [firstReshapedTensor], transposeAttributes);\r\n\r\n      // Second
reshape\r\n      const secondReshapeShape = [\r\n        inputs[0].dims[0], inputs[0].dims[1] / blocksizeSqr,
inputs[0].dims[2] * blocksize,\r\n        inputs[0].dims[3] * blocksize\r\n      ];\r\n      const result =
inferenceHandler.reshapeUnpacked(transposeOutput, secondReshapeShape);\r\n      return [result];\r\n
};\r\n\r\nexport const parseDepthToSpaceAttributes: OperatorInitialization<DepthToSpaceAttributes> =\r\n    (node:
Graph.Node): DepthToSpaceAttributes => {\r\n      // processing node attributes\r\n      const blocksize =
node.attributes.getInt('blocksize');\r\n      if (blocksize < 1) {\r\n        throw new Error(`blocksize must be >= 1, but
got : ${blocksize} for DepthToSpace`);\r\n      }\r\n      const mode = node.attributes.getString('mode', 'DCR');\r\n
if (mode !== 'DCR' && mode !== 'CRD') {\r\n        throw new Error(`unrecognized mode: ${mode} for
DepthToSpace`);\r\n      }\r\n      return {mode, blocksize};\r\n    };\r\n\r\nconst validateInputs = (inputs: Tensor[]):
void => {\r\n  if (inputs.length !== 1) {\r\n    throw new Error(`DepthToSpace expect 1 inputs, but got
${inputs.length}`);\r\n  }\r\n\r\n  // Input has to be a 4-D tensor\r\n  // TODO: Support string depth-to-space.\r\n  if
(inputs[0].type === 'string' || inputs[0].dims.length !== 4) {\r\n    throw new TypeError('DepthToSpace input should
be a 4-D numeric tensor');\r\n  }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n//
Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from
'../../../util';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-
handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport
{getActicationSnippet, InternalActivationAttributes} from './fuse-utils';\r\nimport {calculateIm2ColDims} from
'./im2col';\r\n\r\nconst createDotProductProgramMetadata = (hasBias: boolean, attributes:
InternalActivationAttributes) => ({\r\n  name: 'ConvDotProduct',\r\n  inputNames: hasBias ? ['Im2Col', 'K', 'B'] :
['Im2Col', 'K'],\r\n  inputTypes: hasBias ? [TextureType.unpacked, TextureType.packedLastDimension,
TextureType.unpacked] :\r\n                        [TextureType.unpacked, TextureType.packedLastDimension],\r\n
cacheKey: attributes.activationCacheKey\r\n});\r\n\r\nconst createDotProductProgramInfo =\r\n
(inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: readonly Tensor[],\r\n
outputShape: number[], attributes: InternalActivationAttributes): ProgramInfo => {\r\n      const xshape =
inputs[0].dims;\r\n      const kshape = inputs[1].dims;\r\n      const adjustedKernelShape = [kshape[0],
Math.ceil((xshape[1] * kshape[2] * kshape[3]) / 4)];\r\n      const im2colShape = calculateIm2ColDims(xshape,
kshape, outputShape);\r\n      const [kWidth, kHeight] =\r\n
inferenceHandler.calculateTextureWidthAndHeight(adjustedKernelShape,
TextureType.packedLastDimension);\r\n\r\n      const im2colStrides = ShapeUtil.computeStrides(im2colShape);\r\n
  const [im2colWidth, im2colHeight] =\r\n          inferenceHandler.calculateTextureWidthAndHeight(im2colShape,
TextureType.packedLastDimension);\r\n      const rank = outputShape.length;\r\n\r\n      const initValue =
(inputs.length < 3) ? '0.0' : '_B(b)';\r\n      const sharedDim = Math.ceil(xshape[1] * kshape[2] * kshape[3] / 4);\r\n
const {activationFunction, applyActivation} = getActicationSnippet(attributes);\r\n      const glsl =
getGlsl(inferenceHandler.session.backend.glContext.version);\r\n      const shaderSource =
`\r\n${activationFunction}\r\nfloat process(int indices[${rank}]) {\r\n  int b[1];\r\n  b[0] = indices[1];\r\n  int
im2col[4];\r\n  im2col[0] = indices[0];\r\n  im2col[1] = indices[2];\r\n  im2col[2] = indices[3];\r\n  int im2colOffset
= im2col[0] * ${im2colStrides[0]} + im2col[1] * ${im2colStrides[1]} + im2col[2] * ${\r\n
im2colStrides[2]};\r\n  int kernelOffset = indices[1] * ${adjustedKernelShape[1]};\r\n  float value =
${initValue};\r\n  for (int i = 0; i < ${sharedDim}; ++i) {\r\n    vec2 im2colCoords = offsetToCoords(im2colOffset,
${im2colWidth}, ${im2colHeight});\r\n    vec2 kernelCoords = offsetToCoords(kernelOffset, ${kWidth},
${kHeight});\r\n    value += dot(${glsl.texture2D}(Im2Col, im2colCoords), ${glsl.texture2D}(K,
kernelCoords));\r\n    ++im2colOffset;\r\n    ++kernelOffset;\r\n  }\r\n  ${applyActivation}\r\n  return
value;\r\n}`;\r\n      return {\r\n        ...metadata,\r\n        output: {dims: outputShape, type: inputs[0].type,
textureType: TextureType.unpacked},\r\n        shaderSource\r\n      };\r\n    };\r\n\r\nexport const
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createDotProductProgramInfoLoader =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], outputShape: number[],\r\n   attributes: InternalActivationAttributes): ProgramInfoLoader => {\r\n   const metadata = createDotProductProgramMetadata(inputs.length > 2, attributes);\r\n   return {\r\n   ...metadata,\r\n   get: () => createDotProductProgramInfo(inferenceHandler, metadata, inputs, outputShape, attributes)\r\n   };\r\n   };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const flatten: OperatorImplementation<number> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axis: number): Tensor[] => {\r\n   validateInputs(inputs, axis);\r\n\r\n   const outputDims = ShapeUtil.flattenShape(inputs[0].dims, axis);\r\n   return [inferenceHandler.reshapeUnpacked(inputs[0], outputDims)];\r\n   };\r\n\r\nexport const parseFlattenAttributes: OperatorInitialization<number> = (node: Graph.Node): number =>\r\n   node.attributes.getInt('axis', 1); // default axis is 1\r\n\r\nconst validateInputs = (inputs: Tensor[], axis: number): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Flatten requires 1 input.');\r\n }\r\n\r\n const r = inputs[0].dims.length;\r\n if (r === 0) {\r\n   throw new Error('scalar tensor is not supported.');\r\n }\r\n\r\n if (axis < -r || axis > r) {\r\n   throw new Error('Invalid axis');\r\n }\r\n\r\n // TODO: Support string type\r\n if (inputs[0].type === 'string') {\r\n   throw new Error('string tensor is not supported.');\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Attribute} from '../../../attribute';\r\nimport {GlslValueFunction} from '../glsl-definitions';\r\nimport {glslClip, glslRelu, glslSigmoid} from './unary-op';\r\n\r\nexport interface InternalActivationAttributes {\r\n readonly activation: string;\r\n readonly clipMin?: number;\r\n readonly clipMax?: number;\r\n readonly activationCacheKey: string;\r\n}\r\n\r\nexport function getActicationSnippet(attributes: InternalActivationAttributes) {\r\n let func: GlslValueFunction;\r\n switch (attributes.activation) {\r\n   case 'Relu':\r\n   func = glslRelu();\r\n   break;\r\n   case 'Sigmoid':\r\n   func = glslSigmoid();\r\n   break;\r\n   case 'Clip':\r\n   func = glslClip(attributes.clipMin!, attributes.clipMax!);\r\n   break;\r\n   // TODO: adding other activations that can be fused.\r\n   default:\r\n   return {activationFunction: ", applyActivation: "};\r\n }\r\n\r\n const activationName = func.name;\r\n const activationFunction = func.body;\r\n const applyActivation = `value = ${activationName}_(value);`;\r\n return {activationFunction, applyActivation};\r\n}\r\n\r\nexport const parseInternalActivationAttributes = (attributes: Attribute): InternalActivationAttributes => {\r\n const activation = attributes.getString('__internal_activation', ");\r\n\r\n if (activation === 'Clip') {\r\n   const clipMax = attributes.getFloat('__clip_max', 3.402823e+38);\r\n   const clipMin = attributes.getFloat('__clip_min', -3.402823e+38);\r\n   return {activation, clipMax, clipMin, activationCacheKey: `${activation}:${clipMin},${clipMax}`};\r\n }\r\n return {activation, activationCacheKey: activation};\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {NUMBER_TYPES, OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\ninterface GatherAttributes extends AttributeWithCacheKey {\r\n readonly axis: number;\r\n}\r\n\r\nexport const gather: OperatorImplementation<GatherAttributes> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: GatherAttributes): Tensor[] => {\r\n   validateInputs(inputs, attributes.axis);\r\n   const output = inferenceHandler.run(createGatherProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n   return [output];\r\n   };\r\n\r\nexport const parseGatherAttributes: OperatorInitialization<GatherAttributes> = (node: Graph.Node): GatherAttributes =>\r\n   createAttributeWithCacheKey({axis: node.attributes.getInt('axis', 0)});\r\n\r\nconst gatherProgramMetadata = {\r\n name: 'Gather',\r\n inputNames: ['A', 'B'],\r\n inputTypes: [TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nconst createGatherProgramInfo =\r\n   (handler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: Tensor[], axis: number): ProgramInfo => {\r\n

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const inputShape = inputs[0].dims.slice();\r\n      const indexDataShape = inputs[1].dims.slice();\r\n      const
outputShape = new Array(inputShape.length + indexDataShape.length - 1);\r\n\r\n      axis =
ShapeUtil.normalizeAxis(axis, inputShape.length);\r\n      const indexCopyOps: string[] = [];\r\n      for (let i = 0; i <
outputShape.length; i++) {\r\n        // outputShape is divided into three parts: A, B, C\r\n        // |0        axis|  axis +
indexDataShape.length |          end|\r\n        // |     A       |            B                 |      C      |\r\n        //\r\n        // inputIdx:
[A, inputs[1][B], C]\r\n        if (i < axis) {  // A\r\n          outputShape[i] = inputShape[i];\r\n
indexCopyOps.push(`inputIdx[${i}] = outputIdx[${i}];`);\r\n        } else {\r\n          if (i < axis +
indexDataShape.length) {  // B\r\n            outputShape[i] = indexDataShape[i - axis];\r\n
indexCopyOps.push(`indexDataIdx[${i - axis}] = outputIdx[${i}];`);\r\n          } else {
     // C\r\n            outputShape[i] = inputShape[i - indexDataShape.length + 1];  // skip 1 for axis\r\n
indexCopyOps.push(`inputIdx[${i - indexDataShape.length + 1}] = outputIdx[${i}];`);\r\n          }\r\n        }\r\n
}\r\n\r\n      const orank = outputShape.length || 1;\r\n      const irank = inputShape.length;\r\n      const iDrank =
indexDataShape.length || 1;\r\n      const shaderSource = `\r\n      float process(int outputIdx[${orank}]) {\r\n        int
inputIdx[${irank}];\r\n        int indexDataIdx[${iDrank}];\r\n        indexDataIdx[0] = 0;\r\n
${indexCopyOps.join('\\n        ')}\r\n        int idx = int(_B(indexDataIdx));\r\n        inputIdx[${axis}] = idx < 0 ? idx
+ ${inputShape[axis]} : idx;\r\n        return _A(inputIdx);\r\n      }`;\r\n      return {\r\n        ...metadata,\r\n
output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n        shaderSource\r\n
};\r\n    };\r\n\r\nconst createGatherProgramInfoLoader =\r\n    (handler: WebGLInferenceHandler, inputs: Tensor[],
attributes: GatherAttributes): ProgramInfoLoader => {\r\n      const metadata = {...gatherProgramMetadata,
cacheHint: attributes.cacheKey};\r\n      return {...metadata, get: () => createGatherProgramInfo(handler, metadata,
inputs, attributes.axis)};\r\n    };\r\n\r\nconst validateInputs = (inputs: Tensor[], axis: number): void => {\r\n  if
(!inputs || inputs.length !== 2) {\r\n    throw new Error('Gather requires 2 inputs.');\r\n  }\r\n  const tensorRank =
inputs[0].dims.length;\r\n  if (tensorRank < 1) {\r\n    throw new Error('Invalid input shape.');\r\n  }\r\n  if (axis < -
tensorRank || axis > tensorRank - 1) {\r\n    throw new Error('Invalid axis.');\r\n  }\r\n  if
(NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n    throw new Error('Invaid input type.');\r\n  }\r\n  if
(inputs[1].type !== 'int32' && inputs[1].type !== 'int16') {\r\n    throw new Error('Invaid input type.');\r\n
}\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-
key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from
'../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {GemmUtil} from '../../../util';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader,
ProgramMetadata, TextureType} from '../types';\r\n\r\nexport interface GemmAttributes extends
AttributeWithCacheKey {\r\n  transA: boolean;\r\n  transB: boolean;\r\n  alpha: number;\r\n  beta: number;\r\n
isOptionalC: boolean;  // in opset 11, C becomes optional\r\n}\r\n\r\nexport const gemm:
OperatorImplementation<GemmAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: GemmAttributes): Tensor[] => {\r\n      validateInputs(inputs, attributes);\r\n      const output =
inferenceHandler.run(createGemmProgramInfoLoader(inputs, attributes), inputs);\r\n      return [output];\r\n
};\r\n\r\nconst parseGemmAttributes = (node: Graph.Node, isOptionalC: boolean): GemmAttributes => {\r\n  const
transA = node.attributes.getInt('transA', 0) !== 0;\r\n  const transB = node.attributes.getInt('transB', 0) !== 0;\r\n
const alpha = node.attributes.getFloat('alpha', 1.0);\r\n  const beta = node.attributes.getFloat('beta', 1.0);\r\n  return
createAttributeWithCacheKey({transA, transB, alpha, beta, isOptionalC});\r\n};\r\n\r\nexport const
parseGemmAttributesV7: OperatorInitialization<GemmAttributes> = (node: Graph.Node): GemmAttributes =>\r\n
parseGemmAttributes(node, false);\r\n\r\nexport const parseGemmAttributesV11:
OperatorInitialization<GemmAttributes> = (node: Graph.Node): GemmAttributes =>\r\n
parseGemmAttributes(node, true);\r\n\r\nconst createGemmProgramInfoLoader = (inputs: Tensor[], attributes:
GemmAttributes): ProgramInfoLoader => {\r\n  const metadata = {\r\n    name: 'Gemm',\r\n    inputNames:
inputs.length === 3 ? ['A', 'B', 'C'] : ['A', 'B'],\r\n    inputTypes: inputs.length === 3 ? [TextureType.unpacked,
TextureType.unpacked, TextureType.unpacked] :\r\n                              [TextureType.unpacked,
```

TextureType.unpacked],\r\n key: attributes.cacheKey\r\n };\r\n\r\n return {...metadata, get: () => createGemmProgramInfo(metadata, inputs, attributes)};\r\n};\r\n\r\nconst createGemmProgramInfo =\r\n (metadata: ProgramMetadata, inputs: Tensor[], attributes: GemmAttributes): ProgramInfo => {\r\n const aShape = inputs[0].dims.slice();\r\n const bShape = inputs[1].dims.slice();\r\n const [M, N] = GemmUtil.getShapeOfGemmResult(\r\n aShape, attributes.transA, bShape, attributes.transB, inputs.length === 3 ? inputs[2].dims : undefined);\r\n const outputShape = [M, N];\r\n if (!outputShape) {\r\n throw new Error('Can\\'t use gemm on the given tensors');\r\n }\r\n let sharedDim = aShape[aShape.length - 1];\r\n let line = '';\r\n if (attributes.transA) {\r\n sharedDim = aShape[0];\r\n }\r\n if (attributes.transA && attributes.transB) {\r\n line = 'value += _A_T(a) * _B_T(b);';\r\n } else if (attributes.transA && !attributes.transB) {\r\n line = 'value += _A_T(a) * _B(b);';\r\n } else if (!attributes.transA && attributes.transB) {\r\n line = 'value += _A(a) * _B_T(b);';\r\n } else if (!attributes.transA && !attributes.transB) {\r\n line = 'value += _A(a) * _B(b);';\r\n }\r\n const rank = outputShape.length;\r\n const declareC = inputs.length === 3 ? `int c[${inputs[2].dims.length}];` : '';\r\n const broadcastC = inputs.length === 3 ? 'bcastIndices_C(indices, c);' : '';\r\n const calculateC = inputs.length === 3 ? 'value += beta * _C(c);' : '';\r\n const shaderSource = `\r\n float process(int indices[${rank}]) {\r\n int a[${rank}];\r\n int b[${rank}];\r\n ${declareC}\r\n\r\n copyVec(indices, a);\r\n copyVec(indices, b);\r\n ${broadcastC}\r\n\r\n float value = 0.0;\r\n for (int k=0; k<${sharedDim}; ++k) {\r\n a[${rank - 1}] = k;\r\n b[${rank - 2}] = k;\r\n ${line}\r\n }\r\n\r\n value = value * alpha;\r\n ${calculateC}\r\n return value;\r\n }`;\r\n return {\r\n ...metadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n variables: [\r\n {name: 'alpha', type: 'float', data: attributes.alpha}, {name: 'beta', type: 'float', data: attributes.beta}\r\n],\r\n shaderSource\r\n };\r\n };\r\n\r\nconst validateInputs = (inputs: Tensor[], attributes: GemmAttributes): void => {\r\n if (!inputs) {\r\n throw new Error('Input is missing');\r\n }\r\n if (attributes.isOptionalC && (inputs.length < 2 || inputs.length > 3)) {\r\n throw new Error('Invaid input shape.');\r\n }\r\n if (!attributes.isOptionalC && inputs.length !== 3) {\r\n throw new Error('Gemm requires 3 inputs');\r\n }\r\n\r\n // 'C' can be of dimensionality 1 or 2 only\r\n if (inputs.length === 3 && inputs[2].dims.length !== 1 && inputs[2].dims.length !== 2) {\r\n throw new Error('Invalid input shape of C');\r\n }\r\n\r\n if ((inputs[0].type !== 'float32' && inputs[0].type !== 'float64') ||\r\n (inputs[1].type !== 'float32' && inputs[1].type !== 'float64') ||\r\n (inputs.length === 3 && inputs[2].type !== 'float32' && inputs[2].type !== 'float64')) {\r\n throw new Error('Invalid input type.');\r\n }\r\n\r\n if ((inputs[0].type !== inputs[1].type) || (inputs.length === 3 && inputs[0].type !== inputs[2].type)) {\r\n throw new Error('Input types are mismatched');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport {ConvAttributes} from './conv';\r\nimport {unpackFromChannel} from './packing-utils';\r\n\r\nconst createPackedIm2ColProgramMetadata = (cacheHint: string) => ({\r\n name: 'Im2Col (packed)',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.packed],\r\n cacheHint,\r\n});\r\n\r\nconst createPackedIm2ColProgramInfo =\r\n (inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, x: Tensor, w: Tensor,\r\n outputShape: readonly number[], attributes: ConvAttributes): ProgramInfo => {\r\n const xshape = x.dims;\r\n const wshape = w.dims;\r\n const rowDim = 2;\r\n const colDim = 3;\r\n const rank = outputShape.length;\r\n const im2colShape = [wshape[1] * wshape[2] * wshape[3], outputShape[2] * outputShape[3]];\r\n const kernelSize = wshape[2] * wshape[3];\r\n const unpackChannel = unpackFromChannel();\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n let unrolled = '';\r\n\r\n for (let row = 0; row <= 1; row++) {\r\n for (let col = 0; col <= 1; col++) {\r\n unrolled += `\r\n blockIndex = rc.x + ${col};\r\n pos = rc.y + ${row};\r\n\r\n if(blockIndex < ${im2colShape[1]} && pos < ${im2colShape[0]}) {\r\n offsetY = int(blockIndex / (${outputShape[rank - 1]})) * ${attributes.strides[0]} - ${\r\n attributes.pads[0]};\r\n d0 = offsetY + ${attributes.dilations[0]} * (imod(pos, ${kernelSize}) / ${wshape[2]});\r\n\r\n if(d0 < ${xshape[rowDim]}

&& d0 >= 0) {\r\n offsetX = imod(blockIndex, ${outputShape[rank - 1]}) * ${attributes.strides[1]} - ${\r\n attributes.pads[1]};\r\n d1 = offsetX + ${attributes.dilations[1]} * imod(imod(pos, ${kernelSize}), ${wshape[2]});\r\n\r\n if(d1 < ${xshape[colDim]} && d1 >= 0) {\r\n\r\n ch = int(float(pos)/ ${kernelSize}.);\r\n innerDims = vec2(d0, d1);\r\n result[${row * 2 + col}] = getChannel(\r\n getA(0, ch, int(innerDims.x),\r\n int(innerDims.y)), innerDims);\r\n }\r\n }\r\n }\r\n\r\n `;\r\n }\r\n }\r\n\r\n const shaderSource = `\r\n ${unpackChannel}\r\n\r\n void main() {\r\n ivec2 rc = getOutputCoords();\r\n vec4 result = vec4(0.0);\r\n int blockIndex, pos, offsetY, d0, offsetX, d1, ch;\r\n vec2 innerDims;\r\n ${unrolled}\r\n ${glsl.output} = result;\r\n }\r\n `;\r\n return {\r\n ...metadata,\r\n output: {dims: im2colShape, type: x.type, textureType: TextureType.packed},\r\n shaderSource,\r\n hasMain: true\r\n };\r\n };\r\n\r\nexport const createPackedIm2ColProgramInfoLoader =\r\n (inferenceHandler: WebGLInferenceHandler, x: Tensor, w: Tensor, outputShape: readonly number[],\r\n attributes: ConvAttributes): ProgramInfoLoader => {\r\n const metadata = createPackedIm2ColProgramMetadata(attributes.cacheKey);\r\n return {\r\n ...metadata,\r\n get: () => createPackedIm2ColProgramInfo(inferenceHandler, metadata, x, w, outputShape, attributes)\r\n };\r\n };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport {ConvAttributes} from './conv';\r\n\r\nconst createIm2ColProgramMetadata = (cacheHint: string) => ({\r\n name: 'Im2Col',\r\n inputNames: ['X'],\r\n inputTypes: [TextureType.unpacked],\r\n cacheHint,\r\n});\r\n\r\nconst createIm2ColProgramInfo =\r\n (inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, x: Tensor, w: Tensor,\r\n outputShape: readonly number[], attributes: ConvAttributes): ProgramInfo => {\r\n const xshape = x.dims;\r\n const wshape = w.dims;\r\n\r\n const rank = outputShape.length;\r\n const im2colDims = calculateIm2ColDims(xshape, wshape, outputShape, 4);\r\n\r\n const shaderSource = `\r\n const int XC = ${xshape[1]};\r\n const int XH = ${xshape[2]};\r\n const int XW = ${xshape[3]};\r\n const int KH = ${attributes.kernelShape[0]};\r\n const int KW = ${attributes.kernelShape[1]};\r\n const int dilationH = ${attributes.dilations[0]};\r\n const int dilationW = ${attributes.dilations[1]};\r\n const int strideH = ${attributes.strides[0]};\r\n const int strideW = ${attributes.strides[1]};\r\n const int padH = ${attributes.pads[0]};\r\n const int padW = ${attributes.pads[1]};\r\n const int KHKW = KH*KW;\r\n const int XCKHKW = XC * KHKW;\r\n const int outputChannels = 4;\r\n vec4 process(int indices[${rank}]) {\r\n int b = indices[0]; // batch size\r\n int oh = indices[1] * strideH - padH; //output height\r\n int ow = indices[2] * strideW - padW; //output width\r\n int p = indices[3] * outputChannels; //patch\r\n vec4 value = vec4(0.0);\r\n for(int i=0; i < outputChannels; ++i) {\r\n if(p < XCKHKW) {\r\n int patchC = p / KHKW;\r\n int patchH = (p - patchC*KHKW) / KW;\r\n int patchW = (p - patchC*KHKW) - patchH * KW;\r\n int xh2 = oh + patchH * dilationH;\r\n int xw2 = ow + patchW * dilationW;\r\n int x[${xshape.length}];\r\n x[0] = b;\r\n x[1] = patchC;\r\n x[2] = xh2;\r\n x[3] = xw2;\r\n if(xh2 >= 0 &&\r\n xh2 < XH &&\r\n xw2 >= 0 &&\r\n xw2 < XW) {\r\n value[i] = _X(x);\r\n }\r\n }\r\n ++p;\r\n }\r\n return value;\r\n }\r\n `;\r\n return {\r\n ...metadata,\r\n output: {dims: im2colDims, type: x.type, textureType: TextureType.packedLastDimension},\r\n shaderSource\r\n };\r\n };\r\n\r\nexport const createIm2ColProgramInfoLoader =\r\n (inferenceHandler: WebGLInferenceHandler, x: Tensor, w: Tensor, outputShape: readonly number[],\r\n attributes: ConvAttributes): ProgramInfoLoader => {\r\n const metadata = createIm2ColProgramMetadata(attributes.cacheKey);\r\n return {\r\n ...metadata,\r\n get: () => createIm2ColProgramInfo(inferenceHandler, metadata, x, w, outputShape, attributes)\r\n };\r\n };\r\n\r\n\r\nexport const calculateIm2ColDims =\r\n (inputShape: readonly number[], kernelShape: readonly number[], outputShape: readonly number[], channels = 4):\r\n number[] =>\r\n [outputShape[0], outputShape[2], outputShape[3],\r\n Math.ceil(inputShape[1] * kernelShape[2] * kernelShape[3] / channels)];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT

License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport interface ImageScalerAttributes extends AttributeWithCacheKey {\r\n scale: number;\r\n bias: number[];\r\n}\r\n\r\nexport const imageScaler: OperatorImplementation<ImageScalerAttributes> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ImageScalerAttributes): Tensor[] => {\r\n   validateInputs(inputs);\r\n   const output =\r\n   inferenceHandler.run(createImageScalerProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n   return [output];\r\n   };\r\n\r\nexport const parseImageScalerAttributes: OperatorInitialization<ImageScalerAttributes> =\r\n   (node: Graph.Node): ImageScalerAttributes => {\r\n   const scale = node.attributes.getFloat('scale');\r\n   const bias = node.attributes.getFloats('bias');\r\n   return createAttributeWithCacheKey({scale, bias});\r\n   };\r\n\r\nconst imageScalerProgramMetadata = {\r\n name: 'ImageScaler',\r\n inputNames: ['X'],\r\n inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nconst createImageScalerProgramInfo =\r\n   (handler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: Tensor[], attributes: ImageScalerAttributes):\r\n   ProgramInfo => {\r\n   const outputShape = inputs[0].dims.slice();\r\n   const rank = outputShape.length;\r\n   const getBiasMethod = createGetBiasMethod(attributes.bias.length);\r\n   const shaderSource = `\r\n      ${getBiasMethod}\r\n      float process(int indices[${rank}]) {\r\n        return _X(indices) * scale + getBias(bias, indices[1]);\r\n      }`;\r\n   return {\r\n   ...metadata,\r\n   output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n   variables: [\r\n   {name: 'bias', type: 'float', arrayLength: attributes.bias.length, data: attributes.bias},\r\n   {name: 'scale', type: 'float', data: attributes.scale}\r\n   ],\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst createImageScalerProgramInfoLoader =\r\n   (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: ImageScalerAttributes): ProgramInfoLoader => {\r\n   const metadata = {...imageScalerProgramMetadata, cacheHint: attributes.cacheKey};\r\n   return {...metadata, get: () => createImageScalerProgramInfo(handler, metadata, inputs, attributes)};\r\n   };\r\n\r\nconst createGetBiasMethod = (numChannels: number): string => {\r\n const codeLines: string[] = [`float getBias(float bias[${numChannels}], int channel) {`];\r\n for (let i = 0; i < numChannels; ++i) {\r\n   if (i === 0) {\r\n   codeLines.push(\r\n   '\\t' +\r\n   `if (channel == ${i}) { return bias[${i}]; }`);\r\n   } else if (i === numChannels - 1) {\r\n   codeLines.push(\r\n   '\\t' +\r\n   `else { return bias[${i}]; }`);\r\n   } else {\r\n   codeLines.push(\r\n   '\\t' +\r\n   `else if (channel == ${i}) { return bias[${i}]; }`);\r\n   }\r\n }\r\n codeLines.push(\r\n   '\\t' +\r\n   '}');\r\n return codeLines.join('\\n');\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('ImageScaler requires 1 input.');\r\n }\r\n if (inputs[0].dims.length !== 4) {\r\n   throw new Error('Invalid input shape.');\r\n }\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n   throw new Error('Invalid input type.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport const instanceNormalization: OperatorImplementation<number> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], epsilon: number): Tensor[] => {\r\n   validateInputs(inputs);\r\n\r\n   const meanAndVariance = inferenceHandler.run(createMeanAndVarianceProgramInfoLoader(inputs[0]), inputs);\r\n   const output = inferenceHandler.run(\r\n   createComputeOutputProgramInfoLoader(inferenceHandler, inputs[0], epsilon, meanAndVariance.dims),\r\n   [inputs[0], meanAndVariance, inputs[1], inputs[2]]);\r\n   return [output];\r\n   };\r\n\r\nexport const parseInstanceNormalizationAttributes: OperatorInitialization<number> = (node: Graph.Node): number =>\r\n   node.attributes.getFloat('epsilon', 1e-5);\r\n\r\nconst meanAndVarianceProgramMetadata = {\r\n name: 'InstanceNormalization_MeanAndVariance',\r\n inputNames: ['X'],\r\n inputTypes:

[TextureType.unpacked],\r\n};\r\n\r\nconst createMeanAndVarianceProgramInfo = (metadata: ProgramMetadata, input: Tensor): ProgramInfo => {\r\n const xDims = input.dims.slice();\r\n const channel = xDims[1];\r\n const channelSize = xDims[2] * xDims[3];\r\n const outputShape = [xDims[0], channel];\r\n\r\n const shaderSource = `\r\n   vec4 process(int[2] indices) {\r\n   vec4 v = vec4(0.0);\r\n   int a[4];\r\n   a[0] = indices[0];\r\n   a[1] = indices[1];\r\n   float temp = 0.0;\r\n   for(int a2=0; a2<${xDims[2]}; a2++) {\r\n   a[2] = a2;\r\n   for(int a3=0; a3<${xDims[3]}; a3++) {\r\n   a[3] = a3;\r\n   float x = _X(a);\r\n   temp += x;\r\n   }\r\n   }\r\n   float mean = temp / float(${channelSize});\r\n   temp = 0.0;\r\n   for(int a2=0; a2<${xDims[2]}; a2++) {\r\n   a[2] = a2;\r\n   for(int a3=0; a3<${xDims[3]}; a3++) {\r\n   a[3] = a3;\r\n   float x = _X(a);\r\n   temp += (x - mean) * (x - mean);\r\n   }\r\n   }\r\n   v.r = mean;\r\n   v.g = temp / float(${channelSize});\r\n\r\n   return v;\r\n   }`;\r\n return {\r\n   ...metadata,\r\n   output: {dims: outputShape, type: input.type, textureType: TextureType.packedLastDimension},\r\n   shaderSource\r\n };\r\n};\r\n\r\nconst createMeanAndVarianceProgramInfoLoader = (input: Tensor): ProgramInfoLoader => ({\r\n ...meanAndVarianceProgramMetadata,\r\n get: () => createMeanAndVarianceProgramInfo(meanAndVarianceProgramMetadata, input)\r\n});\r\n\r\nconst computeOutputProgramMetadata = {\r\n name: 'InstanceNormalization_ComputeOutput',\r\n inputNames: ['X', 'MeanAndVariance', 'Scale', 'B'],\r\n inputTypes: [TextureType.unpacked, TextureType.packedLastDimension, TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nconst createComputeOutputProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, input: Tensor, epsilon: number,\r\n   meanAndVarianceShape: readonly number[]): ProgramInfo => {\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const [textureWidth, textureHeight] =\r\n   inferenceHandler.calculateTextureWidthAndHeight(meanAndVarianceShape, TextureType.packedLastDimension);\r\n   const [meanAndVarianceWidth, meanAndVarianceHeight] = [textureWidth / 4, textureHeight];\r\n   const shaderSource = `\r\n   vec4 get_MeanAndVariance(int[2] mv) {\r\n   int offset = indicesToOffset_MeanAndVariance(mv);\r\n   vec2 coords = offsetToCoords(offset, ${meanAndVarianceWidth}, ${meanAndVarianceHeight});\r\n   return ${glsl.texture2D}(MeanAndVariance, coords);\r\n   }\r\n\r\n   float process(int[4] indices) {\r\n   int mv[2];\r\n   mv[0] = indices[0];\r\n   mv[1] = indices[1];\r\n   vec4 mean_and_variance = get_MeanAndVariance(mv);\r\n   float mean = mean_and_variance.r;\r\n   float variance = mean_and_variance.g;\r\n\r\n   int sb[1];\r\n   sb[0] = indices[1];\r\n   float scale = _Scale(sb);\r\n   float b = _B(sb);\r\n\r\n   return scale * (_X(indices) - mean) / sqrt(variance + epsilon) + b;\r\n   }`;\r\n   return {\r\n   ...metadata,\r\n   output: {dims: input.dims, type: input.type, textureType: TextureType.unpacked},\r\n   variables: [{name: 'epsilon', type: 'float', data: epsilon}],\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst createComputeOutputProgramInfoLoader =\r\n   (inferenceHandler: WebGLInferenceHandler, input: Tensor, epsilon: number, meanAndVarianceShape: readonly number[]):\r\n   ProgramInfoLoader => {\r\n   const metadata = {...computeOutputProgramMetadata, cacheHint: `${epsilon}`};\r\n   return {\r\n   ...metadata,\r\n   get: () => createComputeOutputProgramInfo(inferenceHandler, metadata, input, epsilon, meanAndVarianceShape)\r\n   };\r\n   };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 3) {\r\n   throw new Error('InstanceNormalization requires 3 inputs.');\r\n }\r\n\r\n const X = inputs[0];\r\n const scale = inputs[1];\r\n const B = inputs[2];\r\n\r\n // input should at least have three dimensions - N,C,dim1,...,dimn\r\n // other inputs can have only one dimensions\r\n if (X.dims.length < 3 || scale.dims.length !== 1 || B.dims.length !== 1) {\r\n   throw new Error('Invalid input shape.');\r\n }\r\n if (scale.dims[0] !== X.dims[1] || B.dims[0] !== X.dims[1]) {\r\n   throw new Error('Input shapes are mismatched.');\r\n }\r\n if ((X.type !== 'float32' && X.type !== 'float64') || (scale.type !== 'float32' && scale.type !== 'float64') ||\r\n   (B.type !== 'float32' && B.type !== 'float64')) {\r\n   throw new Error('Invalid input type.');\r\n }\r\n if (inputs[0].dims.length !== 4) {\r\n   throw new Error('Only support 4-D input shape.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {BroadcastUtil} from '../../../util';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo,

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ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport {getCoordsDataType,
getGlChannels} from '../utils';\r\n\r\nimport {getActicationSnippet, InternalActivationAttributes} from './fuse-
utils';\r\nimport {getBiasForMatmul} from './matmul';\r\n\r\nconst createPackedMatmulProgramMetadata =
(hasBias: boolean, cacheHint: string) => ({\r\n  name: 'MatMul (packed)',\r\n  inputNames: hasBias ? ['A', 'B', 'Bias']
: ['A', 'B'],\r\n  inputTypes: hasBias ? [TextureType.packed, TextureType.packed, TextureType.packed] :\r\n
        [TextureType.packed, TextureType.packed],\r\n  cacheHint\r\n});\r\n\r\nconst
createPackedMatmulProgramInfo =\r\n    (inferenceHandler: WebGLInferenceHandler, metadata:
ProgramMetadata, inputs: Tensor[],\r\n     activationAttributes: InternalActivationAttributes): ProgramInfo => {\r\n
  const hasBias = inputs.length > 2;\r\n      const processBias = hasBias ? 'value += getBiasForMatmul();' : '';\r\n
const aShape = inputs[0].dims;\r\n      const bShape = inputs[1].dims;\r\n      const outputShape =
BroadcastUtil.calcShape(aShape, bShape, true);\r\n      const isBroadcast = !ShapeUtil.areEqual(inputs[0].dims,
inputs[1].dims);\r\n\r\n      if (!outputShape) {\r\n        throw new Error('Can\\'t use matmul on the given tensors');\r\n
    }\r\n      const sharedDim = aShape[aShape.length - 1];\r\n      const sharedDimIndex = Math.ceil(sharedDim /
2);\r\n      const aRank = aShape.length;\r\n      const bRank = bShape.length;\r\n\r\n      const glsl =
getGlsl(inferenceHandler.session.backend.glContext.version);\r\n      const coordsDataType =
getCoordsDataType(outputShape.length);\r\n      const outRank = outputShape.length;\r\n      const allGlChannels =
getGlChannels();\r\n      const {activationFunction, applyActivation} =
getActicationSnippet(activationAttributes);\r\n\r\n      const getBiasForMatmulSnippet =\r\n          hasBias ?
`${getBiasForMatmul(coordsDataType, allGlChannels, inputs[2].dims, outputShape, true)}` : '';\r\n\r\n      const
getBcastedSamplerForMatmulSnippet =\r\n          isBroadcast ? `${getBcastSamplerForMatmul(coordsDataType,
allGlChannels, inputs, outputShape)}` : '';\r\n\r\n      const getSamplerAInLoopSnippet = isBroadcast ?
'getAAtOutCoordsMatmul(i)' : `getA(${getA(allGlChannels, aRank)})`;\r\n      const getSamplerBInLoopSnippet =
isBroadcast ? 'getBAtOutCoordsMatmul(i)' : `getB(${getB(allGlChannels, bRank)})`;\r\n      const
getOutputCoordsSnippet = isBroadcast ? '' : `${coordsDataType} rc =\r\n          getOutputCoords(); int lastDim =
rc.${allGlChannels[outRank - 1]}; rc.${allGlChannels[outRank - 1]} =\r\n          rc.${allGlChannels[outRank - 2]};
rc.${allGlChannels[outRank - 2]} = lastDim;\r\n      `;\r\n      const shaderSource = `\r\n
${getBcastedSamplerForMatmulSnippet}\r\n            ${getBiasForMatmulSnippet}\r\n
${activationFunction}\r\n            void main() {\r\n              ${getOutputCoordsSnippet}\r\n\r\n              vec4 value =
vec4(0);\r\n              for (int i = 0; i < ${sharedDimIndex}; i++) {\r\n                vec4 a =
${getSamplerAInLoopSnippet};\r\n                vec4 b = ${getSamplerBInLoopSnippet};\r\n\r\n                value +=
(a.rrbb * b.rgrg);\r\n                value += (a.ggaa * b.baba);\r\n              }\r\n              ${processBias}\r\n
${applyActivation}\r\n              ${glsl.output} = value;\r\n            }`;\r\n      return {\r\n        ...metadata,\r\n
output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.packed},\r\n        shaderSource,\r\n
hasMain: true\r\n      };\r\n    };\r\n\r\nexport const createPackedMatmulProgramInfoLoader =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],\r\n     activationAttributes:
InternalActivationAttributes): ProgramInfoLoader => {\r\n      const metadata =
createPackedMatmulProgramMetadata(inputs.length > 2, activationAttributes.activationCacheKey);\r\n      return
{\r\n        ...metadata,\r\n        get: () => createPackedMatmulProgramInfo(inferenceHandler, metadata, inputs,
activationAttributes)\r\n      };\r\n    };\r\n\r\nfunction getBcastSamplerForMatmul(\r\n    coordsDataType: string,
allGlChannels: readonly string[], inputs: Tensor[], outShape: readonly number[]): string {\r\n  let
unpackedACoordsSnippet = [];\r\n  let unpackedBCoordsSnippet = [];\r\n\r\n  const inAShape = inputs[0].dims;\r\n
const inBShape = inputs[1].dims;\r\n\r\n  const inARank = inAShape.length;\r\n  const inBRank =
inBShape.length;\r\n\r\n  const outRank = outShape.length;\r\n  const rankADiff = outRank - inARank;\r\n  const
rankBDiff = outRank - inBRank;\r\n\r\n  unpackedACoordsSnippet = inAShape.map((s, i) =>
`coords.${allGlChannels[i + rankADiff]}`);\r\n  unpackedACoordsSnippet[inARank - 1] = 'i*2';\r\n
unpackedACoordsSnippet.join(', ');\r\n  unpackedBCoordsSnippet = inBShape.map((s, i) =>
`coords.${allGlChannels[i + rankBDiff]}`);\r\n  unpackedBCoordsSnippet[inBRank - 2] = 'i*2';\r\n
unpackedBCoordsSnippet.join(', ');\r\n\r\n  const broadcastADims = BroadcastUtil.getBroadcastDims(inAShape,
```

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outShape);\r\n  const broadcastBDims = BroadcastUtil.getBroadcastDims(inBShape, outShape);\r\n\r\n  const
coordsASnippet = broadcastADims.map(d => `coords.${allGlChannels[d + rankADiff]} = 0;`).join('\\n');\r\n  const
coordsBSnippet = broadcastBDims.map(d => `coords.${allGlChannels[d + rankBDiff]} = 0;`).join('\\n');\r\n  const
swapDimSnippet = `int lastDim = coords.${allGlChannels[outRank - 1]};\r\n  coords.${allGlChannels[outRank -
1]} = coords.${allGlChannels[outRank - 2]};\r\n  coords.${allGlChannels[outRank - 2]} = lastDim;`;\r\n\r\n  const
getBcastSamplerMatmulSource = `\r\nvec4 getAAtOutCoordsMatmul(int i) {\r\n  ${coordsDataType} coords =
getOutputCoords();\r\n  ${swapDimSnippet}\r\n  ${coordsASnippet}\r\n  vec4 outputValue =
getA(${unpackedACoordsSnippet});\r\n  return outputValue;\r\n}\r\n\r\nvec4 getBAtOutCoordsMatmul(int i) {\r\n
${coordsDataType} coords = getOutputCoords();\r\n  ${swapDimSnippet}\r\n  ${coordsBSnippet}\r\n  vec4
outputValue = getB(${unpackedBCoordsSnippet});\r\n  return outputValue;\r\n}`;\r\n\r\n  return
getBcastSamplerMatmulSource;\r\n}\r\n\r\nfunction getA(allGlChannels: string[], rank: number): string {\r\n  let res
= '';\r\n  for (let i = 0; i < rank - 2; i++) {\r\n    res += `rc.${allGlChannels[i]}, `;\r\n  }\r\n  res +=
`rc.${allGlChannels[rank - 2]}, ` +\r\n      'i*2';\r\n  return res;\r\n}\r\n\r\nfunction getB(allGlChannels: string[],
rank: number): string {\r\n  let res = '';\r\n  for (let i = 0; i < rank - 2; i++) {\r\n    res += `rc.${allGlChannels[i]},
`;\r\n  }\r\n  res += 'i*2, ' +\r\n      `rc.${allGlChannels[rank - 1]}`;\r\n  return res;\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from
'../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor}
from '../../../tensor';\r\nimport {BroadcastUtil, ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler}
from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from
'../types';\r\nimport {getCoordsDataType, getGlChannels} from '../utils';\r\nimport {getActicationSnippet,
InternalActivationAttributes, parseInternalActivationAttributes} from './fuse-utils';\r\nimport
{createPackedMatmulProgramInfoLoader} from './matmul-pack';\r\n\r\nexport const matMul:
OperatorImplementation<InternalActivationAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs:
Tensor[], attributes: InternalActivationAttributes): Tensor[] => {\r\n      validateInputs(inputs);\r\n\r\n      if
(inferenceHandler.session.pack) {\r\n        return [inferenceHandler.run(\r\n
createPackedMatmulProgramInfoLoader(inferenceHandler, inputs, attributes), inputs)];\r\n      } else {\r\n        return
[inferenceHandler.run(createMatmulProgramInfoLoader(inputs, attributes), inputs)];\r\n      }\r\n    };\r\n\r\nexport
const parseMatMulAttributes: OperatorInitialization<InternalActivationAttributes> =\r\n    (node: Graph.Node):
InternalActivationAttributes => parseInternalActivationAttributes(node.attributes);\r\n\r\nconst
createMatmulProgramMetadata = (hasBias: boolean, cacheHint: string) => ({\r\n  name: 'MatMul',\r\n  inputNames:
hasBias ? ['A', 'B', 'Bias'] : ['A', 'B'],\r\n  inputTypes: hasBias ? [TextureType.unpacked, TextureType.unpacked,
TextureType.unpacked] :\r\n                         [TextureType.unpacked, TextureType.unpacked],\r\n
cacheHint\r\n});\r\n\r\nfunction createMatmulProgramInfo(\r\n    metadata: ProgramMetadata, inputs: Tensor[],
activationAttributes: InternalActivationAttributes): ProgramInfo {\r\n  const aShape = inputs[0].dims;\r\n  const
bShape = inputs[1].dims;\r\n  const outputShape = BroadcastUtil.calcShape(aShape, bShape, true);\r\n  if
(!outputShape) {\r\n    throw new Error('Can\\'t use matmul on the given tensors');\r\n  }\r\n  const coordsDataType
= getCoordsDataType(outputShape.length);\r\n  const allGlChannels = getGlChannels();\r\n  const
{activationFunction, applyActivation} = getActicationSnippet(activationAttributes);\r\n\r\n  const hasBias =
inputs.length > 2;\r\n  const processBias = hasBias ? 'value += getBiasForMatmul();' : '';\r\n  const
getBiasForMatmulSnippet =\r\n      hasBias ? `${getBiasForMatmul(coordsDataType, allGlChannels,
inputs[2].dims, outputShape, false)}` : '';\r\n\r\n  const rank = outputShape.length;\r\n  const arank =
aShape.length;\r\n  const brank = bShape.length;\r\n  const sharedDim = aShape[aShape.length - 1];\r\n  const
shaderSource = `\r\n    ${activationFunction}\r\n    ${getBiasForMatmulSnippet}\r\n    float process(int
indices[${rank}]) {\r\n        int a[${arank}];\r\n        int b[${brank}];\r\n        bcastMatmulIndices_A(indices, a);\r\n
    bcastMatmulIndices_B(indices, b);\r\n\r\n        float value;\r\n        for (int k=0; k<${sharedDim}; ++k) {\r\n
 a[${arank - 1}] = k;\r\n            b[${brank - 2}] = k;\r\n            value += _A(a) * _B(b);\r\n        }\r\n
${processBias}\r\n        ${applyActivation}\r\n        return value;\r\n    }`;\r\n  return {\r\n    ...metadata,\r\n    output:
{dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n    shaderSource,\r\n
```

};\r\n}\r\n\r\nexport function createMatmulProgramInfoLoader(\r\n   inputs: Tensor[], activationAttributes: InternalActivationAttributes): ProgramInfoLoader {\r\n const metadata = createMatmulProgramMetadata(inputs.length > 2, activationAttributes.activationCacheKey);\r\n return {...metadata, get: () => createMatmulProgramInfo(metadata, inputs, activationAttributes)};\r\n}\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 2) {\r\n   throw new Error('MatMul requires 2 inputs.');\r\n }\r\n\r\n if (inputs[0].dims[inputs[0].dims.length - 1] !== inputs[1].dims[inputs[1].dims.length - 2]) {\r\n   throw new Error('shared dimension does not match.');\r\n }\r\n\r\n if ((inputs[0].type !== 'float32' && inputs[0].type !== 'float64') ||\r\n   (inputs[1].type !== 'float32' && inputs[1].type !== 'float64')) {\r\n   throw new Error('inputs should be float type');\r\n }\r\n\r\n if (inputs[0].type !== inputs[1].type) {\r\n   throw new Error('inputs types should match');\r\n }\r\n};\r\n\r\nexport function getBiasForMatmul(\r\n   coordsDataType: string, allGlChannels: readonly string[], inShape: readonly number[], outShape: readonly number[],\r\n   isPacked: boolean): string {\r\n let unpackedCoordsSnippet = '';\r\n const inRank = inShape.length;\r\n const outRank = outShape.length;\r\n const rankDiff = outRank - inRank;\r\n if (outRank < 2 && inRank > 0) {\r\n   unpackedCoordsSnippet = 'coords';\r\n } else {\r\n   unpackedCoordsSnippet = inShape.map((s, i) => `coords.${allGlChannels[i + rankDiff]}`).join(', ');\r\n }\r\n const broadcastDims = BroadcastUtil.getBroadcastDims(inShape, outShape);\r\n const coordsSnippet = broadcastDims.map(d => `coords.${allGlChannels[d + rankDiff]} = 0;`).join('\\n');\r\n const inSize = ShapeUtil.size(inShape);\r\n const isInputScalar = inSize === 1;\r\n let output = 'vec4(outputValue.xx, outputValue.yy)';\r\n if (isInputScalar) {\r\n   output = 'vec4(outputValue.x)';\r\n }\r\n const getBiasForMatmulSource = isPacked ? `\r\nvec4 getBiasForMatmul() {\r\n  ${coordsDataType} coords = getOutputCoords();\r\n  ${coordsSnippet}\r\n  vec4 outputValue = getBias(${unpackedCoordsSnippet});\r\n  return ${output};\r\n}` :\r\n `\r\nfloat getBiasForMatmul() {\r\n  ${coordsDataType} coords = getOutputCoords();\r\n  ${coordsSnippet}\r\n  return getBias(coords.x);\r\n}`;\r\n\r\n return getBiasForMatmulSource;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, TextureType} from '../types';\r\nimport {getCoordsDataType} from '../utils';\r\n\r\nimport {getChannels} from './packing-utils';\r\n\r\nconst packProgramMetadata = {\r\n name: 'pack',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpackedReversed]\r\n};\r\n\r\nconst createPackProgramInfo = (handler: WebGLInferenceHandler, input: Tensor): ProgramInfo => {\r\n const glsl = getGlsl(handler.session.backend.glContext.version);\r\n const inputShape = input.dims;\r\n\r\n const inputRank = inputShape.length;\r\n // createTextureLayoutFromShape won't change output rank. Need to verify by running tests\r\n const outputRank = input.dims.length;\r\n\r\n const coordsDataType = getCoordsDataType(outputRank);\r\n const channels = getChannels('rc', outputRank);\r\n const setup = getSetup(outputRank, channels, inputShape[inputShape.length - 2], inputShape[inputShape.length - 1]);\r\n\r\n let reversedInputWH;\r\n if (inputRank === 0) {\r\n   reversedInputWH = [1, 1];\r\n } else if (inputRank === 1) {\r\n   reversedInputWH = [inputShape[0], 1];\r\n } else {\r\n   reversedInputWH = [inputShape[outputRank - 1], inputShape[outputRank - 2]];\r\n }\r\n const outOfBoundsCondition = getOutOfBoundsCondition(outputRank, reversedInputWH, channels);\r\n const output = getOutput(inputShape, channels);\r\n\r\n const shaderSource = `\r\n   void main() {\r\n ${coordsDataType} rc = getOutputCoords();\r\n\r\n   if(${outOfBoundsCondition}) {\r\n ${glsl.output} = vec4(0);\r\n   } else {\r\n ${setup}\r\n\r\n ${glsl.output} = vec4(${output});\r\n   }\r\n   }\r\n   `;\r\n return {\r\n   ...packProgramMetadata,\r\n   hasMain: true,\r\n   output: {dims: input.dims, type: input.type, textureType: TextureType.packed},\r\n   shaderSource\r\n };\r\n};\r\n\r\nexport const createPackProgramInfoLoader = (handler: WebGLInferenceHandler, input: Tensor): ProgramInfoLoader =>\r\n   ({...packProgramMetadata, get: () => createPackProgramInfo(handler, input)});\r\n\r\n/**\r\n * check output coordinate location and return false if it is outside input's width/height boundary\r\n */\r\nfunction getOutOfBoundsCondition(rank: number, shape: readonly number[], dims: string[]): string {\r\n if (rank === 0) {\r\n   return 'false';\r\n }\r\n if (rank === 1) {\r\n   return `rc > ${shape[0]}`;\r\n }\r\n\r\n let cond = '';\r\n for (let i = rank - 2; i < rank; i++) {\r\n   cond += `${dims[i]} >=

${shape[i - rank + 2]}`;\r\n   if (i < rank - 1) {\r\n   cond += '||';\r\n   }\r\n }\r\n\r\n return cond;\r\n}\r\n\r\n/**\r\n * code snippet to sample input texture with output coordiantes\r\n */\r\nfunction getOutput(shape: readonly number[], dims: string[]): string {\r\n const rank = shape.length;\r\n\r\n if (rank === 0) {\r\n   return 'getA(), 0, 0, 0';\r\n }\r\n\r\n if (rank === 1) {\r\n   return `getA(rc),\r\n            rc + 1 >= ${shape[0]} ? 0. : getA(rc + 1),\r\n            0, 0`;\r\n }\r\n\r\n const coord00 = 'r, c';\r\n const coord01 = 'r, cp1';\r\n const coord10 = 'rp1, c';\r\n const coord11 = 'rp1, cp1';\r\n let D = '';\r\n if (rank > 2) {\r\n   for (let i = 0; i < rank - 2; ++i) {\r\n   D = D + `${dims[i]},`;\r\n   }\r\n }\r\n return `getA(${D}${coord00}),\r\n          rEdge ? 0. : getA(${D}${coord10}),\r\n          cEdge ? 0. : getA(${D}${coord01}),\r\n          rEdge || cEdge ? 0. : getA(${D}${coord11})`;\r\n}\r\n\r\n/**\r\n * code snippet to setup 4 coordinates and edge conditions\r\n */\r\nfunction getSetup(rank: number, dims: string[], rows: number, cols: number): string {\r\n if (rank === 0 || rank === 1) {\r\n   return '';\r\n }\r\n // rank >= 2 for width+height pack.\r\n else {\r\n   const setup = `\r\n    int r = ${dims[rank - 2]};\r\n    int c = ${dims[rank - 1]};\r\n    int rp1 = ${dims[rank - 2]} + 1;\r\n    int cp1 = ${dims[rank - 1]} + 1;\r\n    bool rEdge = rp1 >= ${cols};\r\n    bool cEdge = cp1 >= ${rows};\r\n    `;\r\n   return setup;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {getGlChannels} from '../utils';\r\n\r\nexport function getVecChannels(name: string, rank: number): string[] {\r\n return getGlChannels(rank).map(d => `${name}.${d}`);\r\n}\r\n\r\nexport function getChannels(name: string, rank: number): string[] {\r\n if (rank === 1) {\r\n   return [name];\r\n }\r\n return getVecChannels(name, rank);\r\n}\r\n\r\nexport function unpackFromChannel(): string {\r\n return `\r\n   float getChannel(vec4 frag, int dim) {\r\n   int modCoord = imod(dim, 2);\r\n   return modCoord == 0 ? frag.r : frag.g;\r\n   }\r\n\r\n   float getChannel(vec4 frag, vec2 innerDims) {\r\n   vec2 modCoord = mod(innerDims, 2.);\r\n   return modCoord.x == 0. ?\r\n   (modCoord.y == 0. ? frag.r : frag.g) :\r\n   (modCoord.y == 0. ? frag.b : frag.a);\r\n   }\r\n `;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl, Glsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface PadAttributes extends AttributeWithCacheKey {\r\n readonly mode: string;\r\n readonly pads: number[];\r\n readonly value: number;\r\n}\r\n\r\nconst padProgramMetadata = {\r\n name: 'Pad',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nexport const pad: OperatorImplementation<PadAttributes> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: PadAttributes): Tensor[] => {\r\n   validateInputs(inputs);\r\n   const output = inferenceHandler.run(\r\n   {\r\n   ...padProgramMetadata,\r\n   cacheHint: attributes.cacheKey,\r\n   get: () => createPadProgramInfo(inferenceHandler, inputs, attributes)\r\n   },\r\n   inputs);\r\n   return [output];\r\n   };\r\n\r\nexport const parsePadAttributes: OperatorInitialization<PadAttributes> = (node: Graph.Node): PadAttributes => {\r\n const mode = node.attributes.getString('mode', 'constant');\r\n const value = node.attributes.getFloat('value', 0.0);\r\n const pads = node.attributes.getInts('pads');\r\n return createAttributeWithCacheKey({mode, value, pads});\r\n};\r\n\r\nconst createPadProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: PadAttributes): ProgramInfo => {\r\n   const outputShape = ShapeUtil.padShape(inputs[0].dims.slice(), attributes.pads);\r\n   const rank = outputShape.length;\r\n   const padFunction = getPadFunction(inferenceHandler, inputs[0], attributes);\r\n   const shaderSource = `\r\n      ${padFunction}\r\n      float process(int[${rank}] indices) {\r\n          return padA(indices);\r\n      }`;\r\n   return {\r\n   name: 'Pad',\r\n   inputNames: ['A'],\r\n   inputTypes: [TextureType.unpacked],\r\n   output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Pad requires 1 input');\r\n }\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n   throw new Error('Invalid input type.');\r\n }\r\n};\r\n\r\nconst getPadFunction = (inferenceHandler: WebGLInferenceHandler, input: Tensor, attributes: PadAttributes): string => {\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n const

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[width, height] = inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n  const
strides = ShapeUtil.computeStrides(input.dims);\r\n\r\n  switch (attributes.mode) {\r\n    case 'constant':\r\n      return
getPadConstant(glsl, input.dims, strides, width, height, attributes.pads, attributes.value);\r\n    case 'reflect':\r\n
return getPadReflect(glsl, input.dims, strides, width, height, attributes.pads);\r\n    case 'edge':\r\n      return
getPadEdge(glsl, input.dims, strides, width, height, attributes.pads);\r\n    default:\r\n      throw new Error('Invalid
mode');\r\n  }\r\n};\r\n\r\nconst getPadConstant =\r\n    (glsl: Glsl, shape: readonly number[], strides: readonly
number[], width: number, height: number, pads: number[],\r\n     value: number): string => {\r\n      const rank =
shape.length;\r\n      let block = '';\r\n      for (let i = rank - 1; i >= 0; --i) {\r\n        block += `\r\n        k = m[${i}] -
${pads[i]};\r\n        if (k < 0)  return constant;\r\n        if (k >= ${shape[i]}) return constant;\r\n        offset += k *
${strides[i]};\r\n        `;\r\n      }\r\n      return `\r\n      float padA(int m[${rank}]) {\r\n        const float constant =
float(${value});\r\n        int offset = 0;\r\n        int k = 0;\r\n        ${block}\r\n        vec2 coords =
offsetToCoords(offset, ${width}, ${height});\r\n        float value = getColorAsFloat(${glsl.texture2D}(A,
coords));\r\n        return value;\r\n      }\r\n      `;\r\n    };\r\n\r\nconst getPadReflect =\r\n    (glsl: Glsl, shape:
readonly number[], strides: readonly number[], width: number, height: number, pads: number[]):\r\n        string =>
{\r\n          const rank = shape.length;\r\n\r\n          let block = '';\r\n          for (let i = rank - 1; i >= 0; --i) {\r\n
block += `\r\n        k = m[${i}] - ${pads[i]};\r\n        if (k < 0) { k = -k; }\r\n        {\r\n          const int _2n_1 = ${2 *
(shape[i] - 1)};\r\n          k = int( mod( float(k), float(_2n_1) ) ) ;\r\n          if(k >= ${shape[i]}) { k = _2n_1 - k; }\r\n
     }\r\n        offset += k * ${strides[i]};\r\n        `;\r\n          }\r\n          return `\r\n      float padA(int m[${rank}])
{\r\n        int offset = 0;\r\n        int k = 0;\r\n        ${block}\r\n        vec2 coords = offsetToCoords(offset, ${width},
${height});\r\n        float value = getColorAsFloat(${glsl.texture2D}(A, coords));\r\n        return value;\r\n      }\r\n
 `;\r\n        };\r\n\r\nconst getPadEdge =\r\n    (glsl: Glsl, shape: readonly number[], strides: readonly number[],
width: number, height: number, pads: number[]):\r\n        string => {\r\n          const rank = shape.length;\r\n\r\n
let block = '';\r\n          for (let i = rank - 1; i >= 0; --i) {\r\n            block += `\r\n        k = m[${i}] - ${pads[i]};\r\n
 if (k < 0)  k = 0;\r\n        if (k >= ${shape[i]}) k = ${shape[i] - 1};\r\n        offset += k * ${strides[i]};\r\n      `;\r\n
   }\r\n          return `\r\n      float padA(int m[${rank}]) {\r\n        int offset = 0;\r\n        int k = 0;\r\n
${block}\r\n        vec2 coords = offsetToCoords(offset, ${width}, ${height});\r\n        float value =
getColorAsFloat(${glsl.texture2D}(A, coords));\r\n        return value;\r\n      }\r\n      `;\r\n        };\r\n","// Copyright
(c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph}
from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport
{Tensor} from '../../../tensor';\r\nimport {PoolConvUtil, ShapeUtil} from '../../../util';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramMetadata, TextureType}
from '../types';\r\n\r\nexport interface AveragePoolAttributes extends AttributeWithCacheKey {\r\n  readonly
autoPad: string;\r\n  readonly ceilMode: number;\r\n  readonly countIncludePad: boolean;\r\n  readonly kernelShape:
number[];\r\n  readonly strides: number[];\r\n  readonly pads: number[];\r\n}\r\n\r\nexport const averagePool:
OperatorImplementation<AveragePoolAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs:
Tensor[], attributes: AveragePoolAttributes): Tensor[] => {\r\n      validateInputs(inputs);\r\n      const metadata
=\r\n          {name: 'AveragePool', inputNames: ['X'], inputTypes: [TextureType.unpacked], cacheHint:
attributes.cacheKey};\r\n      const output = inferenceHandler.run(\r\n          {...metadata, get: () =>
createAveragePoolProgramInfo(inputs, metadata, false, attributes)}, inputs);\r\n      return [output];\r\n
};\r\n\r\nexport const parseAveragePoolAttributes: OperatorInitialization<AveragePoolAttributes> =\r\n    (node:
Graph.Node): AveragePoolAttributes => {\r\n      const autoPad = node.attributes.getString('auto_pad',
'NOTSET');\r\n      const ceilMode = node.attributes.getInt('ceil_mode', 0);\r\n      const countIncludePad =
(node.attributes.getInt('count_include_pad', 0) === 0 ? false : true);\r\n      const kernelShape =
node.attributes.getInts('kernel_shape');\r\n      const strides = node.attributes.getInts('strides', []);\r\n      const pads =
node.attributes.getInts('pads', []);\r\n\r\n      // TODO: support attribute 'ceil_mode'\r\n      if (ceilMode !== 0) {\r\n
  throw new Error('using ceil() in shape computation is not yet supported for AveragePool');\r\n      }\r\n\r\n      return
createAttributeWithCacheKey({autoPad, ceilMode, countIncludePad, kernelShape, strides, pads});\r\n
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};\r\n\r\nconst createAveragePoolProgramInfo =\r\n    (inputs: Tensor[], metadata: ProgramMetadata,
isGlobalOperator: boolean, attributes: AveragePoolAttributes):\r\n        ProgramInfo => {\r\n          const inputShape
= inputs[0].dims.slice();\r\n          PoolConvUtil.adjustPoolAttributes(\r\n              isGlobalOperator, inputShape,
attributes.kernelShape, attributes.strides, attributes.pads);\r\n          const outputShape =
PoolConvUtil.computePoolOutputShape(\r\n              isGlobalOperator, inputShape, attributes.strides,
attributes.kernelShape, attributes.pads,\r\n              attributes.autoPad);\r\n          const kernelSize =
ShapeUtil.size(attributes.kernelShape);\r\n          const op1 = 'value += _X(x);';\r\n          let op2 = '';\r\n          if
(attributes.countIncludePad) {\r\n            op2 += `value /= float(${kernelSize});`;\r\n          } else {\r\n            op2 +=
`value /= float(${kernelSize} - pad);`;\r\n          }\r\n          const poolingCode =
generatePoolingCode(inputs[0].dims, attributes, op1, op2, '0.0');\r\n          const shaderSource = `\r\n
${poolingCode}\r\n      `;\r\n          return {\r\n            ...metadata,\r\n            output: {dims: outputShape, type:
inputs[0].type, textureType: TextureType.unpacked},\r\n            shaderSource\r\n          };\r\n        };\r\n\r\nexport
const globalAveragePool: OperatorImplementation<AveragePoolAttributes> =\r\n    (inferenceHandler:
WebGLInferenceHandler, inputs: Tensor[], attributes: AveragePoolAttributes): Tensor[] => {\r\n
validateInputs(inputs);\r\n      const metadata = {\r\n        name: 'GlobalAveragePool',\r\n        inputNames: ['X'],\r\n
    inputTypes: [TextureType.unpacked],\r\n        cacheHint: `${attributes.countIncludePad}`\r\n      };\r\n      const
output = inferenceHandler.run(\r\n          {...metadata, get: () => createAveragePoolProgramInfo(inputs, metadata,
true, attributes)}, inputs);\r\n      return [output];\r\n    };\r\n\r\nexport const parseGlobalAveragePoolAttributes:
OperatorInitialization<AveragePoolAttributes> =\r\n    (node: Graph.Node): AveragePoolAttributes => {\r\n
const countIncludePad = (node.attributes.getInt('count_include_pad', 0) === 0 ? false : true);\r\n      return
createAttributeWithCacheKey(\r\n          {autoPad: '', ceilMode: 0, countIncludePad, kernelShape: [], strides: [],
pads: []});\r\n    };\r\n\r\nexport interface MaxPoolAttributes extends AveragePoolAttributes {\r\n  readonly
storageOrder: number;\r\n}\r\n\r\nexport const maxPool: OperatorImplementation<MaxPoolAttributes> =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: MaxPoolAttributes): Tensor[] => {\r\n
validateInputs(inputs);\r\n      const metadata =\r\n          {name: 'MaxPool', inputNames: ['X'], inputTypes:
[TextureType.unpacked], cacheHint: attributes.cacheKey};\r\n      const output = inferenceHandler.run(\r\n
{...metadata, get: () => createMaxPoolProgramInfo(inputs, metadata, false, attributes)}, inputs);\r\n      return
[output];\r\n    };\r\n\r\nexport const parseMaxPoolAttributes: OperatorInitialization<MaxPoolAttributes> =\r\n
(node: Graph.Node): MaxPoolAttributes => {\r\n      const autoPad = node.attributes.getString('auto_pad',
'NOTSET');\r\n      const ceilMode = node.attributes.getInt('ceil_mode', 0);\r\n      const kernelShape =
node.attributes.getInts('kernel_shape');\r\n      const strides = node.attributes.getInts('strides', []);\r\n      const pads =
node.attributes.getInts('pads', []);\r\n      const storageOrder = node.attributes.getInt('storage_order', 0);\r\n\r\n      //
TODO: support attribute 'ceil_mode' and 'storage_order'\r\n      if (storageOrder !== 0) {\r\n        throw new
Error('column major storage order is not yet supported for MaxPool');\r\n      }\r\n      if (ceilMode !== 0) {\r\n
throw new Error('using ceil() in shape computation is not yet supported for MaxPool');\r\n      }\r\n\r\n      return
createAttributeWithCacheKey(\r\n          {autoPad, ceilMode, countIncludePad: false, kernelShape, strides, pads,
storageOrder});\r\n    };\r\n\r\nconst createMaxPoolProgramInfo =\r\n    (inputs: Tensor[], metadata:
ProgramMetadata, isGlobalOperator: boolean, attributes: MaxPoolAttributes):\r\n        ProgramInfo => {\r\n
const inputShape = inputs[0].dims.slice();\r\n          PoolConvUtil.adjustPoolAttributes(\r\n
isGlobalOperator, inputShape, attributes.kernelShape, attributes.strides, attributes.pads);\r\n          const outputShape
= PoolConvUtil.computePoolOutputShape(\r\n              isGlobalOperator, inputShape, attributes.strides,
attributes.kernelShape, attributes.pads,\r\n              attributes.autoPad);\r\n          const op1 = `\r\n      value =
max(_X(x), value);\r\n    `;\r\n          const op2 = '';\r\n          const poolingCode = generatePoolingCode(inputShape,
attributes, op1, op2, '-1e5');\r\n          const shaderSource = `\r\n      ${poolingCode}\r\n    `;\r\n          return {\r\n
   ...metadata,\r\n            output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n
        shaderSource\r\n          };\r\n        };\r\n\r\nconst globalMaxPoolAttributes = {\r\n  autoPad: '',\r\n  ceilMode:
0,\r\n  countIncludePad: false,\r\n  kernelShape: [],\r\n  strides: [],\r\n  pads: [],\r\n  storageOrder: 0,\r\n  cacheKey:
''\r\n};\r\n\r\nconst globalMaxPoolMetadata = {\r\n  name: 'GlobalMaxPool',\r\n  inputNames: ['X'],\r\n  inputTypes:
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[TextureType.unpacked]\r\n};\r\n\r\nexport const globalMaxPool = (inferenceHandler: WebGLInferenceHandler,
inputs: Tensor[]): Tensor[] => {\r\n  validateInputs(inputs);\r\n  const output = inferenceHandler.run(\r\n      {\r\n
...globalMaxPoolMetadata,\r\n        get: () => createMaxPoolProgramInfo(inputs, globalMaxPoolMetadata, true,
globalMaxPoolAttributes)\r\n      },\r\n      inputs);\r\n  return [output];\r\n};\r\n\r\nconst validateInputs = (inputs:
Tensor[]): void => {\r\n  if (!inputs || inputs.length !== 1) {\r\n    throw new Error('Pool ops requires 1 input.');\r\n
}\r\n  if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n    throw new Error('Invalid input
type.');\r\n  }\r\n};\r\n\r\nconst generatePoolingCode =\r\n    (inputDims: readonly number[], attributes:
AveragePoolAttributes, op1: string, op2: string, start: string):\r\n        string => {\r\n          const rank =
inputDims.length;\r\n          if (attributes.kernelShape.length <= 2) {\r\n            const kw =
attributes.kernelShape[attributes.kernelShape.length - 1];\r\n            const sw =
attributes.strides[attributes.strides.length - 1];\r\n            const pwStart = attributes.pads[attributes.pads.length / 2 -
1];\r\n            const pwEnd = attributes.pads[attributes.pads.length - 1];\r\n            const dimW = inputDims[rank -
1];\r\n            let codeW = '';\r\n            let codeH = '';\r\n            let codeHEnd = '';\r\n            if (pwStart + pwEnd
!== 0) {\r\n              codeW = `\r\n          for (int i = 0; i < ${kw}; i++) {\r\n            x[${rank} - 1] = indices[${rank}
- 1] * ${sw} - ${pwStart} + i;\r\n            if (x[${rank} - 1] < 0 || x[${rank} - 1] >= ${dimW}) {\r\n
pad++;\r\n              continue;\r\n            }\r\n            ${op1}\r\n          }`;\r\n            } else {\r\n              codeW = `\r\n
      for (int i = 0; i < ${kw}; i++) {\r\n            x[${rank} - 1] = indices[${rank} - 1] * ${sw} - ${pwStart} + i;\r\n
     ${op1}\r\n          }`;\r\n            }\r\n\r\n            if (attributes.kernelShape.length === 2) {\r\n              const kh =
attributes.kernelShape[attributes.kernelShape.length - 2];\r\n              const sh =
attributes.strides[attributes.strides.length - 2];\r\n              const phStart = attributes.pads[attributes.pads.length / 2 -
2];\r\n              const phEnd = attributes.pads[attributes.pads.length - 2];\r\n              const dimH = inputDims[rank -
2];\r\n              if (phStart + phEnd !== 0) {\r\n                codeH = `\r\n            for (int j = 0; j < ${kh}; j++) {\r\n
   x[${rank} - 2] = indices[${rank} - 2] * ${sh} - ${phStart} + j;\r\n              if (x[${rank} - 2] < 0 || x[${rank} - 2]
>= ${dimH}) {\r\n                pad+= ${kw};\r\n                continue;\r\n              }\r\n          `;\r\n              } else {\r\n
        codeH = `\r\n            for (int j = 0; j < ${kh}; j++) {\r\n              x[${rank} - 2] = indices[${rank} - 2] * ${sh}
- ${phStart} + j;\r\n            `;\r\n              }\r\n              codeHEnd = `\r\n          }\r\n        `;\r\n            }\r\n\r\n
const poolingCode = `\r\n        float process(int indices[${rank}]) {\r\n          int x[${rank}];\r\n
copyVec(indices, x);\r\n\r\n          float value = ${start};\r\n          int pad = 0;\r\n          ${codeH}\r\n
${codeW}\r\n          ${codeHEnd}\r\n          ${op2}\r\n          return value;\r\n        }\r\n      `;\r\n            return
poolingCode;\r\n          } else {\r\n            const kernelSize = ShapeUtil.size(attributes.kernelShape);\r\n            const
kernelStrides = ShapeUtil.computeStrides(attributes.kernelShape);\r\n            const stridesRank =
kernelStrides.length;\r\n            const padsRank = attributes.pads.length;\r\n            const offsetToIndicesFunction =
offsetToIndices(stridesRank);\r\n            const copyInputDims = copyArray(inputDims, 'inputDims');\r\n
const copyPads = copyArray(attributes.pads, 'pads');\r\n            const copyKernelStrides = copyArray(kernelStrides,
'kernelStrides');\r\n            const copyStrides = copyArray(attributes.strides, 'strides');\r\n            const hasPads =
attributes.pads.reduce((sum, cur) => sum + cur);\r\n            let padCode = '';\r\n            if (hasPads) {\r\n
padCode = `\r\n            if (x[j] >= inputDims[j] || x[j] < 0) {\r\n              pad++;\r\n              isPad = true;\r\n
break;\r\n            }\r\n          }\r\n          if (!isPad) {\r\n            ${op1}\r\n          }`;\r\n            } else {\r\n
padCode = `\r\n          }\r\n          ${op1}\r\n        `;\r\n            }\r\n            const poolingCode = `\r\n
${offsetToIndicesFunction}\r\n        float process(int indices[${rank}]) {\r\n          int x[${rank}];\r\n
copyVec(indices, x);\r\n          int offset[${stridesRank}];\r\n          int pads[${padsRank}];\r\n          int
inputDims[${rank}];\r\n          int kernelStrides[${stridesRank}];\r\n          int strides[${stridesRank}];\r\n
${copyPads}\r\n          ${copyInputDims}\r\n          ${copyStrides}\r\n          ${copyKernelStrides}\r\n\r\n
float value = ${start};\r\n          int pad = 0;\r\n          bool isPad = false;\r\n          for (int i = 0; i < ${kernelSize};
i++) {\r\n            offsetToIndices(i, kernelStrides, offset);\r\n            isPad = false;\r\n            for (int j = ${rank} -
${stridesRank}; j < ${rank}; j++) {\r\n              x[j] = indices[j] * strides[j - ${rank} + ${stridesRank}]\r\n
+ offset[j - ${rank} + ${stridesRank}] - pads[j - 2];\r\n              ${padCode}\r\n          }\r\n          ${op2}\r\n\r\n
return value;\r\n        }\r\n      `;\r\n            return poolingCode;\r\n          }\r\n        };\r\n\r\nconst copyArray = (array:
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readonly number[], arrayName: string): string => {\r\n  let block = '';\r\n  for (let i = 0; i < array.length; i++) {\r\n
block += `\r\n      ${arrayName}[${i}] = ${array[i]};\r\n    `;\r\n  }\r\n  return block;\r\n};\r\n\r\nconst
offsetToIndices = (rank: number): string => `\r\n  void offsetToIndices(int offset, int[${rank}] strides, out
int[${rank}] indices) {\r\n    if (${rank} == 0) {\r\n      return;\r\n    }\r\n    for (int i = 0; i < ${rank} - 1; ++i) {\r\n
indices[i] = offset / strides[i];\r\n      offset -= indices[i] * strides[i];\r\n    }\r\n    indices[${rank} - 1] = offset;\r\n
}`;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-
key';\r\nimport {Graph} from '../../../graph';\r\nimport {NUMBER_TYPES, OperatorImplementation,
OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from
'../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo,
ProgramMetadata, TextureType} from '../types';\r\n\r\nexport interface ReduceAttributes extends
AttributeWithCacheKey {\r\n  readonly axes: number[];\r\n  readonly keepDims: boolean;\r\n}\r\n\r\n// return [init
ops, reduce ops, final ops]\r\ntype ReduceOp = (inputs: Tensor[], axes: number[]) => string[];\r\n\r\nconst reduce
=\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes, name: string,\r\n
   reduceOp: ReduceOp): Tensor[] => {\r\n      validateInputs(inputs);\r\n\r\n      const reduceProgramMetadata =
{\r\n        name,\r\n        inputNames: ['A'],\r\n        inputTypes: [TextureType.unpacked],\r\n      };\r\n\r\n      const
output = inferenceHandler.run(\r\n          {\r\n            ...reduceProgramMetadata,\r\n            cacheHint:
attributes.cacheKey,\r\n            get: () =>\r\n                createReduceProgramInfo(inferenceHandler, inputs,
attributes, name, reduceOp, reduceProgramMetadata)\r\n          },\r\n          inputs);\r\n      return [output];\r\n
};\r\n\r\nexport const parseReduceAttributes: OperatorInitialization<ReduceAttributes> = (node: Graph.Node):
ReduceAttributes => {\r\n  const axes = node.attributes.getInts('axes', []);\r\n  const keepDims =
node.attributes.getInt('keepdims', 1) === 1;\r\n  return createAttributeWithCacheKey({axes,
keepDims});\r\n};\r\n\r\nconst createReduceProgramInfo =\r\n    (handler: WebGLInferenceHandler, inputs:
Tensor[], attributes: ReduceAttributes, name: string, reduceOp: ReduceOp,\r\n     reduceProgramMetadata:
ProgramMetadata): ProgramInfo => {\r\n      const outputShape: number[] = [];\r\n      const iRank =
inputs[0].dims.length || 1;\r\n\r\n      const idxCopy = [];  // copy output indexes to input indexes\r\n\r\n      const axes
= ShapeUtil.normalizeAxes(attributes.axes, inputs[0].dims.length);\r\n      const ops = reduceOp(inputs, axes);\r\n
let reduceOps = ops[1];\r\n\r\n      for (let k = 0; k < inputs[0].dims.length; k++) {\r\n        // if this axis is reduced\r\n
      if (axes.indexOf(k) >= 0 || axes.length === 0) {\r\n          if (attributes.keepDims) {\r\n
outputShape.push(1);\r\n          }  // else { remove the axis from outputShape; }\r\n\r\n          // loop over the d-th
axis\r\n          reduceOps = `\r\n          for(int j${k} = 0; j${k} < ${inputs[0].dims[k]}; j${k}++) {\r\n
inputIdx[${k}] = j${k};\r\n            ${reduceOps}\r\n          }`;\r\n        } else {\r\n
idxCopy.push(`inputIdx[${k}] = outputIdx[${outputShape.length}];`);\r\n\r\n
outputShape.push(inputs[0].dims[k]);\r\n        }\r\n      }\r\n\r\n      const oRank = outputShape.length || 1;\r\n\r\n
const shaderSource = `\r\n      float process(int outputIdx[${oRank}]) {\r\n        float value;                 // final
result\r\n        int inputIdx[${iRank}];      // addressing input data\r\n        ${idxCopy.join('\\n')}\r\n        ${ops[0]}
// init ops for reduce max/min\r\n        ${reduceOps}\r\n        ${ops[2]}       // final computation for reduce mean\r\n
    return value;\r\n      }`;\r\n\r\n      return {\r\n        ...reduceProgramMetadata,\r\n        output: {dims: outputShape,
type: inputs[0].type, textureType: TextureType.unpacked},\r\n        shaderSource\r\n      };\r\n    };\r\n\r\nconst
validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length !== 1) {\r\n    throw new Error('Reduce
op requires 1 input.');\r\n  }\r\n\r\n  if (NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n    throw new
Error('Invalid input type.');\r\n  }\r\n};\r\n\r\nexport const reduceSum: OperatorImplementation<ReduceAttributes>
=\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] =>
{\r\n      const reduceOp: ReduceOp = (): string[] => ['value = 0.0;', 'value += _A(inputIdx);', ''];\r\n      return
reduce(inferenceHandler, inputs, attributes, 'ReduceSum', reduceOp);\r\n    };\r\n\r\nexport const reduceMean:
OperatorImplementation<ReduceAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: ReduceAttributes): Tensor[] => {\r\n      const reduceOp: ReduceOp = (inputs: Tensor[], axes: number[]):
string[] => {\r\n        let size = 1.0;\r\n        for (let k = 0; k < inputs[0].dims.length; k++) {\r\n          if
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(axes.indexOf(k) >= 0 || axes.length === 0) {\r\n          size *= inputs[0].dims[k];\r\n        }\r\n      }\r\n\r\n
return ['value = 0.0;', 'value += _A(inputIdx);', `value /= ${size}.;`];  // ensure real number with `.`\r\n    };\r\n
return reduce(inferenceHandler, inputs, attributes, 'ReduceMean', reduceOp);\r\n  };\r\n\r\nexport const reduceMax:
OperatorImplementation<ReduceAttributes> =\r\n  (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: ReduceAttributes): Tensor[] => {\r\n    const reduceOp: ReduceOp = (inputs: Tensor[], axes: number[]):
string[] => {\r\n      const idxZero = [];\r\n      for (let k = 0; k < inputs[0].dims.length; k++) {\r\n        if
(axes.indexOf(k) >= 0 || axes.length === 0) {\r\n          idxZero.push(`inputIdx[${k}] = 0;`);  // first element\r\n
 }\r\n      }\r\n\r\n      return [`${idxZero.join('\\n')}\\nvalue = _A(inputIdx);`, 'value = max(value, _A(inputIdx));',
''];\r\n    };\r\n    return reduce(inferenceHandler, inputs, attributes, 'ReduceMax', reduceOp);\r\n  };\r\n\r\nexport
const reduceMin: OperatorImplementation<ReduceAttributes> =\r\n  (inferenceHandler: WebGLInferenceHandler,
inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n    const reduceOp: ReduceOp = (inputs: Tensor[],
axes: number[]): string[] => {\r\n      const idxZero = [];\r\n      for (let k = 0; k < inputs[0].dims.length; k++) {\r\n
      if (axes.indexOf(k) >= 0 || axes.length === 0) {\r\n          idxZero.push(`inputIdx[${k}] = 0;`);  // first
element\r\n        }\r\n      }\r\n\r\n      return [`${idxZero.join('\\n')}\\nvalue = _A(inputIdx);`, 'value = min(value,
_A(inputIdx));', ''];\r\n    };\r\n    return reduce(inferenceHandler, inputs, attributes, 'ReduceMin', reduceOp);\r\n
};\r\n\r\nexport const reduceProd: OperatorImplementation<ReduceAttributes> =\r\n  (inferenceHandler:
WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n    const reduceOp:
ReduceOp = (): string[] => ['value = 1.0;', 'value *= _A(inputIdx);', ''];\r\n    return reduce(inferenceHandler, inputs,
attributes, 'ReduceProd', reduceOp);\r\n  };\r\n\r\nexport const reduceLogSum:
OperatorImplementation<ReduceAttributes> =\r\n  (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: ReduceAttributes): Tensor[] => {\r\n    const reduceOp: ReduceOp = (): string[] => ['value = 0.0;', 'value
+= _A(inputIdx);', 'value = log(value);'];\r\n    return reduce(inferenceHandler, inputs, attributes, 'ReduceLogSum',
reduceOp);\r\n  };\r\n\r\nexport const reduceLogSumSquare: OperatorImplementation<ReduceAttributes> =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n
const reduceOp: ReduceOp = (): string[] => ['float t; value = 0.0;', 't = _A(inputIdx); value += t * t;', ''];\r\n    return
reduce(inferenceHandler, inputs, attributes, 'ReduceLogSumSquare', reduceOp);\r\n  };","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from
'../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl} from '../glsl-source';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader,
ProgramMetadata, TextureType} from '../types';\r\n\r\nimport {unpackFromChannel} from './packing-
utils';\r\n\r\nconst createPackedReshape3DProgramMetadata = (outputShape3D: readonly number[]) =>\r\n
({name: 'Reshape (packed)', inputTypes: [TextureType.packed], inputNames: ['A'], cacheHint:
`${outputShape3D}`});\r\n\r\nconst createPackedReshape3DProgramInfo =\r\n  (handler:
WebGLInferenceHandler, input3D: Tensor, metadata: ProgramMetadata, outputShape3D: readonly number[]):\r\n
  ProgramInfo => {\r\n      const inputShape3D = input3D.dims as [number, number, number];\r\n      const
squeezedOutputShape = outputShape3D as [number, number, number];\r\n\r\n      let mainLoop = '';\r\n      for
(let i = 0; i < 4; i++) {\r\n        let outputCoords = '';\r\n        switch (i) {\r\n          case 0:\r\n
outputCoords = 'outputCoords = rc;';\r\n            break;\r\n          case 1:\r\n            outputCoords =
'outputCoords = ivec3(rc.x, rc.y+1, rc.z);';\r\n            break;\r\n          case 2:\r\n            outputCoords =
'outputCoords = ivec3(rc.x, rc.y, rc.z+1);';\r\n            break;\r\n          case 3:\r\n            outputCoords =
'outputCoords = ivec3(rc.x, rc.y+1, rc.z+1);';\r\n            break;\r\n          default:\r\n            throw new
Error();\r\n        }\r\n\r\n        mainLoop += `\r\n        ${outputCoords}\r\n        ${i > 0 ? 'if(outputCoords.y <
rows && outputCoords.z < cols){' : ''}\r\n          int flattenedIndex = getFlattenedIndex(outputCoords);\r\n\r\n
ivec3 inputRC = inputCoordsFromReshapedOutCoords(flattenedIndex);\r\n          vec2 innerDims =
vec2(float(inputRC.y),float(inputRC.z));\r\n\r\n          result[${i}] = getChannel(getA(inputRC.x, inputRC.y,
inputRC.z), innerDims);\r\n\r\n          ${i > 0 ? '}' : ''}\r\n        `;\r\n      }\r\n      const glsl =
getGlsl(handler.session.backend.glContext.version);\r\n\r\n      const shaderSource = `\r\n
${getReshapedInputCoords(inputShape3D)}\r\n      ${getFlattenedIndexFrom3D(squeezedOutputShape)}\r\n
```

${unpackFromChannel()}\r\n\r\n void main() {\r\n ivec3 rc = getOutputCoords();\r\n\r\n vec4 result = vec4(0.0);\r\n\r\n ivec3 outputCoords;\r\n int rows = ${squeezedOutputShape[2]};\r\n int cols = ${squeezedOutputShape[1]};\r\n\r\n ${mainLoop}\r\n ${glsl.output} = result;\r\n }\r\n `;\r\n\r\n return {\r\n ...metadata,\r\n output: {dims: squeezedOutputShape, type: input3D.type, textureType: TextureType.packed},\r\n shaderSource,\r\n hasMain: true\r\n };\r\n };\r\n\r\nexport const createPackedReshape3DProgramInfoLoader =\r\n (handler: WebGLInferenceHandler, input3D: Tensor, outputShape3D: readonly number[]): ProgramInfoLoader => {\r\n const metadata = createPackedReshape3DProgramMetadata(outputShape3D);\r\n return {...metadata, get: () => createPackedReshape3DProgramInfo(handler, input3D, metadata, outputShape3D)};\r\n };\r\n\r\nexport function processDims3D(shape: ArrayLike<number>): [number, number, number] {\r\n if (shape.length === 0) {\r\n return [1, 1, 1];\r\n }\r\n // TODO: squeeze other shapes to 2D case\r\n let batch = 1;\r\n for (let i = 0; i < shape.length - 2; ++i) {\r\n batch *= shape[i];\r\n }\r\n return [batch, shape.length > 1 ? shape[shape.length - 2] : 1, shape[shape.length - 1]];\r\n}\r\n\r\n// For packed reshape, we need to re-arrange texel data for output shape.\r\n// Our pack is designed to pack a 2x2 tile in last h and w dimension, so\r\n// for the reshaped new tensor, we just need to re-arrange the last h and\r\n// w dimension. For any shape that is not in 3D, i.e. [batch, W, H], we\r\n// first convert it to 3D by collapsing other dimension to batch dim, then\r\n// process with the last two dimensions.\r\n// Note: we only need the shape tensor to calculate output shape, so the\r\n// content in shape tensor is never uploaded to GPU. It is always kept in CPU.\r\n// TODO: optimize the algorithm -- in some cases, if the last two dims are\r\n// the same between input shape and output shape, the packed reshape can be\r\n// treated as no-op.\r\nexport function isReshapeCheap(dims: readonly number[], reshapedDims: readonly number[]) {\r\n let isCheapReshape = false;\r\n if (dims.length === 0 || reshapedDims.length === 0) { // scalar\r\n isCheapReshape = true;\r\n } else if (dims.length < 2 || reshapedDims.length < 2) { // 1D\r\n isCheapReshape = dims[dims.length - 1] === reshapedDims[reshapedDims.length - 1];\r\n } else { // 2D +\r\n isCheapReshape = dims[dims.length - 1] === reshapedDims[reshapedDims.length - 1] &&\r\n dims[dims.length - 2] === reshapedDims[reshapedDims.length - 2];\r\n }\r\n\r\n return isCheapReshape;\r\n}\r\n\r\nfunction getReshapedInputCoords(shape: [number, number, number]): string {\r\n const strides = ShapeUtil.computeStrides(shape);\r\n const coords = ['b', 'r', 'c'];\r\n const index = 'index';\r\n const coordsFromIndexSnippet = strides\r\n .map((stride, i) => {\r\n const line1 = `int ${coords[i]} = ${index} / ${stride}`;\r\n const line2 = i === strides.length - 1 ?\r\n `int ${coords[i + 1]} = ${index} - ${coords[i]} * ${stride}` :\r\n `index -= ${coords[i]} * ${stride}`;\r\n return `${line1}; ${line2};`;\r\n })\r\n .join('');\r\n\r\n return `\r\n ivec3 inputCoordsFromReshapedOutCoords(int index) {\r\n ${coordsFromIndexSnippet}\r\n return ivec3(b, r, c);\r\n }\r\n `;\r\n}\r\n\r\nfunction getFlattenedIndexFrom3D(shape: [number, number, number]): string {\r\n const strides = ShapeUtil.computeStrides(shape);\r\n\r\n return `\r\n int getFlattenedIndex(ivec3 coords) {\r\n // reverse y, z order\r\n return coords.x * ${strides[0]} + coords.z * ${strides[1]} + coords.y;\r\n }\r\n`;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const reshape = (handler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n const reshapedDims = ShapeUtil.calculateReshapedDims(inputs[0].dims, inputs[1].integerData);\r\n if (handler.session.pack) {\r\n return [handler.reshapePacked(inputs[0], reshapedDims)];\r\n } else {\r\n return [handler.reshapeUnpacked(inputs[0], reshapedDims)];\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\nimport {getCoordsDataType} from '../utils';\r\n\r\nimport {unpackFromChannel} from './packing-utils';\r\nimport {parseUpsampleAttributes, scalesValidation, UpsampleAttributes, validateInputs} from './upsample';\r\n\r\nconst resizeProgramMetadata = {\r\n name: 'Resize',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.packed]\r\n};\r\n\r\nexport const resize:

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OperatorImplementation<UpsampleAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs:
Tensor[], attributes: UpsampleAttributes): Tensor[] => {\r\n      validateInputs(inputs, attributes);\r\n      const output
= inferenceHandler.run(\r\n          {\r\n            ...resizeProgramMetadata,\r\n            cacheHint:
attributes.cacheKey,\r\n            get: () => createPackedResizeProgramInfo(inferenceHandler, inputs, attributes)\r\n
     },\r\n          inputs);\r\n      return [output];\r\n    };\r\n\r\nexport const parseResizeAttributesV10:
OperatorInitialization<UpsampleAttributes> =\r\n    (node: Graph.Node): UpsampleAttributes =>
parseUpsampleAttributes(node, 10);\r\n\r\nexport const parseResizeAttributesV11:
OperatorInitialization<UpsampleAttributes> =\r\n    (node: Graph.Node): UpsampleAttributes =>
parseUpsampleAttributes(node, 11);\r\n\r\nconst createPackedResizeProgramInfo =\r\n    (inferenceHandler:
WebGLInferenceHandler, inputs: Tensor[], attributes: UpsampleAttributes): ProgramInfo => {\r\n      const glsl =
getGlsl(inferenceHandler.session.backend.glContext.version);\r\n      const [scales, outputShape] =
prepareInputs(inputs, attributes);\r\n\r\n      const isSame =\r\n          scales.every((s: number) => s === 1) &&
attributes.coordinateTransformMode !== 'tf_crop_and_resize';\r\n      if (isSame) {\r\n        return {\r\n
...resizeProgramMetadata,\r\n          output: {dims: outputShape, type: inputs[0].type, textureType:
TextureType.packed},\r\n          hasMain: true,\r\n          shaderSource: `void main() {\r\n                    vec4 v =
${glsl.texture2D}(X, TexCoords);\r\n                    ${glsl.output} = v;\r\n                }`\r\n        };\r\n      }\r\n\r\n
const dim = outputShape.length;\r\n      if (dim < 2) {\r\n        throw new Error(`output dimension should be at least
2, but got ${dim}`);\r\n      }\r\n\r\n      const outputHeight = outputShape[dim - 2];\r\n      const outputWidth =
outputShape[dim - 1];\r\n\r\n      const inputShape = inputs[0].dims;\r\n      if (dim !== inputShape.length) {\r\n
throw new Error(`output dimension should match input ${inputShape.length}, but got ${dim}`);\r\n      }\r\n
const inputHeight = inputShape[dim - 2];\r\n      const inputWidth = inputShape[dim - 1];\r\n\r\n      const
scalesHeight = scales[dim - 2];\r\n      const scalesWidth = scales[dim - 1];\r\n\r\n      let getSourceFracIndex =
'';\r\n\r\n      if (attributes.mode !== 'linear') {\r\n        // TODO: support other modes\r\n        throw new Error(`resize
(packed) does not support mode: '${attributes.mode}'`);\r\n      }\r\n      switch
(attributes.coordinateTransformMode) {\r\n        case 'asymmetric':\r\n          getSourceFracIndex = `\r\n
vec4 getSourceFracIndex(ivec4 coords) {\r\n                      return vec4(coords) / scaleWHWH;\r\n                  }\r\n
              `;\r\n          break;\r\n        case 'half_pixel':\r\n          getSourceFracIndex = `\r\n                  vec4
getSourceFracIndex(ivec4 coords) {\r\n                      return (vec4(coords) + 0.5) / scaleWHWH - 0.5;\r\n
  }\r\n                `;\r\n          break;\r\n        case 'align_corners':\r\n          getSourceFracIndex = `\r\n                  vec4
getSourceFracIndex(ivec4 coords) {\r\n                      vec4 resized = vec4(${outputWidth}.0 - 1.0,
${outputHeight}.0 - 1.0, ${outputWidth}.0 - 1.0,\r\n                        ${outputHeight}.0 - 1.0);\r\n
vec4 original = vec4(${inputWidth}.0 - 1.0, ${inputHeight}.0 - 1.0, ${inputWidth}.0 - 1.0,\r\n
${inputHeight}.0 - 1.0);\r\n                      vec4 new_scale = original / resized;\r\n                      return vec4(coords)
* new_scale;\r\n                  }\r\n                `;\r\n          break;\r\n        default:\r\n          // TODO:supporting other
coordinateTransformModes\r\n          throw new Error(`resize (packed) does not support coordinateTransformMode:
\\\r\n                              '${attributes.coordinateTransformMode}'`);\r\n      }\r\n\r\n      const coordsDataType =
getCoordsDataType(dim);\r\n      const unpackChannel = unpackFromChannel();\r\n      const shaderSource = `\r\n
      const vec2 inputWH = vec2(${inputHeight}.0, ${inputWidth}.0);\r\n            const vec4 scaleWHWH =
vec4(${scalesHeight}.0, ${scalesWidth}.0, ${scalesHeight}.0, ${scalesWidth}.0);\r\n            ${unpackChannel}\r\n
         ${getSourceFracIndex}\r\n            float getAValue(int x10, int r, int c, int d) {\r\n              return
getChannel(getA(x10, r, c, d), vec2(c, d));\r\n            }\r\n            void main() {\r\n              ${coordsDataType} rc
= getOutputCoords();\r\n\r\n              int batch = rc[0];\r\n              int depth = rc[1];\r\n\r\n              // retrieve the
4 coordinates that is used in the 4 packed output values.\r\n              ivec4 coords = ivec4(rc.wz, rc.w + 1, rc.z +
1);\r\n\r\n              // calculate the source index in fraction\r\n              vec4 sourceFrac =
getSourceFracIndex(coords);\r\n\r\n              // get the lower and upper bound of the 4 values that will be packed
into one texel.\r\n              ivec4 x00 = ivec4(max(sourceFrac.xy, vec2(0.0)), min(inputWH - 1.0,
ceil(sourceFrac.xy)));\r\n              ivec4 x01 = ivec4(max(sourceFrac.xw, vec2(0.0)), min(inputWH - 1.0,
ceil(sourceFrac.xw)));\r\n              ivec4 x10 = ivec4(max(sourceFrac.zy, vec2(0.0)), min(inputWH - 1.0,
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ceil(sourceFrac.zy)));\r\n ivec4 x11 = ivec4(max(sourceFrac.zw, vec2(0.0)), min(inputWH - 1.0, ceil(sourceFrac.zw)));\r\n\r\n bool hasNextRow = rc.w < ${outputHeight - 1};\r\n bool hasNextCol = rc.z < ${outputWidth - 1};\r\n\r\n // pack x00, x01, x10, x11's top-left corner into one vec4 structure\r\n vec4 topLeft = vec4(\r\n getAValue(batch, depth, x00.x, x00.y),\r\n hasNextCol ? getAValue(batch, depth, x01.x, x01.y) : 0.0,\r\n hasNextRow ? getAValue(batch, depth, x10.x, x10.y) : 0.0,\r\n (hasNextRow && hasNextCol) ? getAValue(batch, depth, x11.x, x11.y) : 0.0);\r\n\r\n // pack x00, x01, x10, x11's top-right corner into one vec4 structure\r\n vec4 topRight = vec4(\r\n getAValue(batch, depth, x00.x, x00.w),\r\n hasNextCol ? getAValue(batch, depth, x01.x, x01.w) : 0.0,\r\n hasNextRow ? getAValue(batch, depth, x10.x, x10.w) : 0.0,\r\n (hasNextRow && hasNextCol) ? getAValue(batch, depth, x11.x, x11.w) : 0.0);\r\n\r\n // pack x00, x01, x10, x11's bottom-left corner into one vec4 structure\r\n vec4 bottomLeft = vec4(\r\n getAValue(batch, depth, x00.z, x00.y),\r\n hasNextCol ? getAValue(batch, depth, x01.z, x01.y) : 0.0,\r\n hasNextRow ? getAValue(batch, depth, x10.z, x10.y) : 0.0,\r\n (hasNextRow && hasNextCol) ? getAValue(batch, depth, x11.z, x11.y) : 0.0);\r\n\r\n // pack x00, x01, x10, x11's bottom-right corner into one vec4 structure\r\n vec4 bottomRight = vec4(\r\n getAValue(batch, depth, x00.z, x00.w),\r\n hasNextCol ? getAValue(batch, depth, x01.z, x01.w) : 0.0,\r\n hasNextRow ? getAValue(batch, depth, x10.z, x10.w) : 0.0,\r\n (hasNextRow && hasNextCol) ? getAValue(batch, depth, x11.z, x11.w) : 0.0);\r\n\r\n // calculate the interpolation fraction on u and v direction\r\n vec4 frac = vec4(sourceFrac) - floor(sourceFrac);\r\n vec4 clampFrac = clamp(frac, vec4(0.0), vec4(1.0));\r\n\r\n vec4 top = mix(topLeft, topRight, clampFrac.ywyw);\r\n vec4 bottom = mix(bottomLeft, bottomRight, clampFrac.ywyw);\r\n vec4 newValue = mix(top, bottom, clampFrac.xxzz);\r\n\r\n ${glsl.output} = vec4(newValue);\r\n }\r\n `;\r\n return {\r\n ...resizeProgramMetadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.packed},\r\n hasMain: true,\r\n shaderSource\r\n };\r\n };\r\n\r\n\r\nconst prepareInputs = (inputs: Tensor[], attributes: UpsampleAttributes): [readonly number[], readonly number[]] => {\r\n const x = inputs[0];\r\n const xDims = x.dims;\r\n\r\n let scales = attributes.scales;\r\n let outputSizes: number[]|undefined;\r\n if (scales.length === 0) {\r\n const scalesTensor = inputs[attributes.scalesInputIdx];\r\n if (scalesTensor && scalesTensor.size !== 0) {\r\n if (inputs[attributes.sizesInputIdx]) {\r\n throw new Error('Only one of scales or sizes must be provided as input.');\r\n }\r\n scales = parseScalesData(scalesTensor, attributes.mode, attributes.isResize);\r\n } else {\r\n const sizesTensor = inputs[attributes.sizesInputIdx];\r\n if (!sizesTensor || sizesTensor.size === 0) {\r\n throw new Error('Either scales or sizes MUST be provided as input.');\r\n }\r\n\r\n outputSizes = Array.from(sizesTensor.integerData);\r\n scales = parseScalesDataFromOutputSize(outputSizes, xDims, attributes.mode, attributes.isResize);\r\n }\r\n } else {\r\n if (inputs[attributes.sizesInputIdx]) {\r\n throw new Error('Only one of scales or sizes must be provided as input.');\r\n }\r\n }\r\n\r\n const yDims = outputSizes || (xDims.map((dim, i) => Math.floor(dim * scales[i])));\r\n\r\n return [scales, yDims];\r\n};\r\n\r\nconst parseScalesData = (scale: Tensor, mode: string, isResize: boolean): number[] => {\r\n const scales = Array.from(scale.floatData);\r\n scalesValidation(scales, mode, isResize);\r\n return scales;\r\n};\r\n\r\nconst parseScalesDataFromOutputSize =\r\n (yDims: readonly number[], xDims: readonly number[], mode: string, isResize: boolean): number[] => {\r\n const length = xDims.length;\r\n const scales = new Array<number>(length);\r\n\r\n for (let i = 0, end = length; i < end; i++) {\r\n if (xDims[i] === 0) {\r\n if (yDims[i] !== 0) {\r\n throw new Error('Input dim is zero but required output dim is non-zero.');\r\n }\r\n scales[i] = 1;\r\n } else {\r\n scales[i] = yDims[i] / xDims[i];\r\n }\r\n }\r\n scalesValidation(scales, mode, isResize);\r\n return scales;\r\n };\r\n\r\n// roi data is not used yet. but leave here for future usage.\r\n// const getRoi = (inputs: Tensor[], attributes: UpsampleAttributes) : number[] => {\r\n// let roi: number[] = [];\r\n// if (attributes.needRoiInput) {\r\n// if (attributes.roiInputIdx <= 0) {\r\n// throw new Error('Invalid roi input index.');\r\n// }\r\n// const roiTensor = inputs[attributes.roiInputIdx];\r\n// roi = roiTensor.size > 0 ? Array.from(roiTensor.floatData) : [];\r\n// } else

{\r\n//   roi = new Array(inputs[0].dims.length * 2).fill(0);\r\n//   }\r\n//   return roi;\r\n// };","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const shape = (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n validateInputs(inputs);\r\n return [new Tensor([inputs[0].dims.length], 'int32', undefined, undefined, new Int32Array(inputs[0].dims))];\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Shape requires 1 input.');\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {NUMBER_TYPES, OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface SliceAttributes extends AttributeWithCacheKey {\r\n readonly axes: number[];\r\n readonly ends: number[];\r\n readonly starts: number[];\r\n}\r\n\r\nconst sliceProgramMetadata = {\r\n name: 'Slice',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked]\r\n};\r\n\r\nexport const slice: OperatorImplementation<SliceAttributes> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: SliceAttributes): Tensor[] => {\r\n   validateInputs(inputs);\r\n   const output = inferenceHandler.run(\r\n   {\r\n   ...sliceProgramMetadata,\r\n   cacheHint: attributes.cacheKey,\r\n   get: () => createSliceProgramInfo(inferenceHandler, inputs[0], attributes)\r\n   },\r\n   inputs);\r\n   return [output];\r\n   };\r\n\r\nexport const parseSliceAttributes: OperatorInitialization<SliceAttributes> = (node: Graph.Node): SliceAttributes => {\r\n const starts = node.attributes.getInts('starts');\r\n const ends = node.attributes.getInts('ends');\r\n const axes = node.attributes.getInts('axes', []);\r\n return createAttributeWithCacheKey({starts, ends, axes});\r\n};\r\n\r\nconst createSliceProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, input: Tensor, attributes: SliceAttributes): ProgramInfo => {\r\n   const axes = (attributes.axes.length === 0) ? input.dims.slice(0).map((val, i) => i) : attributes.axes;\r\n   const normalizedAxes = ShapeUtil.normalizeAxes(axes, input.dims.length);\r\n   const starts = attributes.starts.map((start, i) => {\r\n   if (start > input.dims[normalizedAxes[i]] - 1) {\r\n   return input.dims[normalizedAxes[i]];\r\n   }\r\n   return ShapeUtil.normalizeAxis(start, input.dims[normalizedAxes[i]]);\r\n   });\r\n   const ends = attributes.ends.map((end, i) => {\r\n   if (end > input.dims[normalizedAxes[i]] - 1) {\r\n   return input.dims[normalizedAxes[i]];\r\n   }\r\n   return ShapeUtil.normalizeAxis(end, input.dims[normalizedAxes[i]]);\r\n   });\r\n\r\n   const outputShape = input.dims.slice();\r\n\r\n   const sliceOps: string[] = [];\r\n   for (let i = 0; i < normalizedAxes.length; i++) {\r\n   outputShape[normalizedAxes[i]] = ends[i] - starts[i];\r\n   if (starts[i] > 0) {\r\n   sliceOps.push(`outputIdx[${normalizedAxes[i]}] += ${starts[i]};`);\r\n   } // else { sliceOps.push(`outputIdx[${normalizedAxes[i]}] += 0;`); }\r\n   }\r\n\r\n   const rank = outputShape.length;\r\n   const shaderSource = `\r\n      float process(int outputIdx[${rank}]) {\r\n        ${sliceOps.join('\\n      ')}\r\n        return _A(outputIdx);\r\n      }`;\r\n   return {\r\n   ...sliceProgramMetadata,\r\n   output: {dims: outputShape, type: input.type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Slice requires 1 input.');\r\n }\r\n if (NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n   throw new Error('Invalid input type.');\r\n }\r\n};\r\n\r\nexport const sliceV10 = (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n validateInputsV10(inputs);\r\n const attributes = generateSliceAttributesFromInputs(inferenceHandler, inputs);\r\n const output = inferenceHandler.run(\r\n   {\r\n   ...sliceProgramMetadata,\r\n   cacheHint: attributes.cacheKey,\r\n   get: () => createSliceProgramInfo(inferenceHandler, inputs[0], attributes)\r\n   },\r\n   [inputs[0]]);\r\n return [output];\r\n};\r\n\r\nconst generateSliceAttributesFromInputs =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): SliceAttributes => {\r\n   if (!inferenceHandler.session.isInitializer(inputs[1].dataId) ||\r\n   !inferenceHandler.session.isInitializer(inputs[2].dataId) ||\r\n   (inputs.length >= 4 &&

!inferenceHandler.session.isInitializer(inputs[3].dataId)) ||\r\n (inputs.length >= 5 && !inferenceHandler.session.isInitializer(inputs[4].dataId))) {\r\n throw new Error('dynamic slice attributes are not allowed');\r\n }\r\n\r\n if (inputs.length >= 5 && inputs[4].integerData.some((i: number) => i !== 1)) {\r\n throw new Error('currently non-1 steps is not supported for Slice');\r\n }\r\n\r\n const starts = Array.from(inputs[1].integerData);\r\n const ends = Array.from(inputs[2].integerData);\r\n const axes = inputs.length >= 4 ? Array.from(inputs[3].integerData) : [];\r\n const cacheKey = `${axes};${starts};${ends}`;\r\n return {starts, ends, axes, cacheKey};\r\n };\r\n\r\nconst validateInputsV10 = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length < 3 || inputs.length > 5) {\r\n throw new Error('Invalid input number.');\r\n }\r\n if (inputs[1].type !== 'int32' || inputs[1].dims.length !== 1) {\r\n throw new Error('Invalid input type.');\r\n }\r\n if (inputs[2].type !== 'int32' || inputs[2].dims.length !== 1) {\r\n throw new Error('Invalid input type.');\r\n }\r\n if (inputs.length >= 4 && (inputs[3].type !== 'int32' || inputs[3].dims.length !== 1)) {\r\n throw new Error('Invalid input type.');\r\n }\r\n if (inputs.length >= 5 && (inputs[4].type !== 'int32' || inputs[4].dims.length !== 1)) {\r\n throw new Error('Invalid input type.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface SoftmaxAttributes extends AttributeWithCacheKey {\r\n readonly axis: number;\r\n}\r\n\r\nconst softmaxComputeMaxProgramMetadata = {\r\n name: 'SoftmaxComputeMax',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nconst softmaxComputeScaleProgramMetadata = {\r\n name: 'SoftmaxComputeScale',\r\n inputNames: ['A', 'Max'],\r\n inputTypes: [TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nconst softmaxProgramMetadata = {\r\n name: 'SoftMax',\r\n inputNames: ['A', 'Max', 'Norm'],\r\n inputTypes: [TextureType.unpacked, TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nexport const softmax: OperatorImplementation<SoftmaxAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: SoftmaxAttributes): Tensor[] => {\r\n validateInputs(inputs);\r\n\r\n const inputShape = inputs[0].dims.slice();\r\n const axis = ShapeUtil.normalizeAxis(attributes.axis, inputShape.length);\r\n const N = ShapeUtil.sizeToDimension(inputShape, axis);\r\n const D = ShapeUtil.sizeFromDimension(inputShape, axis);\r\n\r\n const computeMaxProgramInfo = createComputeMaxProgramInfo(inferenceHandler, inputs[0], N, D, [N]);\r\n const max = inferenceHandler.run(\r\n {...softmaxComputeMaxProgramMetadata, cacheHint: attributes.cacheKey, get: () => computeMaxProgramInfo},\r\n inputs);\r\n\r\n const computeScaleProgramInfo =\r\n createComputScaleProgramInfo(inferenceHandler, inputs[0], N, D, computeMaxProgramInfo.output.dims, [N]);\r\n const scale = inferenceHandler.run(\r\n {...softmaxComputeScaleProgramMetadata, cacheHint: attributes.cacheKey, get: () => computeScaleProgramInfo},\r\n [inputs[0], max]);\r\n\r\n const softMaxProgramInfo = createSoftMaxProgramInfo(\r\n inferenceHandler, inputs[0], N, D, computeMaxProgramInfo.output.dims, computeScaleProgramInfo.output.dims);\r\n const output = inferenceHandler.run(\r\n {...softmaxProgramMetadata, cacheHint: attributes.cacheKey, get: () => softMaxProgramInfo},\r\n [inputs[0], max, scale]);\r\n return [output];\r\n };\r\n\r\nexport const parseSoftmaxAttributes: OperatorInitialization<SoftmaxAttributes> =\r\n (node: Graph.Node): SoftmaxAttributes => createAttributeWithCacheKey({axis: node.attributes.getInt('axis', 1)});\r\n\r\n/**\r\n * Create a texture that contains the maximum value of each of the 'N' rows\r\n */\r\nconst createComputeMaxProgramInfo =\r\n // eslint-disable-next-line @typescript-eslint/naming-convention\r\n (inferenceHandler: WebGLInferenceHandler, input: Tensor, N: number, D: number, outputShape: number[]):\r\n ProgramInfo => {\r\n const [textureWidth, textureHeight] =\r\n inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n const rank = outputShape.length;\r\n\r\n if (N < 1 || D < 1) {\r\n throw new Error('Logical row count N and feature count D must be greater than or equal to 1');\r\n }\r\n\r\n if (outputShape.length !== 1) {\r\n throw new Error('Dimensionality of the output should be 1');\r\n }\r\n\r\n if (outputShape[0] !== N) {\r\n throw new Error('Shape of the output should be equal to logical row count');\r\n }\r\n\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n const shaderSource = `\r\n float process(int[${rank}] indices) {\r\n int logical_row_start_offset = indices[0] * ${D};\r\n\r\n float max = getColorAsFloat(${glsl.texture2D}(A, offsetToCoords(logical_row_start_offset, ${textureWidth},\r\n ${textureHeight})));\r\n for(int i=1; i<${D}; ++i)\r\n {\r\n float current = getColorAsFloat(${glsl.texture2D}(A, offsetToCoords(logical_row_start_offset + i,\r\n ${textureWidth}, ${textureHeight})));\r\n if(current > max)\r\n max = current;\r\n }\r\n\r\n return max;\r\n }`;\r\n return {\r\n ...softmaxComputeMaxProgramMetadata,\r\n output: {dims: outputShape, type: input.type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\n/**\r\n * Create a texture that contains the normalization factor for each of the 'N' rows\r\n */\r\nconst createComputScaleProgramInfo =\r\n // eslint-disable-next-line @typescript-eslint/naming-convention\r\n (inferenceHandler: WebGLInferenceHandler, input: Tensor, N: number, D: number,\r\n maxElementPerLogicalRow: readonly number[], outputShape: number[]): ProgramInfo => {\r\n const [textureWidth, textureHeight] =\r\n inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n const rank = outputShape.length;\r\n\r\n if (N < 1 || D < 1) {\r\n throw new Error('Logical row count N and feature count D must be greater than or equal to 1');\r\n }\r\n\r\n if (outputShape.length !== 1) {\r\n throw new Error('Dimensionality of the output should be 1');\r\n }\r\n\r\n if (outputShape[0] !== N) {\r\n throw new Error('Shape of the output should be equal to logical row count');\r\n }\r\n\r\n if (maxElementPerLogicalRow.length !== 1) {\r\n throw new Error('Dimensionality of the intermediate results should be 1');\r\n }\r\n\r\n if (maxElementPerLogicalRow[0] !== N) {\r\n throw new Error('Shape of the intermediate results should be equal to logical row count');\r\n }\r\n\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n const shaderSource = `\r\n float process(int[${rank}] indices) {\r\n int logical_row_start_offset = indices[0] * ${D};\r\n\r\n float norm_factor = 0.0;\r\n float max = _Max(indices);\r\n for(int i=0; i<${D}; ++i)\r\n {\r\n norm_factor += exp(getColorAsFloat(${glsl.texture2D}(A, offsetToCoords(logical_row_start_offset + i,\r\n ${textureWidth}, ${textureHeight}))) - max);\r\n }\r\n\r\n return norm_factor;\r\n }`;\r\n return {\r\n ...softmaxComputeScaleProgramMetadata,\r\n output: {dims: outputShape, type: input.type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\nconst createSoftMaxProgramInfo =\r\n // eslint-disable-next-line @typescript-eslint/naming-convention\r\n (inferenceHandler: WebGLInferenceHandler, input: Tensor, N: number, D: number,\r\n maxElementPerLogicalRow: readonly number[], normalizationPerLogicalRow: readonly number[]): ProgramInfo => {\r\n const [textureWidth, textureHeight] =\r\n inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n const rank = input.dims.length;\r\n\r\n if (N < 1 || D < 1) {\r\n throw new Error('Logical row count N and feature count D must be greater than or equal to 1');\r\n }\r\n\r\n if (maxElementPerLogicalRow.length !== 1 || normalizationPerLogicalRow.length !== 1) {\r\n throw new Error('Dimensionality of the intermediate results should be 1');\r\n }\r\n\r\n if (maxElementPerLogicalRow[0] !== N || normalizationPerLogicalRow[0] !== N) {\r\n throw new Error('Shape of the intermediate results should be equal to logical row count');\r\n }\r\n\r\n const shaderSource = `\r\n float process(int[${rank}] indices) {\r\n\r\n // get offset of current logical tensor index from the 2-D texture coordinates (TexCoords)\r\n int offset = coordsToOffset(TexCoords, ${textureWidth}, ${textureHeight});\r\n\r\n //determine the logical row for this index\r\n int logical_row_index[1];\r\n logical_row_index[0] = offset / ${D};\r\n\r\n float norm_factor = _Norm(logical_row_index);\r\n\r\n // avoid possible division by 0\r\n // if norm_facor is 0, all elements are zero\r\n // if so, return 0\r\n if(norm_factor == 0.0)\r\n return 0.0;\r\n\r\n return exp(_A(indices) - _Max(logical_row_index)) / norm_factor;\r\n }`;\r\n return {\r\n ...softmaxProgramMetadata,\r\n output: {dims: input.dims, type: input.type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n throw new

Error('Softmax requires 1 input.');\r\n }\r\n\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n   throw new Error('Invalid input type');\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil, SplitUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface SplitAttributes extends AttributeWithCacheKey {\r\n readonly axis: number;\r\n readonly split: number[];\r\n readonly numOutputs: number;\r\n}\r\n\r\nconst splitProgramMetadata = {\r\n name: 'Split',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nexport const split: OperatorImplementation<SplitAttributes> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: SplitAttributes): Tensor[] => {\r\n   validateInputs(inputs);\r\n\r\n   const axis = ShapeUtil.normalizeAxis(attributes.axis, inputs[0].dims.length);\r\n   const count = getProgramCount(inferenceHandler, inputs, axis, attributes);\r\n   const output: Tensor[] = [];\r\n   for (let i = 0; i < count; ++i) {\r\n   output.push(inferenceHandler.run(\r\n   {\r\n   ...splitProgramMetadata,\r\n   cacheHint: `${attributes.cacheKey};${i}`,\r\n   get: () => createSplitProgramInfo(inferenceHandler, inputs[0], attributes, axis, i)\r\n   },\r\n   inputs));\r\n   }\r\n\r\n   return output;\r\n   };\r\n\r\nexport const parseSplitAttributes: OperatorInitialization<SplitAttributes> = (node: Graph.Node): SplitAttributes => {\r\n const axis = node.attributes.getInt('axis', 0);\r\n const split = node.attributes.getInts('split', []);\r\n const numOutputs = node.outputs.length;\r\n return createAttributeWithCacheKey({axis, split, numOutputs});\r\n};\r\n\r\nconst getProgramCount =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axis: number, attributes: SplitAttributes): number => {\r\n   const [, offsets] = SplitUtil.splitShape(inputs[0].dims, axis, attributes.split, attributes.numOutputs);\r\n   return offsets.length;\r\n   };\r\n\r\nconst createSplitProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, input: Tensor, attributes: SplitAttributes, axis: number, index: number):\r\n   ProgramInfo => {\r\n   const [shapes, offsets] = SplitUtil.splitShape(input.dims, axis, attributes.split, attributes.numOutputs);\r\n   const offset = offsets[index];\r\n   const outputShape = shapes[index];\r\n   const rank = outputShape.length;\r\n   const shaderSource = `\r\n      float process(int indices[${rank}]) {\r\n        indices[${axis}] += ${offset};\r\n        return _A(indices);\r\n      }\r\n    `;\r\n   return {\r\n   ...splitProgramMetadata,\r\n   cacheHint: `${attributes.cacheKey}:${index}`,\r\n   output: {dims: outputShape, type: input.type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Split requires one input.');\r\n }\r\n\r\n if (inputs[0].type !== 'int8' && inputs[0].type !== 'uint8' && inputs[0].type !== 'int16' &&\r\n   inputs[0].type !== 'uint16' && inputs[0].type !== 'int32' && inputs[0].type !== 'uint32' &&\r\n   inputs[0].type !== 'float32' && inputs[0].type !== 'float64' && inputs[0].type !== 'bool') {\r\n   throw new Error('Invalid input type.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const squeeze: OperatorImplementation<number[]> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axes: number[]): Tensor[] => {\r\n   validateInputs(inputs);\r\n   const outputShape = ShapeUtil.squeezeShape(inputs[0].dims, axes);\r\n   const output = inferenceHandler.reshapeUnpacked(inputs[0], outputShape);\r\n   return [output];\r\n   };\r\n\r\nexport const parseSqueezeAttributes: OperatorInitialization<number[]> = (node: Graph.Node): number[] =>\r\n   node.attributes.getInts('axes');\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Squeeze requires 1 input.');\r\n }\r\n\r\n if (inputs[0].type === 'string') {\r\n   throw new Error('invalid input tensor types.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport

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{ProgramInfo, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport const sum = (inferenceHandler:
WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n  validateInputs(inputs);\r\n\r\n  const
sumProgramMetadata = {\r\n    name: 'Sum',\r\n    inputNames: inputs.map((v, i) => `X${i}`),\r\n    inputTypes: new
Array(inputs.length).fill(TextureType.unpacked)\r\n  };\r\n\r\n  const output = inferenceHandler.run(\r\n
{...sumProgramMetadata, get: () => createSumProgramInfo(inferenceHandler, inputs, sumProgramMetadata)},
inputs);\r\n  return [output];\r\n};\r\n\r\nconst createSumProgramInfo =\r\n    (inferenceHandler:
WebGLInferenceHandler, inputs: Tensor[], sumProgramMetadata: ProgramMetadata): ProgramInfo => {\r\n
const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n      const outputShape =
inputs[0].dims.slice();\r\n      const sumLine = inputs.map((v, i) => `${glsl.texture2D}(X${i},TexCoords)`).join(' +
');\r\n      const shaderSource = `\r\n      void main() {\r\n        vec4 result = ${sumLine};\r\n        ${glsl.output} =
result;\r\n      }\r\n    `;\r\n      return {\r\n        ...sumProgramMetadata,\r\n        output: {dims: outputShape, type:
inputs[0].type, textureType: TextureType.unpacked},\r\n        hasMain: true,\r\n        shaderSource\r\n      };\r\n
};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length === 0) {\r\n    throw new
Error('Sum requires inputs.');\r\n  }\r\n\r\n  const length = inputs[0].dims.length;\r\n  for (let i = 1; i < inputs.length;
i++) {\r\n    if (length !== inputs[i].dims.length) {\r\n      throw new Error('Input shapes are mismatched.');\r\n
}\r\n\r\n    for (let j = 0; j < length; j++) {\r\n      if (inputs[0].dims[j] !== inputs[i].dims[j]) {\r\n        throw new
Error('Input shapes are not matched.');\r\n      }\r\n    }\r\n  }\r\n\r\n  if (inputs[0].type !== 'float32' && inputs[0].type
!== 'float64') {\r\n    throw new Error('Invalid input type.');\r\n  }\r\n  for (let i = 1; i < inputs.length; i++) {\r\n    if
(inputs[0].type !== inputs[i].type) {\r\n      throw new Error('Input types are not matched.');\r\n    }\r\n  }\r\n};","//
Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{NUMBER_TYPES} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramMetadata, TextureType}
from '../types';\r\n\r\nexport const tile = (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] =>
{\r\n  validateInputs(inputs);\r\n\r\n  const tileProgramMetadata = {\r\n    name: 'Tile',\r\n    inputNames: ['A'],\r\n
inputTypes: [TextureType.unpacked],\r\n  };\r\n\r\n  const output = inferenceHandler.run(\r\n
{...tileProgramMetadata, get: () => createTileProgramInfo(inferenceHandler, inputs, tileProgramMetadata)},\r\n
inputs);\r\n  return [output];\r\n};\r\n\r\nconst createTileProgramInfo =\r\n    (handler: WebGLInferenceHandler,
inputs: Tensor[], tileProgramMetadata: ProgramMetadata): ProgramInfo => {\r\n      const inputShape =
inputs[0].dims.slice();\r\n      const outputShape = new Array(inputShape.length);\r\n\r\n      const tileOps: string[] =
[];\r\n      for (let i = 0; i < inputShape.length; i++) {\r\n        outputShape[i] = inputShape[i] *
inputs[1].numberData[i];\r\n        tileOps.push(`inputIdx[${i}] = int(mod(float(outputIdx[${i}]),
${inputShape[i]}.));`);\r\n      }\r\n\r\n      const rank = outputShape.length;\r\n      const shaderSource = `\r\n      float
process(int outputIdx[${rank}]) {\r\n        int inputIdx[${rank}];\r\n        ${tileOps.join('\\n')}\r\n        return
_A(inputIdx);\r\n      }\r\n    `;\r\n      return {\r\n        ...tileProgramMetadata,\r\n        output: {dims: outputShape,
type: inputs[0].type, textureType: TextureType.unpacked},\r\n        shaderSource\r\n      };\r\n    };\r\n\r\nconst
validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length !== 2) {\r\n    throw new Error('Tile
requires 2 input.');\r\n  }\r\n  if (inputs[1].dims.length !== 1) {\r\n    throw new Error('The second input shape must 1
dimension.');\r\n  }\r\n  if (inputs[1].dims[0] !== inputs[0].dims.length) {\r\n    throw new Error('Invalid input
shape.');\r\n  }\r\n  if (NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n    throw new Error('Invalid input
type.');\r\n  }\r\n  if (inputs[1].type !== 'int32' && inputs[1].type !== 'int16') {\r\n    throw new Error('Invalid repeat
type.');\r\n  }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-
key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from
'../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from
'../types';\r\n\r\nexport interface TransposeAttributes extends AttributeWithCacheKey {\r\n  readonly perm:
number[];\r\n}\r\n\r\nconst transposeProgramMetadata = {\r\n  name: 'Transpose',\r\n  inputNames: ['A'],\r\n
inputTypes: [TextureType.unpacked]\r\n};\r\n\r\nexport const transpose:
```

OperatorImplementation<TransposeAttributes> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: TransposeAttributes): Tensor[] => {\r\n   validateInputs(inputs);\r\n   const output = inferenceHandler.run(\r\n   {\r\n   ...transposeProgramMetadata,\r\n   cacheHint: attributes.cacheKey,\r\n   get: () => createTransposeProgramInfo(inferenceHandler, inputs[0], attributes.perm)\r\n   },\r\n   inputs);\r\n   return [output];\r\n   };\r\n\r\nexport const parseTransposeAttributes: OperatorInitialization<TransposeAttributes> =\r\n   (node: Graph.Node): TransposeAttributes => createAttributeWithCacheKey({perm: node.attributes.getInts('perm', [])});\r\n\r\nconst createTransposeProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, input: Tensor, perm: number[]): ProgramInfo => {\r\n   const inputShape = input.dims;\r\n   perm = getAdjustedPerm(inputShape, perm);\r\n   const unpackedOutputShape = getOutputShape(inputShape, perm);\r\n   const rank = inputShape.length;\r\n   // A dims=[${inputs[0].dims.toString()}]\r\n   // out Dims=[${unpackedOutputShape.toString()}]\r\n   // based on perm=[${perm.toString()}]\r\n   const shaderSource = `\r\n      ${getPermFunctionBody('perm', perm, rank)}\r\n      float process(int indices[${rank}]) {\r\n        int a[${rank}];\r\n        perm(a, indices);\r\n        return _A(a);\r\n      }`;\r\n   return {\r\n   ...transposeProgramMetadata,\r\n   output: {dims: unpackedOutputShape, type: input.type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst getAdjustedPerm = (inputShape: readonly number[], perm: number[]): number[] => {\r\n if (perm && perm.length !== inputShape.length) {\r\n   perm = [...(inputShape.keys())].reverse();\r\n }\r\n return perm;\r\n};\r\n\r\nconst getOutputShape = (inputShape: readonly number[], perm: number[]): readonly number[] => {\r\n perm = getAdjustedPerm(inputShape, perm);\r\n return ShapeUtil.sortBasedOnPerm(inputShape, perm);\r\n};\r\n\r\nconst getPermFunctionBody = (name: string, perm: number[], rank: number): string => {\r\n const reverseFunc = [];\r\n reverseFunc.push(`void ${name}(out int a[${rank}], int src[${rank}]) {`);\r\n for (let i = 0; i < rank; ++i) {\r\n   reverseFunc.push(`\\ta[${perm[i]}]=src[${i}];`);\r\n }\r\n reverseFunc.push('\\t}');\r\n return reverseFunc.join('\\n');\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Transpose requires 1 input.');\r\n }\r\n\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n   throw new Error('input should be float tensor');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {TextureData, TextureType} from '../types';\r\n\r\nexport const encodeAsUint8 = (inferenceHandler: WebGLInferenceHandler, input: TextureData): TextureData => {\r\n const outputShape = input.shape;\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n /**\r\n   * https://github.com/tensorflow/tfjs-core/blob/master/src/kernels/webgl/encode_float_gpu.ts\r\n   */\r\n const shaderSource = `\r\n   const float FLOAT_MAX = 1.70141184e38;\r\n   const float FLOAT_MIN = 1.17549435e-38;\r\n\r\n   bool isNaN(float val) {\r\n   return (val < 1.0 || 0.0 < val || val == 0.0) ? false : true;\r\n   }\r\n\r\n   highp vec4 encodeAsUint8(highp float v) {\r\n   if (isNaN(v)) {\r\n   return vec4(255, 255, 255, 255);\r\n   }\r\n\r\n   highp float av = abs(v);\r\n\r\n   if(av < FLOAT_MIN) {\r\n   return vec4(0.0, 0.0, 0.0, 0.0);\r\n   } else if(v > FLOAT_MAX) {\r\n   return vec4(0.0, 0.0, 128.0, 127.0) / 255.0;\r\n   } else if(v < -FLOAT_MAX) {\r\n   return vec4(0.0, 0.0, 128.0, 255.0) / 255.0;\r\n   }\r\n\r\n   highp vec4 c = vec4(0,0,0,0);\r\n\r\n   highp float e = floor(log2(av));\r\n   highp float m = exp2(fract(log2(av))) - 1.0;\r\n\r\n   c[2] = floor(128.0 * m);\r\n   m -= c[2] / 128.0;\r\n   c[1] = floor(32768.0 * m);\r\n   m -= c[1] / 32768.0;\r\n   c[0] = floor(8388608.0 * m);\r\n\r\n   highp float ebias = e + 127.0;\r\n   c[3] = floor(ebias / 2.0);\r\n   ebias -= c[3] * 2.0;\r\n   c[2] += floor(ebias) * 128.0;\r\n\r\n   c[3] += 128.0 * step(0.0, -v);\r\n\r\n   return c / 255.0;\r\n   }\r\n\r\n   void main() {\r\n   float value = ${glsl.texture2D}(X,TexCoords).r;\r\n ${glsl.output} = encodeAsUint8(value);\r\n   }`;\r\n const programInfo = {\r\n   name: 'Uint8Encode',\r\n   inputTypes: [TextureType.unpacked],\r\n   inputNames: ['X'],\r\n   output: {dims: outputShape, type: input.tensor.type, textureType: TextureType.downloadUint8AsFloat},\r\n   shaderSource,\r\n   hasMain: true\r\n };\r\n return inferenceHandler.executeProgram(programInfo, [input.tensor]);\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {Tensor} from '../../../tensor';\r\nimport {FunctionType,

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GlslValueFunction} from '../glsl-definitions';\r\nimport {getGlsl} from '../glsl-source';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader,
ProgramMetadata, TextureType} from '../types';\r\n\r\nexport function glslAbs(): GlslValueFunction {\r\n  return
glslBuiltinUnary('abs');\r\n}\r\nexport function glslAcos(): GlslValueFunction {\r\n  return
glslBuiltinUnary('acos');\r\n}\r\nexport function glslAsin(): GlslValueFunction {\r\n  return
glslBuiltinUnary('asin');\r\n}\r\nexport function glslAtan(): GlslValueFunction {\r\n  return
glslBuiltinUnary('atan');\r\n}\r\nexport function glslCeil(): GlslValueFunction {\r\n  return
glslBuiltinUnary('ceil');\r\n}\r\nexport function glslCos(): GlslValueFunction {\r\n  return
glslBuiltinUnary('cos');\r\n}\r\nexport function glslElu(alpha: number): GlslValueFunction {\r\n  const name =
'elu';\r\n  const body = `\r\n  const float alpha = float(${alpha});\r\n\r\n  float ${name}_(float a) {\r\n    return a >=
0.0 ? a: (exp(a) - 1.0) * alpha;\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n    return vec4(${name}_(v.x), ${name}_(v.y),
${name}_(v.z), ${name}_(v.w));\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\nexport function glslExp(): GlslValueFunction {\r\n  return
glslBuiltinUnary('exp');\r\n}\r\nexport function glslFloor(): GlslValueFunction {\r\n  return
glslBuiltinUnary('floor');\r\n}\r\nexport function glslClip(min: number, max: number): GlslValueFunction {\r\n
const name = 'clip';\r\n  const body = `\r\n  const float min = float(${min});\r\n  const float max =
float(${max});\r\n\r\n  float ${name}_(float a) {\r\n    return clamp(a, min, max);\r\n  }\r\n  vec4 ${name}_(vec4 v)
{\r\n    return clamp(v, min, max);\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\nexport function glslIdentity(): GlslValueFunction {\r\n  const name =
'indentity';\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return a;\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n
return v;\r\n  }\r\n  `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function
glslLeakyRelu(alpha: number): GlslValueFunction {\r\n  const name = 'leakyRelu';\r\n  const body = `\r\n  const
float alpha = float(${alpha});\r\n\r\n  float ${name}_(float a) {\r\n    return a < 0.0 ? a * alpha : a;\r\n  }\r\n  vec4
${name}_(vec4 v) {\r\n    return vec4(${name}_(v.x), ${name}_(v.y), ${name}_(v.z), ${name}_(v.w));\r\n  }\r\n
`;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslLog(): GlslValueFunction
{\r\n  return glslBuiltinUnary('log');\r\n}\r\nexport function glslNeg(): GlslValueFunction {\r\n  const name =
'neg';\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return -a;\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n
return -v;\r\n  }\r\n  `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslNot():
GlslValueFunction {\r\n  const name = 'not';\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return float( !
bool(a) );\r\n  }\r\n  bool ${name}_(bool a) {\r\n    return !a;\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n    return
vec4(!bool(v.x), !bool(v.y), !bool(v.z), !bool(v.w));\r\n  }\r\n  bvec4 ${name}_(bvec4 v) {\r\n    return bvec4(!v.x,
!v.y, !v.z, !v.w);\r\n  }\r\n  `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function
glslSin(): GlslValueFunction {\r\n  return glslBuiltinUnary('sin');\r\n}\r\nexport function glslRelu():
GlslValueFunction {\r\n  const name = 'relu';\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return max( a,
0.0 );\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n    return max( v, 0.0 );\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\nexport function glslSigmoid(): GlslValueFunction {\r\n  const name =
'sigmoid';\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return 1.0 / (1.0 + exp(-a));\r\n  }\r\n  vec4
${name}_(vec4 v) {\r\n    return 1.0 / (1.0 + exp(-v));\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\nexport function glslSqrt(): GlslValueFunction {\r\n  return
glslBuiltinUnary('sqrt');\r\n}\r\nexport function glslTan(): GlslValueFunction {\r\n  return
glslBuiltinUnary('tan');\r\n}\r\nexport function glslTanh(): GlslValueFunction {\r\n  const name = 'tanh';\r\n  const
body = `\r\n  float ${name}_(float a) {\r\n    a = clamp(a, -10., 10.);\r\n    a = exp(2.*a);\r\n    return (a - 1.) / (a +
1.);\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n    v = clamp(v, -10., 10.);\r\n    v = exp(2.*v);\r\n    return (v - 1.) / (v +
1.);\r\n  }\r\n  `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nfunction glslBuiltinUnary(name:
string): GlslValueFunction {\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return ${name}(a);\r\n  }\r\n
vec4 ${name}_(vec4 v) {\r\n    return ${name}(v);\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\n\r\n/////\r\n/////\r\n/////\r\n\r\nconst createElementwiseProgramInfo =\r\n
(handler: WebGLInferenceHandler, metadata: ProgramMetadata, input: Tensor, glslFunc: GlslValueFunction):\r\n
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ProgramInfo => {\r\n const textureType = handler.session.pack ? TextureType.packed : TextureType.unpacked;\r\n const glsl = getGlsl(handler.session.backend.glContext.version);\r\n return {\r\n ...metadata,\r\n output: {dims: input.dims, type: input.type, textureType},\r\n shaderSource: `\r\n ${glslFunc.body}\r\n void main() {\r\n vec4 v = ${glsl.texture2D}(A, TexCoords);\r\n v = ${glslFunc.name}_(v);\r\n ${glsl.output} = v;\r\n }\r\n `,\r\n hasMain: true\r\n };\r\n };\r\n\r\nconst createElementwiseProgramInfoLoader =\r\n (handler: WebGLInferenceHandler, input: Tensor, glslFunc: GlslValueFunction, cacheKey?: string):\r\n ProgramInfoLoader => {\r\n const textureType = handler.session.pack ? TextureType.packed : TextureType.unpacked;\r\n const metadata = {name: glslFunc.name, inputTypes: [textureType], inputNames: ['A'], cacheHint: cacheKey};\r\n return {...metadata, get: () => createElementwiseProgramInfo(handler, metadata, input, glslFunc)};\r\n };\r\n\r\nexport const abs = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAbs()), inputs)];\r\n\r\nexport const acos = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAcos()), inputs)];\r\n\r\nexport const asin = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAsin()), inputs)];\r\n\r\nexport const atan = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAtan()), inputs)];\r\n\r\nexport interface ClipAttributes extends AttributeWithCacheKey {\r\n readonly min: number;\r\n readonly max: number;\r\n}\r\n\r\nexport const clip =\r\n (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: ClipAttributes): Tensor[] => [handler.run(\r\n createElementwiseProgramInfoLoader(\r\n handler, inputs[0], glslClip(attributes.min, attributes.max), attributes.cacheKey),\r\n inputs)];\r\n\r\nexport const parseClipAttributes = (node: Graph.Node): ClipAttributes => createAttributeWithCacheKey({\r\n min: node.attributes.getFloat('min', -3.4028234663852886e+38),\r\n max: node.attributes.getFloat('max', 3.4028234663852886e+38)\r\n});\r\n\r\nexport const ceil = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslCeil()), inputs)];\r\n\r\nexport const cos = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslCos()), inputs)];\r\n\r\nexport interface EluAttributes extends AttributeWithCacheKey {\r\n readonly alpha: number;\r\n}\r\n\r\nexport const elu =\r\n (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: EluAttributes): Tensor[] => [handler.run(\r\n createElementwiseProgramInfoLoader(handler, inputs[0], glslElu(attributes.alpha), attributes.cacheKey),\r\n inputs)];\r\n\r\nexport const parseEluAttributes = (node: Graph.Node): EluAttributes =>\r\n createAttributeWithCacheKey({alpha: node.attributes.getFloat('alpha', 1.0)});\r\n\r\nexport const exp = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslExp()), inputs)];\r\n\r\nexport const floor = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslFloor()), inputs)];\r\n\r\nexport const identity = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslIdentity()), inputs)];\r\n\r\nexport interface LeakyReluAttributes extends AttributeWithCacheKey {\r\n readonly alpha: number;\r\n}\r\n\r\nexport const leakyRelu =\r\n (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: LeakyReluAttributes): Tensor[] => [handler.run(\r\n createElementwiseProgramInfoLoader(handler, inputs[0], glslLeakyRelu(attributes.alpha), attributes.cacheKey),\r\n inputs)];\r\n\r\nexport const parseLeakyReluAttributes = (node: Graph.Node): LeakyReluAttributes =>\r\n createAttributeWithCacheKey({alpha: node.attributes.getFloat('alpha', 0.01)});\r\n\r\nexport const log = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslLog()), inputs)];\r\n\r\nexport const neg = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] =>

[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslNeg()), inputs)];\r\n\r\nexport const not = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslNot()), inputs)];\r\n\r\nexport const relu = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslRelu()), inputs)];\r\n\r\nexport const sigmoid = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslSigmoid()), inputs)];\r\n\r\nexport const sin = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslSin()), inputs)];\r\n\r\nexport const sqrt = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslSqrt()), inputs)];\r\n\r\nexport const tan = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslTan()), inputs)];\r\n\r\nexport const tanh = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslTanh()), inputs)];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, TextureType} from '../types';\r\nimport {getCoordsDataType} from '../utils';\r\nimport {getChannels, unpackFromChannel} from './packing-utils';\r\n\r\nconst unpackProgramMetadata = {\r\n name: 'unpack',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.packed]\r\n};\r\n\r\nexport const createUnpackProgramInfo = (handler: WebGLInferenceHandler, input: Tensor): ProgramInfo => {\r\n const rank = input.dims.length;\r\n\r\n const channels = getChannels('rc', rank);\r\n const innerDims = channels.slice(-2);\r\n const coordsDataType = getCoordsDataType(rank);\r\n const unpackChannel = unpackFromChannel();\r\n const isScalar = (input.dims.length === 0);\r\n const sourceCoords = isScalar ? '' : getSourceCoords(rank, channels);\r\n const coords = rank <= 1 ? 'rc' : `vec2(${innerDims.join(',')})`;\r\n const glsl = getGlsl(handler.session.backend.glContext.version);\r\n const shaderSource = `\r\n ${unpackChannel}\r\n   void main() {\r\n ${coordsDataType} rc = getOutputCoords();\r\n\r\n   // Sample the texture with the coords to get the rgba channel value.\r\n   vec4 packedInput = getA(${sourceCoords});\r\n\r\n ${glsl.output} = vec4(getChannel(packedInput, ${coords}), 0, 0, 0);\r\n   }\r\n   `;\r\n\r\n return {\r\n   ...unpackProgramMetadata,\r\n   hasMain: true,\r\n   output: {dims: input.dims, type: input.type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n };\r\n};\r\n\r\nexport const createUnpackProgramInfoLoader = (handler: WebGLInferenceHandler, input: Tensor): ProgramInfoLoader =>\r\n   ({...unpackProgramMetadata, get: () => createUnpackProgramInfo(handler, input)});\r\n\r\nfunction getSourceCoords(rank: number, dims: string[]): string {\r\n if (rank === 1) {\r\n   return 'rc';\r\n }\r\n\r\n let coords = '';\r\n for (let i = 0; i < rank; i++) {\r\n   coords += dims[i];\r\n   if (i < rank - 1) {\r\n   coords += ',';\r\n   }\r\n }\r\n return coords;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const unsqueeze: OperatorImplementation<number[]> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axes: number[]): Tensor[] => {\r\n   validateInputs(inputs);\r\n   const outputShape = ShapeUtil.unsqueezeShape(inputs[0].dims, axes);\r\n   const output = inferenceHandler.reshapeUnpacked(inputs[0], outputShape);\r\n   return [output];\r\n   };\r\n\r\nexport const parseUnsqueezeAttributes: OperatorInitialization<number[]> = (node: Graph.Node): number[] =>\r\n   node.attributes.getInts('axes');\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Unsqueeze requires 1 input.');\r\n }\r\n\r\n if (inputs[0].type === 'string') {\r\n   throw new Error('invalid input tensor types.');\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey,

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createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from
'../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor}
from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from
'../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface
UpsampleAttributes extends AttributeWithCacheKey {\r\n  readonly opset: number;\r\n  readonly isResize:
boolean;\r\n  readonly mode: string;\r\n  readonly scales: number[];\r\n  readonly extrapolationValue: number;\r\n
readonly coordinateTransformMode: string;\r\n  readonly useExtrapolation: boolean;\r\n  readonly needRoiInput:
boolean;\r\n  readonly nearestMode: string;\r\n  readonly cubicCoefficientA: number;\r\n  readonly excludeOutside:
boolean;\r\n  readonly useNearest2xOptimization: boolean;\r\n  readonly roiInputIdx: number;\r\n  readonly
scalesInputIdx: number;\r\n  readonly sizesInputIdx: number;\r\n}\r\n\r\nconst upsampleProgramMetadata = {\r\n
name: 'Upsample',\r\n  inputNames: ['X'],\r\n  inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nexport const
upsample: OperatorImplementation<UpsampleAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler,
inputs: Tensor[], attributes: UpsampleAttributes): Tensor[] => {\r\n      validateInputs(inputs, attributes);\r\n      const
output = inferenceHandler.run(\r\n          {\r\n            ...upsampleProgramMetadata,\r\n            cacheHint:
attributes.cacheKey,\r\n            get: () => createUpsampleProgramInfo(inferenceHandler, inputs, attributes)\r\n
},\r\n          inputs);\r\n      return [output];\r\n    };\r\n\r\nexport const parseUpsampleAttributesV7:
OperatorInitialization<UpsampleAttributes> =\r\n    (node: Graph.Node): UpsampleAttributes =>
parseUpsampleAttributes(node, 7);\r\n\r\nexport const parseUpsampleAttributesV9:
OperatorInitialization<UpsampleAttributes> =\r\n    (node: Graph.Node): UpsampleAttributes =>
parseUpsampleAttributes(node, 9);\r\n\r\nexport const parseUpsampleAttributes = (node: Graph.Node, opset:
number): UpsampleAttributes => {\r\n  const isResize = (opset >= 10);\r\n\r\n  // processing node attributes\r\n
const mode = node.attributes.getString('mode', 'nearest');\r\n  if (mode !== 'nearest' && mode !== 'linear' && (opset
< 11 || mode !== 'cubic')) {\r\n    throw new Error(`unrecognized mode: ${mode}`);\r\n  }\r\n\r\n  let scales:
number[] = [];\r\n  if (opset < 9) {\r\n    scales = node.attributes.getFloats('scales');\r\n    scalesValidation(scales,
mode, isResize);\r\n  }\r\n\r\n  const extrapolationValue = node.attributes.getFloat('extrapolation_value', 0.0);\r\n\r\n
const coordinateTransformMode =\r\n      opset > 10 ? node.attributes.getString('coordinate_transformation_mode',
'half_pixel') : 'asymmetric';\r\n  if ([\r\n        'asymmetric', 'pytorch_half_pixel', 'tf_half_pixel_for_nn',
'align_corners', 'tf_crop_and_resize', 'half_pixel'\r\n      ].indexOf(coordinateTransformMode) === -1) {\r\n    throw
new Error(`coordinate_transform_mode '${coordinateTransformMode}' is not supported`);\r\n  }\r\n  const
needRoiInput = (coordinateTransformMode === 'tf_crop_and_resize');\r\n  const useExtrapolation =
needRoiInput;\r\n\r\n  const nearestMode =\r\n      (mode === 'nearest' && opset >= 11) ?
node.attributes.getString('nearest_mode', 'round_prefer_floor') : '';\r\n  if (['round_prefer_floor', 'round_prefer_ceil',
'floor', 'ceil', ''].indexOf(nearestMode) === -1) {\r\n    throw new Error(`nearest_mode '${nearestMode}' is not
supported`);\r\n  }\r\n\r\n  const cubicCoefficientA = node.attributes.getFloat('cubic_coeff_a', -0.75);\r\n  const
excludeOutside = node.attributes.getInt('exclude_outside', 0) !== 0;\r\n  if (excludeOutside && mode !== 'cubic')
{\r\n    throw new Error('exclude_outside can be set to 1 only when mode is CUBIC.');\r\n  }\r\n\r\n  const
useNearest2xOptimization =\r\n      (opset < 11) ? true : (mode === 'nearest' && coordinateTransformMode ===
'asymmetric' && nearestMode === 'floor');\r\n\r\n  let roiInputIdx = 0;\r\n  let scalesInputIdx = 0;\r\n  let
sizesInputIdx = 0;\r\n\r\n  if (opset > 10) {\r\n    roiInputIdx = 1;\r\n    scalesInputIdx = 2;\r\n    sizesInputIdx = 3;\r\n
} else if (opset === 9) {\r\n    scalesInputIdx = 1;\r\n  }\r\n\r\n  return createAttributeWithCacheKey({\r\n
opset,\r\n    isResize,\r\n    mode,\r\n    scales,\r\n    extrapolationValue,\r\n    coordinateTransformMode,\r\n
useExtrapolation,\r\n    needRoiInput,\r\n    nearestMode,\r\n    cubicCoefficientA,\r\n    excludeOutside,\r\n
useNearest2xOptimization,\r\n    roiInputIdx,\r\n    scalesInputIdx,\r\n    sizesInputIdx\r\n  });\r\n};\r\n\r\nconst
createUpsampleProgramInfo =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes:
UpsampleAttributes): ProgramInfo => {\r\n      const glsl =
getGlsl(inferenceHandler.session.backend.glContext.version);\r\n      const [inputWidth, inputHeight] =\r\n
inferenceHandler.calculateTextureWidthAndHeight(inputs[0].dims, TextureType.unpacked);\r\n\r\n      const
outputShape = inputs[0].dims.map((dim, i) => Math.floor(dim * attributes.scales[i]));\r\n      const [outputWidth,
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outputHeight] =\r\n          inferenceHandler.calculateTextureWidthAndHeight(outputShape,
TextureType.unpacked);\r\n      const dim = outputShape.length;\r\n\r\n      const outputPitches = new
Array<number>(dim);\r\n      const inputPitches = new Array<number>(dim);\r\n      let precalculatedPitches = `\r\n
   int output_pitches[${dim}];\r\n      int input_pitches[${dim}];\r\n      `;\r\n      for (let d = dim - 1; d >= 0; d--) {\r\n
      outputPitches[d] = (d === dim - 1) ? 1 : outputPitches[d + 1] * outputShape[d + 1];\r\n        inputPitches[d] = (d
=== dim - 1) ? 1 : inputPitches[d + 1] * inputs[0].dims[d + 1];\r\n\r\n        precalculatedPitches += `\r\n
output_pitches[${d}] = ${outputPitches[d]};\r\n        input_pitches[${d}] = ${inputPitches[d]};\r\n        `;\r\n
}\r\n      const getInputFloatFunction = `\r\n      float getInputFloat(int index) {\r\n        vec2 coords =
offsetToCoords(index, ${inputWidth}, ${inputHeight});\r\n        float value =
getColorAsFloat(${glsl.texture2D}(X, coords));\r\n        return value;\r\n      }\r\n      `;\r\n\r\n      const shaderSource
= attributes.mode === 'nearest' ?\r\n          // nearest\r\n          `\r\n    ${getInputFloatFunction}\r\n    float process(int
indices[${dim}]) {\r\n      int input_index = 0;\r\n      int output_index = coordsToOffset(TexCoords,
${outputWidth}, ${outputHeight});\r\n\r\n      ${precalculatedPitches}\r\n\r\n      int d, m;\r\n      for (int dim = 0;
dim < ${dim}; ++dim) {\r\n        d = output_index / output_pitches[dim];\r\n        m = output_index - d *
output_pitches[dim];\r\n        output_index = m;\r\n\r\n        if (scales[dim] != 1 && d > 0) {\r\n          int d2 = d /
scales[dim];\r\n          m = d - d2 * scales[dim];\r\n          d = d2;\r\n        }\r\n        input_index +=
input_pitches[dim] * d;\r\n      }\r\n\r\n      return getInputFloat(input_index);\r\n    }` :\r\n          dim === 4 ?\r\n
// bilinear 4D\r\n              `\r\n    ${getInputFloatFunction}\r\n    float process(int indices[4]) {\r\n      int input_index
= 0;\r\n      int output_index = coordsToOffset(TexCoords, ${outputWidth}, ${outputHeight});\r\n\r\n
${precalculatedPitches}\r\n\r\n      int m;\r\n      int index_of_dim0, index_of_dim1, index_of_dim2,
index_of_dim3;\r\n      index_of_dim0 = output_index / output_pitches[0];\r\n      m = output_index - index_of_dim0
* output_pitches[0];\r\n      index_of_dim1 = m / output_pitches[1];\r\n      m = m - index_of_dim1 *
output_pitches[1];\r\n      index_of_dim2 = m / output_pitches[2];\r\n      m = m - index_of_dim2 *
output_pitches[2];\r\n      index_of_dim3 = m;\r\n\r\n      int index_of_input_dim2, index_of_input_dim3, x_offset,
y_offset;\r\n      index_of_input_dim2 = index_of_dim2 / scales[2];\r\n      y_offset = index_of_dim2 -
index_of_input_dim2 * scales[2];\r\n      index_of_input_dim3 = index_of_dim3 / scales[3];\r\n      x_offset =
index_of_dim3 - index_of_input_dim3 * scales[3];\r\n\r\n      input_index = index_of_dim0 * input_pitches[0] +\r\n
        index_of_dim1 * input_pitches[1] +\r\n            index_of_input_dim2 * input_pitches[2] +\r\n
index_of_input_dim3;\r\n\r\n      float x00 = getInputFloat(input_index);\r\n      float x10, x01, x11;\r\n\r\n      bool
end_of_dim2 = false;\r\n      if (index_of_input_dim2 == (${inputs[0].dims[2]} - 1)) {\r\n        // It's the end in
dimension 2\r\n        x01 = x00;\r\n        end_of_dim2 = true;\r\n      } else {\r\n        x01 = getInputFloat(input_index
+ input_pitches[2]);\r\n      }\r\n\r\n      if (index_of_input_dim3 == (input_pitches[2] - 1)) {\r\n        // It's the end in
dimension 3\r\n        x10 = x00;\r\n        x11 = x01;\r\n      }\r\n      else {\r\n        x10 = getInputFloat(input_index +
1);\r\n        x11 = end_of_dim2 ? x10 : getInputFloat(input_index + input_pitches[2] + 1);\r\n      }\r\n\r\n      float y0
= x00 + float(y_offset) * (x01 - x00) / float(scales[2]);\r\n      float y1 = x10 + float(y_offset) * (x11 - x10) /
float(scales[2]);\r\n      return y0 + float(x_offset) * (y1 - y0) / float(scales[3]);\r\n    }` :\r\n              // bilinear 2D\r\n
          `\r\n    ${getInputFloatFunction}\r\n    float process(int indices[2]) {\r\n      int input_index = 0;\r\n      int
output_index = coordsToOffset(TexCoords, ${outputWidth}, ${outputHeight});\r\n\r\n
${precalculatedPitches}\r\n\r\n      int m;\r\n      int index_of_dim0, index_of_dim1;\r\n      index_of_dim0 =
output_index / output_pitches[0];\r\n      m = output_index - index_of_dim0 * output_pitches[0];\r\n
index_of_dim1 = m;\r\n\r\n      int index_of_input_dim0, index_of_input_dim1, x_offset, y_offset;\r\n
index_of_input_dim0 = index_of_dim0 / scales[0];\r\n      y_offset = index_of_dim0 - index_of_input_dim0 *
scales[0];\r\n      index_of_input_dim1 = index_of_dim1 / scales[1];\r\n      x_offset = index_of_dim1 -
index_of_input_dim1 * scales[1];\r\n\r\n      input_index = index_of_input_dim0 * input_pitches[0] +
index_of_input_dim1;\r\n\r\n      float x00 = getInputFloat(input_index);\r\n      float x10, x01, x11;\r\n\r\n      bool
end_of_dim0 = false;\r\n      if (index_of_input_dim0 == (${inputs[0].dims[0]} - 1)) {\r\n        // It's the end in
dimension 0\r\n        x01 = x00;\r\n        end_of_dim0 = true;\r\n      } else {\r\n        x01 = getInputFloat(input_index
+ input_pitches[0]);\r\n      }\r\n\r\n      if (index_of_input_dim1 == (input_pitches[0] - 1)) {\r\n        // It's the end in
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dimension 1\r\n   x10 = x00;\r\n   x11 = x01;\r\n   }\r\n   else {\r\n   x10 = getInputFloat(input_index + 1);\r\n   x11 = end_of_dim0 ? x10 : getInputFloat(input_index + input_pitches[0] + 1);\r\n   }\r\n\r\n   float y0 = x00 + float(y_offset) * (x01 - x00) / float(scales[0]);\r\n   float y1 = x10 + float(y_offset) * (x11 - x10) / float(scales[0]);\r\n   return y0 + float(x_offset) * (y1 - y0) / float(scales[1]);\r\n   }`;\r\n   return {\r\n ...upsampleProgramMetadata,\r\n   output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n   shaderSource,\r\n   variables: [{\r\n   name: 'scales',\r\n   type: 'int',\r\n   arrayLength: attributes.scales.length,\r\n   data: attributes.scales.map(x => Math.ceil(x))\r\n   }]\r\n   };\r\n   };\r\n\r\nexport const validateInputs = (inputs: Tensor[], attribute: UpsampleAttributes): void => {\r\n if (!inputs || (attribute.opset < 9 && inputs.length !== 1) ||\r\n   (attribute.opset >= 9 && attribute.opset < 11 && inputs.length !== 2) ||\r\n   (attribute.opset >= 11 && inputs.length !== 3 && inputs.length !== 4)) {\r\n   throw new Error('invalid inputs.');\r\n }\r\n\r\n if (attribute.scales.length > 0 && inputs[0].dims.length !== attribute.scales.length) {\r\n   throw new Error('Invalid input shape.');\r\n }\r\n\r\n if (inputs[0].type === 'string') {\r\n   throw new Error('Invalid input tensor types.');\r\n }\r\n};\r\n\r\nexport const scalesValidation = (scales: number[], mode: string, isResize: boolean): void => {\r\n if (!isResize) {\r\n   for (const scale of scales) {\r\n   if (scale < 1) {\r\n   throw new Error('Scale value should be greater than or equal to 1.');\r\n   }\r\n   }\r\n } else {\r\n   for (const scale of scales) {\r\n   if (scale <= 0) {\r\n   throw new Error('Scale value should be greater than 0.');\r\n   }\r\n   }\r\n }\r\n if (mode === 'linear' || mode === 'cubic') {\r\n   if (scales.length !== 2 && (scales.length !== 4 || scales[0] !== 1 || scales[1] !== 1)) {\r\n   throw new Error(`'Linear' mode and 'Cubic' mode only support 2-D inputs ('Bilinear', 'Bicubic') \\\r\n        or 4-D inputs with the corresponding outermost 2 scale values being 1 \\\r\n        in the ${isResize ? 'Resize' : 'Upsample'} opeartor.`);\r\n   }\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env} from 'onnxruntime-common';\r\nimport {Logger, Profiler} from '../../instrument';\r\n\r\nimport {GlslPreprocessor} from './glsl-preprocessor';\r\nimport {getVertexShaderSource} from './glsl-source';\r\nimport {TextureLayoutStrategy} from './texture-layout-strategy';\r\nimport {Artifact, ProgramInfo, ProgramVariable, TextureData, TextureLayout, VariableInfo} from './types';\r\nimport {WebGLContext} from './webgl-context';\r\n\r\n/**\r\n * ProgramManager is the main class behind running computations\r\n * It builds ProgramInfo's into Artifacts\r\n * It compiles given ProgramInfo's into WebGL Prorams (cached as Artifacts)\r\n * Uses the artifact to run the computation by calling Draw on\r\n * the WebGL drawing buffer\r\n * ProgramManager automatically maps (binds) input variables to their\r\n * corresponding Location's in the binary program\r\n */\r\nexport class ProgramManager {\r\n repo: Map<unknown, Artifact>; // this should be per-session object\r\n vertexShader: WebGLShader;\r\n attributesBound: boolean;\r\n\r\n constructor(\r\n   public profiler: Readonly<Profiler>, public glContext: WebGLContext,\r\n   public textureLayoutStrategy: TextureLayoutStrategy) {\r\n   this.repo = new Map();\r\n   this.attributesBound = false;\r\n }\r\n getArtifact(key: unknown): Artifact|undefined {\r\n   return this.repo.get(key);\r\n }\r\n setArtifact(key: unknown, artifact: Artifact): void {\r\n   this.repo.set(key, artifact);\r\n }\r\n run(buildArtifact: Artifact, inputs: TextureData[], output: TextureData): void {\r\n   this.profiler.event('op', `ProgramManager.run ${buildArtifact.programInfo.name ?? 'unknown kernel'}`, () => {\r\n   const gl = this.glContext.gl;\r\n   const program = buildArtifact.program;\r\n   gl.useProgram(program);\r\n   try {\r\n   this.bindOutput(output);\r\n   if (!this.attributesBound) {\r\n   this.bindAttributes(buildArtifact.attribLocations);\r\n   }\r\n   this.bindUniforms(buildArtifact.uniformLocations, buildArtifact.programInfo.variables ?? [], inputs);\r\n   } catch (err) {\r\n   Logger.error('ProgramManager', buildArtifact.programInfo.shaderSource);\r\n   throw err;\r\n   }\r\n   this.profiler.event('backend', 'GlContext.draw()', () => {\r\n   this.glContext.draw();\r\n   });\r\n   }, this.glContext);\r\n }\r\n dispose(): void {\r\n   if (this.vertexShader) {\r\n   this.glContext.deleteShader(this.vertexShader);\r\n   }\r\n   this.repo.forEach(a => this.glContext.deleteProgram(a.program));\r\n }\r\n build(programInfo: ProgramInfo, inputTextureLayouts: TextureLayout[], outputTextureLayout: TextureLayout): Artifact {\r\n   return this.profiler.event('backend', 'ProgramManager.build', () => {\r\n   const preprocessor = new GlslPreprocessor(this.glContext, programInfo, inputTextureLayouts, outputTextureLayout);\r\n   const fragScript = preprocessor.preprocess();\r\n   const program = this.compile(fragScript);\r\n const artifact = {\r\n programInfo,\r\n program,\r\n uniformLocations: this.getUniformLocations(\r\n program, preprocessor.context.programInfo.inputNames, preprocessor.context.programInfo.variables),\r\n attribLocations: this.getAttribLocations(program)\r\n };\r\n return artifact;\r\n });\r\n }\r\n protected compile(fragShaderScript: string): WebGLProgram {\r\n if (!this.vertexShader) {\r\n Logger.verbose('ProrgramManager', 'Compiling and caching Vertex shader for the first time');\r\n const vertexShaderScript = getVertexShaderSource(this.glContext.version);\r\n this.vertexShader = this.glContext.compileShader(vertexShaderScript, this.glContext.gl.VERTEX_SHADER);\r\n }\r\n if (env.debug) {\r\n Logger.verbose('ProrgramManager', `FragShader:\r\n${fragShaderScript}\r\n`);\r\n }\r\n const fragShader = this.glContext.compileShader(fragShaderScript, this.glContext.gl.FRAGMENT_SHADER);\r\n const program = this.glContext.createProgram(this.vertexShader, fragShader);\r\n this.glContext.deleteShader(fragShader);\r\n return program;\r\n }\r\n bindOutput(td: TextureData): void {\r\n const width = td.width;\r\n const height = td.height;\r\n Logger.verbose(\r\n 'ProrgramManager',\r\n `Binding output texture to Framebuffer: w/h=${width}/${height}, shape=${td.shape}, type=${td.tensor.type}`);\r\n this.glContext.attachFramebuffer(td.texture, width, height);\r\n }\r\n bindAttributes(attribLocations: Artifact.AttribLocations): void {\r\n const positionHandle = attribLocations.position;\r\n const textureCoordHandle = attribLocations.textureCoord;\r\n this.glContext.setVertexAttributes(positionHandle, textureCoordHandle);\r\n this.attributesBound = true;\r\n }\r\n bindUniforms(uniformLocations: Artifact.UniformLocations, variables: ProgramVariable[], textures: TextureData[]):\r\n void {\r\n const gl = this.glContext.gl;\r\n let texturePosition = 0;\r\n for (const {name, type, location, arrayLength} of uniformLocations) {\r\n const value = variables.find(v => v.name === name)?.data;\r\n if (type !== 'sampler2D' && !value) {\r\n throw new Error(`variable '${name}' does not have data defined in program info`);\r\n }\r\n switch (type) {\r\n case 'sampler2D':\r\n this.bindTexture(textures[texturePosition], location, texturePosition);\r\n texturePosition++;\r\n break;\r\n case 'float':\r\n if (arrayLength) {\r\n gl.uniform1fv(location, value as number[]);\r\n } else {\r\n gl.uniform1f(location, value as number);\r\n }\r\n break;\r\n case 'int':\r\n if (arrayLength) {\r\n gl.uniform1iv(location, value as number[]);\r\n } else {\r\n gl.uniform1i(location, value as number);\r\n }\r\n break;\r\n default:\r\n throw new Error(`Uniform not implemented: ${type}`);\r\n }\r\n }\r\n }\r\n bindTexture(td: TextureData, uniformHandle: WebGLUniformLocation, position: number): void {\r\n this.glContext.bindTextureToUniform(td.texture, position, uniformHandle);\r\n }\r\n getAttribLocations(program: WebGLProgram): Artifact.AttribLocations {\r\n return {\r\n position: this.getAttribLocation(program, 'position'),\r\n textureCoord: this.getAttribLocation(program, 'textureCoord')\r\n };\r\n }\r\n getUniformLocations(program: WebGLProgram, samplers?: string[], variables?: VariableInfo[]):\r\n Artifact.UniformLocations {\r\n const uniformLocations: Artifact.UniformLocations = [];\r\n if (samplers) {\r\n for (const sampler of samplers) {\r\n uniformLocations.push({name: sampler, type: 'sampler2D', location: this.getUniformLocation(program, sampler)});\r\n }\r\n }\r\n if (variables) {\r\n for (const variable of variables) {\r\n uniformLocations.push({...variable, location: this.getUniformLocation(program, variable.name)});\r\n }\r\n }\r\n return uniformLocations;\r\n }\r\n getUniformLocation(program: WebGLProgram, name: string): WebGLUniformLocation {\r\n const gl = this.glContext.gl;\r\n const reference = gl.getUniformLocation(program, name);\r\n if (reference === null) {\r\n throw new Error(`Uniform ${name} not found.`);\r\n }\r\n return reference;\r\n }\r\n getAttribLocation(program: WebGLProgram, name: string): number {\r\n const gl = this.glContext.gl;\r\n const attributeLocation: number = gl.getAttribLocation(program, name);\r\n return attributeLocation;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {SessionHandler} from '../../backend';\r\nimport {Graph} from '../../graph';\r\nimport {Logger} from '../../instrument';\r\nimport {Operator} from '../../operators';\r\nimport {OpSet, resolveOperator} from '../../opset';\r\nimport {Session} from '../../session';\r\nimport {Tensor} from '../../tensor';\r\nimport {WebGLBackend} from '../backend-webgl';\r\n\r\nimport {WebGLInferenceHandler} from './inference-handler';\r\nimport {WEBGL_OP_RESOLVE_RULES} from './op-resolve-rules';\r\nimport {ProgramManager} from './programmanager';\r\nimport {PreferLogicalStrategy, TextureLayoutStrategy} from './texture-layout-strategy';\r\nimport {TextureManager} from './texture-manager';\r\nimport {TextureData} from './types';\r\n\r\nexport class WebGLSessionHandler implements SessionHandler {\r\n programManager: ProgramManager;\r\n textureManager: TextureManager;\r\n layoutStrategy: TextureLayoutStrategy;\r\n packedTextureDataCache: Map<Tensor.Id, TextureData>;\r\n unpackedTextureDataCache: Map<Tensor.Id, TextureData>;\r\n pack2unpackMap: Map<Tensor.Id, Tensor.Id>;\r\n unpack2packMap: Map<Tensor.Id, Tensor.Id>;\r\n initializers: Set<Tensor.Id>;\r\n pack?: boolean;\r\n\r\n constructor(public readonly backend: WebGLBackend, public readonly context: Session.Context) {\r\n   this.layoutStrategy = new PreferLogicalStrategy(backend.glContext.maxTextureSize);\r\n   this.programManager = new ProgramManager(this.context.profiler, backend.glContext, this.layoutStrategy);\r\n   this.textureManager = new TextureManager(\r\n   backend.glContext, this.layoutStrategy, this.context.profiler,\r\n   {reuseTextures: backend.textureCacheMode === 'full'});\r\n   this.packedTextureDataCache = new Map();\r\n   this.unpackedTextureDataCache = new Map();\r\n   this.pack = backend.pack;\r\n   this.pack2unpackMap = new Map();\r\n   this.unpack2packMap = new Map();\r\n }\r\n\r\n createInferenceHandler() {\r\n   return new WebGLInferenceHandler(this);\r\n }\r\n onGraphInitialized(graph: Graph): void {\r\n   const initializers = graph.getValues().filter(v => v.from === -1 && v.tensor).map(v => v.tensor!.dataId);\r\n   this.initializers = new Set(initializers);\r\n }\r\n isInitializer(tensorId: Tensor.Id): boolean {\r\n   return this.initializers ? this.initializers.has(tensorId) : false;\r\n }\r\n addInitializer(tensorId: Tensor.Id): void {\r\n   this.initializers.add(tensorId);\r\n }\r\n getTextureData(tensorId: Tensor.Id, isPacked: boolean): TextureData|undefined {\r\n   if (isPacked) {\r\n   return this.packedTextureDataCache.get(tensorId);\r\n   } else {\r\n   return this.unpackedTextureDataCache.get(tensorId);\r\n   }\r\n }\r\n setTextureData(tensorId: Tensor.Id, textureData: TextureData, isPacked = false): void {\r\n   Logger.verbose('WebGLSessionHandler', 'Storing Texture data in cache');\r\n   if (isPacked) {\r\n   this.packedTextureDataCache.set(tensorId, textureData);\r\n   } else {\r\n   this.unpackedTextureDataCache.set(tensorId, textureData);\r\n   }\r\n }\r\n dispose(): void {\r\n   this.programManager.dispose();\r\n   this.textureManager.clearActiveTextures();\r\n   this.packedTextureDataCache.forEach(td => this.textureManager.releaseTexture(td, true));\r\n   this.packedTextureDataCache = new Map();\r\n   this.unpackedTextureDataCache.forEach(td => this.textureManager.releaseTexture(td, true));\r\n   this.unpackedTextureDataCache = new Map();\r\n }\r\n resolve(node: Graph.Node, opsets: readonly OpSet[], graph: Graph): Operator {\r\n   const op = resolveOperator(node, opsets, WEBGL_OP_RESOLVE_RULES);\r\n   return {impl: op.opImpl, context: op.opInit ? op.opInit(node, graph) : node};\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Logger} from '../../instrument';\r\n\r\nexport declare namespace Encoder {\r\n export interface DataTypeMap {\r\n   float: Float32Array;\r\n   byte: Uint8Array;\r\n   int: Uint32Array;\r\n }\r\n export type DataType = keyof DataTypeMap;\r\n type DataArrayType = DataTypeMap[DataType];\r\n\r\n /* eslint-disable @typescript-eslint/naming-convention */\r\n export const enum Usage {\r\n   Default = 0,\r\n   UploadOnly,\r\n   Download4BytesAsFloat32,\r\n }\r\n}\r\n\r\n/**\r\n * Abstraction for mapping data types to texture texlets\r\n * Encoding means how a Float32 is mapped to 1 or 4 channels for each texlet\r\n * Decoding means how a texlet's channels are mapped to a resulting Float32\r\n */\r\nexport interface DataEncoder {\r\n internalFormat: number;\r\n format: number;\r\n textureType: number;\r\n channelSize: number;\r\n encode(src: Encoder.DataArrayType, textureSize: number): Encoder.DataArrayType;\r\n allocate(size: number): Encoder.DataArrayType;\r\n decode(buffer: Encoder.DataArrayType, dataSize: number): Encoder.DataArrayType;\r\n}\r\n/**\r\n * WebGL2 data encoder\r\n * Uses R32F as the format for texlet\r\n */\r\nexport class RedFloat32DataEncoder implements DataEncoder {\r\n internalFormat: number;\r\n format: number;\r\n textureType: number;\r\n channelSize: number;\r\n constructor(gl: WebGL2RenderingContext, channels = 1) {\r\n   if (channels === 1) {\r\n   this.internalFormat = gl.R32F;\r\n   this.format = gl.RED;\r\n   this.textureType = gl.FLOAT;\r\n   this.channelSize = channels;\r\n   } else if (channels === 4) {\r\n   this.internalFormat = gl.RGBA32F;\r\n   this.format = gl.RGBA;\r\n   this.textureType = gl.FLOAT;\r\n   this.channelSize = channels;\r\n   } else {\r\n   throw new Error(`Invalid number of channels: ${channels}`);\r\n

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}\r\n  }\r\n  encode(src: Encoder.DataArrayType, textureSize: number): Encoder.DataArrayType {\r\n    let result:
Float32Array;\r\n    let source: Float32Array;\r\n    if (src.constructor !== Float32Array) {\r\n
Logger.warning('Encoder', 'data was not of type Float32; creating new Float32Array');\r\n      source = new
Float32Array(src);\r\n    }\r\n    if (textureSize * this.channelSize > src.length) {\r\n      Logger.warning('Encoder',
'Source data too small. Allocating larger array');\r\n      source = src as Float32Array;\r\n      result =
this.allocate(textureSize * this.channelSize) as Float32Array;\r\n      source.forEach((v, i) => result[i] = v);\r\n    }
else {\r\n      source = src as Float32Array;\r\n      result = source;\r\n    }\r\n    return result;\r\n  }\r\n  allocate(size:
number): Encoder.DataArrayType {\r\n    return new Float32Array(size * 4);\r\n  }\r\n  decode(buffer:
Encoder.DataArrayType, dataSize: number): Float32Array {\r\n    if (this.channelSize === 1) {\r\n      const
filteredData = (buffer as Float32Array).filter((value, index) => index % 4 === 0).subarray(0, dataSize);\r\n      return
filteredData;\r\n    }\r\n    return buffer.subarray(0, dataSize) as Float32Array;\r\n  }\r\n}\r\n/**\r\n * Data encoder
for WebGL 1 with support for floating point texture\r\n */\r\nexport class RGBAFloatDataEncoder implements
DataEncoder {\r\n  internalFormat: number;\r\n  format: number;\r\n  textureType: number;\r\n  channelSize:
number;\r\n  constructor(gl: WebGLRenderingContext, channels = 1, textureType?: number) {\r\n    if (channels !==
1 && channels !== 4) {\r\n      throw new Error(`Invalid number of channels: ${channels}`);\r\n    }\r\n
this.internalFormat = gl.RGBA;\r\n    this.format = gl.RGBA;\r\n    this.channelSize = channels;\r\n
this.textureType = textureType || gl.FLOAT;\r\n  }\r\n  encode(src: Float32Array, textureSize: number):
Encoder.DataArrayType {\r\n    let dest = src;\r\n    if (this.channelSize === 1) {\r\n      Logger.verbose('Encoder',
'Exploding into a larger array');\r\n      dest = this.allocate(textureSize) as Float32Array;\r\n      src.forEach((v, i) =>
dest[i * 4] = v);\r\n    }\r\n    return dest;\r\n  }\r\n  allocate(size: number): Encoder.DataArrayType {\r\n    return
new Float32Array(size * 4);\r\n  }\r\n  decode(buffer: Encoder.DataArrayType, dataSize: number): Float32Array
{\r\n    if (this.channelSize === 1) {\r\n      const filteredData = (buffer as Float32Array).filter((value, index) =>
index % 4 === 0).subarray(0, dataSize);\r\n      return filteredData;\r\n    }\r\n    return buffer.subarray(0, dataSize)
as Float32Array;\r\n  }\r\n}\r\n\r\nexport class Uint8DataEncoder implements DataEncoder {\r\n  internalFormat:
number;\r\n  format: number;\r\n  textureType: number;\r\n  channelSize = 4;\r\n  constructor(gl:
WebGLRenderingContext, channels = 1) {\r\n    if (channels === 1) {\r\n      this.internalFormat = gl.ALPHA;\r\n
this.format = gl.ALPHA;  // not tested\r\n      this.textureType = gl.UNSIGNED_BYTE;\r\n      this.channelSize =
channels;\r\n    } else if (channels === 4) {\r\n      this.internalFormat = gl.RGBA;\r\n      this.format = gl.RGBA;\r\n
    this.textureType = gl.UNSIGNED_BYTE;\r\n      this.channelSize = channels;\r\n    } else {\r\n      throw new
Error(`Invalid number of channels: ${channels}`);\r\n    }\r\n  }\r\n  encode(src: Uint8Array, _textureSize: number):
Encoder.DataArrayType {\r\n    return new Uint8Array(src.buffer, src.byteOffset, src.byteLength);\r\n  }\r\n
allocate(size: number): Encoder.DataArrayType {\r\n    return new Uint8Array(size * this.channelSize);\r\n  }\r\n
decode(buffer: Encoder.DataArrayType, dataSize: number): Uint8Array {\r\n    if (buffer instanceof Uint8Array)
{\r\n      return buffer.subarray(0, dataSize);\r\n    }\r\n    throw new Error(`Invalid array type:
${buffer.constructor}`);\r\n  }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed
under the MIT License.\r\n\r\nimport {Logger} from '../../instrument';\r\nimport {assert} from '../../util';\r\n/**
Layout preferences */\r\nexport interface WidthHeightPrefs {\r\n  breakAxis?: number;\r\n  isPacked?: boolean;\r\n
reverseWH?: boolean;\r\n}\r\n/**\r\n * TextureLayoutStrategy is an abstraction for different plans\r\n * for mapping
n-dimensional arrays to 2D textures (and back)\r\n */\r\nexport interface TextureLayoutStrategy {\r\n
computeTextureWH(shape: readonly number[], prefs?: WidthHeightPrefs): [number, number];\r\n}\r\n\r\n/**\r\n *
This strategy try to find the minimal max(W,H) that fulfills (W * H == totalSize)\r\n */\r\nexport class
AlwaysKeepOriginalSizeStrategy implements TextureLayoutStrategy {\r\n  constructor(public maxTextureSize:
number) {}\r\n  computeTextureWH(shape: readonly number[], prefs?: WidthHeightPrefs): [number, number] {\r\n
 // scalar tensor\r\n    if (shape.length === 0) {\r\n      return [1, 1];\r\n    }\r\n    const maxTextureSize =
this.maxTextureSize;\r\n    if (prefs && prefs.breakAxis !== undefined) {\r\n      // check to see if dims fit\r\n
const wsize = prefs.breakAxis >= shape.length ? 1 : shape.slice(prefs.breakAxis).reduce((a, b) => a * b);\r\n
const hsize = prefs.breakAxis <= 0 ? 1 : shape.slice(0, prefs.breakAxis).reduce((a, b) => a * b);\r\n      if (wsize >
maxTextureSize || hsize > maxTextureSize) {\r\n        // ignore preferences\r\n        // continue with default layout\r\n
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    Logger.verbose(\r\n          'TextureLayout',\r\n          `Given width/height preferences were unattainable:
shape:${shape}, breakAxis:${prefs.breakAxis}`);\r\n      } else {\r\n        return [wsize, hsize];\r\n      }\r\n    }\r\n
const totalSize = shape.reduce((a, b) => a * b);\r\n\r\n    let width = Math.floor(Math.sqrt(totalSize));\r\n\r\n    for (;
width < maxTextureSize && width < totalSize; width++) {\r\n      if (totalSize % width === 0) {\r\n        break;\r\n
 }\r\n    }\r\n\r\n    if (width >= maxTextureSize || totalSize % width !== 0) {\r\n      throw new Error(`The given
dimensions are outside this GPU's boundaries: ${shape}`);\r\n    }\r\n    return [width, totalSize / width];\r\n
}\r\n}\r\n\r\nexport class PreferLogicalStrategy implements TextureLayoutStrategy {\r\n  constructor(public
maxTextureSize: number) {}\r\n  computeTextureWH(shape: readonly number[], prefs?: WidthHeightPrefs):
[number, number] {\r\n    const wh = this.computeTexture(shape, prefs);\r\n    if (prefs && prefs.isPacked) {\r\n
wh[0] /= 2;\r\n      wh[1] /= 2;\r\n    }\r\n    if (prefs && prefs.reverseWH) {\r\n      return [wh[1], wh[0]];\r\n    }\r\n
return wh;\r\n  }\r\n\r\n  computeTexture(shape: readonly number[], prefs?: WidthHeightPrefs): [number, number]
{\r\n    const isPacked = prefs && prefs.isPacked;\r\n    // scalar tensor\r\n    if (shape.length === 0) {\r\n      return
isPacked ? [2, 2] : [1, 1];\r\n    }\r\n    let maxTextureSize = this.maxTextureSize;\r\n    if (prefs && prefs.breakAxis
!== undefined) {\r\n      // check to see if dims fit\r\n      const wsize = prefs.breakAxis >= shape.length ? 1 :
shape.slice(prefs.breakAxis).reduce((a, b) => a * b);\r\n      const hsize = prefs.breakAxis <= 0 ? 1 : shape.slice(0,
prefs.breakAxis).reduce((a, b) => a * b);\r\n      if (wsize > maxTextureSize || hsize > maxTextureSize) {\r\n        //
ignore preferences\r\n        // continue with default layout\r\n        Logger.verbose(\r\n          'TextureLayout',\r\n
   `Given width/height preferences were unattainable: shape:${shape}, breakAxis:${prefs.breakAxis}`);\r\n      }
else {\r\n        return [wsize, hsize];\r\n      }\r\n    }\r\n    let logShape = shape.slice(0);\r\n    if (isPacked) {\r\n
maxTextureSize = maxTextureSize * 2;\r\n\r\n      // This logic ensures we accurately count the number of packed
texels needed\r\n      // to accommodate the tensor. We can only pack values in the same texel if\r\n      // they are
from adjacent pairs of rows/cols within the same batch. So if a\r\n      // tensor has 3 rows, we pretend it has 4 rows
in order to account for the\r\n      // fact that the texels containing the third row are half empty.\r\n      logShape =
logShape.map(\r\n          (d, i) => i >= logShape.length - 2 ? (logShape[i] % 2 === 0 ? logShape[i] : logShape[i] + 1)
: logShape[i]);\r\n\r\n      // Packed texture height is at least 2 (the channel height of a single\r\n      // texel).\r\n      if
(logShape.length === 1) {\r\n        logShape = [2, logShape[0]];\r\n      }\r\n    }\r\n\r\n    // If logical shape is 2, we
don't squeeze, since we want to match physical.\r\n    if (logShape.length !== 2) {\r\n      const squeezeResult =
squeezeShape(logShape);\r\n      logShape = squeezeResult.newShape;\r\n    }\r\n\r\n    const size =
sizeFromShape(logShape);\r\n    if (logShape.length <= 1 && size <= maxTextureSize) {\r\n      return [1, size];\r\n
} else if (logShape.length === 2 && logShape[0] <= maxTextureSize && logShape[1] <= maxTextureSize) {\r\n
return logShape as [number, number];\r\n    } else if (logShape.length === 3 && logShape[0] * logShape[1] <=
maxTextureSize && logShape[2] <= maxTextureSize) {\r\n      return [logShape[0] * logShape[1], logShape[2]];\r\n
  } else if (logShape.length === 3 && logShape[0] <= maxTextureSize && logShape[1] * logShape[2] <=
maxTextureSize) {\r\n      return [logShape[0], logShape[1] * logShape[2]];\r\n    } else if (\r\n        logShape.length
=== 4 && logShape[0] * logShape[1] * logShape[2] <= maxTextureSize &&\r\n        logShape[3] <=
maxTextureSize) {\r\n      return [logShape[0] * logShape[1] * logShape[2], logShape[3]];\r\n    } else if (\r\n
logShape.length === 4 && logShape[0] <= maxTextureSize &&\r\n        logShape[1] * logShape[2] * logShape[3]
<= maxTextureSize) {\r\n      return [logShape[0], logShape[1] * logShape[2] * logShape[3]];\r\n    } else {\r\n      if
(isPacked) {\r\n        // For packed textures size equals the number of channels required to\r\n        // accommodate
the texture data. However in order to squarify such that\r\n        // inner dimensions stay even, we rewrite size to
equal the number of\r\n        // texels. Then in the return statement we rehydrate the squarified\r\n        // dimensions
to channel units.\r\n        return sizeToSquarishShape(size / 4).map(d => d * 2) as [number, number];\r\n      }\r\n
return sizeToSquarishShape(size);\r\n    }\r\n  }\r\n}\r\n\r\nexport function squeezeShape(shape: number[], axis?:
number[]): {newShape: number[]; keptDims: number[]} {\r\n  const newShape: number[] = [];\r\n  const keptDims:
number[] = [];\r\n  const isEmptyArray = axis != null && Array.isArray(axis) && axis.length === 0;\r\n  const axes
= (axis == null || isEmptyArray) ? null : parseAxisParam(axis, shape).sort();\r\n  let j = 0;\r\n  for (let i = 0; i <
shape.length; ++i) {\r\n    if (axes != null) {\r\n      if (axes[j] === i && shape[i] !== 1) {\r\n        throw new
Error(`Can't squeeze axis ${i} since its dim '${shape[i]}' is not 1`);\r\n      }\r\n      if ((axes[j] == null || axes[j] > i)
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&& shape[i] === 1) {\r\n        newShape.push(shape[i]);\r\n        keptDims.push(i);\r\n      }\r\n      if (axes[j] <= i)
{\r\n        j++;\r\n      }\r\n    }\r\n    if (shape[i] !== 1) {\r\n      newShape.push(shape[i]);\r\n
keptDims.push(i);\r\n    }\r\n  }\r\n  return {newShape, keptDims};\r\n}\r\n\r\nexport function parseAxisParam(axis:
number|number[], shape: number[]): number[] {\r\n  const rank = shape.length;\r\n\r\n  // Normalize input\r\n  axis =
axis == null ? shape.map((s, i) => i) : ([] as number[]).concat(axis);\r\n\r\n  // Check for valid range\r\n  assert(\r\n
axis.every(ax => ax >= -rank && ax < rank),\r\n      () => `All values in axis param must be in range [-${rank},
${rank}) but ` +\r\n          `got axis ${axis}`);\r\n\r\n  // Check for only integers\r\n  assert(\r\n
axis.every(isInt),\r\n      () => 'All values in axis param must be integers but ' +\r\n          `got axis ${axis}`);\r\n\r\n
// Handle negative axis.\r\n  return axis.map(a => a < 0 ? rank + a : a);\r\n}\r\nexport function isInt(a: number):
boolean {\r\n  return a % 1 === 0;\r\n}\r\nexport function sizeFromShape(shape: number[]): number {\r\n  if
(shape.length === 0) {\r\n    // Scalar.\r\n    return 1;\r\n  }\r\n  let size = shape[0];\r\n  for (let i = 1; i < shape.length;
i++) {\r\n    size *= shape[i];\r\n  }\r\n  return size;\r\n}\r\nexport function getRowsCols(shape: number[]): [number,
number] {\r\n  if (shape.length === 0) {\r\n    throw Error('Cannot get rows and columns of an empty shape
array.');\r\n  }\r\n\r\n  return [shape.length > 1 ? shape[shape.length - 2] : 1, shape[shape.length - 1]];\r\n}\r\nexport
function sizeToSquarishShape(size: number): [number, number] {\r\n  const width = Math.ceil(Math.sqrt(size));\r\n
return [width, Math.ceil(size / width)];\r\n}\r\nexport function getBatchDim(shape: number[], dimsToSkip = 2):
number {\r\n  return sizeFromShape(shape.slice(0, shape.length - dimsToSkip));\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {ShapeUtil} from
'../../util';\r\nimport {TextureLayoutStrategy, WidthHeightPrefs} from './texture-layout-strategy';\r\nimport
{TextureLayout, TextureType} from './types';\r\n\r\nexport const createTextureLayoutFromTextureType =\r\n
(textureLayoutStrategy: TextureLayoutStrategy, shape: readonly number[],\r\n     textureType: TextureType):
TextureLayout => {\r\n      const channel = (textureType === TextureType.unpacked || textureType ===
TextureType.unpackedReversed) ? 1 : 4;\r\n      const isPacked = textureType === TextureType.packed;\r\n      const
reverseWH = (textureType === TextureType.unpackedReversed || textureType === TextureType.packed);\r\n
const breakAxis = textureType === TextureType.packedLastDimension ? shape.length - 1 : undefined;\r\n      const
unpackedShape = textureType === TextureType.packedLastDimension ?\r\n          shape.map((d, i) => i ===
shape.length - 1 ? d * 4 : d) :\r\n          undefined;\r\n      return createTextureLayoutFromShape(\r\n
textureLayoutStrategy, shape, channel, unpackedShape, {isPacked, reverseWH, breakAxis});\r\n    };\r\n\r\nexport
const calculateTextureWidthAndHeight =\r\n    (textureLayoutStrategy: TextureLayoutStrategy, shape: readonly
number[], textureType: TextureType):\r\n        [number, number] => {\r\n          const layout =
createTextureLayoutFromTextureType(textureLayoutStrategy, shape, textureType);\r\n          return [layout.width,
layout.height];\r\n        };\r\n\r\n/**\r\n * Create a TextureLayout object from shape.\r\n */\r\nexport const
createTextureLayoutFromShape =\r\n    (textureLayoutStrategy: TextureLayoutStrategy, shape: readonly number[],
channels: 1|4 = 1,\r\n     unpackedShape?: readonly number[], prefs?: WidthHeightPrefs): TextureLayout => {\r\n
const isPacked = !!(prefs && prefs.isPacked);\r\n      const [width, height] =
textureLayoutStrategy.computeTextureWH(isPacked ? unpackedShape || shape : shape, prefs);\r\n      const rank =
shape.length;\r\n      let inferredDims = shape.slice(0);\r\n      if (rank === 0) {\r\n        inferredDims = [1];\r\n
}\r\n      if (channels === 1) {\r\n        // unpackedShape will take `shape` and not `inferredDims` so as to create a
scalar Tensor if need be\r\n        unpackedShape = shape;\r\n      } else if (isPacked) {\r\n        if (channels !== 4)
{\r\n          throw new Error('a packed texture must be 4-channel');\r\n        }\r\n        unpackedShape = shape;\r\n
if (rank > 0) {\r\n          inferredDims[rank - 1] = Math.ceil(inferredDims[rank - 1] / 2);\r\n        }\r\n        if (rank >
1) {\r\n          inferredDims[rank - 2] = Math.ceil(inferredDims[rank - 2] / 2);\r\n        }\r\n      } else if
(!unpackedShape) {\r\n        throw new Error('Unpacked shape is needed when using channels > 1');\r\n      }\r\n
return {\r\n        width,\r\n        height,\r\n        channels,\r\n        isPacked,\r\n        shape: inferredDims,\r\n
strides: ShapeUtil.computeStrides(inferredDims),\r\n        unpackedShape,\r\n        reversedWH: (prefs &&
prefs.reverseWH)\r\n      };\r\n    };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed
under the MIT License.\r\n\r\nimport {Logger, Profiler} from '../../instrument';\r\nimport {Tensor} from
'../../tensor';\r\n\r\nimport {Encoder} from './texture-data-encoder';\r\nimport {TextureLayoutStrategy} from
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'./texture-layout-strategy';\r\nimport {TextureData, TextureLayout} from './types';\r\nimport {WebGLContext} from
'./webgl-context';\r\n\r\nexport interface TextureManagerConfig {\r\n  reuseTextures?: boolean;\r\n}\r\n\r\n/**\r\n *
TextureManager is the mainly responsible for caching Textures\r\n * Textures are cached in 2 levels:\r\n *   1. the
texures which are associated with a dataId (from Tensor)\r\n *    Caching these is crucial to performance. These are
In-use Textures\r\n *   2. textures which are not in use by any current ProgramInfo/Tensor\r\n *     These are called
Free Textures\r\n * TextureManager is also used to help creating textures. For this it\r\n * uses WebGLContext and
TextureLayoutStrategy\r\n */\r\nexport class TextureManager {\r\n  private readonly inUseTextures: Map<string,
WebGLTexture[]>;\r\n  private readonly idleTextures: Map<string, WebGLTexture[]>;\r\n  private readonly
textureLookup: Map<WebGLTexture, string>;\r\n  private readonly pendingRead: Map<Tensor.Id, Array<(arr:
Tensor.NumberType) => void>> = new Map();\r\n\r\n  constructor(\r\n      public glContext: WebGLContext, public
layoutStrategy: TextureLayoutStrategy, public profiler: Readonly<Profiler>,\r\n      private config:
TextureManagerConfig) {\r\n    if (config.reuseTextures) {\r\n      this.inUseTextures = new Map();\r\n
this.idleTextures = new Map();\r\n      this.textureLookup = new Map();\r\n    }\r\n  }\r\n
createTextureFromLayout(\r\n      dataType: Tensor.DataType, layout: TextureLayout, data?: Tensor.NumberType,
usage?: Encoder.Usage) {\r\n    const textureDataType = this.toEncoderType(dataType);\r\n\r\n    const encoder =
this.glContext.getEncoder(textureDataType, layout.channels || 1, usage);\r\n    if (layout.isPacked && usage ===
Encoder.Usage.UploadOnly) {\r\n      throw new Error('not implemented');\r\n    }\r\n    const width =
layout.width;\r\n    const height = layout.height;\r\n\r\n    let key: string|undefined;\r\n    let inUseTextures:
WebGLTexture[]|undefined;\r\n    if (this.config.reuseTextures) {\r\n      key =
`${width}x${height}_${encoder.format}_${encoder.internalFormat}_${encoder.textureType}`;\r\n
inUseTextures = this.inUseTextures.get(key);\r\n      if (!inUseTextures) {\r\n        inUseTextures = [];\r\n
this.inUseTextures.set(key, inUseTextures);\r\n      }\r\n\r\n      const idleTextures = this.idleTextures.get(key);\r\n
if (idleTextures && idleTextures.length > 0) {\r\n        const texture = idleTextures.pop()!;\r\n
inUseTextures.push(texture);\r\n        if (usage === Encoder.Usage.UploadOnly) {\r\n
this.glContext.updateTexture(texture, width, height, encoder, this.toTextureData(dataType, data)!);\r\n        }\r\n
return texture;\r\n      }\r\n    }\r\n\r\n    Logger.verbose('TextureManager', `Creating new texture of size
${layout.width}x${layout.height}`);\r\n    const texture = this.glContext.allocateTexture(width, height, encoder,
this.toTextureData(dataType, data));\r\n\r\n    if (this.config.reuseTextures) {\r\n
inUseTextures!.push(texture);\r\n      this.textureLookup.set(texture, key!);\r\n    }\r\n    return texture;\r\n  }\r\n
readTexture(td: TextureData, dataType: Tensor.DataType, channels?: number): Tensor.NumberType {\r\n    if
(!channels) {\r\n      channels = 1;\r\n    }\r\n    return this.profiler.event('backend', 'TextureManager.readTexture', ()
=> {\r\n      const dataSize = td.shape.reduce((a, b) => a * b) * channels!;\r\n      const data =
this.glContext.readTexture(\r\n          td.texture, td.width, td.height, dataSize, this.toEncoderType(dataType),
channels!);\r\n      return this.toTensorData(dataType, data);\r\n    });\r\n  }\r\n  async readTextureAsync(td:
TextureData, dataType: Tensor.DataType, channels?: number): Promise<Tensor.NumberType> {\r\n    const dataId
= td.tensor.dataId;\r\n    if (!channels) {\r\n      channels = 1;\r\n    }\r\n    if (this.pendingRead.has(dataId)) {\r\n
const subscribers = this.pendingRead.get(dataId);\r\n      return new Promise<Tensor.NumberType>(resolve =>
subscribers?.push(resolve));\r\n    }\r\n    return this.profiler.event('backend', 'TextureManager.readTextureAsync',
async () => {\r\n      this.pendingRead.set(dataId, []);\r\n      const dataSize = td.shape.reduce((a, b) => a * b) *
channels!;\r\n      // add a fence waiting for the data to be ready\r\n      await
this.glContext.createAndWaitForFence();\r\n      const data = this.glContext.readTexture(\r\n          td.texture,
td.width, td.height, dataSize, this.toEncoderType(dataType), channels!);\r\n      const tensorData =
this.toTensorData(dataType, data);\r\n      const subscribers = this.pendingRead.get(dataId);\r\n
this.pendingRead.delete(dataId);\r\n      subscribers?.forEach(resolve => resolve(tensorData));\r\n      return
tensorData;\r\n    });\r\n  }\r\n  readUint8TextureAsFloat(td: TextureData): Float32Array {\r\n    return
this.profiler.event('backend', 'TextureManager.readUint8TextureAsFloat', () => {\r\n      const dataSize =
td.shape.reduce((a, b) => a * b);\r\n      const data = this.glContext.readTexture(td.texture, td.width, td.height,
dataSize * 4, 'byte', 4);\r\n      return new Float32Array(data.buffer, data.byteOffset, dataSize);\r\n    });\r\n  }\r\n
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releaseTexture(textureData: TextureData, deleteTexture?: boolean): void {\r\n    let key: string|undefined;\r\n    if
(this.config.reuseTextures) {\r\n      key = this.textureLookup.get(textureData.texture);\r\n      if (key) {\r\n        if
(deleteTexture) {\r\n          this.textureLookup.delete(key);\r\n        }\r\n        const inUseTextures =
this.inUseTextures.get(key);\r\n        if (inUseTextures) {\r\n          const index =
inUseTextures.indexOf(textureData.texture);\r\n          if (index !== -1) {\r\n            inUseTextures.splice(index,
1);\r\n            let idleTextures = this.idleTextures.get(key);\r\n            if (!idleTextures) {\r\n              idleTextures =
[];\r\n              this.idleTextures.set(key, idleTextures);\r\n            }\r\n
idleTextures.push(textureData.texture);\r\n          }\r\n        }\r\n      }\r\n    }\r\n\r\n    if (!key || deleteTexture) {\r\n
 Logger.verbose('TextureManager', `Deleting texture of size ${textureData.width}x${textureData.height}`);\r\n
this.glContext.deleteTexture(textureData.texture);\r\n    }\r\n  }\r\n  toTensorData(dataType: Tensor.DataType, data:
Encoder.DataArrayType): Tensor.NumberType {\r\n    switch (dataType) {\r\n      case 'int16':\r\n        return data
instanceof Int16Array ? data : Int16Array.from(data);\r\n      case 'int32':\r\n        return data instanceof Int32Array ?
data : Int32Array.from(data);\r\n      case 'int8':\r\n        return data instanceof Int8Array ? data :
Int8Array.from(data);\r\n      case 'uint16':\r\n        return data instanceof Uint16Array ? data :
Uint16Array.from(data);\r\n      case 'uint32':\r\n        return data instanceof Uint32Array ? data :
Uint32Array.from(data);\r\n      case 'uint8':\r\n      case 'bool':\r\n        return data instanceof Uint8Array ? data :
Uint8Array.from(data);\r\n      case 'float32':\r\n        return data instanceof Float32Array ? data :
Float32Array.from(data);\r\n      case 'float64':\r\n        return data instanceof Float64Array ? data :
Float64Array.from(data);\r\n      default:\r\n        throw new Error(`TensorData type ${dataType} is not
supported`);\r\n    }\r\n  }\r\n  toTextureData(dataType: Tensor.DataType, data: Tensor.NumberType|undefined):
Encoder.DataArrayType|undefined {\r\n    if (!data) {\r\n      return undefined;\r\n    }\r\n    return (data instanceof
Float32Array) ? data : new Float32Array(data);\r\n    /*\r\n    switch (dataType) {\r\n      case 'int16':\r\n      case
'int32':\r\n      case 'uint16':\r\n      case 'uint32':\r\n        return (data.constructor === Uint32Array) ? data as
Uint32Array : new Uint32Array(data);\r\n      case 'int8':\r\n      case 'uint8':\r\n      case 'bool':\r\n        return
(data.constructor === Uint8Array) ? data as Uint8Array : new Uint8Array(data);\r\n      case 'float32':\r\n      case
'float64':\r\n        return (data.constructor === Float32Array) ? data as Float32Array : new Float32Array(data);\r\n
default:\r\n        throw new Error(`TensorData type ${dataType} is not supported`);\r\n    }\r\n    */\r\n  }\r\n
toEncoderType(_dataType: Tensor.DataType): Encoder.DataType {\r\n    return 'float';\r\n    // switch (dataType)
{\r\n    //   case 'int16':\r\n    //   case 'int32':\r\n    //   case 'uint16':\r\n    //   case 'uint32':\r\n    //     return 'int';\r\n    //
case 'uint8':\r\n    //   case 'bool':\r\n    //     return 'byte';\r\n    //   case 'float32':\r\n    //   case 'float64':\r\n    //     return
'float';\r\n    //   default:\r\n    //     throw new Error(`TensorData type ${dataType} is not supported`);\r\n    // }\r\n
}\r\n  clearActiveTextures(): void {\r\n    this.glContext.clearActiveTextures();\r\n  }\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from
'../../tensor';\r\n\r\n/**\r\n * Layout info is used for mapping n-dimensional array to 2D textures\r\n * The layout is
created by the TextureLayoutStrategy based on\r\n * the Tensor's dimensions and strides\r\n */\r\nexport interface
TextureLayout {\r\n  width: number;\r\n  height: number;\r\n  /**\r\n   * specify the number of value that encoded in
a single pixel\r\n   */\r\n  channels: 1|2|3|4;\r\n  /**\r\n   * whether in packed mode or not\r\n   */\r\n  isPacked?:
boolean;\r\n  /**\r\n   * the normalized shape\r\n   */\r\n  shape: readonly number[];\r\n  /**\r\n   * the stride of each
dimensions, calculated according to shape\r\n   */\r\n  strides: readonly number[];\r\n  /**\r\n   * the original
shape(dims) of the corresponding tensor\r\n   */\r\n  unpackedShape: readonly number[];\r\n\r\n  reversedWH?:
boolean;\r\n}\r\nexport interface TextureData extends TextureLayout {\r\n  tensor: Tensor;\r\n  texture:
WebGLTexture;\r\n}\r\n\r\nexport enum TextureType {\r\n  unpacked,             // <-- normal unpacked texture\r\n
unpackedReversed,     // <-- unpacked texture used in old ONNX.js implementation (deprecated)\r\n  packed,
   // <-- normal packed texture\r\n  downloadUint8AsFloat,  // <-- ONLY used in texture downloading for iOS
devices\r\n  packedLastDimension    // <-- ONLY used in old ONNX.js Conv implementation for input W
(deprecated)\r\n}\r\n\r\nexport interface TensorInfo {\r\n  id?: Tensor.Id;\r\n  dims: readonly number[];\r\n  type:
Tensor.DataType;\r\n  textureType: TextureType;\r\n}\r\n\r\nexport interface ProgramVariable {\r\n  type:
'float'|'int';\r\n  name: string;\r\n  arrayLength?: number;\r\n  data: number|number[];\r\n}\r\n\r\n/**\r\n * A set of
```

metadata of a shader program.\r\n */\r\nexport interface ProgramMetadata {\r\n /**\r\n   * the name of the program. used for debugging and profiling\r\n   */\r\n name: string;\r\n /**\r\n   * texture types for each input\r\n   */\r\n inputTypes: TextureType[];\r\n /**\r\n   * names of each input\r\n   */\r\n inputNames: string[];\r\n /**\r\n   * an optional string as a cache hint in the artifact cache\r\n   */\r\n cacheHint?: string;\r\n}\r\n\r\n/**\r\n * A ProgramInfoLoader allows\r\n */\r\nexport interface ProgramInfoLoader extends ProgramMetadata {\r\n /**\r\n   * a function to get the program info\r\n   */\r\n get(): ProgramInfo;\r\n}\r\n\r\n/**\r\n * A set of data that represent a shader program\r\n */\r\nexport interface ProgramInfo extends ProgramMetadata {\r\n /**\r\n   * information of uniform variables\r\n   */\r\n variables?: ProgramVariable[];\r\n /**\r\n   * tensor info for output\r\n   */\r\n output: TensorInfo;\r\n /**\r\n   * the shader's processing source code\r\n   */\r\n shaderSource: string;\r\n /**\r\n   * whether the shader source contains a customized main function implementation\r\n   */\r\n hasMain?: boolean;\r\n}\r\n\r\nexport interface VariableInfo {\r\n type: 'float'|'int';\r\n name: string;\r\n arrayLength?: number;\r\n}\r\n\r\nexport interface ProgramVariable {\r\n type: 'float'|'int';\r\n name: string;\r\n arrayLength?: number;\r\n data: number|number[];\r\n}\r\n\r\n/**\r\n * Information of uniforms that shader uses\r\n */\r\nexport interface UniformInfo {\r\n type: 'sampler2D'|VariableInfo['type'];\r\n name: string;\r\n arrayLength?: number;\r\n}\r\n\r\nexport interface UniformLocation extends UniformInfo {\r\n location: WebGLUniformLocation;\r\n}\r\n\r\n/**\r\n * Artifact is the result of compilation\r\n * It does not contain input of output data\r\n * However anything that could be run as a \"program\"\r\n */\r\nexport interface Artifact {\r\n programInfo: ProgramInfo;\r\n program: WebGLProgram;\r\n uniformLocations: UniformLocation[];\r\n attribLocations: {position: number; textureCoord: number};\r\n}\r\nexport declare namespace Artifact {\r\n type UniformLocations = Artifact['uniformLocations'];\r\n type AttribLocations = Artifact['attribLocations'];\r\n}\r\n\r\nexport interface UniformData {\r\n [name: string]: number|number[];\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {assert} from '../../util';\r\n/**\r\n * Given a non RGBA shape calculate the R version\r\n * It is assumed that the dimensions are multiples of given channels\r\n * NOTE: it is always the last dim that gets packed.\r\n * @param unpackedShape original shape to create a packed version from\r\n */\r\nexport function getPackedShape(unpackedShape: readonly number[]): readonly number[] {\r\n const len = unpackedShape.length;\r\n return unpackedShape.slice(0, len - 1).concat(unpackedShape[len - 1] / 4);\r\n}\r\n\r\nexport async function repeatedTry(\r\n   checkFn: () => boolean, delayFn = (_counter: number) => 0, maxCounter?: number): Promise<void> {\r\n return new Promise<void>((resolve, reject) => {\r\n   let tryCount = 0;\r\n\r\n   const tryFn = () => {\r\n   if (checkFn()) {\r\n   resolve();\r\n   return;\r\n   }\r\n\r\n   tryCount++;\r\n\r\n   const nextBackoff = delayFn(tryCount);\r\n\r\n   if (maxCounter != null && tryCount >= maxCounter) {\r\n   reject();\r\n   return;\r\n   }\r\n   setTimeout(tryFn, nextBackoff);\r\n   };\r\n\r\n   tryFn();\r\n });\r\n}\r\n\r\n/**\r\n * Generates the function name from an input sampler name.\r\n * @param samplerName Name of the sampler.\r\n */\r\nexport function generateShaderFuncNameFromInputSamplerName(samplerName: string): string {\r\n assert(typeof samplerName !== 'undefined' && samplerName.length !== 0, () => 'empty string found for sampler name');\r\n return 'get' + samplerName.charAt(0).toUpperCase() + samplerName.slice(1);\r\n}\r\n\r\n/**\r\n * Generates the function name from an input sampler name at output coordinates.\r\n * @param samplerName Name of the sampler.\r\n */\r\nexport function generateShaderFuncNameFromInputSamplerNameAtOutCoords(samplerName: string): string {\r\n assert(typeof samplerName !== 'undefined' && samplerName.length !== 0, () => 'empty string found for sampler name');\r\n return 'get' + samplerName.charAt(0).toUpperCase() + samplerName.slice(1) + 'AtOutCoords';\r\n}\r\n\r\n/** Returns a new input shape (a copy) that has a squeezed logical shape. */\r\nexport function squeezeInputShape(inputShape: readonly number[], squeezedShape: number[]): number[] {\r\n // Deep copy.\r\n let newInputShape: number[] = JSON.parse(JSON.stringify(inputShape));\r\n newInputShape = squeezedShape;\r\n return newInputShape;\r\n}\r\n\r\n/** Returns a list of squeezed parameters for shader functions */\r\nexport function getSqueezedParams(params: string[], keptDims: number[]): string {\r\n return keptDims.map(d => params[d]).join(', ');\r\n}\r\n\r\n/** Returns the data type for different ranks. */\r\nexport function getCoordsDataType(rank: number): string {\r\n if (rank <= 1) {\r\n   return 'int';\r\n } else if (rank === 2)

{\r\n return 'ivec2';\r\n } else if (rank === 3) {\r\n return 'ivec3';\r\n } else if (rank === 4) {\r\n return 'ivec4';\r\n } else if (rank === 5) {\r\n return 'ivec5';\r\n } else if (rank === 6) {\r\n return 'ivec6';\r\n } else {\r\n throw Error(`GPU for rank ${rank} is not yet supported`);\r\n }\r\n}\r\n\r\nexport function getGlChannels(rank = 6): string[] {\r\n return ['x', 'y', 'z', 'w', 'u', 'v'].slice(0, rank);\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Logger} from '../../instrument';\r\n\r\nimport {WebGLContext} from './webgl-context';\r\n\r\nconst cache: {[contextId: string]: WebGLContext} = {};\r\n\r\n/**\r\n * This factory function creates proper WebGLRenderingContext based on\r\n * the current browsers capabilities\r\n * The order is from higher/most recent versions to most basic\r\n */\r\nexport function createWebGLContext(contextId?: 'webgl'|'webgl2'): WebGLContext {\r\n let context: WebGLContext|undefined;\r\n if ((!contextId || contextId === 'webgl2') && 'webgl2' in cache) {\r\n context = cache.webgl2;\r\n } else if ((!contextId || contextId === 'webgl') && 'webgl' in cache) {\r\n context = cache.webgl;\r\n }\r\n\r\n context = context || createNewWebGLContext(contextId);\r\n contextId = contextId || context.version === 1 ? 'webgl' : 'webgl2';\r\n const gl = context.gl;\r\n\r\n cache[contextId] = context;\r\n\r\n if (gl.isContextLost()) {\r\n delete cache[contextId];\r\n return createWebGLContext(contextId);\r\n }\r\n\r\n gl.disable(gl.DEPTH_TEST);\r\n gl.disable(gl.STENCIL_TEST);\r\n gl.disable(gl.BLEND);\r\n gl.disable(gl.DITHER);\r\n gl.disable(gl.POLYGON_OFFSET_FILL);\r\n gl.disable(gl.SAMPLE_COVERAGE);\r\n gl.enable(gl.SCISSOR_TEST);\r\n gl.enable(gl.CULL_FACE);\r\n gl.cullFace(gl.BACK);\r\n\r\n return context;\r\n}\r\n\r\nexport function createNewWebGLContext(contextId?: 'webgl'|'webgl2'): WebGLContext {\r\n const canvas = createCanvas();\r\n const contextAttributes: WebGLContextAttributes = {\r\n alpha: false,\r\n depth: false,\r\n antialias: false,\r\n stencil: false,\r\n preserveDrawingBuffer: false,\r\n premultipliedAlpha: false,\r\n failIfMajorPerformanceCaveat: false\r\n };\r\n let gl: WebGLRenderingContext|null;\r\n const ca = contextAttributes;\r\n if (!contextId || contextId === 'webgl2') {\r\n gl = canvas.getContext('webgl2', ca);\r\n if (gl) {\r\n try {\r\n return new WebGLContext(gl, 2);\r\n } catch (err) {\r\n Logger.warning('GlContextFactory', `failed to create WebGLContext using contextId 'webgl2'. Error: ${err}`);\r\n }\r\n }\r\n }\r\n if (!contextId || contextId === 'webgl') {\r\n gl = canvas.getContext('webgl', ca) || canvas.getContext('experimental-webgl', ca) as WebGLRenderingContext;\r\n if (gl) {\r\n try {\r\n return new WebGLContext(gl, 1);\r\n } catch (err) {\r\n Logger.warning(\r\n 'GlContextFactory',\r\n `failed to create WebGLContext using contextId 'webgl' or 'experimental-webgl'. Error: ${err}`);\r\n }\r\n }\r\n }\r\n\r\n throw new Error('WebGL is not supported');\r\n}\r\n\r\nfunction createCanvas(): HTMLCanvasElement {\r\n const canvas: HTMLCanvasElement = document.createElement('canvas');\r\n canvas.width = 1;\r\n canvas.height = 1;\r\n return canvas;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env} from 'onnxruntime-common';\r\n\r\nimport * as DataEncoders from './texture-data-encoder';\r\nimport {DataEncoder, Encoder} from './texture-data-encoder';\r\nimport {repeatedTry} from './utils';\r\n\r\nexport interface FenceContext {\r\n query: WebGLSync|null;\r\n isFencePassed(): boolean;\r\n}\r\n\r\ntype PollItem = {\r\n isDoneFn: () => boolean; resolveFn: () => void;\r\n};\r\n\r\nexport function linearSearchLastTrue(arr: Array<() => boolean>): number {\r\n let i = 0;\r\n for (; i < arr.length; ++i) {\r\n const isDone = arr[i]();\r\n if (!isDone) {\r\n break;\r\n }\r\n }\r\n return i - 1;\r\n}\r\n\r\n/**\r\n * Abstraction and wrapper around WebGLRenderingContext and its operations\r\n */\r\nexport class WebGLContext {\r\n gl: WebGLRenderingContext;\r\n version: 1|2;\r\n\r\n private vertexbuffer: WebGLBuffer;\r\n private framebuffer: WebGLFramebuffer;\r\n\r\n // WebGL flags and vital parameters\r\n private isFloatTextureAttachableToFrameBuffer: boolean;\r\n isFloat32DownloadSupported: boolean;\r\n isRenderFloat32Supported: boolean;\r\n isBlendSupported: boolean;\r\n maxTextureSize: number;\r\n // private maxCombinedTextureImageUnits: number;\r\n private maxTextureImageUnits: number;\r\n // private maxCubeMapTextureSize: number;\r\n // private shadingLanguageVersion: string;\r\n // private webglVendor: string;\r\n // private webglVersion: string;\r\n\r\n // WebGL2 flags and vital parameters\r\n // private max3DTextureSize: number;\r\n // private maxArrayTextureLayers: number;\r\n // private maxColorAttachments: number;\r\n // private maxDrawBuffers: number;\r\n\r\n // WebGL extensions\r\n // eslint-disable-next-line camelcase\r\n textureFloatExtension: OES_texture_float|null;\r\n // eslint-disable-next-line camelcase\r\n textureHalfFloatExtension: OES_texture_half_float|null;\r\n\r\n // WebGL2 extensions\r\n colorBufferFloatExtension: unknown|null;\r\n // eslint-disable-next-line @typescript-eslint/naming-convention\r\n disjointTimerQueryWebgl2Extension: {TIME_ELAPSED_EXT: GLenum; GPU_DISJOINT_EXT: GLenum}|null;\r\n\r\n private disposed: boolean;\r\n private frameBufferBound = false;\r\n\r\n constructor(gl: WebGLRenderingContext, version: 1|2) {\r\n   this.gl = gl;\r\n   this.version = version;\r\n\r\n this.getExtensions();\r\n   this.vertexbuffer = this.createVertexbuffer();\r\n   this.framebuffer = this.createFramebuffer();\r\n   this.queryVitalParameters();\r\n }\r\n\r\n allocateTexture(width: number, height: number, encoder: DataEncoder, data?: Encoder.DataArrayType): WebGLTexture {\r\n   const gl = this.gl;\r\n   // create the texture\r\n   const texture = gl.createTexture();\r\n   // bind the texture so the following methods effect this texture.\r\n   gl.bindTexture(gl.TEXTURE_2D, texture);\r\n   gl.texParameteri(gl.TEXTURE_2D, gl.TEXTURE_MIN_FILTER, gl.NEAREST);\r\n   gl.texParameteri(gl.TEXTURE_2D, gl.TEXTURE_MAG_FILTER, gl.NEAREST);\r\n   gl.texParameteri(gl.TEXTURE_2D, gl.TEXTURE_WRAP_S, gl.CLAMP_TO_EDGE);\r\n   gl.texParameteri(gl.TEXTURE_2D, gl.TEXTURE_WRAP_T, gl.CLAMP_TO_EDGE);\r\n   const buffer = data ? encoder.encode(data, width * height) : null;\r\n gl.texImage2D(\r\n   gl.TEXTURE_2D,\r\n   0, // Level of detail.\r\n   encoder.internalFormat, width, height,\r\n   0, // Always 0 in OpenGL ES.\r\n   encoder.format, encoder.textureType, buffer);\r\n this.checkError();\r\n   return texture as WebGLTexture;\r\n }\r\n updateTexture(\r\n   texture: WebGLTexture, width: number, height: number, encoder: DataEncoder, data: Encoder.DataArrayType): void {\r\n   const gl = this.gl;\r\n   gl.bindTexture(gl.TEXTURE_2D, texture);\r\n   const buffer = encoder.encode(data, width * height);\r\n   gl.texSubImage2D(\r\n   gl.TEXTURE_2D,\r\n   0, // level\r\n   0, // xoffset\r\n   0, // yoffset\r\n   width, height, encoder.format, encoder.textureType, buffer);\r\n   this.checkError();\r\n }\r\n attachFramebuffer(texture: WebGLTexture, width: number, height: number): void {\r\n   const gl = this.gl;\r\n   // Make it the target for framebuffer operations - including rendering.\r\n   gl.bindTexture(gl.TEXTURE_2D, texture);\r\n   gl.bindFramebuffer(gl.FRAMEBUFFER, this.framebuffer);\r\n   gl.framebufferTexture2D(\r\n gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0, gl.TEXTURE_2D, texture,\r\n   0); // 0, we aren't using MIPMAPs\r\n   this.checkError();\r\n   gl.viewport(0, 0, width, height);\r\n   gl.scissor(0, 0, width, height);\r\n }\r\n readTexture(\r\n   texture: WebGLTexture, width: number, height: number, dataSize: number, dataType: Encoder.DataType,\r\n   channels: number): Encoder.DataArrayType {\r\n   const gl = this.gl;\r\n   if (!channels) {\r\n   channels = 1;\r\n   }\r\n   if (!this.frameBufferBound) {\r\n   this.attachFramebuffer(texture, width, height);\r\n   }\r\n   const encoder = this.getEncoder(dataType, channels);\r\n   const buffer = encoder.allocate(width * height);\r\n   // bind texture to framebuffer\r\n   gl.bindTexture(gl.TEXTURE_2D, texture);\r\n   gl.framebufferTexture2D(\r\n   gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0, gl.TEXTURE_2D, texture,\r\n   0); // 0, we aren't using MIPMAPs\r\n   // TODO: Check if framebuffer is ready\r\n   gl.readPixels(0, 0, width, height, gl.RGBA, encoder.textureType, buffer);\r\n   this.checkError();\r\n   // unbind FB\r\n   return encoder.decode(buffer, dataSize);\r\n }\r\n\r\n isFramebufferReady(): boolean {\r\n   // TODO: Implement logic to check if the framebuffer is ready\r\n   return true;\r\n }\r\n getActiveTexture(): string {\r\n   const gl = this.gl;\r\n   const n = gl.getParameter(this.gl.ACTIVE_TEXTURE);\r\n   return `TEXTURE${(n - gl.TEXTURE0)}`;\r\n }\r\n getTextureBinding(): WebGLTexture {\r\n   return this.gl.getParameter(this.gl.TEXTURE_BINDING_2D);\r\n }\r\n getFramebufferBinding(): WebGLFramebuffer {\r\n   return this.gl.getParameter(this.gl.FRAMEBUFFER_BINDING);\r\n }\r\n setVertexAttributes(positionHandle: number, textureCoordHandle: number): void {\r\n   const gl = this.gl;\r\n gl.vertexAttribPointer(positionHandle, 3, gl.FLOAT, false, 20, 0);\r\n gl.enableVertexAttribArray(positionHandle);\r\n   if (textureCoordHandle !== -1) {\r\n gl.vertexAttribPointer(textureCoordHandle, 2, gl.FLOAT, false, 20, 12);\r\n gl.enableVertexAttribArray(textureCoordHandle);\r\n   }\r\n   this.checkError();\r\n }\r\n createProgram(\r\n vertexShader: WebGLShader,\r\n   fragShader: WebGLShader,\r\n   ): WebGLProgram {\r\n   const gl = this.gl;\r\n   const program = gl.createProgram()!;\r\n\r\n   // the program consists of our shaders\r\n

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gl.attachShader(program, vertexShader);\r\n    gl.attachShader(program, fragShader);\r\n
gl.linkProgram(program);\r\n    return program;\r\n  }\r\n  compileShader(shaderSource: string, shaderType:
number): WebGLShader {\r\n    const gl = this.gl;\r\n    const shader = gl.createShader(shaderType);\r\n    if
(!shader) {\r\n      throw new Error(`createShader() returned null with type ${shaderType}`);\r\n    }\r\n\r\n
gl.shaderSource(shader, shaderSource);\r\n    gl.compileShader(shader);\r\n    if (gl.getShaderParameter(shader,
gl.COMPILE_STATUS) === false) {\r\n      throw new Error(`Failed to compile shader:
${gl.getShaderInfoLog(shader)}\r\nShader source:\r\n${shaderSource}`);\r\n    }\r\n    return shader;\r\n  }\r\n
deleteShader(shader: WebGLShader): void {\r\n    this.gl.deleteShader(shader);\r\n  }\r\n
bindTextureToUniform(texture: WebGLTexture, position: number, uniformHandle: WebGLUniformLocation): void
{\r\n    const gl = this.gl;\r\n    gl.activeTexture(gl.TEXTURE0 + position);\r\n    this.checkError();\r\n
gl.bindTexture(gl.TEXTURE_2D, texture);\r\n    this.checkError();\r\n    gl.uniform1i(uniformHandle, position);\r\n
 this.checkError();\r\n  }\r\n  draw(): void {\r\n    this.gl.drawArrays(this.gl.TRIANGLE_STRIP, 0, 4);\r\n
this.checkError();\r\n  }\r\n  checkError(): void {\r\n    if (env.debug) {\r\n      const gl = this.gl;\r\n      const error =
gl.getError();\r\n      let label = '';\r\n      switch (error) {\r\n        case (gl.NO_ERROR):\r\n          return;\r\n        case
(gl.INVALID_ENUM):\r\n          label = 'INVALID_ENUM';\r\n          break;\r\n        case
(gl.INVALID_VALUE):\r\n          label = 'INVALID_VALUE';\r\n          break;\r\n        case
(gl.INVALID_OPERATION):\r\n          label = 'INVALID_OPERATION';\r\n          break;\r\n        case
(gl.INVALID_FRAMEBUFFER_OPERATION):\r\n          label =
'INVALID_FRAMEBUFFER_OPERATION';\r\n          break;\r\n        case (gl.OUT_OF_MEMORY):\r\n
label = 'OUT_OF_MEMORY';\r\n          break;\r\n        case (gl.CONTEXT_LOST_WEBGL):\r\n          label =
'CONTEXT_LOST_WEBGL';\r\n          break;\r\n        default:\r\n          label = `Unknown WebGL Error:
${error.toString(16)}`;\r\n      }\r\n      throw new Error(label);\r\n    }\r\n  }\r\n  deleteTexture(texture:
WebGLTexture): void {\r\n    this.gl.deleteTexture(texture);\r\n  }\r\n  deleteProgram(program: WebGLProgram):
void {\r\n    this.gl.deleteProgram(program);\r\n  }\r\n  getEncoder(dataType: Encoder.DataType, channels: number,
usage: Encoder.Usage = Encoder.Usage.Default): DataEncoder {\r\n    if (this.version === 2) {\r\n      return new
DataEncoders.RedFloat32DataEncoder(this.gl as WebGL2RenderingContext, channels);\r\n    }\r\n\r\n    switch
(dataType) {\r\n      case 'float':\r\n        if (usage === Encoder.Usage.UploadOnly || this.isRenderFloat32Supported)
{\r\n          return new DataEncoders.RGBAFloatDataEncoder(this.gl, channels);\r\n        } else {\r\n          return
new DataEncoders.RGBAFloatDataEncoder(\r\n              this.gl, channels,
this.textureHalfFloatExtension!.HALF_FLOAT_OES);\r\n        }\r\n      case 'int':\r\n        throw new Error('not
implemented');\r\n      case 'byte':\r\n        return new DataEncoders.Uint8DataEncoder(this.gl, channels);\r\n
default:\r\n        throw new Error(`Invalid dataType: ${dataType}`);\r\n    }\r\n  }\r\n  clearActiveTextures(): void
{\r\n    const gl = this.gl;\r\n    for (let unit = 0; unit < this.maxTextureImageUnits; ++unit) {\r\n
gl.activeTexture(gl.TEXTURE0 + unit);\r\n      gl.bindTexture(gl.TEXTURE_2D, null);\r\n    }\r\n  }\r\n  dispose():
void {\r\n    if (this.disposed) {\r\n      return;\r\n    }\r\n    const gl = this.gl;\r\n
gl.bindFramebuffer(gl.FRAMEBUFFER, null);\r\n    gl.deleteFramebuffer(this.framebuffer);\r\n
gl.bindBuffer(gl.ARRAY_BUFFER, null);\r\n    gl.deleteBuffer(this.vertexbuffer);\r\n
gl.bindBuffer(gl.ELEMENT_ARRAY_BUFFER, null);\r\n    gl.finish();\r\n    this.disposed = true;\r\n  }\r\n\r\n
private createDefaultGeometry(): Float32Array {\r\n    // Sets of x,y,z(=0),s,t coordinates.\r\n    return new
Float32Array([\r\n      -1.0, 1.0,  0.0, 0.0, 1.0,  // upper left\r\n      -1.0, -1.0, 0.0, 0.0, 0.0,  // lower left\r\n      1.0,
1.0,  0.0, 1.0, 1.0,  // upper right\r\n      1.0,  -1.0, 0.0, 1.0, 0.0   // lower right\r\n    ]);\r\n  }\r\n  private
createVertexbuffer(): WebGLBuffer {\r\n    const gl = this.gl;\r\n    const buffer = gl.createBuffer();\r\n    if (!buffer)
{\r\n      throw new Error('createBuffer() returned null');\r\n    }\r\n    const geometry =
this.createDefaultGeometry();\r\n    gl.bindBuffer(gl.ARRAY_BUFFER, buffer);\r\n
gl.bufferData(gl.ARRAY_BUFFER, geometry, gl.STATIC_DRAW);\r\n    this.checkError();\r\n    return buffer;\r\n
}\r\n  private createFramebuffer(): WebGLFramebuffer {\r\n    const fb = this.gl.createFramebuffer();\r\n    if (!fb)
{\r\n      throw new Error('createFramebuffer returned null');\r\n    }\r\n    return fb;\r\n  }\r\n\r\n  private
queryVitalParameters(): void {\r\n    const gl = this.gl;\r\n\r\n    this.isFloatTextureAttachableToFrameBuffer =
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this.checkFloatTextureAttachableToFrameBuffer();\r\n    this.isRenderFloat32Supported =
this.checkRenderFloat32();\r\n    this.isFloat32DownloadSupported = this.checkFloat32Download();\r\n\r\n    if
(this.version === 1 && !this.textureHalfFloatExtension && !this.isRenderFloat32Supported) {\r\n      throw new
Error('both float32 and float16 TextureType are not supported');\r\n    }\r\n\r\n    this.isBlendSupported =
!this.isRenderFloat32Supported || this.checkFloat32Blend();\r\n\r\n    // this.maxCombinedTextureImageUnits =
gl.getParameter(gl.MAX_COMBINED_TEXTURE_IMAGE_UNITS);\r\n    this.maxTextureSize =
gl.getParameter(gl.MAX_TEXTURE_SIZE);\r\n    this.maxTextureImageUnits =
gl.getParameter(gl.MAX_TEXTURE_IMAGE_UNITS);\r\n    // this.maxCubeMapTextureSize =
gl.getParameter(gl.MAX_CUBE_MAP_TEXTURE_SIZE);\r\n    // this.shadingLanguageVersion =
gl.getParameter(gl.SHADING_LANGUAGE_VERSION);\r\n    // this.webglVendor =
gl.getParameter(gl.VENDOR);\r\n    // this.webglVersion = gl.getParameter(gl.VERSION);\r\n\r\n    if (this.version
=== 2) {\r\n      // this.max3DTextureSize =
gl.getParameter(WebGL2RenderingContext.MAX_3D_TEXTURE_SIZE);\r\n      // this.maxArrayTextureLayers =
gl.getParameter(WebGL2RenderingContext.MAX_ARRAY_TEXTURE_LAYERS);\r\n      //
this.maxColorAttachments = gl.getParameter(WebGL2RenderingContext.MAX_COLOR_ATTACHMENTS);\r\n
 // this.maxDrawBuffers = gl.getParameter(WebGL2RenderingContext.MAX_DRAW_BUFFERS);\r\n    }\r\n  }\r\n
private getExtensions(): void {\r\n    if (this.version === 2) {\r\n      this.colorBufferFloatExtension =
this.gl.getExtension('EXT_color_buffer_float');\r\n      this.disjointTimerQueryWebgl2Extension =
this.gl.getExtension('EXT_disjoint_timer_query_webgl2');\r\n    } else {\r\n      this.textureFloatExtension =
this.gl.getExtension('OES_texture_float');\r\n      this.textureHalfFloatExtension =
this.gl.getExtension('OES_texture_half_float');\r\n    }\r\n  }\r\n\r\n  private
checkFloatTextureAttachableToFrameBuffer(): boolean {\r\n    // test whether Float32 texture is supported:\r\n    //
STEP.1 create a float texture\r\n    const gl = this.gl;\r\n    const texture = gl.createTexture();\r\n
gl.bindTexture(gl.TEXTURE_2D, texture);\r\n    // eslint-disable-next-line @typescript-eslint/naming-
convention\r\n    const internalFormat = this.version === 2 ? (gl as unknown as {RGBA32F: number}).RGBA32F :
gl.RGBA;\r\n    gl.texImage2D(gl.TEXTURE_2D, 0, internalFormat, 1, 1, 0, gl.RGBA, gl.FLOAT, null);\r\n    //
STEP.2 bind a frame buffer\r\n    const frameBuffer = gl.createFramebuffer();\r\n
gl.bindFramebuffer(gl.FRAMEBUFFER, frameBuffer);\r\n    // STEP.3 attach texture to framebuffer\r\n
gl.framebufferTexture2D(gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0, gl.TEXTURE_2D, texture, 0);\r\n
// STEP.4 test whether framebuffer is complete\r\n    const isComplete =
gl.checkFramebufferStatus(gl.FRAMEBUFFER) === gl.FRAMEBUFFER_COMPLETE;\r\n
gl.bindTexture(gl.TEXTURE_2D, null);\r\n    gl.bindFramebuffer(gl.FRAMEBUFFER, null);\r\n
gl.deleteTexture(texture);\r\n    gl.deleteFramebuffer(frameBuffer);\r\n    return isComplete;\r\n  }\r\n\r\n  private
checkRenderFloat32(): boolean {\r\n    if (this.version === 2) {\r\n      if (!this.colorBufferFloatExtension) {\r\n
return false;\r\n      }\r\n    } else {\r\n      if (!this.textureFloatExtension) {\r\n        return false;\r\n      }\r\n    }\r\n
return this.isFloatTextureAttachableToFrameBuffer;\r\n  }\r\n\r\n  private checkFloat32Download(): boolean {\r\n
if (this.version === 2) {\r\n      if (!this.colorBufferFloatExtension) {\r\n        return false;\r\n      }\r\n    } else {\r\n
 if (!this.textureFloatExtension) {\r\n        return false;\r\n      }\r\n      if
(!this.gl.getExtension('WEBGL_color_buffer_float')) {\r\n        return false;\r\n      }\r\n    }\r\n    return
this.isFloatTextureAttachableToFrameBuffer;\r\n  }\r\n\r\n  /**\r\n   * Check whether GL_BLEND is supported\r\n
*/\r\n  private checkFloat32Blend(): boolean {\r\n    // it looks like currently (2019-05-08) there is no easy way to
detect whether BLEND is supported\r\n    // https://github.com/microsoft/onnxjs/issues/145\r\n\r\n    const gl =
this.gl;\r\n\r\n    let texture: WebGLTexture|null|undefined;\r\n    let frameBuffer:
WebGLFramebuffer|null|undefined;\r\n    let vertexShader: WebGLShader|null|undefined;\r\n    let fragmentShader:
WebGLShader|null|undefined;\r\n    let program: WebGLProgram|null|undefined;\r\n\r\n    try {\r\n      texture =
gl.createTexture();\r\n      frameBuffer = gl.createFramebuffer();\r\n      gl.bindTexture(gl.TEXTURE_2D,
texture);\r\n\r\n      // eslint-disable-next-line @typescript-eslint/naming-convention\r\n      const internalFormat =
this.version === 2 ? (gl as unknown as {RGBA32F: number}).RGBA32F : gl.RGBA;\r\n
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gl.texImage2D(gl.TEXTURE_2D, 0, internalFormat, 1, 1, 0, gl.RGBA, gl.FLOAT, null);\r\n\r\n gl.bindFramebuffer(gl.FRAMEBUFFER, frameBuffer);\r\n gl.framebufferTexture2D(gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0, gl.TEXTURE_2D, texture, 0);\r\n\r\n gl.enable(gl.BLEND);\r\n\r\n vertexShader = gl.createShader(gl.VERTEX_SHADER);\r\n if (!vertexShader) {\r\n return false;\r\n }\r\n gl.shaderSource(vertexShader, 'void main(){}');\r\n gl.compileShader(vertexShader);\r\n\r\n fragmentShader = gl.createShader(gl.FRAGMENT_SHADER);\r\n if (!fragmentShader) {\r\n return false;\r\n }\r\n gl.shaderSource(fragmentShader, 'precision highp float;void main(){gl_FragColor=vec4(0.5);}');\r\n gl.compileShader(fragmentShader);\r\n\r\n program = gl.createProgram();\r\n if (!program) {\r\n return false;\r\n }\r\n gl.attachShader(program, vertexShader);\r\n gl.attachShader(program, fragmentShader);\r\n gl.linkProgram(program);\r\n gl.useProgram(program);\r\n\r\n gl.drawArrays(gl.POINTS, 0, 1);\r\n return gl.getError() === gl.NO_ERROR;\r\n\r\n } finally {\r\n gl.disable(gl.BLEND);\r\n\r\n if (program) {\r\n gl.deleteProgram(program);\r\n }\r\n if (vertexShader) {\r\n gl.deleteShader(vertexShader);\r\n }\r\n if (fragmentShader) {\r\n gl.deleteShader(fragmentShader);\r\n }\r\n if (frameBuffer) {\r\n gl.bindFramebuffer(gl.FRAMEBUFFER, null);\r\n gl.deleteFramebuffer(frameBuffer);\r\n }\r\n if (texture) {\r\n gl.bindTexture(gl.TEXTURE_2D, null);\r\n gl.deleteTexture(texture);\r\n }\r\n }\r\n }\r\n\r\n beginTimer(): WebGLQuery {\r\n if (this.version === 2 && this.disjointTimerQueryWebgl2Extension) {\r\n const gl2 = this.gl as WebGL2RenderingContext;\r\n const ext = this.disjointTimerQueryWebgl2Extension;\r\n\r\n const query = gl2.createQuery() as WebGLQuery;\r\n gl2.beginQuery(ext.TIME_ELAPSED_EXT, query);\r\n return query;\r\n } else {\r\n // TODO: add webgl 1 handling.\r\n throw new Error('WebGL1 profiling currently not supported.');\r\n }\r\n }\r\n\r\n endTimer() {\r\n if (this.version === 2 && this.disjointTimerQueryWebgl2Extension) {\r\n const gl2 = this.gl as WebGL2RenderingContext;\r\n const ext = this.disjointTimerQueryWebgl2Extension;\r\n gl2.endQuery(ext.TIME_ELAPSED_EXT);\r\n return;\r\n } else {\r\n // TODO: add webgl 1 handling.\r\n throw new Error('WebGL1 profiling currently not supported');\r\n }\r\n }\r\n\r\n isTimerResultAvailable(query: WebGLQuery): boolean {\r\n let available = false, disjoint = false;\r\n if (this.version === 2 && this.disjointTimerQueryWebgl2Extension) {\r\n const gl2 = this.gl as WebGL2RenderingContext;\r\n const ext = this.disjointTimerQueryWebgl2Extension;\r\n\r\n available = gl2.getQueryParameter(query, gl2.QUERY_RESULT_AVAILABLE);\r\n disjoint = gl2.getParameter(ext.GPU_DISJOINT_EXT);\r\n } else {\r\n // TODO: add webgl 1 handling.\r\n throw new Error('WebGL1 profiling currently not supported');\r\n }\r\n\r\n return available && !disjoint;\r\n }\r\n\r\n getTimerResult(query: WebGLQuery): number {\r\n let timeElapsed = 0;\r\n if (this.version === 2) {\r\n const gl2 = this.gl as WebGL2RenderingContext;\r\n timeElapsed = gl2.getQueryParameter(query, gl2.QUERY_RESULT);\r\n gl2.deleteQuery(query);\r\n } else {\r\n // TODO: add webgl 1 handling.\r\n throw new Error('WebGL1 profiling currently not supported');\r\n }\r\n // return miliseconds\r\n return timeElapsed / 1000000;\r\n }\r\n\r\n async waitForQueryAndGetTime(query: WebGLQuery): Promise<number> {\r\n await repeatedTry(() => this.isTimerResultAvailable(query));\r\n return this.getTimerResult(query);\r\n }\r\n\r\n public async createAndWaitForFence(): Promise<void> {\r\n const fenceContext = this.createFence(this.gl);\r\n return this.pollFence(fenceContext);\r\n }\r\n\r\n private createFence(gl: WebGLRenderingContext): FenceContext {\r\n let isFencePassed: () => boolean;\r\n const gl2 = gl as WebGL2RenderingContext;\r\n const query = gl2.fenceSync(gl2.SYNC_GPU_COMMANDS_COMPLETE, 0);\r\n gl.flush();\r\n if (query === null) {\r\n isFencePassed = () => true;\r\n } else {\r\n isFencePassed = () => {\r\n const status = gl2.clientWaitSync(query, 0, 0);\r\n return status === gl2.ALREADY_SIGNALED || status === gl2.CONDITION_SATISFIED;\r\n };\r\n }\r\n return {query, isFencePassed};\r\n }\r\n\r\n async pollFence(fenceContext: FenceContext) {\r\n return new Promise<void>(resolve => {\r\n void this.addItemToPoll(() => fenceContext.isFencePassed(), () => resolve());\r\n });\r\n }\r\n\r\n private itemsToPoll: PollItem[] = [];\r\n\r\n pollItems(): void {\r\n // Find the last query that has finished.\r\n const index = linearSearchLastTrue(this.itemsToPoll.map(x => x.isDoneFn));\r\n for (let i = 0; i <= index; ++i) {\r\n const {resolveFn} = this.itemsToPoll[i];\r\n resolveFn();\r\n }\r\n this.itemsToPoll = this.itemsToPoll.slice(index + 1);\r\n }\r\n\r\n private async addItemToPoll(isDoneFn: () => boolean, resolveFn: () => void) {\r\n this.itemsToPoll.push({isDoneFn, resolveFn});\r\n if (this.itemsToPoll.length > 1) {\r\n // We already have a running loop that polls.\r\n return;\r\n }\r\n // Start a new loop that polls.\r\n await repeatedTry(() => {\r\n this.pollItems();\r\n // End the loop if no more items to poll.\r\n return this.itemsToPoll.length === 0;\r\n });\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {SessionHandler} from './backend';\r\nimport {Graph} from './graph';\r\nimport {Logger, Profiler} from './instrument';\r\nimport {Operator} from './operators';\r\nimport {Tensor} from './tensor';\r\n\r\nclass KernelOp {\r\n constructor(public op: Operator, public node: Graph.Node) {}\r\n}\r\n\r\nexport class ExecutionPlan {\r\n constructor(private graph: Graph, ops: Operator[], private profiler: Readonly<Profiler>) {\r\n this.initialize(ops);\r\n }\r\n\r\n initialize(ops: Operator[]) {\r\n this.profiler.event('session', 'ExecutionPlan.initialize', () => {\r\n const graphNodes = this.graph.getNodes();\r\n if (graphNodes.length !== ops.length) {\r\n throw new Error('The size of nodes and OPs do not match.');\r\n }\r\n\r\n this._ops = ops.map((op, i) => new KernelOp(op, graphNodes[i]));\r\n this.reset();\r\n\r\n // look for starter node(s)\r\n this._starter = [];\r\n this._ops.forEach((op, i) => {\r\n let resolved = true;\r\n for (const input of op.node.inputs) {\r\n if (\r\n !this._values[input] // not an initialized input\r\n && this.graph.getInputIndices().indexOf(input) === -1 // not model input\r\n) {\r\n resolved = false;\r\n break;\r\n }\r\n }\r\n if (resolved) {\r\n this._starter.push(i);\r\n }\r\n });\r\n });\r\n }\r\n\r\n reset() {\r\n this._values = this.graph.getValues().map(i => i.tensor);\r\n }\r\n\r\n async execute(sessionHandler: SessionHandler, modelInputs: Tensor[]): Promise<Tensor[]> {\r\n return this.profiler.event('session', 'ExecutionPlan.execute', async () => {\r\n // reset mediem result\r\n this.reset();\r\n\r\n // create inference handler\r\n const inferenceHandler = sessionHandler.createInferenceHandler();\r\n\r\n // populate inputs value\r\n const graphInputs = this.graph.getInputIndices();\r\n if (modelInputs.length !== graphInputs.length) {\r\n throw new Error(`number of input tensors don't match the number of inputs to the model: actual: ${\r\n modelInputs.length} expected: ${graphInputs.length}`);\r\n }\r\n\r\n modelInputs.forEach((input, i) => {\r\n const index = graphInputs[i];\r\n this._values[index] = input;\r\n });\r\n\r\n // prepare running sequence\r\n const sequence: number[] = this._starter.slice(0);\r\n\r\n // execution iterations\r\n const graphValues = this.graph.getValues();\r\n const graphNodes = this.graph.getNodes();\r\n\r\n let rear = 0;\r\n while (rear < sequence.length) {\r\n const thisOpIndex = sequence[rear++];\r\n const thisOp = this._ops[thisOpIndex];\r\n\r\n // check input\r\n const inputList = thisOp.node.inputs.map(i => this._values[i]);\r\n if (inputList.indexOf(undefined) !== -1) {\r\n throw new Error(`unresolved input detected: op: ${thisOp.node}`);\r\n }\r\n\r\n // run\r\n const inputTensors = inputList as Tensor[];\r\n Logger.verbose(\r\n 'ExecPlan',\r\n `Runing op:${thisOp.node.name} (${\r\n inputTensors.map((t, i) => `'${thisOp.node.inputs[i]}': ${t.type}[${t.dims.join(',')}]`).join(', ')})`);\r\n\r\n const outputList = await this.profiler.event(\r\n 'node', thisOp.node.name, async () => thisOp.op.impl(inferenceHandler, inputTensors, thisOp.op.context));\r\n\r\n // check output\r\n if (outputList.length !== thisOp.node.outputs.length) {\r\n throw new Error('the size of output does not match model definition.');\r\n }\r\n\r\n // fill value\r\n outputList.forEach((output, i) => {\r\n const j = thisOp.node.outputs[i];\r\n if (this._values[j]) {\r\n throw new Error(`output [${j}] already has value: op:${thisOp.node.name}`);\r\n }\r\n this._values[j] = output;\r\n });\r\n\r\n // resolve downstream nodes\r\n const downstreamNodes = new Set<number>();\r\n outputList.forEach((output, i) => {\r\n const j = thisOp.node.outputs[i];\r\n for (const currentDownstreamNodeIndex of graphValues[j].to) {\r\n const currentDownstreamNode = graphNodes[currentDownstreamNodeIndex];\r\n let resolved = true;\r\n for (const k of currentDownstreamNode.inputs) {\r\n if (!this._values[k]) {\r\n resolved = false;\r\n break;\r\n }\r\n }\r\n if (resolved) {\r\n downstreamNodes.add(currentDownstreamNodeIndex);\r\n }\r\n }\r\n });\r\n sequence.push(...downstreamNodes);\r\n }\r\n\r\n const output: Tensor[] = [];\r\n for (let i = 0; i <

this.graph.getOutputIndices().length; i++) {\r\n   const outputIndex = this.graph.getOutputIndices()[i];\r\n   const outputTensor = this._values[outputIndex];\r\n   if (outputTensor === undefined) {\r\n   throw new Error(`required output [${outputIndex}] does not have value`);\r\n   }\r\n   if (outputIndex === 0) {\r\n   await outputTensor.getData();\r\n   } else {\r\n   // eslint-disable-next-line no-unused-expressions\r\n   outputTensor.data;\r\n   }\r\n   output.push(outputTensor);\r\n   }\r\n   Logger.verbose('ExecPlan', 'disposing of inferenceHandler');\r\n   inferenceHandler.dispose();\r\n   return output;\r\n   });\r\n }\r\n\r\n _values: Array<Tensor|undefined>;\r\n _ops: KernelOp[];\r\n _starter: number[];\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {onnx} from 'onnx-proto';\r\n\r\nimport {Attribute} from './attribute';\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\nimport {Tensor} from './tensor';\r\nimport {LongUtil, ProtoUtil} from './util';\r\n\r\nexport declare namespace Graph {\r\n export interface Shape {\r\n   readonly dims: readonly number[];\r\n }\r\n export interface ValueType {\r\n   readonly tensorType: Tensor.DataType;\r\n   readonly shape: Shape;\r\n }\r\n export interface Value {\r\n   // the tensor data. empty for non-initialized inputs\r\n   readonly tensor?: Tensor;\r\n\r\n   // index to the Node where the value comes from. -1 for initializer.\r\n   readonly from: number;\r\n\r\n   // indices to the Nodes where the values go to.\r\n   readonly to: readonly number[];\r\n\r\n   // value type specification. empty for non-input values.\r\n   readonly type?: ValueType;\r\n }\r\n export interface Node {\r\n   // name of the node\r\n   readonly name: string;\r\n\r\n   // the operator type\r\n   readonly opType: string;\r\n\r\n   // indices to the Values where the inputs come from.\r\n   readonly inputs: readonly number[];\r\n\r\n   // indices to the Values where the outpus go to.\r\n   readonly outputs: readonly number[];\r\n\r\n   // the attributes that used by the operator\r\n   readonly attributes: Attribute;\r\n }\r\n\r\n /**\r\n   * a Transformer is an instance that allows all possible transformation operations that applied to a graph\r\n   */\r\n export interface Transformer {\r\n   removeAllIdentityNodes(): void;\r\n   removeAllDropoutNodes(): void;\r\n   fuseConvActivationNodes(): void;\r\n   // TODO: add generic functions to manipulate the graph\r\n }\r\n\r\n // an initializer can use transformer to transform the graph\r\n export interface Initializer {\r\n   transformGraph(transformer: Transformer): void;\r\n }\r\n}\r\n\r\n// eslint-disable-next-line @typescript-eslint/no-redeclare\r\nexport interface Graph {\r\n getInputIndices(): readonly number[];\r\n getInputNames(): readonly string[];\r\n getOutputIndices(): readonly number[];\r\n getOutputNames(): readonly string[];\r\n getValues(): readonly Graph.Value[];\r\n getNodes(): readonly Graph.Node[];\r\n}\r\n\r\n// eslint-disable-next-line @typescript-eslint/naming-convention, @typescript-eslint/no-redeclare\r\nexport const Graph = {\r\n /**\r\n   * construct a graph from a graph protobuf type\r\n   */\r\n from: (graphProto: onnx.IGraphProto|ortFbs.Graph, initializer?: Graph.Initializer) =>\r\n   new GraphImpl(graphProto, initializer),\r\n};\r\n\r\nclass Value implements Graph.Value {\r\n constructor(valueInfo?: onnx.IValueInfoProto) {\r\n   this._from = undefined;\r\n   this._to = [];\r\n   this.tensor = undefined;\r\n   this.type = undefined;\r\n\r\n   if (valueInfo) {\r\n   this.type = ProtoUtil.tensorValueTypeFromProto(valueInfo.type!.tensorType!);\r\n   }\r\n }\r\n\r\n _from?: number; // -1 represent from initializer\r\n get from() {\r\n   return this._from!;\r\n }\r\n _to: number[];\r\n get to() {\r\n   return this._to;\r\n }\r\n type?: Graph.ValueType;\r\n tensor?: Tensor;\r\n}\r\n\r\nclass Node implements Graph.Node {\r\n constructor(_nodeProto: onnx.INodeProto|ortFbs.Node, name?: string) {\r\n   if (_nodeProto instanceof onnx.NodeProto) {\r\n   this.name = _nodeProto.name;\r\n   this.opType = _nodeProto.opType;\r\n   this.attributes = new Attribute(_nodeProto.attribute);\r\n   } else if (_nodeProto instanceof ortFbs.Node) {\r\n   this.name = name ?? _nodeProto.name()!;\r\n   this.opType = _nodeProto.opType()!;\r\n   this.attributes = new Attribute(ProtoUtil.tensorAttributesFromORTFormat(_nodeProto));\r\n   }\r\n\r\n   this.inputs = [];\r\n   this.outputs = [];\r\n   this.executeNode = true;\r\n }\r\n\r\n name: string;\r\n opType: string;\r\n inputs: number[];\r\n outputs: number[];\r\n attributes: Attribute;\r\n executeNode: boolean;\r\n}\r\n\r\nclass GraphImpl implements Graph, Graph.Transformer {\r\n private _allData: Value[];\r\n\r\n private _allInputIndices: number[];\r\n private _allInputNames: string[];\r\n\r\n private _allOutputIndices: number[];\r\n private _allOutputNames: string[];\r\n\r\n private _nodes: Node[];\r\n\r\n constructor(graph: onnx.IGraphProto|ortFbs.Graph, graphInitializer?: Graph.Initializer) {\r\n   if (!graph) {\r\n   throw new

TypeError('graph is empty');\r\n   }\r\n\r\n   // build the graph - will throw exceptions if something fatal is detected\r\n   this.buildGraph(graph);\r\n\r\n   // execute any transformation logic for the graph (if applicable)\r\n   this.transformGraph(graphInitializer);\r\n\r\n   // check for cycles and other inconsistencies - will throw exceptions if something fatal is detected\r\n   this.checkIsAcyclic();\r\n }\r\n\r\n getInputIndices(): readonly number[] {\r\n   return this._allInputIndices;\r\n }\r\n\r\n getInputNames(): readonly string[] {\r\n   return this._allInputNames;\r\n }\r\n\r\n getOutputIndices(): readonly number[] {\r\n   return this._allOutputIndices;\r\n }\r\n\r\n getOutputNames(): readonly string[] {\r\n   return this._allOutputNames;\r\n }\r\n\r\n getValues(): readonly Graph.Value[] {\r\n   return this._allData;\r\n }\r\n\r\n getNodes(): readonly Graph.Node[] {\r\n   return this._nodes;\r\n }\r\n\r\n private buildGraph(graph: onnx.IGraphProto|ortFbs.Graph) {\r\n   // build the graph - will throw exceptions if something fatal is detected\r\n   if (graph instanceof onnx.GraphProto) {\r\n   this.buildGraphFromOnnxFormat(graph);\r\n   } else if (graph instanceof ortFbs.Graph) {\r\n   this.buildGraphFromOrtFormat(graph);\r\n   } else {\r\n   throw new TypeError('Graph type is not supported.');\r\n   }\r\n }\r\n private buildGraphFromOnnxFormat(graph: onnx.IGraphProto) {\r\n   const dataIndices = new Map<string, number>();\r\n   this._allData = [];\r\n\r\n   this._allInputIndices = [];\r\n   this._allInputNames = [];\r\n\r\n   this._allOutputIndices = [];\r\n   this._allOutputNames = [];\r\n\r\n   this._nodes = [];\r\n\r\n   const nodesIndices = new Map<string, number>();\r\n\r\n   // scan all inputs\r\n   if (!graph.input) {\r\n   throw new Error('missing information in graph: input');\r\n   }\r\n   const inputValueNames = [];\r\n   for (const i of graph.input) {\r\n   if (dataIndices.has(i.name!)) {\r\n   throw new Error(`duplicated input name: ${i.name}`);\r\n   }\r\n   const currentIndex = this._allData.push(new Value(i)) - 1;\r\n   dataIndices.set(i.name!, currentIndex);\r\n   inputValueNames.push(i.name!);\r\n   }\r\n\r\n   // scan all initializers\r\n   if (!graph.initializer) {\r\n   throw new Error('missing information in graph: initializer');\r\n   }\r\n   for (const i of graph.initializer) {\r\n   let index = dataIndices.get(i.name!);\r\n   if (index === undefined) {\r\n   const value = new Value();\r\n   value.type = {\r\n   shape: {dims: ProtoUtil.tensorDimsFromProto(i.dims!)},\r\n   tensorType: ProtoUtil.tensorDataTypeFromProto(i.dataType!)\r\n   };\r\n   index = this._allData.push(value) - 1;\r\n   dataIndices.set(i.name!, index);\r\n   }\r\n   this._allData[index]._from = -1;\r\n   this._allData[index].tensor = Tensor.fromProto(i);\r\n   }\r\n\r\n   // filter out input indices\r\n   for (let i = 0; i < this._allData.length; i++) {\r\n   if (!this._allData[i].tensor) {\r\n   this._allInputIndices.push(i);\r\n   this._allInputNames.push(inputValueNames[i]);\r\n   }\r\n   }\r\n\r\n   // scan all outputs\r\n   if (!graph.output) {\r\n   throw new Error('missing information in graph: output');\r\n   }\r\n   for (const i of graph.output) {\r\n   if (dataIndices.has(i.name!)) {\r\n   throw new Error(`duplicated output name: ${i.name}`);\r\n   }\r\n   const currentIndex = this._allData.push(new Value(i)) - 1;\r\n   dataIndices.set(i.name!, currentIndex);\r\n   this._allOutputIndices.push(currentIndex);\r\n   this._allOutputNames.push(i.name!);\r\n   }\r\n\r\n   // scan all nodes\r\n   if (!graph.node) {\r\n   throw new Error('missing information in graph: node');\r\n   }\r\n   for (const nodeProto of graph.node) {\r\n   if (!nodeProto.name) {\r\n   // assign a name to the node if it doesn't have one\r\n   for (let pick = 0;; pick++) {\r\n   const name = `unnamed_${nodeProto.opType}_${pick}`;\r\n   if (!nodesIndices.has(name)) {\r\n   nodeProto.name = name;\r\n   break;\r\n   }\r\n   }\r\n   }\r\n\r\n   if (nodesIndices.has(nodeProto.name)) {\r\n   throw new Error(`duplicated node name: ${nodeProto.name}`);\r\n   }\r\n   const currentIndex = this._nodes.push(new Node(nodeProto)) - 1;\r\n   nodesIndices.set(nodeProto.name, currentIndex);\r\n   }\r\n\r\n   // scan node's outputs\r\n   for (let i = 0; i < this._nodes.length; i++) {\r\n   const node = this._nodes[i];\r\n   const nodeProto = graph.node[i];\r\n   if (!nodeProto.output) {\r\n   throw new Error(`missing output for node: ${nodeProto.name}`);\r\n   }\r\n   for (const output of nodeProto.output) {\r\n   let dataIndex = dataIndices.get(output);\r\n   if (typeof dataIndex === 'undefined') {\r\n   dataIndex = this._allData.push(new Value()) - 1;\r\n   dataIndices.set(output, dataIndex);\r\n   }\r\n   node.outputs.push(dataIndex);\r\n\r\n   if (this._allData[dataIndex]._from !== undefined) {\r\n   throw new Error(`multiple nodes output to one data value: ${dataIndex}`);\r\n   }\r\n   this._allData[dataIndex]._from = i;\r\n\r\n   // for the 'Constant' operator, just create a new edge in the graph corresponding to the 'output' of the\r\n   // operator and ignore the node from the graph\r\n   if (nodeProto.opType === 'Constant') {\r\n if (!nodeProto.attribute || nodeProto.attribute.length !== 1 || !nodeProto.attribute[0].t) {\r\n throw new Error('missing attributes or missing tensor value in attributes for this Constant operator');\r\n }\r\n if (!nodeProto.output || nodeProto.output.length !== 1) {\r\n throw new Error('missing output or incorrect number of outputs for this Constant operator');\r\n }\r\n node.outputs.pop();\r\n node.executeNode = false;\r\n\r\n this._allData[dataIndex]._from = -1;\r\n this._allData[dataIndex].tensor = Tensor.fromProto(nodeProto.attribute[0].t);\r\n }\r\n }\r\n }\r\n\r\n // scan node's inputs\r\n for (let i = 0; i < this._nodes.length; i++) {\r\n const node = this._nodes[i];\r\n const nodeProto = graph.node[i];\r\n\r\n if (!nodeProto.input) {\r\n throw new Error(`missing input for node: ${nodeProto.name}`);\r\n }\r\n for (const input of nodeProto.input) {\r\n const dataIndex = dataIndices.get(input);\r\n if (typeof dataIndex === 'undefined') {\r\n throw new Error(`unrecognized input '${input}' for node: ${nodeProto.name}`);\r\n }\r\n node.inputs.push(dataIndex);\r\n\r\n this._allData[dataIndex]._to.push(i);\r\n }\r\n }\r\n\r\n return true;\r\n }\r\n\r\n private buildGraphFromOrtFormat(graph: ortFbs.Graph) {\r\n const dataIndices = new Map<string, number>();\r\n this._allData = [];\r\n\r\n this._allInputIndices = [];\r\n this._allInputNames = [];\r\n\r\n this._allOutputIndices = [];\r\n this._allOutputNames = [];\r\n\r\n this._nodes = [];\r\n\r\n const nodesIndices = new Map<string, number>();\r\n\r\n // scan all inputs\r\n const inputValueNames = [];\r\n for (let i = 0; i < graph.inputsLength(); i++) {\r\n const inputName = graph.inputs(i);\r\n if (dataIndices.has(inputName)) {\r\n throw new Error(`duplicated input name: ${inputName}`);\r\n }\r\n // Find the input typeInfo from nodeargs\r\n for (let j = 0; j < graph.nodeArgsLength(); j++) {\r\n if (graph.nodeArgs(j)?.name() === inputName) {\r\n const value = new Value();\r\n const valueType = graph.nodeArgs(j)?.type()?.valueType();\r\n if (valueType !== ortFbs.TypeInfoValue.tensor_type) {\r\n throw new Error('Unexpected value type for the nodeArg.');\r\n }\r\n const valueInfo = graph.nodeArgs(j)!.type()!.value(new ortFbs.TensorTypeAndShape())!;\r\n const type = ProtoUtil.tensorDataTypeFromProto(valueInfo.elemType());\r\n const shape = valueInfo.shape()!;\r\n const dims = [];\r\n for (let k = 0; k < shape.dimLength()!; k++) {\r\n dims.push(LongUtil.longToNumber(shape.dim(k)!.value()!.dimValue()!));\r\n }\r\n value.type = {shape: {dims}, tensorType: type};\r\n const currentIndex = this._allData.push(value) - 1;\r\n dataIndices.set(inputName, currentIndex);\r\n inputValueNames.push(inputName);\r\n }\r\n }\r\n }\r\n // check initializers\r\n for (let i = 0; i < graph.initializersLength(); i++) {\r\n const initializer = graph.initializers(i)!;\r\n let index = dataIndices.get(initializer.name()!);\r\n if (index === undefined) {\r\n const value = new Value();\r\n const dims = ProtoUtil.tensorDimsFromORTFormat(initializer);\r\n const type = ProtoUtil.tensorDataTypeFromProto(initializer.dataType());\r\n value.type = {shape: {dims}, tensorType: type};\r\n index = this._allData.push(value) - 1;\r\n dataIndices.set(initializer.name()!, index);\r\n }\r\n this._allData[index]._from = -1;\r\n this._allData[index].tensor = Tensor.fromOrtTensor(initializer);\r\n }\r\n\r\n // filter out input indices\r\n for (let i = 0; i < this._allData.length; i++) {\r\n if (!this._allData[i].tensor) {\r\n this._allInputIndices.push(i);\r\n this._allInputNames.push(inputValueNames[i]);\r\n }\r\n }\r\n\r\n // scan all outputs\r\n for (let i = 0; i < graph.outputsLength(); i++) {\r\n const outputName = graph.outputs(i);\r\n if (dataIndices.has(outputName)) {\r\n throw new Error(`duplicated output name: ${outputName}`);\r\n }\r\n const currentIndex = this._allData.push(new Value()) - 1;\r\n dataIndices.set(outputName, currentIndex);\r\n this._allOutputIndices.push(currentIndex);\r\n this._allOutputNames.push(outputName);\r\n }\r\n\r\n // scan all nodes\r\n if (!graph.nodes) {\r\n throw new Error('missing information in graph: node');\r\n }\r\n for (let i = 0; i < graph.nodesLength(); i++) {\r\n const nodeProto = graph.nodes(i);\r\n let name = nodeProto!.name();\r\n if (!name) {\r\n // assign a name to the node if it doesn't have one\r\n for (let pick = 0;; pick++) {\r\n name = `unnamed_${nodeProto!.opType()}_${pick}`;\r\n if (!nodesIndices.has(name)) {\r\n // an unique name is found. break.\r\n break;\r\n }\r\n }\r\n }\r\n\r\n if (nodesIndices.has(name)) {\r\n throw new Error(`duplicated node name: ${name}`);\r\n }\r\n const currentIndex = this._nodes.push(new Node(nodeProto!, name)) - 1;\r\n nodesIndices.set(name, currentIndex);\r\n }\r\n\r\n // scan node's outputs\r\n for (let i = 0; i < this._nodes.length; i++) {\r\n const node = this._nodes[i];\r\n const nodeProto = graph.nodes(i);\r\n if (nodeProto == null) {\r\n throw new Error(`No node exists at index ${i}`);\r\n }\r\n if (nodeProto?.outputsLength() === 0) {\r\n throw new Error(`missing output for node: ${nodeProto.name}`);\r\n }\r\n for (let j = 0; j < nodeProto?.outputsLength(); j++) {\r\n const output = nodeProto?.outputs(j);\r\n let dataIndex = dataIndices.get(output);\r\n if (typeof dataIndex === 'undefined') {\r\n dataIndex = this._allData.push(new Value()) - 1;\r\n dataIndices.set(output, dataIndex);\r\n }\r\n node.outputs.push(dataIndex);\r\n\r\n if (this._allData[dataIndex]._from !== undefined) {\r\n throw new Error(`multiple nodes output to one data value: ${dataIndex}`);\r\n }\r\n this._allData[dataIndex]._from = i;\r\n\r\n // for the 'Constant' operator, just create a new edge in the graph corresponding to the 'output' of the\r\n // operator and ignore the node from the graph\r\n if (nodeProto.opType() === 'Constant') {\r\n if (nodeProto.attributesLength() !== 1 || !nodeProto.attributes(0)!.t()) {\r\n throw new Error('missing attributes or missing tensor value in attributes for this Constant operator');\r\n }\r\n if (nodeProto.outputsLength() !== 1) {\r\n throw new Error('missing output or incorrect number of outputs for this Constant operator');\r\n }\r\n node.outputs.pop();\r\n node.executeNode = false;\r\n\r\n this._allData[dataIndex]._from = -1;\r\n this._allData[dataIndex].tensor = Tensor.fromOrtTensor(nodeProto.attributes(0)!.t()!);\r\n }\r\n }\r\n }\r\n\r\n // scan node's inputs\r\n for (let i = 0; i < this._nodes.length; i++) {\r\n const node = this._nodes[i];\r\n const nodeProto = graph.nodes(i)!;\r\n\r\n if (nodeProto.inputsLength() === 0) {\r\n throw new Error(`missing input for node: ${nodeProto.name}`);\r\n }\r\n for (let j = 0; j < nodeProto.inputsLength()!; j++) {\r\n const input = nodeProto.inputs(j)!;\r\n const dataIndex = dataIndices.get(input);\r\n if (typeof dataIndex === 'undefined') {\r\n throw new Error(`unrecognized input '${input}' for node: ${nodeProto!.name()}`);\r\n }\r\n node.inputs.push(dataIndex);\r\n\r\n this._allData[dataIndex]._to.push(i);\r\n }\r\n }\r\n }\r\n\r\n private checkIsAcyclic() {\r\n // go through the graph and check for cycles or other fatal inconsistencies\r\n const starters: Set<number> = new Set<number>();\r\n this._allInputIndices.forEach(i => {\r\n const data = this._allData[i];\r\n data._to.forEach(j => {\r\n starters.add(j);\r\n });\r\n });\r\n\r\n // Iterative DFS to check for cycles\r\n const nodesStack = Array.from(starters);\r\n const nodesState = new Array<string>(this._nodes.length).fill('white');\r\n\r\n while (nodesStack.length > 0) {\r\n const nodeIndex = nodesStack.pop()!;\r\n // this node has now been processed completely. Mark this node 'black' to denote this.\r\n if (nodesState[nodeIndex] === 'gray') {\r\n nodesState[nodeIndex] = 'black';\r\n } else {\r\n // this node is under processing stage. mark this node 'gray' to denote this.\r\n nodesStack.push(nodeIndex);\r\n nodesState[nodeIndex] = 'gray';\r\n\r\n this._nodes[nodeIndex].outputs.forEach((outgoingEdgeIndex) => {\r\n const data = this._allData[outgoingEdgeIndex];\r\n if (typeof data.tensor !== 'undefined') {\r\n throw new Error('node outputs should not be initialized');\r\n }\r\n if (data._from !== nodeIndex) {\r\n throw new Error('from property of the Value object doesn\\'t match index of Node being processed');\r\n }\r\n data._to.forEach((downstreamNodeIndex) => {\r\n // back edge found - cyclic\r\n if (nodesState[downstreamNodeIndex] === 'gray') {\r\n throw new Error('model graph is cyclic');\r\n }\r\n // tree edge found - continue processing by adding it to stack\r\n else if (nodesState[downstreamNodeIndex] === 'white') {\r\n nodesStack.push(downstreamNodeIndex);\r\n }\r\n });\r\n });\r\n }\r\n }\r\n }\r\n\r\n private transformGraph(graphInitializer?: Graph.Initializer): void {\r\n // apply common transform\r\n this.removeAllIdentityNodes();\r\n this.removeAllDropoutNodes();\r\n this.fuseConvActivationNodes();\r\n // apply initializer specific transform\r\n if (graphInitializer) {\r\n graphInitializer.transformGraph(this);\r\n }\r\n\r\n // finalize graph\r\n this.finalizeGraph();\r\n }\r\n\r\n /**\r\n * finalize the graph.\r\n *\r\n * this function should be called after all the transformation completed.\r\n * this function removes all unnecessary nodes and values from the graph\r\n */\r\n finalizeGraph() {\r\n let offset = 0;\r\n // delete all nodes that are not being executed\r\n for (let i = 0; i < this._nodes.length; i++) {\r\n if (!this._nodes[i].executeNode) {\r\n // delete this node and shift all subsequent nodes up\r\n offset++;\r\n // delete all output values\r\n this._nodes[i].outputs.forEach(ind => {\r\n this._allData[ind]._from = -2;\r\n });\r\n this._nodes.splice(i, 1);\r\n i--;\r\n continue;\r\n }\r\n if (offset > 0) {\r\n // update the value table\r\n this._nodes[i].inputs.forEach(value => {\r\n const ind = this._allData[value]._to.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._allData[value]._to[ind] = i;\r\n }\r\n });\r\n this._nodes[i].outputs.forEach(value => {\r\n if (this._allData[value]._from && this._allData[value]._from! === i + offset) {\r\n this._allData[value]._from! = i;\r\n }\r\n });\r\n }\r\n }\r\n offset = 0;\r\n // delete all values that are not being referenced\r\n for (let i = 0; i < this._allData.length; i++) {\r\n // if current value is neither linked to next node, nor an output value, remove it.\r\n if (this._allData[i].from === -2 && this._allOutputIndices.indexOf(i + offset) === -1) {\r\n offset++;\r\n this._allData.splice(i, 1);\r\n i--;\r\n continue;\r\n }\r\n if (offset > 0) {\r\n let ind = -1;\r\n // if current value is neither an input value nor an initializer, find the node it's\r\n // coming from and update the corresponding node output\r\n if (this._allData[i].from !== undefined && this._allData[i].from !== -1) {\r\n ind = this._nodes[this._allData[i].from].outputs.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._nodes[this._allData[i].from].outputs[ind] = i;\r\n }\r\n } else {\r\n // if current value is an input value, update its reference in inputIndices\r\n ind = this._allInputIndices.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._allInputIndices[ind] = i;\r\n }\r\n }\r\n\r\n // find the node that the current value is linking to and update its input reference\r\n this._allData[i].to.forEach(node => {\r\n ind = this._nodes[node].inputs.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._nodes[node].inputs[ind] = i;\r\n }\r\n });\r\n if (this._allData[i].to.length === 0) {\r\n // if current value is a graph output, update its reference in outputIndices\r\n ind = this._allOutputIndices.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._allOutputIndices[ind] = i;\r\n }\r\n }\r\n }\r\n }\r\n }\r\n\r\n /**\r\n * Delete the specifed node. Assume the node has only one input and the first output connected to other nodes\r\n * @param nodeIndex The index of node to be deleted\r\n */\r\n private deleteNode(nodeIndex: number) {\r\n const node = this._nodes[nodeIndex];\r\n if (node.inputs.length > 1) {\r\n throw new Error('Node deletion with multiple inputs is not supported. ');\r\n }\r\n if (node.outputs.length > 1) {\r\n for (let i = 1; i < node.outputs.length; i++) {\r\n if (this._allData[node.outputs[i]].to.length > 0) {\r\n throw new Error('Node deletion with more than one output connected to other nodes is not supported. ');\r\n }\r\n }\r\n }\r\n\r\n // this node wil not be executed\r\n node.executeNode = false;\r\n const inputValueIndex = node.inputs[0];\r\n const outputValueIndex = node.outputs[0];\r\n const nodesConsumingOutput = this._allData[outputValueIndex].to;\r\n\r\n // remove this node from the to property of the input Value\r\n const delIndex = this._allData[inputValueIndex].to.indexOf(nodeIndex);\r\n // should not happen\r\n if (delIndex === -1) {\r\n throw new Error('The Value object doesn\\'t have the current Node in it\\'s \\'to\\' property ');\r\n }\r\n this._allData[inputValueIndex].to.splice(delIndex, 1);\r\n\r\n // clear node indices consuming this output Value\r\n this._allData[outputValueIndex]._to = [];\r\n\r\n // if the output of this node is a graph output, adjust the index appropriately\r\n const index = this._allOutputIndices.indexOf(outputValueIndex);\r\n if (index !== -1) {\r\n this._allOutputIndices[index] = inputValueIndex;\r\n }\r\n\r\n // override the inputs for nodes consuming this node's output with the input to this node\r\n if (nodesConsumingOutput && nodesConsumingOutput.length > 0) {\r\n for (const nodeIndex of nodesConsumingOutput) {\r\n const replaceIndex = this._nodes[nodeIndex].inputs.indexOf(outputValueIndex);\r\n // should not happen\r\n if (replaceIndex === -1) {\r\n throw new Error('The Node object doesn\\'t have the output Value in it\\'s \\'inputs\\' property ');\r\n }\r\n this._nodes[nodeIndex].inputs[replaceIndex] = inputValueIndex;\r\n this._allData[inputValueIndex].to.push(nodeIndex);\r\n }\r\n }\r\n }\r\n\r\n removeAllDropoutNodes() {\r\n let nodeIndex = 0;\r\n for (const node of this._nodes) {\r\n // weed out 'Dropout' nodes so that no time is wasted in execution\r\n if (node.opType === 'Dropout') {\r\n // the node should have exactly 1 input and 1 or 2 outputs\r\n if (node.inputs.length !== 1) {\r\n throw new Error('Dropout nodes should only contain one input. ');\r\n }\r\n if (node.outputs.length !== 1 && node.outputs.length !== 2) {\r\n throw new Error('Dropout nodes should contain either 1 or 2 output(s)');\r\n }\r\n // the second output should not be referenced by any other node\r\n if (node.outputs.length === 2 && this._allData[node.outputs[1]]._to.length

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!== 0) {\r\n          throw new Error('Dropout nodes\\'s second output should not be referenced by other nodes');\r\n
  }\r\n        this.deleteNode(nodeIndex);\r\n      }\r\n      nodeIndex++;\r\n    }\r\n  }\r\n\r\n  removeAllIdentityNodes()
{\r\n    let nodeIndex = 0;\r\n    for (const node of this._nodes) {\r\n      // weed out 'Identity' nodes so that no time is
wasted in execution\r\n      if (node.opType === 'Identity') {\r\n        this.deleteNode(nodeIndex);\r\n      }\r\n
nodeIndex++;\r\n    }\r\n  }\r\n\r\n  isActivation(n: Node): boolean {\r\n    switch (n.opType) {\r\n      // TODO: add
other activation methods\r\n      case 'Relu':\r\n      case 'Sigmoid':\r\n      case 'Clip':\r\n        return true;\r\n
default:\r\n        return false;\r\n    }\r\n  }\r\n\r\n  fuseConvActivationNodes() {\r\n    for (const node of this._nodes)
{\r\n      if (node.opType === 'Conv') {\r\n        const next = this._allData[node.outputs[0]]._to;\r\n        if
(next.length === 1 && this.isActivation(this._nodes[next[0]])) {\r\n          const child = this._nodes[next[0]];\r\n
 node.attributes.set('__internal_activation', 'string', (child.opType));\r\n          // TODO: need add support for Clip
after opset 11, which has min/max as inputs\r\n          if (child.opType === 'Clip') {\r\n
node.attributes.set('__clip_min', 'float', child.attributes.getFloat('min'));\r\n            node.attributes.set('__clip_max',
'float', child.attributes.getFloat('max'));\r\n          }\r\n          this.deleteNode(next[0]);\r\n        }\r\n      }\r\n    }\r\n
}\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {Env} from 'onnxruntime-common';\r\n\r\nimport {WebGLContext} from
'./backends/webgl/webgl-context';\r\n\r\nexport declare namespace Logger {\r\n  export interface SeverityTypeMap
{\r\n    verbose: 'v';\r\n    info: 'i';\r\n    warning: 'w';\r\n    error: 'e';\r\n    fatal: 'f';\r\n  }\r\n\r\n  export type Severity
= keyof SeverityTypeMap;\r\n\r\n  export type Provider = 'none'|'console';\r\n\r\n  /**\r\n   * Logging config that
used to control the behavior of logger\r\n   */\r\n  export interface Config {\r\n    /**\r\n     * Specify the logging
provider. 'console' by default\r\n     */\r\n    provider?: Provider;\r\n    /**\r\n     * Specify the minimal logger
serverity. 'warning' by default\r\n     */\r\n    minimalSeverity?: Logger.Severity;\r\n    /**\r\n     * Whether to output
date time in log. true by default\r\n     */\r\n    logDateTime?: boolean;\r\n    /**\r\n     * Whether to output source
information (Not yet supported). false by default\r\n     */\r\n    logSourceLocation?: boolean;\r\n  }\r\n\r\n  export
interface CategorizedLogger {\r\n    verbose(content: string): void;\r\n    info(content: string): void;\r\n
warning(content: string): void;\r\n    error(content: string): void;\r\n    fatal(content: string): void;\r\n  }\r\n}\r\n\r\n//
eslint-disable-next-line @typescript-eslint/no-redeclare\r\nexport interface Logger {\r\n  (category: string):
Logger.CategorizedLogger;\r\n\r\n  verbose(content: string): void;\r\n  verbose(category: string, content: string):
void;\r\n  info(content: string): void;\r\n  info(category: string, content: string): void;\r\n  warning(content: string):
void;\r\n  warning(category: string, content: string): void;\r\n  error(content: string): void;\r\n  error(category: string,
content: string): void;\r\n  fatal(content: string): void;\r\n  fatal(category: string, content: string): void;\r\n\r\n  /**\r\n
 * Reset the logger configuration.\r\n   * @param config specify an optional default config\r\n   */\r\n  reset(config?:
Logger.Config): void;\r\n  /**\r\n   * Set the logger's behavior on the given category\r\n   * @param category specify
a category string. If '*' is specified, all previous configuration will be overwritten. If\r\n   * '' is specified, the default
behavior will be updated.\r\n   * @param config the config object to indicate the logger's behavior\r\n   */\r\n
set(category: string, config: Logger.Config): void;\r\n\r\n  /**\r\n   * Set the logger's behavior from ort-common
env\r\n   * @param env the env used to set logger. Currently only setting loglevel is supported through Env.\r\n
*/\r\n  setWithEnv(env: Env): void;\r\n}\r\n\r\ninterface LoggerProvider {\r\n  log(severity: Logger.Severity,
content: string, category?: string): void;\r\n}\r\nclass NoOpLoggerProvider implements LoggerProvider {\r\n
log(_severity: Logger.Severity, _content: string, _category?: string) {\r\n    // do nothing\r\n  }\r\n}\r\nclass
ConsoleLoggerProvider implements LoggerProvider {\r\n  log(severity: Logger.Severity, content: string, category?:
string) {\r\n    // eslint-disable-next-line no-console\r\n    console.log(`${this.color(severity)} ${category ?
'\\x1b[35m' + category + '\\x1b[0m ' : ''}${content}`);\r\n  }\r\n\r\n  private color(severity: Logger.Severity) {\r\n
switch (severity) {\r\n      case 'verbose':\r\n        return '\\x1b[34;40mv\\x1b[0m';\r\n      case 'info':\r\n        return
'\\x1b[32mi\\x1b[0m';\r\n      case 'warning':\r\n        return '\\x1b[30;43mw\\x1b[0m';\r\n      case 'error':\r\n
return '\\x1b[31;40me\\x1b[0m';\r\n      case 'fatal':\r\n        return '\\x1b[101mf\\x1b[0m';\r\n      default:\r\n
throw new Error(`unsupported severity: ${severity}`);\r\n    }\r\n  }\r\n}\r\n\r\nconst SEVERITY_VALUE = {\r\n
verbose: 1000,\r\n  info: 2000,\r\n  warning: 4000,\r\n  error: 5000,\r\n  fatal: 6000\r\n};\r\n\r\nconst
LOGGER_PROVIDER_MAP: {readonly [provider: string]: Readonly<LoggerProvider>} = {\r\n  ['none']: new
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NoOpLoggerProvider(),\r\n  ['console']: new ConsoleLoggerProvider()\r\n};\r\nconst
LOGGER_DEFAULT_CONFIG = {\r\n  provider: 'console',\r\n  minimalSeverity: 'warning',\r\n  logDateTime:
true,\r\n  logSourceLocation: false\r\n};\r\nlet LOGGER_CONFIG_MAP:\r\n    {[category: string]:
Readonly<Required<Logger.Config>>} = {['']: LOGGER_DEFAULT_CONFIG as
Required<Logger.Config>};\r\n\r\n\r\nfunction log(category: string): Logger.CategorizedLogger;\r\nfunction
log(severity: Logger.Severity, content: string): void;\r\nfunction log(severity: Logger.Severity, category: string,
content: string): void;\r\nfunction log(severity: Logger.Severity, arg1: string, arg2?: string): void;\r\nfunction
log(\r\n    arg0: string|Logger.Severity, arg1?: string, arg2?: string|number, arg3?: number):
Logger.CategorizedLogger|void {\r\n  if (arg1 === undefined) {\r\n    // log(category: string):
Logger.CategorizedLogger;\r\n    return createCategorizedLogger(arg0);\r\n  } else if (arg2 === undefined) {\r\n    //
log(severity, content);\r\n    logInternal(arg0 as Logger.Severity, arg1, 1);\r\n  } else if (typeof arg2 === 'number'
&& arg3 === undefined) {\r\n    // log(severity, content, stack)\r\n    logInternal(arg0 as Logger.Severity, arg1,
arg2);\r\n  } else if (typeof arg2 === 'string' && arg3 === undefined) {\r\n    // log(severity, category, content)\r\n
logInternal(arg0 as Logger.Severity, arg2, 1, arg1);\r\n  } else if (typeof arg2 === 'string' && typeof arg3 ===
'number') {\r\n    // log(severity, category, content, stack)\r\n    logInternal(arg0 as Logger.Severity, arg2, arg3,
arg1);\r\n  } else {\r\n    throw new TypeError('input is valid');\r\n  }\r\n}\r\n\r\nfunction
createCategorizedLogger(category: string): Logger.CategorizedLogger {\r\n  return {\r\n    verbose:
log.verbose.bind(null, category),\r\n    info: log.info.bind(null, category),\r\n    warning: log.warning.bind(null,
category),\r\n    error: log.error.bind(null, category),\r\n    fatal: log.fatal.bind(null, category)\r\n  };\r\n}\r\n\r\n//
NOTE: argument 'category' is put the last parameter beacause typescript\r\n// doesn't allow optional argument put in
front of required argument. This\r\n// order is different from a usual logging API.\r\nfunction logInternal(severity:
Logger.Severity, content: string, stack: number, category?: string) {\r\n  const config =
LOGGER_CONFIG_MAP[category || ''] || LOGGER_CONFIG_MAP[''];\r\n  if (SEVERITY_VALUE[severity] <
SEVERITY_VALUE[config.minimalSeverity]) {\r\n    return;\r\n  }\r\n\r\n  if (config.logDateTime) {\r\n    content
= `${new Date().toISOString()}|${content}`;\r\n  }\r\n\r\n  if (config.logSourceLocation) {\r\n    // TODO: calculate
source location from 'stack'\r\n  }\r\n\r\n  LOGGER_PROVIDER_MAP[config.provider].log(severity, content,
category);\r\n}\r\n\r\n// eslint-disable-next-line @typescript-eslint/no-namespace\r\nnamespace log {\r\n  export
function verbose(content: string): void;\r\n  export function verbose(category: string, content: string): void;\r\n
export function verbose(arg0: string, arg1?: string) {\r\n    log('verbose', arg0, arg1);\r\n  }\r\n  export function
info(content: string): void;\r\n  export function info(category: string, content: string): void;\r\n  export function
info(arg0: string, arg1?: string) {\r\n    log('info', arg0, arg1);\r\n  }\r\n  export function warning(content: string):
void;\r\n  export function warning(category: string, content: string): void;\r\n  export function warning(arg0: string,
arg1?: string) {\r\n    log('warning', arg0, arg1);\r\n  }\r\n  export function error(content: string): void;\r\n  export
function error(category: string, content: string): void;\r\n  export function error(arg0: string, arg1?: string) {\r\n
log('error', arg0, arg1);\r\n  }\r\n  export function fatal(content: string): void;\r\n  export function fatal(category:
string, content: string): void;\r\n  export function fatal(arg0: string, arg1?: string) {\r\n    log('fatal', arg0, arg1);\r\n
}\r\n\r\n  export function reset(config?: Logger.Config): void {\r\n    LOGGER_CONFIG_MAP = {};\r\n    set('',
config || {});\r\n  }\r\n  export function set(category: string, config: Logger.Config): void {\r\n    if (category === '*')
{\r\n      reset(config);\r\n    } else {\r\n      const previousConfig = LOGGER_CONFIG_MAP[category] ||
LOGGER_DEFAULT_CONFIG;\r\n      LOGGER_CONFIG_MAP[category] = {\r\n        provider: config.provider
|| previousConfig.provider,\r\n        minimalSeverity: config.minimalSeverity || previousConfig.minimalSeverity,\r\n
    logDateTime: (config.logDateTime === undefined) ? previousConfig.logDateTime : config.logDateTime,\r\n
logSourceLocation: (config.logSourceLocation === undefined) ? previousConfig.logSourceLocation :\r\n
                                            config.logSourceLocation\r\n      };\r\n    }\r\n\r\n    // TODO: we want to support
wildcard or regex?\r\n  }\r\n\r\n  export function setWithEnv(env: Env): void {\r\n    const config: Logger.Config =
{};\r\n    if (env.logLevel) {\r\n      config.minimalSeverity = env.logLevel as Logger.Severity;\r\n    }\r\n    set('',
config);\r\n  }\r\n}\r\n\r\n// eslint-disable-next-line @typescript-eslint/no-redeclare, @typescript-eslint/naming-
convention\r\nexport const Logger: Logger = log;\r\n\r\nexport declare namespace Profiler {\r\n  export interface
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Config {\r\n   maxNumberEvents?: number;\r\n   flushBatchSize?: number;\r\n   flushIntervalInMilliseconds?: number;\r\n }\r\n\r\n export type EventCategory = 'session'|'node'|'op'|'backend';\r\n\r\n export interface Event {\r\n   end(): void|Promise<void>;\r\n }\r\n}\r\n// TODO\r\n// class WebGLEvent implements Profiler.Event {}\r\n\r\nclass Event implements Profiler.Event {\r\n constructor(\r\n   public category: Profiler.EventCategory, public name: string, public startTime: number,\r\n   private endCallback: (e: Event) => void|Promise<void>, public timer?: WebGLQuery, public ctx?: WebGLContext) {}\r\n\r\n end() {\r\n   return this.endCallback(this);\r\n }\r\n\r\n async checkTimer(): Promise<number> {\r\n   if (this.ctx === undefined || this.timer === undefined) {\r\n   throw new Error('No webgl timer found');\r\n   } else {\r\n   this.ctx.endTimer();\r\n   return this.ctx.waitForQueryAndGetTime(this.timer);\r\n   }\r\n }\r\n}\r\n\r\nclass EventRecord {\r\n constructor(\r\n   public category: Profiler.EventCategory, public name: string, public startTime: number, public endTime: number) {}\r\n}\r\n\r\nexport class Profiler {\r\n static create(config?: Profiler.Config): Profiler {\r\n   if (config === undefined) {\r\n   return new this();\r\n   }\r\n   return new this(config.maxNumberEvents, config.flushBatchSize, config.flushIntervalInMilliseconds);\r\n }\r\n\r\n private constructor(maxNumberEvents?: number, flushBatchSize?: number, flushIntervalInMilliseconds?: number) {\r\n   this._started = false;\r\n   this._maxNumberEvents = maxNumberEvents === undefined ? 10000 : maxNumberEvents;\r\n   this._flushBatchSize = flushBatchSize === undefined ? 10 : flushBatchSize;\r\n   this._flushIntervalInMilliseconds = flushIntervalInMilliseconds === undefined ? 5000 : flushIntervalInMilliseconds;\r\n }\r\n\r\n // start profiling\r\n start() {\r\n   this._started = true;\r\n   this._timingEvents = [];\r\n   this._flushTime = now();\r\n   this._flushPointer = 0;\r\n }\r\n\r\n // stop profiling\r\n stop() {\r\n   this._started = false;\r\n   for (; this._flushPointer < this._timingEvents.length; this._flushPointer++) {\r\n   this.logOneEvent(this._timingEvents[this._flushPointer]);\r\n   }\r\n }\r\n\r\n // create an event scope for the specific function\r\n event<T>(category: Profiler.EventCategory, name: string, func: () => T, ctx?: WebGLContext): T;\r\n event<T>(category: Profiler.EventCategory, name: string, func: () => Promise<T>, ctx?: WebGLContext): Promise<T>;\r\n\r\n event<T>(category: Profiler.EventCategory, name: string, func: () => T | Promise<T>, ctx?: WebGLContext): T\r\n |Promise<T> {\r\n   const event = this._started ? this.begin(category, name, ctx) : undefined;\r\n   let isPromise = false;\r\n\r\n   const res = func();\r\n\r\n   // we consider a then-able object is a promise\r\n   if (res && typeof (res as Promise<T>).then === 'function') {\r\n   isPromise = true;\r\n   return new Promise<T>((resolve, reject) => {\r\n   (res as Promise<T>)\r\n   .then(\r\n   async value => { // fulfilled\r\n   if (event) {\r\n   await event.end();\r\n   }\r\n   resolve(value);\r\n   },\r\n   async reason => { // rejected\r\n   if (event) {\r\n   await event.end();\r\n   }\r\n   reject(reason);\r\n   });\r\n   });\r\n   }\r\n   if (!isPromise && event) {\r\n   const eventRes = event.end();\r\n   if (eventRes && typeof eventRes.then === 'function') {\r\n   return new Promise<T>((resolve, reject) => {\r\n   (eventRes).then(\r\n   () => { // fulfilled\r\n   resolve(res);\r\n   },\r\n   (reason) => { // rejected\r\n   reject(reason);\r\n   });\r\n   });\r\n   }\r\n   }\r\n   return res;\r\n }\r\n\r\n // begin an event\r\n begin(category: Profiler.EventCategory, name: string, ctx?: WebGLContext): Event {\r\n   if (!this._started) {\r\n   throw new Error('profiler is not started yet');\r\n   }\r\n   if (ctx === undefined) {\r\n   const startTime = now();\r\n   this.flush(startTime);\r\n   return new Event(category, name, startTime, e => this.endSync(e));\r\n   } else {\r\n   const timer: WebGLQuery = ctx.beginTimer();\r\n   return new Event(category, name, 0, async e => this.end(e), timer, ctx);\r\n   }\r\n }\r\n\r\n // end the specific event\r\n private async end(event: Event): Promise<void> {\r\n   const endTime: number = await event.checkTimer();\r\n   if (this._timingEvents.length < this._maxNumberEvents) {\r\n   this._timingEvents.push(new EventRecord(event.category, event.name, event.startTime, endTime));\r\n   this.flush(endTime);\r\n   }\r\n }\r\n\r\n private endSync(event: Event): void {\r\n   const endTime: number = now();\r\n   if (this._timingEvents.length < this._maxNumberEvents) {\r\n   this._timingEvents.push(new EventRecord(event.category, event.name, event.startTime, endTime));\r\n   this.flush(endTime);\r\n   }\r\n }\r\n\r\n private logOneEvent(event: EventRecord) {\r\n   Logger.verbose(\r\n   `Profiler.${event.category}`,\r\n   `${(event.endTime - event.startTime).toFixed(2)}ms on event '${event.name}' at ${event.endTime.toFixed(2)}`);\r\n }\r\n\r\n private flush(currentTime: number) {\r\n   if (this._timingEvents.length - this._flushPointer >= this._flushBatchSize ||\r\n   currentTime - this._flushTime >= this._flushIntervalInMilliseconds) {\r\n   // should flush when either batch size accumlated or interval elepsed\r\n\r\n   for (const previousPointer = this._flushPointer; this._flushPointer < previousPointer + this._flushBatchSize &&\r\n   this._flushPointer < this._timingEvents.length;\r\n   this._flushPointer++) {\r\n   this.logOneEvent(this._timingEvents[this._flushPointer]);\r\n   }\r\n\r\n   this._flushTime = now();\r\n   }\r\n }\r\n\r\n get started() {\r\n   return this._started;\r\n }\r\n private _started = false;\r\n private _timingEvents: EventRecord[];\r\n\r\n private readonly _maxNumberEvents: number;\r\n\r\n private readonly _flushBatchSize: number;\r\n private readonly _flushIntervalInMilliseconds: number;\r\n\r\n private _flushTime: number;\r\n private _flushPointer = 0;\r\n}\r\n\r\n/**\r\n * returns a number to represent the current timestamp in a resolution as high as possible.\r\n */\r\nexport const now = (typeof performance !== 'undefined' && performance.now) ? () => performance.now() : Date.now;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {flatbuffers} from 'flatbuffers';\r\nimport {onnx} from 'onnx-proto';\r\n\r\nimport {Graph} from './graph';\r\nimport {OpSet} from './opset';\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\nimport {LongUtil} from './util';\r\n\r\nexport class Model {\r\n // empty model\r\n constructor() {}\r\n\r\n load(buf: Uint8Array, graphInitializer?: Graph.Initializer, isOrtFormat?: boolean): void {\r\n   if (!isOrtFormat) {\r\n   // isOrtFormat === false || isOrtFormat === undefined\r\n   try {\r\n   this.loadFromOnnxFormat(buf, graphInitializer);\r\n   return;\r\n   } catch (e) {\r\n   if (isOrtFormat !== undefined) {\r\n   throw e;\r\n   }\r\n   }\r\n   }\r\n\r\n   this.loadFromOrtFormat(buf, graphInitializer);\r\n }\r\n\r\n private loadFromOnnxFormat(buf: Uint8Array, graphInitializer?: Graph.Initializer): void {\r\n   const modelProto = onnx.ModelProto.decode(buf);\r\n   const irVersion = LongUtil.longToNumber(modelProto.irVersion);\r\n   if (irVersion < 3) {\r\n   throw new Error('only support ONNX model with IR_VERSION>=3');\r\n   }\r\n\r\n   this._opsets =\r\n modelProto.opsetImport.map(i => ({domain: i.domain as string, version: LongUtil.longToNumber(i.version!)}));\r\n\r\n   this._graph = Graph.from(modelProto.graph!, graphInitializer);\r\n }\r\n\r\n private loadFromOrtFormat(buf: Uint8Array, graphInitializer?: Graph.Initializer): void {\r\n   const fb = new flatbuffers.ByteBuffer(buf);\r\n   const ortModel = ortFbs.InferenceSession.getRootAsInferenceSession(fb).model()!;\r\n   const irVersion = LongUtil.longToNumber(ortModel.irVersion());\r\n   if (irVersion < 3) {\r\n   throw new Error('only support ONNX model with IR_VERSION>=3');\r\n   }\r\n   this._opsets = [];\r\n   for (let i = 0; i < ortModel.opsetImportLength(); i++) {\r\n   const opsetId = ortModel.opsetImport(i)!;\r\n this._opsets.push({domain: opsetId?.domain() as string, version: LongUtil.longToNumber(opsetId.version()!)});\r\n   }\r\n\r\n   this._graph = Graph.from(ortModel.graph()!, graphInitializer);\r\n }\r\n\r\n private _graph: Graph;\r\n get graph(): Graph {\r\n   return this._graph;\r\n }\r\n\r\n private _opsets: OpSet[];\r\n get opsets(): readonly OpSet[] {\r\n   return this._opsets;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceHandler} from './backend';\r\nimport {Graph} from './graph';\r\nimport {Tensor} from './tensor';\r\n\r\nexport type OperatorImplementation<T> = (inferenceHandler: InferenceHandler, inputs: Tensor[], context: T) => Tensor[];\r\nexport type OperatorInitialization<T> = (node: Graph.Node, graph: Graph) => T;\r\n\r\nexport interface Operator {\r\n readonly impl: OperatorImplementation<unknown>;\r\n readonly context: Graph.Node|unknown;\r\n}\r\n\r\nexport const NUMBER_TYPES: readonly Tensor.DataType[] =\r\n   ['float32', 'float64', 'int32', 'int16', 'int8', 'uint16', 'uint32', 'uint8'];\r\nexport const INT_TYPES: readonly Tensor.DataType[] = ['int32', 'int16', 'int8', 'uint16', 'uint32', 'uint8'];\r\nexport const FLOAT_TYPES: readonly Tensor.DataType[] = ['float32', 'float64'];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from './graph';\r\nimport {OperatorImplementation, OperatorInitialization} from './operators';\r\n\r\nexport interface OpSet {\r\n domain: string;\r\n version: number;\r\n}\r\n\r\nexport declare namespace OpSet {\r\n /**\r\n   * Domain of an opset, it can be an empty string(default value, represent for ai.onnx), or 'ai.onnx.ml'\r\n   */\r\n type Domain = ''|'ai.onnx.ml';\r\n\r\n /**\r\n   * A resolve rule consists of 4 or 5 items: opType, opSetDomain, versionSelector, operatorImplementation and\r\n   * operatorInitialization (optional)\r\n   */\r\n type ResolveRule =

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[\r\n    string, Domain, string, OperatorImplementation<Graph.Node>\r\n  ]|[string, Domain, string,
OperatorImplementation<unknown>, OperatorInitialization<unknown>];\r\n}\r\n\r\nexport function
resolveOperator(node: Graph.Node, opsets: readonly OpSet[], rules: readonly OpSet.ResolveRule[]) {\r\n  for (const
rule of rules) {\r\n    const opType = rule[0];\r\n    const domain = rule[1];\r\n    const versionSelector = rule[2];\r\n
const opImpl = rule[3];\r\n    const opInit = rule[4];\r\n\r\n    if (node.opType === opType) {  // operator type
matches\r\n      for (const opset of opsets) {\r\n        // opset '' and 'ai.onnx' are considered the same.\r\n        if
(opset.domain === domain || (opset.domain === 'ai.onnx' && domain === '')) {  // opset domain found\r\n          if
(matchSelector(opset.version, versionSelector)) {\r\n            return {opImpl, opInit};\r\n          }\r\n        }\r\n
}\r\n    }\r\n  }\r\n\r\n  throw new TypeError(`cannot resolve operator '${node.opType}' with opsets: ${\r\n
opsets.map(set => `${set.domain || 'ai.onnx'} v${set.version}`).join(', ')}`);\r\n}\r\n\r\nfunction
matchSelector(version: number, selector: string): boolean {\r\n  if (selector.endsWith('+')) {\r\n    // minimum
version match ('7+' expects version>=7)\r\n    const rangeStart = Number.parseInt(selector.substring(0,
selector.length - 1), 10);\r\n    return !isNaN(rangeStart) && rangeStart <= version;\r\n  } else if (selector.split('-
').length === 2) {\r\n    // range match ('6-8' expects 6<=version<=8)\r\n    const pair = selector.split('-');\r\n    const
rangeStart = Number.parseInt(pair[0], 10);\r\n    const rangeEnd = Number.parseInt(pair[1], 10);\r\n    return
!isNaN(rangeStart) && !isNaN(rangeEnd) && rangeStart <= version && version <= rangeEnd;\r\n  } else {\r\n    //
exact match ('7' expects version===7)\r\n    return Number.parseInt(selector, 10) === version;\r\n  }\r\n}\r\n","//
automatically generated by the FlatBuffers compiler, do not modify\r\n/* eslint-disable */\r\n\r\nimport {flatbuffers}
from 'flatbuffers';\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n
export enum AttributeType {\r\n    UNDEFINED = 0,\r\n    FLOAT = 1,\r\n    INT = 2,\r\n    STRING = 3,\r\n
TENSOR = 4,\r\n    GRAPH = 5,\r\n    FLOATS = 6,\r\n    INTS = 7,\r\n    STRINGS = 8,\r\n    TENSORS = 9,\r\n
GRAPHS = 10,\r\n    SPARSE_TENSOR = 11,\r\n    SPARSE_TENSORS = 12\r\n  }\r\n}\r\n\r\n/**\r\n * @enum
{number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export enum DimensionValueType
{UNKNOWN = 0, VALUE = 1, PARAM = 2}\r\n}\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n  export enum TensorDataType {\r\n    UNDEFINED = 0,\r\n    FLOAT = 1,\r\n
UINT8 = 2,\r\n    INT8 = 3,\r\n    UINT16 = 4,\r\n    INT16 = 5,\r\n    INT32 = 6,\r\n    INT64 = 7,\r\n    STRING =
8,\r\n    BOOL = 9,\r\n    FLOAT16 = 10,\r\n    DOUBLE = 11,\r\n    UINT32 = 12,\r\n    UINT64 = 13,\r\n
COMPLEX64 = 14,\r\n    COMPLEX128 = 15,\r\n    BFLOAT16 = 16\r\n  }\r\n}\r\n\r\n/**\r\n * @enum
{number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export enum NodeType {Primitive = 0,
Fused = 1}\r\n}\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n
export enum TypeInfoValue {NONE = 0, tensor_type = 1, sequence_type = 2, map_type = 3}\r\n}\r\n\r\n/**\r\n *
@constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class Shape {\r\n    bb:
flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @returns Shape\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): Shape
{\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param Shape= obj\r\n     * @returns Shape\r\n     */\r\n    static
getRootAsShape(bb: flatbuffers.ByteBuffer, obj?: Shape): Shape {\r\n      return (obj || new
Shape()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param Shape= obj\r\n     * @returns Shape\r\n     */\r\n    static
getSizePrefixedRootAsShape(bb: flatbuffers.ByteBuffer, obj?: Shape): Shape {\r\n      bb.setPosition(bb.position() +
flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new Shape()).__init(bb.readInt32(bb.position()) +
bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.Dimension= obj\r\n     * @returns onnxruntime.experimental.fbs.Dimension\r\n
*/\r\n    dim(index: number, obj?: onnxruntime.experimental.fbs.Dimension):
onnxruntime.experimental.fbs.Dimension|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return
offset ? (obj || new onnxruntime.experimental.fbs.Dimension())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                 null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    dimLength(): number {\r\n      let offset =
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this.bb!.__offset(this.bb_pos, 4);\r\n   return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   */\r\n   static startShape(builder: flatbuffers.Builder) {\r\n   builder.startObject(1);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset dimOffset\r\n   */\r\n   static addDim(builder: flatbuffers.Builder, dimOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(0, dimOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param Array.<flatbuffers.Offset> data\r\n   * @returns flatbuffers.Offset\r\n   */\r\n   static createDimVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n   builder.startVector(4, data.length, 4);\r\n   for (let i = data.length - 1; i >= 0; i--) {\r\n   builder.addOffset(data[i]);\r\n   }\r\n   return builder.endVector();\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param number numElems\r\n   */\r\n   static startDimVector(builder: flatbuffers.Builder, numElems: number) {\r\n   builder.startVector(4, numElems, 4);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @returns flatbuffers.Offset\r\n   */\r\n   static endShape(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n   let offset = builder.endObject();\r\n   return offset;\r\n   }\r\n\r\n   static createShape(builder: flatbuffers.Builder, dimOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n   Shape.startShape(builder);\r\n   Shape.addDim(builder, dimOffset);\r\n   return Shape.endShape(builder);\r\n   }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class Dimension {\r\n   bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n   bb_pos = 0;\r\n   /**\r\n   * @param number i\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @returns Dimension\r\n   */\r\n   __init(i: number, bb: flatbuffers.ByteBuffer): Dimension {\r\n   this.bb_pos = i;\r\n   this.bb = bb;\r\n   return this;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param Dimension= obj\r\n   * @returns Dimension\r\n   */\r\n   static getRootAsDimension(bb: flatbuffers.ByteBuffer, obj?: Dimension): Dimension {\r\n   return (obj || new Dimension()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param Dimension= obj\r\n   * @returns Dimension\r\n   */\r\n   static getSizePrefixedRootAsDimension(bb: flatbuffers.ByteBuffer, obj?: Dimension): Dimension {\r\n   bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n   return (obj || new Dimension()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n   /**\r\n   * @param onnxruntime.experimental.fbs.DimensionValue= obj\r\n   * @returns onnxruntime.experimental.fbs.DimensionValue|null\r\n   */\r\n   value(obj?: onnxruntime.experimental.fbs.DimensionValue): onnxruntime.experimental.fbs.DimensionValue|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 4);\r\n   return offset ? (obj || new onnxruntime.experimental.fbs.DimensionValue())\r\n   .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n   null;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Encoding= optionalEncoding\r\n   * @returns string|Uint8Array|null\r\n   */\r\n   denotation(): string|null;\r\n   denotation(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n   denotation(optionalEncoding?: any): string|Uint8Array|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 6);\r\n   return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   */\r\n   static startDimension(builder: flatbuffers.Builder) {\r\n   builder.startObject(2);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset valueOffset\r\n   */\r\n   static addValue(builder: flatbuffers.Builder, valueOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(0, valueOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset denotationOffset\r\n   */\r\n   static addDenotation(builder: flatbuffers.Builder, denotationOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(1, denotationOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @returns flatbuffers.Offset\r\n   */\r\n   static endDimension(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n   let offset = builder.endObject();\r\n   return offset;\r\n   }\r\n\r\n   static createDimension(\r\n   builder: flatbuffers.Builder, valueOffset: flatbuffers.Offset,\r\n   denotationOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n   Dimension.startDimension(builder);\r\n   Dimension.addValue(builder, valueOffset);\r\n   Dimension.addDenotation(builder, denotationOffset);\r\n   return Dimension.endDimension(builder);\r\n   }\r\n

}\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class DimensionValue {\r\n   bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n   bb_pos = 0;\r\n   /**\r\n   * @param number i\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @returns DimensionValue\r\n   */\r\n   __init(i: number, bb: flatbuffers.ByteBuffer): DimensionValue {\r\n   this.bb_pos = i;\r\n   this.bb = bb;\r\n   return this;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param DimensionValue= obj\r\n   * @returns DimensionValue\r\n   */\r\n   static getRootAsDimensionValue(bb: flatbuffers.ByteBuffer, obj?: DimensionValue): DimensionValue {\r\n   return (obj || new DimensionValue()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param DimensionValue= obj\r\n   * @returns DimensionValue\r\n   */\r\n   static getSizePrefixedRootAsDimensionValue(bb: flatbuffers.ByteBuffer, obj?: DimensionValue): DimensionValue {\r\n   bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n   return (obj || new DimensionValue()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n   /**\r\n   * @returns onnxruntime.experimental.fbs.DimensionValueType\r\n   */\r\n   dimType(): onnxruntime.experimental.fbs.DimensionValueType {\r\n   let offset = this.bb!.__offset(this.bb_pos, 4);\r\n   return offset ? /** */ (this.bb!.readInt8(this.bb_pos + offset)) :\r\n   onnxruntime.experimental.fbs.DimensionValueType.UNKNOWN;\r\n   }\r\n\r\n   /**\r\n   * @returns flatbuffers.Long\r\n   */\r\n   dimValue(): flatbuffers.Long {\r\n   let offset = this.bb!.__offset(this.bb_pos, 6);\r\n   return offset ? this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Encoding= optionalEncoding\r\n   * @returns string|Uint8Array|null\r\n   */\r\n   dimParam(): string|null;\r\n   dimParam(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n   dimParam(optionalEncoding?: any): string|Uint8Array|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 8);\r\n   return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   */\r\n   static startDimensionValue(builder: flatbuffers.Builder) {\r\n   builder.startObject(3);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param onnxruntime.experimental.fbs.DimensionValueType dimType\r\n   */\r\n   static addDimType(builder: flatbuffers.Builder, dimType: onnxruntime.experimental.fbs.DimensionValueType) {\r\n   builder.addFieldInt8(0, dimType, onnxruntime.experimental.fbs.DimensionValueType.UNKNOWN);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Long dimValue\r\n   */\r\n   static addDimValue(builder: flatbuffers.Builder, dimValue: flatbuffers.Long) {\r\n   builder.addFieldInt64(1, dimValue, builder.createLong(0, 0));\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset dimParamOffset\r\n   */\r\n   static addDimParam(builder: flatbuffers.Builder, dimParamOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(2, dimParamOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @returns flatbuffers.Offset\r\n   */\r\n   static endDimensionValue(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n   let offset = builder.endObject();\r\n   return offset;\r\n   }\r\n\r\n   static createDimensionValue(\r\n   builder: flatbuffers.Builder, dimType: onnxruntime.experimental.fbs.DimensionValueType,\r\n   dimValue: flatbuffers.Long, dimParamOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n   DimensionValue.startDimensionValue(builder);\r\n   DimensionValue.addDimType(builder, dimType);\r\n   DimensionValue.addDimValue(builder, dimValue);\r\n   DimensionValue.addDimParam(builder, dimParamOffset);\r\n   return DimensionValue.endDimensionValue(builder);\r\n   }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class TensorTypeAndShape {\r\n   bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n   bb_pos = 0;\r\n   /**\r\n   * @param number i\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @returns TensorTypeAndShape\r\n   */\r\n   __init(i: number, bb: flatbuffers.ByteBuffer): TensorTypeAndShape {\r\n   this.bb_pos = i;\r\n   this.bb = bb;\r\n   return this;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param TensorTypeAndShape= obj\r\n   * @returns TensorTypeAndShape\r\n   */\r\n   static getRootAsTensorTypeAndShape(bb: flatbuffers.ByteBuffer, obj?: TensorTypeAndShape): TensorTypeAndShape {\r\n   return (obj || new TensorTypeAndShape()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n   /**\r\n   *

@param flatbuffers.ByteBuffer bb\r\n * @param TensorTypeAndShape= obj\r\n * @returns TensorTypeAndShape\r\n */\r\n static getSizePrefixedRootAsTensorTypeAndShape(bb: flatbuffers.ByteBuffer, obj?: TensorTypeAndShape):\r\n TensorTypeAndShape {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new TensorTypeAndShape()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @returns onnxruntime.experimental.fbs.TensorDataType\r\n */\r\n elemType(): onnxruntime.experimental.fbs.TensorDataType {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? /** */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n onnxruntime.experimental.fbs.TensorDataType.UNDEFINED;\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.Shape= obj\r\n * @returns onnxruntime.experimental.fbs.Shape|null\r\n */\r\n shape(obj?: onnxruntime.experimental.fbs.Shape): onnxruntime.experimental.fbs.Shape|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Shape())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startTensorTypeAndShape(builder: flatbuffers.Builder) {\r\n builder.startObject(2);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param onnxruntime.experimental.fbs.TensorDataType elemType\r\n */\r\n static addElemType(builder: flatbuffers.Builder, elemType: onnxruntime.experimental.fbs.TensorDataType) {\r\n builder.addFieldInt32(0, elemType, onnxruntime.experimental.fbs.TensorDataType.UNDEFINED);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset shapeOffset\r\n */\r\n static addShape(builder: flatbuffers.Builder, shapeOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, shapeOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endTensorTypeAndShape(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createTensorTypeAndShape(\r\n builder: flatbuffers.Builder, elemType: onnxruntime.experimental.fbs.TensorDataType,\r\n shapeOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n TensorTypeAndShape.startTensorTypeAndShape(builder);\r\n TensorTypeAndShape.addElemType(builder, elemType);\r\n TensorTypeAndShape.addShape(builder, shapeOffset);\r\n return TensorTypeAndShape.endTensorTypeAndShape(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class MapType {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns MapType\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): MapType {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param MapType= obj\r\n * @returns MapType\r\n */\r\n static getRootAsMapType(bb: flatbuffers.ByteBuffer, obj?: MapType): MapType {\r\n return (obj || new MapType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param MapType= obj\r\n * @returns MapType\r\n */\r\n static getSizePrefixedRootAsMapType(bb: flatbuffers.ByteBuffer, obj?: MapType): MapType {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new MapType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @returns onnxruntime.experimental.fbs.TensorDataType\r\n */\r\n keyType(): onnxruntime.experimental.fbs.TensorDataType {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? /** */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n onnxruntime.experimental.fbs.TensorDataType.UNDEFINED;\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.TypeInfo= obj\r\n * @returns onnxruntime.experimental.fbs.TypeInfo|null\r\n */\r\n valueType(obj?: onnxruntime.experimental.fbs.TypeInfo): onnxruntime.experimental.fbs.TypeInfo|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.TypeInfo())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startMapType(builder: flatbuffers.Builder) {\r\n builder.startObject(2);\r\n }\r\n\r\n /**\r\n * @param

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flatbuffers.Builder builder\r\n     * @param onnxruntime.experimental.fbs.TensorDataType keyType\r\n     */\r\n
static addKeyType(builder: flatbuffers.Builder, keyType: onnxruntime.experimental.fbs.TensorDataType) {\r\n
builder.addFieldInt32(0, keyType, onnxruntime.experimental.fbs.TensorDataType.UNDEFINED);\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset valueTypeOffset\r\n     */\r\n
static addValueType(builder: flatbuffers.Builder, valueTypeOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, valueTypeOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
* @returns flatbuffers.Offset\r\n     */\r\n    static endMapType(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n
  let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createMapType(\r\n        builder:
flatbuffers.Builder, keyType: onnxruntime.experimental.fbs.TensorDataType,\r\n        valueTypeOffset:
flatbuffers.Offset): flatbuffers.Offset {\r\n      MapType.startMapType(builder);\r\n
MapType.addKeyType(builder, keyType);\r\n      MapType.addValueType(builder, valueTypeOffset);\r\n      return
MapType.endMapType(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n  export class SequenceType {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n
  bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @returns
SequenceType\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): SequenceType {\r\n      this.bb_pos =
i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     *
@param SequenceType= obj\r\n     * @returns SequenceType\r\n     */\r\n    static getRootAsSequenceType(bb:
flatbuffers.ByteBuffer, obj?: SequenceType): SequenceType {\r\n      return (obj || new
SequenceType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param SequenceType= obj\r\n     * @returns SequenceType\r\n     */\r\n    static
getSizePrefixedRootAsSequenceType(bb: flatbuffers.ByteBuffer, obj?: SequenceType): SequenceType {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
SequenceType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.TypeInfo= obj\r\n     * @returns onnxruntime.experimental.fbs.TypeInfo|null\r\n
*/\r\n    elemType(obj?: onnxruntime.experimental.fbs.TypeInfo): onnxruntime.experimental.fbs.TypeInfo|null {\r\n
   let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.TypeInfo())\r\n                        .__init(this.bb!.__indirect(this.bb_pos + offset),
this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static
startSequenceType(builder: flatbuffers.Builder) {\r\n      builder.startObject(1);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset elemTypeOffset\r\n     */\r\n    static
addElemType(builder: flatbuffers.Builder, elemTypeOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(0,
elemTypeOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns
flatbuffers.Offset\r\n     */\r\n    static endSequenceType(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let
offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createSequenceType(builder:
flatbuffers.Builder, elemTypeOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
SequenceType.startSequenceType(builder);\r\n      SequenceType.addElemType(builder, elemTypeOffset);\r\n
return SequenceType.endSequenceType(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport
namespace onnxruntime.experimental.fbs {\r\n  export class EdgeEnd {\r\n    bb: flatbuffers.ByteBuffer|null =
null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     *
@returns EdgeEnd\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): EdgeEnd {\r\n      this.bb_pos = i;\r\n
    this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodeIndex(): number
{\r\n      return this.bb!.readUint32(this.bb_pos);\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n
srcArgIndex(): number {\r\n      return this.bb!.readInt32(this.bb_pos + 4);\r\n    }\r\n\r\n    /**\r\n     * @returns
number\r\n     */\r\n    dstArgIndex(): number {\r\n      return this.bb!.readInt32(this.bb_pos + 8);\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     * @param number node_index\r\n     * @param number
src_arg_index\r\n     * @param number dst_arg_index\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createEdgeEnd(\r\n        builder: flatbuffers.Builder, node_index: number, src_arg_index: number,\r\n
dst_arg_index: number): flatbuffers.Offset {\r\n      builder.prep(4, 12);\r\n      builder.writeInt32(dst_arg_index);\r\n
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builder.writeInt32(src_arg_index);\r\n builder.writeInt32(node_index);\r\n return builder.offset();\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class NodeEdge {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns NodeEdge\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): NodeEdge {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param NodeEdge= obj\r\n * @returns NodeEdge\r\n */\r\n static getRootAsNodeEdge(bb: flatbuffers.ByteBuffer, obj?: NodeEdge): NodeEdge {\r\n return (obj || new NodeEdge()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param NodeEdge= obj\r\n * @returns NodeEdge\r\n */\r\n static getSizePrefixedRootAsNodeEdge(bb: flatbuffers.ByteBuffer, obj?: NodeEdge): NodeEdge {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new NodeEdge()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n nodeIndex(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.readUint32(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param onnxruntime.experimental.fbs.EdgeEnd= obj\r\n * @returns onnxruntime.experimental.fbs.EdgeEnd\r\n */\r\n inputEdges(index: number, obj?: onnxruntime.experimental.fbs.EdgeEnd): onnxruntime.experimental.fbs.EdgeEnd|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.EdgeEnd())\r\n .__init(this.bb!.__vector(this.bb_pos + offset) + index * 12, this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n inputEdgesLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param onnxruntime.experimental.fbs.EdgeEnd= obj\r\n * @returns onnxruntime.experimental.fbs.EdgeEnd\r\n */\r\n outputEdges(index: number, obj?: onnxruntime.experimental.fbs.EdgeEnd): onnxruntime.experimental.fbs.EdgeEnd|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.EdgeEnd())\r\n .__init(this.bb!.__vector(this.bb_pos + offset) + index * 12, this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n outputEdgesLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startNodeEdge(builder: flatbuffers.Builder) {\r\n builder.startObject(3);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number nodeIndex\r\n */\r\n static addNodeIndex(builder: flatbuffers.Builder, nodeIndex: number) {\r\n builder.addFieldInt32(0, nodeIndex, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset inputEdgesOffset\r\n */\r\n static addInputEdges(builder: flatbuffers.Builder, inputEdgesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, inputEdgesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startInputEdgesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(12, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset outputEdgesOffset\r\n */\r\n static addOutputEdges(builder: flatbuffers.Builder, outputEdgesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, outputEdgesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startOutputEdgesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(12, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endNodeEdge(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createNodeEdge(\r\n builder: flatbuffers.Builder, nodeIndex: number, inputEdgesOffset: flatbuffers.Offset,\r\n outputEdgesOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n NodeEdge.startNodeEdge(builder);\r\n NodeEdge.addNodeIndex(builder, nodeIndex);\r\n NodeEdge.addInputEdges(builder, inputEdgesOffset);\r\n NodeEdge.addOutputEdges(builder, outputEdgesOffset);\r\n return NodeEdge.endNodeEdge(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n

*/\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class Node {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns Node\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): Node {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Node= obj\r\n * @returns Node\r\n */\r\n static getRootAsNode(bb: flatbuffers.ByteBuffer, obj?: Node): Node {\r\n return (obj || new Node()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Node= obj\r\n * @returns Node\r\n */\r\n static getSizePrefixedRootAsNode(bb: flatbuffers.ByteBuffer, obj?: Node): Node {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new Node()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n name(): string|null;\r\n name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n name(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n docString(): string|null;\r\n docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n docString(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n domain(): string|null;\r\n domain(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n domain(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n sinceVersion(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 10);\r\n return offset ? this.bb!.readInt32(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n index(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 12);\r\n return offset ? this.bb!.readUint32(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n opType(): string|null;\r\n opType(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n opType(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 14);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @returns onnxruntime.experimental.fbs.NodeType\r\n */\r\n type(): onnxruntime.experimental.fbs.NodeType {\r\n let offset = this.bb!.__offset(this.bb_pos, 16);\r\n return offset ? /** */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n onnxruntime.experimental.fbs.NodeType.Primitive;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n executionProviderType(): string|null;\r\n executionProviderType(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n executionProviderType(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 18);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array\r\n */\r\n inputs(index: number): string;\r\n inputs(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n inputs(index: number, optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 20);\r\n return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n inputsLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 20);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array\r\n */\r\n outputs(index: number): string;\r\n outputs(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n outputs(index: number, optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 22);\r\n return offset ?

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this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    outputsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 22);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.Attribute= obj\r\n     * @returns
onnxruntime.experimental.fbs.Attribute\r\n     */\r\n    attributes(index: number, obj?:
onnxruntime.experimental.fbs.Attribute): onnxruntime.experimental.fbs.Attribute\r\n        |null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 24);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Attribute())\r\n
                .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n
null;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    attributesLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 24);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @returns number\r\n     */\r\n    inputArgCounts(index: number):
number|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 26);\r\n      return offset ?
this.bb!.readInt32(this.bb!.__vector(this.bb_pos + offset) + index * 4) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns
number\r\n     */\r\n    inputArgCountsLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 26);\r\n
return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns Int32Array\r\n
*/\r\n    inputArgCountsArray(): Int32Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 26);\r\n      return
offset ?\r\n          new Int32Array(\r\n              this.bb!.bytes().buffer, this.bb!.bytes().byteOffset +
this.bb!.__vector(this.bb_pos + offset),\r\n              this.bb!.__vector_len(this.bb_pos + offset)) :\r\n          null;\r\n
}\r\n\r\n    /**\r\n     * @param number index\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     *
@returns string|Uint8Array\r\n     */\r\n    implicitInputs(index: number): string;\r\n    implicitInputs(index: number,
optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n    implicitInputs(index: number, optionalEncoding?:
any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 28);\r\n      return offset ?
this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    implicitInputsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 28);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startNode(builder: flatbuffers.Builder) {\r\n
builder.startObject(13);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset nameOffset\r\n     */\r\n    static addName(builder: flatbuffers.Builder, nameOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, nameOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset docStringOffset\r\n     */\r\n    static
addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1,
docStringOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset domainOffset\r\n     */\r\n    static addDomain(builder: flatbuffers.Builder, domainOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(2, domainOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number sinceVersion\r\n     */\r\n    static addSinceVersion(builder:
flatbuffers.Builder, sinceVersion: number) {\r\n      builder.addFieldInt32(3, sinceVersion, 0);\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     * @param number index\r\n     */\r\n    static addIndex(builder:
flatbuffers.Builder, index: number) {\r\n      builder.addFieldInt32(4, index, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset opTypeOffset\r\n     */\r\n    static addOpType(builder:
flatbuffers.Builder, opTypeOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(5, opTypeOffset, 0);\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param onnxruntime.experimental.fbs.NodeType
type\r\n     */\r\n    static addType(builder: flatbuffers.Builder, type: onnxruntime.experimental.fbs.NodeType) {\r\n
  builder.addFieldInt32(6, type, onnxruntime.experimental.fbs.NodeType.Primitive);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset executionProviderTypeOffset\r\n     */\r\n
static addExecutionProviderType(builder: flatbuffers.Builder, executionProviderTypeOffset: flatbuffers.Offset) {\r\n
    builder.addFieldOffset(7, executionProviderTypeOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset inputsOffset\r\n     */\r\n    static addInputs(builder:
flatbuffers.Builder, inputsOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(8, inputsOffset, 0);\r\n
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}\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param Array.<flatbuffers.Offset> data\r\n     *
@returns flatbuffers.Offset\r\n     */\r\n    static createInputsVector(builder: flatbuffers.Builder, data:
flatbuffers.Offset[]): flatbuffers.Offset {\r\n      builder.startVector(4, data.length, 4);\r\n      for (let i = data.length -
1; i >= 0; i--) {\r\n        builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n
  * @param flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startInputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n
 }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset outputsOffset\r\n
*/\r\n    static addOutputs(builder: flatbuffers.Builder, outputsOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(9, outputsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     *
@param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createOutputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startOutputsVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset attributesOffset\r\n     */\r\n    static
addAttributes(builder: flatbuffers.Builder, attributesOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(10,
attributesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createAttributesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startAttributesVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset inputArgCountsOffset\r\n     */\r\n    static
addInputArgCounts(builder: flatbuffers.Builder, inputArgCountsOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(11, inputArgCountsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param Array.<number> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createInputArgCountsVector(builder: flatbuffers.Builder, data: number[]|Uint8Array): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addInt32(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startInputArgCountsVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4,
numElems, 4);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset
implicitInputsOffset\r\n     */\r\n    static addImplicitInputs(builder: flatbuffers.Builder, implicitInputsOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(12, implicitInputsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n
*/\r\n    static createImplicitInputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset
{\r\n      builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startImplicitInputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4,
numElems, 4);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns
flatbuffers.Offset\r\n     */\r\n    static endNode(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset =
builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createNode(\r\n        builder: flatbuffers.Builder,
nameOffset: flatbuffers.Offset, docStringOffset: flatbuffers.Offset,\r\n        domainOffset: flatbuffers.Offset,
sinceVersion: number, index: number, opTypeOffset: flatbuffers.Offset,\r\n        type:
onnxruntime.experimental.fbs.NodeType, executionProviderTypeOffset: flatbuffers.Offset,\r\n        inputsOffset:
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flatbuffers.Offset, outputsOffset: flatbuffers.Offset, attributesOffset: flatbuffers.Offset,\r\n
inputArgCountsOffset: flatbuffers.Offset, implicitInputsOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
Node.startNode(builder);\r\n      Node.addName(builder, nameOffset);\r\n      Node.addDocString(builder,
docStringOffset);\r\n      Node.addDomain(builder, domainOffset);\r\n      Node.addSinceVersion(builder,
sinceVersion);\r\n      Node.addIndex(builder, index);\r\n      Node.addOpType(builder, opTypeOffset);\r\n
Node.addType(builder, type);\r\n      Node.addExecutionProviderType(builder, executionProviderTypeOffset);\r\n
Node.addInputs(builder, inputsOffset);\r\n      Node.addOutputs(builder, outputsOffset);\r\n
Node.addAttributes(builder, attributesOffset);\r\n      Node.addInputArgCounts(builder, inputArgCountsOffset);\r\n
  Node.addImplicitInputs(builder, implicitInputsOffset);\r\n      return Node.endNode(builder);\r\n    }\r\n
}\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class
ValueInfo {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n
  * @param flatbuffers.ByteBuffer bb\r\n     * @returns ValueInfo\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): ValueInfo {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param ValueInfo= obj\r\n     * @returns ValueInfo\r\n
*/\r\n    static getRootAsValueInfo(bb: flatbuffers.ByteBuffer, obj?: ValueInfo): ValueInfo {\r\n      return (obj || new
ValueInfo()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param ValueInfo= obj\r\n     * @returns ValueInfo\r\n     */\r\n    static
getSizePrefixedRootAsValueInfo(bb: flatbuffers.ByteBuffer, obj?: ValueInfo): ValueInfo {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
ValueInfo()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    name():
string|null;\r\n    name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
name(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    docString():
string|null;\r\n    docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
docString(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
  return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.TypeInfo= obj\r\n     * @returns onnxruntime.experimental.fbs.TypeInfo|null\r\n
*/\r\n    type(obj?: onnxruntime.experimental.fbs.TypeInfo): onnxruntime.experimental.fbs.TypeInfo|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.TypeInfo())\r\n                      .__init(this.bb!.__indirect(this.bb_pos + offset),
this.bb!) :\r\n                      null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static
startValueInfo(builder: flatbuffers.Builder) {\r\n      builder.startObject(3);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset nameOffset\r\n     */\r\n    static addName(builder:
flatbuffers.Builder, nameOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, nameOffset, 0);\r\n    }\r\n\r\n
 /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset docStringOffset\r\n     */\r\n
static addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, docStringOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
* @param flatbuffers.Offset typeOffset\r\n     */\r\n    static addType(builder: flatbuffers.Builder, typeOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(2, typeOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static endValueInfo(builder:
flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n
static createValueInfo(\r\n        builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset, docStringOffset:
flatbuffers.Offset,\r\n        typeOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
ValueInfo.startValueInfo(builder);\r\n      ValueInfo.addName(builder, nameOffset);\r\n
ValueInfo.addDocString(builder, docStringOffset);\r\n      ValueInfo.addType(builder, typeOffset);\r\n      return
ValueInfo.endValueInfo(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace
```

```
onnxruntime.experimental.fbs {\r\n  export class TypeInfo {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n
bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @returns
TypeInfo\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): TypeInfo {\r\n      this.bb_pos = i;\r\n
this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param
TypeInfo= obj\r\n     * @returns TypeInfo\r\n     */\r\n    static getRootAsTypeInfo(bb: flatbuffers.ByteBuffer, obj?:
TypeInfo): TypeInfo {\r\n      return (obj || new TypeInfo()).__init(bb.readInt32(bb.position()) + bb.position(),
bb);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param TypeInfo= obj\r\n     * @returns
TypeInfo\r\n     */\r\n    static getSizePrefixedRootAsTypeInfo(bb: flatbuffers.ByteBuffer, obj?: TypeInfo):
TypeInfo {\r\n      bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
TypeInfo()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    denotation():
string|null;\r\n    denotation(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
denotation(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
   return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     *
@returns onnxruntime.experimental.fbs.TypeInfoValue\r\n     */\r\n    valueType():
onnxruntime.experimental.fbs.TypeInfoValue {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return
offset ? /**  */ (this.bb!.readUint8(this.bb_pos + offset)) :\r\n
onnxruntime.experimental.fbs.TypeInfoValue.NONE;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Table obj\r\n
  * @returns ?flatbuffers.Table\r\n     */\r\n    value<T extends flatbuffers.Table>(obj: T): T|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.__union(obj, this.bb_pos + offset) : null;\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startTypeInfo(builder:
flatbuffers.Builder) {\r\n      builder.startObject(3);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param flatbuffers.Offset denotationOffset\r\n     */\r\n    static addDenotation(builder:
flatbuffers.Builder, denotationOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, denotationOffset, 0);\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
onnxruntime.experimental.fbs.TypeInfoValue valueType\r\n     */\r\n    static addValueType(builder:
flatbuffers.Builder, valueType: onnxruntime.experimental.fbs.TypeInfoValue) {\r\n      builder.addFieldInt8(1,
valueType, onnxruntime.experimental.fbs.TypeInfoValue.NONE);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset valueOffset\r\n     */\r\n    static addValue(builder:
flatbuffers.Builder, valueOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(2, valueOffset, 0);\r\n    }\r\n\r\n
 /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
endTypeInfo(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      return
offset;\r\n    }\r\n\r\n    static createTypeInfo(\r\n        builder: flatbuffers.Builder, denotationOffset:
flatbuffers.Offset,\r\n        valueType: onnxruntime.experimental.fbs.TypeInfoValue, valueOffset:
flatbuffers.Offset): flatbuffers.Offset {\r\n      TypeInfo.startTypeInfo(builder);\r\n
TypeInfo.addDenotation(builder, denotationOffset);\r\n      TypeInfo.addValueType(builder, valueType);\r\n
TypeInfo.addValue(builder, valueOffset);\r\n      return TypeInfo.endTypeInfo(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n
* @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class OperatorSetId {\r\n
bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @returns OperatorSetId\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): OperatorSetId {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param OperatorSetId= obj\r\n     * @returns
OperatorSetId\r\n     */\r\n    static getRootAsOperatorSetId(bb: flatbuffers.ByteBuffer, obj?: OperatorSetId):
OperatorSetId {\r\n      return (obj || new OperatorSetId()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n
 }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param OperatorSetId= obj\r\n     * @returns
OperatorSetId\r\n     */\r\n    static getSizePrefixedRootAsOperatorSetId(bb: flatbuffers.ByteBuffer, obj?:
OperatorSetId): OperatorSetId {\r\n      bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n
return (obj || new OperatorSetId()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n
```

* @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n domain(): string|null;\r\n domain(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n domain(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @returns flatbuffers.Long\r\n */\r\n version(): flatbuffers.Long {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startOperatorSetId(builder: flatbuffers.Builder) {\r\n builder.startObject(2);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset domainOffset\r\n */\r\n static addDomain(builder: flatbuffers.Builder, domainOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, domainOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Long version\r\n */\r\n static addVersion(builder: flatbuffers.Builder, version: flatbuffers.Long) {\r\n builder.addFieldInt64(1, version, builder.createLong(0, 0));\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endOperatorSetId(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createOperatorSetId(\r\n builder: flatbuffers.Builder, domainOffset: flatbuffers.Offset, version: flatbuffers.Long): flatbuffers.Offset {\r\n OperatorSetId.startOperatorSetId(builder);\r\n OperatorSetId.addDomain(builder, domainOffset);\r\n OperatorSetId.addVersion(builder, version);\r\n return OperatorSetId.endOperatorSetId(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class Tensor {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns Tensor\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): Tensor {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Tensor= obj\r\n * @returns Tensor\r\n */\r\n static getRootAsTensor(bb: flatbuffers.ByteBuffer, obj?: Tensor): Tensor {\r\n return (obj || new Tensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Tensor= obj\r\n * @returns Tensor\r\n */\r\n static getSizePrefixedRootAsTensor(bb: flatbuffers.ByteBuffer, obj?: Tensor): Tensor {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new Tensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n name(): string|null;\r\n name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n name(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n docString(): string|null;\r\n docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n docString(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @returns flatbuffers.Long\r\n */\r\n dims(index: number): flatbuffers.Long|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.readInt64(this.bb!.__vector(this.bb_pos + offset) + index * 8) :\r\n this.bb!.createLong(0, 0);\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n dimsLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @returns onnxruntime.experimental.fbs.TensorDataType\r\n */\r\n dataType(): onnxruntime.experimental.fbs.TensorDataType {\r\n let offset = this.bb!.__offset(this.bb_pos, 10);\r\n return offset ? /** */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n onnxruntime.experimental.fbs.TensorDataType.UNDEFINED;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @returns number\r\n */\r\n rawData(index: number): number|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 12);\r\n return offset ? this.bb!.readUint8(this.bb!.__vector(this.bb_pos + offset) +

index) : 0;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n rawDataLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 12);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @returns Uint8Array\r\n */\r\n rawDataArray(): Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 12);\r\n return offset ?\r\n new Uint8Array(\r\n this.bb!.bytes().buffer, this.bb!.bytes().byteOffset + this.bb!.__vector(this.bb_pos + offset),\r\n this.bb!.__vector_len(this.bb_pos + offset)) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array\r\n */\r\n stringData(index: number): string;\r\n stringData(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n stringData(index: number, optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 14);\r\n return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n stringDataLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 14);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startTensor(builder: flatbuffers.Builder) {\r\n builder.startObject(6);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nameOffset\r\n */\r\n static addName(builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, nameOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset docStringOffset\r\n */\r\n static addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, docStringOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset dimsOffset\r\n */\r\n static addDims(builder: flatbuffers.Builder, dimsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, dimsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Long> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createDimsVector(builder: flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n builder.startVector(8, data.length, 8);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addInt64(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startDimsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(8, numElems, 8);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param onnxruntime.experimental.fbs.TensorDataType dataType\r\n */\r\n static addDataType(builder: flatbuffers.Builder, dataType: onnxruntime.experimental.fbs.TensorDataType) {\r\n builder.addFieldInt32(3, dataType, onnxruntime.experimental.fbs.TensorDataType.UNDEFINED);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset rawDataOffset\r\n */\r\n static addRawData(builder: flatbuffers.Builder, rawDataOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(4, rawDataOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<number> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createRawDataVector(builder: flatbuffers.Builder, data: number[]|Uint8Array): flatbuffers.Offset {\r\n builder.startVector(1, data.length, 1);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addInt8(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startRawDataVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(1, numElems, 1);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset stringDataOffset\r\n */\r\n static addStringData(builder: flatbuffers.Builder, stringDataOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(5, stringDataOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createStringDataVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startStringDataVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n *

@param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endTensor(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createTensor(\r\n builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset, docStringOffset: flatbuffers.Offset,\r\n dimsOffset: flatbuffers.Offset, dataType: onnxruntime.experimental.fbs.TensorDataType,\r\n rawDataOffset: flatbuffers.Offset, stringDataOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n Tensor.startTensor(builder);\r\n Tensor.addName(builder, nameOffset);\r\n Tensor.addDocString(builder, docStringOffset);\r\n Tensor.addDims(builder, dimsOffset);\r\n Tensor.addDataType(builder, dataType);\r\n Tensor.addRawData(builder, rawDataOffset);\r\n Tensor.addStringData(builder, stringDataOffset);\r\n return Tensor.endTensor(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class SparseTensor {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns SparseTensor\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): SparseTensor {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param SparseTensor= obj\r\n * @returns SparseTensor\r\n */\r\n static getRootAsSparseTensor(bb: flatbuffers.ByteBuffer, obj?: SparseTensor): SparseTensor {\r\n return (obj || new SparseTensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param SparseTensor= obj\r\n * @returns SparseTensor\r\n */\r\n static getSizePrefixedRootAsSparseTensor(bb: flatbuffers.ByteBuffer, obj?: SparseTensor): SparseTensor {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new SparseTensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.Tensor= obj\r\n * @returns onnxruntime.experimental.fbs.Tensor|null\r\n */\r\n values(obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.Tensor= obj\r\n * @returns onnxruntime.experimental.fbs.Tensor|null\r\n */\r\n indices(obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @returns flatbuffers.Long\r\n */\r\n dims(index: number): flatbuffers.Long|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.readInt64(this.bb!.__vector(this.bb_pos + offset) + index * 8) :\r\n this.bb!.createLong(0, 0);\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n dimsLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startSparseTensor(builder: flatbuffers.Builder) {\r\n builder.startObject(3);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset valuesOffset\r\n */\r\n static addValues(builder: flatbuffers.Builder, valuesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, valuesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset indicesOffset\r\n */\r\n static addIndices(builder: flatbuffers.Builder, indicesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, indicesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset dimsOffset\r\n */\r\n static addDims(builder: flatbuffers.Builder, dimsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, dimsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Long> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createDimsVector(builder: flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n builder.startVector(8, data.length, 8);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addInt64(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startDimsVector(builder:

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flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(8, numElems, 8);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
endSparseTensor(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n
return offset;\r\n    }\r\n\r\n    static createSparseTensor(\r\n        builder: flatbuffers.Builder, valuesOffset:
flatbuffers.Offset, indicesOffset: flatbuffers.Offset,\r\n        dimsOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
SparseTensor.startSparseTensor(builder);\r\n      SparseTensor.addValues(builder, valuesOffset);\r\n
SparseTensor.addIndices(builder, indicesOffset);\r\n      SparseTensor.addDims(builder, dimsOffset);\r\n      return
SparseTensor.endSparseTensor(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n  export class Attribute {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n
bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @returns
Attribute\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): Attribute {\r\n      this.bb_pos = i;\r\n      this.bb
= bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param Attribute=
obj\r\n     * @returns Attribute\r\n     */\r\n    static getRootAsAttribute(bb: flatbuffers.ByteBuffer, obj?: Attribute):
Attribute {\r\n      return (obj || new Attribute()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n
  /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param Attribute= obj\r\n     * @returns Attribute\r\n
*/\r\n    static getSizePrefixedRootAsAttribute(bb: flatbuffers.ByteBuffer, obj?: Attribute): Attribute {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
Attribute()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    name():
string|null;\r\n    name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
name(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    docString():
string|null;\r\n    docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
docString(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
  return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @returns
onnxruntime.experimental.fbs.AttributeType\r\n     */\r\n    type(): onnxruntime.experimental.fbs.AttributeType {\r\n
    let offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? /**  */ (this.bb!.readInt32(this.bb_pos + offset))
:\r\n                      onnxruntime.experimental.fbs.AttributeType.UNDEFINED;\r\n    }\r\n\r\n    /**\r\n     * @returns
number\r\n     */\r\n    f(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 10);\r\n      return offset ?
this.bb!.readFloat32(this.bb_pos + offset) : 0.0;\r\n    }\r\n\r\n    /**\r\n     * @returns flatbuffers.Long\r\n     */\r\n
i(): flatbuffers.Long {\r\n      let offset = this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ?
this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    s(): string|null;\r\n
s(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n    s(optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 14);\r\n      return offset ?
this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.Tensor= obj\r\n     * @returns onnxruntime.experimental.fbs.Tensor|null\r\n     */\r\n
t(obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 16);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n
             .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                      null;\r\n    }\r\n\r\n    /**\r\n     *
@param onnxruntime.experimental.fbs.Graph= obj\r\n     * @returns onnxruntime.experimental.fbs.Graph|null\r\n
*/\r\n    g(obj?: onnxruntime.experimental.fbs.Graph): onnxruntime.experimental.fbs.Graph|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 18);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Graph())\r\n
             .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                      null;\r\n    }\r\n\r\n    /**\r\n     *
@param number index\r\n     * @returns number\r\n     */\r\n    floats(index: number): number|null {\r\n      let offset
= this.bb!.__offset(this.bb_pos, 20);\r\n      return offset ? this.bb!.readFloat32(this.bb!.__vector(this.bb_pos +
offset) + index * 4) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    floatsLength(): number {\r\n
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let offset = this.bb!.__offset(this.bb_pos, 20);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) :
0;\r\n    }\r\n\r\n    /**\r\n     * @returns Float32Array\r\n     */\r\n    floatsArray(): Float32Array|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 20);\r\n      return offset ?\r\n          new Float32Array(\r\n
this.bb!.bytes().buffer, this.bb!.bytes().byteOffset + this.bb!.__vector(this.bb_pos + offset),\r\n
this.bb!.__vector_len(this.bb_pos + offset)) :\r\n          null;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n
* @returns flatbuffers.Long\r\n     */\r\n    ints(index: number): flatbuffers.Long|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 22);\r\n      return offset ? this.bb!.readInt64(this.bb!.__vector(this.bb_pos + offset) +
index * 8) :\r\n                        this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n
intsLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 22);\r\n      return offset ?
this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array\r\n     */\r\n    strings(index: number):
string;\r\n    strings(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n    strings(index:
number, optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 24);\r\n
 return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    stringsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 24);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.Tensor= obj\r\n     * @returns
onnxruntime.experimental.fbs.Tensor\r\n     */\r\n    tensors(index: number, obj?:
onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 26);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n
            .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n
null;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    tensorsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 26);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.Graph= obj\r\n     * @returns
onnxruntime.experimental.fbs.Graph\r\n     */\r\n    graphs(index: number, obj?:
onnxruntime.experimental.fbs.Graph): onnxruntime.experimental.fbs.Graph|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 28);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Graph())\r\n
            .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n
null;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    graphsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 28);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startAttribute(builder: flatbuffers.Builder) {\r\n
   builder.startObject(13);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset nameOffset\r\n     */\r\n    static addName(builder: flatbuffers.Builder, nameOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, nameOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset docStringOffset\r\n     */\r\n    static
addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1,
docStringOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
onnxruntime.experimental.fbs.AttributeType type\r\n     */\r\n    static addType(builder: flatbuffers.Builder, type:
onnxruntime.experimental.fbs.AttributeType) {\r\n      builder.addFieldInt32(2, type,
onnxruntime.experimental.fbs.AttributeType.UNDEFINED);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number f\r\n     */\r\n    static addF(builder: flatbuffers.Builder, f:
number) {\r\n      builder.addFieldFloat32(3, f, 0.0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param flatbuffers.Long i\r\n     */\r\n    static addI(builder: flatbuffers.Builder, i: flatbuffers.Long)
{\r\n      builder.addFieldInt64(4, i, builder.createLong(0, 0));\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset sOffset\r\n     */\r\n    static addS(builder:
flatbuffers.Builder, sOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(5, sOffset, 0);\r\n    }\r\n\r\n    /**\r\n
  * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset tOffset\r\n     */\r\n    static addT(builder:
flatbuffers.Builder, tOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(6, tOffset, 0);\r\n    }\r\n\r\n    /**\r\n
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* @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset gOffset\r\n */\r\n static addG(builder: flatbuffers.Builder, gOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(7, gOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset floatsOffset\r\n */\r\n static addFloats(builder: flatbuffers.Builder, floatsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(8, floatsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<number> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createFloatsVector(builder: flatbuffers.Builder, data: number[]|Uint8Array): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addFloat32(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startFloatsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset intsOffset\r\n */\r\n static addInts(builder: flatbuffers.Builder, intsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(9, intsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Long> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createIntsVector(builder: flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n builder.startVector(8, data.length, 8);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addInt64(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startIntsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(8, numElems, 8);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset stringsOffset\r\n */\r\n static addStrings(builder: flatbuffers.Builder, stringsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(10, stringsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createStringsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startStringsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset tensorsOffset\r\n */\r\n static addTensors(builder: flatbuffers.Builder, tensorsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(11, tensorsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createTensorsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startTensorsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset graphsOffset\r\n */\r\n static addGraphs(builder: flatbuffers.Builder, graphsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(12, graphsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createGraphsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startGraphsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endAttribute(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createAttribute(\r\n builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset, docStringOffset: flatbuffers.Offset,\r\n type: onnxruntime.experimental.fbs.AttributeType, f: number, i: flatbuffers.Long, sOffset:

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flatbuffers.Offset,\r\n        tOffset: flatbuffers.Offset, gOffset: flatbuffers.Offset, floatsOffset: flatbuffers.Offset,\r\n
  intsOffset: flatbuffers.Offset, stringsOffset: flatbuffers.Offset, tensorsOffset: flatbuffers.Offset,\r\n
graphsOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n      Attribute.startAttribute(builder);\r\n
Attribute.addName(builder, nameOffset);\r\n      Attribute.addDocString(builder, docStringOffset);\r\n
Attribute.addType(builder, type);\r\n      Attribute.addF(builder, f);\r\n      Attribute.addI(builder, i);\r\n
Attribute.addS(builder, sOffset);\r\n      Attribute.addT(builder, tOffset);\r\n      Attribute.addG(builder, gOffset);\r\n
  Attribute.addFloats(builder, floatsOffset);\r\n      Attribute.addInts(builder, intsOffset);\r\n
Attribute.addStrings(builder, stringsOffset);\r\n      Attribute.addTensors(builder, tensorsOffset);\r\n
Attribute.addGraphs(builder, graphsOffset);\r\n      return Attribute.endAttribute(builder);\r\n    }\r\n
}\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class Graph
{\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     *
@param flatbuffers.ByteBuffer bb\r\n     * @returns Graph\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): Graph {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n
  * @param flatbuffers.ByteBuffer bb\r\n     * @param Graph= obj\r\n     * @returns Graph\r\n     */\r\n    static
getRootAsGraph(bb: flatbuffers.ByteBuffer, obj?: Graph): Graph {\r\n      return (obj || new
Graph()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param Graph= obj\r\n     * @returns Graph\r\n     */\r\n    static
getSizePrefixedRootAsGraph(bb: flatbuffers.ByteBuffer, obj?: Graph): Graph {\r\n      bb.setPosition(bb.position()
+ flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new Graph()).__init(bb.readInt32(bb.position()) +
bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.Tensor= obj\r\n     * @returns onnxruntime.experimental.fbs.Tensor\r\n     */\r\n
initializers(index: number, obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null
{\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.Tensor())\r\n                          .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos
+ offset) + index * 4), this.bb!) :\r\n                      null;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n
initializersLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ?
this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.ValueInfo= obj\r\n     * @returns onnxruntime.experimental.fbs.ValueInfo\r\n
*/\r\n    nodeArgs(index: number, obj?: onnxruntime.experimental.fbs.ValueInfo):
onnxruntime.experimental.fbs.ValueInfo|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return
offset ? (obj || new onnxruntime.experimental.fbs.ValueInfo())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                      null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodeArgsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.Node= obj\r\n     * @returns
onnxruntime.experimental.fbs.Node\r\n     */\r\n    nodes(index: number, obj?: onnxruntime.experimental.fbs.Node):
onnxruntime.experimental.fbs.Node|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ?
(obj || new onnxruntime.experimental.fbs.Node())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                      null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodesLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    maxNodeIndex(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 10);\r\n      return offset ? this.bb!.readUint32(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.NodeEdge= obj\r\n     * @returns
onnxruntime.experimental.fbs.NodeEdge\r\n     */\r\n    nodeEdges(index: number, obj?:
onnxruntime.experimental.fbs.NodeEdge): onnxruntime.experimental.fbs.NodeEdge|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.NodeEdge())\r\n
              .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n
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null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n nodeEdgesLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 12);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array\r\n */\r\n inputs(index: number): string;\r\n inputs(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n inputs(index: number, optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 14);\r\n return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n inputsLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 14);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array\r\n */\r\n outputs(index: number): string;\r\n outputs(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n outputs(index: number, optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 16);\r\n return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n outputsLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 16);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param onnxruntime.experimental.fbs.SparseTensor= obj\r\n * @returns onnxruntime.experimental.fbs.SparseTensor\r\n */\r\n sparseInitializers(index: number, obj?: onnxruntime.experimental.fbs.SparseTensor):\r\n onnxruntime.experimental.fbs.SparseTensor|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 18);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.SparseTensor())\r\n .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n sparseInitializersLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 18);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startGraph(builder: flatbuffers.Builder) {\r\n builder.startObject(8);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset initializersOffset\r\n */\r\n static addInitializers(builder: flatbuffers.Builder, initializersOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, initializersOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createInitializersVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startInitializersVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nodeArgsOffset\r\n */\r\n static addNodeArgs(builder: flatbuffers.Builder, nodeArgsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, nodeArgsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createNodeArgsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startNodeArgsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nodesOffset\r\n */\r\n static addNodes(builder: flatbuffers.Builder, nodesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, nodesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createNodesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startNodesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number maxNodeIndex\r\n */\r\n static addMaxNodeIndex(builder: flatbuffers.Builder, maxNodeIndex: number) {\r\n builder.addFieldInt32(3, maxNodeIndex, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nodeEdgesOffset\r\n */\r\n static addNodeEdges(builder: flatbuffers.Builder, nodeEdgesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(4, nodeEdgesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createNodeEdgesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startNodeEdgesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset inputsOffset\r\n */\r\n static addInputs(builder: flatbuffers.Builder, inputsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(5, inputsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createInputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startInputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset outputsOffset\r\n */\r\n static addOutputs(builder: flatbuffers.Builder, outputsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(6, outputsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createOutputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startOutputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset sparseInitializersOffset\r\n */\r\n static addSparseInitializers(builder: flatbuffers.Builder, sparseInitializersOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(7, sparseInitializersOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createSparseInitializersVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]):\r\n flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startSparseInitializersVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endGraph(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createGraph(\r\n builder: flatbuffers.Builder, initializersOffset: flatbuffers.Offset, nodeArgsOffset: flatbuffers.Offset,\r\n nodesOffset: flatbuffers.Offset, maxNodeIndex: number, nodeEdgesOffset: flatbuffers.Offset,\r\n inputsOffset: flatbuffers.Offset, outputsOffset: flatbuffers.Offset,\r\n sparseInitializersOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n Graph.startGraph(builder);\r\n Graph.addInitializers(builder, initializersOffset);\r\n

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Graph.addNodeArgs(builder, nodeArgsOffset);\r\n      Graph.addNodes(builder, nodesOffset);\r\n
Graph.addMaxNodeIndex(builder, maxNodeIndex);\r\n      Graph.addNodeEdges(builder, nodeEdgesOffset);\r\n
Graph.addInputs(builder, inputsOffset);\r\n      Graph.addOutputs(builder, outputsOffset);\r\n
Graph.addSparseInitializers(builder, sparseInitializersOffset);\r\n      return Graph.endGraph(builder);\r\n    }\r\n
}\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class Model
{\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     *
@param flatbuffers.ByteBuffer bb\r\n     * @returns Model\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): Model {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n
   * @param flatbuffers.ByteBuffer bb\r\n     * @param Model= obj\r\n     * @returns Model\r\n     */\r\n    static
getRootAsModel(bb: flatbuffers.ByteBuffer, obj?: Model): Model {\r\n      return (obj || new
Model()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param Model= obj\r\n     * @returns Model\r\n     */\r\n    static
getSizePrefixedRootAsModel(bb: flatbuffers.ByteBuffer, obj?: Model): Model {\r\n      bb.setPosition(bb.position()
+ flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new Model()).__init(bb.readInt32(bb.position()) +
bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @returns flatbuffers.Long\r\n     */\r\n    irVersion(): flatbuffers.Long
{\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? this.bb!.readInt64(this.bb_pos + offset) :
this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.OperatorSetId= obj\r\n     * @returns onnxruntime.experimental.fbs.OperatorSetId\r\n
   */\r\n    opsetImport(index: number, obj?: onnxruntime.experimental.fbs.OperatorSetId):\r\n
onnxruntime.experimental.fbs.OperatorSetId|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return
offset ? (obj || new onnxruntime.experimental.fbs.OperatorSetId())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    opsetImportLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n
producerName(): string|null;\r\n    producerName(optionalEncoding: flatbuffers.Encoding):
string|Uint8Array|null;\r\n    producerName(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) :
null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns
string|Uint8Array|null\r\n     */\r\n    producerVersion(): string|null;\r\n    producerVersion(optionalEncoding:
flatbuffers.Encoding): string|Uint8Array|null;\r\n    producerVersion(optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 10);\r\n      return offset ?
this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    domain():
string|null;\r\n    domain(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
domain(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 12);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @returns
flatbuffers.Long\r\n     */\r\n    modelVersion(): flatbuffers.Long {\r\n      let offset = this.bb!.__offset(this.bb_pos,
14);\r\n      return offset ? this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n
  * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n
docString(): string|null;\r\n    docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
docString(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 16);\r\n
    return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     *
@param onnxruntime.experimental.fbs.Graph= obj\r\n     * @returns onnxruntime.experimental.fbs.Graph|null\r\n
*/\r\n    graph(obj?: onnxruntime.experimental.fbs.Graph): onnxruntime.experimental.fbs.Graph|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 18);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.Graph())\r\n                    .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!)
:\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     *
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@returns string|Uint8Array|null\r\n   */\r\n   graphDocString(): string|null;\r\n graphDocString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n graphDocString(optionalEncoding?: any): string|Uint8Array|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 20);\r\n   return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   */\r\n   static startModel(builder: flatbuffers.Builder) {\r\n builder.startObject(9);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Long irVersion\r\n   */\r\n   static addIrVersion(builder: flatbuffers.Builder, irVersion: flatbuffers.Long) {\r\n   builder.addFieldInt64(0, irVersion, builder.createLong(0, 0));\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset opsetImportOffset\r\n   */\r\n   static addOpsetImport(builder: flatbuffers.Builder, opsetImportOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, opsetImportOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param Array.<flatbuffers.Offset> data\r\n   * @returns flatbuffers.Offset\r\n   */\r\n   static createOpsetImportVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n   for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n   }\r\n   return builder.endVector();\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param number numElems\r\n   */\r\n   static startOpsetImportVector(builder: flatbuffers.Builder, numElems: number) {\r\n   builder.startVector(4, numElems, 4);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset producerNameOffset\r\n   */\r\n   static addProducerName(builder: flatbuffers.Builder, producerNameOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, producerNameOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset producerVersionOffset\r\n   */\r\n   static addProducerVersion(builder: flatbuffers.Builder, producerVersionOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(3, producerVersionOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset domainOffset\r\n   */\r\n   static addDomain(builder: flatbuffers.Builder, domainOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(4, domainOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Long modelVersion\r\n   */\r\n   static addModelVersion(builder: flatbuffers.Builder, modelVersion: flatbuffers.Long) {\r\n   builder.addFieldInt64(5, modelVersion, builder.createLong(0, 0));\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset docStringOffset\r\n   */\r\n   static addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(6, docStringOffset, 0);\r\n   }\r\n\r\n   /**\r\n * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset graphOffset\r\n   */\r\n   static addGraph(builder: flatbuffers.Builder, graphOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(7, graphOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset graphDocStringOffset\r\n   */\r\n   static addGraphDocString(builder: flatbuffers.Builder, graphDocStringOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(8, graphDocStringOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @returns flatbuffers.Offset\r\n   */\r\n   static endModel(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n   let offset = builder.endObject();\r\n   return offset;\r\n   }\r\n\r\n static createModel(\r\n   builder: flatbuffers.Builder, irVersion: flatbuffers.Long, opsetImportOffset: flatbuffers.Offset,\r\n   producerNameOffset: flatbuffers.Offset, producerVersionOffset: flatbuffers.Offset,\r\n domainOffset: flatbuffers.Offset, modelVersion: flatbuffers.Long, docStringOffset: flatbuffers.Offset,\r\n graphOffset: flatbuffers.Offset, graphDocStringOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n Model.startModel(builder);\r\n   Model.addIrVersion(builder, irVersion);\r\n   Model.addOpsetImport(builder, opsetImportOffset);\r\n   Model.addProducerName(builder, producerNameOffset);\r\n Model.addProducerVersion(builder, producerVersionOffset);\r\n   Model.addDomain(builder, domainOffset);\r\n   Model.addModelVersion(builder, modelVersion);\r\n   Model.addDocString(builder, docStringOffset);\r\n Model.addGraph(builder, graphOffset);\r\n   Model.addGraphDocString(builder, graphDocStringOffset);\r\n return Model.endModel(builder);\r\n   }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class KernelCreateInfos {\r\n   bb: flatbuffers.ByteBuffer|null =

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null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     *
@returns KernelCreateInfos\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): KernelCreateInfos {\r\n
this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer
bb\r\n     * @param KernelCreateInfos= obj\r\n     * @returns KernelCreateInfos\r\n     */\r\n    static
getRootAsKernelCreateInfos(bb: flatbuffers.ByteBuffer, obj?: KernelCreateInfos): KernelCreateInfos {\r\n
return (obj || new KernelCreateInfos()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param KernelCreateInfos= obj\r\n     * @returns
KernelCreateInfos\r\n     */\r\n    static getSizePrefixedRootAsKernelCreateInfos(bb: flatbuffers.ByteBuffer, obj?:
KernelCreateInfos):\r\n        KernelCreateInfos {\r\n      bb.setPosition(bb.position() +
flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
KernelCreateInfos()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
number index\r\n     * @returns number\r\n     */\r\n    nodeIndices(index: number): number|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? this.bb!.readUint32(this.bb!.__vector(this.bb_pos + offset) +
index * 4) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodeIndicesLength(): number {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n
}\r\n\r\n    /**\r\n     * @returns Uint32Array\r\n     */\r\n    nodeIndicesArray(): Uint32Array|null {\r\n      let offset
= this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ?\r\n          new Uint32Array(\r\n
this.bb!.bytes().buffer, this.bb!.bytes().byteOffset + this.bb!.__vector(this.bb_pos + offset),\r\n
this.bb!.__vector_len(this.bb_pos + offset)) :\r\n          null;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n
* @returns flatbuffers.Long\r\n     */\r\n    kernelDefHashes(index: number): flatbuffers.Long|null {\r\n      let offset
= this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? this.bb!.readUint64(this.bb!.__vector(this.bb_pos + offset)
+ index * 8) :\r\n                      this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n
kernelDefHashesLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ?
this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
*/\r\n    static startKernelCreateInfos(builder: flatbuffers.Builder) {\r\n      builder.startObject(2);\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset nodeIndicesOffset\r\n     */\r\n
static addNodeIndices(builder: flatbuffers.Builder, nodeIndicesOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(0, nodeIndicesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
 * @param Array.<number> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createNodeIndicesVector(builder: flatbuffers.Builder, data: number[]|Uint8Array): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addInt32(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startNodeIndicesVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset kernelDefHashesOffset\r\n     */\r\n    static
addKernelDefHashes(builder: flatbuffers.Builder, kernelDefHashesOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, kernelDefHashesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param Array.<flatbuffers.Long> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createKernelDefHashesVector(builder: flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n
builder.startVector(8, data.length, 8);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addInt64(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startKernelDefHashesVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(8,
numElems, 8);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns
flatbuffers.Offset\r\n     */\r\n    static endKernelCreateInfos(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n
let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createKernelCreateInfos(\r\n        builder:
flatbuffers.Builder, nodeIndicesOffset: flatbuffers.Offset,\r\n        kernelDefHashesOffset: flatbuffers.Offset):
flatbuffers.Offset {\r\n      KernelCreateInfos.startKernelCreateInfos(builder);\r\n
```

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KernelCreateInfos.addNodeIndices(builder, nodeIndicesOffset);\r\n
KernelCreateInfos.addKernelDefHashes(builder, kernelDefHashesOffset);\r\n      return
KernelCreateInfos.endKernelCreateInfos(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport
namespace onnxruntime.experimental.fbs {\r\n  export class SubGraphSessionState {\r\n    bb:
flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @returns SubGraphSessionState\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): SubGraphSessionState {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param SubGraphSessionState= obj\r\n     *
@returns SubGraphSessionState\r\n     */\r\n    static getRootAsSubGraphSessionState(bb: flatbuffers.ByteBuffer,
obj?: SubGraphSessionState): SubGraphSessionState {\r\n      return (obj || new
SubGraphSessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.ByteBuffer bb\r\n     * @param SubGraphSessionState= obj\r\n     * @returns
SubGraphSessionState\r\n     */\r\n    static getSizePrefixedRootAsSubGraphSessionState(bb:
flatbuffers.ByteBuffer, obj?: SubGraphSessionState):\r\n        SubGraphSessionState {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
SubGraphSessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    graphId():
string|null;\r\n    graphId(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
graphId(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.SessionState= obj\r\n     * @returns
onnxruntime.experimental.fbs.SessionState|null\r\n     */\r\n    sessionState(obj?:
onnxruntime.experimental.fbs.SessionState): onnxruntime.experimental.fbs.SessionState|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.SessionState())\r\n
                  .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                   null;\r\n    }\r\n\r\n    /**\r\n
  * @param flatbuffers.Builder builder\r\n     */\r\n    static startSubGraphSessionState(builder: flatbuffers.Builder)
{\r\n      builder.startObject(2);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset graphIdOffset\r\n     */\r\n    static addGraphId(builder: flatbuffers.Builder, graphIdOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, graphIdOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset sessionStateOffset\r\n     */\r\n    static
addSessionState(builder: flatbuffers.Builder, sessionStateOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, sessionStateOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
 * @returns flatbuffers.Offset\r\n     */\r\n    static endSubGraphSessionState(builder: flatbuffers.Builder):
flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      builder.requiredField(offset, 4);  // graph_id\r\n
return offset;\r\n    }\r\n\r\n    static createSubGraphSessionState(\r\n        builder: flatbuffers.Builder, graphIdOffset:
flatbuffers.Offset,\r\n        sessionStateOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
SubGraphSessionState.startSubGraphSessionState(builder);\r\n      SubGraphSessionState.addGraphId(builder,
graphIdOffset);\r\n      SubGraphSessionState.addSessionState(builder, sessionStateOffset);\r\n      return
SubGraphSessionState.endSubGraphSessionState(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n
*/\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class SessionState {\r\n    bb:
flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @returns SessionState\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer):
SessionState {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param SessionState= obj\r\n     * @returns SessionState\r\n     */\r\n    static
getRootAsSessionState(bb: flatbuffers.ByteBuffer, obj?: SessionState): SessionState {\r\n      return (obj || new
SessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param SessionState= obj\r\n     * @returns SessionState\r\n     */\r\n    static
getSizePrefixedRootAsSessionState(bb: flatbuffers.ByteBuffer, obj?: SessionState): SessionState {\r\n
```

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bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
SessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.KernelCreateInfos= obj\r\n     * @returns
onnxruntime.experimental.fbs.KernelCreateInfos|null\r\n     */\r\n    kernels(obj?:
onnxruntime.experimental.fbs.KernelCreateInfos): onnxruntime.experimental.fbs.KernelCreateInfos|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.KernelCreateInfos())\r\n                        .__init(this.bb!.__indirect(this.bb_pos +
offset), this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.SubGraphSessionState= obj\r\n     * @returns
onnxruntime.experimental.fbs.SubGraphSessionState\r\n     */\r\n    subGraphSessionStates(index: number, obj?:
onnxruntime.experimental.fbs.SubGraphSessionState):\r\n
onnxruntime.experimental.fbs.SubGraphSessionState|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
 return offset ? (obj || new onnxruntime.experimental.fbs.SubGraphSessionState())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    subGraphSessionStatesLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startSessionState(builder: flatbuffers.Builder)
{\r\n      builder.startObject(2);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset kernelsOffset\r\n     */\r\n    static addKernels(builder: flatbuffers.Builder, kernelsOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, kernelsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset subGraphSessionStatesOffset\r\n     */\r\n    static
addSubGraphSessionStates(builder: flatbuffers.Builder, subGraphSessionStatesOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, subGraphSessionStatesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createSubGraphSessionStatesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]):\r\n
flatbuffers.Offset {\r\n      builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startSubGraphSessionStatesVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4,
numElems, 4);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns
flatbuffers.Offset\r\n     */\r\n    static endSessionState(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let
offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createSessionState(\r\n        builder:
flatbuffers.Builder, kernelsOffset: flatbuffers.Offset,\r\n        subGraphSessionStatesOffset: flatbuffers.Offset):
flatbuffers.Offset {\r\n      SessionState.startSessionState(builder);\r\n      SessionState.addKernels(builder,
kernelsOffset);\r\n      SessionState.addSubGraphSessionStates(builder, subGraphSessionStatesOffset);\r\n      return
SessionState.endSessionState(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n  export class InferenceSession {\r\n    bb: flatbuffers.ByteBuffer|null =
null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     *
@returns InferenceSession\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): InferenceSession {\r\n
this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer
bb\r\n     * @param InferenceSession= obj\r\n     * @returns InferenceSession\r\n     */\r\n    static
getRootAsInferenceSession(bb: flatbuffers.ByteBuffer, obj?: InferenceSession): InferenceSession {\r\n      return
(obj || new InferenceSession()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.ByteBuffer bb\r\n     * @param InferenceSession= obj\r\n     * @returns InferenceSession\r\n
*/\r\n    static getSizePrefixedRootAsInferenceSession(bb: flatbuffers.ByteBuffer, obj?: InferenceSession):
InferenceSession {\r\n      bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj ||
new InferenceSession()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @returns boolean\r\n     */\r\n    static bufferHasIdentifier(bb:
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flatbuffers.ByteBuffer): boolean {\r\n return bb.__has_identifier('ORTM');\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n ortVersion(): string|null;\r\n ortVersion(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n ortVersion(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.Model= obj\r\n * @returns onnxruntime.experimental.fbs.Model|null\r\n */\r\n model(obj?: onnxruntime.experimental.fbs.Model): onnxruntime.experimental.fbs.Model|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Model())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.SessionState= obj\r\n * @returns onnxruntime.experimental.fbs.SessionState|null\r\n */\r\n sessionState(obj?: onnxruntime.experimental.fbs.SessionState): onnxruntime.experimental.fbs.SessionState|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.SessionState())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startInferenceSession(builder: flatbuffers.Builder) {\r\n builder.startObject(3);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset ortVersionOffset\r\n */\r\n static addOrtVersion(builder: flatbuffers.Builder, ortVersionOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, ortVersionOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset modelOffset\r\n */\r\n static addModel(builder: flatbuffers.Builder, modelOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, modelOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset sessionStateOffset\r\n */\r\n static addSessionState(builder: flatbuffers.Builder, sessionStateOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, sessionStateOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endInferenceSession(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset offset\r\n */\r\n static finishInferenceSessionBuffer(builder: flatbuffers.Builder, offset: flatbuffers.Offset) {\r\n builder.finish(offset, 'ORTM');\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset offset\r\n */\r\n static finishSizePrefixedInferenceSessionBuffer(builder: flatbuffers.Builder, offset: flatbuffers.Offset) {\r\n builder.finish(offset, 'ORTM', true);\r\n }\r\n\r\n static createInferenceSession(\r\n builder: flatbuffers.Builder, ortVersionOffset: flatbuffers.Offset, modelOffset: flatbuffers.Offset,\r\n sessionStateOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n InferenceSession.startInferenceSession(builder);\r\n InferenceSession.addOrtVersion(builder, ortVersionOffset);\r\n InferenceSession.addModel(builder, modelOffset);\r\n InferenceSession.addSessionState(builder, sessionStateOffset);\r\n return InferenceSession.endInferenceSession(builder);\r\n }\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceSession, SessionHandler, Tensor} from 'onnxruntime-common';\r\nimport {Session} from './session';\r\nimport {Tensor as OnnxjsTensor} from './tensor';\r\n\r\nexport class OnnxjsSessionHandler implements SessionHandler {\r\n constructor(private session: Session) {\r\n this.inputNames = this.session.inputNames;\r\n this.outputNames = this.session.outputNames;\r\n }\r\n\r\n async dispose(): Promise<void> {}\r\n inputNames: readonly string[];\r\n outputNames: readonly string[];\r\n async run(\r\n feeds: SessionHandler.FeedsType, _fetches: SessionHandler.FetchesType,\r\n _options: InferenceSession.RunOptions): Promise<SessionHandler.ReturnType> {\r\n const inputMap = new Map<string, OnnxjsTensor>();\r\n for (const name in feeds) {\r\n if (Object.hasOwnProperty.call(feeds, name)) {\r\n const feed = feeds[name];\r\n inputMap.set(\r\n name,\r\n new OnnxjsTensor(\r\n feed.dims, feed.type as OnnxjsTensor.DataType, undefined, undefined,\r\n feed.data as OnnxjsTensor.NumberType));\r\n }\r\n }\r\n const outputMap = await this.session.run(inputMap);\r\n const output: SessionHandler.ReturnType = {};\r\n outputMap.forEach((tensor, name) => {\r\n output[name] = new

Tensor(tensor.type, tensor.data, tensor.dims);\r\n   });\r\n   return output;\r\n }\r\n startProfiling(): void {\r\n   this.session.startProfiling();\r\n }\r\n endProfiling(): void {\r\n   this.session.endProfiling();\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {readFile} from 'fs';\r\nimport {promisify} from 'util';\r\n\r\nimport {resolveBackend, SessionHandlerType} from './backend';\r\nimport {ExecutionPlan} from './execution-plan';\r\nimport {Graph} from './graph';\r\nimport {Profiler} from './instrument';\r\nimport {Model} from './model';\r\nimport {Operator} from './operators';\r\nimport {Tensor} from './tensor';\r\n\r\nexport declare namespace Session {\r\n export interface Config {\r\n   backendHint?: string;\r\n   profiler?: Profiler.Config;\r\n }\r\n\r\n export interface Context {\r\n   profiler: Readonly<Profiler>;\r\n   graphInputTypes?: Tensor.DataType[];\r\n   graphInputDims?: Array<readonly number[]>;\r\n }\r\n}\r\n\r\nexport class Session {\r\n constructor(config: Session.Config = {}) {\r\n   this._initialized = false;\r\n   this.backendHint = config.backendHint;\r\n   this.profiler = Profiler.create(config.profiler);\r\n   this.context = {profiler: this.profiler, graphInputTypes: [], graphInputDims: []};\r\n }\r\n\r\n get inputNames(): readonly string[] {\r\n   return this._model.graph.getInputNames();\r\n }\r\n get outputNames(): readonly string[] {\r\n   return this._model.graph.getOutputNames();\r\n }\r\n\r\n startProfiling() {\r\n   this.profiler.start();\r\n }\r\n\r\n endProfiling() {\r\n   this.profiler.stop();\r\n }\r\n\r\n async loadModel(uri: string): Promise<void>;\r\n async loadModel(buffer: ArrayBuffer, byteOffset?: number, length?: number): Promise<void>;\r\n async loadModel(buffer: Uint8Array): Promise<void>;\r\n async loadModel(arg: string|ArrayBuffer|Uint8Array, byteOffset?: number, length?: number): Promise<void> {\r\n   await this.profiler.event('session', 'Session.loadModel', async () => {\r\n   // resolve backend and session handler\r\n   const backend = await resolveBackend(this.backendHint);\r\n   this.sessionHandler = backend.createSessionHandler(this.context);\r\n\r\n   this._model = new Model();\r\n   if (typeof arg === 'string') {\r\n   const isOrtFormat = arg.endsWith('.ort');\r\n   if (typeof fetch === 'undefined') {\r\n   // node\r\n   const buf = await promisify(readFile)(arg);\r\n   this.initialize(Buffer.from(buf), isOrtFormat);\r\n   } else {\r\n   // browser\r\n   const response = await fetch(arg);\r\n   const buf = await response.arrayBuffer();\r\n   this.initialize(new Uint8Array(buf), isOrtFormat);\r\n   }\r\n   } else if (!ArrayBuffer.isView(arg)) {\r\n   // load model from ArrayBuffer\r\n   const arr = new Uint8Array(arg, byteOffset || 0, length || arg.byteLength);\r\n   this.initialize(arr);\r\n   } else {\r\n   // load model from Uint8array\r\n   this.initialize(arg);\r\n   }\r\n   });\r\n }\r\n\r\n private initialize(modelProtoBlob: Uint8Array, isOrtFormat?: boolean): void {\r\n   if (this._initialized) {\r\n   throw new Error('already initialized');\r\n   }\r\n\r\n   this.profiler.event('session', 'Session.initialize', () => {\r\n   // load graph\r\n   const graphInitializer =\r\n   this.sessionHandler.transformGraph ? this.sessionHandler as Graph.Initializer : undefined;\r\n   this._model.load(modelProtoBlob, graphInitializer, isOrtFormat);\r\n\r\n   // graph is completely initialzied at this stage , let the interested handlers know\r\n   if (this.sessionHandler.onGraphInitialized) {\r\n   this.sessionHandler.onGraphInitialized(this._model.graph);\r\n   }\r\n   // initialize each operator in the graph\r\n   this.initializeOps(this._model.graph);\r\n\r\n   // instantiate an ExecutionPlan object to be used by the Session object\r\n   this._executionPlan = new ExecutionPlan(this._model.graph, this._ops, this.profiler);\r\n   });\r\n\r\n   this._initialized = true;\r\n }\r\n\r\n async run(inputs: Map<string, Tensor>|Tensor[]): Promise<Map<string, Tensor>> {\r\n   if (!this._initialized) {\r\n   throw new Error('session not initialized yet');\r\n   }\r\n\r\n   return this.profiler.event('session', 'Session.run', async () => {\r\n   const inputTensors = this.normalizeAndValidateInputs(inputs);\r\n\r\n   const outputTensors = await this._executionPlan.execute(this.sessionHandler, inputTensors);\r\n\r\n   return this.createOutput(outputTensors);\r\n   });\r\n }\r\n\r\n private normalizeAndValidateInputs(inputs: Map<string, Tensor>|Tensor[]): Tensor[] {\r\n   const modelInputNames = this._model.graph.getInputNames();\r\n\r\n   // normalize inputs\r\n   // inputs: Tensor[]\r\n   if (Array.isArray(inputs)) {\r\n   if (inputs.length !== modelInputNames.length) {\r\n   throw new Error(`incorrect input array length: expected ${modelInputNames.length} but got ${inputs.length}`);\r\n   }\r\n   }\r\n   // convert map to array\r\n   // inputs: Map<string, Tensor>\r\n   else {\r\n   if (inputs.size !== modelInputNames.length) {\r\n   throw new Error(`incorrect input map size: expected ${modelInputNames.length} but got ${inputs.size}`);\r\n   }\r\n\r\n

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const sortedInputs = new Array<Tensor>(inputs.size);\r\n      let sortedInputsIndex = 0;\r\n      for (let i = 0; i <
modelInputNames.length; ++i) {\r\n        const tensor = inputs.get(modelInputNames[i]);\r\n        if (!tensor) {\r\n
   throw new Error(`missing input tensor for: '${name}'`);\r\n        }\r\n        sortedInputs[sortedInputsIndex++] =
tensor;\r\n      }\r\n\r\n      inputs = sortedInputs;\r\n    }\r\n\r\n    // validate dims requirements\r\n    // First session
run - graph input data is not cached for the session\r\n    if (!this.context.graphInputTypes ||
this.context.graphInputTypes.length === 0 || !this.context.graphInputDims ||\r\n
this.context.graphInputDims.length === 0) {\r\n      const modelInputIndices =
this._model.graph.getInputIndices();\r\n      const modelValues = this._model.graph.getValues();\r\n\r\n      const
graphInputDims = new Array<readonly number[]>(modelInputIndices.length);\r\n\r\n      for (let i = 0; i <
modelInputIndices.length; ++i) {\r\n        const graphInput = modelValues[modelInputIndices[i]];\r\n
graphInputDims[i] = graphInput.type!.shape.dims;\r\n\r\n        // cached for second and subsequent runs.\r\n        //
Some parts of the framework works on the assumption that the graph and types and shapes are static\r\n
this.context.graphInputTypes!.push(graphInput.type!.tensorType);\r\n
this.context.graphInputDims!.push(inputs[i].dims);\r\n      }\r\n\r\n
this.validateInputTensorDims(graphInputDims, inputs, true);\r\n    }\r\n\r\n    // Second and subsequent session runs
- graph input data is cached for the session\r\n    else {\r\n
this.validateInputTensorDims(this.context.graphInputDims, inputs, false);\r\n    }\r\n\r\n    // validate types
requirement\r\n    this.validateInputTensorTypes(this.context.graphInputTypes!, inputs);\r\n\r\n    return inputs;\r\n
}\r\n\r\n  private validateInputTensorTypes(graphInputTypes: Tensor.DataType[], givenInputs: Tensor[]) {\r\n    for
(let i = 0; i < givenInputs.length; i++) {\r\n      const expectedType = graphInputTypes[i];\r\n      const actualType =
givenInputs[i].type;\r\n      if (expectedType !== actualType) {\r\n        throw new Error(`input tensor[${i}] check
failed: expected type '${expectedType}' but got ${actualType}`);\r\n      }\r\n    }\r\n  }\r\n\r\n  private
validateInputTensorDims(\r\n      graphInputDims: Array<readonly number[]>, givenInputs: Tensor[],
noneDimSupported: boolean) {\r\n    for (let i = 0; i < givenInputs.length; i++) {\r\n      const expectedDims =
graphInputDims[i];\r\n      const actualDims = givenInputs[i].dims;\r\n      if
(!this.compareTensorDims(expectedDims, actualDims, noneDimSupported)) {\r\n        throw new Error(`input
tensor[${i}] check failed: expected shape '[${expectedDims.join(',')}]' but got [${\r\n
actualDims.join(',')}]`);\r\n      }\r\n    }\r\n  }\r\n\r\n  private compareTensorDims(expectedDims: readonly
number[], actualDims: readonly number[], noneDimSupported: boolean):\r\n      boolean {\r\n    if
(expectedDims.length !== actualDims.length) {\r\n      return false;\r\n    }\r\n\r\n    for (let i = 0; i <
expectedDims.length; ++i) {\r\n      if (expectedDims[i] !== actualDims[i] && (!noneDimSupported ||
expectedDims[i] !== 0)) {\r\n        // data shape mis-match AND not a 'None' dimension.\r\n        return false;\r\n
}\r\n    }\r\n\r\n    return true;\r\n  }\r\n\r\n  private createOutput(outputTensors: Tensor[]): Map<string, Tensor>
{\r\n    const modelOutputNames = this._model.graph.getOutputNames();\r\n    if (outputTensors.length !==
modelOutputNames.length) {\r\n      throw new Error('expected number of outputs do not match number of
generated outputs');\r\n    }\r\n\r\n    const output = new Map<string, Tensor>();\r\n    for (let i = 0; i <
modelOutputNames.length; ++i) {\r\n      output.set(modelOutputNames[i], outputTensors[i]);\r\n    }\r\n\r\n    return
output;\r\n  }\r\n\r\n  private initializeOps(graph: Graph): void {\r\n    const nodes = graph.getNodes();\r\n
this._ops = new Array(nodes.length);\r\n\r\n    for (let i = 0; i < nodes.length; i++) {\r\n      this._ops[i] =
this.sessionHandler.resolve(nodes[i], this._model.opsets, graph);\r\n    }\r\n  }\r\n\r\n  private _model: Model;\r\n
private _initialized: boolean;\r\n\r\n  private _ops: Operator[];\r\n  private _executionPlan: ExecutionPlan;\r\n\r\n
private backendHint?: string;\r\n\r\n  private sessionHandler: SessionHandlerType;\r\n  private context:
Session.Context;\r\n  private profiler: Readonly<Profiler>;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All
rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Guid} from 'guid-typescript';\r\nimport Long
from 'long';\r\nimport {onnx} from 'onnx-proto';\r\n\r\nimport {onnxruntime} from './ort-schema/ort-
generated';\r\n\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\n\r\nimport {ProtoUtil, ShapeUtil} from
'./util';\r\n\r\nexport declare namespace Tensor {\r\n  export interface DataTypeMap {\r\n    bool: Uint8Array;\r\n
float32: Float32Array;\r\n    float64: Float64Array;\r\n    string: string[];\r\n    int8: Int8Array;\r\n    uint8:
```

Uint8Array;\r\n   int16: Int16Array;\r\n   uint16: Uint16Array;\r\n   int32: Int32Array;\r\n   uint32: Uint32Array;\r\n }\r\n\r\n export type DataType = keyof DataTypeMap;\r\n\r\n export type StringType = Tensor.DataTypeMap['string'];\r\n export type BooleanType = Tensor.DataTypeMap['bool'];\r\n export type IntegerType = Tensor.DataTypeMap['int8']|Tensor.DataTypeMap['uint8']|Tensor.DataTypeMap['int16']|\r\n

Tensor.DataTypeMap['uint16']|Tensor.DataTypeMap['int32']|Tensor.DataTypeMap['uint32'];\r\n export type FloatType = Tensor.DataTypeMap['float32']|Tensor.DataTypeMap['float64'];\r\n export type NumberType = BooleanType|IntegerType|FloatType;\r\n\r\n export type Id = Guid;\r\n}\r\n\r\ntype TensorData = Tensor.DataTypeMap[Tensor.DataType];\r\n\r\ntype DataProvider = (id: Tensor.Id) => TensorData;\r\ntype AsyncDataProvider = (id: Tensor.Id) => Promise<TensorData>;\r\n\r\nexport class Tensor {\r\n /**\r\n   * get the underlying tensor data\r\n   */\r\n get data(): TensorData {\r\n   if (this.cache === undefined) {\r\n   const data = this.dataProvider!(this.dataId);\r\n   if (data.length !== this.size) {\r\n   throw new Error('Length of data provided by the Data Provider is inconsistent with the dims of this Tensor.');\r\n   }\r\n   this.cache = data;\r\n   }\r\n   return this.cache;\r\n }\r\n\r\n /**\r\n   * get the underlying string tensor data. Should only use when type is STRING\r\n   */\r\n get stringData() {\r\n   if (this.type !== 'string') {\r\n   throw new TypeError('data type is not string');\r\n   }\r\n\r\n   return this.data as Tensor.StringType;\r\n }\r\n\r\n /**\r\n   * get the underlying integer tensor data. Should only use when type is one of the following: (UINT8, INT8, UINT16,\r\n   * INT16, INT32, UINT32, BOOL)\r\n   */\r\n get integerData() {\r\n   switch (this.type) {\r\n   case 'uint8':\r\n   case 'int8':\r\n   case 'uint16':\r\n   case 'int16':\r\n   case 'int32':\r\n   case 'uint32':\r\n   case 'bool':\r\n   return this.data as Tensor.IntegerType;\r\n\r\n   default:\r\n   throw new TypeError('data type is not integer (uint8, int8, uint16, int16, int32, uint32, bool)');\r\n   }\r\n }\r\n\r\n /**\r\n   * get the underlying float tensor data. Should only use when type is one of the following: (FLOAT, DOUBLE)\r\n   */\r\n get floatData() {\r\n   switch (this.type) {\r\n   case 'float32':\r\n   case 'float64':\r\n   return this.data as Tensor.FloatType;\r\n\r\n   default:\r\n   throw new TypeError('data type is not float (float32, float64)');\r\n   }\r\n }\r\n\r\n /**\r\n   * get the underlying number tensor data. Should only use when type is one of the following: (UINT8, INT8, UINT16,\r\n   * INT16, INT32, UINT32, BOOL, FLOAT, DOUBLE)\r\n   */\r\n get numberData() {\r\n   if (this.type !== 'string') {\r\n   return this.data as Tensor.NumberType;\r\n   }\r\n   throw new TypeError('type cannot be non-number (string)');\r\n }\r\n\r\n /**\r\n   * get value of an element at the given indices\r\n   */\r\n get(indices: readonly number[]): Tensor.DataTypeMap[Tensor.DataType][number] {\r\n   return this.data[ShapeUtil.indicesToOffset(indices, this.strides)];\r\n }\r\n\r\n /**\r\n   * set value of an element at the given indices\r\n   */\r\n set(indices: readonly number[], value: Tensor.DataTypeMap[Tensor.DataType][number]) {\r\n this.data[ShapeUtil.indicesToOffset(indices, this.strides)] = value;\r\n }\r\n\r\n /**\r\n   * get the underlying tensor data asynchronously\r\n   */\r\n async getData(): Promise<TensorData> {\r\n   if (this.cache === undefined) {\r\n   this.cache = await this.asyncDataProvider!(this.dataId);\r\n   }\r\n   return this.cache;\r\n }\r\n\r\n /**\r\n   * get the number of elements in the tensor\r\n   */\r\n public readonly size: number;\r\n\r\n private _strides: readonly number[];\r\n /**\r\n   * get the strides for each dimension\r\n   */\r\n get strides(): readonly number[] {\r\n   if (!this._strides) {\r\n   this._strides = ShapeUtil.computeStrides(this.dims);\r\n   }\r\n   return this._strides;\r\n }\r\n\r\n constructor(\r\n   /**\r\n   * get the dimensions of the tensor\r\n   */\r\n   public readonly dims: readonly number[],\r\n   /**\r\n   * get the type of the tensor\r\n   */\r\n   public readonly type: Tensor.DataType, private dataProvider?: DataProvider,\r\n   private asyncDataProvider?: AsyncDataProvider, private cache?: TensorData,\r\n   /**\r\n   * get the data ID that used to map to a tensor data\r\n   */\r\n   public readonly dataId: Guid = Guid.create()) {\r\n   this.size = ShapeUtil.validateDimsAndCalcSize(dims);\r\n   const size = this.size;\r\n   const empty = (dataProvider === undefined && asyncDataProvider === undefined && cache === undefined);\r\n\r\n   if (cache !== undefined) {\r\n   if (cache.length !== size) {\r\n   throw new RangeError('Input dims doesn\\'t match data length.');\r\n   }\r\n   }\r\n\r\n   if (type === 'string') {\r\n   if (cache !== undefined && (!Array.isArray(cache) || !cache.every(i => typeof i === 'string'))) {\r\n   throw new TypeError('cache should be a string array');\r\n   }\r\n\r\n   if (empty) {\r\n   this.cache = new Array<string>(size);\r\n   }\r\n   } else {\r\n   if (cache !== undefined) {\r\n   const constructor = dataviewConstructor(type);\r\n   if (!(cache instanceof constructor)) {\r\n   throw new TypeError(`cache should be type ${constructor.name}`);\r\n   }\r\n   }\r\n\r\n   if (empty) {\r\n   const buf = new ArrayBuffer(size * sizeof(type));\r\n   this.cache = createView(buf, type);\r\n   }\r\n   }\r\n }\r\n\r\n /**\r\n   * Construct new Tensor from a ONNX Tensor object\r\n   * @param tensorProto the ONNX Tensor\r\n   */\r\n static fromProto(tensorProto: onnx.ITensorProto): Tensor {\r\n   if (!tensorProto) {\r\n   throw new Error('cannot construct Value from an empty tensor');\r\n   }\r\n   const type = ProtoUtil.tensorDataTypeFromProto(tensorProto.dataType!);\r\n   const dims = ProtoUtil.tensorDimsFromProto(tensorProto.dims!);\r\n\r\n   const value = new Tensor(dims, type);\r\n\r\n   if (type === 'string') {\r\n   // When it's STRING type, the value should always be stored in field\r\n   // 'stringData'\r\n   tensorProto.stringData!.forEach((str, i) => {\r\n   const buf = Buffer.from(str.buffer, str.byteOffset, str.byteLength);\r\n   value.data[i] = buf.toString();\r\n   });\r\n\r\n   } else if (\r\n tensorProto.rawData && typeof tensorProto.rawData.byteLength === 'number' &&\r\n tensorProto.rawData.byteLength > 0) {\r\n   // NOT considering segment for now (IMPORTANT)\r\n\r\n   // populate value from rawData\r\n   const dataDest = value.data;\r\n   const dataSource =\r\n   new DataView(tensorProto.rawData.buffer, tensorProto.rawData.byteOffset, tensorProto.rawData.byteLength);\r\n const elementSize = sizeofProto(tensorProto.dataType!);\r\n   const length = tensorProto.rawData.byteLength / elementSize;\r\n\r\n   if (tensorProto.rawData.byteLength % elementSize !== 0) {\r\n   throw new Error('invalid buffer length');\r\n   }\r\n   if (dataDest.length !== length) {\r\n   throw new Error('buffer length mismatch');\r\n   }\r\n\r\n   for (let i = 0; i < length; i++) {\r\n   const n = readProto(dataSource, tensorProto.dataType!, i * elementSize);\r\n   dataDest[i] = n;\r\n   }\r\n   } else {\r\n   // populate value from array\r\n   let array: Array<number|Long>;\r\n   switch (tensorProto.dataType) {\r\n   case onnx.TensorProto.DataType.FLOAT:\r\n   array = tensorProto.floatData!;\r\n   break;\r\n   case onnx.TensorProto.DataType.INT32:\r\n   case onnx.TensorProto.DataType.INT16:\r\n   case onnx.TensorProto.DataType.UINT16:\r\n   case onnx.TensorProto.DataType.INT8:\r\n   case onnx.TensorProto.DataType.UINT8:\r\n   case onnx.TensorProto.DataType.BOOL:\r\n   array = tensorProto.int32Data!;\r\n   break;\r\n   case onnx.TensorProto.DataType.INT64:\r\n   array = tensorProto.int64Data!;\r\n   break;\r\n   case onnx.TensorProto.DataType.DOUBLE:\r\n   array = tensorProto.doubleData!;\r\n   break;\r\n   case onnx.TensorProto.DataType.UINT32:\r\n   case onnx.TensorProto.DataType.UINT64:\r\n   array = tensorProto.uint64Data!;\r\n   break;\r\n   default:\r\n   // should never run here\r\n   throw new Error('unspecific error');\r\n   }\r\n\r\n   if (array === null || array === undefined) {\r\n   throw new Error('failed to populate data from a tensorproto value');\r\n   }\r\n\r\n   const data = value.data;\r\n   if (data.length !== array.length) {\r\n   throw new Error('array length mismatch');\r\n   }\r\n\r\n   for (let i = 0; i < array.length; i++) {\r\n   const element = array[i];\r\n   if (Long.isLong(element)) {\r\n   data[i] = longToNumber(element, tensorProto.dataType);\r\n   } else {\r\n   data[i] = element;\r\n   }\r\n   }\r\n   }\r\n\r\n   return value;\r\n }\r\n\r\n /**\r\n   * Construct new Tensor from raw data\r\n   * @param data the raw data object. Should be a string array for 'string' tensor, and the corresponding typed array\r\n   * for other types of tensor.\r\n   * @param dims the dimensions of the tensor\r\n   * @param type the type of the tensor\r\n   */\r\n static fromData(data: Tensor.DataTypeMap[Tensor.DataType], dims: readonly number[], type: Tensor.DataType) {\r\n   return new Tensor(dims, type, undefined, undefined, data);\r\n }\r\n\r\n static fromOrtTensor(ortTensor: ortFbs.Tensor) {\r\n   if (!ortTensor) {\r\n   throw new Error('cannot construct Value from an empty tensor');\r\n   }\r\n   const dims = ProtoUtil.tensorDimsFromORTFormat(ortTensor);\r\n   const type = ProtoUtil.tensorDataTypeFromProto(ortTensor.dataType());\r\n\r\n   const value = new Tensor(dims, type);\r\n\r\n if (type === 'string') {\r\n   // When it's STRING type, the value should always be stored in field\r\n   // 'stringData'\r\n   for (let i = 0; i < ortTensor.stringDataLength(); i++) {\r\n   value.data[i] = ortTensor.stringData(i);\r\n   }\r\n\r\n   } else if (\r\n   ortTensor.rawDataArray() && typeof ortTensor.rawDataLength() === 'number' && ortTensor.rawDataLength() > 0) {\r\n   // NOT considering segment for now (IMPORTANT)\r\n\r\n   // populate value from rawData\r\n   const dataDest = value.data;\r\n   const dataSource = new DataView(\r\n   ortTensor.rawDataArray()!.buffer, ortTensor.rawDataArray()!.byteOffset,

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ortTensor.rawDataLength());\r\n      const elementSize = sizeofProto(ortTensor.dataType());\r\n      const length =
ortTensor.rawDataLength() / elementSize;\r\n\r\n      if (ortTensor.rawDataLength() % elementSize !== 0) {\r\n
throw new Error('invalid buffer length');\r\n      }\r\n      if (dataDest.length !== length) {\r\n        throw new
Error('buffer length mismatch');\r\n      }\r\n\r\n      for (let i = 0; i < length; i++) {\r\n        const n =
readProto(dataSource, ortTensor.dataType(), i * elementSize);\r\n        dataDest[i] = n;\r\n      }\r\n    }\r\n    return
value;\r\n  }\r\n}\r\n\r\nfunction sizeof(type: Tensor.DataType): number {\r\n  switch (type) {\r\n    case 'bool':\r\n
case 'int8':\r\n    case 'uint8':\r\n      return 1;\r\n    case 'int16':\r\n    case 'uint16':\r\n      return 2;\r\n    case
'int32':\r\n    case 'uint32':\r\n    case 'float32':\r\n      return 4;\r\n    case 'float64':\r\n      return 8;\r\n    default:\r\n
throw new Error(`cannot calculate sizeof() on type ${type}`);\r\n  }\r\n}\r\n\r\nfunction sizeofProto(type:
onnx.TensorProto.DataType|ortFbs.TensorDataType): number {\r\n  switch (type) {\r\n    case
onnx.TensorProto.DataType.UINT8:\r\n    case onnx.TensorProto.DataType.INT8:\r\n    case
onnx.TensorProto.DataType.BOOL:\r\n      return 1;\r\n    case onnx.TensorProto.DataType.UINT16:\r\n    case
onnx.TensorProto.DataType.INT16:\r\n      return 2;\r\n    case onnx.TensorProto.DataType.FLOAT:\r\n    case
onnx.TensorProto.DataType.INT32:\r\n    case onnx.TensorProto.DataType.UINT32:\r\n      return 4;\r\n    case
onnx.TensorProto.DataType.INT64:\r\n    case onnx.TensorProto.DataType.DOUBLE:\r\n    case
onnx.TensorProto.DataType.UINT64:\r\n      return 8;\r\n    default:\r\n      throw new Error(`cannot calculate
sizeof() on type ${onnx.TensorProto.DataType[type]}`);\r\n  }\r\n}\r\n\r\nfunction createView(dataBuffer:
ArrayBuffer, type: Tensor.DataType) {\r\n  return new (dataviewConstructor(type))(dataBuffer);\r\n}\r\n\r\nfunction
dataviewConstructor(type: Tensor.DataType) {\r\n  switch (type) {\r\n    case 'bool':\r\n    case 'uint8':\r\n      return
Uint8Array;\r\n    case 'int8':\r\n      return Int8Array;\r\n    case 'int16':\r\n      return Int16Array;\r\n    case
'uint16':\r\n      return Uint16Array;\r\n    case 'int32':\r\n      return Int32Array;\r\n    case 'uint32':\r\n      return
Uint32Array;\r\n    case 'float32':\r\n      return Float32Array;\r\n    case 'float64':\r\n      return Float64Array;\r\n
default:\r\n      // should never run to here\r\n      throw new Error('unspecified error');\r\n  }\r\n}\r\n\r\n// convert a
long number to a 32-bit integer (cast-down)\r\nfunction longToNumber(i: Long, type:
onnx.TensorProto.DataType|ortFbs.TensorDataType): number {\r\n  // INT64, UINT32, UINT64\r\n  if (type ===
onnx.TensorProto.DataType.INT64 || type === ortFbs.TensorDataType.INT64) {\r\n    if
(i.greaterThanOrEqual(2147483648) || i.lessThan(-2147483648)) {\r\n      throw new TypeError('int64 is not
supported');\r\n    }\r\n  } else if (\r\n      type === onnx.TensorProto.DataType.UINT32 || type ===
ortFbs.TensorDataType.UINT32 ||\r\n      type === onnx.TensorProto.DataType.UINT64 || type ===
ortFbs.TensorDataType.UINT64) {\r\n    if (i.greaterThanOrEqual(4294967296) || i.lessThan(0)) {\r\n      throw new
TypeError('uint64 is not supported');\r\n    }\r\n  } else {\r\n    throw new TypeError(`not a LONG type:
${onnx.TensorProto.DataType[type]}`);\r\n  }\r\n\r\n  return i.toNumber();\r\n}\r\n\r\n// read one value from
TensorProto\r\nfunction readProto(view: DataView, type: onnx.TensorProto.DataType|ortFbs.TensorDataType,
byteOffset: number): number {\r\n  switch (type) {\r\n    case onnx.TensorProto.DataType.BOOL:\r\n    case
onnx.TensorProto.DataType.UINT8:\r\n      return view.getUint8(byteOffset);\r\n    case
onnx.TensorProto.DataType.INT8:\r\n      return view.getInt8(byteOffset);\r\n    case
onnx.TensorProto.DataType.UINT16:\r\n      return view.getUint16(byteOffset, true);\r\n    case
onnx.TensorProto.DataType.INT16:\r\n      return view.getInt16(byteOffset, true);\r\n    case
onnx.TensorProto.DataType.FLOAT:\r\n      return view.getFloat32(byteOffset, true);\r\n    case
onnx.TensorProto.DataType.INT32:\r\n      return view.getInt32(byteOffset, true);\r\n    case
onnx.TensorProto.DataType.UINT32:\r\n      return view.getUint32(byteOffset, true);\r\n    case
onnx.TensorProto.DataType.INT64:\r\n      return longToNumber(\r\n
Long.fromBits(view.getUint32(byteOffset, true), view.getUint32(byteOffset + 4, true), false), type);\r\n    case
onnx.TensorProto.DataType.DOUBLE:\r\n      return view.getFloat64(byteOffset, true);\r\n    case
onnx.TensorProto.DataType.UINT64:\r\n      return longToNumber(\r\n
Long.fromBits(view.getUint32(byteOffset, true), view.getUint32(byteOffset + 4, true), true), type);\r\n    default:\r\n
    throw new Error(`cannot read from DataView for type ${onnx.TensorProto.DataType[type]}`);\r\n  }\r\n}\r\n","//
Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
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{flatbuffers} from 'flatbuffers';\r\nimport Long from 'long';\r\nimport {onnx} from 'onnx-proto';\r\n\r\nimport
{Graph} from './graph';\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\nimport {Tensor} from
'./tensor';\r\n\r\n\r\n// check the inputs shape before running an OP.\r\n// return true when the inputs pass the check\r\n//
return false when the inputs do not fit the requirement\r\n// throw exception when fatal error or not
implemented\r\nexport function checkInputsShape(inputs: Tensor[], ...expectedDimensions: number[]): boolean
{\r\n  if (!inputs || inputs.length !== expectedDimensions.length) {\r\n    return false;\r\n  }\r\n  for (let i = 0; i <
inputs.length; i++) {\r\n    if (!inputs[i].dims || inputs[i].dims.length !== expectedDimensions[i]) {\r\n      return
false;\r\n    }\r\n  }\r\n  return true;\r\n}\r\n\r\n// Evaluates the given expression and asserts error message if
condition is unmet.\r\nexport function assert(expr: boolean, msg: () => string) {\r\n  if (!expr) {\r\n    throw new
Error(typeof msg === 'string' ? msg : msg());\r\n  }\r\n}\r\n\r\nexport class ArrayUtil {\r\n  /**\r\n   * Verifies if 2
input arrays contain the same elements.\r\n   * @param n1 Array 1\r\n   * @param n2 Array 2\r\n   * @returns
Whether these 2 are equal\r\n   */\r\n  static arraysEqual(\r\n      n1: readonly
number[]|Int8Array|Uint8Array|Int16Array|Uint16Array|Int32Array|Uint32Array|Uint8ClampedArray|\r\n
Float32Array|Float64Array,\r\n      n2: readonly
number[]|Int8Array|Uint8Array|Int16Array|Uint16Array|Int32Array|Uint32Array|Uint8ClampedArray|\r\n
Float32Array|Float64Array) {\r\n    if (n1.length !== n2.length) {\r\n      return false;\r\n    }\r\n    for (let i = 0; i <
n1.length; i++) {\r\n      if (n1[i] !== n2[i]) {\r\n        return false;\r\n      }\r\n    }\r\n    return true;\r\n
}\r\n}\r\n\r\nexport class MatMulUtil {\r\n  /**\r\n   * Fix the input shapes for MatMul operation if they need
fixing\r\n   * @param dimsA The shape of tensor A. Should be an array of positive integers\r\n   * @param dimsB
The shape of tensor B. Should be an array of positive integers\r\n   * @returns A tuple containing the preprocessed
input shapes as required by ONNX specifications\r\n   */\r\n  static preprocessInputShapes(dimsA: readonly
number[], dimsB: readonly number[]):\r\n      [readonly number[], readonly number[]] {\r\n    // If the first argument
is 1-D, it is promoted to a matrix by prepending\r\n    // a 1 to its dimensions. After matrix multiplication the
prepended 1 is\r\n    // removed.\r\n    const a = (dimsA.length === 1) ? [1, dimsA[0]] : dimsA;\r\n\r\n    // If the
second argument is 1-D, it is promoted to a matrix by appending\r\n    // a 1 to its dimensions. After matrix
multiplication the appended 1 is\r\n    // removed.\r\n    const b = (dimsB.length === 1) ? [dimsB[0], 1] :
dimsB;\r\n\r\n    return [a, b];\r\n  }\r\n\r\n  /**\r\n   * Fix the output shape computed for MatMul operation if it
needs fixing\r\n   * @param outputShape The computed outputShape. Should be an array (atleast of length 2) of
positive integers.\r\n   * This will be mutated.\r\n   * @param aRank The rank of tensor A.\r\n   * @param bRank
The rank of tensor B.\r\n   */\r\n  static postprocessOutputShape(outputShape: number[], aRank: number, bRank:
number) {\r\n    // Remove prepended dimension if first input is 1d\r\n    if (aRank === 1) {\r\n      // outputShape =
outputShape.slice(0, outputShape.length - 2).concat(outputShape.slice(outputShape.length - 1));\r\n
outputShape.splice(outputShape.length - 2, 1);\r\n    }\r\n    // Remove appended dimension if second input is 1d\r\n
if (bRank === 1) {\r\n      outputShape.pop();\r\n    }\r\n  }\r\n\r\n  /**\r\n   * Calculate the expected shape when
matrix multiplication\r\n   * @param a The shape of tensor A. Should be a tuple of 2 positive integers\r\n   *
@param b The shape of tensor B. Should be a tuple of 2 positive integers\r\n   * @returns The expected shape of the
result, or undefined if N/A\r\n   */\r\n  static calcMatMulShape(a: [number, number], b: [number, number]):
[number, number]|undefined {\r\n    return (a[1] !== b[0]) ? undefined : [a[0], b[1]];\r\n  }\r\n}\r\n\r\nexport class
BroadcastUtil {\r\n  /**\r\n   * Calculate the expected shape when broadcasting 2 tensors\r\n   * @param a The
shape of tensor A. Should be an array of positive integers\r\n   * @param b The shape of tensor B. Should be an
array of positive integers\r\n   * @param isMatMul Whether the operation is MatMul\r\n   * @returns The expected
shape of the result, or undefined if N/A\r\n   */\r\n  static calcShape(adims: readonly number[], bdims: readonly
number[], isMatMul = false): readonly number[]|undefined {\r\n    const arank = adims.length;\r\n    const brank =
bdims.length;\r\n    if (arank === 0) {\r\n      return bdims;\r\n    }\r\n    if (brank === 0) {\r\n      return adims;\r\n
}\r\n    const crank = Math.max(adims.length, bdims.length);\r\n    const cdims = new
Array<number>(crank);\r\n\r\n    // calculate the last 2 dimension if it is MatMul\r\n    if (isMatMul) {\r\n      if
(arank < 2 || brank < 2) {\r\n        return undefined;\r\n      }\r\n      const cShapeMatMul =\r\n
MatMulUtil.calcMatMulShape([adims[arank - 2], adims[arank - 1]], [bdims[brank - 2], bdims[brank - 1]]);\r\n      if
```

(cShapeMatMul === undefined) {\r\n return undefined;\r\n }\r\n [cdims[crank - 2], cdims[crank - 1]] = cShapeMatMul;\r\n }\r\n\r\n for (let i = isMatMul ? 3 : 1; i <= crank; i++) {\r\n const aLen = arank - i < 0 ? 1 : adims[arank - i];\r\n const bLen = brank - i < 0 ? 1 : bdims[brank - i];\r\n\r\n if (aLen !== bLen && aLen > 1 && bLen > 1) {\r\n return undefined;\r\n }\r\n cdims[crank - i] = Math.max(aLen, bLen);\r\n }\r\n\r\n return cdims;\r\n }\r\n\r\n /**\r\n * Given the indices of a broadcasted tensor, calculate the original indices\r\n * @param broadcastedIndices The given indices of the broadcasted tensor.\r\n * @param originalShape The original shape of the tensor before broadcas\r\n * @returns The calculated indices that maps to the original tensor.\r\n */\r\n static index(broadcastedIndices: readonly number[], originalShape: readonly number[]): number[] {\r\n // NOTE 1: we assume the parameter broadcastedIndices is valid. ie. it should have the same\r\n // length as the broadcasted shape, and for each dimension the index should\r\n // not be out of range.\r\n const originalIndices = new Array(originalShape.length);\r\n BroadcastUtil.fillIndex(broadcastedIndices, originalShape, originalIndices);\r\n return originalIndices;\r\n }\r\n\r\n /**\r\n * Given the indices of a broadcasted tensor, calculate the original indices\r\n * @param broadcastedIndices The given indices of the broadcasted tensor.\r\n * @param originalShape The original shape of the tensor before broadcast\r\n * @param originalIndices The mapping of broadcastedIndices to the originalIndices (output parameter - will be\r\n * mutated).\r\n */\r\n static fillIndex(broadcastedIndices: readonly number[], originalShape: readonly number[], originalIndices: number[]) {\r\n // NOTE 1: we assume the parameter broadcastedIndices is valid. ie. it should have the same length as the\r\n // broadcasted shape, and for each dimension the index should not be out of range.\r\n // NOTE 2: we assume the parameter originalIndices has the same length as the originalShape\r\n const dimOffset = broadcastedIndices.length - originalShape.length;\r\n for (let i = 0; i < originalShape.length; i++) {\r\n originalIndices[i] = broadcastedIndices[dimOffset + i] % originalShape[i];\r\n }\r\n }\r\n\r\n /**\r\n * Perform the broadcasting operation on the specific operator\r\n * @param a The input tensor A\r\n * @param b The input tensor B\r\n * @param op The operator lambda function\r\n * @param inplace Whether to write the result back to A.\r\n * @returns The result tensor, or undefined if input not broadcastable.\r\n */\r\n static calc(\r\n a: Tensor, b: Tensor, op: (a: string|number, b: string|number) => (string | number), inplace: boolean,\r\n resultType?: Tensor.DataType): Tensor|undefined {\r\n const outputShape = BroadcastUtil.calcShape(a.dims, b.dims);\r\n\r\n if (outputShape) {\r\n if (inplace && !ShapeUtil.areEqual(outputShape, a.dims)) {\r\n // B is not broadcastable to A, failed to calculate inplace.\r\n return undefined;\r\n }\r\n\r\n const size = ShapeUtil.size(outputShape);\r\n const c = inplace ? a : new Tensor(outputShape, resultType || a.type);\r\n\r\n // both inputs are scalars\r\n if (outputShape.length === 0) {\r\n c.set([], op(a.get([]), b.get([])));\r\n }\r\n\r\n // atleast one input is a non-scalar\r\n else {\r\n const outputIndices = new Array<number>(outputShape.length);\r\n const originalIndicesA = new Array(a.dims.length);\r\n const originalIndicesB = new Array(b.dims.length);\r\n let valA: string|number = 0;\r\n let valB: string|number = 0;\r\n let isAScalar = false;\r\n let isBScalar = false;\r\n if (a.dims.length === 0) {\r\n valA = a.get([]);\r\n isAScalar = true;\r\n }\r\n if (b.dims.length === 0) {\r\n valB = b.get([]);\r\n isBScalar = true;\r\n }\r\n let rest: number;\r\n for (let i = 0; i < size; i++) {\r\n // traversal indices\r\n rest = i;\r\n for (let j = outputShape.length - 1; j >= 0; j--) {\r\n outputIndices[j] = rest % outputShape[j];\r\n rest = Math.floor(rest / outputShape[j]);\r\n }\r\n\r\n if (!isAScalar) {\r\n // map outputIndices (which is actually broadcasted) to the originalIndices\r\n BroadcastUtil.fillIndex(outputIndices, a.dims, originalIndicesA);\r\n valA = a.get(originalIndicesA);\r\n }\r\n if (!isBScalar) {\r\n BroadcastUtil.fillIndex(outputIndices, b.dims, originalIndicesB);\r\n valB = b.get(originalIndicesB);\r\n }\r\n\r\n c.set(outputIndices, op(valA, valB));\r\n }\r\n }\r\n\r\n return c;\r\n }\r\n\r\n return undefined;\r\n }\r\n\r\n /**\r\n * Determine if a shape is unidirectional broadcastable to another shape\r\n * @param shape The input shape\r\n * @param finalShape The desired shape after broadcasting\r\n */\r\n static isValidBroadcast(shape: readonly number[], finalShape: readonly number[]): boolean {\r\n // align shape to the right\r\n const inputRank = shape.length;\r\n const finalRank = finalShape.length;\r\n if (inputRank > finalRank) {\r\n return false;\r\n }\r\n for (let i = 1; i <= inputRank; i++) {\r\n if (shape[inputRank - i] !== 1 && shape[inputRank - i] !== finalShape[finalRank - i]) {\r\n return false;\r\n }\r\n }\r\n return true;\r\n }\r\n\r\n /**\r\n * Determine the broadcasted dims in input shape based on the given output shape.\r\n * Note that this function only returns the broadcasted dims.\r\n * @param inputShape The input shape\r\n * @param outputShape The output shape\r\n * @returns The broadcasted dims in input shape.\r\n */\r\n static getBroadcastDims(inputShape: readonly number[], outputShape: readonly number[]): number[] {\r\n const inRank = inputShape.length;\r\n const dims: number[] = [];\r\n for (let i = 0; i < inRank; i++) {\r\n const dim = inRank - 1 - i;\r\n const a = inputShape[dim] || 1;\r\n const b = outputShape[outputShape.length - 1 - i] || 1;\r\n if (b > 1 && a === 1) {\r\n dims.unshift(dim);\r\n }\r\n }\r\n return dims;\r\n }\r\n}\r\n\r\n// copy array helper\r\n// mimics memcpy as much as possible\r\nexport function arrayCopyHelper(\r\n target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number, sourceIndex: number,\r\n blockSize: number) {\r\n if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n throw new Error('sourceIndex out of bounds');\r\n }\r\n if (targetIndex < 0 || targetIndex >= target.length) {\r\n throw new Error('targetIndex out of bounds');\r\n }\r\n if (sourceIndex + blockSize > source.length) {\r\n throw new Error('source indices to be copied are outside bounds');\r\n }\r\n if (targetIndex + blockSize > target.length) {\r\n throw new Error('target array is too small to hold result');\r\n }\r\n\r\n for (let offset = 0; offset < blockSize; offset++) {\r\n target[targetIndex + offset] = source[sourceIndex + offset];\r\n }\r\n}\r\n\r\nexport class GemmUtil {\r\n // will make sure input shapes are compatible for this op\r\n // and return back the shape of the output in the form of a tuple\r\n // will throw exception if the input shapes are not compatible\r\n static getShapeOfGemmResult(\r\n leftShape: readonly number[], transLeft: boolean, rightShape: readonly number[], transRight: boolean,\r\n biasShape?: readonly number[]): readonly number[] {\r\n if (leftShape.length !== 2 || rightShape.length !== 2) {\r\n throw new Error('shape need to be of size 2');\r\n }\r\n\r\n let M: number;\r\n let K: number;\r\n let N: number;\r\n\r\n if (transLeft) {\r\n M = leftShape[1];\r\n K = leftShape[0];\r\n } else {\r\n M = leftShape[0];\r\n K = leftShape[1];\r\n }\r\n\r\n let kDim = -1;\r\n\r\n if (transRight) {\r\n N = rightShape[0];\r\n kDim = 1;\r\n } else {\r\n N = rightShape[1];\r\n kDim = 0;\r\n }\r\n\r\n if (rightShape[kDim] !== K) {\r\n throw new Error('dimension mismatch');\r\n }\r\n\r\n if (M <= 0 || N <= 0 || K <= 0) {\r\n throw new Error('invalid shape specified');\r\n }\r\n\r\n if (biasShape && !BroadcastUtil.isValidBroadcast(biasShape, [M, N])) {\r\n throw new Error('gemm: invalid bias shape for broadcast');\r\n }\r\n\r\n return [M, N, K];\r\n }\r\n}\r\n\r\nexport class ProtoUtil {\r\n static tensorDataTypeFromProto(typeProto: onnx.TensorProto.DataType|\r\n onnxruntime.experimental.fbs.TensorDataType): Tensor.DataType {\r\n switch (typeProto) {\r\n case onnx.TensorProto.DataType.INT8:\r\n return 'int8';\r\n case onnx.TensorProto.DataType.UINT8:\r\n return 'uint8';\r\n case onnx.TensorProto.DataType.BOOL:\r\n return 'bool';\r\n case onnx.TensorProto.DataType.INT16:\r\n return 'int16';\r\n case onnx.TensorProto.DataType.UINT16:\r\n return 'uint16';\r\n case onnx.TensorProto.DataType.INT32:\r\n return 'int32';\r\n case onnx.TensorProto.DataType.UINT32:\r\n return 'uint32';\r\n case onnx.TensorProto.DataType.FLOAT:\r\n return 'float32';\r\n case onnx.TensorProto.DataType.DOUBLE:\r\n return 'float64';\r\n case onnx.TensorProto.DataType.STRING:\r\n return 'string';\r\n\r\n // For INT64/UINT64, reduce their value to 32-bits.\r\n // Should throw exception when overflow\r\n case onnx.TensorProto.DataType.INT64:\r\n return 'int32';\r\n case onnx.TensorProto.DataType.UINT64:\r\n return 'uint32';\r\n\r\n default:\r\n throw new Error(`unsupported data type: ${onnx.TensorProto.DataType[typeProto]}`);\r\n }\r\n }\r\n\r\n static tensorDataTypeStringToEnum(type: string): onnx.TensorProto.DataType {\r\n switch (type) {\r\n case 'int8':\r\n return onnx.TensorProto.DataType.INT8;\r\n case 'uint8':\r\n return onnx.TensorProto.DataType.UINT8;\r\n case 'bool':\r\n return onnx.TensorProto.DataType.BOOL;\r\n case 'int16':\r\n return onnx.TensorProto.DataType.INT16;\r\n case 'uint16':\r\n return onnx.TensorProto.DataType.UINT16;\r\n case 'int32':\r\n return onnx.TensorProto.DataType.INT32;\r\n case 'uint32':\r\n return onnx.TensorProto.DataType.UINT32;\r\n case 'float32':\r\n return onnx.TensorProto.DataType.FLOAT;\r\n case 'float64':\r\n return onnx.TensorProto.DataType.DOUBLE;\r\n case 'string':\r\n return onnx.TensorProto.DataType.STRING;\r\n case 'int64':\r\n return onnx.TensorProto.DataType.INT64;\r\n case 'uint64':\r\n return

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onnx.TensorProto.DataType.UINT64;\r\n\r\n      default:\r\n        throw new Error(`unsupported data type:
${type}`);\r\n    }\r\n  }\r\n\r\n  static tensorDimsFromProto(dims: Array<number|Long>): number[] {\r\n    // get rid
of Long type for dims\r\n    return dims.map(d => Long.isLong(d) ? d.toNumber() : d);\r\n  }\r\n\r\n  static
tensorValueTypeFromProto(valueType: onnx.TypeProto.ITensor): Graph.ValueType {\r\n    return {\r\n
tensorType: ProtoUtil.tensorDataTypeFromProto(valueType.elemType!),\r\n      shape: {dims:
ProtoUtil.tensorDimsFromProto(valueType.shape!.dim!.map(d => d.dimValue!))}\r\n    };\r\n  }\r\n\r\n  static
tensorDimsFromORTFormat(tensor: onnxruntime.experimental.fbs.Tensor) {\r\n    const dims = [];\r\n    for (let i =
0; i < tensor.dimsLength(); i++) {\r\n      dims.push(LongUtil.longToNumber(tensor.dims(i)!));\r\n    }\r\n    return
dims;\r\n  }\r\n\r\n  static tensorAttributesFromORTFormat(node: onnxruntime.experimental.fbs.Node) {\r\n    const
attributes = [];\r\n    for (let i = 0; i < node.attributesLength(); i++) {\r\n      attributes.push(node.attributes(i)!);\r\n
}\r\n    return attributes;\r\n  }\r\n}\r\n\r\nexport class LongUtil {\r\n  static longToNumber(n:
Long|flatbuffers.Long|number) {\r\n    if (Long.isLong(n)) {\r\n      return n.toNumber();\r\n    } else if (n instanceof
flatbuffers.Long) {\r\n      return Long.fromValue({low: n.low, high: n.high, unsigned: true}).toNumber();\r\n    }\r\n
  return n;\r\n  }\r\n  static isLong(n: unknown) {\r\n    return Long.isLong(n) || n instanceof flatbuffers.Long;\r\n
}\r\n}\r\n\r\nexport class ShapeUtil {\r\n  static size(dims: readonly number[]): number {\r\n    return
ShapeUtil.getSizeFromDimensionRange(dims, 0, dims.length);\r\n  }\r\n\r\n  // `axis` inclusive\r\n  static
sizeFromDimension(dims: readonly number[], axis: number): number {\r\n    if (axis < 0 || axis > dims.length) {\r\n
  throw new Error(`invalid dimension of ${axis} for sizeFromDimension as Tensor has ${dims.length}
dimensions.`);\r\n    }\r\n    return ShapeUtil.getSizeFromDimensionRange(dims, axis, dims.length);\r\n  }\r\n\r\n  //
`axis` exclusive\r\n  static sizeToDimension(dims: readonly number[], axis: number): number {\r\n    if (axis < 0 ||
axis > dims.length) {\r\n      throw new Error(`invalid dimension of ${axis} for sizeToDimension as Tensor has
${dims.length} dimensions.`);\r\n    }\r\n    return ShapeUtil.getSizeFromDimensionRange(dims, 0, axis);\r\n
}\r\n\r\n  static getSizeFromDimensionRange(dims: readonly number[], start: number, end: number): number {\r\n
let size = 1;\r\n    for (let i = start; i < end; i++) {\r\n      // safety check as this method is called by multiple other
methods requiring size.\r\n      // size cannot be 0 or negative.\r\n      if (dims[i] <= 0) {\r\n        throw new Error(\r\n
        // eslint-disable-next-line max-len\r\n            'cannot get valid size from specified dimension range. Most likely
the range contains 0 or negative values in them.');\r\n      }\r\n      size *= dims[i];\r\n    }\r\n    return size;\r\n
}\r\n\r\n  static computeStrides(dims: readonly number[]): readonly number[] {\r\n    const rank = dims.length;\r\n
if (rank === 0) {\r\n      return [];\r\n    } else if (rank === 1) {\r\n      return [1];\r\n    }\r\n    const strides = new
Array(rank);\r\n    strides[rank - 1] = 1;\r\n    strides[rank - 2] = dims[rank - 1];\r\n    for (let i = rank - 3; i >= 0; --i)
{\r\n      strides[i] = strides[i + 1] * dims[i + 1];\r\n    }\r\n    return strides;\r\n  }\r\n\r\n  static transpose(dims:
readonly number[]): readonly number[] {\r\n    const copy = dims.slice();\r\n    return copy.reverse();\r\n  }\r\n\r\n
static indicesToOffset(indices: readonly number[], strides: readonly number[], axis?: number): number {\r\n    if
(axis === undefined) {\r\n      axis = indices.length;\r\n    }\r\n    let offset = 0;\r\n    for (let i = 0; i < axis; ++i) {\r\n
   offset += strides[i] * indices[i];\r\n    }\r\n    return offset;\r\n  }\r\n\r\n  static offsetToIndices(offset: number,
strides: readonly number[]): readonly number[] {\r\n    const rank = strides.length;\r\n    if (rank === 0) {\r\n
return [];\r\n    } else if (rank === 1) {\r\n      return [offset * strides[0]];\r\n    }\r\n    const indices: number[] = new
Array(strides.length);\r\n    for (let i = 0; i < indices.length - 1; ++i) {\r\n      indices[i] = Math.floor(offset /
strides[i]);\r\n      offset -= indices[i] * strides[i];\r\n    }\r\n    indices[indices.length - 1] = offset;\r\n    return
indices;\r\n  }\r\n\r\n  /**\r\n   * normailze axis of range [-r, r) into [0, r).\r\n   */\r\n  static normalizeAxis(axis:
number, tensorRank: number): number {\r\n    if (axis < -tensorRank && axis >= tensorRank) {\r\n      throw new
Error('unsupported axis for this operation.');\r\n    }\r\n    return axis < 0 ? axis + tensorRank : axis;\r\n  }\r\n\r\n
static normalizeAxes(axes: readonly number[], tensorRank: number): number[] {\r\n    return axes.map(x =>
this.normalizeAxis(x, tensorRank));\r\n  }\r\n\r\n  // Increment an index into a tensor (in lexicographic\r\n  //
ordering), wrapping around the specified upper_bound.\r\n  /**\r\n   * Increment an index into a tensor (in
lexicographic ordering), wrapping around the specified upper_bound.\r\n   * @param index Given index to
increment (Will be mutated)\r\n   * @param dims The dimensions of the tensor for which the given index
corresponds to\r\n   * @param axisToIncrementOn The 1-indexed axis to increment on. If undefined,
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axisToIncrementOn == rank\r\n   */\r\n  static incrementIndex(index: number[], dims: readonly number[],
axisToIncrementOn?: number) {\r\n    if (dims.length === 0 || index.length === 0) {\r\n      throw new Error('Index
incrementing unsupported for scalar Tensor');\r\n    }\r\n    if (axisToIncrementOn === undefined) {\r\n
axisToIncrementOn = dims.length;\r\n    } else {\r\n      if (axisToIncrementOn <= 0 || axisToIncrementOn >
dims.length) {\r\n        throw new Error('Incorrect axis to increment on');\r\n      }\r\n    }\r\n\r\n    for (let k =
axisToIncrementOn - 1; k >= 0; --k) {\r\n      index[k]++;\r\n      if (index[k] < dims[k]) {\r\n        break;\r\n      }\r\n
  index[k] = 0;\r\n    }\r\n  }\r\n\r\n  /**\r\n   * Produces a new dimensions array based on the values in the
'originalDimensions' and 'shape' array\r\n   * Used in Reshape\r\n   * @param originalDims Original Shape array\r\n
 * @param shapeHints array containing values to compute the new dimensions\r\n   * For example:\r\n   *
originalDims = [2,2] and shapeHints = [0,-1] will return [2,2]\r\n   * originalDims = [2,2] and shapeHints = [4] will
return [4]\r\n   * originalDims = [2,2] and shapeHints = [5] will throw an exception\r\n   *
https://github.com/onnx/onnx/blob/master/docs/Operators.md#Reshape\r\n   */\r\n\r\n  static
calculateReshapedDims(originalDims: readonly number[], shapeHints: ArrayLike<number>): number[] {\r\n    //
reshape to a Scalar Tensor\r\n    if (shapeHints.length === 0) {\r\n      if (originalDims.length === 0 ||
ShapeUtil.size(originalDims) === 1) {\r\n        return [];\r\n      } else {\r\n        throw new Error('cannot reshape to a
scalar Tensor');\r\n      }\r\n    }\r\n\r\n    const nDims = shapeHints.length;\r\n    const reshapedDims = new
Array<number>(nDims);\r\n    let unknownDimension = -1;\r\n    let newTensorSize = 1;\r\n    for (let i = 0; i <
nDims; i++) {\r\n      if (shapeHints[i] < -1) {\r\n        throw new Error('a dimension in shape hints cannot be less
than -1');\r\n      }\r\n      if (shapeHints[i] === -1) {\r\n        if (unknownDimension !== -1) {\r\n          throw new
Error('at most one dimension in shape hints can be -1');\r\n        }\r\n        unknownDimension = i;\r\n      } else {\r\n
     if (shapeHints[i] === 0) {\r\n          if (i >= originalDims.length) {\r\n            throw new Error('the dimension
with value zero exceeds the dimension size of the input tensor');\r\n          }\r\n          reshapedDims[i] =
originalDims[i];\r\n        } else {\r\n          reshapedDims[i] = shapeHints[i];\r\n        }\r\n        newTensorSize *=
reshapedDims[i];\r\n      }\r\n    }\r\n\r\n    const oldTensorSize = ShapeUtil.size(originalDims);\r\n    if
(unknownDimension !== -1) {\r\n      if (oldTensorSize % newTensorSize !== 0) {\r\n        throw new Error(`the
input tensor cannot be reshaped to the requested shape. Input shape: [${\r\n            originalDims}] Output shape:
[${shapeHints}]`);\r\n      }\r\n      reshapedDims[unknownDimension] = oldTensorSize / newTensorSize;\r\n    }\r\n
  // validate sizes from originalDims and reshapedDims match\r\n    else {\r\n      if (newTensorSize !==
oldTensorSize) {\r\n        throw new Error('reshapedDims and originalDims don\\'t have matching sizes');\r\n
}\r\n    }\r\n    return reshapedDims;\r\n  }\r\n\r\n  /**\r\n   * Sorts a given array based on the indices in the Perm
array\r\n   * Used in Transpose\r\n   * @param a Array to be sorted such as dims or strides\r\n   * @param perm
Perm given; if null a will be reversed\r\n   */\r\n  static sortBasedOnPerm(a: readonly number[], perm?: readonly
number[]): readonly number[] {\r\n    if (perm) {\r\n      return perm.map((v) => a[v]);\r\n    } else {\r\n      return
a.slice().reverse();\r\n    }\r\n  }\r\n\r\n  /**\r\n   * Pads a given shape according to the padding values\r\n   *
@param dims shape of the Tensor to be padded\r\n   * @param pad pad values\r\n   */\r\n  static padShape(dims:
readonly number[], pad: readonly number[]): readonly number[] {\r\n    const rank = dims.length;\r\n    return
dims.map((v, i) => v + pad[i] + pad[i + rank]);\r\n  }\r\n\r\n  /**\r\n   * Determines if the two shapes are identical\r\n
 * @param shape1\r\n   * @param shape2\r\n   */\r\n  static areEqual(shape1: readonly number[], shape2: readonly
number[]): boolean {\r\n    if (shape1.length !== shape2.length) {\r\n      return false;\r\n    }\r\n    return
shape1.every((v, i) => v === shape2[i]);\r\n  }\r\n\r\n  /**\r\n   * Validates if the given `dims` or `shape` is valid in
ONNX.js context and returns data size\r\n   * @param dims - input `dims` that needs to be checked\r\n   */\r\n  static
validateDimsAndCalcSize(dims: readonly number[]): number {\r\n    if (dims.length > 6) {\r\n      throw new
TypeError('Only rank 0 to 6 is supported for tensor shape.');\r\n    }\r\n    let size = 1;\r\n    for (const n of dims) {\r\n
    if (!Number.isInteger(n)) {\r\n        throw new TypeError(`Invalid shape: ${n} is not an integer`);\r\n      }\r\n
if (n < 0 || n > 2147483647) {\r\n        throw new TypeError(`Invalid shape: length ${n} is not allowed`);\r\n      }\r\n
    size *= n;\r\n    }\r\n    return size;\r\n  }\r\n\r\n  /**\r\n   * Determines the shape of output tensor y = flatten(x,
axis)\r\n   * @param dims - shape of input tensor\r\n   * @param axis - flatten axis, in the range [-r, r]\r\n   */\r\n
static flattenShape(dims: readonly number[], axis: number): readonly number[] {\r\n    if (axis < 0) {\r\n      axis +=
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dims.length;\r\n    }\r\n    const total = dims.reduce((x, y) => x * y, 1);\r\n    const right = dims.slice(axis).reduce((x,
y) => x * y, 1);\r\n    const outputDims = [total / right, right];\r\n\r\n    return outputDims;\r\n  }\r\n\r\n  /**\r\n   *
Determines the shape of output tensor y = squeeze(x, axes)\r\n   * @param dims - shape of input tensor\r\n   *
@param axes - squeeze axes\r\n   */\r\n  static squeezeShape(dims: readonly number[], axes: readonly number[]):
readonly number[] {\r\n    const outputDims = new Array<number>();\r\n\r\n    // sanity check\r\n    axes =
ShapeUtil.normalizeAxes(axes, dims.length);\r\n\r\n    for (let i = 0; i < dims.length; i++) {\r\n      const
inSqueezeList = axes.indexOf(i) >= 0;\r\n      if (inSqueezeList && dims[i] !== 1) {\r\n        throw new
Error('squeeze an axis of size different than 1');\r\n      }\r\n\r\n      if ((axes.length === 0 && dims[i] > 1) ||
(axes.length > 0 && !inSqueezeList)) {\r\n        outputDims.push(dims[i]);\r\n      }\r\n    }\r\n\r\n    return
outputDims;\r\n  }\r\n\r\n  /**\r\n   * Determines the shape of output tensor y = unsqueeze(x, axes)\r\n   * @param
dims - shape of input tensor\r\n   * @param axes - unsqueeze axes\r\n   */\r\n  static unsqueezeShape(dims: readonly
number[], axes: readonly number[]): readonly number[] {\r\n    const outputDims = new
Array<number>(dims.length + axes.length);\r\n\r\n    // initialize the array elements to 0\r\n
outputDims.fill(0);\r\n\r\n    // set all axes indices to 1 in outputDims and check for duplicates\r\n    for (let i = 0; i <
axes.length; i++) {\r\n      const axis = ShapeUtil.normalizeAxis(axes[i], dims.length);\r\n      if (axis >=
outputDims.length) {\r\n        throw new Error('\\'axes\\' has an out of range axis');\r\n      }\r\n      if
(outputDims[axis] !== 0) {\r\n        throw new Error('\\'axes\\' has a duplicate axis');\r\n      }\r\n\r\n
outputDims[axis] = 1;\r\n    }\r\n\r\n    // fill in the zero entries of outputDims with the input tensor's shape\r\n    let
inputDimsIterator = 0;\r\n    for (let i = 0; i < outputDims.length; i++) {\r\n      if (outputDims[i] === 0) {\r\n
outputDims[i] = dims[inputDimsIterator++];\r\n      }\r\n    }\r\n\r\n    // sanity check assertion.
'inputDimsIterator'\r\n    // should be equal to the length of 'dims'\r\n    if (inputDimsIterator !== dims.length) {\r\n
throw new Error('the unsqueezed dimension could not be established');\r\n    }\r\n\r\n    return outputDims;\r\n
}\r\n}\r\n\r\n// bunch of helper methods that do a variety of math operations\r\nexport class MathUtil {\r\n  // y =
(x*x) + y\r\n  static sqr(\r\n      target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType,
targetIndex: number, sourceIndex: number,\r\n      blockSize: number) {\r\n    if (sourceIndex < 0 || sourceIndex >=
source.length) {\r\n      throw new Error('sourceIndex out of bounds');\r\n    }\r\n    if (targetIndex < 0 || targetIndex
>= target.length) {\r\n      throw new Error('targetIndex out of bounds');\r\n    }\r\n    if (sourceIndex + blockSize >
source.length) {\r\n      throw new Error('source indices to be copied are outside bounds');\r\n    }\r\n    if
(targetIndex + blockSize > target.length) {\r\n      throw new Error('target array is too small to hold result');\r\n
}\r\n\r\n    for (let offset = 0; offset < blockSize; offset++) {\r\n      target[targetIndex + offset] +=
Math.pow(source[sourceIndex + offset], 2);\r\n    }\r\n  }\r\n\r\n  // y = ax + y\r\n  static axpy(\r\n      target:
number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number, sourceIndex:
number,\r\n      blockSize: number, alpha: number) {\r\n    if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n
  throw new Error('sourceIndex out of bounds');\r\n    }\r\n    if (targetIndex < 0 || targetIndex >= target.length) {\r\n
  throw new Error('targetIndex out of bounds');\r\n    }\r\n    if (sourceIndex + blockSize > source.length) {\r\n
throw new Error('source indices to be copied are outside bounds');\r\n    }\r\n    if (targetIndex + blockSize >
target.length) {\r\n      throw new Error('target array is too small to hold result');\r\n    }\r\n\r\n    for (let offset = 0;
offset < blockSize; offset++) {\r\n      target[targetIndex + offset] += (alpha * source[sourceIndex + offset]);\r\n
}\r\n  }\r\n\r\n  // y = pow(x, b)\r\n  static powx(\r\n      target: number[]|Tensor.NumberType, source:
number[]|Tensor.NumberType, targetIndex: number, sourceIndex: number,\r\n      blockSize: number, b: number)
{\r\n    if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n      throw new Error('sourceIndex out of
bounds');\r\n    }\r\n    if (targetIndex < 0 || targetIndex >= target.length) {\r\n      throw new Error('targetIndex out of
bounds');\r\n    }\r\n    if (sourceIndex + blockSize > source.length) {\r\n      throw new Error('source indices to be
copied are outside bounds');\r\n    }\r\n    if (targetIndex + blockSize > target.length) {\r\n      throw new Error('target
array is too small to hold result');\r\n    }\r\n\r\n    for (let offset = 0; offset < blockSize; offset++) {\r\n
target[targetIndex + offset] = Math.pow(source[sourceIndex + offset], b);\r\n    }\r\n  }\r\n\r\n  // y = x * y\r\n  static
mul(\r\n      target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number,
sourceIndex: number,\r\n      blockSize: number) {\r\n    if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n
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throw new Error('sourceIndex out of bounds');\r\n   }\r\n   if (targetIndex < 0 || targetIndex >= target.length) {\r\n   throw new Error('targetIndex out of bounds');\r\n   }\r\n   if (sourceIndex + blockSize > source.length) {\r\n   throw new Error('source indices to be copied are outside bounds');\r\n   }\r\n   if (targetIndex + blockSize > target.length) {\r\n   throw new Error('target array is too small to hold result');\r\n   }\r\n\r\n   for (let offset = 0; offset < blockSize; offset++) {\r\n   target[targetIndex + offset] = (source[sourceIndex + offset] * target[targetIndex + offset]);\r\n   }\r\n }\r\n}\r\n\r\nexport class SplitUtil {\r\n /**\r\n   * Calculates new Shapes from existing one and the splits given along the axis provides\r\n   * @param dims Shape of the Tensor to be splitted into two or more Shapes\r\n   * @param axis The dimension along which the Tensor will be split\r\n   * @param splits Offsets for the start of each split\r\n   */\r\n static splitShape(dims: readonly number[], axis: number, split: number[], numOutputs?: number):\r\n   [number[][], number[]] {\r\n   if (split.length === 0) {\r\n   if (!numOutputs) {\r\n   throw new Error('need to know number of outputs when the \\'split\\' attribute is not specified');\r\n   }\r\n   SplitUtil.determineSplit(dims[axis], numOutputs, split);\r\n   }\r\n\r\n   const shapes: number[][] = [];\r\n   const offsets = [0];\r\n   for (let i = 0; i < split.length; ++i) {\r\n   if (i !== 0) {\r\n   offsets.push(offsets[i - 1] + split[i - 1]);\r\n   }\r\n   const shape = dims.slice();\r\n   shape[axis] = split[i];\r\n   shapes.push(shape);\r\n   }\r\n   return [shapes, offsets];\r\n }\r\n\r\n static determineSplit(numElementsAlongAxis: number, numOutputs: number, split: number[]) {\r\n   // If 'split' is not specified by the user, we need to partition the number of elements equally among the outputs\r\n   if (numElementsAlongAxis % numOutputs !== 0) {\r\n   throw new Error('cannot split tensor to equal sized parts');\r\n   }\r\n   for (let i = 0; i < numOutputs; ++i) {\r\n   split.push(numElementsAlongAxis / numOutputs);\r\n   }\r\n }\r\n}\r\n\r\nexport class ReduceUtil {\r\n /**\r\n   * Perform reduce operations on the specific operator\r\n   * @param a Input tensor data\r\n   * @param axes The dimensions along which the Tensor will be reduced\r\n   * @param keepdims If set to true, the axes which are reduced are left in the\r\n   *   result as dimensions with size one.\r\n   * @param op1 The operation to be performed on each element in the tensor\r\n   * @param op2 The operation to be performed between elements in the tensor\r\n   */\r\n static calcReduce(\r\n   a: Tensor, axes: number[], keepdims: boolean, op1: (b: number) => number,\r\n   op2: (a: number, b: number) => number): Tensor {\r\n   const dims = a.dims.slice(0);\r\n   // if axes is not set, perform reduce on all axes\r\n   if (axes.length === 0) {\r\n   dims.forEach((d, ind) => axes.push(ind));\r\n   }\r\n   // get a temporary broadcastable output shape\r\n   const outputDims = ReduceUtil.calcReduceShape(dims, axes, true);\r\n\r\n   // loop through the output and calculate result one by one\r\n   const size = ShapeUtil.size(outputDims);\r\n   const y = new Tensor(outputDims, a.type);\r\n   const strides = ShapeUtil.computeStrides(outputDims);\r\n   const inputStrides = ShapeUtil.computeStrides(dims);\r\n   const indicesY = new Array(dims.length);\r\n   for (let i = 0; i < size; i++) {\r\n   const indices = ShapeUtil.offsetToIndices(i, strides);\r\n   // map index\r\n   BroadcastUtil.fillIndex(indices, dims, indicesY);\r\n   y.set(\r\n   indices,\r\n   ReduceUtil.calcReduceByAxis(\r\n   a.numberData, axes, dims, 0, ShapeUtil.indicesToOffset(indicesY, inputStrides), op1, op2));\r\n   }\r\n\r\n   if (keepdims) {\r\n   return y;\r\n   } else {\r\n   // keepdims == 0, calculate the expected shape\r\n   return new Tensor(\r\n   ReduceUtil.calcReduceShape(dims, axes, keepdims), y.type, undefined, undefined, y.data, y.dataId);\r\n   }\r\n }\r\n\r\n /**\r\n   * Perform reduce operations on the specific operator on specific axes\r\n   * @param a Input tensor data\r\n   * @param axes The dimensions along which the Tensor will be reduced\r\n   * @param dims The input dimension.\r\n   * @param curAxisInd Index in axes specifying the current dimension along\r\n   *   which the tensor will be reduced\r\n   * @param pos The current index of element to perform operation\r\n   * @param op1 The operation to be performed on each element in the tensor\r\n   * @param op2 The operation to be performed between elements in the tensor\r\n   */\r\n static calcReduceByAxis(\r\n   input: Tensor.NumberType, axes: number[], dims: number[], curAxisInd: number, pos: number,\r\n   op1: (b: number) => number, op2: (a: number, b: number) => number): number {\r\n   let res = 0;\r\n   if (curAxisInd >= axes.length) {\r\n   return op1(input[pos]);\r\n   }\r\n   const axis = axes[curAxisInd];\r\n   const step = axis >= dims.length ? 1 : ShapeUtil.size(dims.slice(axis + 1));\r\n   for (let i = 0; i < dims[axis]; i++) {\r\n   res = i === 0 ? ReduceUtil.calcReduceByAxis(input, axes, dims, curAxisInd + 1, pos, op1, op2) :\r\n   op2(res, ReduceUtil.calcReduceByAxis(input, axes, dims, curAxisInd + 1, pos, op1, op2));\r\n   pos += step;\r\n   }\r\n   return res;\r\n }\r\n\r\n /**\r\n   * Calculate the expected shape of a reduce operation\r\n   * @param dims The input tensor dimension\r\n   * @param axes The dimensions along which the Tensor will be reduced\r\n   * @param keepdims If set to true, the axes which are reduced are left in the\r\n   * result as dimensions with size one.\r\n   */\r\n static calcReduceShape(dims: readonly number[], axes: readonly number[], keepDims: boolean): number[] {\r\n   const outputDims = dims.slice();\r\n   for (let i = 0; i < axes.length; i++) {\r\n   if (keepDims) {\r\n   outputDims[axes[i]] = 1;\r\n   } else {\r\n   outputDims[axes[i]] = 0;\r\n   }\r\n   }\r\n   return outputDims.filter(dim => dim !== 0);\r\n }\r\n}\r\n\r\nexport class PoolConvUtil {\r\n /**\r\n   * Adjust the kernel, strides, pads to correct rank. Set to default value if not present\r\n   * @param isGlobalOperator If true, perform global pooling.\r\n   * @param inputDims The input tensor dimension.\r\n   * @param kernelShape The size of the kernel along each axis.\r\n   * @param strides Stride along each axis.\r\n   * @param pads Padding for the beginning and ending along each axis.\r\n   */\r\n static adjustPoolAttributes(\r\n   isGlobalOperator: boolean, inputDims: readonly number[], kernelShape: number[], strides: number[],\r\n   pads: number[]) {\r\n   if (!isGlobalOperator && kernelShape.length !== inputDims.length - 2) {\r\n   throw new Error('length of specified kernel shapes should be 2 less than length of input dimensions');\r\n   }\r\n\r\n   if (isGlobalOperator) {\r\n   // adjust kernel shape to cover the input dims\r\n   for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n   if (dim >= kernelShape.length) {\r\n   kernelShape.push(inputDims[dim + 2]);\r\n   } else {\r\n   kernelShape[dim] = inputDims[dim + 2];\r\n   }\r\n   }\r\n   }\r\n\r\n   // adjust strides length to match kernel shape length\r\n   for (let dim = 0; dim < kernelShape.length; dim++) {\r\n   if (dim < strides.length) {\r\n   if (strides[dim] < 0) {\r\n   throw new Error('strides should be greater than or equal to 1');\r\n   }\r\n   } else {\r\n   strides.push(1);\r\n   }\r\n   }\r\n\r\n   // adjust pads length to match 2 * kernel shape length\r\n   for (let dim = 0; dim < kernelShape.length * 2; dim++) {\r\n   if (dim < pads.length) {\r\n   if (pads[dim] < 0) {\r\n   throw new Error('pad should be greater than or equal to 1');\r\n   }\r\n   } else {\r\n   pads.push(0);\r\n   }\r\n   }\r\n\r\n   // sanity checks for values in kernel shapes and pads\r\n   for (let dim = 0; dim < kernelShape.length; dim++) {\r\n   if (kernelShape[dim] <= 0) {\r\n   throw new Error('kernel shapes need to be greater than 0');\r\n   }\r\n\r\n   if (pads[dim] >= kernelShape[dim] || pads[dim + kernelShape.length] >= kernelShape[dim]) {\r\n   throw new Error('pads should be smaller than kernel');\r\n   }\r\n   }\r\n }\r\n\r\n // adjust pad values based on 'autoPad' attribute\r\n static adjustPadsBasedOnAutoPad(\r\n   inputDims: readonly number[], strides: readonly number[], dilations: readonly number[],\r\n   kernelShape: readonly number[], pads: number[], autoPad?: string) {\r\n   if (!autoPad) {\r\n   return;\r\n   }\r\n\r\n   if (pads.length !== 2 * (inputDims.length - 2)) {\r\n   throw new Error('length of pads should be twice the length of data dimensions');\r\n   }\r\n\r\n   if (strides.length !== (inputDims.length - 2)) {\r\n   throw new Error('length of strides should be the length of data dimensions');\r\n   }\r\n\r\n   if (kernelShape.length !== (inputDims.length - 2)) {\r\n   throw new Error('length of kernel shapes should be the length of data dimensions');\r\n   }\r\n\r\n   for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n   PoolConvUtil.adjustPadAndReturnShape(\r\n   inputDims[dim + 2], strides[dim], dilations[dim], kernelShape[dim], pads, dim, dim + inputDims.length - 2,\r\n   autoPad);\r\n   }\r\n }\r\n\r\n /**\r\n   * Calculate the output shape for Pool ops based on input attributes. (Should be used only for Pool ops)\r\n   * @param isGlobalOperator If true, perform global pooling.\r\n   * @param inputDims The input tensor dimension. (inputs[0].dims)\r\n   * @param strides Stride along each axis.\r\n   * @param kernelShape The size of the kernel along each axis.\r\n   * @param pads Padding for the beginning and ending along each axis.\r\n   * @param autoPad DEPRECATED attribute supported for legacy models. Specifies how to implicitly calculate pads in each\r\n   *   dimension. Can take values NOTSET, SAME_UPPER, SAME_LOWER, or VALID.\r\n   */\r\n static computePoolOutputShape(\r\n   isGlobalOperator: boolean, inputDims: readonly number[], strides: number[], kernelShape: number[], pads: number[],\r\n   autoPad?: string): number[] {\r\n   if (inputDims.length <= 0) {\r\n   throw new Error('input shape must be of size greater than 0');\r\n   }\r\n\r\n   // Add batch size and number of channels of output\r\n   const outputDims = [inputDims[0], inputDims[1]];\r\n\r\n   // TODO: support dilations for pool operators\r\n   const dilations = new Array<number>(kernelShape.length).fill(1);\r\n\r\n   PoolConvUtil.computeShapeHelper(\r\n   isGlobalOperator, inputDims, outputDims, strides, dilations, kernelShape, pads, autoPad);\r\n   return outputDims;\r\n }\r\n\r\n /**\r\n   * Calculate the output shape for Conv op based on input attributes. (Should be used only for Conv op)\r\n   * @param inputDims The input tensor dimension. (inputs[0].dims)\r\n   * @param filterDims The filter tensor dimension. (inputs[1].dims)\r\n   * @param strides Stride along each axis.\r\n   * @param kernelShape The size of the kernel along each axis.\r\n   * @param pads Padding for the beginning and ending along each axis.\r\n   * @param autoPad DEPRECATED attribute supported for legacy models. Specifies how to implicitly calculate pads in each\r\n   *   dimension. Can take values NOTSET, SAME_UPPER, SAME_LOWER, or VALID.\r\n   */\r\n static computeConvOutputShape(\r\n   inputDims: readonly number[], filterDims: readonly number[], strides: number[], dilations: number[],\r\n   kernelShape: number[], pads: number[], autoPad?: string): number[] {\r\n   if (inputDims.length <= 0 || filterDims.length <= 0) {\r\n   throw new Error('invalid input tensor dims or invalid filter tensor dims');\r\n   }\r\n\r\n   // Add batch size and number of channels of output\r\n   const outputDims = [inputDims[0], filterDims[0]];\r\n\r\n   PoolConvUtil.computeShapeHelper(false, inputDims, outputDims, strides, dilations, kernelShape, pads, autoPad);\r\n   return outputDims;\r\n }\r\n\r\n // will compute output shapes for data dimensions ONLY (i.e.) no batch size and channels\r\n // called by computePoolOutputShape() and computeConvOutputShape()\r\n // adjust pads based on 'autoPad' attribute prior to shape computation\r\n private static computeShapeHelper(\r\n   isGlobalOperator: boolean, inputDims: readonly number[], outputDims: number[], strides: readonly number[],\r\n   dilations: readonly number[], kernelShape: readonly number[], pads: number[], autoPad?: string) {\r\n   if (isGlobalOperator) {\r\n   for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n   outputDims.push(1);\r\n   }\r\n   } else {\r\n   for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n   outputDims.push(PoolConvUtil.adjustPadAndReturnShape(\r\n   inputDims[dim + 2], strides[dim], dilations[dim], kernelShape[dim], pads, dim, dim + inputDims.length - 2,\r\n   autoPad));\r\n   }\r\n   }\r\n }\r\n\r\n // helper for computeShapeHelper() and adjustPadsBasedOnAutoPad()\r\n // adjusts pad value for given 'autoPad' string and computes output shape along a particular dimension\r\n private static adjustPadAndReturnShape(\r\n   inSize: number, stride: number, dilation: number, kernel: number, pads: number[], padHeadIndex: number,\r\n   padTailIndex: number, autoPad?: string): number {\r\n   const dkernel = dilation * (kernel - 1) + 1;\r\n   if (autoPad && autoPad !== 'NOTSET') {\r\n   switch (autoPad) {\r\n   case 'VALID':\r\n   pads[padHeadIndex] = 0;\r\n   pads[padTailIndex] = 0;\r\n   return Math.floor(((inSize - dkernel) / stride) + 1);\r\n   case 'SAME_LOWER':\r\n   case 'SAME_UPPER':\r\n   if (dilation !== 1) {\r\n   throw new Error('Dilation not supported for SAME_UPPER or SAME_LOWER');\r\n   } else {\r\n   const legacyTargetSize = (inSize + stride - 1) / stride;\r\n   const padNeeded = (legacyTargetSize - 1) * stride + kernel - inSize;\r\n   pads[padHeadIndex] =\r\n   (autoPad === 'SAME_LOWER') ? Math.floor((padNeeded + 1) / 2) : Math.floor(padNeeded / 2);\r\n   pads[padTailIndex] = padNeeded - pads[padHeadIndex];\r\n   return Math.floor(((inSize + padNeeded - kernel) / stride) + 1);\r\n   }\r\n   default:\r\n   throw new Error('Unsupported AutoPad type');\r\n   }\r\n   } else {\r\n   return Math.floor(((inSize + pads[padHeadIndex] + pads[padTailIndex] - dkernel) / stride) + 1);\r\n   }\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\ninterface ExtraOptionsHandler {\r\n (name: string, value: string): void;\r\n}\r\n\r\nexport const iterateExtraOptions =\r\n   (options: Record<string, unknown>, prefix: string, seen: WeakSet<Record<string, unknown>>,\r\n   handler: ExtraOptionsHandler): void => {\r\n   if (typeof options == 'object' && options !== null) {\r\n   if (seen.has(options)) {\r\n   throw new Error('Circular reference in options');\r\n   } else {\r\n   seen.add(options);\r\n   }\r\n   }\r\n\r\n   Object.entries(options).forEach(([key, value]) => {\r\n   const name = (prefix) ? prefix + key : key;\r\n   if (typeof value === 'object') {\r\n   iterateExtraOptions(value as Record<string, unknown>, name + '.', seen, handler);\r\n   } else if (typeof value === 'string' || typeof value === 'number') {\r\n   handler(name, value.toString());\r\n   } else if (typeof value === 'boolean') {\r\n   handler(name, (value) ? '1' : '0');\r\n   } else {\r\n   throw new Error(`Can't handle extra config type: ${typeof value}`);\r\n   }\r\n   });\r\n   };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env, InferenceSession} from 'onnxruntime-common';\r\nimport {OrtWasmMessage, SerializableSessionMetadata, SerializableTensor} from './proxy-messages';\r\nimport * as core from './wasm-core-impl';\r\nimport {initializeWebAssembly} from './wasm-factory';\r\n\r\nconst isProxy = ():

boolean => !!env.wasm.proxy && typeof document !== 'undefined';\r\nlet proxyWorker: Worker|undefined;\r\nlet initializing = false;\r\nlet initialized = false;\r\nlet aborted = false;\r\n\r\n// resolve; reject\r\ntype PromiseCallbacks<T = void> = [(result: T) => void, (reason: unknown) => void];\r\n\r\nlet initWasmCallbacks: PromiseCallbacks;\r\nlet initOrtCallbacks: PromiseCallbacks;\r\nconst createSessionCallbacks: Array<PromiseCallbacks<SerializableSessionMetadata>> = [];\r\nconst releaseSessionCallbacks: Array<PromiseCallbacks<void>> = [];\r\nconst runCallbacks: Array<PromiseCallbacks<SerializableTensor[]>> = [];\r\nconst endProfilingCallbacks: Array<PromiseCallbacks<void>> = [];\r\n\r\nconst ensureWorker = (): void => {\r\n if (initializing || !initialized || aborted || !proxyWorker) {\r\n throw new Error('worker not ready');\r\n }\r\n};\r\n\r\nconst onProxyWorkerMessage = (ev: MessageEvent<OrtWasmMessage>): void => {\r\n switch (ev.data.type) {\r\n case 'init-wasm':\r\n initializing = false;\r\n if (ev.data.err) {\r\n aborted = true;\r\n initWasmCallbacks[1](ev.data.err);\r\n } else {\r\n initialized = true;\r\n initWasmCallbacks[0]();\r\n }\r\n break;\r\n case 'init-ort':\r\n if (ev.data.err) {\r\n initOrtCallbacks[1](ev.data.err);\r\n } else {\r\n initOrtCallbacks[0]();\r\n }\r\n break;\r\n case 'create':\r\n if (ev.data.err) {\r\n createSessionCallbacks.shift()![1](ev.data.err);\r\n } else {\r\n createSessionCallbacks.shift()![0](ev.data.out!);\r\n }\r\n break;\r\n case 'release':\r\n if (ev.data.err) {\r\n releaseSessionCallbacks.shift()![1](ev.data.err);\r\n } else {\r\n releaseSessionCallbacks.shift()![0]();\r\n }\r\n break;\r\n case 'run':\r\n if (ev.data.err) {\r\n runCallbacks.shift()![1](ev.data.err);\r\n } else {\r\n runCallbacks.shift()![0](ev.data.out!);\r\n }\r\n break;\r\n case 'end-profiling':\r\n if (ev.data.err) {\r\n endProfilingCallbacks.shift()![1](ev.data.err);\r\n } else {\r\n endProfilingCallbacks.shift()![0]();\r\n }\r\n break;\r\n default:\r\n }\r\n};\r\n\r\nconst scriptSrc = typeof document !== 'undefined' ? (document?.currentScript as HTMLScriptElement)?.src : undefined;\r\n\r\nexport const initWasm = async(): Promise<void> => {\r\n if (isProxy()) {\r\n if (initialized) {\r\n return;\r\n }\r\n if (initializing) {\r\n throw new Error('multiple calls to \\'initWasm()\\' detected.');\r\n }\r\n if (aborted) {\r\n throw new Error('previous call to \\'initWasm()\\' failed.');\r\n }\r\n\r\n initializing = true;\r\n\r\n // overwrite wasm filepaths\r\n if (env.wasm.wasmPaths === undefined) {\r\n if (scriptSrc && scriptSrc.indexOf('blob:') !== 0) {\r\n env.wasm.wasmPaths = scriptSrc.substr(0, (scriptSrc as string).lastIndexOf('/') + 1);\r\n }\r\n }\r\n\r\n return new Promise<void>((resolve, reject) => {\r\n proxyWorker?.terminate();\r\n // eslint-disable-next-line @typescript-eslint/no-var-requires, @typescript-eslint/no-require-imports\r\n proxyWorker = require('worker-loader?inline=no-fallback!./proxy-worker/main').default() as Worker;\r\n proxyWorker.onmessage = onProxyWorkerMessage;\r\n initWasmCallbacks = [resolve, reject];\r\n const message: OrtWasmMessage = {type: 'init-wasm', in : env.wasm};\r\n proxyWorker.postMessage(message);\r\n });\r\n\r\n } else {\r\n return initializeWebAssembly(env.wasm);\r\n }\r\n};\r\n\r\nexport const initOrt = async(numThreads: number, loggingLevel: number): Promise<void> => {\r\n if (isProxy()) {\r\n ensureWorker();\r\n return new Promise<void>((resolve, reject) => {\r\n initOrtCallbacks = [resolve, reject];\r\n const message: OrtWasmMessage = {type: 'init-ort', in : {numThreads, loggingLevel}};\r\n proxyWorker!.postMessage(message);\r\n });\r\n } else {\r\n core.initOrt(numThreads, loggingLevel);\r\n }\r\n};\r\n\r\nexport const createSession =\r\n async(model: Uint8Array, options?: InferenceSession.SessionOptions): Promise<SerializableSessionMetadata> => {\r\n if (isProxy()) {\r\n ensureWorker();\r\n return new Promise<SerializableSessionMetadata>((resolve, reject) => {\r\n createSessionCallbacks.push([resolve, reject]);\r\n const message: OrtWasmMessage = {type: 'create', in : {model, options}};\r\n proxyWorker!.postMessage(message, [model.buffer]);\r\n });\r\n } else {\r\n return core.createSession(model, options);\r\n }\r\n};\r\n\r\nexport const releaseSession = async(sessionId: number): Promise<void> => {\r\n if (isProxy()) {\r\n ensureWorker();\r\n return new Promise<void>((resolve, reject) => {\r\n releaseSessionCallbacks.push([resolve, reject]);\r\n const message: OrtWasmMessage = {type: 'release', in : sessionId};\r\n proxyWorker!.postMessage(message);\r\n });\r\n } else {\r\n core.releaseSession(sessionId);\r\n }\r\n};\r\n\r\nexport const run = async(\r\n sessionId: number, inputIndices: number[], inputs: SerializableTensor[], outputIndices: number[],\r\n options: InferenceSession.RunOptions): Promise<SerializableTensor[]> => {\r\n if (isProxy()) {\r\n ensureWorker();\r\n return new

Promise<SerializableTensor[]>((resolve, reject) => {\r\n   runCallbacks.push([resolve, reject]);\r\n   const message: OrtWasmMessage = {type: 'run', in : {sessionId, inputIndices, inputs, outputIndices, options}};\r\n   proxyWorker!.postMessage(message, core.extractTransferableBuffers(inputs));\r\n   });\r\n } else {\r\n   return core.run(sessionId, inputIndices, inputs, outputIndices, options);\r\n }\r\n};\r\n\r\nexport const endProfiling = async(sessionId: number): Promise<void> => {\r\n if (isProxy()) {\r\n   ensureWorker();\r\n   return new Promise<void>((resolve, reject) => {\r\n   endProfilingCallbacks.push([resolve, reject]);\r\n   const message: OrtWasmMessage = {type: 'end-profiling', in : sessionId};\r\n   proxyWorker!.postMessage(message);\r\n   });\r\n } else {\r\n   core.endProfiling(sessionId);\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceSession} from 'onnxruntime-common';\r\n\r\nimport {iterateExtraOptions} from './options-utils';\r\nimport {allocWasmString} from './string-utils';\r\nimport {getInstance} from './wasm-factory';\r\n\r\nexport const setRunOptions = (options: InferenceSession.RunOptions): [number, number[]] => {\r\n const wasm = getInstance();\r\n let runOptionsHandle = 0;\r\n const allocs: number[] = [];\r\n\r\n const runOptions: InferenceSession.RunOptions = options || {};\r\n\r\n try {\r\n   if (options?.logSeverityLevel === undefined) {\r\n   runOptions.logSeverityLevel = 2; // Default to warning\r\n   } else if (\r\n   typeof options.logSeverityLevel !== 'number' || !Number.isInteger(options.logSeverityLevel) ||\r\n   options.logSeverityLevel < 0 || options.logSeverityLevel > 4) {\r\n   throw new Error(`log serverity level is not valid: ${options.logSeverityLevel}`);\r\n   }\r\n\r\n   if (options?.logVerbosityLevel === undefined) {\r\n   runOptions.logVerbosityLevel = 0; // Default to 0\r\n   } else if (typeof options.logVerbosityLevel !== 'number' || !Number.isInteger(options.logVerbosityLevel)) {\r\n   throw new Error(`log verbosity level is not valid: ${options.logVerbosityLevel}`);\r\n   }\r\n\r\n   if (options?.terminate === undefined) {\r\n   runOptions.terminate = false;\r\n   }\r\n\r\n   let tagDataOffset = 0;\r\n   if (options?.tag !== undefined) {\r\n   tagDataOffset = allocWasmString(options.tag, allocs);\r\n   }\r\n\r\n   runOptionsHandle = wasm._OrtCreateRunOptions(\r\n   runOptions.logSeverityLevel!, runOptions.logVerbosityLevel!, !!runOptions.terminate!, tagDataOffset);\r\n   if (runOptionsHandle === 0) {\r\n   throw new Error('Can\\'t create run options');\r\n   }\r\n\r\n   if (options?.extra !== undefined) {\r\n   iterateExtraOptions(options.extra, '', new WeakSet<Record<string, unknown>>(), (key, value) => {\r\n   const keyDataOffset = allocWasmString(key, allocs);\r\n   const valueDataOffset = allocWasmString(value, allocs);\r\n\r\n   if (wasm._OrtAddRunConfigEntry(runOptionsHandle, keyDataOffset, valueDataOffset) !== 0) {\r\n   throw new Error(`Can't set a run config entry: ${key} - ${value}`);\r\n   }\r\n   });\r\n   }\r\n\r\n   return [runOptionsHandle, allocs];\r\n } catch (e) {\r\n   if (runOptionsHandle !== 0) {\r\n   wasm._OrtReleaseRunOptions(runOptionsHandle);\r\n   }\r\n   allocs.forEach(wasm._free);\r\n   throw e;\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env, InferenceSession, SessionHandler, Tensor} from 'onnxruntime-common';\r\n\r\nimport {createSession, endProfiling, initOrt, releaseSession, run} from './proxy-wrapper';\r\n\r\nlet ortInit: boolean;\r\n\r\n\r\nconst getLogLevel = (logLevel: 'verbose'|'info'|'warning'|'error'|'fatal'): number => {\r\n switch (logLevel) {\r\n   case 'verbose':\r\n   return 0;\r\n   case 'info':\r\n   return 1;\r\n   case 'warning':\r\n   return 2;\r\n   case 'error':\r\n   return 3;\r\n   case 'fatal':\r\n   return 4;\r\n   default:\r\n   throw new Error(`unsupported logging level: ${logLevel}`);\r\n }\r\n};\r\n\r\nexport class OnnxruntimeWebAssemblySessionHandler implements SessionHandler {\r\n private sessionId: number;\r\n\r\n inputNames: string[];\r\n outputNames: string[];\r\n\r\n async loadModel(model: Uint8Array, options?: InferenceSession.SessionOptions): Promise<void> {\r\n   if (!ortInit) {\r\n   await initOrt(env.wasm.numThreads!, getLogLevel(env.logLevel!));\r\n   ortInit = true;\r\n   }\r\n\r\n   [this.sessionId, this.inputNames, this.outputNames] = await createSession(model, options);\r\n }\r\n\r\n async dispose(): Promise<void> {\r\n   return releaseSession(this.sessionId);\r\n }\r\n\r\n async run(feeds: SessionHandler.FeedsType, fetches: SessionHandler.FetchesType, options: InferenceSession.RunOptions):\r\n   Promise<SessionHandler.ReturnType> {\r\n   const inputArray: Tensor[] = [];\r\n   const inputIndices: number[] = [];\r\n   Object.entries(feeds).forEach(kvp => {\r\n   const name = kvp[0];\r\n   const tensor = kvp[1];\r\n   const index = this.inputNames.indexOf(name);\r\n   if (index === -1) {\r\n   throw new Error(`invalid input '${name}'`);\r\n

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    }\r\n      inputArray.push(tensor);\r\n      inputIndices.push(index);\r\n    });\r\n\r\n    const outputIndices: number[]
= [];\r\n    Object.entries(fetches).forEach(kvp => {\r\n      const name = kvp[0];\r\n      // TODO: support pre-
allocated output\r\n      const index = this.outputNames.indexOf(name);\r\n      if (index === -1) {\r\n        throw new
Error(`invalid output '${name}'`);\r\n      }\r\n      outputIndices.push(index);\r\n    });\r\n\r\n    const outputs =\r\n
 await run(this.sessionId, inputIndices, inputArray.map(t => [t.type, t.dims, t.data]), outputIndices, options);\r\n\r\n
const result: SessionHandler.ReturnType = {};\r\n    for (let i = 0; i < outputs.length; i++) {\r\n
result[this.outputNames[outputIndices[i]]] = new Tensor(outputs[i][0], outputs[i][2], outputs[i][1]);\r\n    }\r\n
return result;\r\n  }\r\n\r\n  startProfiling(): void {\r\n    // TODO: implement profiling\r\n  }\r\n\r\n  endProfiling():
void {\r\n    void endProfiling(this.sessionId);\r\n  }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights
reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceSession} from 'onnxruntime-
common';\r\n\r\nimport {iterateExtraOptions} from './options-utils';\r\nimport {allocWasmString} from './string-
utils';\r\nimport {getInstance} from './wasm-factory';\r\n\r\nconst getGraphOptimzationLevel =
(graphOptimizationLevel: string|unknown): number => {\r\n  switch (graphOptimizationLevel) {\r\n    case
'disabled':\r\n      return 0;\r\n    case 'basic':\r\n      return 1;\r\n    case 'extended':\r\n      return 2;\r\n    case 'all':\r\n
 return 99;\r\n    default:\r\n      throw new Error(`unsupported graph optimization level:
${graphOptimizationLevel}`);\r\n  }\r\n};\r\n\r\nconst getExecutionMode = (executionMode: 'sequential'|'parallel'):
number => {\r\n  switch (executionMode) {\r\n    case 'sequential':\r\n      return 0;\r\n    case 'parallel':\r\n      return
1;\r\n    default:\r\n      throw new Error(`unsupported execution mode: ${executionMode}`);\r\n  }\r\n};\r\n\r\nconst
appendDefaultOptions = (options: InferenceSession.SessionOptions): void => {\r\n  if (!options.extra) {\r\n
options.extra = {};\r\n  }\r\n  if (!options.extra.session) {\r\n    options.extra.session = {};\r\n  }\r\n  const session =
options.extra.session as Record<string, string>;\r\n  if (!session.use_ort_model_bytes_directly) {\r\n    // eslint-
disable-next-line camelcase\r\n    session.use_ort_model_bytes_directly = '1';\r\n  }\r\n};\r\n\r\nexport const
setSessionOptions = (options?: InferenceSession.SessionOptions): [number, number[]] => {\r\n  const wasm =
getInstance();\r\n  let sessionOptionsHandle = 0;\r\n  const allocs: number[] = [];\r\n\r\n  const sessionOptions:
InferenceSession.SessionOptions = options || {};\r\n  appendDefaultOptions(sessionOptions);\r\n\r\n  try {\r\n    if
(options?.graphOptimizationLevel === undefined) {\r\n      sessionOptions.graphOptimizationLevel = 'all';\r\n
}\r\n    const graphOptimizationLevel =
getGraphOptimzationLevel(sessionOptions.graphOptimizationLevel!);\r\n\r\n    if (options?.enableCpuMemArena
=== undefined) {\r\n      sessionOptions.enableCpuMemArena = true;\r\n    }\r\n\r\n    if
(options?.enableMemPattern === undefined) {\r\n      sessionOptions.enableMemPattern = true;\r\n    }\r\n\r\n    if
(options?.executionMode === undefined) {\r\n      sessionOptions.executionMode = 'sequential';\r\n    }\r\n    const
executionMode = getExecutionMode(sessionOptions.executionMode!);\r\n\r\n    let logIdDataOffset = 0;\r\n    if
(options?.logId !== undefined) {\r\n      logIdDataOffset = allocWasmString(options.logId, allocs);\r\n    }\r\n\r\n
if (options?.logSeverityLevel === undefined) {\r\n      sessionOptions.logSeverityLevel = 2;  // Default to
warning\r\n    } else if (\r\n        typeof options.logSeverityLevel !== 'number' ||
!Number.isInteger(options.logSeverityLevel) ||\r\n        options.logSeverityLevel < 0 || options.logSeverityLevel > 4)
{\r\n      throw new Error(`log serverity level is not valid: ${options.logSeverityLevel}`);\r\n    }\r\n\r\n    if
(options?.logVerbosityLevel === undefined) {\r\n      sessionOptions.logVerbosityLevel = 0;  // Default to 0\r\n    }
else if (typeof options.logVerbosityLevel !== 'number' || !Number.isInteger(options.logVerbosityLevel)) {\r\n
throw new Error(`log verbosity level is not valid: ${options.logVerbosityLevel}`);\r\n    }\r\n\r\n    if
(options?.enableProfiling === undefined) {\r\n      sessionOptions.enableProfiling = false;\r\n    }\r\n\r\n
sessionOptionsHandle = wasm._OrtCreateSessionOptions(\r\n        graphOptimizationLevel,
!!sessionOptions.enableCpuMemArena!, !!sessionOptions.enableMemPattern!, executionMode,\r\n
!!sessionOptions.enableProfiling!, 0, logIdDataOffset, sessionOptions.logSeverityLevel!,\r\n
sessionOptions.logVerbosityLevel!);\r\n    if (sessionOptionsHandle === 0) {\r\n      throw new Error('Can\\'t create
session options');\r\n    }\r\n\r\n    if (options?.extra !== undefined) {\r\n      iterateExtraOptions(options.extra, '', new
WeakSet<Record<string, unknown>>(), (key, value) => {\r\n        const keyDataOffset = allocWasmString(key,
allocs);\r\n        const valueDataOffset = allocWasmString(value, allocs);\r\n\r\n        if
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(wasm._OrtAddSessionConfigEntry(sessionOptionsHandle, keyDataOffset, valueDataOffset) !== 0) {\r\n throw new Error(`Can't set a session config entry: ${key} - ${value}`);\r\n }\r\n });\r\n }\r\n\r\n return [sessionOptionsHandle, allocs];\r\n } catch (e) {\r\n if (sessionOptionsHandle !== 0) {\r\n wasm._OrtReleaseSessionOptions(sessionOptionsHandle);\r\n }\r\n allocs.forEach(wasm._free);\r\n throw e;\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {getInstance} from './wasm-factory';\r\n\r\nexport const allocWasmString = (data: string, allocs: number[]): number => {\r\n const wasm = getInstance();\r\n\r\n const dataLength = wasm.lengthBytesUTF8(data) + 1;\r\n const dataOffset = wasm._malloc(dataLength);\r\n wasm.stringToUTF8(data, dataOffset, dataLength);\r\n allocs.push(dataOffset);\r\n\r\n return dataOffset;\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceSession, Tensor} from 'onnxruntime-common';\r\nimport {SerializableSessionMetadata, SerializableTensor} from './proxy-messages';\r\nimport {setRunOptions} from './run-options';\r\nimport {setSessionOptions} from './session-options';\r\nimport {allocWasmString} from './string-utils';\r\nimport {getInstance} from './wasm-factory';\r\n\r\n/**\r\n * initialize ORT environment.\r\n * @param numThreads SetGlobalIntraOpNumThreads(numThreads)\r\n * @param loggingLevel CreateEnv(static_cast<OrtLoggingLevel>(logging_level))\r\n */\r\nexport const initOrt = (numThreads: number, loggingLevel: number): void => {\r\n const errorCode = getInstance()._OrtInit(numThreads, loggingLevel);\r\n if (errorCode !== 0) {\r\n throw new Error(`Can't initialize onnxruntime. error code = ${errorCode}`);\r\n }\r\n};\r\n\r\n/**\r\n * tuple elements are: InferenceSession ID; inputNamesUTF8Encoded; outputNamesUTF8Encoded\r\n */\r\ntype SessionMetadata = [number, number[], number[]];\r\n\r\nconst activeSessions: Array<SessionMetadata|undefined> = [];\r\n\r\n/**\r\n * create an instance of InferenceSession.\r\n * @returns the metadata of InferenceSession. 0-value handle for failure.\r\n */\r\nexport const createSession =\r\n (model: Uint8Array, options?: InferenceSession.SessionOptions): SerializableSessionMetadata => {\r\n const wasm = getInstance();\r\n const modelDataOffset = wasm._malloc(model.byteLength);\r\n let sessionHandle = 0;\r\n let sessionOptionsHandle = 0;\r\n let allocs: number[] = [];\r\n\r\n try {\r\n [sessionOptionsHandle, allocs] = setSessionOptions(options);\r\n\r\n wasm.HEAPU8.set(model, modelDataOffset);\r\n sessionHandle = wasm._OrtCreateSession(modelDataOffset, model.byteLength, sessionOptionsHandle);\r\n if (sessionHandle === 0) {\r\n throw new Error('Can\\'t create a session');\r\n }\r\n } finally {\r\n wasm._free(modelDataOffset);\r\n wasm._OrtReleaseSessionOptions(sessionOptionsHandle);\r\n allocs.forEach(wasm._free);\r\n }\r\n\r\n const inputCount = wasm._OrtGetInputCount(sessionHandle);\r\n const outputCount = wasm._OrtGetOutputCount(sessionHandle);\r\n\r\n const inputNames = [];\r\n const inputNamesUTF8Encoded = [];\r\n const outputNames = [];\r\n const outputNamesUTF8Encoded = [];\r\n for (let i = 0; i < inputCount; i++) {\r\n const name = wasm._OrtGetInputName(sessionHandle, i);\r\n if (name === 0) {\r\n throw new Error('Can\\'t get an input name');\r\n }\r\n inputNamesUTF8Encoded.push(name);\r\n inputNames.push(wasm.UTF8ToString(name));\r\n }\r\n for (let i = 0; i < outputCount; i++) {\r\n const name = wasm._OrtGetOutputName(sessionHandle, i);\r\n if (name === 0) {\r\n throw new Error('Can\\'t get an output name');\r\n }\r\n outputNamesUTF8Encoded.push(name);\r\n outputNames.push(wasm.UTF8ToString(name));\r\n }\r\n\r\n activeSessions.push([sessionHandle, inputNamesUTF8Encoded, outputNamesUTF8Encoded]);\r\n return [activeSessions.length - 1, inputNames, outputNames];\r\n };\r\n\r\nexport const releaseSession = (sessionId: number): void => {\r\n const wasm = getInstance();\r\n const session = activeSessions[sessionId];\r\n if (!session) {\r\n throw new Error('invalid session id');\r\n }\r\n const sessionHandle = session[0];\r\n const inputNamesUTF8Encoded = session[1];\r\n const outputNamesUTF8Encoded = session[2];\r\n\r\n inputNamesUTF8Encoded.forEach(wasm._OrtFree);\r\n outputNamesUTF8Encoded.forEach(wasm._OrtFree);\r\n wasm._OrtReleaseSession(sessionHandle);\r\n activeSessions[sessionId] = undefined;\r\n};\r\n\r\n/**\r\n * Copied from ONNX definition. Use this to drop dependency 'onnx_proto' to decrease compiled .js file size.\r\n */\r\nconst enum DataType {\r\n undefined = 0,\r\n float = 1,\r\n uint8 = 2,\r\n int8 = 3,\r\n uint16 = 4,\r\n int16 = 5,\r\n

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int32 = 6,\r\n  int64 = 7,\r\n  string = 8,\r\n  bool = 9,\r\n  float16 = 10,\r\n  double = 11,\r\n  uint32 = 12,\r\n  uint64
= 13,\r\n  complex64 = 14,\r\n  complex128 = 15,\r\n  bfloat16 = 16\r\n}\r\n\r\n\r\nconst
tensorDataTypeStringToEnum = (type: string): DataType => {\r\n  switch (type) {\r\n    case 'int8':\r\n      return
DataType.int8;\r\n    case 'uint8':\r\n      return DataType.uint8;\r\n    case 'bool':\r\n      return DataType.bool;\r\n
case 'int16':\r\n      return DataType.int16;\r\n    case 'uint16':\r\n      return DataType.uint16;\r\n    case 'int32':\r\n
return DataType.int32;\r\n    case 'uint32':\r\n      return DataType.uint32;\r\n    case 'float32':\r\n      return
DataType.float;\r\n    case 'float64':\r\n      return DataType.double;\r\n    case 'string':\r\n      return
DataType.string;\r\n    case 'int64':\r\n      return DataType.int64;\r\n    case 'uint64':\r\n      return
DataType.uint64;\r\n\r\n    default:\r\n      throw new Error(`unsupported data type: ${type}`);\r\n
}\r\n};\r\n\r\nconst tensorDataTypeEnumToString = (typeProto: DataType): Tensor.Type => {\r\n  switch
(typeProto) {\r\n    case DataType.int8:\r\n      return 'int8';\r\n    case DataType.uint8:\r\n      return 'uint8';\r\n    case
DataType.bool:\r\n      return 'bool';\r\n    case DataType.int16:\r\n      return 'int16';\r\n    case DataType.uint16:\r\n
  return 'uint16';\r\n    case DataType.int32:\r\n      return 'int32';\r\n    case DataType.uint32:\r\n      return
'uint32';\r\n    case DataType.float:\r\n      return 'float32';\r\n    case DataType.double:\r\n      return 'float64';\r\n
case DataType.string:\r\n      return 'string';\r\n    case DataType.int64:\r\n      return 'int32';\r\n    case
DataType.uint64:\r\n      return 'uint32';\r\n\r\n    default:\r\n      throw new Error(`unsupported data type:
${typeProto}`);\r\n  }\r\n};\r\n\r\nconst numericTensorTypeToTypedArray = (type: Tensor.Type):
Float32ArrayConstructor|Uint8ArrayConstructor|\r\n
Int8ArrayConstructor|Uint16ArrayConstructor|Int16ArrayConstructor|Int32ArrayConstructor|BigInt64ArrayConstru
ctor|\r\n    Uint8ArrayConstructor|Float64ArrayConstructor|Uint32ArrayConstructor|BigUint64ArrayConstructor =>
{\r\n      switch (type) {\r\n        case 'float32':\r\n          return Float32Array;\r\n        case 'uint8':\r\n          return
Uint8Array;\r\n        case 'int8':\r\n          return Int8Array;\r\n        case 'uint16':\r\n          return Uint16Array;\r\n
case 'int16':\r\n          return Int16Array;\r\n        case 'int32':\r\n          return Int32Array;\r\n        case 'bool':\r\n
return Uint8Array;\r\n        case 'float64':\r\n          return Float64Array;\r\n        case 'uint32':\r\n          return
Uint32Array;\r\n        case 'int64':\r\n          return BigInt64Array;\r\n        case 'uint64':\r\n          return
BigUint64Array;\r\n        default:\r\n          throw new Error(`unsupported type: ${type}`);\r\n      }\r\n
};\r\n\r\n\r\n/**\r\n * perform inference run\r\n */\r\nexport const run =\r\n    (sessionId: number, inputIndices:
number[], inputs: SerializableTensor[], outputIndices: number[],\r\n     options: InferenceSession.RunOptions):
SerializableTensor[] => {\r\n      const wasm = getInstance();\r\n      const session = activeSessions[sessionId];\r\n
if (!session) {\r\n        throw new Error('invalid session id');\r\n      }\r\n      const sessionHandle = session[0];\r\n
const inputNamesUTF8Encoded = session[1];\r\n      const outputNamesUTF8Encoded = session[2];\r\n\r\n      const
inputCount = inputIndices.length;\r\n      const outputCount = outputIndices.length;\r\n\r\n      let runOptionsHandle
= 0;\r\n      let runOptionsAllocs: number[] = [];\r\n\r\n      const inputValues: number[] = [];\r\n      const
inputAllocs: number[] = [];\r\n\r\n      try {\r\n        [runOptionsHandle, runOptionsAllocs] =
setRunOptions(options);\r\n\r\n        // create input tensors\r\n        for (let i = 0; i < inputCount; i++) {\r\n          const
dataType = inputs[i][0];\r\n          const dims = inputs[i][1];\r\n          const data = inputs[i][2];\r\n\r\n          let
dataOffset: number;\r\n          let dataByteLength: number;\r\n\r\n          if (Array.isArray(data)) {\r\n            // string
tensor\r\n            dataByteLength = 4 * data.length;\r\n            dataOffset = wasm._malloc(dataByteLength);\r\n
  inputAllocs.push(dataOffset);\r\n            let dataIndex = dataOffset / 4;\r\n            for (let i = 0; i < data.length; i++)
{\r\n              if (typeof data[i] !== 'string') {\r\n                throw new TypeError(`tensor data at index ${i} is not a
string`);\r\n              }\r\n              wasm.HEAPU32[dataIndex++] = allocWasmString(data[i], inputAllocs);\r\n
}\r\n          } else {\r\n            dataByteLength = data.byteLength;\r\n            dataOffset =
wasm._malloc(dataByteLength);\r\n            inputAllocs.push(dataOffset);\r\n            wasm.HEAPU8.set(new
Uint8Array(data.buffer, data.byteOffset, dataByteLength), dataOffset);\r\n          }\r\n\r\n          const stack =
wasm.stackSave();\r\n          const dimsOffset = wasm.stackAlloc(4 * dims.length);\r\n          try {\r\n            let
dimIndex = dimsOffset / 4;\r\n            dims.forEach(d => wasm.HEAP32[dimIndex++] = d);\r\n            const tensor
= wasm._OrtCreateTensor(\r\n                tensorDataTypeStringToEnum(dataType), dataOffset, dataByteLength,
dimsOffset, dims.length);\r\n            if (tensor === 0) {\r\n              throw new Error('Can\\'t create a tensor');\r\n
```

}\r\n inputValues.push(tensor);\r\n } finally {\r\n wasm.stackRestore(stack);\r\n }\r\n }\r\n\r\n const beforeRunStack = wasm.stackSave();\r\n const inputValuesOffset = wasm.stackAlloc(inputCount * 4);\r\n const inputNamesOffset = wasm.stackAlloc(inputCount * 4);\r\n const outputValuesOffset = wasm.stackAlloc(outputCount * 4);\r\n const outputNamesOffset = wasm.stackAlloc(outputCount * 4);\r\n\r\n try {\r\n let inputValuesIndex = inputValuesOffset / 4;\r\n let inputNamesIndex = inputNamesOffset / 4;\r\n let outputValuesIndex = outputValuesOffset / 4;\r\n let outputNamesIndex = outputNamesOffset / 4;\r\n for (let i = 0; i < inputCount; i++) {\r\n wasm.HEAPU32[inputValuesIndex++] = inputValues[i];\r\n wasm.HEAPU32[inputNamesIndex++] = inputNamesUTF8Encoded[inputIndices[i]];\r\n }\r\n for (let i = 0; i < outputCount; i++) {\r\n wasm.HEAPU32[outputValuesIndex++] = 0;\r\n wasm.HEAPU32[outputNamesIndex++] = outputNamesUTF8Encoded[outputIndices[i]];\r\n }\r\n\r\n // support RunOptions\r\n let errorCode = wasm._OrtRun(\r\n sessionHandle, inputNamesOffset, inputValuesOffset, inputCount, outputNamesOffset, outputCount,\r\n outputValuesOffset, runOptionsHandle);\r\n\r\n const output: SerializableTensor[] = [];\r\n\r\n if (errorCode === 0) {\r\n for (let i = 0; i < outputCount; i++) {\r\n const tensor = wasm.HEAPU32[outputValuesOffset / 4 + i];\r\n\r\n const beforeGetTensorDataStack = wasm.stackSave();\r\n // stack allocate 4 pointer value\r\n const tensorDataOffset = wasm.stackAlloc(4 * 4);\r\n\r\n let type: Tensor.Type|undefined, dataOffset = 0;\r\n try {\r\n errorCode = wasm._OrtGetTensorData(\r\n tensor, tensorDataOffset, tensorDataOffset + 4, tensorDataOffset + 8, tensorDataOffset + 12);\r\n if (errorCode !== 0) {\r\n throw new Error(`Can't get a tensor data. error code = ${errorCode}`);\r\n }\r\n let tensorDataIndex = tensorDataOffset / 4;\r\n const dataType = wasm.HEAPU32[tensorDataIndex++];\r\n dataOffset = wasm.HEAPU32[tensorDataIndex++];\r\n const dimsOffset = wasm.HEAPU32[tensorDataIndex++];\r\n const dimsLength = wasm.HEAPU32[tensorDataIndex++];\r\n const dims = [];\r\n for (let i = 0; i < dimsLength; i++) {\r\n dims.push(wasm.HEAPU32[dimsOffset / 4 + i]);\r\n }\r\n wasm._OrtFree(dimsOffset);\r\n\r\n const size = dims.length === 0 ? 1 : dims.reduce((a, b) => a * b);\r\n type = tensorDataTypeEnumToString(dataType);\r\n if (type === 'string') {\r\n const stringData: string[] = [];\r\n let dataIndex = dataOffset / 4;\r\n for (let i = 0; i < size; i++) {\r\n const offset = wasm.HEAPU32[dataIndex++];\r\n const maxBytesToRead = i === size - 1 ? undefined : wasm.HEAPU32[dataIndex] - offset;\r\n stringData.push(wasm.UTF8ToString(offset, maxBytesToRead));\r\n }\r\n output.push([type, dims, stringData]);\r\n } else {\r\n const typedArrayConstructor = numericTensorTypeToTypedArray(type);\r\n const data = new typedArrayConstructor(size);\r\n new Uint8Array(data.buffer, data.byteOffset, data.byteLength)\r\n .set(wasm.HEAPU8.subarray(dataOffset, dataOffset + data.byteLength));\r\n output.push([type, dims, data]);\r\n }\r\n } finally {\r\n wasm.stackRestore(beforeGetTensorDataStack);\r\n if (type === 'string' && dataOffset) {\r\n wasm._free(dataOffset);\r\n }\r\n wasm._OrtReleaseTensor(tensor);\r\n }\r\n }\r\n }\r\n\r\n if (errorCode === 0) {\r\n return output;\r\n } else {\r\n throw new Error(`failed to call OrtRun(). error code = ${errorCode}.`);\r\n }\r\n } finally {\r\n wasm.stackRestore(beforeRunStack);\r\n }\r\n } finally {\r\n inputValues.forEach(wasm._OrtReleaseTensor);\r\n inputAllocs.forEach(wasm._free);\r\n\r\n wasm._OrtReleaseRunOptions(runOptionsHandle);\r\n runOptionsAllocs.forEach(wasm._free);\r\n }\r\n };\r\n\r\n/**\r\n * end profiling\r\n */\r\nexport const endProfiling = (sessionId: number): void => {\r\n const wasm = getInstance();\r\n const session = activeSessions[sessionId];\r\n if (!session) {\r\n throw new Error('invalid session id');\r\n }\r\n const sessionHandle = session[0];\r\n\r\n // profile file name is not used yet, but it must be freed.\r\n const profileFileName = wasm._OrtEndProfiling(sessionHandle);\r\n if (profileFileName === 0) {\r\n throw new Error('Can\\'t get an profile file name');\r\n }\r\n wasm._OrtFree(profileFileName);\r\n};\r\n\r\nexport const extractTransferableBuffers = (tensors: readonly SerializableTensor[]): ArrayBufferLike[] => {\r\n const buffers: ArrayBufferLike[] = [];\r\n for (const tensor of tensors) {\r\n const data = tensor[2];\r\n if (!Array.isArray(data) && data.buffer) {\r\n buffers.push(data.buffer);\r\n }\r\n }\r\n return buffers;\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Env} from 'onnxruntime-common';\r\nimport * as path from 'path';\r\n\r\nimport {OrtWasmModule} from './binding/ort-wasm';\r\nimport {OrtWasmThreadedModule} from './binding/ort-wasm-threaded';\r\nimport ortWasmFactoryThreaded from './binding/ort-wasm-threaded.js';\r\nimport ortWasmFactory from './binding/ort-wasm.js';\r\n\r\nlet wasm: OrtWasmModule|undefined;\r\nlet initialized = false;\r\nlet initializing = false;\r\nlet aborted = false;\r\n\r\nconst isMultiThreadSupported = (): boolean => {\r\n try {\r\n   // If 'SharedArrayBuffer' is not available, WebAssembly threads will not work.\r\n   if (typeof SharedArrayBuffer === 'undefined') {\r\n   return false;\r\n   }\r\n\r\n   // Test for transferability of SABs (for browsers. needed for Firefox)\r\n   // https://groups.google.com/forum/#!msg/mozilla.dev.platform/IHkBZlHETpA/dwsMNchWEQAJ\r\n   if (typeof MessageChannel !== 'undefined') {\r\n   new MessageChannel().port1.postMessage(new SharedArrayBuffer(1));\r\n   }\r\n\r\n   // Test for WebAssembly threads capability (for both browsers and Node.js)\r\n   // This typed array is a WebAssembly program containing threaded instructions.\r\n   return WebAssembly.validate(new Uint8Array([\r\n   0, 97, 115, 109, 1, 0, 0, 0, 1, 4, 1, 96, 0,   0, 3, 2, 1, 0, 5,\r\n   4, 1, 3,   1,   1, 10, 11, 1, 9, 0, 65, 0, 254, 16, 2, 0, 26, 11\r\n   ]));\r\n } catch (e) {\r\n   return false;\r\n }\r\n};\r\n\r\nconst isSimdSupported = (): boolean => {\r\n try {\r\n   // Test for WebAssembly SIMD capability (for both browsers and Node.js)\r\n   // This typed array is a WebAssembly program containing SIMD instructions.\r\n   return WebAssembly.validate(new Uint8Array(\r\n   [0, 97, 115, 109, 1, 0, 0, 0, 1, 4, 1, 96, 0, 0, 3, 2, 1, 0, 10, 9, 1, 7, 0, 65, 0, 253, 15, 26, 11]));\r\n } catch (e) {\r\n   return false;\r\n }\r\n};\r\n\r\nconst getWasmFileName = (useSimd: boolean, useThreads: boolean) => {\r\n if (useThreads) {\r\n   return useSimd ? 'ort-wasm-simd-threaded.wasm' : 'ort-wasm-threaded.wasm';\r\n } else {\r\n   return useSimd ? 'ort-wasm-simd.wasm' : 'ort-wasm.wasm';\r\n }\r\n};\r\n\r\nexport const initializeWebAssembly = async(flags: Env.WebAssemblyFlags): Promise<void> => {\r\n if (initialized) {\r\n   return Promise.resolve();\r\n }\r\n if (initializing) {\r\n   throw new Error('multiple calls to \\'initializeWebAssembly()\\' detected.');\r\n }\r\n if (aborted) {\r\n   throw new Error('previous call to \\'initializeWebAssembly()\\' failed.');\r\n }\r\n\r\n initializing = true;\r\n\r\n // wasm flags are already initialized\r\n const timeout = flags.initTimeout!;\r\n const numThreads = flags.numThreads!;\r\n const simd = flags.simd!;\r\n\r\n const useThreads = numThreads > 1 && isMultiThreadSupported();\r\n const useSimd = simd && isSimdSupported();\r\n\r\n const wasmPrefixOverride = typeof flags.wasmPaths === 'string' ? flags.wasmPaths : undefined;\r\n const wasmFileName = getWasmFileName(false, useThreads);\r\n const wasmOverrideFileName = getWasmFileName(useSimd, useThreads);\r\n const wasmPathOverride = typeof flags.wasmPaths === 'object' ? flags.wasmPaths[wasmOverrideFileName] : undefined;\r\n\r\n let isTimeout = false;\r\n\r\n const tasks: Array<Promise<void>> = [];\r\n\r\n // promise for timeout\r\n if (timeout > 0) {\r\n   tasks.push(new Promise((resolve) => {\r\n   setTimeout(() => {\r\n   isTimeout = true;\r\n   resolve();\r\n   }, timeout);\r\n   }));\r\n }\r\n\r\n // promise for module initialization\r\n tasks.push(new Promise((resolve, reject) => {\r\n   const factory = useThreads ? ortWasmFactoryThreaded : ortWasmFactory;\r\n   const config: Partial<OrtWasmModule> = {\r\n   locateFile: (fileName: string, scriptDirectory: string) => {\r\n   if (fileName.endsWith('.worker.js') && typeof Blob !== 'undefined') {\r\n   return URL.createObjectURL(new Blob(\r\n   [\r\n   // This require() function is handled by webpack to load file content of the corresponding .worker.js\r\n   // eslint-disable-next-line @typescript-eslint/no-require-imports\r\n   require('./binding/ort-wasm-threaded.worker.js')\r\n   ],\r\n   {type: 'text/javascript'}));\r\n   }\r\n\r\n   if (fileName === wasmFileName) {\r\n   const prefix: string = wasmPrefixOverride ?? scriptDirectory;\r\n   return wasmPathOverride ?? prefix + wasmOverrideFileName;\r\n   }\r\n\r\n   return scriptDirectory + fileName;\r\n   }\r\n   };\r\n\r\n   if (useThreads) {\r\n   if (typeof Blob === 'undefined') {\r\n   config.mainScriptUrlOrBlob = path.join(__dirname, 'ort-wasm-threaded.js');\r\n   } else {\r\n   const scriptSourceCode =\r\n   `var ortWasmThreaded=(function(){var _scriptDir;return ${ortWasmFactoryThreaded.toString()}})();`;\r\n   config.mainScriptUrlOrBlob = new Blob([scriptSourceCode], {type: 'text/javascript'});\r\n   }\r\n   }\r\n\r\n   factory(config).then(\r\n   // wasm module initialized successfully\r\n   module => {\r\n   initializing =

```
false;\r\n          initialized = true;\r\n          wasm = module;\r\n          resolve();\r\n        },\r\n        // wasm module
failed to initialize\r\n        (what) => {\r\n          initializing = false;\r\n          aborted = true;\r\n          reject(what);\r\n
      });\r\n  }));\r\n\r\n  await Promise.race(tasks);\r\n\r\n  if (isTimeout) {\r\n    throw new Error(`WebAssembly
backend initializing failed due to timeout: ${timeout}ms`);\r\n  }\r\n};\r\n\r\nexport const getInstance = ():
OrtWasmModule => {\r\n  if (initialized && wasm) {\r\n    return wasm;\r\n  }\r\n\r\n  throw new
Error('WebAssembly is not initialized yet.');\r\n};\r\n\r\nexport const dispose = (): void => {\r\n  if (initialized &&
!initializing && !aborted) {\r\n    initializing = true;\r\n\r\n    (wasm as
OrtWasmThreadedModule).PThread?.terminateAllThreads();\r\n    wasm = undefined;\r\n\r\n    initializing =
false;\r\n    initialized = false;\r\n    aborted = true;\r\n  }\r\n};\r\n","\nimport worker from
\"!!../../../node_modules/worker-loader/dist/runtime/inline.js\";\n\nexport default function Worker_fn() {\n  return
worker(\"/*!\\n* ONNX Runtime Web v1.9.0\\n* Copyright (c) Microsoft Corporation. All rights reserved.\\n*
Licensed under the MIT License.\\n*/\\n!function(){var e={474:function(e,t,n){var
_scriptDir,r=(_scriptDir=(_scriptDir=\\\"undefined\\\"!=typeof
document&&document.currentScript?document.currentScript.src:void 0)||__filename,function(e){function t(){return
R.buffer!=L&&Q(R.buffer),W}function r(){return R.buffer!=L&&Q(R.buffer),j}function a(){return
R.buffer!=L&&Q(R.buffer),H}function i(){return R.buffer!=L&&Q(R.buffer),Y}function o(){return
R.buffer!=L&&Q(R.buffer),z}var u,s,c;e=e||{},u||(u=void 0!==e?e:{}),u.ready=new
Promise((function(e,t){s=e,c=t}));var l,f={};for(l in u)u.hasOwnProperty(l)&&(f[l]=u[l]);var
p=\\\"./this.program\\\";function d(e,t){throw t}var m,h,g,b,y,v=\\\"object\\\"==typeof
window,_=\\\"function\\\"==typeof importScripts,w=\\\"object\\\"==typeof process&&\\\"object\\\"==typeof
process.versions&&\\\"string\\\"==typeof
process.versions.node,O=u.ENVIRONMENT_IS_PTHREAD||!1,A=\\\"\\\";function E(e){return
u.locateFile?u.locateFile(e,A):A+e}if(w){var
S;A=_?n(622).dirname(A)+\\\"/\\\":__dirname+\\\"/\\\",m=function(e,t){return
b||(b=n(747)),y||(y=n(622)),e=y.normalize(e),b.readFileSync(e,t?null:\\\"utf8\\\")},g=function(e){return(e=m(e,!0)).b
uffer||(e=new
Uint8Array(e)),F(e.buffer),e},h=function(e,t,r){b||(b=n(747)),y||(y=n(622)),e=y.normalize(e),b.readFile(e,(function(
e,n){e?r(e):t(n.buffer)}))},1<process.argv.length&&(p=process.argv[1].replace(/\\\\\\\\/g,\\\"/\\\")),process.argv.slice(
2),process.on(\\\"uncaughtException\\\",(function(e){if(!(e instanceof Bt))throw
e})),process.on(\\\"unhandledRejection\\\",le),d=function(e,t){if(ae())throw
process.exitCode=e,t;process.exit(e)},u.inspect=function(){return\\\"[Emscripten Module
object]\\\"};try{S=n(13)}catch(e){throw console.error('The \\\"worker_threads\\\" module is not supported in this
node.js build - perhaps a newer version is
needed?'),e}global.Worker=S.Worker}else(v||_)&&(_?A=self.location.href:\\\"undefined\\\"!=typeof
document&&document.currentScript&&(A=document.currentScript.src),_scriptDir&&(A=_scriptDir),A=0!==A.in
dexOf(\\\"blob:\\\")?A.substr(0,A.lastIndexOf(\\\"/\\\")+1):\\\"\\\",w?(m=function(e,t){return
b||(b=n(747)),y||(y=n(622)),e=y.normalize(e),b.readFileSync(e,t?null:\\\"utf8\\\")},g=function(e){return(e=m(e,!0)).b
uffer||(e=new
Uint8Array(e)),F(e.buffer),e},h=function(e,t,r){b||(b=n(747)),y||(y=n(622)),e=y.normalize(e),b.readFile(e,(function(
e,n){e?r(e):t(n.buffer)}))}):(m=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.send(null),t.responseText},_&&(g=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.responseType=\\\"arraybuffer\\\",t.send(null),new
Uint8Array(t.response)}),h=function(e,t,n){var r=new
XMLHttpRequest;r.open(\\\"GET\\\",e,!0),r.responseType=\\\"arraybuffer\\\",r.onload=function(){200==r.status||0=
=r.status&&r.response?t(r.response):n()},r.onerror=n,r.send(null)}));w&&\\\"undefined\\\"==typeof
performance&&(global.performance=n(630).performance);var
T,M,k=u.print||console.log.bind(console),x=u.printErr||console.warn.bind(console);for(l in
f)f.hasOwnProperty(l)&&(u[l]=f[l]);f=null,u.thisProgram&&(p=u.thisProgram),u.quit&&(d=u.quit),u.wasmBinary
```

```
&&(M=u.wasmBinary);var D=u.noExitRuntime||!1;\\\"object\\\"!=typeof WebAssembly&&le(\\\"no native wasm
support detected\\\");var R,C,P,I=!1;function F(e,t){e||le(\\\"Assertion failed: \\\"+t)}function U(e){var t=new
TextDecoder(e);this.decode=function(e){return e.buffer instanceof SharedArrayBuffer&&(e=new
Uint8Array(e)),t.decode.call(t,e)}}var L,W,j,H,Y,z,B=\\\"undefined\\\"!=typeof TextDecoder?new
U(\\\"utf8\\\"):void 0;function G(e,t,n){var r=t+n;for(n=t;e[n]&&!(n>=r);)++n;if(16<n-t&&e.subarray&&B)return
B.decode(e.subarray(t,n));for(r=\\\"\\\";t<n;){var a=e[t++];if(128&a){var
i=63&e[t++];if(192==(224&a))r+=String.fromCharCode((31&a)<<6|i);else{var
o=63&e[t++];65536>(a=224==(240&a)?(15&a)<<12|i<<6|o:(7&a)<<18|i<<12|o<<6|63&e[t++])?r+=String.fromCh
arCode(a):(a-=65536,r+=String.fromCharCode(55296|a>>10,56320|1023&a))}}else
r+=String.fromCharCode(a)}return r}function N(e,t){return e?G(r(),e,t):\\\"\\\"}function q(e,t,n,r){if(!(0<r))return
0;var a=n;r=n+r-1;for(var i=0;i<e.length;++i){var
o=e.charCodeAt(i);if(55296<=o&&57343>=o&&(o=65536+((1023&o)<<10)|1023&e.charCodeAt(++i)),127>=o){i
f(n>=r)break;t[n++]=o}else{if(2047>=o){if(n+1>=r)break;t[n++]=192|o>>6}else{if(65535>=o){if(n+2>=r)break;t[
n++]=224|o>>12}else{if(n+3>=r)break;t[n++]=240|o>>18,t[n++]=128|o>>12&63}t[n++]=128|o>>6&63}t[n++]=1
28|63&o}}return t[n]=0,n-a}function V(e,t,n){return q(e,r(),t,n)}function X(e){for(var t=0,n=0;n<e.length;++n){var
r=e.charCodeAt(n);55296<=r&&57343>=r&&(r=65536+((1023&r)<<10)|1023&e.charCodeAt(++n)),127>=r?++t:t
=2047>=r?t+2:65535>=r?t+3:t+4}return t}function J(e){var n=X(e)+1,r=bt(n);return r&&q(e,t(),r,n),r}function
Q(e){L=e,u.HEAP8=W=new Int8Array(e),u.HEAP16=new Int16Array(e),u.HEAP32=H=new
Int32Array(e),u.HEAPU8=j=new Uint8Array(e),u.HEAPU16=new Uint16Array(e),u.HEAPU32=Y=new
Uint32Array(e),u.HEAPF32=new Float32Array(e),u.HEAPF64=z=new Float64Array(e)}\\\"undefined\\\"!=typeof
TextDecoder&&new U(\\\"utf-16le\\\"),O&&(L=u.buffer);var
Z=u.INITIAL_MEMORY||16777216;if(O)R=u.wasmMemory,L=u.buffer;else
if(u.wasmMemory)R=u.wasmMemory;else if(!((R=new
WebAssembly.Memory({initial:Z/65536,maximum:32768,shared:!0})).buffer instanceof SharedArrayBuffer))throw
x(\\\"requested a shared WebAssembly.Memory but the returned buffer is not a SharedArrayBuffer, indicating that
while the browser has SharedArrayBuffer it does not have WebAssembly threads support - you may need to set a
flag\\\"),w&&console.log(\\\"(on node you may need: --experimental-wasm-threads --experimental-wasm-bulk-
memory and also use a recent version)\\\"),Error(\\\"bad memory\\\");R&&(L=R.buffer),Z=L.byteLength,Q(L);var
K,$=[],ee=[],te=[],ne=[],re=0;function ae(){return D||0<re}function ie(){var e=u.preRun.shift();$.unshift(e)}var
oe,ue=0,se=null,ce=null;function le(e){throw u.onAbort&&u.onAbort(e),F(!O),x(e),I=!0,P=1,e=new
WebAssembly.RuntimeError(\\\"abort(\\\"+e+\\\"). Build with -s ASSERTIONS=1 for more
info.\\\"),c(e),e}function fe(){return oe.startsWith(\\\"data:application/octet-stream;base64,\\\")}function pe(){var
e=oe;try{if(e==oe&&M)return new Uint8Array(M);if(g)return g(e);throw\\\"both async and sync fetching of the
wasm failed\\\"}catch(e){le(e)}}u.preloadedImages={},u.preloadedAudios={},oe=\\\"ort-wasm-
threaded.wasm\\\",fe()||(oe=E(oe));var de={973748:function(){throw\\\"Canceled!\\\"}};function
me(e){for(;0<e.length;){var t=e.shift();if(\\\"function\\\"==typeof t)t(u);else{var n=t.Nb;\\\"number\\\"==typeof
n?void 0===t.ib?K.get(n)():K.get(n)(t.ib):n(void 0===t.ib?null:t.ib)}}}function
he(e,n){if(0>=e||e>t().length||1&e||0>n)return-28;if(0==n)return 0;2147483647<=n&&(n=1/0);var
r=Atomics.load(a(),zt>>2),i=0;if(r==e&&Atomics.compareExchange(a(),zt>>2,r,0)==r&&(i=1,0>=--n))return
1;if(0<=(e=Atomics.notify(a(),e>>2,n)))return e+i;throw\\\"Atomics.notify returned an unexpected value
\\\"+e}function ge(e){if(O)throw\\\"Internal Error! cleanupThread() can only ever be called from main application
thread!\\\";if(!e)throw\\\"Internal Error! Null pthread_ptr in cleanupThread!\\\";var
t=ye.cb[e];t&&(a()[e+12>>2]=0,ye.sb(t.worker))}u._emscripten_futex_wake=he;var
be,ye={gb:[],fb:[],zb:[],xc:function(){},Rb:function(){for(var
e=bt(228),t=0;57>t;++t)i()[e/4+t]=0;a()[e+12>>2]=e,t=e+152,a()[t>>2]=t;var
n=bt(512);for(t=0;128>t;++t)i()[n/4+t]=0;Atomics.store(i(),e+100>>2,n),Atomics.store(i(),e+40>>2,e),Dt(e,!_,1),Ot
(e)},Sb:function(){ye.receiveObjectTransfer=ye.Xb,ye.threadInit=ye.hc,ye.threadCancel=ye.fc,ye.threadExit=ye.Hb
,ye.setExitStatus=ye.Zb},cb:{},yb:[],Eb:function(){for(;0<ye.yb.length;)ye.yb.pop()();Ct()},Fb:function(e,t){Atomi
```

```
cs.store(i(),e+56>>2,1),Atomics.store(i(),e+60>>2,0),ye.Eb(),Atomics.store(i(),e+4>>2,t),Atomics.store(i(),e+0>>2,
1),he(e+0,2147483647),Dt(0,0,0)},Zb:function(e){P=e},Hb:function(e){var
t=_t();t&&(ye.Fb(t,e),O&&postMessage({cmd:\\\"exit\\\"}))},fc:function(){ye.Fb(_t(),-
1),postMessage({cmd:\\\"cancelDone\\\"})},Gb:function(){for(var e in ye.cb){var
t=ye.cb[e];t&&t.worker&&ye.sb(t.worker)}for(ye.cb={},e=0;e<ye.gb.length;++e){var
n=ye.gb[e];n.terminate()}for(ye.gb=[],e=0;e<ye.fb.length;++e)t=(n=ye.fb[e]).bb,ye.xb(t),n.terminate();ye.fb=[]},xb:
function(e){if(e){if(e.eb){var
t=a()[e.eb+100>>2];a()[e.eb+100>>2]=0,vt(t),vt(e.eb)}e.eb=0,e.wb&&e.hb&&vt(e.hb),e.hb=0,e.worker&&(e.work
er.bb=null)}},sb:function(e){ye.Yb((function(){delete
ye.cb[e.bb.eb],ye.gb.push(e),ye.fb.splice(ye.fb.indexOf(e),1),ye.xb(e.bb),e.bb=void
0}))},Yb:function(e){a()[Yt>>2]=0;try{e()}finally{a()[Yt>>2]=1}},Xb:function(){},hc:function(){for(var e in
ye.zb)ye.zb[e]()},Ub:function(e,t){e.onmessage=function(n){var
r=n.data,o=r.cmd;if(e.bb&&(ye.Lb=e.bb.eb),r.targetThread&&r.targetThread!=_t()){var
u=ye.cb[r.Dc];u?u.worker.postMessage(n.data,r.transferList):x('Internal error! Worker sent a message \\\"'+o+'\\\" to
target pthread '+r.targetThread+\\\", but that thread no longer exists!\\\")}else
if(\\\"processQueuedMainThreadWork\\\"===o)St();else if(\\\"spawnThread\\\"===o)Oe(n.data);else
if(\\\"cleanupThread\\\"===o)ge(r.thread);else if(\\\"killThread\\\"===o){if(n=r.thread,O)throw\\\"Internal Error!
killThread() can only ever be called from main application thread!\\\";if(!n)throw\\\"Internal Error! Null pthread_ptr
in killThread!\\\";a()[n+12>>2]=0,r=ye.cb[n],delete
ye.cb[n],r.worker.terminate(),ye.xb(r),ye.fb.splice(ye.fb.indexOf(r.worker),1),r.worker.bb=void 0}else
if(\\\"cancelThread\\\"===o){if(n=r.thread,O)throw\\\"Internal Error! cancelThread() can only ever be called from
main application thread!\\\";if(!n)throw\\\"Internal Error! Null pthread_ptr in
cancelThread!\\\";ye.cb[n].worker.postMessage({cmd:\\\"cancel\\\"})}else
if(\\\"loaded\\\"===o)e.loaded=!0,t&&t(e),e.mb&&(e.mb(),delete e.mb);else if(\\\"print\\\"===o)k(\\\"Thread
\\\"+r.threadId+\\\": \\\"+r.text);else if(\\\"printErr\\\"===o)x(\\\"Thread \\\"+r.threadId+\\\": \\\"+r.text);else
if(\\\"alert\\\"===o)alert(\\\"Thread \\\"+r.threadId+\\\": \\\"+r.text);else
if(\\\"exit\\\"===o)e.bb&&Atomics.load(i(),e.bb.eb+64>>2)&&ye.sb(e);else
if(\\\"exitProcess\\\"===o)try{Nt(r.returnCode)}catch(e){if(e instanceof Bt)return;throw
e}else\\\"cancelDone\\\"===o?ye.sb(e):\\\"objectTransfer\\\"!==o&&(\\\"setimmediate\\\"===n.data.target?e.postMe
ssage(n.data):x(\\\"worker sent an unknown command \\\"+o));ye.Lb=void 0},e.onerror=function(e){x(\\\"pthread
sent an error! \\\"+e.filename+\\\":\\\"+e.lineno+\\\":
\\\"+e.message)},w&&(e.on(\\\"message\\\",(function(t){e.onmessage({data:t})})),e.on(\\\"error\\\",(function(t){e.on
error(t)})),e.on(\\\"exit\\\",(function(){}))),e.postMessage({cmd:\\\"load\\\",urlOrBlob:u.mainScriptUrlOrBlob||_scri
ptDir,wasmMemory:R,wasmModule:C})},Ib:function(){var e=E(\\\"ort-wasm-
threaded.worker.js\\\");ye.gb.push(new Worker(e))},Ob:function(){return
0==ye.gb.length&&(ye.Ib(),ye.Ub(ye.gb[0])),ye.gb.pop()},nc:function(e){for(e=performance.now()+e;performance.
now()<e;);}};function ve(e,t){if(0===e)e=Date.now();else{if(1!==e&&4!==e)return a()[yt()>>2]=28,-
1;e=be()}return a()[t>>2]=e/1e3|0,a()[t+4>>2]=e%1e3*1e6|0,0}function _e(e,t){if(O)return
Ne(1,1,e,t);te.unshift({Nb:e,ib:t})}function we(e){this.lb=e-
16,this.dc=function(e){a()[this.lb+4>>2]=e},this.ac=function(e){a()[this.lb+8>>2]=e},this.bc=function(){a()[this.lb
>>2]=0},this.$b=function(){t()[this.lb+12>>0]=0},this.cc=function(){t()[this.lb+13>>0]=0},this.Pb=function(e,t){t
his.dc(e),this.ac(t),this.bc(),this.$b(),this.cc()}}function Oe(e){if(O)throw\\\"Internal Error! spawnThread() can only
ever be called from main application thread!\\\";var t=ye.Ob();if(!t)return 6;if(void 0!==t.bb)throw\\\"Internal
error!\\\";if(!e.rb)throw\\\"Internal error, no pthread ptr!\\\";ye.fb.push(t);for(var
n=bt(512),r=0;128>r;++r)a()[n+4*r>>2]=0;var
o=e.hb+e.jb,u=(r=ye.cb[e.rb]={worker:t,hb:e.hb,jb:e.jb,wb:e.wb,eb:e.rb}).eb>>2;Atomics.store(i(),u+16,e.detached)
,Atomics.store(i(),u+25,n),Atomics.store(i(),u+10,r.eb),Atomics.store(i(),u+20,e.jb),Atomics.store(i(),u+19,o),Atom
ics.store(i(),u+26,e.jb),Atomics.store(i(),u+28,o),Atomics.store(i(),u+29,e.detached),n=Rt()+40,Atomics.store(i(),u+
```

```
43,n),t.bb=r;var
s={cmd:\\\"run\\\",start_routine:e.ec,arg:e.ib,threadInfoStruct:e.rb,stackBase:e.hb,stackSize:e.jb};return
t.mb=function(){s.time=performance.now(),t.postMessage(s,e.mc)},t.loaded&&(t.mb(),delete t.mb),0}function
Ae(e,n,r){if(0>=e||e>t().length||1&e)return-28;if(v){if(Atomics.load(a(),e>>2)!=n)return-6;var
i=performance.now();for(r=i+r,Atomics.exchange(a(),zt>>2,e);;){if((i=performance.now())>r)return
Atomics.exchange(a(),zt>>2,0),-
73;if(0==(i=Atomics.exchange(a(),zt>>2,0)))break;if(St(),Atomics.load(a(),e>>2)!=n)return-
6;Atomics.exchange(a(),zt>>2,e)}return 0}if(\\\"timed-out\\\"===(e=Atomics.wait(a(),e>>2,n,r)))return-
73;if(\\\"not-equal\\\"===e)return-6;if(\\\"ok\\\"===e)return 0;throw\\\"Atomics.wait returned an unexpected value
\\\"+e}function Ee(){w||_||(T||(T={}),T[\\\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-thread\\\"]||(T[\\\"Blocking on the
main thread is very dangerous, see https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-
browser-thread\\\"]=1,x(\\\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-
thread\\\")))}u.establishStackSpace=function(e,t){jt(e,t),Lt(e)},u.invokeEntryPoint=function(e,t){return
K.get(e)(t)},be=w?function(){var e=process.hrtime();return 1e3*e[0]+e[1]/1e6}:O?function(){return
performance.now()-u.__performance_now_clock_drift}:function(){return performance.now()};var
Se={},Te=[null,[],[]];function Me(e,t){var n=Te[e];0===t||10===t?((1===e?k:x)(G(n,0)),n.length=0):n.push(t)}var
ke={};function xe(e,t){return O?Ne(2,1,e,t):(e=N(e),ke.rc(e,t))}function De(e,t,n){return O?Ne(3,1,e,t,n):0}function
Re(e,t){if(O)return Ne(4,1,e,t)}function Ce(e,t,n){if(O)return Ne(5,1,e,t,n)}function Pe(e,t,n){return
O?Ne(6,1,e,t,n):0}function Ie(e,t){if(O)return Ne(7,1,e,t)}function Fe(e,t){return
O?Ne(8,1,e,t):(e=N(e),ke.sc(e,t))}function Ue(e,t,n,a,i,o){if(O)t=Ne(9,1,e,t,n,a,i,o);else
if(o<<=12,0!=(16&a)&&0!=e%65536)t=-28;else if(0!=(32&a)){var
u=65536*Math.ceil(t/65536);(e=Ht(65536,u))?r().fill(0,e,e+u):e=0,e?(Se[e]={Wb:e,Tb:t,Jb:!0,fd:i,Ac:n,flags:a,offse
t:o},t=e):t=-48}else t=-52;return t}function Le(e,t){if(O)e=Ne(10,1,e,t);else{var
n=Se[e];0!==t&&n?(t===n.Tb&&(Se[e]=null,n.Jb&&vt(n.Wb)),e=0):e=-28}return e}function
We(e,t,n){if(O)return Ne(11,1,e,t,n)}function je(e,t,n){return O?Ne(12,1,e,t,n):(e=N(e),ke.tc(e,t,n))}function
He(e){if(O)return Ne(13,1,e)}function Ye(e,t){if(O)return Ne(14,1,e,t)}function ze(e){if(O)return
Ne(15,1,e)}function Be(){if(O)return Ne(16,1);le()}var Ge=[];function Ne(e,t){for(var n=arguments.length-
2,r=Ut(),a=Wt(8*n),i=a>>3,u=0;u<n;u++){var s=arguments[2+u];o()[i+u]=s}return n=Tt(e,n,a,t),Lt(r),n}var
qe=[],Ve=[0,\\\"undefined\\\"!=typeof document?document:0,\\\"undefined\\\"!=typeof window?window:0];function
Xe(e){return e=2<e?N(e):e,Ve[e]||(\\\"undefined\\\"!=typeof document?document.querySelector(e):void 0)}function
Je(e,t,n){var r=Xe(e);if(!r)return-
4;if(r.qb&&(a()[r.qb>>2]=t,a()[r.qb+4>>2]=n),!r.Db&&r.pc){if(r.qb){r=a()[r.qb+8>>2],e=e?N(e):\\\"\\\";var
i=Ut(),o=Wt(12),u=0;if(e){u=X(e)+1;var s=bt(u);V(e,s,u),u=s}return
a()[o>>2]=u,a()[o+4>>2]=t,a()[o+8>>2]=n,Mt(0,r,657457152,0,u,o),Lt(i),1}return-4}return
r.Db&&(r=r.Db),e=!1,r.pb&&r.pb.ob&&(e=0===(e=r.pb.ob.getParameter(2978))[0]&&0===e[1]&&e[2]===r.widt
h&&e[3]===r.height),r.width=t,r.height=n,e&&r.pb.ob.viewport(0,0,t,n),0}function Qe(e,t,n){return
O?Ne(17,1,e,t,n):Je(e,t,n)}var Ze,Ke=[\\\"default\\\",\\\"low-power\\\",\\\"high-performance\\\"],$e={};function
et(){if(!Ze){var
e,t={USER:\\\"web_user\\\",LOGNAME:\\\"web_user\\\",PATH:\\\"/\\\",PWD:\\\"/\\\",HOME:\\\"/home/web_user\\\
",LANG:(\\\"object\\\"==typeof navigator&&navigator.languages&&navigator.languages[0]||\\\"C\\\").replace(\\\"-
\\\",\\\"_\\\")+\\\".UTF-8\\\",_:p||\\\"./this.program\\\"};for(e in $e)void 0===$e[e]?delete t[e]:t[e]=$e[e];var
n=[];for(e in t)n.push(e+\\\"=\\\"+t[e]);Ze=n}return Ze}function tt(e,n){if(O)return Ne(18,1,e,n);var r=0;return
et().forEach((function(i,o){var
u=n+r;for(o=a()[e+4*o>>2]=u,u=0;u<i.length;++u)t()[o++>>0]=i.charCodeAt(u);t()[o>>0]=0,r+=i.length+1})),0}fu
nction nt(e,t){if(O)return Ne(19,1,e,t);var n=et();a()[e>>2]=n.length;var r=0;return
n.forEach((function(e){r+=e.length+1})),a()[t>>2]=r,0}function rt(e){return O?Ne(20,1,e):0}function at(e,n){return
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O?Ne(21,1,e,n):(e=1==e||2==e?2:le(),t()[n>>0]=e,0)}function it(e,t,n,r){return
O?Ne(22,1,e,t,n,r):(e=ke.vc(e),t=ke.uc(e,t,n),a()[r>>2]=t,0)}function ot(e,t,n,r,a){if(O)return
Ne(23,1,e,t,n,r,a)}function ut(e,t,n,i){if(O)return Ne(24,1,e,t,n,i);for(var o=0,u=0;u<n;u++){for(var
s=a()[t+8*u>>2],c=a()[t+(8*u+4)>>2],l=0;l<c;l++)Me(e,r()[s+l]);o+=c}return a()[i>>2]=o,0}function st(){function
e(e){return(e=e.toTimeString().match(/\\\\(([A-Za-z ]+)\\\\)$/))?e[1]:\\\"GMT\\\"}if(O)return
Ne(25,1);if(!st.Kb){st.Kb=!0;var t=(new Date).getFullYear(),n=new Date(t,0,1),r=new
Date(t,6,1);t=n.getTimezoneOffset();var
i=r.getTimezoneOffset(),o=Math.max(t,i);a()[Ft()>>2]=60*o,a()[It()>>2]=Number(t!=i),n=e(n),r=e(r),n=J(n),r=J(r),i
<t?(a()[Pt()>>2]=n,a()[Pt()+4>>2]=r):(a()[Pt()>>2]=r,a()[Pt()+4>>2]=n)}}function ct(e){return
0==e%4&&(0!=e%100||0==e%400)}function lt(e,t){for(var n=0,r=0;r<=t;n+=e[r++]);return n}var
ft=[31,29,31,30,31,30,31,31,30,31,30,31],pt=[31,28,31,30,31,30,31,31,30,31,30,31];function dt(e,t){for(e=new
Date(e.getTime());0<t;){var n=e.getMonth(),r=(ct(e.getFullYear())?ft:pt)[n];if(!(t>r-
e.getDate())){e.setDate(e.getDate()+t);break}t-=r-
e.getDate()+1,e.setDate(1),11>n?e.setMonth(n+1):(e.setMonth(0),e.setFullYear(e.getFullYear()+1))}return
e}function mt(e,n,r,i){function o(e,t,n){for(e=\\\"number\\\"==typeof
e?e.toString():e||\\\"\\\";e.length<t;)e=n[0]+e;return e}function u(e,t){return o(e,t,\\\"0\\\")}function s(e,t){function
n(e){return 0>e?-1:0<e?1:0}var r;return 0===(r=n(e.getFullYear()-t.getFullYear()))&&0===(r=n(e.getMonth()-
t.getMonth()))&&(r=n(e.getDate()-t.getDate())),r}function c(e){switch(e.getDay()){case 0:return new
Date(e.getFullYear()-1,11,29);case 1:return e;case 2:return new Date(e.getFullYear(),0,3);case 3:return new
Date(e.getFullYear(),0,2);case 4:return new Date(e.getFullYear(),0,1);case 5:return new Date(e.getFullYear()-
1,11,31);case 6:return new Date(e.getFullYear()-1,11,30)}}function l(e){e=dt(new Date(e.ab+1900,0,1),e.vb);var
t=new Date(e.getFullYear()+1,0,4),n=c(new Date(e.getFullYear(),0,4));return
t=c(t),0>=s(n,e)?0>=s(t,e)?e.getFullYear()+1:e.getFullYear():e.getFullYear()-1}var f=a()[i+40>>2];for(var p in
i={kc:a()[i>>2],jc:a()[i+4>>2],tb:a()[i+8>>2],nb:a()[i+12>>2],kb:a()[i+16>>2],ab:a()[i+20>>2],ub:a()[i+24>>2],vb
:a()[i+28>>2],Ec:a()[i+32>>2],ic:a()[i+36>>2],lc:f?N(f):\\\"\\\"},r=N(r),f={\\\"%c\\\":\\\"%a %b %d %H:%M:%S
%Y\\\",\\\"%D\\\":\\\"%m/%d/%y\\\",\\\"%F\\\":\\\"%Y-%m-%d\\\",\\\"%h\\\":\\\"%b\\\",\\\"%r\\\":\\\"%I:%M:%S
%p\\\",\\\"%R\\\":\\\"%H:%M\\\",\\\"%T\\\":\\\"%H:%M:%S\\\",\\\"%x\\\":\\\"%m/%d/%y\\\",\\\"%X\\\":\\\"%H:%M:
%S\\\",\\\"%Ec\\\":\\\"%c\\\",\\\"%EC\\\":\\\"%C\\\",\\\"%Ex\\\":\\\"%m/%d/%y\\\",\\\"%EX\\\":\\\"%H:%M:%S\\\",\\\
"%Ey\\\":\\\"%y\\\",\\\"%EY\\\":\\\"%Y\\\",\\\"%Od\\\":\\\"%d\\\",\\\"%Oe\\\":\\\"%e\\\",\\\"%OH\\\":\\\"%H\\\",\\\"%
OI\\\":\\\"%I\\\",\\\"%Om\\\":\\\"%m\\\",\\\"%OM\\\":\\\"%M\\\",\\\"%OS\\\":\\\"%S\\\",\\\"%Ou\\\":\\\"%u\\\",\\\"%O
U\\\":\\\"%U\\\",\\\"%OV\\\":\\\"%V\\\",\\\"%Ow\\\":\\\"%w\\\",\\\"%OW\\\":\\\"%W\\\",\\\"%Oy\\\":\\\"%y\\\"})r=r.re
place(new RegExp(p,\\\"g\\\"),f[p]);var d=\\\"Sunday Monday Tuesday Wednesday Thursday Friday
Saturday\\\".split(\\\" \\\"),m=\\\"January February March April May June July August September October
November December\\\".split(\\\" \\\");for(p in f={\\\"%a\\\":function(e){return
d[e.ub].substring(0,3)},\\\"%A\\\":function(e){return d[e.ub]},\\\"%b\\\":function(e){return
m[e.kb].substring(0,3)},\\\"%B\\\":function(e){return m[e.kb]},\\\"%C\\\":function(e){return
u((e.ab+1900)/100|0,2)},\\\"%d\\\":function(e){return u(e.nb,2)},\\\"%e\\\":function(e){return o(e.nb,2,\\\"
\\\")},\\\"%g\\\":function(e){return l(e).toString().substring(2)},\\\"%G\\\":function(e){return
l(e)},\\\"%H\\\":function(e){return u(e.tb,2)},\\\"%I\\\":function(e){return 0==(e=e.tb)?e=12:12<e&&(e-
=12),u(e,2)},\\\"%j\\\":function(e){return u(e.nb+lt(ct(e.ab+1900)?ft:pt,e.kb-1),3)},\\\"%m\\\":function(e){return
u(e.kb+1,2)},\\\"%M\\\":function(e){return
u(e.jc,2)},\\\"%n\\\":function(){return\\\"\\\\n\\\"},\\\"%p\\\":function(e){return
0<=e.tb&&12>e.tb?\\\"AM\\\":\\\"PM\\\"},\\\"%S\\\":function(e){return
u(e.kc,2)},\\\"%t\\\":function(){return\\\"\\\\t\\\"},\\\"%u\\\":function(e){return e.ub||7},\\\"%U\\\":function(e){var
t=new Date(e.ab+1900,0,1),n=0===t.getDay()?t:dt(t,7-t.getDay());return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(lt(ct(e.getFullYear())?ft:pt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%V\\\":function(e){var t=new
Date(e.ab+1901,0,4),n=c(new Date(e.ab+1900,0,4));t=c(t);var r=dt(new Date(e.ab+1900,0,1),e.vb);return
```

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0>s(r,n)?\\\"53\\\":0>=s(t,r)?\\\"01\\\":u(Math.ceil((n.getFullYear()<e.ab+1900?e.vb+32-n.getDate():e.vb+1-
n.getDate())/7),2)},\\\"%w\\\":function(e){return e.ub},\\\"%W\\\":function(e){var t=new
Date(e.ab,0,1),n=1===t.getDay()?t:dt(t,0===t.getDay()?1:7-t.getDay()+1);return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(lt(ct(e.getFullYear())?ft:pt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%y\\\":function(e){return(e.ab+1900).toString().substring(
2)},\\\"%Y\\\":function(e){return e.ab+1900},\\\"%z\\\":function(e){var t=0<=(e=e.ic);return
e=Math.abs(e)/60,(t?\\\"+\\\":\\\"-\\\")+String(\\\"0000\\\"+(e/60*100+e%60)).slice(-4)},\\\"%Z\\\":function(e){return
e.lc},\\\"%%\\\":function(){return\\\"%\\\"}})r.includes(p)&&(r=r.replace(new
RegExp(p,\\\"g\\\"),f[p](i)));return(p=function(e){var t=Array(X(e)+1);return
q(e,t,0,t.length),t}(r)).length>n?0:(function(e,n){t().set(e,n)}(p,e),p.length-1)}var
ht=[null,_e,xe,De,Re,Ce,Pe,Ie,Fe,Ue,Le,We,je,He,Ye,ze,Be,Qe,tt,nt,rt,at,it,ot,ut,st],gt={h:function(e,t,n,r){le(\\\"Ass
ertion failed: \\\"+N(e)+\\\", at: \\\"+[t?N(t):\\\"unknown filename\\\",n,r?N(r):\\\"unknown
function\\\"])},M:function(e,t){return ve(e,t)},b:function(e){return bt(e+16)+16},d:function(e,t){return
_e(e,t)},e:function(e,t){ye.yb.push((function(){K.get(e)(t)}))},c:function(e,t,n){throw new
we(e).Pb(t,n),e},Z:function(e,t,n,r){if(\\\"undefined\\\"==typeof SharedArrayBuffer)return x(\\\"Current
environment does not support SharedArrayBuffer, pthreads are not available!\\\"),6;if(!e)return x(\\\"pthread_create
called with a null thread pointer!\\\"),28;var o=[];if(O&&0===o.length)return Et(687865856,e,t,n,r);var
u=0,s=0;if(t&&-1!=t){var c=a()[t>>2];c+=81920,u=a()[t+8>>2],s=0!==a()[t+12>>2]}else
c=2097152;(t=0==u)?u=Ht(16,c):F(0<(u-=c));for(var l=bt(228),f=0;57>f;++f)i()[(l>>2)+f]=0;return
a()[e>>2]=l,a()[l+12>>2]=l,e=l+152,a()[e>>2]=e,n={hb:u,jb:c,wb:t,detached:s,ec:n,rb:l,ib:r,mc:o},O?(n.oc=\\\"spaw
nThread\\\",postMessage(n,o),0):Oe(n)},X:function(e){throw
O?ye.Hb(e):(ye.Eb(),Nt(e)),\\\"unwind\\\"},Y:function(e,t){return function(e,t){if(!e)return x(\\\"pthread_join
attempted on a null thread pointer!\\\"),71;if(O&&_t()==e)return x(\\\"PThread \\\"+e+\\\" is attempting to join to
itself!\\\"),16;if(!O&&At()==e)return x(\\\"Main thread \\\"+e+\\\" is attempting to join to
itself!\\\"),16;if(a()[e+12>>2]!==e)return x(\\\"pthread_join attempted on thread \\\"+e+\\\", which does not point to
a valid thread, or does not exist anymore!\\\"),71;if(Atomics.load(i(),e+64>>2))return x(\\\"Attempted to join thread
\\\"+e+\\\", which was already detached!\\\"),28;for(Ee();;){var n=Atomics.load(i(),e+0>>2);if(1==n)return
n=Atomics.load(i(),e+4>>2),t&&(a()[t>>2]=n),Atomics.store(i(),e+64>>2,1),O?postMessage({cmd:\\\"cleanupThre
ad\\\",thread:e}):ge(e),0;kt(),O||St(),Ae(e+0,n,O?100:1)}}(e,t)},L:xe,s:De,S:Re,V:Ce,u:function(){return
42},F:Pe,Q:Ie,P:Fe,U:Ue,T:Le,q:We,K:je,N:He,v:Ye,O:ze,da:function(e,t){if(e==t)postMessage({cmd:\\\"processQ
ueuedMainThreadWork\\\"});else
if(O)postMessage({targetThread:e,cmd:\\\"processThreadQueue\\\"});else{if(!(e=(e=ye.cb[e])&&e.worker))return;e.
postMessage({cmd:\\\"processThreadQueue\\\"})}return 1},f:Be,w:ve,ga:function(e,t){return e-
t},A:function(){le(\\\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},l:function(){le(\\\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},C:function(){le(\\\"To use dlopen, you need to use Emscripten's linking support,
see https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},z:function(){le(\\\"To use dlopen, you need to
use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},ea:function(e,t,n){var
i;for(Ge.length=0,n>>=2;i=r()[t++];)(i=105>i)&&1&n&&n++,Ge.push(i?o()[n++>>1]:a()[n]),++n;return
de[e].apply(null,Ge)},G:Ee,n:function(){},k:Ae,j:he,W:function(){return
2147483648},i:be,D:function(e,t,n){r().copyWithin(e,t,t+n)},o:function(){return
w?n(87).cpus().length:navigator.hardwareConcurrency},aa:function(e,t,n){qe.length=t,n>>=3;for(var
r=0;r<t;r++)qe[r]=o()[n+r];return(0>e?de[-e-1]:ht[e]).apply(null,qe)},E:function(e){var
t=r().length;if((e>>>=0)<=t||2147483648<e)return!1;for(var n=1;4>=n;n*=2){var
a=t*(1+.2/n);a=Math.min(a,e+100663296),0<(a=Math.max(e,a))%65536&&(a+=65536-
a%65536);e:{try{R.grow(Math.min(2147483648,a)-L.byteLength+65535>>>16),Q(R.buffer);var i=1;break
```

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e}catch(e){}i=void 0}if(i)return!0}return!1},ba:function(e,t,n){return
Xe(e)?Je(e,t,n):Qe(e,t,n)},x:function(){},$:function(e,t,n){return re+=1,setTimeout((function(){--
re,function(e){if(!I){try{e()}catch(e){if(e instanceof Bt)return;if(\\\"unwind\\\"!==e)throw
e&&\\\"object\\\"==typeof e&&e.stack&&x(\\\"exception thrown:
\\\"+[e,e.stack]),e}if(!ae())try{O?xt(P):Nt(P)}catch(e){if(!(e instanceof Bt))throw
e}}}((function(){K.get(e)(n)}))}),t)},ca:function(e,t){t>>=2;var n=a()[t+6];return
t={alpha:!!a()[t],depth:!!a()[t+1],stencil:!!a()[t+2],antialias:!!a()[t+3],premultipliedAlpha:!!a()[t+4],preserveDrawin
gBuffer:!!a()[t+5],powerPreference:Ke[n],failIfMajorPerformanceCaveat:!!a()[t+7],Vb:a()[t+8],yc:a()[t+9],Bb:a()[t
+10],Mb:a()[t+11],Bc:a()[t+12],Cc:a()[t+13]},!(e=Xe(e))||t.Mb?0:function(e,t){e.Cb||(e.Cb=e.getContext,e.getConte
xt=function(t,n){return\\\"webgl\\\"==t==(n=e.Cb(t,n))instanceof WebGLRenderingContext?n:null});var
n=e.getContext(\\\"webgl\\\",t);return n?function(e,t){var n=bt(8);a()[n+4>>2]=_t();var
r={wc:n,attributes:t,version:t.Vb,ob:e};return e.canvas&&(e.canvas.pb=r),(void
0===t.Bb||t.Bb)&&function(e){if(e||(e=void 0),!e.Qb){e.Qb=!0;var t=e.ob;!function(e){var
t=e.getExtension(\\\"ANGLE_instanced_arrays\\\");t&&(e.vertexAttribDivisor=function(e,n){t.vertexAttribDivisor
ANGLE(e,n)},e.drawArraysInstanced=function(e,n,r,a){t.drawArraysInstancedANGLE(e,n,r,a)},e.drawElementsIns
tanced=function(e,n,r,a,i){t.drawElementsInstancedANGLE(e,n,r,a,i)})}(t),function(e){var
t=e.getExtension(\\\"OES_vertex_array_object\\\");t&&(e.createVertexArray=function(){return
t.createVertexArrayOES()},e.deleteVertexArray=function(e){t.deleteVertexArrayOES(e)},e.bindVertexArray=funct
ion(e){t.bindVertexArrayOES(e)},e.isVertexArray=function(e){return t.isVertexArrayOES(e)})}(t),function(e){var
t=e.getExtension(\\\"WEBGL_draw_buffers\\\");t&&(e.drawBuffers=function(e,n){t.drawBuffersWEBGL(e,n)})}(t
),t.qc=t.getExtension(\\\"EXT_disjoint_timer_query\\\"),t.zc=t.getExtension(\\\"WEBGL_multi_draw\\\"),(t.getSupp
ortedExtensions()||[]).forEach((function(e){e.includes(\\\"lose_context\\\")||e.includes(\\\"debug\\\")||t.getExtension(e
)}))}}(r),n}(n,t):0}(e,t)},I:tt,J:nt,m:rt,H:at,t:it,B:ot,p:ut,R:function(e){var t=Date.now();return
a()[e>>2]=t/1e3|0,a()[e+4>>2]=t%1e3*1e3|0,0},ha:function e(t,n){return t=new
Date(1e3*a()[t>>2]),a()[n>>2]=t.getUTCSeconds(),a()[n+4>>2]=t.getUTCMinutes(),a()[n+8>>2]=t.getUTCHours()
,a()[n+12>>2]=t.getUTCDate(),a()[n+16>>2]=t.getUTCMonth(),a()[n+20>>2]=t.getUTCFullYear()-
1900,a()[n+24>>2]=t.getUTCDay(),a()[n+36>>2]=0,a()[n+32>>2]=0,t=(t.getTime()-
Date.UTC(t.getUTCFullYear(),0,1,0,0,0,0))/864e5|0,a()[n+28>>2]=t,e.Ab||(e.Ab=J(\\\"GMT\\\")),a()[n+40>>2]=e.A
b,n},_:function(){ye.Rb()},r:function(e,t){st(),e=new
Date(1e3*a()[e>>2]),a()[t>>2]=e.getSeconds(),a()[t+4>>2]=e.getMinutes(),a()[t+8>>2]=e.getHours(),a()[t+12>>2]
=e.getDate(),a()[t+16>>2]=e.getMonth(),a()[t+20>>2]=e.getFullYear()-1900,a()[t+24>>2]=e.getDay();var n=new
Date(e.getFullYear(),0,1),r=(e.getTime()-n.getTime())/864e5|0;return a()[t+28>>2]=r,a()[t+36>>2]=-
60*e.getTimezoneOffset(),r=new
Date(e.getFullYear(),6,1).getTimezoneOffset(),e=0|(r!=(n=n.getTimezoneOffset())&&e.getTimezoneOffset()==Mat
h.min(n,r)),a()[t+32>>2]=e,e=a()[Pt()+(e?4:0)>>2],a()[t+40>>2]=e,t},a:R||u.wasmMemory,y:function(e){st();var
t=new
Date(a()[e+20>>2]+1900,a()[e+16>>2],a()[e+12>>2],a()[e+8>>2],a()[e+4>>2],a()[e>>2],0),n=a()[e+32>>2],r=t.get
TimezoneOffset(),i=new Date(t.getFullYear(),0,1),o=new
Date(t.getFullYear(),6,1).getTimezoneOffset(),u=i.getTimezoneOffset(),s=Math.min(u,o);return
0>n?a()[e+32>>2]=Number(o!=u&&s==r):0<n!=(s==r)&&(o=Math.max(u,o),t.setTime(t.getTime()+6e4*((0<n?s:o
)-r))),a()[e+24>>2]=t.getDay(),n=(t.getTime()-
i.getTime())/864e5|0,a()[e+28>>2]=n,a()[e>>2]=t.getSeconds(),a()[e+4>>2]=t.getMinutes(),a()[e+8>>2]=t.getHours
(),a()[e+12>>2]=t.getDate(),a()[e+16>>2]=t.getMonth(),t.getTime()/1e3|0},fa:mt,g:function(e,t,n,r){return
mt(e,t,n,r)}};!function(){function
e(e,t){u.asm=e.exports,K=u.asm.Ca,ee.unshift(u.asm.ia),ye.zb.push(u.asm.Ha),C=t,O||(ue--
,u.monitorRunDependencies&&u.monitorRunDependencies(ue),0==ue&&(null!==se&&(clearInterval(se),se=null),
ce&&(e=ce,ce=null,e())))}function t(t){e(t.instance,t.module)}function n(e){return
function(){if(!M&&(v||_)){if(\\\"function\\\"==typeof fetch&&!oe.startsWith(\\\"file://\\\"))return
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fetch(oe,{credentials:\\\"same-origin\\\"}).then((function(e){if(!e.ok)throw\\\"failed to load wasm binary file at
'\\\"+oe+\\\"'\\\";return e.arrayBuffer()})).catch((function(){return pe()}));if(h)return new
Promise((function(e,t){h(oe,(function(t){e(new Uint8Array(t))}),t)}))}return
Promise.resolve().then((function(){return pe()}))}().then((function(e){return
WebAssembly.instantiate(e,r)})).then(e,(function(e){x(\\\"failed to asynchronously prepare wasm:
\\\"+e),le(e)}))}var
r={a:gt};if(O||(ue++,u.monitorRunDependencies&&u.monitorRunDependencies(ue)),u.instantiateWasm)try{return
u.instantiateWasm(r,e)}catch(e){return x(\\\"Module.instantiateWasm callback failed with error:
\\\"+e),!1}(M||\\\"function\\\"!=typeof
WebAssembly.instantiateStreaming||fe()||oe.startsWith(\\\"file://\\\")||\\\"function\\\"!=typeof
fetch?n(t):fetch(oe,{credentials:\\\"same-origin\\\"}).then((function(e){return
WebAssembly.instantiateStreaming(e,r).then(t,(function(e){return x(\\\"wasm streaming compile failed:
\\\"+e),x(\\\"falling back to ArrayBuffer
instantiation\\\"),n(t)}))}))).catch(c)}(),u.___wasm_call_ctors=function(){return(u.___wasm_call_ctors=u.asm.ia).a
pply(null,arguments)},u._OrtInit=function(){return(u._OrtInit=u.asm.ja).apply(null,arguments)},u._OrtCreateSessio
nOptions=function(){return(u._OrtCreateSessionOptions=u.asm.ka).apply(null,arguments)},u._OrtAddSessionConfi
gEntry=function(){return(u._OrtAddSessionConfigEntry=u.asm.la).apply(null,arguments)},u._OrtReleaseSessionO
ptions=function(){return(u._OrtReleaseSessionOptions=u.asm.ma).apply(null,arguments)},u._OrtCreateSession=fu
nction(){return(u._OrtCreateSession=u.asm.na).apply(null,arguments)},u._OrtReleaseSession=function(){return(u._
OrtReleaseSession=u.asm.oa).apply(null,arguments)},u._OrtGetInputCount=function(){return(u._OrtGetInputCount
=u.asm.pa).apply(null,arguments)},u._OrtGetOutputCount=function(){return(u._OrtGetOutputCount=u.asm.qa).app
ly(null,arguments)},u._OrtGetInputName=function(){return(u._OrtGetInputName=u.asm.ra).apply(null,arguments)
},u._OrtGetOutputName=function(){return(u._OrtGetOutputName=u.asm.sa).apply(null,arguments)},u._OrtFree=f
unction(){return(u._OrtFree=u.asm.ta).apply(null,arguments)},u._OrtCreateTensor=function(){return(u._OrtCreate
Tensor=u.asm.ua).apply(null,arguments)},u._OrtGetTensorData=function(){return(u._OrtGetTensorData=u.asm.va)
.apply(null,arguments)},u._OrtReleaseTensor=function(){return(u._OrtReleaseTensor=u.asm.wa).apply(null,argum
ents)},u._OrtCreateRunOptions=function(){return(u._OrtCreateRunOptions=u.asm.xa).apply(null,arguments)},u._O
rtAddRunConfigEntry=function(){return(u._OrtAddRunConfigEntry=u.asm.ya).apply(null,arguments)},u._OrtRele
aseRunOptions=function(){return(u._OrtReleaseRunOptions=u.asm.za).apply(null,arguments)},u._OrtRun=function
(){return(u._OrtRun=u.asm.Aa).apply(null,arguments)},u._OrtEndProfiling=function(){return(u._OrtEndProfiling=
u.asm.Ba).apply(null,arguments)};var
bt=u._malloc=function(){return(bt=u._malloc=u.asm.Da).apply(null,arguments)},yt=u.___errno_location=function(
){return(yt=u.___errno_location=u.asm.Ea).apply(null,arguments)},vt=u._free=function(){return(vt=u._free=u.asm.
Fa).apply(null,arguments)},_t=u._pthread_self=function(){return(_t=u._pthread_self=u.asm.Ga).apply(null,argumen
ts)};u._emscripten_tls_init=function(){return(u._emscripten_tls_init=u.asm.Ha).apply(null,arguments)},u._emscript
en_current_thread_process_queued_calls=function(){return(u._emscripten_current_thread_process_queued_calls=u.
asm.Ia).apply(null,arguments)};var
wt,Ot=u._emscripten_register_main_browser_thread_id=function(){return(Ot=u._emscripten_register_main_brows
er_thread_id=u.asm.Ja).apply(null,arguments)},At=u._emscripten_main_browser_thread_id=function(){return(At=u
._emscripten_main_browser_thread_id=u.asm.Ka).apply(null,arguments)},Et=u._emscripten_sync_run_in_main_thr
ead_4=function(){return(Et=u._emscripten_sync_run_in_main_thread_4=u.asm.La).apply(null,arguments)},St=u._e
mscripten_main_thread_process_queued_calls=function(){return(St=u._emscripten_main_thread_process_queued_c
alls=u.asm.Ma).apply(null,arguments)},Tt=u._emscripten_run_in_main_runtime_thread_js=function(){return(Tt=u.
_emscripten_run_in_main_runtime_thread_js=u.asm.Na).apply(null,arguments)},Mt=u.__emscripten_call_on_threa
d=function(){return(Mt=u.__emscripten_call_on_thread=u.asm.Oa).apply(null,arguments)},kt=u._pthread_testcanc
el=function(){return(kt=u._pthread_testcancel=u.asm.Pa).apply(null,arguments)},xt=u._pthread_exit=function(){ret
urn(xt=u._pthread_exit=u.asm.Qa).apply(null,arguments)},Dt=u.__emscripten_thread_init=function(){return(Dt=u.
__emscripten_thread_init=u.asm.Ra).apply(null,arguments)},Rt=u._emscripten_get_global_libc=function(){return(
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Rt=u._emscripten_get_global_libc=u.asm.Sa).apply(null,arguments)},Ct=u.___pthread_tsd_run_dtors=function(){re
turn(Ct=u.___pthread_tsd_run_dtors=u.asm.Ta).apply(null,arguments)},Pt=u.__get_tzname=function(){return(Pt=u.
__get_tzname=u.asm.Ua).apply(null,arguments)},It=u.__get_daylight=function(){return(It=u.__get_daylight=u.asm
.Va).apply(null,arguments)},Ft=u.__get_timezone=function(){return(Ft=u.__get_timezone=u.asm.Wa).apply(null,ar
guments)},Ut=u.stackSave=function(){return(Ut=u.stackSave=u.asm.Xa).apply(null,arguments)},Lt=u.stackRestore
=function(){return(Lt=u.stackRestore=u.asm.Ya).apply(null,arguments)},Wt=u.stackAlloc=function(){return(Wt=u.
stackAlloc=u.asm.Za).apply(null,arguments)},jt=u._emscripten_stack_set_limits=function(){return(jt=u._emscripte
n_stack_set_limits=u.asm._a).apply(null,arguments)},Ht=u._memalign=function(){return(Ht=u._memalign=u.asm.
$a).apply(null,arguments)},Yt=u.__emscripten_allow_main_runtime_queued_calls=973296,zt=u.__emscripten_mai
n_thread_futex=977204;function Bt(e){this.name=\\\"ExitStatus\\\",this.message=\\\"Program terminated with
exit(\\\"+e+\\\")\\\",this.status=e}function Gt(){function
e(){if(!wt&&(wt=!0,u.calledRun=!0,!I)&&(O||me(ee),s(u),u.onRuntimeInitialized&&u.onRuntimeInitialized(),!O))
{if(u.postRun)for(\\\"function\\\"==typeof u.postRun&&(u.postRun=[u.postRun]);u.postRun.length;){var
e=u.postRun.shift();ne.unshift(e)}me(ne)}}if(!(0<ue))if(O)s(u),O||me(ee),postMessage({cmd:\\\"loaded\\\"});else{if
(!O){if(u.preRun)for(\\\"function\\\"==typeof
u.preRun&&(u.preRun=[u.preRun]);u.preRun.length;)ie();me($)}0<ue||(u.setStatus?(u.setStatus(\\\"Running...\\\"),s
etTimeout((function(){setTimeout((function(){u.setStatus(\\\"\\\")}),1),e()}),1)):e())}}function
Nt(e){if(P=e,O)throw postMessage({cmd:\\\"exitProcess\\\",returnCode:e}),new
Bt(e);ae()||(ye.Gb(),O||(me(te),\\\"undefined\\\"!=typeof
_fflush&&_fflush(0),Te[1].length&&Me(1,10),Te[2].length&&Me(2,10))),P=e,ae()||(ye.Gb(),u.onExit&&u.onExit(
e),I=!0),d(e,new
Bt(e))}if(u.UTF8ToString=N,u.stringToUTF8=V,u.lengthBytesUTF8=X,u.keepRuntimeAlive=ae,u.PThread=ye,u.s
tackSave=Ut,u.stackRestore=Lt,u.stackAlloc=Wt,u.PThread=ye,u.wasmMemory=R,u.ExitStatus=Bt,ce=function
e(){wt||Gt(),wt||(ce=e)},u.run=Gt,u.preInit)for(\\\"function\\\"==typeof
u.preInit&&(u.preInit=[u.preInit]);0<u.preInit.length;)u.preInit.pop()();return
O&&(D=!1,ye.Sb()),Gt(),e.ready});e.exports=r},118:function(e){\\\"use strict\\\";e.exports='\\\"use strict\\\";var
e={};if(\\\"object\\\"==typeof process&&\\\"object\\\"==typeof process.versions&&\\\"string\\\"==typeof
process.versions.node){var
a=require(\\\"worker_threads\\\"),t=a.parentPort;t.on(\\\"message\\\",(function(e){onmessage({data:e})}));var
r=require(\\\"fs\\\");Object.assign(global,{self:global,require:require,Module:e,location:{href:__filename},Worker:a.
Worker,importScripts:function(e){(0,eval)(r.readFileSync(e,\\\"utf8\\\"))},postMessage:function(e){t.postMessage(e
)},performance:global.performance||{now:function(){return Date.now()}}})}var s=function(){var
e=Array.prototype.slice.call(arguments).join(\\\" \\\");console.error(e)};self.alert=function(){var
a=Array.prototype.slice.call(arguments).join(\\\"
\\\");postMessage({cmd:\\\"alert\\\",text:a,threadId:e._pthread_self()})},e.instantiateWasm=function(a,t){var r=new
WebAssembly.Instance(e.wasmModule,a);return
t(r),e.wasmModule=null,r.exports},self.onmessage=function(a){try{if(\\\"load\\\"===a.data.cmd){if(e.wasmModule
=a.data.wasmModule,e.wasmMemory=a.data.wasmMemory,e.buffer=e.wasmMemory.buffer,e.ENVIRONMENT_I
S_PTHREAD=!0,\\\"string\\\"==typeof a.data.urlOrBlob)importScripts(a.data.urlOrBlob);else{var
t=URL.createObjectURL(a.data.urlOrBlob);importScripts(t),URL.revokeObjectURL(t)}ortWasmThreaded(e).then((
function(a){e=a}))}else if(\\\"objectTransfer\\\"===a.data.cmd)e.PThread.receiveObjectTransfer(a.data);else
if(\\\"run\\\"===a.data.cmd){e.__performance_now_clock_drift=performance.now()-
a.data.time,e.__emscripten_thread_init(a.data.threadInfoStruct,0,0);var
r=a.data.stackBase,o=a.data.stackBase+a.data.stackSize;e.establishStackSpace(o,r),e.PThread.receiveObjectTransfer
(a.data),e.PThread.threadInit();try{var
n=e.invokeEntryPoint(a.data.start_routine,a.data.arg);e.keepRuntimeAlive()?e.PThread.setExitStatus(n):e.PThread.t
hreadExit(n)}catch(a){if(\\\"Canceled!\\\"===a)e.PThread.threadCancel();else if(\\\"unwind\\\"!=a){if(!(a instanceof
e.ExitStatus))throw e.PThread.threadExit(-
```

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2),a;e.keepRuntimeAlive()||e.PThread.threadExit(a.status)}}}else\\\"cancel\\\"===a.data.cmd?e._pthread_self()&&e
.PThread.threadCancel():\\\"setimmediate\\\"===a.data.target||(\\\"processThreadQueue\\\"===a.data.cmd?e._pthrea
d_self()&&e._emscripten_current_thread_process_queued_calls():(s(\\\"worker.js received unknown command
\\\"+a.data.cmd),s(a.data)))}catch(e){throw s(\\\"worker.js onmessage() captured an uncaught exception:
\\\"+e),e&&e.stack&&s(e.stack),e}};\\\\n'},932:function(e,t,n){var
_scriptDir,r=(_scriptDir=(_scriptDir=\\\"undefined\\\"!=typeof
document&&document.currentScript?document.currentScript.src:void 0)||__filename,function(e){var
t,r,a;e=e||{},t||(t=void 0!==e?e:{}),t.ready=new Promise((function(e,t){r=e,a=t}));var i,o={};for(i in
t)t.hasOwnProperty(i)&&(o[i]=t[i]);var u,s,c,l,f,p=\\\"./this.program\\\",d=\\\"object\\\"==typeof
window,m=\\\"function\\\"==typeof importScripts,h=\\\"object\\\"==typeof process&&\\\"object\\\"==typeof
process.versions&&\\\"string\\\"==typeof
process.versions.node,g=\\\"\\\";h?(g=m?n(622).dirname(g)+\\\"/\\\":__dirname+\\\"/\\\",u=function(e,t){return
l||(l=n(747)),f||(f=n(622)),e=f.normalize(e),l.readFileSync(e,t?null:\\\"utf8\\\")},c=function(e){return(e=u(e,!0)).buff
er||(e=new Uint8Array(e)),e.buffer||B(\\\"Assertion failed:
undefined\\\"),e},s=function(e,t,r){l||(l=n(747)),f||(f=n(622)),e=f.normalize(e),l.readFile(e,(function(e,n){e?r(e):t(n.b
uffer)}))},1<process.argv.length&&(p=process.argv[1].replace(/\\\\\\\\/g,\\\"/\\\")),process.argv.slice(2),process.on(\\\
"uncaughtException\\\",(function(e){throw
e})),process.on(\\\"unhandledRejection\\\",B),t.inspect=function(){return\\\"[Emscripten Module
object]\\\"}):(d||m)&&(m?g=self.location.href:\\\"undefined\\\"!=typeof
document&&document.currentScript&&(g=document.currentScript.src),_scriptDir&&(g=_scriptDir),g=0!==g.inde
xOf(\\\"blob:\\\")?g.substr(0,g.lastIndexOf(\\\"/\\\")+1):\\\"\\\",u=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.send(null),t.responseText},m&&(c=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.responseType=\\\"arraybuffer\\\",t.send(null),new
Uint8Array(t.response)}),s=function(e,t,n){var r=new
XMLHttpRequest;r.open(\\\"GET\\\",e,!0),r.responseType=\\\"arraybuffer\\\",r.onload=function(){200==r.status||0=
=r.status&&r.response?t(r.response):n()},r.onerror=n,r.send(null)});var
b,y=t.print||console.log.bind(console),v=t.printErr||console.warn.bind(console);for(i in
o)o.hasOwnProperty(i)&&(t[i]=o[i]);o=null,t.thisProgram&&(p=t.thisProgram),t.wasmBinary&&(b=t.wasmBinary)
,t.noExitRuntime,\\\"object\\\"!=typeof WebAssembly&&B(\\\"no native wasm support detected\\\");var
_,w,O,A,E,S=!1,T=\\\"undefined\\\"!=typeof TextDecoder?new TextDecoder(\\\"utf8\\\"):void 0;function
M(e,t,n){var r=t+n;for(n=t;e[n]&&!(n>=r);)++n;if(16<n-t&&e.subarray&&T)return
T.decode(e.subarray(t,n));for(r=\\\"\\\";t<n;){var a=e[t++];if(128&a){var
i=63&e[t++];if(192==(224&a))r+=String.fromCharCode((31&a)<<6|i);else{var
o=63&e[t++];65536>(a=224==(240&a)?(15&a)<<12|i<<6|o:(7&a)<<18|i<<12|o<<6|63&e[t++])?r+=String.fromCh
arCode(a):(a-=65536,r+=String.fromCharCode(55296|a>>10,56320|1023&a))}}else
r+=String.fromCharCode(a)}return r}function k(e,t){return e?M(A,e,t):\\\"\\\"}function x(e,t,n,r){if(!(0<r))return
0;var a=n;r=n+r-1;for(var i=0;i<e.length;++i){var
o=e.charCodeAt(i);if(55296<=o&&57343>=o&&(o=65536+((1023&o)<<10)|1023&e.charCodeAt(++i)),127>=o){i
f(n>=r)break;t[n++]=o}else{if(2047>=o){if(n+1>=r)break;t[n++]=192|o>>6}else{if(65535>=o){if(n+2>=r)break;t[
n++]=224|o>>12}else{if(n+3>=r)break;t[n++]=240|o>>18,t[n++]=128|o>>12&63}t[n++]=128|o>>6&63}t[n++]=1
28|63&o}}return t[n]=0,n-a}function D(e){for(var t=0,n=0;n<e.length;++n){var
r=e.charCodeAt(n);55296<=r&&57343>=r&&(r=65536+((1023&r)<<10)|1023&e.charCodeAt(++n)),127>=r?++t:t
=2047>=r?t+2:65535>=r?t+3:t+4}return t}function R(e){var t=D(e)+1,n=pe(t);return n&&x(e,O,n,t),n}function
C(){var e=_.buffer;w=e,t.HEAP8=O=new Int8Array(e),t.HEAP16=new Int16Array(e),t.HEAP32=E=new
Int32Array(e),t.HEAPU8=A=new Uint8Array(e),t.HEAPU16=new Uint16Array(e),t.HEAPU32=new
Uint32Array(e),t.HEAPF32=new Float32Array(e),t.HEAPF64=new Float64Array(e)}var
P,I=[],F=[],U=[],L=[];function W(){var e=t.preRun.shift();I.unshift(e)}var j,H=0,Y=null,z=null;function B(e){throw
t.onAbort&&t.onAbort(e),v(e),S=!0,e=new WebAssembly.RuntimeError(\\\"abort(\\\"+e+\\\"). Build with -s
```

```
ASSERTIONS=1 for more info.\\\"),a(e),e}function G(){return j.startsWith(\\\"data:application/octet-
stream;base64,\\\")}if(t.preloadedImages={},t.preloadedAudios={},j=\\\"ort-wasm.wasm\\\",!G()){var
N=j;j=t.locateFile?t.locateFile(N,g):g+N}function q(){var e=j;try{if(e==j&&b)return new Uint8Array(b);if(c)return
c(e);throw\\\"both async and sync fetching of the wasm failed\\\"}catch(e){B(e)}}function
V(e){for(;0<e.length;){var n=e.shift();if(\\\"function\\\"==typeof n)n(t);else{var r=n.Ea;\\\"number\\\"==typeof
r?void 0===n.xa?P.get(r)():P.get(r)(n.xa):r(void 0===n.xa?null:n.xa)}}}function X(e){this.ya=e-
16,this.Na=function(e){E[this.ya+4>>2]=e},this.Ka=function(e){E[this.ya+8>>2]=e},this.La=function(){E[this.ya>
>2]=0},this.Ja=function(){O[this.ya+12>>0]=0},this.Ma=function(){O[this.ya+13>>0]=0},this.Ga=function(e,t){thi
s.Na(e),this.Ka(t),this.La(),this.Ja(),this.Ma()}}var J,Q={},Z=[null,[],[]],K={};J=h?function(){var
e=process.hrtime();return 1e3*e[0]+e[1]/1e6}:function(){return performance.now()};var $,ee,te={};function
ne(){if(!$){var
e,t={USER:\\\"web_user\\\",LOGNAME:\\\"web_user\\\",PATH:\\\"/\\\",PWD:\\\"/\\\",HOME:\\\"/home/web_user\\\
",LANG:(\\\"object\\\"==typeof navigator&&navigator.languages&&navigator.languages[0]||\\\"C\\\").replace(\\\"-
\\\",\\\"_\\\")+\\\".UTF-8\\\",_:p||\\\"./this.program\\\"};for(e in te)void 0===te[e]?delete t[e]:t[e]=te[e];var n=[];for(e
in t)n.push(e+\\\"=\\\"+t[e]);$=n}return $}function re(){function e(e){return(e=e.toTimeString().match(/\\\\(([A-Za-z
]+)\\\\)$/))?e[1]:\\\"GMT\\\"}if(!ee){ee=!0;var t=(new Date).getFullYear(),n=new Date(t,0,1),r=new
Date(t,6,1);t=n.getTimezoneOffset();var
a=r.getTimezoneOffset(),i=Math.max(t,a);E[be()>>2]=60*i,E[ge()>>2]=Number(t!=a),n=e(n),r=e(r),n=R(n),r=R(r),
a<t?(E[he()>>2]=n,E[he()+4>>2]=r):(E[he()>>2]=r,E[he()+4>>2]=n)}}function ae(e){return
0==e%4&&(0!=e%100||0==e%400)}function ie(e,t){for(var n=0,r=0;r<=t;n+=e[r++]);return n}var
oe=[31,29,31,30,31,30,31,31,30,31,30,31],ue=[31,28,31,30,31,30,31,31,30,31,30,31];function se(e,t){for(e=new
Date(e.getTime());0<t;){var n=e.getMonth(),r=(ae(e.getFullYear())?oe:ue)[n];if(!(t>r-
e.getDate())){e.setDate(e.getDate()+t);break}t-=r-
e.getDate()+1,e.setDate(1),11>n?e.setMonth(n+1):(e.setMonth(0),e.setFullYear(e.getFullYear()+1))}return
e}function ce(e,t,n,r){function a(e,t,n){for(e=\\\"number\\\"==typeof
e?e.toString():e||\\\"\\\";e.length<t;)e=n[0]+e;return e}function i(e,t){return a(e,t,\\\"0\\\")}function o(e,t){function
n(e){return 0>e?-1:0<e?1:0}var r;return 0===(r=n(e.getFullYear()-t.getFullYear()))&&0===(r=n(e.getMonth()-
t.getMonth()))&&(r=n(e.getDate()-t.getDate())),r}function u(e){switch(e.getDay()){case 0:return new
Date(e.getFullYear()-1,11,29);case 1:return e;case 2:return new Date(e.getFullYear(),0,3);case 3:return new
Date(e.getFullYear(),0,2);case 4:return new Date(e.getFullYear(),0,1);case 5:return new Date(e.getFullYear()-
1,11,31);case 6:return new Date(e.getFullYear()-1,11,30)}}function s(e){e=se(new Date(e.va+1900,0,1),e.Ca);var
t=new Date(e.getFullYear()+1,0,4),n=u(new Date(e.getFullYear(),0,4));return
t=u(t),0>=o(n,e)?0>=o(t,e)?e.getFullYear()+1:e.getFullYear():e.getFullYear()-1}var c=E[r+40>>2];for(var l in
r={Qa:E[r>>2],Pa:E[r+4>>2],Aa:E[r+8>>2],za:E[r+12>>2],wa:E[r+16>>2],va:E[r+20>>2],Ba:E[r+24>>2],Ca:E[r+
28>>2],Ya:E[r+32>>2],Oa:E[r+36>>2],Ra:c?k(c):\\\"\\\"},n=k(n),c={\\\"%c\\\":\\\"%a %b %d %H:%M:%S
%Y\\\",\\\"%D\\\":\\\"%m/%d/%y\\\",\\\"%F\\\":\\\"%Y-%m-%d\\\",\\\"%h\\\":\\\"%b\\\",\\\"%r\\\":\\\"%I:%M:%S
%p\\\",\\\"%R\\\":\\\"%H:%M\\\",\\\"%T\\\":\\\"%H:%M:%S\\\",\\\"%x\\\":\\\"%m/%d/%y\\\",\\\"%X\\\":\\\"%H:%M:
%S\\\",\\\"%Ec\\\":\\\"%c\\\",\\\"%EC\\\":\\\"%C\\\",\\\"%Ex\\\":\\\"%m/%d/%y\\\",\\\"%EX\\\":\\\"%H:%M:%S\\\",\\\
"%Ey\\\":\\\"%y\\\",\\\"%EY\\\":\\\"%Y\\\",\\\"%Od\\\":\\\"%d\\\",\\\"%Oe\\\":\\\"%e\\\",\\\"%OH\\\":\\\"%H\\\",\\\"%
OI\\\":\\\"%I\\\",\\\"%Om\\\":\\\"%m\\\",\\\"%OM\\\":\\\"%M\\\",\\\"%OS\\\":\\\"%S\\\",\\\"%Ou\\\":\\\"%u\\\",\\\"%O
U\\\":\\\"%U\\\",\\\"%OV\\\":\\\"%V\\\",\\\"%Ow\\\":\\\"%w\\\",\\\"%OW\\\":\\\"%W\\\",\\\"%Oy\\\":\\\"%y\\\"})n=n.r
eplace(new RegExp(l,\\\"g\\\"),c[l]);var f=\\\"Sunday Monday Tuesday Wednesday Thursday Friday
Saturday\\\".split(\\\" \\\"),p=\\\"January February March April May June July August September October November
December\\\".split(\\\" \\\");for(l in c={\\\"%a\\\":function(e){return
f[e.Ba].substring(0,3)},\\\"%A\\\":function(e){return f[e.Ba]},\\\"%b\\\":function(e){return
p[e.wa].substring(0,3)},\\\"%B\\\":function(e){return p[e.wa]},\\\"%C\\\":function(e){return
i((e.va+1900)/100|0,2)},\\\"%d\\\":function(e){return i(e.za,2)},\\\"%e\\\":function(e){return a(e.za,2,\\\"
\\\")},\\\"%g\\\":function(e){return s(e).toString().substring(2)},\\\"%G\\\":function(e){return
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s(e)},\\\"%H\\\":function(e){return i(e.Aa,2)},\\\"%I\\\":function(e){return 0==(e=e.Aa)?e=12:12<e&&(e-
=12),i(e,2)},\\\"%j\\\":function(e){return i(e.za+ie(ae(e.va+1900)?oe:ue,e.wa-1),3)},\\\"%m\\\":function(e){return
i(e.wa+1,2)},\\\"%M\\\":function(e){return
i(e.Pa,2)},\\\"%n\\\":function(){return\\\"\\\\n\\\"},\\\"%p\\\":function(e){return
0<=e.Aa&&12>e.Aa?\\\"AM\\\":\\\"PM\\\"},\\\"%S\\\":function(e){return
i(e.Qa,2)},\\\"%t\\\":function(){return\\\"\\\\t\\\"},\\\"%u\\\":function(e){return e.Ba||7},\\\"%U\\\":function(e){var
t=new Date(e.va+1900,0,1),n=0===t.getDay()?t:se(t,7-t.getDay());return 0>o(n,e=new
Date(e.va+1900,e.wa,e.za))?i(Math.ceil((31-n.getDate()+(ie(ae(e.getFullYear())?oe:ue,e.getMonth()-1)-
31)+e.getDate())/7),2):0===o(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%V\\\":function(e){var t=new
Date(e.va+1901,0,4),n=u(new Date(e.va+1900,0,4));t=u(t);var r=se(new Date(e.va+1900,0,1),e.Ca);return
0>o(r,n)?\\\"53\\\":0>=o(t,r)?\\\"01\\\":i(Math.ceil((n.getFullYear()<e.va+1900?e.Ca+32-n.getDate():e.Ca+1-
n.getDate())/7),2)},\\\"%w\\\":function(e){return e.Ba},\\\"%W\\\":function(e){var t=new
Date(e.va,0,1),n=1===t.getDay()?t:se(t,0===t.getDay()?1:7-t.getDay()+1);return 0>o(n,e=new
Date(e.va+1900,e.wa,e.za))?i(Math.ceil((31-n.getDate()+(ie(ae(e.getFullYear())?oe:ue,e.getMonth()-1)-
31)+e.getDate())/7),2):0===o(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%y\\\":function(e){return(e.va+1900).toString().substring(
2)},\\\"%Y\\\":function(e){return e.va+1900},\\\"%z\\\":function(e){var t=0<=(e=e.Oa);return
e=Math.abs(e)/60,(t?\\\"+\\\":\\\"-\\\")+String(\\\"0000\\\"+(e/60*100+e%60)).slice(-4)},\\\"%Z\\\":function(e){return
e.Ra},\\\"%%\\\":function(){return\\\"%\\\"}})n.includes(l)&&(n=n.replace(new
RegExp(l,\\\"g\\\"),c[l](r)));return(l=function(e){var t=Array(D(e)+1);return
x(e,t,0,t.length),t}(n)).length>t?0:(O.set(l,e),l.length-1)}var le={a:function(e){return
pe(e+16)+16},c:function(e,t){U.unshift({Ea:e,xa:t})},d:function(e,t){U.unshift({Ea:e,xa:t})},b:function(e,t,n){thro
w new X(e).Ga(t,n),e},D:function(e,t){return e=k(e),K.Sa(e,t)},m:function(){return
0},I:function(){},L:function(){},o:function(){return 42},x:function(){return
0},H:function(){},G:function(e,t){return
e=k(e),K.Ta(e,t)},K:function(e,t,n,r,a,i){if(i<<=12,0!=(16&r)&&0!=e%65536)t=-28;else
if(0!=(32&r)){e=65536*Math.ceil(t/65536);var
o=we(65536,e);o?(A.fill(0,o,o+e),e=o):e=0,e?(Q[e]={Ia:e,Ha:t,Fa:!0,fd:a,Xa:n,flags:r,offset:i},t=e):t=-48}else t=-
52;return t},J:function(e,t){var n=Q[e];return 0!==t&&n?(t===n.Ha&&(Q[e]=null,n.Fa&&me(n.Ia)),e=0):e=-
28,e},j:function(){},C:function(e,t,n){return
e=k(e),K.Ua(e,t,n)},E:function(){},r:function(){},F:function(){},h:function(){B()},p:function(e,t){if(0===e)e=Date.
now();else{if(1!==e&&4!==e)return E[de()>>2]=28,-1;e=J()}return
E[t>>2]=e/1e3|0,E[t+4>>2]=e%1e3*1e6|0,0},s:function(e,t){return e-t},P:function(){B(\\\"To use dlopen, you need
to use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},g:function(){B(\\\"To use dlopen, you need to use Emscripten's linking support,
see https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},Q:function(){B(\\\"To use dlopen, you need to
use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},O:function(){B(\\\"To use dlopen, you need to use Emscripten's linking support,
see https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},M:function(){return
2147483648},v:function(e,t,n){A.copyWithin(e,t,t+n)},i:function(e){var
t=A.length;if(2147483648<(e>>>=0))return!1;for(var n=1;4>=n;n*=2){var
r=t*(1+.2/n);r=Math.min(r,e+100663296),0<(r=Math.max(e,r))%65536&&(r+=65536-
r%65536);e:{try{_.grow(Math.min(2147483648,r)-w.byteLength+65535>>>16),C();var a=1;break
e}catch(e){}a=void 0}if(a)return!0}return!1},B:function(e){for(var t=J();J()-t<e;);},z:function(e,t){var n=0;return
ne().forEach((function(r,a){var
i=t+n;for(a=E[e+4*a>>2]=i,i=0;i<r.length;++i)O[a++>>0]=r.charCodeAt(i);O[a>>0]=0,n+=r.length+1})),0},A:func
tion(e,t){var n=ne();E[e>>2]=n.length;var r=0;return
n.forEach((function(e){r+=e.length+1})),E[t>>2]=r,0},f:function(){return 0},y:function(e,t){return
e=1==e||2==e?2:B(),O[t>>0]=e,0},n:function(e,t,n,r){return
```

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e=K.Wa(e),t=K.Va(e,t,n),E[r>>2]=t,0},u:function(){},q:function(e,t,n,r){for(var a=0,i=0;i<n;i++){for(var
o=E[t+8*i>>2],u=E[t+(8*i+4)>>2],s=0;s<u;s++){var
c=A[o+s],l=Z[e];0===c||10===c?((1===e?y:v)(M(l,0)),l.length=0):l.push(c)}a+=u}return
E[r>>2]=a,0},w:function(e){var t=Date.now();return E[e>>2]=t/1e3|0,E[e+4>>2]=t%1e3*1e3|0,0},t:function
e(t,n){return t=new
Date(1e3*E[t>>2]),E[n>>2]=t.getUTCSeconds(),E[n+4>>2]=t.getUTCMinutes(),E[n+8>>2]=t.getUTCHours(),E[n
+12>>2]=t.getUTCDate(),E[n+16>>2]=t.getUTCMonth(),E[n+20>>2]=t.getUTCFullYear()-
1900,E[n+24>>2]=t.getUTCDay(),E[n+36>>2]=0,E[n+32>>2]=0,E[n+28>>2]=(t.getTime()-
Date.UTC(t.getUTCFullYear(),0,1,0,0,0,0))/864e5|0,e.Da||(e.Da=R(\\\"GMT\\\")),E[n+40>>2]=e.Da,n},l:function(e,
t){re(),e=new
Date(1e3*E[e>>2]),E[t>>2]=e.getSeconds(),E[t+4>>2]=e.getMinutes(),E[t+8>>2]=e.getHours(),E[t+12>>2]=e.get
Date(),E[t+16>>2]=e.getMonth(),E[t+20>>2]=e.getFullYear()-1900,E[t+24>>2]=e.getDay();var n=new
Date(e.getFullYear(),0,1);E[t+28>>2]=(e.getTime()-n.getTime())/864e5|0,E[t+36>>2]=-
60*e.getTimezoneOffset();var r=new Date(e.getFullYear(),6,1).getTimezoneOffset();return
e=0|(r!=(n=n.getTimezoneOffset())&&e.getTimezoneOffset()==Math.min(n,r)),E[t+32>>2]=e,e=E[he()+(e?4:0)>>2
],E[t+40>>2]=e,t},k:function(e){re();var t=new
Date(E[e+20>>2]+1900,E[e+16>>2],E[e+12>>2],E[e+8>>2],E[e+4>>2],E[e>>2],0),n=E[e+32>>2],r=t.getTimezon
eOffset(),a=new Date(t.getFullYear(),0,1),i=new
Date(t.getFullYear(),6,1).getTimezoneOffset(),o=a.getTimezoneOffset(),u=Math.min(o,i);return
0>n?E[e+32>>2]=Number(i!=o&&u==r):0<n!=(u==r)&&(i=Math.max(o,i),t.setTime(t.getTime()+6e4*((0<n?u:i)-
r))),E[e+24>>2]=t.getDay(),E[e+28>>2]=(t.getTime()-
a.getTime())/864e5|0,E[e>>2]=t.getSeconds(),E[e+4>>2]=t.getMinutes(),E[e+8>>2]=t.getHours(),E[e+12>>2]=t.ge
tDate(),E[e+16>>2]=t.getMonth(),t.getTime()/1e3|0},N:ce,e:function(e,t,n,r){return
ce(e,t,n,r)}};!function(){function e(e){t.asm=e.exports,_=t.asm.R,C(),P=t.asm.ua,F.unshift(t.asm.S),H--
,t.monitorRunDependencies&&t.monitorRunDependencies(H),0==H&&(null!==Y&&(clearInterval(Y),Y=null),z&
&(e=z,z=null,e()))}function n(t){e(t.instance)}function r(e){return
function(){if(!b&&(d||m)){if(\\\"function\\\"==typeof fetch&&!j.startsWith(\\\"file://\\\"))return
fetch(j,{credentials:\\\"same-origin\\\"}).then((function(e){if(!e.ok)throw\\\"failed to load wasm binary file at
'\\\"+j+\\\"'\\\";return e.arrayBuffer()})).catch((function(){return q()}));if(s)return new
Promise((function(e,t){s(j,(function(t){e(new Uint8Array(t))}),t)}))}return
Promise.resolve().then((function(){return q()}))}().then((function(e){return
WebAssembly.instantiate(e,i)})).then(e,(function(e){v(\\\"failed to asynchronously prepare wasm:
\\\"+e),B(e)}))}var
i={a:le};if(H++,t.monitorRunDependencies&&t.monitorRunDependencies(H),t.instantiateWasm)try{return
t.instantiateWasm(i,e)}catch(e){return v(\\\"Module.instantiateWasm callback failed with error:
\\\"+e),!1}(b||\\\"function\\\"!=typeof
WebAssembly.instantiateStreaming||G()||j.startsWith(\\\"file://\\\")||\\\"function\\\"!=typeof
fetch?r(n):fetch(j,{credentials:\\\"same-origin\\\"}).then((function(e){return
WebAssembly.instantiateStreaming(e,i).then(n,(function(e){return v(\\\"wasm streaming compile failed:
\\\"+e),v(\\\"falling back to ArrayBuffer
instantiation\\\"),r(n)}))}))).catch(a)}(),t.___wasm_call_ctors=function(){return(t.___wasm_call_ctors=t.asm.S).app
ly(null,arguments)},t._OrtInit=function(){return(t._OrtInit=t.asm.T).apply(null,arguments)},t._OrtCreateSessionOpt
ions=function(){return(t._OrtCreateSessionOptions=t.asm.U).apply(null,arguments)},t._OrtAddSessionConfigEntry
=function(){return(t._OrtAddSessionConfigEntry=t.asm.V).apply(null,arguments)},t._OrtReleaseSessionOptions=f
unction(){return(t._OrtReleaseSessionOptions=t.asm.W).apply(null,arguments)},t._OrtCreateSession=function(){ret
urn(t._OrtCreateSession=t.asm.X).apply(null,arguments)},t._OrtReleaseSession=function(){return(t._OrtReleaseSes
sion=t.asm.Y).apply(null,arguments)},t._OrtGetInputCount=function(){return(t._OrtGetInputCount=t.asm.Z).apply(
null,arguments)},t._OrtGetOutputCount=function(){return(t._OrtGetOutputCount=t.asm._).apply(null,arguments)},t
```

```
._OrtGetInputName=function(){return(t._OrtGetInputName=t.asm.$).apply(null,arguments)},t._OrtGetOutputName
=function(){return(t._OrtGetOutputName=t.asm.aa).apply(null,arguments)},t._OrtFree=function(){return(t._OrtFree
=t.asm.ba).apply(null,arguments)},t._OrtCreateTensor=function(){return(t._OrtCreateTensor=t.asm.ca).apply(null,a
rguments)},t._OrtGetTensorData=function(){return(t._OrtGetTensorData=t.asm.da).apply(null,arguments)},t._OrtR
eleaseTensor=function(){return(t._OrtReleaseTensor=t.asm.ea).apply(null,arguments)},t._OrtCreateRunOptions=fu
nction(){return(t._OrtCreateRunOptions=t.asm.fa).apply(null,arguments)},t._OrtAddRunConfigEntry=function(){re
turn(t._OrtAddRunConfigEntry=t.asm.ga).apply(null,arguments)},t._OrtReleaseRunOptions=function(){return(t._O
rtReleaseRunOptions=t.asm.ha).apply(null,arguments)},t._OrtRun=function(){return(t._OrtRun=t.asm.ia).apply(nul
l,arguments)},t._OrtEndProfiling=function(){return(t._OrtEndProfiling=t.asm.ja).apply(null,arguments)};var
fe,pe=t._malloc=function(){return(pe=t._malloc=t.asm.ka).apply(null,arguments)},de=t.___errno_location=function
(){return(de=t.___errno_location=t.asm.la).apply(null,arguments)},me=t._free=function(){return(me=t._free=t.asm.
ma).apply(null,arguments)},he=t.__get_tzname=function(){return(he=t.__get_tzname=t.asm.na).apply(null,argumen
ts)},ge=t.__get_daylight=function(){return(ge=t.__get_daylight=t.asm.oa).apply(null,arguments)},be=t.__get_timez
one=function(){return(be=t.__get_timezone=t.asm.pa).apply(null,arguments)},ye=t.stackSave=function(){return(ye
=t.stackSave=t.asm.qa).apply(null,arguments)},ve=t.stackRestore=function(){return(ve=t.stackRestore=t.asm.ra).ap
ply(null,arguments)},_e=t.stackAlloc=function(){return(_e=t.stackAlloc=t.asm.sa).apply(null,arguments)},we=t._m
emalign=function(){return(we=t._memalign=t.asm.ta).apply(null,arguments)};function Oe(){function
e(){if(!fe&&(fe=!0,t.calledRun=!0,!S)){if(V(F),r(t),t.onRuntimeInitialized&&t.onRuntimeInitialized(),t.postRun)for
(\\\"function\\\"==typeof t.postRun&&(t.postRun=[t.postRun]);t.postRun.length;){var
e=t.postRun.shift();L.unshift(e)}V(L)}}if(!(0<H)){if(t.preRun)for(\\\"function\\\"==typeof
t.preRun&&(t.preRun=[t.preRun]);t.preRun.length;)W();V(I),0<H||(t.setStatus?(t.setStatus(\\\"Running...\\\"),setTim
eout((function(){setTimeout((function(){t.setStatus(\\\"\\\")}),1),e()}),1)):e())}}if(t.UTF8ToString=k,t.stringToUTF
8=function(e,t,n){return
x(e,A,t,n)},t.lengthBytesUTF8=D,t.stackSave=ye,t.stackRestore=ve,t.stackAlloc=_e,z=function
e(){fe||Oe(),fe||(z=e)},t.run=Oe,t.preInit)for(\\\"function\\\"==typeof
t.preInit&&(t.preInit=[t.preInit]);0<t.preInit.length;)t.preInit.pop()();return
Oe(),e.ready});e.exports=r},967:function(e,t){\\\"use strict\\\";var n=this&&this.__read||function(e,t){var
n=\\\"function\\\"==typeof Symbol&&e[Symbol.iterator];if(!n)return e;var r,a,i=n.call(e),o=[];try{for(;(void
0===t||t--
>0)&&!(r=i.next()).done;)o.push(r.value)}catch(e){a={error:e}}finally{try{r&&!r.done&&(n=i.return)&&n.call(i)}
finally{if(a)throw a.error}}return
o};Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.iterateExtraOptions=void
0,t.iterateExtraOptions=function(e,r,a,i){if(\\\"object\\\"==typeof e&&null!==e){if(a.has(e))throw new
Error(\\\"Circular reference in options\\\");a.add(e)}Object.entries(e).forEach((function(e){var
o=n(e,2),u=o[0],s=o[1],c=r?r+u:u;if(\\\"object\\\"==typeof s)t.iterateExtraOptions(s,c+\\\".\\\",a,i);else
if(\\\"string\\\"==typeof s||\\\"number\\\"==typeof s)i(c,s.toString());else{if(\\\"boolean\\\"!=typeof s)throw new
Error(\\\"Can't handle extra config type: \\\"+typeof s);i(c,s?\\\"1\\\":\\\"0\\\")}}))}},586:function(e,t,n){\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.setRunOptions=void 0;var
r=n(967),a=n(983),i=n(361);t.setRunOptions=function(e){var t=i.getInstance(),n=0,o=[],u=e||{};try{if(void
0===(null==e?void 0:e.logSeverityLevel))u.logSeverityLevel=2;else if(\\\"number\\\"!=typeof
e.logSeverityLevel||!Number.isInteger(e.logSeverityLevel)||e.logSeverityLevel<0||e.logSeverityLevel>4)throw new
Error(\\\"log serverity level is not valid: \\\"+e.logSeverityLevel);if(void 0===(null==e?void
0:e.logVerbosityLevel))u.logVerbosityLevel=0;else if(\\\"number\\\"!=typeof
e.logVerbosityLevel||!Number.isInteger(e.logVerbosityLevel))throw new Error(\\\"log verbosity level is not valid:
\\\"+e.logVerbosityLevel);void 0===(null==e?void 0:e.terminate)&&(u.terminate=!1);var s=0;if(void
0!==(null==e?void
0:e.tag)&&(s=a.allocWasmString(e.tag,o)),0===(n=t._OrtCreateRunOptions(u.logSeverityLevel,u.logVerbosityLev
el,!!u.terminate,s)))throw new Error(\\\"Can't create run options\\\");return void 0!==(null==e?void
```

```
0:e.extra)&&r.iterateExtraOptions(e.extra,\\\"\\\",new WeakSet,(function(e,r){var
i=a.allocWasmString(e,o),u=a.allocWasmString(r,o);if(0!==t._OrtAddRunConfigEntry(n,i,u))throw new
Error(\\\"Can't set a run config entry: \\\"+e+\\\" - \\\"+r)})),[n,o]}catch(e){throw
0!==n&&t._OrtReleaseRunOptions(n),o.forEach(t._free),e}}},919:function(e,t,n){\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.setSessionOptions=void 0;var
r=n(967),a=n(983),i=n(361);t.setSessionOptions=function(e){var
t=i.getInstance(),n=0,o=[],u=e||{};!function(e){e.extra||(e.extra={}),e.extra.session||(e.extra.session={});var
t=e.extra.session;t.use_ort_model_bytes_directly||(t.use_ort_model_bytes_directly=\\\"1\\\")}(u);try{void
0===(null==e?void 0:e.graphOptimizationLevel)&&(u.graphOptimizationLevel=\\\"all\\\");var
s=function(e){switch(e){case\\\"disabled\\\":return 0;case\\\"basic\\\":return 1;case\\\"extended\\\":return
2;case\\\"all\\\":return 99;default:throw new Error(\\\"unsupported graph optimization level:
\\\"+e)}}(u.graphOptimizationLevel);void 0===(null==e?void
0:e.enableCpuMemArena)&&(u.enableCpuMemArena=!0),void 0===(null==e?void
0:e.enableMemPattern)&&(u.enableMemPattern=!0),void 0===(null==e?void
0:e.executionMode)&&(u.executionMode=\\\"sequential\\\");var
c=function(e){switch(e){case\\\"sequential\\\":return 0;case\\\"parallel\\\":return 1;default:throw new
Error(\\\"unsupported execution mode: \\\"+e)}}(u.executionMode),l=0;if(void 0!==(null==e?void
0:e.logId)&&(l=a.allocWasmString(e.logId,o)),void 0===(null==e?void
0:e.logSeverityLevel))u.logSeverityLevel=2;else if(\\\"number\\\"!=typeof
e.logSeverityLevel||!Number.isInteger(e.logSeverityLevel)||e.logSeverityLevel<0||e.logSeverityLevel>4)throw new
Error(\\\"log serverity level is not valid: \\\"+e.logSeverityLevel);if(void 0===(null==e?void
0:e.logVerbosityLevel))u.logVerbosityLevel=0;else if(\\\"number\\\"!=typeof
e.logVerbosityLevel||!Number.isInteger(e.logVerbosityLevel))throw new Error(\\\"log verbosity level is not valid:
\\\"+e.logVerbosityLevel);if(void 0===(null==e?void
0:e.enableProfiling)&&(u.enableProfiling=!1),0===(n=t._OrtCreateSessionOptions(s,!!u.enableCpuMemArena,!!u.
enableMemPattern,c,!!u.enableProfiling,0,l,u.logSeverityLevel,u.logVerbosityLevel)))throw new Error(\\\"Can't
create session options\\\");return void 0!==(null==e?void 0:e.extra)&&r.iterateExtraOptions(e.extra,\\\"\\\",new
WeakSet,(function(e,r){var
i=a.allocWasmString(e,o),u=a.allocWasmString(r,o);if(0!==t._OrtAddSessionConfigEntry(n,i,u))throw new
Error(\\\"Can't set a session config entry: \\\"+e+\\\" - \\\"+r)})),[n,o]}catch(e){throw
0!==n&&t._OrtReleaseSessionOptions(n),o.forEach(t._free),e}}},983:function(e,t,n){\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.allocWasmString=void 0;var
r=n(361);t.allocWasmString=function(e,t){var n=r.getInstance(),a=n.lengthBytesUTF8(e)+1,i=n._malloc(a);return
n.stringToUTF8(e,i,a),t.push(i),i}},349:function(e,t,n){\\\"use strict\\\";var r=this&&this.__read||function(e,t){var
n=\\\"function\\\"==typeof Symbol&&e[Symbol.iterator];if(!n)return e;var r,a,i=n.call(e),o=[];try{for(;(void
0===t||t--
>0)&&!(r=i.next()).done;)o.push(r.value)}catch(e){a={error:e}}finally{try{r&&!r.done&&(n=i.return)&&n.call(i)}
finally{if(a)throw a.error}}return o},a=this&&this.__values||function(e){var t=\\\"function\\\"==typeof
Symbol&&Symbol.iterator,n=t&&e[t],r=0;if(n)return n.call(e);if(e&&\\\"number\\\"==typeof
e.length)return{next:function(){return e&&r>=e.length&&(e=void 0),{value:e&&e[r++],done:!e}}};throw new
TypeError(t?\\\"Object is not iterable.\\\":\\\"Symbol.iterator is not
defined.\\\")};Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.extractTransferableBuffers=t.endProfiling=t.r
un=t.releaseSession=t.createSession=t.initOrt=void 0;var
i=n(586),o=n(919),u=n(983),s=n(361);t.initOrt=function(e,t){var n=s.getInstance()._OrtInit(e,t);if(0!==n)throw new
Error(\\\"Can't initialize onnxruntime. error code = \\\"+n)};var c=[];t.createSession=function(e,t){var
n,a=s.getInstance(),i=a._malloc(e.byteLength),u=0,l=0,f=[];try{if(l=(n=r(o.setSessionOptions(t),2))[0],f=n[1],a.HE
APU8.set(e,i),0===(u=a._OrtCreateSession(i,e.byteLength,l)))throw new Error(\\\"Can't create a
session\\\")}finally{a._free(i),a._OrtReleaseSessionOptions(l),f.forEach(a._free)}for(var
```

```
p=a._OrtGetInputCount(u),d=a._OrtGetOutputCount(u),m=[],h=[],g=[],b=[],y=0;y<p;y++){var
v=a._OrtGetInputName(u,y);if(0===v)throw new Error(\\\"Can't get an input
name\\\");h.push(v),m.push(a.UTF8ToString(v))}for(y=0;y<d;y++){var
_=a._OrtGetOutputName(u,y);if(0===_)throw new Error(\\\"Can't get an output
name\\\");b.push(_),g.push(a.UTF8ToString(_))}return c.push([u,h,b]),[c.length-
1,m,g]},t.releaseSession=function(e){var t=s.getInstance(),n=c[e];if(!n)throw new Error(\\\"invalid session
id\\\");var r=n[0],a=n[1],i=n[2];a.forEach(t._OrtFree),i.forEach(t._OrtFree),t._OrtReleaseSession(r),c[e]=void 0};var
l=function(e){switch(e){case 3:return\\\"int8\\\";case 2:return\\\"uint8\\\";case 9:return\\\"bool\\\";case
5:return\\\"int16\\\";case 4:return\\\"uint16\\\";case 6:return\\\"int32\\\";case 12:return\\\"uint32\\\";case
1:return\\\"float32\\\";case 11:return\\\"float64\\\";case 8:return\\\"string\\\";case 7:return\\\"int32\\\";case
13:return\\\"uint32\\\";default:throw new Error(\\\"unsupported data type:
\\\"+e)}},f=function(e){switch(e){case\\\"float32\\\":return Float32Array;case\\\"uint8\\\":return
Uint8Array;case\\\"int8\\\":return Int8Array;case\\\"uint16\\\":return Uint16Array;case\\\"int16\\\":return
Int16Array;case\\\"int32\\\":return Int32Array;case\\\"bool\\\":return Uint8Array;case\\\"float64\\\":return
Float64Array;case\\\"uint32\\\":return Uint32Array;case\\\"int64\\\":return BigInt64Array;case\\\"uint64\\\":return
BigUint64Array;default:throw new Error(\\\"unsupported type: \\\"+e)}};t.run=function(e,t,n,a,o){var
p,d=s.getInstance(),m=c[e];if(!m)throw new Error(\\\"invalid session id\\\");var
h=m[0],g=m[1],b=m[2],y=t.length,v=a.length,_=0,w=[],O=[],A=[];try{_=(p=r(i.setRunOptions(o),2))[0],w=p[1];for
(var E=function(e){var t=n[e][0],r=n[e][1],a=n[e][2],i=void 0,o=void
0;if(Array.isArray(a)){o=4*a.length,i=d._malloc(o),A.push(i);for(var
s=i/4,c=0;c<a.length;c++){if(\\\"string\\\"!=typeof a[c])throw new TypeError(\\\"tensor data at index \\\"+c+\\\" is
not a string\\\");d.HEAPU32[s++]=u.allocWasmString(a[c],A)}}else
o=a.byteLength,i=d._malloc(o),A.push(i),d.HEAPU8.set(new Uint8Array(a.buffer,a.byteOffset,o),i);var
l=d.stackSave(),f=d.stackAlloc(4*r.length);try{var p=f/4;r.forEach((function(e){return d.HEAP32[p++]=e}));var
m=d._OrtCreateTensor(function(e){switch(e){case\\\"int8\\\":return 3;case\\\"uint8\\\":return
2;case\\\"bool\\\":return 9;case\\\"int16\\\":return 5;case\\\"uint16\\\":return 4;case\\\"int32\\\":return
6;case\\\"uint32\\\":return 12;case\\\"float32\\\":return 1;case\\\"float64\\\":return 11;case\\\"string\\\":return
8;case\\\"int64\\\":return 7;case\\\"uint64\\\":return 13;default:throw new Error(\\\"unsupported data type:
\\\"+e)}}(t),i,o,f,r.length);if(0===m)throw new Error(\\\"Can't create a
tensor\\\");O.push(m)}finally{d.stackRestore(l)}},S=0;S<y;S++)E(S);var
T=d.stackSave(),M=d.stackAlloc(4*y),k=d.stackAlloc(4*y),x=d.stackAlloc(4*v),D=d.stackAlloc(4*v);try{var
R=M/4,C=k/4,P=x/4,I=D/4;for(S=0;S<y;S++)d.HEAPU32[R++]=O[S],d.HEAPU32[C++]=g[t[S]];for(S=0;S<v;S+
+)d.HEAPU32[P++]=0,d.HEAPU32[I++]=b[a[S]];var
F=d._OrtRun(h,k,M,y,D,v,x,_),U=[];if(0===F)for(S=0;S<v;S++){var
L=d.HEAPU32[x/4+S],W=d.stackSave(),j=d.stackAlloc(16),H=void
0,Y=0;try{if(0!==(F=d._OrtGetTensorData(L,j,j+4,j+8,j+12)))throw new Error(\\\"Can't get a tensor data. error
code = \\\"+F);var z=j/4,B=d.HEAPU32[z++];Y=d.HEAPU32[z++];for(var
G=d.HEAPU32[z++],N=d.HEAPU32[z++],q=[],V=0;V<N;V++)q.push(d.HEAPU32[G/4+V]);d._OrtFree(G);var
X=0===q.length?1:q.reduce((function(e,t){return e*t}));if(\\\"string\\\"===(H=l(B))){for(var
J=[],Q=Y/4,Z=0;Z<X;Z++){var K=d.HEAPU32[Q++],$=Z===X-1?void 0:d.HEAPU32[Q]-
K;J.push(d.UTF8ToString(K,$))}U.push([H,q,J])}else{var ee=new(f(H))(X);new
Uint8Array(ee.buffer,ee.byteOffset,ee.byteLength).set(d.HEAPU8.subarray(Y,Y+ee.byteLength)),U.push([H,q,ee])
}}finally{d.stackRestore(W),\\\"string\\\"===H&&Y&&d._free(Y),d._OrtReleaseTensor(L)}}if(0===F)return
U;throw new Error(\\\"failed to call OrtRun(). error code =
\\\"+F+\\\".\\\")}finally{d.stackRestore(T)}}finally{O.forEach(d._OrtReleaseTensor),A.forEach(d._free),d._OrtRele
aseRunOptions(_),w.forEach(d._free)}},t.endProfiling=function(e){var t=s.getInstance(),n=c[e];if(!n)throw new
Error(\\\"invalid session id\\\");var r=n[0],a=t._OrtEndProfiling(r);if(0===a)throw new Error(\\\"Can't get an profile
file name\\\");t._OrtFree(a)},t.extractTransferableBuffers=function(e){var t,n,r=[];try{for(var
```

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i=a(e),o=i.next();!o.done;o=i.next()){var
u=o.value[2];!Array.isArray(u)&&u.buffer&&r.push(u.buffer)}}catch(e){t={error:e}}finally{try{o&&!o.done&&(
n=i.return)&&n.call(i)}finally{if(t)throw t.error}}return r}},361:function(e,t,n){\\\"use strict\\\";var
r=this&&this.__createBinding||(Object.create?function(e,t,n,r){void
0===r&&(r=n),Object.defineProperty(e,r,{enumerable:!0,get:function(){return t[n]}})}:function(e,t,n,r){void
0===r&&(r=n),e[r]=t[n]}),a=this&&this.__setModuleDefault||(Object.create?function(e,t){Object.defineProperty(e,
\\\"default\\\",{enumerable:!0,value:t})}:function(e,t){e.default=t}),i=this&&this.__importStar||function(e){if(e&&e
.__esModule)return e;var t={};if(null!=e)for(var n in
e)\\\"default\\\"!==n&&Object.prototype.hasOwnProperty.call(e,n)&&r(t,e,n);return
a(t,e),t},o=this&&this.__awaiter||function(e,t,n,r){return new(n||(n=Promise))((function(a,i){function
o(e){try{s(r.next(e))}catch(e){i(e)}}function u(e){try{s(r.throw(e))}catch(e){i(e)}}function s(e){var
t;e.done?a(e.value):(t=e.value,t instanceof n?t:new
n((function(e){e(t)}))).then(o,u)}s((r=r.apply(e,t||[])).next())}))},u=this&&this.__generator||function(e,t){var
n,r,a,i,o={label:0,sent:function(){if(1&a[0])throw a[1];return a[1]},trys:[],ops:[]};return
i={next:u(0),throw:u(1),return:u(2)},\\\"function\\\"==typeof Symbol&&(i[Symbol.iterator]=function(){return
this}),i;function u(i){return function(u){return function(i){if(n)throw new TypeError(\\\"Generator is already
executing.\\\");for(;o;)try{if(n=1,r&&(a=2&i[0]?r.return:i[0]?r.throw||((a=r.return)&&a.call(r),0):r.next)&&!(a=a.ca
ll(r,i[1])).done)return a;switch(r=0,a&&(i=[2&i[0],a.value]),i[0]){case 0:case 1:a=i;break;case 4:return
o.label++,{value:i[1],done:!1};case 5:o.label++,r=i[1],i=[0];continue;case
7:i=o.ops.pop(),o.trys.pop();continue;default:if(!((a=(a=o.trys).length>0&&a[a.length-
1])||6!==i[0]&&2!==i[0])){o=0;continue}if(3===i[0]&&(!a||i[1]>a[0]&&i[1]<a[3])){o.label=i[1];break}if(6===i[0]
&&o.label<a[1]){o.label=a[1],a=i;break}if(a&&o.label<a[2]){o.label=a[2],o.ops.push(i);break}a[2]&&o.ops.pop(),
o.trys.pop();continue}i=t.call(e,o)}catch(e){i=[6,e],r=0}finally{n=a=0}if(5&i[0])throw
i[1];return{value:i[0]?i[1]:void 0,done:!0}}([i,u])}}},s=this&&this.__importDefault||function(e){return
e&&e.__esModule?e:{default:e}};Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.dispose=t.getInstance=t.i
nitializeWebAssembly=void 0;var c,l=i(n(622)),f=s(n(474)),p=s(n(932)),d=!1,m=!1,h=!1,g=function(e,t){return
t?e?\\\"ort-wasm-simd-threaded.wasm\\\":\\\"ort-wasm-threaded.wasm\\\":e?\\\"ort-wasm-simd.wasm\\\":\\\"ort-
wasm.wasm\\\"};t.initializeWebAssembly=function(e){return o(void 0,void 0,void 0,(function(){var
t,r,a,i,o,s,b,y,v,_,w;return u(this,(function(u){switch(u.label){case 0:if(d)return[2,Promise.resolve()];if(m)throw new
Error(\\\"multiple calls to 'initializeWebAssembly()' detected.\\\");if(h)throw new Error(\\\"previous call to
'initializeWebAssembly()' failed.\\\");return
m=!0,t=e.initTimeout,r=e.numThreads,a=e.simd,i=r>1&&function(){try{return\\\"undefined\\\"!=typeof
SharedArrayBuffer&&(\\\"undefined\\\"!=typeof MessageChannel&&(new
MessageChannel).port1.postMessage(new SharedArrayBuffer(1)),WebAssembly.validate(new
Uint8Array([0,97,115,109,1,0,0,0,1,4,1,96,0,0,3,2,1,0,5,4,1,3,1,1,10,11,1,9,0,65,0,254,16,2,0,26,11])))}catch(e){ret
urn!1}}(),o=a&&function(){try{return WebAssembly.validate(new
Uint8Array([0,97,115,109,1,0,0,0,1,4,1,96,0,0,3,2,1,0,10,9,1,7,0,65,0,253,15,26,11]))}catch(e){return!1}}(),s=\\\"str
ing\\\"==typeof e.wasmPaths?e.wasmPaths:void 0,b=g(!1,i),y=g(o,i),v=\\\"object\\\"==typeof
e.wasmPaths?e.wasmPaths[y]:void 0,_=!1,w=[],t>0&&w.push(new
Promise((function(e){setTimeout((function(){_=!0,e()}),t)}))),w.push(new Promise((function(e,t){var
r=i?f.default:p.default,a={locateFile:function(e,t){return e.endsWith(\\\".worker.js\\\")&&\\\"undefined\\\"!=typeof
Blob?URL.createObjectURL(new
Blob([n(118)],{type:\\\"text/javascript\\\"})):e===b?null!=v?v:(null!=s?s:t)+y:t+e}};if(i)if(\\\"undefined\\\"==typeof
Blob)a.mainScriptUrlOrBlob=l.join(__dirname,\\\"ort-wasm-threaded.js\\\");else{var o=\\\"var
ortWasmThreaded=(function(){var _scriptDir;return
\\\"+f.default.toString()+\\\"})();\\\";a.mainScriptUrlOrBlob=new
Blob([o],{type:\\\"text/javascript\\\"})}r(a).then((function(t){m=!1,d=!0,c=t,e()}),(function(e){m=!1,h=!0,t(e)}))})))
,[4,Promise.race(w)];case 1:if(u.sent(),_)throw new Error(\\\"WebAssembly backend initializing failed due to
```

```
timeout: \\\"+t+\\\"ms\\\");return[2]}}))}))},t.getInstance=function(){if(d&&c)return c;throw new
Error(\\\"WebAssembly is not initialized yet.\\\")},t.dispose=function(){var
e;!d||m||h||(m=!0,null===(e=c.PThread)||void 0===e||e.terminateAllThreads(),c=void
0,m=!1,d=!1,h=!0)}},747:function(e){\\\"use strict\\\";e.exports=require(\\\"fs\\\")},87:function(e){\\\"use
strict\\\";e.exports=require(\\\"os\\\")},622:function(e){\\\"use
strict\\\";e.exports=require(\\\"path\\\")},630:function(e){\\\"use
strict\\\";e.exports=require(\\\"perf_hooks\\\")},13:function(e){\\\"use
strict\\\";e.exports=require(\\\"worker_threads\\\")}},t={};function n(r){var a=t[r];if(void 0!==a)return a.exports;var
i=t[r]={exports:{}};return e[r].call(i.exports,i,i.exports,n),i.exports}!function(){\\\"use strict\\\";var
e=n(349),t=n(361);self.onmessage=function(n){switch(n.data.type){case\\\"init-
wasm\\\":t.initializeWebAssembly(n.data.in).then((function(){return postMessage({type:\\\"init-
wasm\\\"})}),(function(e){return postMessage({type:\\\"init-wasm\\\",err:e})}));break;case\\\"init-ort\\\":try{var
r=n.data.in,a=r.numThreads,i=r.loggingLevel;e.initOrt(a,i),postMessage({type:\\\"init-
ort\\\"})}catch(e){postMessage({type:\\\"init-ort\\\",err:e})}break;case\\\"create\\\":try{var
o=n.data.in,u=o.model,s=o.options,c=e.createSession(u,s);postMessage({type:\\\"create\\\",out:c})}catch(e){postMe
ssage({type:\\\"create\\\",err:e})}break;case\\\"release\\\":try{var
l=n.data.in;e.releaseSession(l),postMessage({type:\\\"release\\\"})}catch(e){postMessage({type:\\\"release\\\",err:e})
}break;case\\\"run\\\":try{var
f=n.data.in,p=f.sessionId,d=f.inputIndices,m=f.inputs,h=f.outputIndices,g=(s=f.options,e.run(p,d,m,h,s));postMessa
ge({type:\\\"run\\\",out:g},e.extractTransferableBuffers(g))}catch(e){postMessage({type:\\\"run\\\",err:e})}break;cas
e\\\"end-profiling\\\":try{l=n.data.in,e.endProfiling(l),postMessage({type:\\\"end-
profiling\\\"})}catch(e){postMessage({type:\\\"end-profiling\\\",err:e})}}}}()}();\\n\", \"Worker\", undefined,
undefined);\n}\n","\"use strict\";\n\n/* eslint-env browser */\n\n/* eslint-disable no-undef, no-use-before-define,
new-cap */\nmodule.exports = function (content, workerConstructor, workerOptions, url) {\n  var globalScope = self
|| window;\n\n  try {\n    try {\n      var blob;\n\n      try {\n        // New API\n        blob = new
globalScope.Blob([content]);\n      } catch (e) {\n        // BlobBuilder = Deprecated, but widely implemented\n
var BlobBuilder = globalScope.BlobBuilder || globalScope.WebKitBlobBuilder || globalScope.MozBlobBuilder ||
globalScope.MSBlobBuilder;\n        blob = new BlobBuilder();\n        blob.append(content);\n        blob =
blob.getBlob();\n      }\n\n      var URL = globalScope.URL || globalScope.webkitURL;\n      var objectURL =
URL.createObjectURL(blob);\n      var worker = new globalScope[workerConstructor](objectURL,
workerOptions);\n      URL.revokeObjectURL(objectURL);\n      return worker;\n    } catch (e) {\n      return new
globalScope[workerConstructor](\"data:application/javascript,\".concat(encodeURIComponent(content)),
workerOptions);\n    }\n  } catch (e) {\n    if (!url) {\n      throw Error(\"Inline worker is not supported\");\n    }\n\n
return new globalScope[workerConstructor](url, workerOptions);\n  }\n};","module.exports =
require(\"fs\");;","module.exports = require(\"os\");;","module.exports = require(\"path\");;","module.exports =
require(\"perf_hooks\");;","module.exports = require(\"util\");;","module.exports =
require(\"worker_threads\");;","module.exports = require(\"onnxruntime-common\");;","// The module cache\nvar
__webpack_module_cache__ = {};\n\n// The require function\nfunction __webpack_require__(moduleId) {\n\t//
Check if module is in cache\n\tvar cachedModule = __webpack_module_cache__[moduleId];\n\tif (cachedModule
!== undefined) {\n\t\treturn cachedModule.exports;\n\t}\n\t// Create a new module (and put it into the cache)\n\tvar
module = __webpack_module_cache__[moduleId] = {\n\t\t// no module.id needed\n\t\t// no module.loaded
needed\n\t\texports: {}\n\t};\n\n\t// Execute the module
function\n\t__webpack_modules__[moduleId].call(module.exports, module, module.exports,
__webpack_require__);\n\n\t// Return the exports of the module\n\treturn module.exports;\n}\n\n","//
getDefaultExport function for compatibility with non-harmony modules\n__webpack_require__.n =
function(module) {\n\tvar getter = module && module.__esModule ?\n\t\tfunction() { return module['default']; }
:\n\t\tfunction() { return module; };\n\t__webpack_require__.d(getter, { a: getter });\n\treturn getter;\n};","// define
getter functions for harmony exports\n__webpack_require__.d = function(exports, definition) {\n\tfor(var key in
```

definition) {\n\t\tif(__webpack_require__.o(definition, key) && !__webpack_require__.o(exports, key)) {\n\t\t\tObject.defineProperty(exports, key, { enumerable: true, get: definition[key] });\n\t\t}\n\t}\n};","__webpack_require__.o = function(obj, prop) { return Object.prototype.hasOwnProperty.call(obj, prop); }","// define __esModule on exports\n__webpack_require__.r = function(exports) {\n\tif(typeof Symbol !== 'undefined' && Symbol.toStringTag) {\n\t\tObject.defineProperty(exports, Symbol.toStringTag, { value: 'Module' });\n\t}\n\tObject.defineProperty(exports, '__esModule', { value: true });\n};","// startup\n// Load entry module and return exports\n// This entry module is referenced by other modules so it can't be inlined\nvar __webpack_exports__ = __webpack_require__(6018);\n"],"sourceRoot":""}

Found in path(s):
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/dist/ort-web.node.js.map
No license file was found, but licenses were detected in source scan.

/*!
* ONNX Runtime Web v1.9.0
* Copyright (c) Microsoft Corporation. All rights reserved.
* Licensed under the MIT License.
*/

Found in path(s):
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/dist/ort-web.es6.min.js
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/dist/ort.es6.min.js
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/dist/ort-web.node.js
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/dist/ort-web.min.js
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/dist/ort.min.js
No license file was found, but licenses were detected in source scan.

{"version":3,"sources":["webpack://ort/webpack/universalModuleDefinition","webpack://ort/../common/dist/lib/backend-impl.js","webpack://ort/../common/dist/lib/env.js","webpack://ort/../common/dist/lib/env-impl.js","webpack://ort/../common/dist/lib/tensor-impl.js","webpack://ort/../common/dist/lib/tensor.js","webpack://ort/../common/dist/lib/inference-session-impl.js","webpack://ort/../common/dist/lib/inference-session.js","webpack://ort/./lib/wasm/binding/ort-wasm-threaded.min.js","webpack://ort/./lib/wasm/binding/ort-wasm.js","webpack://ort/./node_modules/@protobufjs/aspromise/index.js","webpack://ort/./node_modules/@protobufjs/base64/index.js","webpack://ort/./node_modules/@protobufjs/eventemitter/index.js","webpack://ort/./node_modules/@protobufjs/float/index.js","webpack://ort/./node_modules/@protobufjs/inquire/index.js","webpack://ort/./node_modules/@protobufjs/pool/index.js","webpack://ort/./node_modules/@protobufjs/utf8/index.js","webpack://ort/./node_modules/flatbuffers/js/flatbuffers.mjs","webpack://ort/./node_modules/guid-typescript/dist/guid.js","webpack://ort/./node_modules/long/src/long.js","webpack://ort/./node_modules/onnx-proto/dist/onnx.js","webpack://ort/./node_modules/protobufjs/minimal.js","webpack://ort/./node_modules/protobufjs/src/index-minimal.js","webpack://ort/./node_modules/protobufjs/src/reader.js","webpack://ort/./node_modules/protobufjs/src/reader_buffer.js","webpack://ort/./node_modules/protobufjs/src/roots.js","webpack://ort/./node_modules/protobufjs/src/rpc.js","webpack://ort/./node_modules/protobufjs/src/rpc/service.js","webpack://ort/./node_modules/protobufjs/src/util/longbits.js","webpack://ort/./node_modules/protobufjs/src/util/minimal.js","webpack://ort/./node_modules/protobufjs/src/writer.js","webpack://ort/./node_modules/protobufjs/src/writer_buffer.js","webpack://ort/./lib/backend-onnxjs.ts","webpack://ort/./lib/backend-wasm.ts","webpack://ort/./lib/index.ts","webpack://ort/./lib/onnxjs/attribute-with-cache-key.ts","webpack://ort/./lib/onnxjs/attribute.ts","webpack://ort/./lib/onnxjs/backend.ts","webpack://ort/./lib/onnxjs/backends/backend-webgl.ts","webpack://ort/./lib/onnxjs/backends/webgl/glsl-coordinate-lib.ts","webpack://ort/./lib/onnxjs/backends/webgl/glsl-definitions.ts","webpack://ort/./lib/onnxjs/backends/webgl/glsl-encoding-lib.ts","webpack://ort/./lib/onnxjs/backends/webgl/glsl-fragcolor-lib.ts","webpack://ort/./lib/onnxjs/backends/webgl/glsl-function-inliner.ts","webpack://ort/./lib/onnxjs/backends/webgl/glsl-preprocessor.ts","webpack://ort/./lib/onnxjs/backends/webgl/glsl-registered-libs.ts","webpack://ort/./lib/onnxjs/backends/webgl/glsl-shape-utils-lib.ts","webpack://ort/./lib/onnxjs/backends/webgl/glsl-source.ts","webpack://ort/./lib/onnxjs/backends/webgl/glsl-vec-lib.ts","webpack://ort/./lib/onnxjs/backends/webgl/inference-handler.ts","webpack://ort/./lib/onnxjs/backends/webgl/op-resolve-rules.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/batch-normalization.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/binary-op.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/concat-packed.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/concat.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/conv-grouped.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/conv-pack.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/conv.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/depth-to-space.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/dot-product.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/flatten.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/fuse-utils.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/gather.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/gemm.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/im2col-pack.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/im2col.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/image-scaler.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/instance-normalization.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/matmul-pack.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/matmul.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/pack.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/packing-utils.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/pad.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/pool.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/reduce.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/reshape-packed.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/reshape.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/resize-packed.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/shape.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/slice.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/softmax.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/split.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/squeeze.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/sum.ts","webpack://ort/./lib/onnxjs/backends/webgl/ops/tile.ts","webpack://ort/./lib/onnxjs/backe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q+F,qBAGpEp+F,EAAOD,QCpBfq+F,oBAAoBh3F,EAAKpH,IACxB,IAAIw+F,EAASx+F,GAAUA,EAAO84B,
WAC7B,IAAO94B,EAAiB,QACxB,IAAM,EAEP,OADAo+F,oBAAoBh2F,EAAEo2F,EAAQ,CAAEh3F,EAAGg3
F,IAC5BA,GCLRJ,oBAAoBh2F,EAAI,CAACrI,EAAS0+F,KACjC,IAAI,IAAIz5F,KAAOy5F,EACXL,oBAAoBz
2F,EAAE82F,EAAYz5F,KAASo5F,oBAAoBz2F,EAAE5H,EAASiF,IAC5EP,OAAOy1B,eAAen6B,EAASiF,EAA
K,CAAE05F,YAAY,EAAMp7F,IAAKm7F,EAAWz5F,MCJ3Eo5F,oBAAoB51F,EAAI,WACvB,GAA0B,iBAAfm
2F,WAAyB,OAAOA,WAC3C,IACC,OAAOt9F,MAAQ,IAAIu9F,SAAS,cAAb,GACd,MAAOv4F,GACR,GAAsB,
iBAAXqC,OAAqB,OAAOA,QALjB,GCAxB01F,oBAAoBz2F,EAAI,CAACotB,EAAKyX,IAAAU/nC,OAAOunB,
UAAU/mB,eAAeC,KAAK6vB,EAAKyX,GCClF4xD,oBAAoB92F,EAAKvH,IACH,oBAAX8+F,QAA0BA,OAA
OC,aAC1Cr6F,OAAOy1B,eAAen6B,EAAS8+F,OAAOC,YAAa,CAAEr9F,MAAO,WAE7DgD,OAAOy1B,eAAen
6B,EAAS,aAAc,CAAE0B,OAAO,KCFvD,IAAIs9F,oBAAsBX,oBAAoB,M","file":"ort.es6.min.js","sourcesConten
t":["(function webpackUniversalModuleDefinition(root, factory) {\n\tif(typeof exports === 'object' && typeof
module === 'object')\n\t\tmodule.exports = factory();\n\telse if(typeof define === 'function' &&
define.amd)\n\t\tdefine([], factory);\n\telse if(typeof exports === 'object')\n\t\texports[\"ort\"] =
factory();\n\telse\n\t\troot[\"ort\"] = factory();\n})(self, function() {\nreturn ","// Copyright (c) Microsoft
Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\nconst backends = {};\r\nconst
backendsSortedByPriority = [];\r\n/**\r\n * Register a backend.\r\n *\r\n * @param name - the name as a key to
lookup as an execution provider.\r\n * @param backend - the backend object.\r\n * @param priority - an integer
indicating the priority of the backend. Higher number means higher priority.\r\n */\r\nexport const registerBackend
= (name, backend, priority) => {\r\n   if (backend && typeof backend.init === 'function' && typeof
backend.createSessionHandler === 'function') {\r\n   const currentBackend = backends[name];\r\n   if
(currentBackend === undefined) {\r\n   backends[name] = { backend, priority };\r\n   }\r\n   else if
(currentBackend.backend === backend) {\r\n   return;\r\n   }\r\n   else {\r\n   throw new
Error(`backend \"${name}\" is already registered`);\r\n   }\r\n   for (let i = 0; i <

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backendsSortedByPriority.length; i++) {\r\n            if (backends[backendsSortedByPriority[i]].priority <= priority)
{\r\n                backendsSortedByPriority.splice(i, 0, name);\r\n                return;\r\n            }\r\n        }\r\n
backendsSortedByPriority.push(name);\r\n        return;\r\n    }\r\n    throw new TypeError('not a valid
backend');\r\n};\r\n/**\r\n * Resolve backend by specified hints.\r\n *\r\n * @param backendHints - a list of
execution provider names to lookup. If omitted use registered backends as list.\r\n * @returns a promise that
resolves to the backend.\r\n */\r\nexport const resolveBackend = async (backendHints) => {\r\n    const
backendNames = backendHints.length === 0 ? backendsSortedByPriority : backendHints;\r\n    const errors = [];\r\n
  for (const backendName of backendNames) {\r\n        const backendInfo = backends[backendName];\r\n        if
(backendInfo) {\r\n            if (backendInfo.initialized) {\r\n                return backendInfo.backend;\r\n            }\r\n
    else if (backendInfo.initializing) {\r\n                throw new Error(`backend \"${backendName}\" is being
initialized; cannot initialize multiple times.`);\r\n            }\r\n            else if (backendInfo.aborted) {\r\n
continue; // current backend is unavailable; try next\r\n            }\r\n            try {\r\n                backendInfo.initializing
= true;\r\n                await backendInfo.backend.init();\r\n                backendInfo.initialized = true;\r\n
return backendInfo.backend;\r\n            }\r\n            catch (e) {\r\n                errors.push({ name: backendName, err:
e });\r\n                backendInfo.aborted = true;\r\n            }\r\n            finally {\r\n                backendInfo.initializing =
false;\r\n            }\r\n        }\r\n    }\r\n    throw new Error(`no available backend found. ERR: ${errors.map(e =>
`[${e.name}] ${e.err}`).join(', ')}`);\r\n};\r\n//# sourceMappingURL=backend-impl.js.map","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\nimport { EnvImpl } from
'./env-impl';\r\n/**\r\n * Represent a set of flags as a global singleton.\r\n */\r\nexport const env = new
EnvImpl();\r\n//# sourceMappingURL=env.js.map","// Copyright (c) Microsoft Corporation. All rights
reserved.\r\n// Licensed under the MIT License.\r\nexport class EnvImpl {\r\n    constructor() {\r\n        this.wasm =
{};\r\n        this.webgl = {};\r\n        this.logLevelInternal = 'warning';\r\n    }\r\n    // TODO standadize the getter
and setter convention in env for other fields.\r\n    set logLevel(value) {\r\n        if (value === undefined) {\r\n
return;\r\n        }\r\n        if (typeof value !== 'string' || ['verbose', 'info', 'warning', 'error', 'fatal'].indexOf(value) === -
1) {\r\n            throw new Error(`Unsupported logging level: ${value}`);\r\n        }\r\n        this.logLevelInternal =
value;\r\n    }\r\n    get logLevel() {\r\n        return this.logLevelInternal;\r\n    }\r\n}\r\n//# sourceMappingURL=env-
impl.js.map","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\nconst isBigInt64ArrayAvailable = typeof BigInt64Array !== 'undefined' && typeof BigInt64Array.from
=== 'function';\r\nconst isBigUint64ArrayAvailable = typeof BigUint64Array !== 'undefined' && typeof
BigUint64Array.from === 'function';\r\n// a runtime map that maps type string to TypedArray constructor. Should
match Tensor.DataTypeMap.\r\nconst NUMERIC_TENSOR_TYPE_TO_TYPEDARRAY_MAP = new Map([\r\n
['float32', Float32Array],\r\n    ['uint8', Uint8Array],\r\n    ['int8', Int8Array],\r\n    ['uint16', Uint16Array],\r\n
['int16', Int16Array],\r\n    ['int32', Int32Array],\r\n    ['bool', Uint8Array],\r\n    ['float64', Float64Array],\r\n
['uint32', Uint32Array],\r\n]);\r\n// a runtime map that maps type string to TypedArray constructor. Should match
Tensor.DataTypeMap.\r\nconst NUMERIC_TENSOR_TYPEDARRAY_TO_TYPE_MAP = new Map([\r\n
[Float32Array, 'float32'],\r\n    [Uint8Array, 'uint8'],\r\n    [Int8Array, 'int8'],\r\n    [Uint16Array, 'uint16'],\r\n
[Int16Array, 'int16'],\r\n    [Int32Array, 'int32'],\r\n    [Float64Array, 'float64'],\r\n    [Uint32Array,
'uint32'],\r\n]);\r\nif (isBigInt64ArrayAvailable) {\r\n
NUMERIC_TENSOR_TYPE_TO_TYPEDARRAY_MAP.set('int64', BigInt64Array);\r\n
NUMERIC_TENSOR_TYPEDARRAY_TO_TYPE_MAP.set(BigInt64Array, 'int64');\r\n}\r\nif
(isBigUint64ArrayAvailable) {\r\n    NUMERIC_TENSOR_TYPE_TO_TYPEDARRAY_MAP.set('uint64',
BigUint64Array);\r\n    NUMERIC_TENSOR_TYPEDARRAY_TO_TYPE_MAP.set(BigUint64Array,
'uint64');\r\n}\r\n/**\r\n * calculate size from dims.\r\n *\r\n * @param dims the dims array. May be an illegal
input.\r\n */\r\nconst calculateSize = (dims) => {\r\n    let size = 1;\r\n    for (let i = 0; i < dims.length; i++) {\r\n
const dim = dims[i];\r\n        if (typeof dim !== 'number' || !Number.isSafeInteger(dim)) {\r\n            throw new
TypeError(`dims[${i}] must be an integer, got: ${dim}`);\r\n        }\r\n        if (dim < 0) {\r\n            throw new
RangeError(`dims[${i}] must be a non-negative integer, got: ${dim}`);\r\n        }\r\n        size *= dim;\r\n    }\r\n
return size;\r\n};\r\nexport class Tensor {\r\n    constructor(arg0, arg1, arg2) {\r\n        let type;\r\n        let data;\r\n
```

let dims;\r\n // check whether arg0 is type or data\r\n if (typeof arg0 === 'string') {\r\n //\r\n // Override: constructor(type, data, ...)\r\n //\r\n type = arg0;\r\n dims = arg2;\r\n if (arg0 === 'string') {\r\n // string tensor\r\n if (!Array.isArray(arg1)) {\r\n throw new TypeError('A string tensor\\'s data must be a string array.');\r\n }\r\n // we don't check whether every element in the array is string; this is too slow. we assume it's correct and\r\n // error will be populated at inference\r\n data = arg1;\r\n }\r\n else {\r\n // numeric tensor\r\n const typedArrayConstructor = NUMERIC_TENSOR_TYPE_TO_TYPEDARRAY_MAP.get(arg0);\r\n if (typedArrayConstructor === undefined) {\r\n throw new TypeError(`Unsupported tensor type: ${arg0}.`);\r\n }\r\n if (Array.isArray(arg1)) {\r\n // use 'as any' here because TypeScript's check on type of 'SupportedTypedArrayConstructors.from()' produces\r\n // incorrect results.\r\n // 'typedArrayConstructor' should be one of the typed array prototype objects.\r\n // eslint-disable-next-line @typescript-eslint/no-explicit-any\r\n data = typedArrayConstructor.from(arg1);\r\n }\r\n else if (arg1 instanceof typedArrayConstructor) {\r\n data = arg1;\r\n }\r\n else {\r\n throw new TypeError(`A ${type} tensor's data must be type of ${typedArrayConstructor}`);\r\n }\r\n }\r\n }\r\n else {\r\n //\r\n // Override: constructor(data, ...)\r\n //\r\n dims = arg1;\r\n if (Array.isArray(arg0)) {\r\n // only boolean[] and string[] is supported\r\n if (arg0.length === 0) {\r\n throw new TypeError('Tensor type cannot be inferred from an empty array.');\r\n }\r\n const firstElementType = typeof arg0[0];\r\n if (firstElementType === 'string') {\r\n type = 'string';\r\n data = arg0;\r\n }\r\n else if (firstElementType === 'boolean') {\r\n type = 'bool';\r\n // 'arg0' is of type 'boolean[]'. Uint8Array.from(boolean[]) actually works, but typescript thinks this is\r\n // wrong type. We use 'as any' to make it happy.\r\n // eslint-disable-next-line @typescript-eslint/no-explicit-any\r\n data = Uint8Array.from(arg0);\r\n }\r\n else {\r\n throw new TypeError(`Invalid element type of data array: ${firstElementType}.`);\r\n }\r\n }\r\n else {\r\n // get tensor type from TypedArray\r\n const mappedType = NUMERIC_TENSOR_TYPEDARRAY_TO_TYPE_MAP.get(arg0.constructor);\r\n if (mappedType === undefined) {\r\n throw new TypeError(`Unsupported type for tensor data: ${arg0.constructor}.`);\r\n }\r\n type = mappedType;\r\n data = arg0;\r\n }\r\n }\r\n // type and data is processed, now processing dims\r\n if (dims === undefined) {\r\n // assume 1-D tensor if dims omitted\r\n dims = [data.length];\r\n }\r\n else if (!Array.isArray(dims)) {\r\n throw new TypeError('A tensor\\'s dims must be a number array');\r\n }\r\n // perform check\r\n const size = calculateSize(dims);\r\n if (size !== data.length) {\r\n throw new Error(`Tensor's size(${size}) does not match data length(${data.length}).`);\r\n }\r\n this.dims = dims;\r\n this.type = type;\r\n this.data = data;\r\n this.size = size;\r\n }\r\n //#endregion\r\n //#region tensor utilities\r\n reshape(dims) {\r\n return new Tensor(this.type, this.data, dims);\r\n }\r\n}\r\n//# sourceMappingURL=tensor-impl.js.map","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\nimport { Tensor as TensorImpl } from './tensor-impl';\r\n// eslint-disable-next-line @typescript-eslint/naming-convention\r\nexport const Tensor = TensorImpl;\r\n//# sourceMappingURL=tensor.js.map","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\nimport { resolveBackend } from './backend-impl';\r\nimport { Tensor } from './tensor';\r\nexport class InferenceSession {\r\n constructor(handler) {\r\n this.handler = handler;\r\n }\r\n async run(feeds, arg1, arg2) {\r\n const fetches = {};\r\n let options = {};\r\n // check inputs\r\n if (typeof feeds !== 'object' || feeds === null || feeds instanceof Tensor || Array.isArray(feeds)) {\r\n throw new TypeError('\\'feeds\\' must be an object that use input names as keys and OnnxValue as corresponding values.');\r\n }\r\n let isFetchesEmpty = true;\r\n // determine which override is being used\r\n if (typeof arg1 === 'object') {\r\n if (arg1 === null) {\r\n throw new TypeError('Unexpected argument[1]: cannot be null.');\r\n }\r\n if (arg1 instanceof Tensor) {\r\n throw new TypeError('\\'fetches\\' cannot be a Tensor');\r\n }\r\n if (Array.isArray(arg1)) {\r\n if (arg1.length === 0) {\r\n throw new TypeError('\\'fetches\\'

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cannot be an empty array.');\r\n            }\r\n            isFetchesEmpty = false;\r\n            // output names\r\n
    for (const name of arg1) {\r\n                if (typeof name !== 'string') {\r\n                    throw new
TypeError('\\'fetches\\' must be a string array or an object.');\r\n                }\r\n                if
(this.outputNames.indexOf(name) === -1) {\r\n                    throw new RangeError(`'fetches' contains invalid
output name: ${name}.`);\r\n                }\r\n                fetches[name] = null;\r\n            }\r\n            if
(typeof arg2 === 'object' && arg2 !== null) {\r\n                options = arg2;\r\n            }\r\n            else if
(typeof arg2 !== 'undefined') {\r\n                throw new TypeError('\\'options\\' must be an object.');\r\n
}\r\n        }\r\n        else {\r\n            // decide whether arg1 is fetches or options\r\n            // if any output
name is present and its value is valid OnnxValue, we consider it fetches\r\n            let isFetches = false;\r\n
  const arg1Keys = Object.getOwnPropertyNames(arg1);\r\n            for (const name of this.outputNames) {\r\n
        if (arg1Keys.indexOf(name) !== -1) {\r\n                    const v = arg1[name];\r\n                    if (v ===
null || v instanceof Tensor) {\r\n                        isFetches = true;\r\n                        isFetchesEmpty = false;\r\n
                        fetches[name] = v;\r\n                    }\r\n                }\r\n            }\r\n            if (isFetches) {\r\n
                if (typeof arg2 === 'object' && arg2 !== null) {\r\n                    options = arg2;\r\n                }\r\n
              else if (typeof arg2 !== 'undefined') {\r\n                    throw new TypeError('\\'options\\' must be an
object.');\r\n                }\r\n            }\r\n            else {\r\n                options = arg1;\r\n            }\r\n
}\r\n        }\r\n        else if (typeof arg1 !== 'undefined') {\r\n            throw new TypeError('Unexpected argument[1]:
must be \\'fetches\\' or \\'options\\'.');\r\n        }\r\n        // check if all inputs are in feed\r\n        for (const name of
this.inputNames) {\r\n            if (typeof feeds[name] === 'undefined') {\r\n                throw new Error(`input
'${name}' is missing in 'feeds'.`);\r\n            }\r\n        }\r\n        // if no fetches is specified, we use the full output
names list\r\n        if (isFetchesEmpty) {\r\n            for (const name of this.outputNames) {\r\n
fetches[name] = null;\r\n            }\r\n        }\r\n        // feeds, fetches and options are prepared\r\n        const results =
await this.handler.run(feeds, fetches, options);\r\n        const returnValue = {};\r\n        for (const key in results) {\r\n
          if (Object.hasOwnProperty.call(results, key)) {\r\n                returnValue[key] = new Tensor(results[key].type,
results[key].data, results[key].dims);\r\n            }\r\n        }\r\n        return returnValue;\r\n    }\r\n    static async
create(arg0, arg1, arg2, arg3) {\r\n        // either load from a file or buffer\r\n        let filePathOrUint8Array;\r\n
let options = {};\r\n        if (typeof arg0 === 'string') {\r\n            filePathOrUint8Array = arg0;\r\n            if (typeof
arg1 === 'object' && arg1 !== null) {\r\n                options = arg1;\r\n            }\r\n            else if (typeof arg1 !==
'undefined') {\r\n                throw new TypeError('\\'options\\' must be an object.');\r\n            }\r\n        }\r\n        else
if (arg0 instanceof Uint8Array) {\r\n            filePathOrUint8Array = arg0;\r\n            if (typeof arg1 === 'object' &&
arg1 !== null) {\r\n                options = arg1;\r\n            }\r\n            else if (typeof arg1 !== 'undefined') {\r\n
 throw new TypeError('\\'options\\' must be an object.');\r\n            }\r\n        }\r\n        else if (arg0 instanceof
ArrayBuffer ||\r\n            (typeof SharedArrayBuffer !== 'undefined' && arg0 instanceof SharedArrayBuffer)) {\r\n
       const buffer = arg0;\r\n            let byteOffset = 0;\r\n            let byteLength = arg0.byteLength;\r\n            if
(typeof arg1 === 'object' && arg1 !== null) {\r\n                options = arg1;\r\n            }\r\n            else if (typeof arg1
=== 'number') {\r\n                byteOffset = arg1;\r\n                if (!Number.isSafeInteger(byteOffset)) {\r\n
throw new RangeError('\\'byteOffset\\' must be an integer.');\r\n                }\r\n                if (byteOffset < 0 ||
byteOffset >= buffer.byteLength) {\r\n                    throw new RangeError(`'byteOffset' is out of range [0,
${buffer.byteLength}).`);\r\n                }\r\n                byteLength = arg0.byteLength - byteOffset;\r\n                if
(typeof arg2 === 'number') {\r\n                    byteLength = arg2;\r\n                    if
(!Number.isSafeInteger(byteLength)) {\r\n                        throw new RangeError('\\'byteLength\\' must be an
integer.');\r\n                    }\r\n                    if (byteLength <= 0 || byteOffset + byteLength > buffer.byteLength) {\r\n
                    throw new RangeError(`'byteLength' is out of range (0, ${buffer.byteLength - byteOffset}].`);\r\n
       }\r\n                    if (typeof arg3 === 'object' && arg3 !== null) {\r\n                        options = arg3;\r\n
   }\r\n                    else if (typeof arg3 !== 'undefined') {\r\n                        throw new TypeError('\\'options\\' must
be an object.');\r\n                    }\r\n                }\r\n                else if (typeof arg2 !== 'undefined') {\r\n
throw new TypeError('\\'byteLength\\' must be a number.');\r\n                }\r\n            }\r\n            else if (typeof arg1
!== 'undefined') {\r\n                throw new TypeError('\\'options\\' must be an object.');\r\n            }\r\n
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filePathOrUint8Array = new Uint8Array(buffer, byteOffset, byteLength);\r\n        }\r\n        else {\r\n            throw
new TypeError('Unexpected argument[0]: must be \\'path\\' or \\'buffer\\'.');\r\n        }\r\n        // get backend hints\r\n
        const eps = options.executionProviders || [];\r\n        const backendHints = eps.map(i => typeof i === 'string' ? i :
i.name);\r\n        const backend = await resolveBackend(backendHints);\r\n        const handler = await
backend.createSessionHandler(filePathOrUint8Array, options);\r\n        return new InferenceSession(handler);\r\n
}\r\n    startProfiling() {\r\n        this.handler.startProfiling();\r\n    }\r\n    endProfiling() {\r\n
this.handler.endProfiling();\r\n    }\r\n    get inputNames() {\r\n        return this.handler.inputNames;\r\n    }\r\n    get
outputNames() {\r\n        return this.handler.outputNames;\r\n    }\r\n}\r\n//# sourceMappingURL=inference-
session-impl.js.map","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\nimport { InferenceSession as InferenceSessionImpl } from './inference-session-impl';\r\n// eslint-disable-
next-line @typescript-eslint/naming-convention\r\nexport const InferenceSession = InferenceSessionImpl;\r\n//#
sourceMappingURL=inference-session.js.map","var _scriptDir,e=(_scriptDir=\"undefined\"!=typeof
document&&document.currentScript?document.currentScript.src:void 0,\"undefined\"!=typeof
__filename&&(_scriptDir=_scriptDir||__filename),function(e){function t(){return
S.buffer!=Y&&Q(S.buffer),P}function n(){return S.buffer!=Y&&Q(S.buffer),W}function r(){return
S.buffer!=Y&&Q(S.buffer),q}function a(){return S.buffer!=Y&&Q(S.buffer),U}function i(){return
S.buffer!=Y&&Q(S.buffer),B}var o,u,s;e=e||{},o||(o=void 0!==e?e:{}),o.ready=new
Promise((function(e,t){u=e,s=t}));var c,f={};for(c in o)o.hasOwnProperty(c)&&(f[c]=o[c]);var
l=\"./this.program\";function p(e,t){throw t}var d,m,b,h,g,_=\"object\"==typeof window,y=\"function\"==typeof
importScripts,w=\"object\"==typeof process&&\"object\"==typeof process.versions&&\"string\"==typeof
process.versions.node,v=o.ENVIRONMENT_IS_PTHREAD||!1,A=\"\";function T(e){return
o.locateFile?o.locateFile(e,A):A+e}if(w){var
O;A=y?require(\"path\").dirname(A)+\"/\":__dirname+\"/\",d=function(e,t){return
h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.readFileSync(e,t?null:\"utf8\")},b=function(e){retur
n(e=d(e,!0)).buffer||(e=new
Uint8Array(e)),F(e.buffer),e},m=function(e,t,n){h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.rea
dFile(e,(function(e,r){e?n(e):t(r.buffer)}))},1<process.argv.length&&(l=process.argv[1].replace(/\\\\/g,\"/\")),process
.argv.slice(2),process.on(\"uncaughtException\",(function(e){if(!(e instanceof Gt))throw
e})),process.on(\"unhandledRejection\",ce),p=function(e,t){if(re())throw
process.exitCode=e,t;process.exit(e)},o.inspect=function(){return\"[Emscripten Module
object]\"};try{O=require(\"worker_threads\")}catch(e){throw console.error('The \"worker_threads\" module is not
supported in this node.js build - perhaps a newer version is
needed?'),e}global.Worker=O.Worker}else(_||y)&&(y?A=self.location.href:\"undefined\"!=typeof
document&&document.currentScript&&(A=document.currentScript.src),_scriptDir&&(A=_scriptDir),A=0!==A.in
dexOf(\"blob:\")?A.substr(0,A.lastIndexOf(\"/\")+1):\"\",w?(d=function(e,t){return
h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.readFileSync(e,t?null:\"utf8\")},b=function(e){retur
n(e=d(e,!0)).buffer||(e=new
Uint8Array(e)),F(e.buffer),e},m=function(e,t,n){h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.rea
dFile(e,(function(e,r){e?n(e):t(r.buffer)}))}):(d=function(e){var t=new XMLHttpRequest;return
t.open(\"GET\",e,!1),t.send(null),t.responseText},y&&(b=function(e){var t=new XMLHttpRequest;return
t.open(\"GET\",e,!1),t.responseType=\"arraybuffer\",t.send(null),new
Uint8Array(t.response)}),m=function(e,t,n){var r=new
XMLHttpRequest;r.open(\"GET\",e,!0),r.responseType=\"arraybuffer\",r.onload=function(){200==r.status||0==r.stat
us&&r.response?t(r.response):n()},r.onerror=n,r.send(null)}));w&&\"undefined\"==typeof
performance&&(global.performance=require(\"perf_hooks\").performance);var
k,E,x=o.print||console.log.bind(console),M=o.printErr||console.warn.bind(console);for(c in
f)f.hasOwnProperty(c)&&(o[c]=f[c]);f=null,o.thisProgram&&(l=o.thisProgram),o.quit&&(p=o.quit),o.wasmBinary
&&(E=o.wasmBinary);var D=o.noExitRuntime||!1;\"object\"!=typeof WebAssembly&&ce(\"no native wasm
```

```
support detected\");var S,C,R,I=!1;function F(e,t){e||ce(\"Assertion failed: \"+t)}function j(e){var t=new
TextDecoder(e);this.decode=function(e){return e.buffer instanceof SharedArrayBuffer&&(e=new
Uint8Array(e)),t.decode.call(t,e)}}var Y,P,W,q,U,B,G=\"undefined\"!=typeof TextDecoder?new j(\"utf8\"):void
0;function H(e,t,n){var r=t+n;for(n=t;e[n]&&!(n>=r);)++n;if(16<n-t&&e.subarray&&G)return
G.decode(e.subarray(t,n));for(r=\"\";t<n;){var a=e[t++];if(128&a){var
i=63&e[t++];if(192==(224&a))r+=String.fromCharCode((31&a)<<6|i);else{var
o=63&e[t++];65536>(a=224==(240&a)?(15&a)<<12|i<<6|o:(7&a)<<18|i<<12|o<<6|63&e[t++])?r+=String.fromCh
arCode(a):(a-=65536,r+=String.fromCharCode(55296|a>>10,56320|1023&a))}}else
r+=String.fromCharCode(a)}return r}function z(e,t){return e?H(n(),e,t):\"\"}function L(e,t,n,r){if(!(0<r))return 0;var
a=n;r=n+r-1;for(var i=0;i<e.length;++i){var
o=e.charCodeAt(i);if(55296<=o&&57343>=o&&(o=65536+((1023&o)<<10)|1023&e.charCodeAt(++i)),127>=o){i
f(n>=r)break;t[n++]=o}else{if(2047>=o){if(n+1>=r)break;t[n++]=192|o>>6}else{if(65535>=o){if(n+2>=r)break;t[
n++]=224|o>>12}else{if(n+3>=r)break;t[n++]=240|o>>18,t[n++]=128|o>>12&63}t[n++]=128|o>>6&63}t[n++]=1
28|63&o}}return t[n]=0,n-a}function N(e,t,r){return L(e,n(),t,r)}function V(e){for(var t=0,n=0;n<e.length;++n){var
r=e.charCodeAt(n);55296<=r&&57343>=r&&(r=65536+((1023&r)<<10)|1023&e.charCodeAt(++n)),127>=r?++t:t
=2047>=r?t+2:65535>=r?t+3:t+4}return t}function X(e){var n=V(e)+1,r=ht(n);return r&&L(e,t(),r,n),r}function
Q(e){Y=e,o.HEAP8=P=new Int8Array(e),o.HEAP16=new Int16Array(e),o.HEAP32=q=new
Int32Array(e),o.HEAPU8=W=new Uint8Array(e),o.HEAPU16=new Uint16Array(e),o.HEAPU32=U=new
Uint32Array(e),o.HEAPF32=new Float32Array(e),o.HEAPF64=B=new Float64Array(e)}\"undefined\"!=typeof
TextDecoder&&new j(\"utf-16le\"),v&&(Y=o.buffer);var
J=o.INITIAL_MEMORY||16777216;if(v)S=o.wasmMemory,Y=o.buffer;else
if(o.wasmMemory)S=o.wasmMemory;else if(!((S=new
WebAssembly.Memory({initial:J/65536,maximum:32768,shared:!0})).buffer instanceof SharedArrayBuffer))throw
M(\"requested a shared WebAssembly.Memory but the returned buffer is not a SharedArrayBuffer, indicating that
while the browser has SharedArrayBuffer it does not have WebAssembly threads support - you may need to set a
flag\"),w&&console.log(\"(on node you may need: --experimental-wasm-threads --experimental-wasm-bulk-
memory and also use a recent version)\"),Error(\"bad memory\");S&&(Y=S.buffer),J=Y.byteLength,Q(Y);var
Z,$=[],K=[],ee=[],te=[],ne=0;function re(){return D||0<ne}function ae(){var e=o.preRun.shift();$.unshift(e)}var
ie,oe=0,ue=null,se=null;function ce(e){throw o.onAbort&&o.onAbort(e),F(!v),M(e),I=!0,R=1,e=new
WebAssembly.RuntimeError(\"abort(\"+e+\"). Build with -s ASSERTIONS=1 for more info.\"),s(e),e}function
fe(){return ie.startsWith(\"data:application/octet-stream;base64,\")}function le(){var e=ie;try{if(e==ie&&E)return
new Uint8Array(E);if(b)return b(e);throw\"both async and sync fetching of the wasm
failed\"}catch(e){ce(e)}}o.preloadedImages={},o.preloadedAudios={},ie=\"ort-wasm-
threaded.wasm\",fe()||(ie=T(ie));var pe={973748:function(){throw\"Canceled!\"}};function
de(e){for(;0<e.length;){var t=e.shift();if(\"function\"==typeof t)t(o);else{var n=t.Nb;\"number\"==typeof n?void
0===t.ib?Z.get(n)():Z.get(n)(t.ib):n(void 0===t.ib?null:t.ib)}}}function
me(e,n){if(0>=e||e>t().length||1&e||0>n)return-28;if(0==n)return 0;2147483647<=n&&(n=1/0);var
a=Atomics.load(r(),Bt>>2),i=0;if(a==e&&Atomics.compareExchange(r(),Bt>>2,a,0)==a&&(i=1,0>=--n))return
1;if(0<=(e=Atomics.notify(r(),e>>2,n)))return e+i;throw\"Atomics.notify returned an unexpected value
\"+e}function be(e){if(v)throw\"Internal Error! cleanupThread() can only ever be called from main application
thread!\";if(!e)throw\"Internal Error! Null pthread_ptr in cleanupThread!\";var
t=ge.cb[e];t&&(r()[e+12>>2]=0,ge.sb(t.worker))}o._emscripten_futex_wake=me;var
he,ge={gb:[],fb:[],zb:[],xc:function(){},Rb:function(){for(var
e=ht(228),t=0;57>t;++t)a()[e/4+t]=0;r()[e+12>>2]=e,t=e+152,r()[t>>2]=t;var
n=ht(512);for(t=0;128>t;++t)a()[n/4+t]=0;Atomics.store(a(),e+100>>2,n),Atomics.store(a(),e+40>>2,e),Dt(e,!y,1),v
t(e)},Sb:function(){ge.receiveObjectTransfer=ge.Xb,ge.threadInit=ge.hc,ge.threadCancel=ge.fc,ge.threadExit=ge.H
b,ge.setExitStatus=ge.Zb},cb:{},yb:[],Eb:function(){for(;0<ge.yb.length;)ge.yb.pop()();Ct()},Fb:function(e,t){Atom
ics.store(a(),e+56>>2,1),Atomics.store(a(),e+60>>2,0),ge.Eb(),Atomics.store(a(),e+4>>2,t),Atomics.store(a(),e+0>
```

```
>2,1),me(e+0,2147483647),Dt(0,0,0)},Zb:function(e){R=e},Hb:function(e){var
t=yt();t&&(ge.Fb(t,e),v&&postMessage({cmd:\"exit\"}))},fc:function(){ge.Fb(yt(),-
1),postMessage({cmd:\"cancelDone\"})},Gb:function(){for(var e in ge.cb){var
t=ge.cb[e];t&&t.worker&&ge.sb(t.worker)}for(ge.cb={},e=0;e<ge.gb.length;++e){var
n=ge.gb[e];n.terminate()}for(ge.gb=[],e=0;e<ge.fb.length;++e)t=(n=ge.fb[e]).bb,ge.xb(t),n.terminate();ge.fb=[]},xb:
function(e){if(e){if(e.eb){var
t=r()[e.eb+100>>2];r()[e.eb+100>>2]=0,_t(t),_t(e.eb)}e.eb=0,e.wb&&e.hb&&_t(e.hb),e.hb=0,e.worker&&(e.worke
r.bb=null)}},sb:function(e){ge.Yb((function(){delete
ge.cb[e.bb.eb],ge.gb.push(e),ge.fb.splice(ge.fb.indexOf(e),1),ge.xb(e.bb),e.bb=void
0}))},Yb:function(e){r()[Ut>>2]=0;try{e()}finally{r()[Ut>>2]=1}},Xb:function(){},hc:function(){for(var e in
ge.zb)ge.zb[e]()},Ub:function(e,t){e.onmessage=function(n){var
i=n.data,o=i.cmd;if(e.bb&&(ge.Lb=e.bb.eb),i.targetThread&&i.targetThread!=yt()){var
u=ge.cb[i.Dc];u?u.worker.postMessage(n.data,i.transferList):M('Internal error! Worker sent a message \"'+o+'\" to
target pthread '+i.targetThread+\", but that thread no longer exists!\")}else
if(\"processQueuedMainThreadWork\"===o)Ot();else if(\"spawnThread\"===o)ve(n.data);else
if(\"cleanupThread\"===o)be(i.thread);else if(\"killThread\"===o){if(n=i.thread,v)throw\"Internal Error!
killThread() can only ever be called from main application thread!\";if(!n)throw\"Internal Error! Null pthread_ptr in
killThread!\";r()[n+12>>2]=0,i=ge.cb[n],delete
ge.cb[n],i.worker.terminate(),ge.xb(i),ge.fb.splice(ge.fb.indexOf(i.worker),1),i.worker.bb=void 0}else
if(\"cancelThread\"===o){if(n=i.thread,v)throw\"Internal Error! cancelThread() can only ever be called from main
application thread!\";if(!n)throw\"Internal Error! Null pthread_ptr in
cancelThread!\";ge.cb[n].worker.postMessage({cmd:\"cancel\"})}else
if(\"loaded\"===o)e.loaded=!0,t&&t(e),e.mb&&(e.mb(),delete e.mb);else if(\"print\"===o)x(\"Thread
\"+i.threadId+\": \"+i.text);else if(\"printErr\"===o)M(\"Thread \"+i.threadId+\": \"+i.text);else
if(\"alert\"===o)alert(\"Thread \"+i.threadId+\": \"+i.text);else
if(\"exit\"===o)e.bb&&Atomics.load(a(),e.bb.eb+64>>2)&&ge.sb(e);else
if(\"exitProcess\"===o)try{zt(i.returnCode)}catch(e){if(e instanceof Gt)return;throw
e}else\"cancelDone\"===o?ge.sb(e):\"objectTransfer\"!==o&&(\"setimmediate\"===n.data.target?e.postMessage(n.
data):M(\"worker sent an unknown command \"+o));ge.Lb=void 0},e.onerror=function(e){M(\"pthread sent an
error! \"+e.filename+\":\"+e.lineno+\":
\"+e.message)},w&&(e.on(\"message\",(function(t){e.onmessage({data:t})})),e.on(\"error\",(function(t){e.onerror(t)
})),e.on(\"exit\",(function(){}))),e.postMessage({cmd:\"load\",urlOrBlob:o.mainScriptUrlOrBlob||_scriptDir,wasm
Memory:S,wasmModule:C})},Ib:function(){var e=T(\"ort-wasm-threaded.worker.js\");ge.gb.push(new
Worker(e))},Ob:function(){return
0==ge.gb.length&&(ge.Ib(),ge.Ub(ge.gb[0])),ge.gb.pop()},nc:function(e){for(e=performance.now()+e;performance.
now()<e;);}};function _e(e,t){if(0===e)e=Date.now();else{if(1!==e&&4!==e)return r()[gt()>>2]=28,-
1;e=he()}return r()[t>>2]=e/1e3|0,r()[t+4>>2]=e%1e3*1e6|0,0}function ye(e,t){if(v)return
ze(1,1,e,t);ee.unshift({Nb:e,ib:t})}function we(e){this.lb=e-
16,this.dc=function(e){r()[this.lb+4>>2]=e},this.ac=function(e){r()[this.lb+8>>2]=e},this.bc=function(){r()[this.lb>
>2]=0},this.$b=function(){t()[this.lb+12>>0]=0},this.cc=function(){t()[this.lb+13>>0]=0},this.Pb=function(e,t){thi
s.dc(e),this.ac(t),this.bc(),this.$b(),this.cc()}}function ve(e){if(v)throw\"Internal Error! spawnThread() can only ever
be called from main application thread!\";var t=ge.Ob();if(!t)return 6;if(void 0!==t.bb)throw\"Internal
error!\";if(!e.rb)throw\"Internal error, no pthread ptr!\";ge.fb.push(t);for(var
n=ht(512),i=0;128>i;++i)r()[n+4*i>>2]=0;var
o=e.hb+e.jb,u=(i=ge.cb[e.rb]={worker:t,hb:e.hb,jb:e.jb,wb:e.wb,eb:e.rb}).eb>>2;Atomics.store(a(),u+16,e.detached)
,Atomics.store(a(),u+25,n),Atomics.store(a(),u+10,i.eb),Atomics.store(a(),u+20,e.jb),Atomics.store(a(),u+19,o),Ato
mics.store(a(),u+26,e.jb),Atomics.store(a(),u+28,o),Atomics.store(a(),u+29,e.detached),n=St()+40,Atomics.store(a()
,u+43,n),t.bb=i;var
```

```
s={cmd:\"run\",start_routine:e.ec,arg:e.ib,threadInfoStruct:e.rb,stackBase:e.hb,stackSize:e.jb};return
t.mb=function(){s.time=performance.now(),t.postMessage(s,e.mc)},t.loaded&&(t.mb(),delete t.mb),0}function
Ae(e,n,a){if(0>=e||e>t().length||1&e)return-28;if(_){if(Atomics.load(r(),e>>2)!=n)return-6;var
i=performance.now();for(a=i+a,Atomics.exchange(r(),Bt>>2,e);;){if((i=performance.now())>a)return
Atomics.exchange(r(),Bt>>2,0),-
73;if(0==(i=Atomics.exchange(r(),Bt>>2,0)))break;if(Ot(),Atomics.load(r(),e>>2)!=n)return-
6;Atomics.exchange(r(),Bt>>2,e)}return 0}if(\"timed-out\"===(e=Atomics.wait(r(),e>>2,n,a)))return-73;if(\"not-
equal\"===e)return-6;if(\"ok\"===e)return 0;throw\"Atomics.wait returned an unexpected value \"+e}function
Te(){w||y||(k||(k={}),k[\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-thread\"]||(k[\"Blocking on the
main thread is very dangerous, see https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-
browser-thread\"]=1,M(\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-
thread\")))}o.establishStackSpace=function(e,t){Wt(e,t),Yt(e)},o.invokeEntryPoint=function(e,t){return
Z.get(e)(t)},he=w?function(){var e=process.hrtime();return 1e3*e[0]+e[1]/1e6}:v?function(){return
performance.now()-o.__performance_now_clock_drift}:function(){return performance.now()};var
Oe={},ke=[null,[],[]];function Ee(e,t){var n=ke[e];0===t||10===t?((1===e?x:M)(H(n,0)),n.length=0):n.push(t)}var
xe={};function Me(e,t){return v?ze(2,1,e,t):(e=z(e),xe.rc(e,t))}function De(e,t,n){return v?ze(3,1,e,t,n):0}function
Se(e,t){if(v)return ze(4,1,e,t)}function Ce(e,t,n){if(v)return ze(5,1,e,t,n)}function Re(e,t,n){return
v?ze(6,1,e,t,n):0}function Ie(e,t){if(v)return ze(7,1,e,t)}function Fe(e,t){return
v?ze(8,1,e,t):(e=z(e),xe.sc(e,t))}function je(e,t,r,a,i,o){if(v)t=ze(9,1,e,t,r,a,i,o);else
if(o<<=12,0!=(16&a)&&0!=e%65536)t=-28;else if(0!=(32&a)){var
u=65536*Math.ceil(t/65536);(e=qt(65536,u))?n().fill(0,e,e+u):e=0,e?(Oe[e]={Wb:e,Tb:t,Jb:!0,fd:i,Ac:r,flags:a,offse
t:o},t=e):t=-48}else t=-52;return t}function Ye(e,t){if(v)e=ze(10,1,e,t);else{var
n=Oe[e];0!==t&&n?(t===n.Tb&&(Oe[e]=null,n.Jb&&_t(n.Wb)),e=0):e=-28}return e}function Pe(e,t,n){if(v)return
ze(11,1,e,t,n)}function We(e,t,n){return v?ze(12,1,e,t,n):(e=z(e),xe.tc(e,t,n))}function qe(e){if(v)return
ze(13,1,e)}function Ue(e,t){if(v)return ze(14,1,e,t)}function Be(e){if(v)return ze(15,1,e)}function Ge(){if(v)return
ze(16,1);ce()}var He=[];function ze(e,t){for(var n=arguments.length-2,r=jt(),a=Pt(8*n),o=a>>3,u=0;u<n;u++){var
s=arguments[2+u];i()[o+u]=s}return n=kt(e,n,a,t),Yt(r),n}var Le=[],Ne=[0,\"undefined\"!=typeof
document?document:0,\"undefined\"!=typeof window?window:0];function Ve(e){return
e=2<e?z(e):e,Ne[e]||(\"undefined\"!=typeof document?document.querySelector(e):void 0)}function Xe(e,t,n){var
a=Ve(e);if(!a)return-
4;if(a.qb&&(r()[a.qb>>2]=t,r()[a.qb+4>>2]=n),!a.Db&&a.pc){if(a.qb){a=r()[a.qb+8>>2],e=e?z(e):\"\";var
i=jt(),o=Pt(12),u=0;if(e){u=V(e)+1;var s=ht(u);N(e,s,u),u=s}return
r()[o>>2]=u,r()[o+4>>2]=t,r()[o+8>>2]=n,Et(0,a,657457152,0,u,o),Yt(i),1}return-4}return
a.Db&&(a=a.Db),e=!1,a.pb&&a.pb.ob&&(e=0===(e=a.pb.ob.getParameter(2978))[0]&&0===e[1]&&e[2]===a.wi
dth&&e[3]===a.height),a.width=t,a.height=n,e&&a.pb.ob.viewport(0,0,t,n),0}function Qe(e,t,n){return
v?ze(17,1,e,t,n):Xe(e,t,n)}var Je,Ze=[\"default\",\"low-power\",\"high-performance\"],$e={};function
Ke(){if(!Je){var
e,t={USER:\"web_user\",LOGNAME:\"web_user\",PATH:\"/\",PWD:\"/\",HOME:\"/home/web_user\",LANG:(\"ob
ject\"==typeof navigator&&navigator.languages&&navigator.languages[0]||\"C\").replace(\"-\",\"_\")+\".UTF-
8\",_:l||\"./this.program\"};for(e in $e)void 0===$e[e]?delete t[e]:t[e]=$e[e];var n=[];for(e in
t)n.push(e+\"=\"+t[e]);Je=n}return Je}function et(e,n){if(v)return ze(18,1,e,n);var a=0;return
Ke().forEach((function(i,o){var
u=n+a;for(o=r()[e+4*o>>2]=u,u=0;u<i.length;++u)t()[o++>>0]=i.charCodeAt(u);t()[o>>0]=0,a+=i.length+1})),0}f
unction tt(e,t){if(v)return ze(19,1,e,t);var n=Ke();r()[e>>2]=n.length;var a=0;return
n.forEach((function(e){a+=e.length+1})),r()[t>>2]=a,0}function nt(e){return v?ze(20,1,e):0}function rt(e,n){return
v?ze(21,1,e,n):(e=1==e||2==e?2:ce(),t()[n>>0]=e,0)}function at(e,t,n,a){return
```

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v?ze(22,1,e,t,n,a):(e=xe.vc(e),t=xe.uc(e,t,n),r()[a>>2]=t,0)}function it(e,t,n,r,a){if(v)return
ze(23,1,e,t,n,r,a)}function ot(e,t,a,i){if(v)return ze(24,1,e,t,a,i);for(var o=0,u=0;u<a;u++){for(var
s=r()[t+8*u>>2],c=r()[t+(8*u+4)>>2],f=0;f<c;f++)Ee(e,n()[s+f]);o+=c}return r()[i>>2]=o,0}function ut(){function
e(e){return(e=e.toTimeString().match(/\\(([A-Za-z ]+)\\)$/))?e[1]:\"GMT\"}if(v)return
ze(25,1);if(!ut.Kb){ut.Kb=!0;var t=(new Date).getFullYear(),n=new Date(t,0,1),a=new
Date(t,6,1);t=n.getTimezoneOffset();var
i=a.getTimezoneOffset(),o=Math.max(t,i);r()[Ft()>>2]=60*o,r()[It()>>2]=Number(t!=i),n=e(n),a=e(a),n=X(n),a=X(
a),i<t?(r()[Rt()>>2]=n,r()[Rt()+4>>2]=a):(r()[Rt()>>2]=a,r()[Rt()+4>>2]=n)}}function st(e){return
0==e%4&&(0!=e%100||0==e%400)}function ct(e,t){for(var n=0,r=0;r<=t;n+=e[r++]);return n}var
ft=[31,29,31,30,31,30,31,31,30,31,30,31],lt=[31,28,31,30,31,30,31,31,30,31,30,31];function pt(e,t){for(e=new
Date(e.getTime());0<t;){var n=e.getMonth(),r=(st(e.getFullYear())?ft:lt)[n];if(!(t>r-
e.getDate())){e.setDate(e.getDate()+t);break}t-=r-
e.getDate()+1,e.setDate(1),11>n?e.setMonth(n+1):(e.setMonth(0),e.setFullYear(e.getFullYear()+1))}return
e}function dt(e,n,a,i){function o(e,t,n){for(e=\"number\"==typeof e?e.toString():e||\"\";e.length<t;)e=n[0]+e;return
e}function u(e,t){return o(e,t,\"0\")}function s(e,t){function n(e){return 0>e?-1:0<e?1:0}var r;return
0===(r=n(e.getFullYear()-t.getFullYear()))&&0===(r=n(e.getMonth()-t.getMonth()))&&(r=n(e.getDate()-
t.getDate())),r}function c(e){switch(e.getDay()){case 0:return new Date(e.getFullYear()-1,11,29);case 1:return
e;case 2:return new Date(e.getFullYear(),0,3);case 3:return new Date(e.getFullYear(),0,2);case 4:return new
Date(e.getFullYear(),0,1);case 5:return new Date(e.getFullYear()-1,11,31);case 6:return new Date(e.getFullYear()-
1,11,30)}}function f(e){e=pt(new Date(e.ab+1900,0,1),e.vb);var t=new Date(e.getFullYear()+1,0,4),n=c(new
Date(e.getFullYear(),0,4));return t=c(t),0>=s(n,e)?0>=s(t,e)?e.getFullYear()+1:e.getFullYear():e.getFullYear()-
1}var l=r()[i+40>>2];for(var p in
i={kc:r()[i>>2],jc:r()[i+4>>2],tb:r()[i+8>>2],nb:r()[i+12>>2],kb:r()[i+16>>2],ab:r()[i+20>>2],ub:r()[i+24>>2],vb:r(
)[i+28>>2],Ec:r()[i+32>>2],ic:r()[i+36>>2],lc:l?z(l):\"\"},a=z(a),l={\"%c\":\"%a %b %d %H:%M:%S
%Y\",\"%D\":\"%m/%d/%y\",\"%F\":\"%Y-%m-%d\",\"%h\":\"%b\",\"%r\":\"%I:%M:%S
%p\",\"%R\":\"%H:%M\",\"%T\":\"%H:%M:%S\",\"%x\":\"%m/%d/%y\",\"%X\":\"%H:%M:%S\",\"%Ec\":\"%c\",\
"%EC\":\"%C\",\"%Ex\":\"%m/%d/%y\",\"%EX\":\"%H:%M:%S\",\"%Ey\":\"%y\",\"%EY\":\"%Y\",\"%Od\":\"%d
\",\"%Oe\":\"%e\",\"%OH\":\"%H\",\"%OI\":\"%I\",\"%Om\":\"%m\",\"%OM\":\"%M\",\"%OS\":\"%S\",\"%Ou\":\"
%u\",\"%OU\":\"%U\",\"%OV\":\"%V\",\"%Ow\":\"%w\",\"%OW\":\"%W\",\"%Oy\":\"%y\"})a=a.replace(new
RegExp(p,\"g\"),l[p]);var d=\"Sunday Monday Tuesday Wednesday Thursday Friday Saturday\".split(\"
\"),m=\"January February March April May June July August September October November December\".split(\"
\");for(p in l={\"%a\":function(e){return d[e.ub].substring(0,3)},\"%A\":function(e){return
d[e.ub]},\"%b\":function(e){return m[e.kb].substring(0,3)},\"%B\":function(e){return
m[e.kb]},\"%C\":function(e){return u((e.ab+1900)/100|0,2)},\"%d\":function(e){return
u(e.nb,2)},\"%e\":function(e){return o(e.nb,2,\" \")},\"%g\":function(e){return
f(e).toString().substring(2)},\"%G\":function(e){return f(e)},\"%H\":function(e){return
u(e.tb,2)},\"%I\":function(e){return 0==(e=e.tb)?e=12:12<e&&(e-=12),u(e,2)},\"%j\":function(e){return
u(e.nb+ct(st(e.ab+1900)?ft:lt,e.kb-1),3)},\"%m\":function(e){return u(e.kb+1,2)},\"%M\":function(e){return
u(e.jc,2)},\"%n\":function(){return\"\\n\"},\"%p\":function(e){return
0<=e.tb&&12>e.tb?\"AM\":\"PM\"},\"%S\":function(e){return
u(e.kc,2)},\"%t\":function(){return\"\\t\"},\"%u\":function(e){return e.ub||7},\"%U\":function(e){var t=new
Date(e.ab+1900,0,1),n=0===t.getDay()?t:pt(t,7-t.getDay());return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(ct(st(e.getFullYear())?ft:lt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\"01\":\"00\"},\"%V\":function(e){var t=new Date(e.ab+1901,0,4),n=c(new
Date(e.ab+1900,0,4));t=c(t);var r=pt(new Date(e.ab+1900,0,1),e.vb);return
0>s(r,n)?\"53\":0>=s(t,r)?\"01\":u(Math.ceil((n.getFullYear()<e.ab+1900?e.vb+32-n.getDate():e.vb+1-
n.getDate())/7),2)},\"%w\":function(e){return e.ub},\"%W\":function(e){var t=new
Date(e.ab,0,1),n=1===t.getDay()?t:pt(t,0===t.getDay()?1:7-t.getDay()+1);return 0>s(n,e=new
```

```
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(ct(st(e.getFullYear())?ft:lt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\"01\":\"00\"},\"%y\":function(e){return(e.ab+1900).toString().substring(2)},\"%
Y\":function(e){return e.ab+1900},\"%z\":function(e){var t=0<=(e=e.ic);return e=Math.abs(e)/60,(t?\"+\":\"-
\")+String(\"0000\"+(e/60*100+e%60)).slice(-4)},\"%Z\":function(e){return
e.lc},\"%%\":function(){return\"%\"}})a.includes(p)&&(a=a.replace(new
RegExp(p,\"g\"),l[p](i)));return(p=function(e){var t=Array(V(e)+1);return
L(e,t,0,t.length),t}(a)).length>n?0:(function(e,n){t().set(e,n)}(p,e),p.length-1)}var
mt=[null,ye,Me,De,Se,Ce,Re,Ie,Fe,je,Ye,Pe,We,qe,Ue,Be,Ge,Qe,et,tt,nt,rt,at,it,ot,ut],bt={h:function(e,t,n,r){ce(\"As
sertion failed: \"+z(e)+\", at: \"+[t?z(t):\"unknown filename\",n,r?z(r):\"unknown
function\"])},M:function(e,t){return _e(e,t)},b:function(e){return ht(e+16)+16},d:function(e,t){return
ye(e,t)},e:function(e,t){ge.yb.push((function(){Z.get(e)(t)}))},c:function(e,t,n){throw new
we(e).Pb(t,n),e},Z:function(e,t,n,i){if(\"undefined\"==typeof SharedArrayBuffer)return M(\"Current environment
does not support SharedArrayBuffer, pthreads are not available!\"),6;if(!e)return M(\"pthread_create called with a
null thread pointer!\"),28;var o=[];if(v&&0===o.length)return Tt(687865856,e,t,n,i);var u=0,s=0;if(t&&-1!=t){var
c=r()[t>>2];c+=81920,u=r()[t+8>>2],s=0!==r()[t+12>>2]}else c=2097152;(t=0==u)?u=qt(16,c):F(0<(u-=c));for(var
f=ht(228),l=0;57>l;++l)a()[(f>>2)+l]=0;return
r()[e>>2]=f,r()[f+12>>2]=f,e=f+152,r()[e>>2]=e,n={hb:u,jb:c,wb:t,detached:s,ec:n,rb:f,ib:i,mc:o},v?(n.oc=\"spawn
Thread\",postMessage(n,o),0):ve(n)},X:function(e){throw
v?ge.Hb(e):(ge.Eb(),zt(e)),\"unwind\"},Y:function(e,t){return function(e,t){if(!e)return M(\"pthread_join attempted
on a null thread pointer!\"),71;if(v&&yt()==e)return M(\"PThread \"+e+\" is attempting to join to
itself!\"),16;if(!v&&At()==e)return M(\"Main thread \"+e+\" is attempting to join to
itself!\"),16;if(r()[e+12>>2]!==e)return M(\"pthread_join attempted on thread \"+e+\", which does not point to a
valid thread, or does not exist anymore!\"),71;if(Atomics.load(a(),e+64>>2))return M(\"Attempted to join thread
\"+e+\", which was already detached!\"),28;for(Te();;){var n=Atomics.load(a(),e+0>>2);if(1==n)return
n=Atomics.load(a(),e+4>>2),t&&(r()[t>>2]=n),Atomics.store(a(),e+64>>2,1),v?postMessage({cmd:\"cleanupThrea
d\",thread:e}):be(e),0;xt(),v||Ot(),Ae(e+0,n,v?100:1)}}(e,t)},L:Me,s:De,S:Se,V:Ce,u:function(){return
42},F:Re,Q:Ie,P:Fe,U:je,T:Ye,q:Pe,K:We,N:qe,v:Ue,O:Be,da:function(e,t){if(e==t)postMessage({cmd:\"processQu
euedMainThreadWork\"});else
if(v)postMessage({targetThread:e,cmd:\"processThreadQueue\"});else{if(!(e=(e=ge.cb[e])&&e.worker))return;e.po
stMessage({cmd:\"processThreadQueue\"})}return 1},f:Ge,w:_e,ga:function(e,t){return e-t},A:function(){ce(\"To
use dlopen, you need to use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},l:function(){ce(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},C:function(){ce(\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},z:function(){ce(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},ea:function(e,t,a){var
o;for(He.length=0,a>>=2;o=n()[t++];)(o=105>o)&&1&a&&a++,He.push(o?i()[a++>>1]:r()[a]),++a;return
pe[e].apply(null,He)},G:Te,n:function(){},k:Ae,j:me,W:function(){return
2147483648},i:he,D:function(e,t,r){n().copyWithin(e,t,t+r)},o:function(){return
w?require(\"os\").cpus().length:navigator.hardwareConcurrency},aa:function(e,t,n){Le.length=t,n>>=3;for(var
r=0;r<t;r++)Le[r]=i()[n+r];return(0>e?pe[-e-1]:mt[e]).apply(null,Le)},E:function(e){var
t=n().length;if((e>>>=0)<=t||2147483648<e)return!1;for(var r=1;4>=r;r*=2){var
a=t*(1+.2/r);a=Math.min(a,e+100663296),0<(a=Math.max(e,a))%65536&&(a+=65536-
a%65536);e:{try{S.grow(Math.min(2147483648,a)-Y.byteLength+65535>>>16),Q(S.buffer);var i=1;break
e}catch(e){}i=void 0}if(i)return!0}return!1},ba:function(e,t,n){return
Ve(e)?Xe(e,t,n):Qe(e,t,n)},x:function(){},$:function(e,t,n){return ne+=1,setTimeout((function(){--
ne,function(e){if(!I){try{e()}catch(e){if(e instanceof Gt)return;if(\"unwind\"!==e)throw e&&\"object\"==typeof
e&&e.stack&&M(\"exception thrown: \"+[e,e.stack]),e}if(!re())try{v?Mt(R):zt(R)}catch(e){if(!(e instanceof
```

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Gt))throw e}}}((function(){Z.get(e)(n)}))}),t)},ca:function(e,t){t>>=2;var n=r()[t+6];return
t={alpha:!!r()[t],depth:!!r()[t+1],stencil:!!r()[t+2],antialias:!!r()[t+3],premultipliedAlpha:!!r()[t+4],preserveDrawing
Buffer:!!r()[t+5],powerPreference:Ze[n],failIfMajorPerformanceCaveat:!!r()[t+7],Vb:r()[t+8],yc:r()[t+9],Bb:r()[t+10
],Mb:r()[t+11],Bc:r()[t+12],Cc:r()[t+13]},!(e=Ve(e))||t.Mb?0:function(e,t){e.Cb||(e.Cb=e.getContext,e.getContext=f
unction(t,n){return\"webgl\"==t==(n=e.Cb(t,n))instanceof WebGLRenderingContext?n:null});var
n=e.getContext(\"webgl\",t);return n?function(e,t){var n=ht(8);r()[n+4>>2]=yt();var
a={wc:n,attributes:t,version:t.Vb,ob:e};return e.canvas&&(e.canvas.pb=a),(void
0===t.Bb||t.Bb)&&function(e){if(e||(e=void 0),!e.Qb){e.Qb=!0;var t=e.ob;!function(e){var
t=e.getExtension(\"ANGLE_instanced_arrays\");t&&(e.vertexAttribDivisor=function(e,n){t.vertexAttribDivisorAN
GLE(e,n)},e.drawArraysInstanced=function(e,n,r,a){t.drawArraysInstancedANGLE(e,n,r,a)},e.drawElementsInstan
ced=function(e,n,r,a,i){t.drawElementsInstancedANGLE(e,n,r,a,i)}})}(t),function(e){var
t=e.getExtension(\"OES_vertex_array_object\");t&&(e.createVertexArray=function(){return
t.createVertexArrayOES()},e.deleteVertexArray=function(e){t.deleteVertexArrayOES(e)},e.bindVertexArray=funct
ion(e){t.bindVertexArrayOES(e)},e.isVertexArray=function(e){return t.isVertexArrayOES(e)}})}(t),function(e){var
t=e.getExtension(\"WEBGL_draw_buffers\");t&&(e.drawBuffers=function(e,n){t.drawBuffersWEBGL(e,n)})}(t),t.
qc=t.getExtension(\"EXT_disjoint_timer_query\"),t.zc=t.getExtension(\"WEBGL_multi_draw\"),(t.getSupportedExt
ensions()||[]).forEach((function(e){e.includes(\"lose_context\")||e.includes(\"debug\")||t.getExtension(e)}))}}(a),n}(n
,t):0}(e,t)},I:et,J:tt,m:nt,H:rt,t:at,B:it,p:ot,R:function(e){var t=Date.now();return
r()[e>>2]=t/1e3|0,r()[e+4>>2]=t%1e3*1e3|0,0},ha:function e(t,n){return t=new
Date(1e3*r()[t>>2]),r()[n>>2]=t.getUTCSeconds(),r()[n+4>>2]=t.getUTCMinutes(),r()[n+8>>2]=t.getUTCHours(),
r()[n+12>>2]=t.getUTCDate(),r()[n+16>>2]=t.getUTCMonth(),r()[n+20>>2]=t.getUTCFullYear()-
1900,r()[n+24>>2]=t.getUTCDay(),r()[n+36>>2]=0,r()[n+32>>2]=0,t=(t.getTime()-
Date.UTC(t.getUTCFullYear(),0,1,0,0,0,0))/864e5|0,r()[n+28>>2]=t,e.Ab||(e.Ab=X(\"GMT\")),r()[n+40>>2]=e.Ab,
n},_:function(){ge.Rb()},r:function(e,t){ut(),e=new
Date(1e3*r()[e>>2]),r()[t>>2]=e.getSeconds(),r()[t+4>>2]=e.getMinutes(),r()[t+8>>2]=e.getHours(),r()[t+12>>2]=e
.getDate(),r()[t+16>>2]=e.getMonth(),r()[t+20>>2]=e.getFullYear()-1900,r()[t+24>>2]=e.getDay();var n=new
Date(e.getFullYear(),0,1),a=(e.getTime()-n.getTime())/864e5|0;return r()[t+28>>2]=a,r()[t+36>>2]=-
60*e.getTimezoneOffset(),a=new
Date(e.getFullYear(),6,1).getTimezoneOffset(),e=0|(a!=(n=n.getTimezoneOffset())&&e.getTimezoneOffset()==Mat
h.min(n,a)),r()[t+32>>2]=e,e=r()[Rt()+(e?4:0)>>2],r()[t+40>>2]=e,t},a:S||o.wasmMemory,y:function(e){ut();var
t=new
Date(r()[e+20>>2]+1900,r()[e+16>>2],r()[e+12>>2],r()[e+8>>2],r()[e+4>>2],r()[e>>2],0),n=r()[e+32>>2],a=t.getT
imezoneOffset(),i=new Date(t.getFullYear(),0,1),o=new
Date(t.getFullYear(),6,1).getTimezoneOffset(),u=i.getTimezoneOffset(),s=Math.min(u,o);return
0>n?r()[e+32>>2]=Number(o!=u&&s==a):0<n!=(s==a)&&(o=Math.max(u,o),t.setTime(t.getTime()+6e4*((0<n?s:o
)-a))),r()[e+24>>2]=t.getDay(),n=(t.getTime()-
i.getTime())/864e5|0,r()[e+28>>2]=n,r()[e>>2]=t.getSeconds(),r()[e+4>>2]=t.getMinutes(),r()[e+8>>2]=t.getHours(
),r()[e+12>>2]=t.getDate(),r()[e+16>>2]=t.getMonth(),t.getTime()/1e3|0},fa:dt,g:function(e,t,n,r){return
dt(e,t,n,r)}};!function(){function
e(e,t){o.asm=e.exports,Z=o.asm.Ca,K.unshift(o.asm.ia),ge.zb.push(o.asm.Ha),C=t,v||(oe--
,o.monitorRunDependencies&&o.monitorRunDependencies(oe),0==oe&&(null!==ue&&(clearInterval(ue),ue=null)
,se&&(e=se,se=null,e())))}function t(t){e(t.instance,t.module)}function n(e){return
function(){if(!E&&(_||y)){if(\"function\"==typeof fetch&&!ie.startsWith(\"file://\"))return
fetch(ie,{credentials:\"same-origin\"}).then((function(e){if(!e.ok)throw\"failed to load wasm binary file at
'\"+ie+\"'\";return e.arrayBuffer()})).catch((function(){return le()}));if(m)return new
Promise((function(e,t){m(ie,(function(t){e(new Uint8Array(t))}),t)}))}return
Promise.resolve().then((function(){return le()}))}().then((function(e){return
WebAssembly.instantiate(e,r)})).then(e,(function(e){M(\"failed to asynchronously prepare wasm: \"+e),ce(e)}))}var
```

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r={a:bt};if(v||(oe++,o.monitorRunDependencies&&o.monitorRunDependencies(oe)),o.instantiateWasm)try{return
o.instantiateWasm(r,e)}catch(e){return M(\"Module.instantiateWasm callback failed with error:
\"+e),!1}(E||\"function\"!=typeof
WebAssembly.instantiateStreaming||fe()||ie.startsWith(\"file://\")||\"function\"!=typeof
fetch?n(t):fetch(ie,{credentials:\"same-origin\"}).then((function(e){return
WebAssembly.instantiateStreaming(e,r).then(t,(function(e){return M(\"wasm streaming compile failed:
\"+e),M(\"falling back to ArrayBuffer
instantiation\"),n(t)}))}))).catch(s)}(),o.___wasm_call_ctors=function(){return(o.___wasm_call_ctors=o.asm.ia).app
ly(null,arguments)},o._OrtInit=function(){return(o._OrtInit=o.asm.ja).apply(null,arguments)},o._OrtCreateSession
Options=function(){return(o._OrtCreateSessionOptions=o.asm.ka).apply(null,arguments)},o._OrtAddSessionConfig
Entry=function(){return(o._OrtAddSessionConfigEntry=o.asm.la).apply(null,arguments)},o._OrtReleaseSessionOpt
ions=function(){return(o._OrtReleaseSessionOptions=o.asm.ma).apply(null,arguments)},o._OrtCreateSession=funct
ion(){return(o._OrtCreateSession=o.asm.na).apply(null,arguments)},o._OrtReleaseSession=function(){return(o._Ort
ReleaseSession=o.asm.oa).apply(null,arguments)},o._OrtGetInputCount=function(){return(o._OrtGetInputCount=o.
asm.pa).apply(null,arguments)},o._OrtGetOutputCount=function(){return(o._OrtGetOutputCount=o.asm.qa).apply(
null,arguments)},o._OrtGetInputName=function(){return(o._OrtGetInputName=o.asm.ra).apply(null,arguments)},o.
_OrtGetOutputName=function(){return(o._OrtGetOutputName=o.asm.sa).apply(null,arguments)},o._OrtFree=funct
ion(){return(o._OrtFree=o.asm.ta).apply(null,arguments)},o._OrtCreateTensor=function(){return(o._OrtCreateTens
or=o.asm.ua).apply(null,arguments)},o._OrtGetTensorData=function(){return(o._OrtGetTensorData=o.asm.va).appl
y(null,arguments)},o._OrtReleaseTensor=function(){return(o._OrtReleaseTensor=o.asm.wa).apply(null,arguments)
},o._OrtCreateRunOptions=function(){return(o._OrtCreateRunOptions=o.asm.xa).apply(null,arguments)},o._OrtAd
dRunConfigEntry=function(){return(o._OrtAddRunConfigEntry=o.asm.ya).apply(null,arguments)},o._OrtReleaseR
unOptions=function(){return(o._OrtReleaseRunOptions=o.asm.za).apply(null,arguments)},o._OrtRun=function(){re
turn(o._OrtRun=o.asm.Aa).apply(null,arguments)},o._OrtEndProfiling=function(){return(o._OrtEndProfiling=o.as
m.Ba).apply(null,arguments)};var
ht=o._malloc=function(){return(ht=o._malloc=o.asm.Da).apply(null,arguments)},gt=o.___errno_location=function(
){return(gt=o.___errno_location=o.asm.Ea).apply(null,arguments)},_t=o._free=function(){return(_t=o._free=o.asm.
Fa).apply(null,arguments)},yt=o._pthread_self=function(){return(yt=o._pthread_self=o.asm.Ga).apply(null,argumen
ts)};o._emscripten_tls_init=function(){return(o._emscripten_tls_init=o.asm.Ha).apply(null,arguments)},o._emscript
en_current_thread_process_queued_calls=function(){return(o._emscripten_current_thread_process_queued_calls=o.
asm.Ia).apply(null,arguments)};var
wt,vt=o._emscripten_register_main_browser_thread_id=function(){return(vt=o._emscripten_register_main_browser
_thread_id=o.asm.Ja).apply(null,arguments)},At=o._emscripten_main_browser_thread_id=function(){return(At=o._
emscripten_main_browser_thread_id=o.asm.Ka).apply(null,arguments)},Tt=o._emscripten_sync_run_in_main_thre
ad_4=function(){return(Tt=o._emscripten_sync_run_in_main_thread_4=o.asm.La).apply(null,arguments)},Ot=o._e
mscripten_main_thread_process_queued_calls=function(){return(Ot=o._emscripten_main_thread_process_queued_
calls=o.asm.Ma).apply(null,arguments)},kt=o._emscripten_run_in_main_runtime_thread_js=function(){return(kt=o.
_emscripten_run_in_main_runtime_thread_js=o.asm.Na).apply(null,arguments)},Et=o.__emscripten_call_on_threa
d=function(){return(Et=o.__emscripten_call_on_thread=o.asm.Oa).apply(null,arguments)},xt=o._pthread_testcance
l=function(){return(xt=o._pthread_testcancel=o.asm.Pa).apply(null,arguments)},Mt=o._pthread_exit=function(){ret
urn(Mt=o._pthread_exit=o.asm.Qa).apply(null,arguments)},Dt=o.__emscripten_thread_init=function(){return(Dt=o.
__emscripten_thread_init=o.asm.Ra).apply(null,arguments)},St=o._emscripten_get_global_libc=function(){return(S
t=o._emscripten_get_global_libc=o.asm.Sa).apply(null,arguments)},Ct=o.___pthread_tsd_run_dtors=function(){ret
urn(Ct=o.___pthread_tsd_run_dtors=o.asm.Ta).apply(null,arguments)},Rt=o.__get_tzname=function(){return(Rt=o.
__get_tzname=o.asm.Ua).apply(null,arguments)},It=o.__get_daylight=function(){return(It=o.__get_daylight=o.asm
.Va).apply(null,arguments)},Ft=o.__get_timezone=function(){return(Ft=o.__get_timezone=o.asm.Wa).apply(null,ar
guments)},jt=o.stackSave=function(){return(jt=o.stackSave=o.asm.Xa).apply(null,arguments)},Yt=o.stackRestore=f
unction(){return(Yt=o.stackRestore=o.asm.Ya).apply(null,arguments)},Pt=o.stackAlloc=function(){return(Pt=o.stac
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kAlloc=o.asm.Za).apply(null,arguments)},Wt=o._emscripten_stack_set_limits=function(){return(Wt=o._emscripten
_stack_set_limits=o.asm._a).apply(null,arguments)},qt=o._memalign=function(){return(qt=o._memalign=o.asm.$a)
.apply(null,arguments)},Ut=o.__emscripten_allow_main_runtime_queued_calls=973296,Bt=o.__emscripten_main_
thread_futex=977204;function Gt(e){this.name=\"ExitStatus\",this.message=\"Program terminated with
exit(\"+e+\")\",this.status=e}function Ht(){function
e(){if(!wt&&(wt=!0,o.calledRun=!0,!I)&&(v||de(K),u(o),o.onRuntimeInitialized&&o.onRuntimeInitialized(),!v)){if
(o.postRun)for(\"function\"==typeof o.postRun&&(o.postRun=[o.postRun]);o.postRun.length;){var
e=o.postRun.shift();te.unshift(e)}de(te)}}if(!(0<oe))if(v)u(o),v||de(K),postMessage({cmd:\"loaded\"});else{if(!v){if
(o.preRun)for(\"function\"==typeof
o.preRun&&(o.preRun=[o.preRun]);o.preRun.length;)ae();de($)}0<oe||(o.setStatus?(o.setStatus(\"Running...\"),setT
imeout((function(){setTimeout((function(){o.setStatus(\"\")}),1),e()}),1)):e())}}function zt(e){if(R=e,v)throw
postMessage({cmd:\"exitProcess\",returnCode:e}),new Gt(e);re()||(ge.Gb(),v||(de(ee),\"undefined\"!=typeof
_fflush&&_fflush(0),ke[1].length&&Ee(1,10),ke[2].length&&Ee(2,10))),R=e,re()||(ge.Gb(),o.onExit&&o.onExit(e),
I=!0),p(e,new
Gt(e))}if(o.UTF8ToString=z,o.stringToUTF8=N,o.lengthBytesUTF8=V,o.keepRuntimeAlive=re,o.PThread=ge,o.st
ackSave=jt,o.stackRestore=Yt,o.stackAlloc=Pt,o.PThread=ge,o.wasmMemory=S,o.ExitStatus=Gt,se=function
e(){wt||Ht(),wt||(se=e)},o.run=Ht,o.preInit)for(\"function\"==typeof
o.preInit&&(o.preInit=[o.preInit]);0<o.preInit.length;)o.preInit.pop()();return
v&&(D=!1,ge.Sb()),Ht(),e.ready});\"object\"==typeof exports&&\"object\"==typeof
module?module.exports=e:\"function\"==typeof define&&define.amd?define([],(function(){return
e})):\"object\"==typeof exports&&(exports.ortWasmThreaded=e);\n","\r\nvar ortWasm = (function() {\r\n  var
_scriptDir = typeof document !== 'undefined' && document.currentScript ? document.currentScript.src :
undefined;\r\n  if (typeof __filename !== 'undefined') _scriptDir = _scriptDir || __filename;\r\n  return
(\r\nfunction(ortWasm) {\r\n  ortWasm = ortWasm || {};\r\n\r\n\r\nvar c;c||(c=typeof ortWasm !== 'undefined' ?
ortWasm : {});var aa,g;c.ready=new Promise(function(a,b){aa=a;g=b});var r={},t;for(t in
c)c.hasOwnProperty(t)&&(r[t]=c[t]);var v=\"./this.program\",ba=\"object\"===typeof
window,w=\"function\"===typeof importScripts,ca=\"object\"===typeof process&&\"object\"===typeof
process.versions&&\"string\"===typeof
process.versions.node,x=\"\",y,z,B,C,D;\r\nif(ca)x=w?require(\"path\").dirname(x)+\"/\":__dirname+\"/\",y=function
(a,b){C||(C=require(\"fs\"));D||(D=require(\"path\"));a=D.normalize(a);return
C.readFileSync(a,b?null:\"utf8\")},B=function(a){a=y(a,!0);a.buffer||(a=new Uint8Array(a));a.buffer||E(\"Assertion
failed: undefined\");return
a},z=function(a,b,e){C||(C=require(\"fs\"));D||(D=require(\"path\"));a=D.normalize(a);C.readFile(a,function(f,h){f?e
(f):b(h.buffer)})},1<process.argv.length&&(v=process.argv[1].replace(/\\\\/g,\"/\")),process.argv.slice(2),process.on(
\"uncaughtException\",\r\nfunction(a){throw
a;}),process.on(\"unhandledRejection\",E),c.inspect=function(){return\"[Emscripten Module object]\"};else
if(ba||w)w?x=self.location.href:\"undefined\"!==typeof
document&&document.currentScript&&(x=document.currentScript.src),_scriptDir&&(x=_scriptDir),0!==x.indexO
f(\"blob:\")?x=x.substr(0,x.lastIndexOf(\"/\")+1):x=\"\",y=function(a){var b=new
XMLHttpRequest;b.open(\"GET\",a,!1);b.send(null);return b.responseText},w&&(B=function(a){var b=new
XMLHttpRequest;b.open(\"GET\",a,!1);b.responseType=\"arraybuffer\";\r\nb.send(null);return new
Uint8Array(b.response)}),z=function(a,b,e){var f=new
XMLHttpRequest;f.open(\"GET\",a,!0);f.responseType=\"arraybuffer\";f.onload=function(){200==f.status||0==f.stat
us&&f.response?b(f.response):e()};f.onerror=e;f.send(null)};var
da=c.print||console.log.bind(console),F=c.printErr||console.warn.bind(console);for(t in
r)r.hasOwnProperty(t)&&(c[t]=r[t]);r=null;c.thisProgram&&(v=c.thisProgram);var
H;c.wasmBinary&&(H=c.wasmBinary);var noExitRuntime=c.noExitRuntime||!1;\r\n\"object\"!==typeof
WebAssembly&&E(\"no native wasm support detected\");var I,ea=!1,fa=\"undefined\"!==typeof TextDecoder?new
```

```
TextDecoder(\"utf8\"):void 0;\r\nfunction ha(a,b,e){var f=b+e;for(e=b;a[e]&&!(e>=f);)++e;if(16<e-
b&&a.subarray&&fa)return fa.decode(a.subarray(b,e));for(f=\"\";b<e;){var h=a[b++];if(h&128){var
k=a[b++]&63;if(192==(h&224))f+=String.fromCharCode((h&31)<<6|k);else{var
l=a[b++]&63;h=224==(h&240)?(h&15)<<12|k<<6|l:(h&7)<<18|k<<12|l<<6|a[b++]&63;65536>h?f+=String.fromC
harCode(h):(h-=65536,f+=String.fromCharCode(55296|h>>10,56320|h&1023))}}else
f+=String.fromCharCode(h)}return f}function J(a,b){return a?ha(K,a,b):\"\"}\r\nfunction L(a,b,e,f){if(!(0<f))return
0;var h=e;f=e+f-1;for(var k=0;k<a.length;++k){var l=a.charCodeAt(k);if(55296<=l&&57343>=l){var
q=a.charCodeAt(++k);l=65536+((l&1023)<<10)|q&1023}if(127>=l){if(e>=f)break;b[e++]=l}else{if(2047>=l){if(e
+1>=f)break;b[e++]=192|l>>6}else{if(65535>=l){if(e+2>=f)break;b[e++]=224|l>>12}else{if(e+3>=f)break;b[e++]
=240|l>>18;b[e++]=128|l>>12&63}b[e++]=128|l>>6&63}b[e++]=128|l&63}}b[e]=0;return e-h}\r\nfunction
ia(a){for(var b=0,e=0;e<a.length;++e){var
f=a.charCodeAt(e);55296<=f&&57343>=f&&(f=65536+((f&1023)<<10)|a.charCodeAt(++e)&1023);127>=f?++b:
b=2047>=f?b+2:65535>=f?b+3:b+4}return b}function ja(a){var b=ia(a)+1,e=ka(b);e&&L(a,M,e,b);return e}var
la,M,K,N;\r\nfunction ma(){var a=I.buffer;la=a;c.HEAP8=M=new Int8Array(a);c.HEAP16=new
Int16Array(a);c.HEAP32=N=new Int32Array(a);c.HEAPU8=K=new Uint8Array(a);c.HEAPU16=new
Uint16Array(a);c.HEAPU32=new Uint32Array(a);c.HEAPF32=new Float32Array(a);c.HEAPF64=new
Float64Array(a)}var na,oa=[],pa=[],qa=[],ra=[];function sa(){var a=c.preRun.shift();oa.unshift(a)}var
O=0,ta=null,P=null;c.preloadedImages={};c.preloadedAudios={};\r\nfunction
E(a){if(c.onAbort)c.onAbort(a);F(a);ea=!0;a=new WebAssembly.RuntimeError(\"abort(\"+a+\"). Build with -s
ASSERTIONS=1 for more info.\");g(a);throw a;}function ua(){return Q.startsWith(\"data:application/octet-
stream;base64,\")}var Q;Q=\"ort-wasm.wasm\";if(!ua()){var va=Q;Q=c.locateFile?c.locateFile(va,x):x+va}function
wa(){var a=Q;try{if(a==Q&&H)return new Uint8Array(H);if(B)return B(a);throw\"both async and sync fetching of
the wasm failed\";}catch(b){E(b)}}\r\nfunction xa(){if(!H&&(ba||w)){if(\"function\"===typeof
fetch&&!Q.startsWith(\"file://\"))return fetch(Q,{credentials:\"same-
origin\"}).then(function(a){if(!a.ok)throw\"failed to load wasm binary file at '\"+Q+\"'\";return
a.arrayBuffer()}).catch(function(){return wa()});if(z)return new Promise(function(a,b){z(Q,function(e){a(new
Uint8Array(e))},b)})}return Promise.resolve().then(function(){return wa()})}\r\nfunction
ya(a){for(;0<a.length;){var b=a.shift();if(\"function\"==typeof b)b(c);else{var e=b.Ea;\"number\"===typeof e?void
0===b.xa?na.get(e)():na.get(e)(b.xa):e(void 0===b.xa?null:b.xa)}}}function za(a){this.ya=a-
16;this.Na=function(b){N[this.ya+4>>2]=b};this.Ka=function(b){N[this.ya+8>>2]=b};this.La=function(){N[this.ya
>>2]=0};this.Ja=function(){M[this.ya+12>>0]=0};this.Ma=function(){M[this.ya+13>>0]=0};this.Ga=function(b,e)
{this.Na(b);this.Ka(e);this.La();this.Ja();this.Ma()}}\r\nvar Aa=0,Ba={},Ca=[null,[],[]],R={},S;S=ca?function(){var
a=process.hrtime();return 1E3*a[0]+a[1]/1E6}:function(){return performance.now()};var Da={};function
Ea(){if(!Fa){var
a={USER:\"web_user\",LOGNAME:\"web_user\",PATH:\"/\",PWD:\"/\",HOME:\"/home/web_user\",LANG:(\"obj
ect\"===typeof navigator&&navigator.languages&&navigator.languages[0]||\"C\").replace(\"-\",\"_\")+\".UTF-
8\",_:v||\"./this.program\"},b;for(b in Da)void 0===Da[b]?delete a[b]:a[b]=Da[b];var e=[];for(b in
a)e.push(b+\"=\"+a[b]);Fa=e}return Fa}var Fa;\r\nfunction T(a,b){a=new
Date(1E3*N[a>>2]);N[b>>2]=a.getUTCSeconds();N[b+4>>2]=a.getUTCMinutes();N[b+8>>2]=a.getUTCHours();
N[b+12>>2]=a.getUTCDate();N[b+16>>2]=a.getUTCMonth();N[b+20>>2]=a.getUTCFullYear()-
1900;N[b+24>>2]=a.getUTCDay();N[b+36>>2]=0;N[b+32>>2]=0;N[b+28>>2]=(a.getTime()-
Date.UTC(a.getUTCFullYear(),0,1,0,0,0,0))/864E5|0;T.Da||(T.Da=ja(\"GMT\"));N[b+40>>2]=T.Da;return
b}\r\nfunction Ga(){function a(l){return(l=l.toTimeString().match(/\\(([A-Za-z
]+)\\)$/))?l[1]:\"GMT\"}if(!Ka){Ka=!0;var b=(new Date).getFullYear(),e=new Date(b,0,1),f=new
Date(b,6,1);b=e.getTimezoneOffset();var
h=f.getTimezoneOffset(),k=Math.max(b,h);N[La()>>2]=60*k;N[Ma()>>2]=Number(b!=h);e=a(e);f=a(f);e=ja(e);f=j
a(f);h<b?(N[U()>>2]=e,N[U()+4>>2]=f):(N[U()>>2]=f,N[U()+4>>2]=e)}}var Ka;function V(a){return
0===a%4&&(0!==a%100||0===a%400)}function Na(a,b){for(var e=0,f=0;f<=b;e+=a[f++]);return e}\r\nvar
```

```
W=[31,29,31,30,31,30,31,31,30,31,30,31],X=[31,28,31,30,31,30,31,31,30,31,30,31];function Y(a,b){for(a=new
Date(a.getTime());0<b;){var e=a.getMonth(),f=(V(a.getFullYear())?W:X)[e];if(b>f-a.getDate())b-=f-
a.getDate()+1,a.setDate(1),11>e?a.setMonth(e+1):(a.setMonth(0),a.setFullYear(a.getFullYear()+1));else{a.setDate(
a.getDate()+b);break}}return a}\r\nfunction Oa(a,b,e,f){function h(d,m,n){for(d=\"number\"===typeof
d?d.toString():d||\"\";d.length<m;)d=n[0]+d;return d}function k(d,m){return h(d,m,\"0\")}function l(d,m){function
n(Ha){return 0>Ha?-1:0<Ha?1:0}var A;0===(A=n(d.getFullYear()-m.getFullYear()))&&0===(A=n(d.getMonth()-
m.getMonth()))&&(A=n(d.getDate()-m.getDate()));return A}function q(d){switch(d.getDay()){case 0:return new
Date(d.getFullYear()-1,11,29);case 1:return d;case 2:return new Date(d.getFullYear(),0,3);case 3:return new
Date(d.getFullYear(),\r\n0,2);case 4:return new Date(d.getFullYear(),0,1);case 5:return new Date(d.getFullYear()-
1,11,31);case 6:return new Date(d.getFullYear()-1,11,30)}}function G(d){d=Y(new Date(d.va+1900,0,1),d.Ca);var
m=new Date(d.getFullYear()+1,0,4),n=q(new Date(d.getFullYear(),0,4));m=q(m);return
0>=l(n,d)?0>=l(m,d)?d.getFullYear()+1:d.getFullYear():d.getFullYear()-1}var
u=N[f+40>>2];f={Qa:N[f>>2],Pa:N[f+4>>2],Aa:N[f+8>>2],za:N[f+12>>2],wa:N[f+16>>2],va:N[f+20>>2],Ba:N[
f+24>>2],Ca:N[f+28>>2],Ya:N[f+32>>2],Oa:N[f+\r\n36>>2],Ra:u?J(u):\"\"};e=J(e);u={\"%c\":\"%a %b %d
%H:%M:%S %Y\",\"%D\":\"%m/%d/%y\",\"%F\":\"%Y-%m-%d\",\"%h\":\"%b\",\"%r\":\"%I:%M:%S
%p\",\"%R\":\"%H:%M\",\"%T\":\"%H:%M:%S\",\"%x\":\"%m/%d/%y\",\"%X\":\"%H:%M:%S\",\"%Ec\":\"%c\",\
"%EC\":\"%C\",\"%Ex\":\"%m/%d/%y\",\"%EX\":\"%H:%M:%S\",\"%Ey\":\"%y\",\"%EY\":\"%Y\",\"%Od\":\"%d
\",\"%Oe\":\"%e\",\"%OH\":\"%H\",\"%OI\":\"%I\",\"%Om\":\"%m\",\"%OM\":\"%M\",\"%OS\":\"%S\",\"%Ou\":\"
%u\",\"%OU\":\"%U\",\"%OV\":\"%V\",\"%Ow\":\"%w\",\"%OW\":\"%W\",\"%Oy\":\"%y\"};for(var p in
u)e=e.replace(new RegExp(p,\"g\"),u[p]);var Ia=\"Sunday Monday Tuesday Wednesday Thursday Friday
Saturday\".split(\" \"),\r\nJa=\"January February March April May June July August September October November
December\".split(\" \");u={\"%a\":function(d){return Ia[d.Ba].substring(0,3)},\"%A\":function(d){return
Ia[d.Ba]},\"%b\":function(d){return Ja[d.wa].substring(0,3)},\"%B\":function(d){return
Ja[d.wa]},\"%C\":function(d){return k((d.va+1900)/100|0,2)},\"%d\":function(d){return
k(d.za,2)},\"%e\":function(d){return h(d.za,2,\" \")},\"%g\":function(d){return
G(d).toString().substring(2)},\"%G\":function(d){return G(d)},\"%H\":function(d){return
k(d.Aa,\r\n2)},\"%I\":function(d){d=d.Aa;0==d?d=12:12<d&&(d-=12);return k(d,2)},\"%j\":function(d){return
k(d.za+Na(V(d.va+1900)?W:X,d.wa-1),3)},\"%m\":function(d){return k(d.wa+1,2)},\"%M\":function(d){return
k(d.Pa,2)},\"%n\":function(){return\"\\n\"},\"%p\":function(d){return
0<=d.Aa&&12>d.Aa?\"AM\":\"PM\"},\"%S\":function(d){return
k(d.Qa,2)},\"%t\":function(){return\"\\t\"},\"%u\":function(d){return d.Ba||7},\"%U\":function(d){var m=new
Date(d.va+1900,0,1),n=0===m.getDay()?m:Y(m,7-m.getDay());d=new Date(d.va+1900,d.wa,d.za);return
0>\r\nl(n,d)?k(Math.ceil((31-n.getDate()+(Na(V(d.getFullYear())?W:X,d.getMonth()-1)-
31)+d.getDate())/7),2):0===l(n,m)?\"01\":\"00\"},\"%V\":function(d){var m=new Date(d.va+1901,0,4),n=q(new
Date(d.va+1900,0,4));m=q(m);var A=Y(new Date(d.va+1900,0,1),d.Ca);return
0>l(A,n)?\"53\":0>=l(m,A)?\"01\":k(Math.ceil((n.getFullYear()<d.va+1900?d.Ca+32-n.getDate():d.Ca+1-
n.getDate())/7),2)},\"%w\":function(d){return d.Ba},\"%W\":function(d){var m=new
Date(d.va,0,1),n=1===m.getDay()?m:Y(m,0===m.getDay()?1:7-m.getDay()+1);d=new
Date(d.va+\r\n1900,d.wa,d.za);return 0>l(n,d)?k(Math.ceil((31-
n.getDate()+(Na(V(d.getFullYear())?W:X,d.getMonth()-1)-
31)+d.getDate())/7),2):0===l(n,m)?\"01\":\"00\"},\"%y\":function(d){return(d.va+1900).toString().substring(2)},\"
%Y\":function(d){return d.va+1900},\"%z\":function(d){d=d.Oa;var m=0<=d;d=Math.abs(d)/60;return(m?\"+\":\"-
\")+String(\"0000\"+(d/60*100+d%60)).slice(-4)},\"%Z\":function(d){return
d.Ra},\"%%\":function(){return\"%\"}};for(p in u)e.includes(p)&&(e=e.replace(new
RegExp(p,\"g\"),u[p](f)));p=Pa(e);if(p.length>b)return 0;\r\nM.set(p,a);return p.length-1}function Pa(a){var
b=Array(ia(a)+1);L(a,b,0,b.length);return b}\r\nvar Ta={a:function(a){return
ka(a+16)+16},c:function(a,b){qa.unshift({Ea:a,xa:b})},d:function(a,b){qa.unshift({Ea:a,xa:b})},b:function(a,b,e){(
new za(a)).Ga(b,e);Aa++;throw a;},D:function(a,b){a=J(a);return R.Sa(a,b)},m:function(){return
```

```
0},I:function(){},L:function(){},o:function(){return 42},x:function(){return
0},H:function(){},G:function(a,b){a=J(a);return
R.Ta(a,b)},K:function(a,b,e,f,h,k){k<<=12;if(0!==(f&16)&&0!==a%65536)b=-28;else
if(0!==(f&32)){a=65536*Math.ceil(b/65536);var
l=Qa(65536,a);\r\nl?(K.fill(0,l,l+a),a=l):a=0;a?(Ba[a]={Ia:a,Ha:b,Fa:!0,fd:h,Xa:e,flags:f,offset:k},b=a):b=-48}else
b=-52;return b},J:function(a,b){var e=Ba[a];0!==b&&e?(b===e.Ha&&(Ba[a]=null,e.Fa&&Ra(e.Ia)),a=0):a=-
28;return a},j:function(){},C:function(a,b,e){a=J(a);return
R.Ua(a,b,e)},E:function(){},r:function(){},F:function(){},h:function(){E()},p:function(a,b){if(0===a)a=Date.now();
else if(1===a||4===a)a=S();else return N[Sa()>>2]=28,-1;N[b>>2]=a/1E3|0;N[b+4>>2]=a%1E3*1E6|0;return
0},s:function(a,b){return a-\r\nb},P:function(){E(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},g:function(){E(\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},Q:function(){E(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},O:function(){E(\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},\r\nM:function(){return
2147483648},v:function(a,b,e){K.copyWithin(a,b,b+e)},i:function(a){var
b=K.length;a>>>=0;if(2147483648<a)return!1;for(var e=1;4>=e;e*=2){var
f=b*(1+.2/e);f=Math.min(f,a+100663296);f=Math.max(a,f);0<f%65536&&(f+=65536-
f%65536);a:{try{I.grow(Math.min(2147483648,f)-la.byteLength+65535>>>16);ma();var h=1;break
a}catch(k){}h=void 0}if(h)return!0}return!1},B:function(a){for(var b=S();S()-b<a;);},z:function(a,b){var
e=0;Ea().forEach(function(f,h){var
k=b+e;h=N[a+4*h>>2]=k;for(k=0;k<f.length;++k)M[h++>>\r\n0]=f.charCodeAt(k);M[h>>0]=0;e+=f.length+1});re
turn 0},A:function(a,b){var e=Ea();N[a>>2]=e.length;var
f=0;e.forEach(function(h){f+=h.length+1});N[b>>2]=f;return 0},f:function(){return
0},y:function(a,b){a=1==a||2==a?2:E();M[b>>0]=a;return
0},n:function(a,b,e,f){a=R.Wa(a);b=R.Va(a,b,e);N[f>>2]=b;return 0},u:function(){},q:function(a,b,e,f){for(var
h=0,k=0;k<e;k++){for(var l=N[b+8*k>>2],q=N[b+(8*k+4)>>2],G=0;G<q;G++){var
u=K[l+G],p=Ca[a];0===u||10===u?((1===a?da:F)(ha(p,0)),p.length=0):p.push(u)}h+=\r\nq}N[f>>2]=h;return
0},w:function(a){var b=Date.now();N[a>>2]=b/1E3|0;N[a+4>>2]=b%1E3*1E3|0;return
0},t:T,l:function(a,b){Ga();a=new
Date(1E3*N[a>>2]);N[b>>2]=a.getSeconds();N[b+4>>2]=a.getMinutes();N[b+8>>2]=a.getHours();N[b+12>>2]=a.
getDate();N[b+16>>2]=a.getMonth();N[b+20>>2]=a.getFullYear()-1900;N[b+24>>2]=a.getDay();var e=new
Date(a.getFullYear(),0,1);N[b+28>>2]=(a.getTime()-e.getTime())/864E5|0;N[b+36>>2]=-
(60*a.getTimezoneOffset());var f=(new
Date(a.getFullYear(),6,1)).getTimezoneOffset();e=\r\ne.getTimezoneOffset();a=(f!=e&&a.getTimezoneOffset()==
Math.min(e,f))|0;N[b+32>>2]=a;a=N[U()+(a?4:0)>>2];N[b+40>>2]=a;return b},k:function(a){Ga();var b=new
Date(N[a+20>>2]+1900,N[a+16>>2],N[a+12>>2],N[a+8>>2],N[a+4>>2],N[a>>2],0),e=N[a+32>>2],f=b.getTimez
oneOffset(),h=new Date(b.getFullYear(),0,1),k=(new
Date(b.getFullYear(),6,1)).getTimezoneOffset(),l=h.getTimezoneOffset(),q=Math.min(l,k);0>e?N[a+32>>2]=Numb
er(k!=l&&q==f):0<e!=(q==f)&&(k=Math.max(l,k),b.setTime(b.getTime()+6E4*((0<e?q:k)-
f)));N[a+\r\n24>>2]=b.getDay();N[a+28>>2]=(b.getTime()-
h.getTime())/864E5|0;N[a>>2]=b.getSeconds();N[a+4>>2]=b.getMinutes();N[a+8>>2]=b.getHours();N[a+12>>2]=
b.getDate();N[a+16>>2]=b.getMonth();return b.getTime()/1E3|0},N:Oa,e:function(a,b,e,f){return
Oa(a,b,e,f)}};\r\n(function(){function a(h){c.asm=h.exports;I=c.asm.R;ma();na=c.asm.ua;pa.unshift(c.asm.S);O--
;c.monitorRunDependencies&&c.monitorRunDependencies(O);0==O&&(null!==ta&&(clearInterval(ta),ta=null),P
&&(h=P,P=null,h()))}function b(h){a(h.instance)}function e(h){return xa().then(function(k){return
WebAssembly.instantiate(k,f)}).then(h,function(k){F(\"failed to asynchronously prepare wasm: \"+k);E(k)})}var
```

```
f={a:Ta};O++;c.monitorRunDependencies&&c.monitorRunDependencies(O);if(c.instantiateWasm)try{return
c.instantiateWasm(f,\r\na)}catch(h){return F(\"Module.instantiateWasm callback failed with error:
\"+h),!1}(function(){return H||\"function\"!==typeof
WebAssembly.instantiateStreaming||ua()||Q.startsWith(\"file://\")||\"function\"!==typeof
fetch?e(b):fetch(Q,{credentials:\"same-origin\"}).then(function(h){return
WebAssembly.instantiateStreaming(h,f).then(b,function(k){F(\"wasm streaming compile failed: \"+k);F(\"falling
back to ArrayBuffer instantiation\");return
e(b)})})})().catch(g);return{}})();\r\nc.___wasm_call_ctors=function(){return(c.___wasm_call_ctors=c.asm.S).appl
y(null,arguments)};c._OrtInit=function(){return(c._OrtInit=c.asm.T).apply(null,arguments)};c._OrtCreateSessionO
ptions=function(){return(c._OrtCreateSessionOptions=c.asm.U).apply(null,arguments)};c._OrtAddSessionConfigE
ntry=function(){return(c._OrtAddSessionConfigEntry=c.asm.V).apply(null,arguments)};c._OrtReleaseSessionOptio
ns=function(){return(c._OrtReleaseSessionOptions=c.asm.W).apply(null,arguments)};\r\nc._OrtCreateSession=func
tion(){return(c._OrtCreateSession=c.asm.X).apply(null,arguments)};c._OrtReleaseSession=function(){return(c._Ort
ReleaseSession=c.asm.Y).apply(null,arguments)};c._OrtGetInputCount=function(){return(c._OrtGetInputCount=c.a
sm.Z).apply(null,arguments)};c._OrtGetOutputCount=function(){return(c._OrtGetOutputCount=c.asm._).apply(null
,arguments)};c._OrtGetInputName=function(){return(c._OrtGetInputName=c.asm.$).apply(null,arguments)};\r\nc._
OrtGetOutputName=function(){return(c._OrtGetOutputName=c.asm.aa).apply(null,arguments)};c._OrtFree=functio
n(){return(c._OrtFree=c.asm.ba).apply(null,arguments)};c._OrtCreateTensor=function(){return(c._OrtCreateTensor
=c.asm.ca).apply(null,arguments)};c._OrtGetTensorData=function(){return(c._OrtGetTensorData=c.asm.da).apply(
null,arguments)};c._OrtReleaseTensor=function(){return(c._OrtReleaseTensor=c.asm.ea).apply(null,arguments)};\r\
nc._OrtCreateRunOptions=function(){return(c._OrtCreateRunOptions=c.asm.fa).apply(null,arguments)};c._OrtAdd
RunConfigEntry=function(){return(c._OrtAddRunConfigEntry=c.asm.ga).apply(null,arguments)};c._OrtReleaseRu
nOptions=function(){return(c._OrtReleaseRunOptions=c.asm.ha).apply(null,arguments)};c._OrtRun=function(){ret
urn(c._OrtRun=c.asm.ia).apply(null,arguments)};c._OrtEndProfiling=function(){return(c._OrtEndProfiling=c.asm.j
a).apply(null,arguments)};\r\nvar
ka=c._malloc=function(){return(ka=c._malloc=c.asm.ka).apply(null,arguments)},Sa=c.___errno_location=function(
){return(Sa=c.___errno_location=c.asm.la).apply(null,arguments)},Ra=c._free=function(){return(Ra=c._free=c.asm
.ma).apply(null,arguments)},U=c.__get_tzname=function(){return(U=c.__get_tzname=c.asm.na).apply(null,argume
nts)},Ma=c.__get_daylight=function(){return(Ma=c.__get_daylight=c.asm.oa).apply(null,arguments)},La=c.__get_t
imezone=function(){return(La=c.__get_timezone=c.asm.pa).apply(null,\r\narguments)},Ua=c.stackSave=function()
{return(Ua=c.stackSave=c.asm.qa).apply(null,arguments)},Va=c.stackRestore=function(){return(Va=c.stackRestore
=c.asm.ra).apply(null,arguments)},Wa=c.stackAlloc=function(){return(Wa=c.stackAlloc=c.asm.sa).apply(null,argu
ments)},Qa=c._memalign=function(){return(Qa=c._memalign=c.asm.ta).apply(null,arguments)};c.UTF8ToString=J
;c.stringToUTF8=function(a,b,e){return
L(a,K,b,e)};c.lengthBytesUTF8=ia;c.stackSave=Ua;c.stackRestore=Va;c.stackAlloc=Wa;var Z;\r\nP=function
Xa(){Z||Ya();Z||(P=Xa)};\r\nfunction Ya(){function
a(){if(!Z&&(Z=!0,c.calledRun=!0,!ea)){ya(pa);aa(c);if(c.onRuntimeInitialized)c.onRuntimeInitialized();if(c.postRu
n)for(\"function\"==typeof c.postRun&&(c.postRun=[c.postRun]);c.postRun.length;){var
b=c.postRun.shift();ra.unshift(b)}ya(ra)}}if(!(0<O)){if(c.preRun)for(\"function\"==typeof
c.preRun&&(c.preRun=[c.preRun]);c.preRun.length;)sa();ya(oa);0<O||(c.setStatus?(c.setStatus(\"Running...\"),setTi
meout(function(){setTimeout(function(){c.setStatus(\"\")},1);a()},1)):a())}}c.run=Ya;\r\nif(c.preInit)for(\"function\"
==typeof c.preInit&&(c.preInit=[c.preInit]);0<c.preInit.length;)c.preInit.pop()();Ya();\r\n\r\n\r\n  return
ortWasm.ready\r\n}\r\n);\r\n})();\r\nif (typeof exports === 'object' && typeof module === 'object')\r\n
module.exports = ortWasm;\r\nelse if (typeof define === 'function' && define['amd'])\r\n  define([], function() {
return ortWasm; });\r\nelse if (typeof exports === 'object')\r\n  exports[\"ortWasm\"] = ortWasm;\r\n","\"use
strict\";\r\nmodule.exports = asPromise;\r\n\r\n/**\r\n * Callback as used by {@link util.asPromise}.\r\n * @typedef
asPromiseCallback\r\n * @type {function}\r\n * @param {Error|null} error Error, if any\r\n * @param {...*}
params Additional arguments\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n * Returns a promise from a node-style
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callback function.\r\n * @memberof util\r\n * @param {asPromiseCallback} fn Function to call\r\n * @param {*}
ctx Function context\r\n * @param {...*} params Function arguments\r\n * @returns {Promise<*>} Promisified
function\r\n */\r\nfunction asPromise(fn, ctx/*, varargs */) {\r\n    var params  = new Array(arguments.length -
1),\r\n        offset  = 0,\r\n        index   = 2,\r\n        pending = true;\r\n    while (index < arguments.length)\r\n
params[offset++] = arguments[index++];\r\n    return new Promise(function executor(resolve, reject) {\r\n
params[offset] = function callback(err/*, varargs */) {\r\n            if (pending) {\r\n                pending = false;\r\n
      if (err)\r\n                    reject(err);\r\n                else {\r\n                    var params = new Array(arguments.length -
1),\r\n                        offset = 0;\r\n                    while (offset < params.length)\r\n                        params[offset++] =
arguments[offset];\r\n                    resolve.apply(null, params);\r\n                }\r\n            }\r\n        };\r\n        try {\r\n
         fn.apply(ctx || null, params);\r\n        } catch (err) {\r\n            if (pending) {\r\n                pending = false;\r\n
          reject(err);\r\n            }\r\n        }\r\n    });\r\n}\r\n","\"use strict\";\r\n\r\n/**\r\n * A minimal base64
implementation for number arrays.\r\n * @memberof util\r\n * @namespace\r\n */\r\nvar base64 =
exports;\r\n\r\n\r\n/**\r\n * Calculates the byte length of a base64 encoded string.\r\n * @param {string} string Base64
encoded string\r\n * @returns {number} Byte length\r\n */\r\nbase64.length = function length(string) {\r\n    var p =
string.length;\r\n    if (!p)\r\n        return 0;\r\n    var n = 0;\r\n    while (--p % 4 > 1 && string.charAt(p) ===
\"=\")\r\n        ++n;\r\n    return Math.ceil(string.length * 3) / 4 - n;\r\n};\r\n\r\n// Base64 encoding table\r\nvar b64 =
new Array(64);\r\n\r\n// Base64 decoding table\r\nvar s64 = new Array(123);\r\n\r\n// 65..90, 97..122, 48..57, 43,
47\r\nfor (var i = 0; i < 64;)\r\n    s64[b64[i] = i < 26 ? i + 65 : i < 52 ? i + 71 : i < 62 ? i - 4 : i - 59 | 43] =
i++;\r\n\r\n/**\r\n * Encodes a buffer to a base64 encoded string.\r\n * @param {Uint8Array} buffer Source
buffer\r\n * @param {number} start Source start\r\n * @param {number} end Source end\r\n * @returns {string}
Base64 encoded string\r\n */\r\nbase64.encode = function encode(buffer, start, end) {\r\n    var parts = null,\r\n
chunk = [];\r\n    var i = 0, // output index\r\n        j = 0, // goto index\r\n        t;     // temporary\r\n    while (start <
end) {\r\n        var b = buffer[start++];\r\n        switch (j) {\r\n            case 0:\r\n                chunk[i++] = b64[b >>
2];\r\n                t = (b & 3) << 4;\r\n                j = 1;\r\n                break;\r\n            case 1:\r\n                chunk[i++] =
b64[t | b >> 4];\r\n                t = (b & 15) << 2;\r\n                j = 2;\r\n                break;\r\n            case 2:\r\n
chunk[i++] = b64[t | b >> 6];\r\n                chunk[i++] = b64[b & 63];\r\n                j = 0;\r\n                break;\r\n
}\r\n        if (i > 8191) {\r\n            (parts || (parts = [])).push(String.fromCharCode.apply(String, chunk));\r\n            i
= 0;\r\n        }\r\n    }\r\n    if (j) {\r\n        chunk[i++] = b64[t];\r\n        chunk[i++] = 61;\r\n        if (j === 1)\r\n
 chunk[i++] = 61;\r\n    }\r\n    if (parts) {\r\n        if (i)\r\n            parts.push(String.fromCharCode.apply(String,
chunk.slice(0, i)));\r\n        return parts.join(\"\");\r\n    }\r\n    return String.fromCharCode.apply(String,
chunk.slice(0, i));\r\n};\r\n\r\nvar invalidEncoding = \"invalid encoding\";\r\n\r\n/**\r\n * Decodes a base64 encoded
string to a buffer.\r\n * @param {string} string Source string\r\n * @param {Uint8Array} buffer Destination
buffer\r\n * @param {number} offset Destination offset\r\n * @returns {number} Number of bytes written\r\n *
@throws {Error} If encoding is invalid\r\n */\r\nbase64.decode = function decode(string, buffer, offset) {\r\n    var
start = offset;\r\n    var j = 0, // goto index\r\n        t;     // temporary\r\n    for (var i = 0; i < string.length;) {\r\n
var c = string.charCodeAt(i++);\r\n        if (c === 61 && j > 1)\r\n            break;\r\n        if ((c = s64[c]) ===
undefined)\r\n            throw Error(invalidEncoding);\r\n        switch (j) {\r\n            case 0:\r\n                t = c;\r\n
       j = 1;\r\n                break;\r\n            case 1:\r\n                buffer[offset++] = t << 2 | (c & 48) >> 4;\r\n                t
= c;\r\n                j = 2;\r\n                break;\r\n            case 2:\r\n                buffer[offset++] = (t & 15) << 4 | (c & 60)
>> 2;\r\n                t = c;\r\n                j = 3;\r\n                break;\r\n            case 3:\r\n                buffer[offset++] = (t &
3) << 6 | c;\r\n                j = 0;\r\n                break;\r\n        }\r\n    }\r\n    if (j === 1)\r\n        throw
Error(invalidEncoding);\r\n    return offset - start;\r\n};\r\n\r\n/**\r\n * Tests if the specified string appears to be
base64 encoded.\r\n * @param {string} string String to test\r\n * @returns {boolean} `true` if probably base64
encoded, otherwise false\r\n */\r\nbase64.test = function test(string) {\r\n    return /^(?:[A-Za-z0-9+/]{4})*(?:[A-Za-
z0-9+/]{2}==|[A-Za-z0-9+/]{3}=)?$/.test(string);\r\n};\r\n","\"use strict\";\r\nmodule.exports =
EventEmitter;\r\n\r\n/**\r\n * Constructs a new event emitter instance.\r\n * @classdesc A minimal event
emitter.\r\n * @memberof util\r\n * @constructor\r\n */\r\nfunction EventEmitter() {\r\n\r\n    /**\r\n     * Registered
listeners.\r\n     * @type {Object.<string,*>}\r\n     * @private\r\n     */\r\n    this._listeners = {};\r\n}\r\n\r\n/**\r\n *
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Registers an event listener.\r\n * @param {string} evt Event name\r\n * @param {function} fn Listener\r\n * @param {*} [ctx] Listener context\r\n * @returns {util.EventEmitter} `this`\r\n */\r\nEventEmitter.prototype.on = function on(evt, fn, ctx) {\r\n   (this._listeners[evt] || (this._listeners[evt] = [])).push({\r\n   fn : fn,\r\n   ctx : ctx || this\r\n   });\r\n   return this;\r\n};\r\n\r\n/**\r\n * Removes an event listener or any matching listeners if arguments are omitted.\r\n * @param {string} [evt] Event name. Removes all listeners if omitted.\r\n * @param {function} [fn] Listener to remove. Removes all listeners of `evt` if omitted.\r\n * @returns {util.EventEmitter} `this`\r\n */\r\nEventEmitter.prototype.off = function off(evt, fn) {\r\n   if (evt === undefined)\r\n   this._listeners = {};\r\n   else {\r\n   if (fn === undefined)\r\n   this._listeners[evt] = [];\r\n   else {\r\n   var listeners = this._listeners[evt];\r\n   for (var i = 0; i < listeners.length;)\r\n   if (listeners[i].fn === fn)\r\n   listeners.splice(i, 1);\r\n   else\r\n   ++i;\r\n   }\r\n   }\r\n   return this;\r\n};\r\n\r\n/**\r\n * Emits an event by calling its listeners with the specified arguments.\r\n * @param {string} evt Event name\r\n * @param {...*} args Arguments\r\n * @returns {util.EventEmitter} `this`\r\n */\r\nEventEmitter.prototype.emit = function emit(evt) {\r\n   var listeners = this._listeners[evt];\r\n   if (listeners) {\r\n   var args = [],\r\n   i = 1;\r\n   for (; i < arguments.length;)\r\n   args.push(arguments[i++]);\r\n   for (i = 0; i < listeners.length;)\r\n   listeners[i].fn.apply(listeners[i++].ctx, args);\r\n   }\r\n   return this;\r\n};\r\n","\"use strict\";\r\n\r\nmodule.exports = factory(factory);\r\n\r\n/**\r\n * Reads / writes floats / doubles from / to buffers.\r\n * @name util.float\r\n * @namespace\r\n */\r\n\r\n/**\r\n * Writes a 32 bit float to a buffer using little endian byte order.\r\n * @name util.float.writeFloatLE\r\n * @function\r\n * @param {number} val Value to write\r\n * @param {Uint8Array} buf Target buffer\r\n * @param {number} pos Target buffer offset\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n * Writes a 32 bit float to a buffer using big endian byte order.\r\n * @name util.float.writeFloatBE\r\n * @function\r\n * @param {number} val Value to write\r\n * @param {Uint8Array} buf Target buffer\r\n * @param {number} pos Target buffer offset\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n * Reads a 32 bit float from a buffer using little endian byte order.\r\n * @name util.float.readFloatLE\r\n * @function\r\n * @param {Uint8Array} buf Source buffer\r\n * @param {number} pos Source buffer offset\r\n * @returns {number} Value read\r\n */\r\n\r\n/**\r\n * Reads a 32 bit float from a buffer using big endian byte order.\r\n * @name util.float.readFloatBE\r\n * @function\r\n * @param {Uint8Array} buf Source buffer\r\n * @param {number} pos Source buffer offset\r\n * @returns {number} Value read\r\n */\r\n\r\n/**\r\n * Writes a 64 bit double to a buffer using little endian byte order.\r\n * @name util.float.writeDoubleLE\r\n * @function\r\n * @param {number} val Value to write\r\n * @param {Uint8Array} buf Target buffer\r\n * @param {number} pos Target buffer offset\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n * Writes a 64 bit double to a buffer using big endian byte order.\r\n * @name util.float.writeDoubleBE\r\n * @function\r\n * @param {number} val Value to write\r\n * @param {Uint8Array} buf Target buffer\r\n * @param {number} pos Target buffer offset\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n * Reads a 64 bit double from a buffer using little endian byte order.\r\n * @name util.float.readDoubleLE\r\n * @function\r\n * @param {Uint8Array} buf Source buffer\r\n * @param {number} pos Source buffer offset\r\n * @returns {number} Value read\r\n */\r\n\r\n/**\r\n * Reads a 64 bit double from a buffer using big endian byte order.\r\n * @name util.float.readDoubleBE\r\n * @function\r\n * @param {Uint8Array} buf Source buffer\r\n * @param {number} pos Source buffer offset\r\n * @returns {number} Value read\r\n */\r\n\r\n// Factory function for the purpose of node-based testing in modified global environments\r\nfunction factory(exports) {\r\n\r\n   // float: typed array\r\n   if (typeof Float32Array !== \"undefined\") (function() {\r\n\r\n   var f32 = new Float32Array([-0]),\r\n   f8b = new Uint8Array(f32.buffer),\r\n   le = f8b[3] === 128;\r\n\r\n   function writeFloat_f32_cpy(val, buf, pos) {\r\n   f32[0] = val;\r\n   buf[pos   ] = f8b[0];\r\n   buf[pos + 1] = f8b[1];\r\n   buf[pos + 2] = f8b[2];\r\n   buf[pos + 3] = f8b[3];\r\n   }\r\n\r\n   function writeFloat_f32_rev(val, buf, pos) {\r\n   f32[0] = val;\r\n   buf[pos   ] = f8b[3];\r\n   buf[pos + 1] = f8b[2];\r\n   buf[pos + 2] = f8b[1];\r\n   buf[pos + 3] = f8b[0];\r\n   }\r\n\r\n   /* istanbul ignore next */\r\n   exports.writeFloatLE = le ? writeFloat_f32_cpy : writeFloat_f32_rev;\r\n   /* istanbul ignore next */\r\n   exports.writeFloatBE = le ? writeFloat_f32_rev : writeFloat_f32_cpy;\r\n\r\n   function readFloat_f32_cpy(buf, pos) {\r\n   f8b[0] = buf[pos   ];\r\n   f8b[1] = buf[pos + 1];\r\n   f8b[2] = buf[pos + 2];\r\n   f8b[3] = buf[pos + 3];\r\n return f32[0];\r\n }\r\n\r\n function readFloat_f32_rev(buf, pos) {\r\n f8b[3] = buf[pos];\r\n f8b[2] = buf[pos + 1];\r\n f8b[1] = buf[pos + 2];\r\n f8b[0] = buf[pos + 3];\r\n return f32[0];\r\n }\r\n\r\n /* istanbul ignore next */\r\n exports.readFloatLE = le ? readFloat_f32_cpy : readFloat_f32_rev;\r\n /* istanbul ignore next */\r\n exports.readFloatBE = le ? readFloat_f32_rev : readFloat_f32_cpy;\r\n\r\n // float: ieee754\r\n })(); else (function() {\r\n\r\n function writeFloat_ieee754(writeUint, val, buf, pos) {\r\n var sign = val < 0 ? 1 : 0;\r\n if (sign)\r\n val = -val;\r\n if (val === 0)\r\n writeUint(1 / val > 0 ? /* positive */ 0 : /* negative 0 */ 2147483648, buf, pos);\r\n else if (isNaN(val))\r\n writeUint(2143289344, buf, pos);\r\n else if (val > 3.4028234663852886e+38) // +-Infinity\r\n writeUint((sign << 31 | 2139095040) >>> 0, buf, pos);\r\n else if (val < 1.1754943508222875e-38) // denormal\r\n writeUint((sign << 31 | Math.round(val / 1.401298464324817e-45)) >>> 0, buf, pos);\r\n else {\r\n var exponent = Math.floor(Math.log(val) / Math.LN2),\r\n mantissa = Math.round(val * Math.pow(2, -exponent) * 8388608) & 8388607;\r\n writeUint((sign << 31 | exponent + 127 << 23 | mantissa) >>> 0, buf, pos);\r\n }\r\n }\r\n\r\n exports.writeFloatLE = writeFloat_ieee754.bind(null, writeUintLE);\r\n exports.writeFloatBE = writeFloat_ieee754.bind(null, writeUintBE);\r\n\r\n function readFloat_ieee754(readUint, buf, pos) {\r\n var uint = readUint(buf, pos),\r\n sign = (uint >> 31) * 2 + 1,\r\n exponent = uint >>> 23 & 255,\r\n mantissa = uint & 8388607;\r\n return exponent === 255\r\n ? mantissa\r\n ? NaN\r\n : sign * Infinity\r\n : exponent === 0 // denormal\r\n ? sign * 1.401298464324817e-45 * mantissa\r\n : sign * Math.pow(2, exponent - 150) * (mantissa + 8388608);\r\n }\r\n\r\n exports.readFloatLE = readFloat_ieee754.bind(null, readUintLE);\r\n exports.readFloatBE = readFloat_ieee754.bind(null, readUintBE);\r\n\r\n })();\r\n\r\n // double: typed array\r\n if (typeof Float64Array !== \"undefined\") (function() {\r\n\r\n var f64 = new Float64Array([-0]),\r\n f8b = new Uint8Array(f64.buffer),\r\n le = f8b[7] === 128;\r\n\r\n function writeDouble_f64_cpy(val, buf, pos) {\r\n f64[0] = val;\r\n buf[pos] = f8b[0];\r\n buf[pos + 1] = f8b[1];\r\n buf[pos + 2] = f8b[2];\r\n buf[pos + 3] = f8b[3];\r\n buf[pos + 4] = f8b[4];\r\n buf[pos + 5] = f8b[5];\r\n buf[pos + 6] = f8b[6];\r\n buf[pos + 7] = f8b[7];\r\n }\r\n\r\n function writeDouble_f64_rev(val, buf, pos) {\r\n f64[0] = val;\r\n buf[pos] = f8b[7];\r\n buf[pos + 1] = f8b[6];\r\n buf[pos + 2] = f8b[5];\r\n buf[pos + 3] = f8b[4];\r\n buf[pos + 4] = f8b[3];\r\n buf[pos + 5] = f8b[2];\r\n buf[pos + 6] = f8b[1];\r\n buf[pos + 7] = f8b[0];\r\n }\r\n\r\n /* istanbul ignore next */\r\n exports.writeDoubleLE = le ? writeDouble_f64_cpy : writeDouble_f64_rev;\r\n /* istanbul ignore next */\r\n exports.writeDoubleBE = le ? writeDouble_f64_rev : writeDouble_f64_cpy;\r\n\r\n function readDouble_f64_cpy(buf, pos) {\r\n f8b[0] = buf[pos];\r\n f8b[1] = buf[pos + 1];\r\n f8b[2] = buf[pos + 2];\r\n f8b[3] = buf[pos + 3];\r\n f8b[4] = buf[pos + 4];\r\n f8b[5] = buf[pos + 5];\r\n f8b[6] = buf[pos + 6];\r\n f8b[7] = buf[pos + 7];\r\n return f64[0];\r\n }\r\n\r\n function readDouble_f64_rev(buf, pos) {\r\n f8b[7] = buf[pos];\r\n f8b[6] = buf[pos + 1];\r\n f8b[5] = buf[pos + 2];\r\n f8b[4] = buf[pos + 3];\r\n f8b[3] = buf[pos + 4];\r\n f8b[2] = buf[pos + 5];\r\n f8b[1] = buf[pos + 6];\r\n f8b[0] = buf[pos + 7];\r\n return f64[0];\r\n }\r\n\r\n /* istanbul ignore next */\r\n exports.readDoubleLE = le ? readDouble_f64_cpy : readDouble_f64_rev;\r\n /* istanbul ignore next */\r\n exports.readDoubleBE = le ? readDouble_f64_rev : readDouble_f64_cpy;\r\n\r\n // double: ieee754\r\n })(); else (function() {\r\n\r\n function writeDouble_ieee754(writeUint, off0, off1, val, buf, pos) {\r\n var sign = val < 0 ? 1 : 0;\r\n if (sign)\r\n val = -val;\r\n if (val === 0) {\r\n writeUint(0, buf, pos + off0);\r\n writeUint(1 / val > 0 ? /* positive */ 0 : /* negative 0 */ 2147483648, buf, pos + off1);\r\n } else if (isNaN(val)) {\r\n writeUint(0, buf, pos + off0);\r\n writeUint(2146959360, buf, pos + off1);\r\n } else if (val > 1.7976931348623157e+308) { // +-Infinity\r\n writeUint(0, buf, pos + off0);\r\n writeUint((sign << 31 | 2146435072) >>> 0, buf, pos + off1);\r\n } else {\r\n var mantissa;\r\n if (val < 2.2250738585072014e-308) { // denormal\r\n mantissa = val / 5e-324;\r\n writeUint(mantissa >>> 0, buf, pos + off0);\r\n writeUint((sign << 31 | mantissa / 4294967296) >>> 0,

buf, pos + off1);\r\n } else {\r\n var exponent = Math.floor(Math.log(val) / Math.LN2);\r\n
if (exponent === 1024)\r\n exponent = 1023;\r\n mantissa = val * Math.pow(2, -
exponent);\r\n writeUint(mantissa * 4503599627370496 >>> 0, buf, pos + off0);\r\n
writeUint((sign << 31 | exponent + 1023 << 20 | mantissa * 1048576 & 1048575) >>> 0, buf, pos + off1);\r\n
}\r\n }\r\n }\r\n\r\n exports.writeDoubleLE = writeDouble_ieee754.bind(null, writeUintLE, 0,
4);\r\n exports.writeDoubleBE = writeDouble_ieee754.bind(null, writeUintBE, 4, 0);\r\n\r\n function
readDouble_ieee754(readUint, off0, off1, buf, pos) {\r\n var lo = readUint(buf, pos + off0),\r\n hi =
readUint(buf, pos + off1);\r\n var sign = (hi >> 31) * 2 + 1,\r\n exponent = hi >>> 20 & 2047,\r\n
mantissa = 4294967296 * (hi & 1048575) + lo;\r\n return exponent === 2047\r\n ?
mantissa\r\n ? NaN\r\n : sign * Infinity\r\n : exponent === 0 // denormal\r\n ?
sign * 5e-324 * mantissa\r\n : sign * Math.pow(2, exponent - 1075) * (mantissa + 4503599627370496);\r\n
}\r\n\r\n exports.readDoubleLE = readDouble_ieee754.bind(null, readUintLE, 0, 4);\r\n
exports.readDoubleBE = readDouble_ieee754.bind(null, readUintBE, 4, 0);\r\n\r\n })();\r\n\r\n return
exports;\r\n}\r\n\r\n// uint helpers\r\n\r\nfunction writeUintLE(val, buf, pos) {\r\n buf[pos] = val & 255;\r\n
buf[pos + 1] = val >>> 8 & 255;\r\n buf[pos + 2] = val >>> 16 & 255;\r\n buf[pos + 3] = val >>>
24;\r\n}\r\n\r\nfunction writeUintBE(val, buf, pos) {\r\n buf[pos] = val >>> 24;\r\n buf[pos + 1] = val >>>
16 & 255;\r\n buf[pos + 2] = val >>> 8 & 255;\r\n buf[pos + 3] = val & 255;\r\n}\r\n\r\nfunction
readUintLE(buf, pos) {\r\n return (buf[pos]\r\n | buf[pos + 1] << 8\r\n | buf[pos + 2] << 16\r\n |
buf[pos + 3] << 24) >>> 0;\r\n}\r\n\r\nfunction readUintBE(buf, pos) {\r\n return (buf[pos] << 24\r\n |
buf[pos + 1] << 16\r\n | buf[pos + 2] << 8\r\n | buf[pos + 3]) >>> 0;\r\n}\r\n","\"use
strict\";\r\nmodule.exports = inquire;\r\n\r\n/**\r\n * Requires a module only if available.\r\n * @memberof util\r\n
* @param {string} moduleName Module to require\r\n * @returns {?Object} Required module if available and not
empty, otherwise `null`\r\n */\r\nfunction inquire(moduleName) {\r\n try {\r\n var mod =
eval(\"quire\".replace(/^/,\"re\"))(moduleName); // eslint-disable-line no-eval\r\n if (mod && (mod.length ||
Object.keys(mod).length))\r\n return mod;\r\n } catch (e) {} // eslint-disable-line no-empty\r\n return
null;\r\n}\r\n","\"use strict\";\r\nmodule.exports = pool;\r\n\r\n/**\r\n * An allocator as used by {@link
util.pool}.\r\n * @typedef PoolAllocator\r\n * @type {function}\r\n * @param {number} size Buffer size\r\n *
@returns {Uint8Array} Buffer\r\n */\r\n\r\n/**\r\n * A slicer as used by {@link util.pool}.\r\n * @typedef
PoolSlicer\r\n * @type {function}\r\n * @param {number} start Start offset\r\n * @param {number} end End
offset\r\n * @returns {Uint8Array} Buffer slice\r\n * @this {Uint8Array}\r\n */\r\n\r\n/**\r\n * A general purpose
buffer pool.\r\n * @memberof util\r\n * @function\r\n * @param {PoolAllocator} alloc Allocator\r\n * @param
{PoolSlicer} slice Slicer\r\n * @param {number} [size=8192] Slab size\r\n * @returns {PoolAllocator} Pooled
allocator\r\n */\r\nfunction pool(alloc, slice, size) {\r\n var SIZE = size || 8192;\r\n var MAX = SIZE >>>
1;\r\n var slab = null;\r\n var offset = SIZE;\r\n return function pool_alloc(size) {\r\n if (size < 1 || size >
MAX)\r\n return alloc(size);\r\n if (offset + size > SIZE) {\r\n slab = alloc(SIZE);\r\n offset
= 0;\r\n }\r\n var buf = slice.call(slab, offset, offset += size);\r\n if (offset & 7) // align to 32 bit\r\n
offset = (offset | 7) + 1;\r\n return buf;\r\n };\r\n}\r\n","\"use strict\";\r\n\r\n/**\r\n * A minimal UTF8
implementation for number arrays.\r\n * @memberof util\r\n * @namespace\r\n */\r\nvar utf8 =
exports;\r\n\r\n/**\r\n * Calculates the UTF8 byte length of a string.\r\n * @param {string} string String\r\n *
@returns {number} Byte length\r\n */\r\nutf8.length = function utf8_length(string) {\r\n var len = 0,\r\n c =
0;\r\n for (var i = 0; i < string.length; ++i) {\r\n c = string.charCodeAt(i);\r\n if (c < 128)\r\n len +=
1;\r\n else if (c < 2048)\r\n len += 2;\r\n else if ((c & 0xFC00) === 0xD800 && (string.charCodeAt(i
+ 1) & 0xFC00) === 0xDC00) {\r\n ++i;\r\n len += 4;\r\n } else\r\n len += 3;\r\n }\r\n
return len;\r\n};\r\n\r\n/**\r\n * Reads UTF8 bytes as a string.\r\n * @param {Uint8Array} buffer Source buffer\r\n
* @param {number} start Source start\r\n * @param {number} end Source end\r\n * @returns {string} String
read\r\n */\r\nutf8.read = function utf8_read(buffer, start, end) {\r\n var len = end - start;\r\n if (len < 1)\r\n
return \"\";\r\n var parts = null,\r\n chunk = [],\r\n i = 0, // char offset\r\n t; // temporary\r\n while
(start < end) {\r\n t = buffer[start++];\r\n if (t < 128)\r\n chunk[i++] = t;\r\n else if (t > 191 && t

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< 224)\r\n            chunk[i++] = (t & 31) << 6 | buffer[start++] & 63;\r\n        else if (t > 239 && t < 365) {\r\n
t = ((t & 7) << 18 | (buffer[start++] & 63) << 12 | (buffer[start++] & 63) << 6 | buffer[start++] & 63) - 0x10000;\r\n
        chunk[i++] = 0xD800 + (t >> 10);\r\n            chunk[i++] = 0xDC00 + (t & 1023);\r\n        } else\r\n
chunk[i++] = (t & 15) << 12 | (buffer[start++] & 63) << 6 | buffer[start++] & 63;\r\n        if (i > 8191) {\r\n
(parts || (parts = [])).push(String.fromCharCode.apply(String, chunk));\r\n            i = 0;\r\n        }\r\n    }\r\n    if
(parts) {\r\n        if (i)\r\n            parts.push(String.fromCharCode.apply(String, chunk.slice(0, i)));\r\n        return
parts.join(\"\");\r\n    }\r\n    return String.fromCharCode.apply(String, chunk.slice(0, i));\r\n};\r\n\r\n/**\r\n * Writes
a string as UTF8 bytes.\r\n * @param {string} string Source string\r\n * @param {Uint8Array} buffer Destination
buffer\r\n * @param {number} offset Destination offset\r\n * @returns {number} Bytes written\r\n */\r\nutf8.write
= function utf8_write(string, buffer, offset) {\r\n    var start = offset,\r\n        c1, // character 1\r\n        c2; // character
2\r\n    for (var i = 0; i < string.length; ++i) {\r\n        c1 = string.charCodeAt(i);\r\n        if (c1 < 128) {\r\n
buffer[offset++] = c1;\r\n        } else if (c1 < 2048) {\r\n            buffer[offset++] = c1 >> 6       | 192;\r\n
buffer[offset++] = c1       & 63 | 128;\r\n        } else if ((c1 & 0xFC00) === 0xD800 && ((c2 = string.charCodeAt(i
+ 1)) & 0xFC00) === 0xDC00) {\r\n            c1 = 0x10000 + ((c1 & 0x03FF) << 10) + (c2 & 0x03FF);\r\n
++i;\r\n            buffer[offset++] = c1 >> 18      | 240;\r\n            buffer[offset++] = c1 >> 12 & 63 | 128;\r\n
buffer[offset++] = c1 >> 6  & 63 | 128;\r\n            buffer[offset++] = c1       & 63 | 128;\r\n        } else {\r\n
buffer[offset++] = c1 >> 12      | 224;\r\n            buffer[offset++] = c1 >> 6  & 63 | 128;\r\n            buffer[offset++] =
c1       & 63 | 128;\r\n        }\r\n    }\r\n    return offset - start;\r\n};\r\n","/// @file\n/// @addtogroup
flatbuffers_javascript_api\n/// @{\n/// @cond FLATBUFFERS_INTERNAL\n\n/**\n * @fileoverview\n *\n *
Need to suppress 'global this' error so the Node.js export line doesn't cause\n * closure compile to error out.\n *
@suppress {globalThis}\n */\n\n/**\n * @const\n * @namespace\n */\nvar flatbuffers = {};\n\n/**\n * @typedef
{number}\n */\nflatbuffers.Offset;\n\n/**\n * @typedef {{\n *   bb: flatbuffers.ByteBuffer,\n *   bb_pos: number\n *
}}\n */\nflatbuffers.Table;\n\n/**\n * @type {number}\n * @const\n */\nflatbuffers.SIZEOF_SHORT = 2;\n\n/**\n
 * @type {number}\n * @const\n */\nflatbuffers.SIZEOF_INT = 4;\n\n/**\n * @type {number}\n * @const\n
*/\nflatbuffers.FILE_IDENTIFIER_LENGTH = 4;\n\n/**\n * @type {number}\n * @const\n
*/\nflatbuffers.SIZE_PREFIX_LENGTH = 4;\n\n/**\n * @enum {number}\n */\nflatbuffers.Encoding = {\n
UTF8_BYTES: 1,\n  UTF16_STRING: 2\n};\n\n/**\n * @type {Int32Array}\n * @const\n */\nflatbuffers.int32 =
new Int32Array(2);\n\n/**\n * @type {Float32Array}\n * @const\n */\nflatbuffers.float32 = new
Float32Array(flatbuffers.int32.buffer);\n\n/**\n * @type {Float64Array}\n * @const\n */\nflatbuffers.float64 = new
Float64Array(flatbuffers.int32.buffer);\n\n/**\n * @type {boolean}\n * @const\n */\nflatbuffers.isLittleEndian =
new Uint16Array(new Uint8Array([1, 0]).buffer)[0] ===
1;\n\n////////////////////////////////////////////////////////////////////////////////\n\n/**\n * @constructor\n * @param {number} low\n
 * @param {number} high\n */\nflatbuffers.Long = function(low, high) {\n  /**\n   * @type {number}\n   *
@const\n   */\n  this.low = low | 0;\n\n  /**\n   * @type {number}\n   * @const\n   */\n  this.high = high |
0;\n};\n\n/**\n * @param {number} low\n * @param {number} high\n * @returns {!flatbuffers.Long}\n
*/\nflatbuffers.Long.create = function(low, high) {\n  // Special-case zero to avoid GC overhead for default values\n
return low == 0 && high == 0 ? flatbuffers.Long.ZERO : new flatbuffers.Long(low, high);\n};\n\n/**\n * @returns
{number}\n */\nflatbuffers.Long.prototype.toFloat64 = function() {\n  return (this.low >>> 0) + this.high *
0x100000000;\n};\n\n/**\n * @param {flatbuffers.Long} other\n * @returns {boolean}\n
*/\nflatbuffers.Long.prototype.equals = function(other) {\n  return this.low == other.low && this.high ==
other.high;\n};\n\n/**\n * @type {!flatbuffers.Long}\n * @const\n */\nflatbuffers.Long.ZERO = new
flatbuffers.Long(0, 0);\n\n/// @endcond\n////////////////////////////////////////////////////////////////////////////////\n/**\n * Create a
FlatBufferBuilder.\n *\n * @constructor\n * @param {number=} opt_initial_size\n */\nflatbuffers.Builder =
function(opt_initial_size) {\n  if (!opt_initial_size) {\n    var initial_size = 1024;\n  } else {\n    var initial_size =
opt_initial_size;\n  }\n\n  /**\n   * @type {flatbuffers.ByteBuffer}\n   * @private\n   */\n  this.bb =
flatbuffers.ByteBuffer.allocate(initial_size);\n\n  /**\n   * Remaining space in the ByteBuffer.\n   *\n   * @type
{number}\n   * @private\n   */\n  this.space = initial_size;\n\n  /**\n   * Minimum alignment encountered so far.\n
*\n   * @type {number}\n   * @private\n   */\n  this.minalign = 1;\n\n  /**\n   * The vtable for the current table.\n
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*\n   * @type {Array.<number>}\n   * @private\n   */\n this.vtable = null;\n\n /**\n   * The amount of fields we're actually using.\n   *\n   * @type {number}\n   * @private\n   */\n this.vtable_in_use = 0;\n\n /**\n   * Whether we are currently serializing a table.\n   *\n   * @type {boolean}\n   * @private\n   */\n this.isNested = false;\n\n /**\n   * Starting offset of the current struct/table.\n   *\n   * @type {number}\n   * @private\n   */\n this.object_start = 0;\n\n /**\n   * List of offsets of all vtables.\n   *\n   * @type {Array.<number>}\n   * @private\n   */\n this.vtables = [];\n\n /**\n   * For the current vector being built.\n   *\n   * @type {number}\n   * @private\n   */\n this.vector_num_elems = 0;\n\n /**\n   * False omits default values from the serialized data\n   *\n   * @type {boolean}\n   * @private\n   */\n this.force_defaults = false;\n};\n\nflatbuffers.Builder.prototype.clear = function() {\n this.bb.clear();\n this.space = this.bb.capacity();\n this.minalign = 1;\n this.vtable = null;\n this.vtable_in_use = 0;\n this.isNested = false;\n this.object_start = 0;\n this.vtables = [];\n this.vector_num_elems = 0;\n this.force_defaults = false;\n};\n\n/**\n * In order to save space, fields that are set to their default value\n * don't get serialized into the buffer. Forcing defaults provides a\n * way to manually disable this optimization.\n *\n * @param {boolean} forceDefaults true always serializes default values\n */\nflatbuffers.Builder.prototype.forceDefaults = function(forceDefaults) {\n this.force_defaults = forceDefaults;\n};\n\n/**\n * Get the ByteBuffer representing the FlatBuffer. Only call this after you've\n * called finish(). The actual data starts at the ByteBuffer's current position,\n * not necessarily at 0.\n *\n * @returns {flatbuffers.ByteBuffer}\n */\nflatbuffers.Builder.prototype.dataBuffer = function() {\n return this.bb;\n};\n\n/**\n * Get the bytes representing the FlatBuffer. Only call this after you've\n * called finish().\n *\n * @returns {!Uint8Array}\n */\nflatbuffers.Builder.prototype.asUint8Array = function() {\n return this.bb.bytes().subarray(this.bb.position(), this.bb.position() + this.offset());\n};\n\n/// @cond FLATBUFFERS_INTERNAL\n/**\n * Prepare to write an element of `size` after `additional_bytes` have been\n * written, e.g. if you write a string, you need to align such the int length\n * field is aligned to 4 bytes, and the string data follows it directly. If all\n * you need to do is alignment, `additional_bytes` will be 0.\n *\n * @param {number} size This is the of the new element to write\n * @param {number} additional_bytes The padding size\n */\nflatbuffers.Builder.prototype.prep = function(size, additional_bytes) {\n // Track the biggest thing we've ever aligned to.\n if (size > this.minalign) {\n   this.minalign = size;\n }\n\n // Find the amount of alignment needed such that `size` is properly\n // aligned after `additional_bytes`\n var align_size = ((~(this.bb.capacity() - this.space + additional_bytes)) + 1) & (size - 1);\n\n // Reallocate the buffer if needed.\n while (this.space < align_size + size + additional_bytes) {\n   var old_buf_size = this.bb.capacity();\n   this.bb = flatbuffers.Builder.growByteBuffer(this.bb);\n   this.space += this.bb.capacity() - old_buf_size;\n }\n\n this.pad(align_size);\n};\n\n/**\n * @param {number} byte_size\n */\nflatbuffers.Builder.prototype.pad = function(byte_size) {\n for (var i = 0; i < byte_size; i++) {\n   this.bb.writeInt8(--this.space, 0);\n }\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeInt8 = function(value) {\n this.bb.writeInt8(this.space -= 1, value);\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeInt16 = function(value) {\n this.bb.writeInt16(this.space -= 2, value);\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeInt32 = function(value) {\n this.bb.writeInt32(this.space -= 4, value);\n};\n\n/**\n * @param {flatbuffers.Long} value\n */\nflatbuffers.Builder.prototype.writeInt64 = function(value) {\n this.bb.writeInt64(this.space -= 8, value);\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeFloat32 = function(value) {\n this.bb.writeFloat32(this.space -= 4, value);\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeFloat64 = function(value) {\n this.bb.writeFloat64(this.space -= 8, value);\n};\n/// @endcond\n\n/**\n * Add an `int8` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `int8` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addInt8 = function(value) {\n this.prep(1, 0);\n this.writeInt8(value);\n};\n\n/**\n * Add an `int16` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `int16` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addInt16 = function(value) {\n this.prep(2, 0);\n this.writeInt16(value);\n};\n\n/**\n * Add an `int32` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `int32` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addInt32 = function(value) {\n this.prep(4, 0);\n

this.writeInt32(value);\n};\n\n/**\n * Add an `int64` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {flatbuffers.Long} value The `int64` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addInt64 = function(value) {\n this.prep(8, 0);\n this.writeInt64(value);\n};\n\n/**\n * Add a `float32` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `float32` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addFloat32 = function(value) {\n this.prep(4, 0);\n this.writeFloat32(value);\n};\n\n/**\n * Add a `float64` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `float64` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addFloat64 = function(value) {\n this.prep(8, 0);\n this.writeFloat64(value);\n};\n\n/// @cond FLATBUFFERS_INTERNAL\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt8 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addInt8(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt16 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addInt16(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt32 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addInt32(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {flatbuffers.Long} value\n * @param {flatbuffers.Long} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt64 = function(voffset, value, defaultValue) {\n if (this.force_defaults || !value.equals(defaultValue)) {\n   this.addInt64(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldFloat32 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addFloat32(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldFloat64 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addFloat64(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {flatbuffers.Offset} value\n * @param {flatbuffers.Offset} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldOffset = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addOffset(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * Structs are stored inline, so nothing additional is being added. `d` is always 0.\n *\n * @param {number} voffset\n * @param {flatbuffers.Offset} value\n * @param {flatbuffers.Offset} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldStruct = function(voffset, value, defaultValue) {\n if (value != defaultValue) {\n   this.nested(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * Structures are always stored inline, they need to be created right\n * where they're used. You'll get this assertion failure if you\n * created it elsewhere.\n *\n * @param {flatbuffers.Offset} obj The offset of the created object\n */\nflatbuffers.Builder.prototype.nested = function(obj) {\n if (obj != this.offset()) {\n   throw new Error('FlatBuffers: struct must be serialized inline.');\n }\n};\n\n/**\n * Should not be creating any other object, string or vector\n * while an object is being constructed\n */\nflatbuffers.Builder.prototype.notNested = function() {\n if (this.isNested) {\n   throw new Error('FlatBuffers: object serialization must not be nested.');\n }\n};\n\n/**\n * Set the current vtable at `voffset` to the current location in the buffer.\n *\n * @param {number} voffset\n */\nflatbuffers.Builder.prototype.slot = function(voffset) {\n this.vtable[voffset] = this.offset();\n};\n\n/**\n * @returns {flatbuffers.Offset} Offset relative to the end of the buffer.\n */\nflatbuffers.Builder.prototype.offset = function() {\n return this.bb.capacity() - this.space;\n};\n\n/**\n * Doubles the size of the backing ByteBuffer and copies the old data towards\n * the end of the new buffer (since we build the buffer backwards).\n *\n * @param {flatbuffers.ByteBuffer} bb The current buffer with the existing data\n * @returns {!flatbuffers.ByteBuffer} A new byte buffer with the old data copied\n * to it. The data is located at the end of the buffer.\n *\n * uint8Array.set() formally takes {Array<number>|ArrayBufferView}, so to pass\n * it a uint8Array we need to suppress the type check:\n * @suppress {checkTypes}\n */\nflatbuffers.Builder.growByteBuffer = function(bb) {\n var old_buf_size = bb.capacity();\n\n // Ensure we don't grow beyond what fits in an int.\n if (old_buf_size & 0xC0000000) {\n   throw new Error('FlatBuffers: cannot grow buffer beyond 2 gigabytes.');\n }\n\n var new_buf_size = old_buf_size << 1;\n var nbb = flatbuffers.ByteBuffer.allocate(new_buf_size);\n nbb.setPosition(new_buf_size - old_buf_size);\n nbb.bytes().set(bb.bytes(), new_buf_size - old_buf_size);\n return nbb;\n};\n/// @endcond\n\n/**\n * Adds on offset, relative to where it will be written.\n *\n * @param {flatbuffers.Offset} offset The offset to add.\n */\nflatbuffers.Builder.prototype.addOffset = function(offset) {\n this.prep(flatbuffers.SIZEOF_INT, 0); // Ensure alignment is already done.\n this.writeInt32(this.offset() - offset + flatbuffers.SIZEOF_INT);\n};\n\n/// @cond FLATBUFFERS_INTERNAL\n/**\n * Start encoding a new object in the buffer. Users will not usually need to\n * call this directly. The FlatBuffers compiler will generate helper methods\n * that call this method internally.\n *\n * @param {number} numfields\n */\nflatbuffers.Builder.prototype.startObject = function(numfields) {\n this.notNested();\n if (this.vtable == null) {\n   this.vtable = [];\n }\n this.vtable_in_use = numfields;\n for (var i = 0; i < numfields; i++) {\n   this.vtable[i] = 0; // This will push additional elements as needed\n }\n this.isNested = true;\n this.object_start = this.offset();\n};\n\n/**\n * Finish off writing the object that is under construction.\n *\n * @returns {flatbuffers.Offset} The offset to the object inside `dataBuffer`\n */\nflatbuffers.Builder.prototype.endObject = function() {\n if (this.vtable == null || !this.isNested) {\n   throw new Error('FlatBuffers: endObject called without startObject');\n }\n\n this.addInt32(0);\n var vtableloc = this.offset();\n\n // Trim trailing zeroes.\n var i = this.vtable_in_use - 1;\n for (; i >= 0 && this.vtable[i] == 0; i--) {}\n var trimmed_size = i + 1;\n\n // Write out the current vtable.\n for (; i >= 0; i--) {\n   // Offset relative to the start of the table.\n   this.addInt16(this.vtable[i] != 0 ? vtableloc - this.vtable[i] : 0);\n }\n\n var standard_fields = 2; // The fields below:\n this.addInt16(vtableloc - this.object_start);\n var len = (trimmed_size + standard_fields) * flatbuffers.SIZEOF_SHORT;\n this.addInt16(len);\n\n // Search for an existing vtable that matches the current one.\n var existing_vtable = 0;\n var vt1 = this.space;\nouter_loop:\n for (i = 0; i < this.vtables.length; i++) {\n   var vt2 = this.bb.capacity() - this.vtables[i];\n   if (len == this.bb.readInt16(vt2)) {\n   for (var j = flatbuffers.SIZEOF_SHORT; j < len; j += flatbuffers.SIZEOF_SHORT) {\n   if (this.bb.readInt16(vt1 + j) != this.bb.readInt16(vt2 + j)) {\n   continue outer_loop;\n   }\n   }\n   existing_vtable = this.vtables[i];\n   break;\n   }\n }\n\n if (existing_vtable) {\n   // Found a match:\n   // Remove the current vtable.\n   this.space = this.bb.capacity() - vtableloc;\n\n   // Point table to existing vtable.\n   this.bb.writeInt32(this.space, existing_vtable - vtableloc);\n } else {\n   // No match:\n   // Add the location of the current vtable to the list of vtables.\n   this.vtables.push(this.offset());\n\n   // Point table to current vtable.\n   this.bb.writeInt32(this.bb.capacity() - vtableloc, this.offset() - vtableloc);\n }\n\n this.isNested = false;\n return vtableloc;\n};\n/// @endcond\n\n/**\n * Finalize a buffer, poiting to the given `root_table`.\n *\n * @param {flatbuffers.Offset} root_table\n * @param {string=} opt_file_identifier\n * @param {boolean=} opt_size_prefix\n */\nflatbuffers.Builder.prototype.finish = function(root_table, opt_file_identifier, opt_size_prefix) {\n var size_prefix = opt_size_prefix ? flatbuffers.SIZE_PREFIX_LENGTH : 0;\n if (opt_file_identifier) {\n   var file_identifier = opt_file_identifier;\n   this.prep(this.minalign, flatbuffers.SIZEOF_INT +\n   flatbuffers.FILE_IDENTIFIER_LENGTH + size_prefix);\n   if (file_identifier.length != flatbuffers.FILE_IDENTIFIER_LENGTH) {\n   throw new Error('FlatBuffers: file identifier must be length ' +\n   flatbuffers.FILE_IDENTIFIER_LENGTH);\n   }\n   for (var i = flatbuffers.FILE_IDENTIFIER_LENGTH - 1; i >= 0; i--) {\n   this.writeInt8(file_identifier.charCodeAt(i));\n   }\n }\n this.prep(this.minalign, flatbuffers.SIZEOF_INT + size_prefix);\n this.addOffset(root_table);\n if (size_prefix) {\n   this.addInt32(this.bb.capacity() - this.space);\n }\n this.bb.setPosition(this.space);\n};\n\n/**\n * Finalize a size prefixed buffer, pointing to the given `root_table`.\n *\n * @param {flatbuffers.Offset} root_table\n * @param {string=} opt_file_identifier\n */\nflatbuffers.Builder.prototype.finishSizePrefixed = function (root_table, opt_file_identifier) {\n this.finish(root_table, opt_file_identifier, true);\n};\n\n/// @cond FLATBUFFERS_INTERNAL\n/**\n * This checks a required field has been set in a given table that has\n * just been constructed.\n *\n * @param {flatbuffers.Offset} table\n * @param {number} field\n */\nflatbuffers.Builder.prototype.requiredField = function(table, field) {\n var table_start = this.bb.capacity() -

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table;\n  var vtable_start = table_start - this.bb.readInt32(table_start);\n  var ok = this.bb.readInt16(vtable_start +
field) != 0;\n\n  // If this fails, the caller will show what field needs to be set.\n  if (!ok) {\n    throw new
Error('FlatBuffers: field ' + field + ' must be set');\n  }\n};\n\n/**\n * Start a new array/vector of objects.  Users
usually will not call\n * this directly. The FlatBuffers compiler will create a start/end\n * method for vector types in
generated code.\n *\n * @param {number} elem_size The size of each element in the array\n * @param {number}
num_elems The number of elements in the array\n * @param {number} alignment The alignment of the array\n
*/\nflatbuffers.Builder.prototype.startVector = function(elem_size, num_elems, alignment) {\n  this.notNested();\n
this.vector_num_elems = num_elems;\n  this.prep(flatbuffers.SIZEOF_INT, elem_size * num_elems);\n
this.prep(alignment, elem_size * num_elems); // Just in case alignment > int.\n};\n\n/**\n * Finish off the creation
of an array and all its elements. The array must be\n * created with `startVector`.\n *\n * @returns
{flatbuffers.Offset} The offset at which the newly created array\n * starts.\n
*/\nflatbuffers.Builder.prototype.endVector = function() {\n  this.writeInt32(this.vector_num_elems);\n  return
this.offset();\n};\n/// @endcond\n\n/**\n * Encode the string `s` in the buffer using UTF-8. If a Uint8Array is
passed\n * instead of a string, it is assumed to contain valid UTF-8 encoded data.\n *\n * @param
{string|Uint8Array} s The string to encode\n * @return {flatbuffers.Offset} The offset in the buffer where the
encoded string starts\n */\nflatbuffers.Builder.prototype.createString = function(s) {\n  if (s instanceof Uint8Array)
{\n    var utf8 = s;\n  } else {\n    var utf8 = [];\n    var i = 0;\n\n    while (i < s.length) {\n      var codePoint;\n\n      //
Decode UTF-16\n      var a = s.charCodeAt(i++);\n      if (a < 0xD800 || a >= 0xDC00) {\n        codePoint = a;\n      }
else {\n        var b = s.charCodeAt(i++);\n        codePoint = (a << 10) + b + (0x10000 - (0xD800 << 10) -
0xDC00);\n      }\n\n      // Encode UTF-8\n      if (codePoint < 0x80) {\n        utf8.push(codePoint);\n      } else {\n
  if (codePoint < 0x800) {\n          utf8.push(((codePoint >> 6) & 0x1F) | 0xC0);\n        } else {\n          if (codePoint
< 0x10000) {\n            utf8.push(((codePoint >> 12) & 0x0F) | 0xE0);\n          } else {\n            utf8.push(\n
((codePoint >> 18) & 0x07) | 0xF0,\n              ((codePoint >> 12) & 0x3F) | 0x80);\n          }\n
utf8.push(((codePoint >> 6) & 0x3F) | 0x80);\n        }\n        utf8.push((codePoint & 0x3F) | 0x80);\n      }\n    }\n
}\n\n  this.addInt8(0);\n  this.startVector(1, utf8.length, 1);\n  this.bb.setPosition(this.space -= utf8.length);\n  for
(var i = 0, offset = this.space, bytes = this.bb.bytes(); i < utf8.length; i++) {\n    bytes[offset++] = utf8[i];\n  }\n
return this.endVector();\n};\n\n/**\n * A helper function to avoid generated code depending on this file directly.\n
*\n * @param {number} low\n * @param {number} high\n * @returns {!flatbuffers.Long}\n
*/\nflatbuffers.Builder.prototype.createLong = function(low, high) {\n  return flatbuffers.Long.create(low,
high);\n};\n////////////////////////////////////////////////////////////////////////////////\n/// @cond
FLATBUFFERS_INTERNAL\n/**\n * Create a new ByteBuffer with a given array of bytes (`Uint8Array`).\n *\n *
@constructor\n * @param {Uint8Array} bytes\n */\nflatbuffers.ByteBuffer = function(bytes) {\n  /**\n   * @type
{Uint8Array}\n   * @private\n   */\n  this.bytes_ = bytes;\n\n  /**\n   * @type {number}\n   * @private\n   */\n
this.position_ = 0;\n};\n\n/**\n * Create and allocate a new ByteBuffer with a given size.\n *\n * @param {number}
byte_size\n * @returns {!flatbuffers.ByteBuffer}\n */\nflatbuffers.ByteBuffer.allocate = function(byte_size) {\n
return new flatbuffers.ByteBuffer(new Uint8Array(byte_size));\n};\n\nflatbuffers.ByteBuffer.prototype.clear =
function() {\n  this.position_ = 0;\n};\n\n/**\n * Get the underlying `Uint8Array`.\n *\n * @returns {Uint8Array}\n
*/\nflatbuffers.ByteBuffer.prototype.bytes = function() {\n  return this.bytes_;\n};\n\n/**\n * Get the buffer's
position.\n *\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.position = function() {\n  return
this.position_;\n};\n\n/**\n * Set the buffer's position.\n *\n * @param {number} position\n
*/\nflatbuffers.ByteBuffer.prototype.setPosition = function(position) {\n  this.position_ = position;\n};\n\n/**\n *
Get the buffer's capacity.\n *\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.capacity = function()
{\n  return this.bytes_.length;\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n
*/\nflatbuffers.ByteBuffer.prototype.readInt8 = function(offset) {\n  return this.readUint8(offset) << 24 >>
24;\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n
*/\nflatbuffers.ByteBuffer.prototype.readUint8 = function(offset) {\n  return this.bytes_[offset];\n};\n\n/**\n *
@param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readInt16 =
function(offset) {\n  return this.readUint16(offset) << 16 >> 16;\n};\n\n/**\n * @param {number} offset\n *
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@returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readUint16 = function(offset) {\n return this.bytes_[offset] | this.bytes_[offset + 1] << 8;\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readInt32 = function(offset) {\n return this.bytes_[offset] | this.bytes_[offset + 1] << 8 | this.bytes_[offset + 2] << 16 | this.bytes_[offset + 3] << 24;\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readUint32 = function(offset) {\n return this.readInt32(offset) >>> 0;\n};\n\n/**\n * @param {number} offset\n * @returns {!flatbuffers.Long}\n */\nflatbuffers.ByteBuffer.prototype.readInt64 = function(offset) {\n return new flatbuffers.Long(this.readInt32(offset), this.readInt32(offset + 4));\n};\n\n/**\n * @param {number} offset\n * @returns {!flatbuffers.Long}\n */\nflatbuffers.ByteBuffer.prototype.readUint64 = function(offset) {\n return new flatbuffers.Long(this.readUint32(offset), this.readUint32(offset + 4));\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readFloat32 = function(offset) {\n flatbuffers.int32[0] = this.readInt32(offset);\n return flatbuffers.float32[0];\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readFloat64 = function(offset) {\n flatbuffers.int32[flatbuffers.isLittleEndian ? 0 : 1] = this.readInt32(offset);\n flatbuffers.int32[flatbuffers.isLittleEndian ? 1 : 0] = this.readInt32(offset + 4);\n return flatbuffers.float64[0];\n};\n\n/**\n * @param {number} offset\n * @param {number|boolean} value\n */\nflatbuffers.ByteBuffer.prototype.writeInt8 = function(offset, value) {\n this.bytes_[offset] = /** @type {number} */(value);\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeUint8 = function(offset, value) {\n this.bytes_[offset] = value;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeInt16 = function(offset, value) {\n this.bytes_[offset] = value;\n this.bytes_[offset + 1] = value >> 8;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeUint16 = function(offset, value) {\n   this.bytes_[offset] = value;\n   this.bytes_[offset + 1] = value >> 8;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeInt32 = function(offset, value) {\n this.bytes_[offset] = value;\n this.bytes_[offset + 1] = value >> 8;\n this.bytes_[offset + 2] = value >> 16;\n this.bytes_[offset + 3] = value >> 24;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeUint32 = function(offset, value) {\n   this.bytes_[offset] = value;\n   this.bytes_[offset + 1] = value >> 8;\n   this.bytes_[offset + 2] = value >> 16;\n   this.bytes_[offset + 3] = value >> 24;\n};\n\n/**\n * @param {number} offset\n * @param {flatbuffers.Long} value\n */\nflatbuffers.ByteBuffer.prototype.writeInt64 = function(offset, value) {\n this.writeInt32(offset, value.low);\n this.writeInt32(offset + 4, value.high);\n};\n\n/**\n * @param {number} offset\n * @param {flatbuffers.Long} value\n */\nflatbuffers.ByteBuffer.prototype.writeUint64 = function(offset, value) {\n   this.writeUint32(offset, value.low);\n   this.writeUint32(offset + 4, value.high);\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeFloat32 = function(offset, value) {\n flatbuffers.float32[0] = value;\n this.writeInt32(offset, flatbuffers.int32[0]);\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeFloat64 = function(offset, value) {\n flatbuffers.float64[0] = value;\n this.writeInt32(offset, flatbuffers.int32[flatbuffers.isLittleEndian ? 0 : 1]);\n this.writeInt32(offset + 4, flatbuffers.int32[flatbuffers.isLittleEndian ? 1 : 0]);\n};\n\n/**\n * Return the file identifier.   Behavior is undefined for FlatBuffers whose\n * schema does not include a file_identifier (likely points at padding or the\n * start of a the root vtable).\n * @returns {string}\n */\nflatbuffers.ByteBuffer.prototype.getBufferIdentifier = function() {\n if (this.bytes_.length < this.position_ + flatbuffers.SIZEOF_INT +\n   flatbuffers.FILE_IDENTIFIER_LENGTH) {\n   throw new Error(\n 'FlatBuffers: ByteBuffer is too short to contain an identifier.');\n }\n var result = \"\";\n for (var i = 0; i < flatbuffers.FILE_IDENTIFIER_LENGTH; i++) {\n   result += String.fromCharCode(\n this.readInt8(this.position_ + flatbuffers.SIZEOF_INT + i));\n }\n return result;\n};\n\n/**\n * Look up a field in the vtable, return an offset into the object, or 0 if the\n * field is not present.\n *\n * @param {number} bb_pos\n * @param {number} vtable_offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__offset =

function(bb_pos, vtable_offset) {\n var vtable = bb_pos - this.readInt32(bb_pos);\n return vtable_offset < this.readInt16(vtable) ? this.readInt16(vtable + vtable_offset) : 0;\n};\n\n/**\n * Initialize any Table-derived type to point to the union at the given offset.\n *\n * @param {flatbuffers.Table} t\n * @param {number} offset\n * @returns {flatbuffers.Table}\n */\nflatbuffers.ByteBuffer.prototype.__union = function(t, offset) {\n t.bb_pos = offset + this.readInt32(offset);\n t.bb = this;\n return t;\n};\n\n/**\n * Create a JavaScript string from UTF-8 data stored inside the FlatBuffer.\n * This allocates a new string and converts to wide chars upon each access.\n *\n * To avoid the conversion to UTF-16, pass flatbuffers.Encoding.UTF8_BYTES as\n * the \"optionalEncoding\" argument. This is useful for avoiding conversion to\n * and from UTF-16 when the data will just be packaged back up in another\n * FlatBuffer later on.\n *\n * @param {number} offset\n * @param {flatbuffers.Encoding=} opt_encoding Defaults to UTF16_STRING\n * @returns {string|!Uint8Array}\n */\nflatbuffers.ByteBuffer.prototype.__string = function(offset, opt_encoding) {\n offset += this.readInt32(offset);\n\n var length = this.readInt32(offset);\n var result = '';\n var i = 0;\n\n offset += flatbuffers.SIZEOF_INT;\n\n if (opt_encoding === flatbuffers.Encoding.UTF8_BYTES) {\n   return this.bytes_.subarray(offset, offset + length);\n }\n\n while (i < length) {\n   var codePoint;\n\n   // Decode UTF-8\n   var a = this.readUint8(offset + i++);\n   if (a < 0xC0) {\n   codePoint = a;\n   } else {\n   var b = this.readUint8(offset + i++);\n   if (a < 0xE0) {\n   codePoint =\n   ((a & 0x1F) << 6) |\n   (b & 0x3F);\n   } else {\n   var c = this.readUint8(offset + i++);\n   if (a < 0xF0) {\n   codePoint =\n   ((a & 0x0F) << 12) |\n   ((b & 0x3F) << 6) |\n   (c & 0x3F);\n   } else {\n   var d = this.readUint8(offset + i++);\n   codePoint =\n   ((a & 0x07) << 18) |\n   ((b & 0x3F) << 12) |\n   ((c & 0x3F) << 6) |\n   (d & 0x3F);\n   }\n   }\n   }\n\n   // Encode UTF-16\n   if (codePoint < 0x10000) {\n   result += String.fromCharCode(codePoint);\n   } else {\n   codePoint -= 0x10000;\n   result += String.fromCharCode(\n   (codePoint >> 10) + 0xD800,\n   (codePoint & ((1 << 10) - 1)) + 0xDC00);\n   }\n }\n\n return result;\n};\n\n/**\n * Retrieve the relative offset stored at \"offset\"\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__indirect = function(offset) {\n return offset + this.readInt32(offset);\n};\n\n/**\n * Get the start of data of a vector whose offset is stored at \"offset\" in this object.\n *\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__vector = function(offset) {\n return offset + this.readInt32(offset) + flatbuffers.SIZEOF_INT; // data starts after the length\n};\n\n/**\n * Get the length of a vector whose offset is stored at \"offset\" in this object.\n *\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__vector_len = function(offset) {\n return this.readInt32(offset + this.readInt32(offset));\n};\n\n/**\n * @param {string} ident\n * @returns {boolean}\n */\nflatbuffers.ByteBuffer.prototype.__has_identifier = function(ident) {\n if (ident.length != flatbuffers.FILE_IDENTIFIER_LENGTH) {\n   throw new Error('FlatBuffers: file identifier must be length ' +\n   flatbuffers.FILE_IDENTIFIER_LENGTH);\n }\n for (var i = 0; i < flatbuffers.FILE_IDENTIFIER_LENGTH; i++) {\n   if (ident.charCodeAt(i) != this.readInt8(this.position_ + flatbuffers.SIZEOF_INT + i)) {\n   return false;\n   }\n }\n return true;\n};\n\n/**\n * A helper function to avoid generated code depending on this file directly.\n *\n * @param {number} low\n * @param {number} high\n * @returns {!flatbuffers.Long}\n */\nflatbuffers.ByteBuffer.prototype.createLong = function(low, high) {\n return flatbuffers.Long.create(low, high);\n};\n\n// Exports for Node.js and RequireJS\nexport { flatbuffers };\n\n/// @endcond\n/// @}\n","\"use strict\";\r\nexports.__esModule = true;\r\nvar Guid = /** @class */ (function () {\r\n   function Guid(guid) {\r\n   if (!guid) {\r\n   throw new TypeError(\"Invalid argument; `value` has no value.\");\r\n   }\r\n   this.value = Guid.EMPTY;\r\n   if (guid && Guid.isGuid(guid)) {\r\n   this.value = guid;\r\n   }\r\n   }\r\n   Guid.isGuid = function (guid) {\r\n   var value = guid.toString();\r\n   return guid && (guid instanceof Guid || Guid.validator.test(value));\r\n   };\r\n   Guid.create = function () {\r\n   return new Guid([Guid.gen(2), Guid.gen(1), Guid.gen(1), Guid.gen(1), Guid.gen(3)].join(\"-\"));\r\n   };\r\n   Guid.createEmpty = function () {\r\n   return new Guid(\"emptyguid\");\r\n   };\r\n   Guid.parse = function (guid) {\r\n   return new Guid(guid);\r\n   };\r\n   Guid.raw = function () {\r\n   return [Guid.gen(2), Guid.gen(1), Guid.gen(1), Guid.gen(1), Guid.gen(3)].join(\"-\");\r\n   };\r\n   Guid.gen = function (count) {\r\n   var out = \"\";\r\n   for (var i = 0; i < count; i++) {\r\n   // tslint:disable-next-line:no-bitwise\r\n   out

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+= (((1 + Math.random()) * 0x10000) | 0).toString(16).substring(1);\r\n        }\r\n        return out;\r\n    };\r\n
Guid.prototype.equals = function (other) {\r\n        // Comparing string `value` against provided `guid` will auto-
call\r\n        // toString on `guid` for comparison\r\n        return Guid.isGuid(other) && this.value ===
other.toString();\r\n    };\r\n    Guid.prototype.isEmpty = function () {\r\n        return this.value ===
Guid.EMPTY;\r\n    };\r\n    Guid.prototype.toString = function () {\r\n        return this.value;\r\n    };\r\n
Guid.prototype.toJSON = function () {\r\n        return {\r\n            value: this.value\r\n        };\r\n    };\r\n
Guid.validator = new RegExp(\"^[a-z0-9]{8}-[a-z0-9]{4}-[a-z0-9]{4}-[a-z0-9]{4}-[a-z0-9]{12}$\", \"i\");\r\n
Guid.EMPTY = \"00000000-0000-0000-0000-000000000000\";\r\n    return Guid;\r\n}());\r\nexports.Guid =
Guid;\r\n","module.exports = Long;\r\n\r\n/**\r\n * wasm optimizations, to do native i64 multiplication and
divide\r\n */\r\nvar wasm = null;\r\n\r\ntry {\r\n  wasm = new WebAssembly.Instance(new
WebAssembly.Module(new Uint8Array([\r\n    0, 97, 115, 109, 1, 0, 0, 0, 1, 13, 2, 96, 0, 1, 127, 96, 4, 127, 127,
127, 127, 1, 127, 3, 7, 6, 0, 1, 1, 1, 1, 1, 6, 6, 1, 127, 1, 65, 0, 11, 7, 50, 6, 3, 109, 117, 108, 0, 1, 5, 100, 105, 118, 95,
115, 0, 2, 5, 100, 105, 118, 95, 117, 0, 3, 5, 114, 101, 109, 95, 115, 0, 4, 5, 114, 101, 109, 95, 117, 0, 5, 8, 103, 101,
116, 95, 104, 105, 103, 104, 0, 0, 10, 191, 1, 6, 4, 0, 35, 0, 11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132,
32, 2, 173, 32, 3, 173, 66, 32, 134, 132, 126, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167, 11, 36, 1, 1, 126, 32, 0, 173,
32, 1, 173, 66, 32, 134, 132, 32, 2, 173, 32, 3, 173, 66, 32, 134, 132, 127, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167,
11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132, 32, 2, 173, 32, 3, 173, 66, 32, 134, 132, 128, 34, 4, 66, 32,
135, 167, 36, 0, 32, 4, 167, 11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132, 32, 2, 173, 32, 3, 173, 66, 32,
134, 132, 129, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167, 11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132, 32,
2, 173, 32, 3, 173, 66, 32, 134, 132, 130, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167, 11\r\n  ])), {}).exports;\r\n} catch
(e) {\r\n  // no wasm support :(\r\n}\r\n\r\n/**\r\n * Constructs a 64 bit two's-complement integer, given its low and
high 32 bit values as *signed* integers.\r\n *  See the from* functions below for more convenient ways of
constructing Longs.\r\n * @exports Long\r\n * @class A Long class for representing a 64 bit two's-complement
integer value.\r\n * @param {number} low The low (signed) 32 bits of the long\r\n * @param {number} high The
high (signed) 32 bits of the long\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n
* @constructor\r\n */\r\nfunction Long(low, high, unsigned) {\r\n\r\n    /**\r\n     * The low 32 bits as a signed
value.\r\n     * @type {number}\r\n     */\r\n    this.low = low | 0;\r\n\r\n    /**\r\n     * The high 32 bits as a signed
value.\r\n     * @type {number}\r\n     */\r\n    this.high = high | 0;\r\n\r\n    /**\r\n     * Whether unsigned or not.\r\n
  * @type {boolean}\r\n     */\r\n    this.unsigned = !!unsigned;\r\n}\r\n\r\n// The internal representation of a long is
the two given signed, 32-bit values.\r\n// We use 32-bit pieces because these are the size of integers on which\r\n//
Javascript performs bit-operations.  For operations like addition and\r\n// multiplication, we split each number into
16 bit pieces, which can easily be\r\n// multiplied within Javascript's floating-point representation without
overflow\r\n// or change in sign.\r\n//\r\n// In the algorithms below, we frequently reduce the negative case to
the\r\n// positive case by negating the input(s) and then post-processing the result.\r\n// Note that we must ALWAYS
check specially whether those values are MIN_VALUE\r\n// (-2^63) because -MIN_VALUE == MIN_VALUE
(since 2^63 cannot be represented as\r\n// a positive number, it overflows back into a negative).  Not handling
this\r\n// case would often result in infinite recursion.\r\n//\r\n// Common constant values ZERO, ONE, NEG_ONE,
etc. are defined below the from*\r\n// methods on which they depend.\r\n\r\n\r\n/**\r\n * An indicator used to reliably
determine if an object is a Long or not.\r\n * @type {boolean}\r\n * @const\r\n * @private\r\n
*/\r\nLong.prototype.__isLong__;\r\n\r\nObject.defineProperty(Long.prototype, \"__isLong__\", { value: true
});\r\n\r\n\r\n/**\r\n * @function\r\n * @param {*} obj Object\r\n * @returns {boolean}\r\n * @inner\r\n */\r\nfunction
isLong(obj) {\r\n    return (obj && obj[\"__isLong__\"]) === true;\r\n}\r\n\r\n/**\r\n * Tests if the specified object
is a Long.\r\n * @function\r\n * @param {*} obj Object\r\n * @returns {boolean}\r\n */\r\nLong.isLong =
isLong;\r\n\r\n/**\r\n * A cache of the Long representations of small integer values.\r\n * @type {!Object}\r\n *
@inner\r\n */\r\nvar INT_CACHE = {};\r\n\r\n/**\r\n * A cache of the Long representations of small unsigned
integer values.\r\n * @type {!Object}\r\n * @inner\r\n */\r\nvar UINT_CACHE = {};\r\n\r\n/**\r\n * @param
{number} value\r\n * @param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction
fromInt(value, unsigned) {\r\n    var obj, cachedObj, cache;\r\n    if (unsigned) {\r\n        value >>>= 0;\r\n        if
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(cache = (0 <= value && value < 256)) {\r\n cachedObj = UINT_CACHE[value];\r\n if (cachedObj)\r\n return cachedObj;\r\n }\r\n obj = fromBits(value, (value | 0) < 0 ? -1 : 0, true);\r\n if (cache)\r\n UINT_CACHE[value] = obj;\r\n return obj;\r\n } else {\r\n value |= 0;\r\n if (cache = (-128 <= value && value < 128)) {\r\n cachedObj = INT_CACHE[value];\r\n if (cachedObj)\r\n return cachedObj;\r\n }\r\n obj = fromBits(value, value < 0 ? -1 : 0, false);\r\n if (cache)\r\n INT_CACHE[value] = obj;\r\n return obj;\r\n }\r\n}\r\n\r\n/**\r\n * Returns a Long representing the given 32 bit integer value.\r\n * @function\r\n * @param {number} value The 32 bit integer in question\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long} The corresponding Long value\r\n */\r\nLong.fromInt = fromInt;\r\n\r\n/**\r\n * @param {number} value\r\n * @param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromNumber(value, unsigned) {\r\n if (isNaN(value))\r\n return unsigned ? UZERO : ZERO;\r\n if (unsigned) {\r\n if (value < 0)\r\n return UZERO;\r\n if (value >= TWO_PWR_64_DBL)\r\n return MAX_UNSIGNED_VALUE;\r\n } else {\r\n if (value <= -TWO_PWR_63_DBL)\r\n return MIN_VALUE;\r\n if (value + 1 >= TWO_PWR_63_DBL)\r\n return MAX_VALUE;\r\n }\r\n if (value < 0)\r\n return fromNumber(-value, unsigned).neg();\r\n return fromBits((value % TWO_PWR_32_DBL) | 0, (value / TWO_PWR_32_DBL) | 0, unsigned);\r\n}\r\n\r\n/**\r\n * Returns a Long representing the given value, provided that it is a finite number. Otherwise, zero is returned.\r\n * @function\r\n * @param {number} value The number in question\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long} The corresponding Long value\r\n */\r\nLong.fromNumber = fromNumber;\r\n\r\n/**\r\n * @param {number} lowBits\r\n * @param {number} highBits\r\n * @param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromBits(lowBits, highBits, unsigned) {\r\n return new Long(lowBits, highBits, unsigned);\r\n}\r\n\r\n/**\r\n * Returns a Long representing the 64 bit integer that comes by concatenating the given low and high bits. Each is\r\n * assumed to use 32 bits.\r\n * @function\r\n * @param {number} lowBits The low 32 bits\r\n * @param {number} highBits The high 32 bits\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long} The corresponding Long value\r\n */\r\nLong.fromBits = fromBits;\r\n\r\n/**\r\n * @function\r\n * @param {number} base\r\n * @param {number} exponent\r\n * @returns {number}\r\n * @inner\r\n */\r\nvar pow_dbl = Math.pow; // Used 4 times (4*8 to 15+4)\r\n\r\n/**\r\n * @param {string} str\r\n * @param {(boolean|number)=} unsigned\r\n * @param {number=} radix\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromString(str, unsigned, radix) {\r\n if (str.length === 0)\r\n throw Error('empty string');\r\n if (str === \"NaN\" || str === \"Infinity\" || str === \"+Infinity\" || str === \"-Infinity\")\r\n return ZERO;\r\n if (typeof unsigned === 'number') {\r\n // For goog.math.long compatibility\r\n radix = unsigned,\r\n unsigned = false;\r\n } else {\r\n unsigned = !! unsigned;\r\n }\r\n radix = radix || 10;\r\n if (radix < 2 || 36 < radix)\r\n throw RangeError('radix');\r\n\r\n var p;\r\n if ((p = str.indexOf('-')) > 0)\r\n throw Error('interior hyphen');\r\n else if (p === 0) {\r\n return fromString(str.substring(1), unsigned, radix).neg();\r\n }\r\n\r\n // Do several (8) digits each time through the loop, so as to\r\n // minimize the calls to the very expensive emulated div.\r\n var radixToPower = fromNumber(pow_dbl(radix, 8));\r\n\r\n var result = ZERO;\r\n for (var i = 0; i < str.length; i += 8) {\r\n var size = Math.min(8, str.length - i),\r\n value = parseInt(str.substring(i, i + size), radix);\r\n if (size < 8) {\r\n var power = fromNumber(pow_dbl(radix, size));\r\n result = result.mul(power).add(fromNumber(value));\r\n } else {\r\n result = result.mul(radixToPower);\r\n result = result.add(fromNumber(value));\r\n }\r\n }\r\n result.unsigned = unsigned;\r\n return result;\r\n}\r\n\r\n/**\r\n * Returns a Long representation of the given string, written using the specified radix.\r\n * @function\r\n * @param {string} str The textual representation of the Long\r\n * @param {(boolean|number)=} unsigned Whether unsigned or not, defaults to signed\r\n * @param {number=} radix The radix in which the text is written (2-36), defaults to 10\r\n * @returns {!Long} The corresponding Long value\r\n */\r\nLong.fromString = fromString;\r\n\r\n/**\r\n * @function\r\n * @param {!Long|number|string|!{low: number, high: number, unsigned: boolean}} val\r\n * @param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromValue(val, unsigned) {\r\n if (typeof val === 'number')\r\n return fromNumber(val, unsigned);\r\n if (typeof val === 'string')\r\n   return fromString(val, unsigned);\r\n   // Throws for non-objects, converts non-instanceof Long:\r\n   return fromBits(val.low, val.high, typeof unsigned === 'boolean' ? unsigned : val.unsigned);\r\n}\r\n\r\n/**\r\n * Converts the specified value to a Long using the appropriate from* function for its type.\r\n * @function\r\n * @param {!Long|number|string|!{low: number, high: number, unsigned: boolean}} val Value\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long}\r\n */\r\nLong.fromValue = fromValue;\r\n\r\n// NOTE: the compiler should inline these constant values below and then remove these variables, so there should be\r\n// no runtime penalty for these.\r\n\r\n/**\r\n * @type {number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_16_DBL = 1 << 16;\r\n\r\n/**\r\n * @type {number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_24_DBL = 1 << 24;\r\n\r\n/**\r\n * @type {number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_32_DBL = TWO_PWR_16_DBL * TWO_PWR_16_DBL;\r\n\r\n/**\r\n * @type {number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_64_DBL = TWO_PWR_32_DBL * TWO_PWR_32_DBL;\r\n\r\n/**\r\n * @type {number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_63_DBL = TWO_PWR_64_DBL / 2;\r\n\r\n/**\r\n * @type {!Long}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_24 = fromInt(TWO_PWR_24_DBL);\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar ZERO = fromInt(0);\r\n\r\n/**\r\n * Signed zero.\r\n * @type {!Long}\r\n */\r\nLong.ZERO = ZERO;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar UZERO = fromInt(0, true);\r\n\r\n/**\r\n * Unsigned zero.\r\n * @type {!Long}\r\n */\r\nLong.UZERO = UZERO;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar ONE = fromInt(1);\r\n\r\n/**\r\n * Signed one.\r\n * @type {!Long}\r\n */\r\nLong.ONE = ONE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar UONE = fromInt(1, true);\r\n\r\n/**\r\n * Unsigned one.\r\n * @type {!Long}\r\n */\r\nLong.UONE = UONE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar NEG_ONE = fromInt(-1);\r\n\r\n/**\r\n * Signed negative one.\r\n * @type {!Long}\r\n */\r\nLong.NEG_ONE = NEG_ONE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar MAX_VALUE = fromBits(0xFFFFFFFF|0, 0x7FFFFFFF|0, false);\r\n\r\n/**\r\n * Maximum signed value.\r\n * @type {!Long}\r\n */\r\nLong.MAX_VALUE = MAX_VALUE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar MAX_UNSIGNED_VALUE = fromBits(0xFFFFFFFF|0, 0xFFFFFFFF|0, true);\r\n\r\n/**\r\n * Maximum unsigned value.\r\n * @type {!Long}\r\n */\r\nLong.MAX_UNSIGNED_VALUE = MAX_UNSIGNED_VALUE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar MIN_VALUE = fromBits(0, 0x80000000|0, false);\r\n\r\n/**\r\n * Minimum signed value.\r\n * @type {!Long}\r\n */\r\nLong.MIN_VALUE = MIN_VALUE;\r\n\r\n/**\r\n * @alias Long.prototype\r\n * @inner\r\n */\r\nvar LongPrototype = Long.prototype;\r\n\r\n/**\r\n * Converts the Long to a 32 bit integer, assuming it is a 32 bit integer.\r\n * @returns {number}\r\n */\r\nLongPrototype.toInt = function toInt() {\r\n   return this.unsigned ? this.low >>> 0 : this.low;\r\n};\r\n\r\n/**\r\n * Converts the Long to a the nearest floating-point representation of this value (double, 53 bit mantissa).\r\n * @returns {number}\r\n */\r\nLongPrototype.toNumber = function toNumber() {\r\n   if (this.unsigned)\r\n   return ((this.high >>> 0) * TWO_PWR_32_DBL) + (this.low >>> 0);\r\n   return this.high * TWO_PWR_32_DBL + (this.low >>> 0);\r\n};\r\n\r\n/**\r\n * Converts the Long to a string written in the specified radix.\r\n * @param {number=} radix Radix (2-36), defaults to 10\r\n * @returns {string}\r\n * @override\r\n * @throws {RangeError} If `radix` is out of range\r\n */\r\nLongPrototype.toString = function toString(radix) {\r\n   radix = radix || 10;\r\n   if (radix < 2 || 36 < radix)\r\n   throw RangeError('radix');\r\n   if (this.isZero())\r\n   return '0';\r\n   if (this.isNegative()) { // Unsigned Longs are never negative\r\n   if (this.eq(MIN_VALUE)) {\r\n   // We need to change the Long value before it can be negated, so we remove\r\n   // the bottom-most digit in this base and then recurse to do the rest.\r\n   var radixLong = fromNumber(radix),\r\n   div = this.div(radixLong),\r\n   rem1 = div.mul(radixLong).sub(this);\r\n   return div.toString(radix) + rem1.toInt().toString(radix);\r\n   } else\r\n   return '-' + this.neg().toString(radix);\r\n   }\r\n\r\n   // Do several (6) digits each time through the loop, so as to\r\n   // minimize the calls to the very expensive emulated div.\r\n   var radixToPower = fromNumber(pow_dbl(radix, 6), this.unsigned),\r\n   rem = this;\r\n   var result = '';\r\n   while (true) {\r\n   var remDiv = rem.div(radixToPower),\r\n   intval = rem.sub(remDiv.mul(radixToPower)).toInt() >>> 0,\r\n   digits = intval.toString(radix);\r\n   rem = remDiv;\r\n   if (rem.isZero())\r\n   return digits + result;\r\n else {\r\n   while (digits.length < 6)\r\n   digits = '0' + digits;\r\n   result = '' + digits + result;\r\n   }\r\n   }\r\n};\r\n\r\n/**\r\n * Gets the high 32 bits as a signed integer.\r\n * @returns {number} Signed high bits\r\n */\r\nLongPrototype.getHighBits = function getHighBits() {\r\n   return this.high;\r\n};\r\n\r\n/**\r\n * Gets the high 32 bits as an unsigned integer.\r\n * @returns {number} Unsigned high bits\r\n */\r\nLongPrototype.getHighBitsUnsigned = function getHighBitsUnsigned() {\r\n   return this.high >>> 0;\r\n};\r\n\r\n/**\r\n * Gets the low 32 bits as a signed integer.\r\n * @returns {number} Signed low bits\r\n */\r\nLongPrototype.getLowBits = function getLowBits() {\r\n   return this.low;\r\n};\r\n\r\n/**\r\n * Gets the low 32 bits as an unsigned integer.\r\n * @returns {number} Unsigned low bits\r\n */\r\nLongPrototype.getLowBitsUnsigned = function getLowBitsUnsigned() {\r\n   return this.low >>> 0;\r\n};\r\n\r\n/**\r\n * Gets the number of bits needed to represent the absolute value of this Long.\r\n * @returns {number}\r\n */\r\nLongPrototype.getNumBitsAbs = function getNumBitsAbs() {\r\n   if (this.isNegative()) // Unsigned Longs are never negative\r\n   return this.eq(MIN_VALUE) ? 64 : this.neg().getNumBitsAbs();\r\n   var val = this.high != 0 ? this.high : this.low;\r\n   for (var bit = 31; bit > 0; bit--)\r\n   if ((val & (1 << bit)) != 0)\r\n   break;\r\n   return this.high != 0 ? bit + 33 : bit + 1;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value equals zero.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isZero = function isZero() {\r\n   return this.high === 0 && this.low === 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value equals zero. This is an alias of {@link Long#isZero}.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.eqz = LongPrototype.isZero;\r\n\r\n/**\r\n * Tests if this Long's value is negative.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isNegative = function isNegative() {\r\n   return !this.unsigned && this.high < 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is positive.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isPositive = function isPositive() {\r\n   return this.unsigned || this.high >= 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is odd.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isOdd = function isOdd() {\r\n   return (this.low & 1) === 1;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is even.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isEven = function isEven() {\r\n   return (this.low & 1) === 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value equals the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.equals = function equals(other) {\r\n   if (!isLong(other))\r\n   other = fromValue(other);\r\n   if (this.unsigned !== other.unsigned && (this.high >>> 31) === 1 && (other.high >>> 31) === 1)\r\n   return false;\r\n   return this.high === other.high && this.low === other.low;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value equals the specified's. This is an alias of {@link Long#equals}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.eq = LongPrototype.equals;\r\n\r\n/**\r\n * Tests if this Long's value differs from the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.notEquals = function notEquals(other) {\r\n   return !this.eq(/* validates */ other);\r\n};\r\n\r\n/**\r\n * Tests if this Long's value differs from the specified's. This is an alias of {@link Long#notEquals}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.neq = LongPrototype.notEquals;\r\n\r\n/**\r\n * Tests if this Long's value differs from the specified's. This is an alias of {@link Long#notEquals}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.ne = LongPrototype.notEquals;\r\n\r\n/**\r\n * Tests if this Long's value is less than the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.lessThan = function lessThan(other) {\r\n   return this.comp(/* validates */ other) < 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is less than the specified's. This is an alias of {@link Long#lessThan}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.lt = LongPrototype.lessThan;\r\n\r\n/**\r\n * Tests if this Long's value is less than or equal the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.lessThanOrEqual = function lessThanOrEqual(other) {\r\n   return this.comp(/* validates */ other) <= 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is less than or equal the specified's. This is an alias of {@link Long#lessThanOrEqual}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.lte = LongPrototype.lessThanOrEqual;\r\n\r\n/**\r\n * Tests if this Long's value is less than or equal the specified's. This is an alias of {@link Long#lessThanOrEqual}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.le = LongPrototype.lessThanOrEqual;\r\n\r\n/**\r\n * Tests if this Long's value is greater than the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.greaterThan = function greaterThan(other) {\r\n   return this.comp(/* validates */ other) > 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is greater than the specified's. This is an alias of {@link Long#greaterThan}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.gt = LongPrototype.greaterThan;\r\n\r\n/**\r\n * Tests if this Long's value is greater than or equal the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.greaterThanOrEqual = function greaterThanOrEqual(other) {\r\n   return this.comp(/* validates */ other) >= 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is greater than or equal the specified's. This is an alias of {@link Long#greaterThanOrEqual}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.gte = LongPrototype.greaterThanOrEqual;\r\n\r\n/**\r\n * Tests if this Long's value is greater than or equal the specified's. This is an alias of {@link Long#greaterThanOrEqual}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.ge = LongPrototype.greaterThanOrEqual;\r\n\r\n/**\r\n * Compares this Long's value with the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {number} 0 if they are the same, 1 if the this is greater and -1\r\n * if the given one is greater\r\n */\r\nLongPrototype.compare = function compare(other) {\r\n   if (!isLong(other))\r\n   other = fromValue(other);\r\n   if (this.eq(other))\r\n   return 0;\r\n   var thisNeg = this.isNegative(),\r\n   otherNeg = other.isNegative();\r\n   if (thisNeg && !otherNeg)\r\n   return -1;\r\n   if (!thisNeg && otherNeg)\r\n   return 1;\r\n   // At this point the sign bits are the same\r\n   if (!this.unsigned)\r\n   return this.sub(other).isNegative() ? -1 : 1;\r\n   // Both are positive if at least one is unsigned\r\n   return (other.high >>> 0) > (this.high >>> 0) || (other.high === this.high && (other.low >>> 0) > (this.low >>> 0)) ? -1 : 1;\r\n};\r\n\r\n/**\r\n * Compares this Long's value with the specified's. This is an alias of {@link Long#compare}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {number} 0 if they are the same, 1 if the this is greater and -1\r\n * if the given one is greater\r\n */\r\nLongPrototype.comp = LongPrototype.compare;\r\n\r\n/**\r\n * Negates this Long's value.\r\n * @returns {!Long} Negated Long\r\n */\r\nLongPrototype.negate = function negate() {\r\n   if (!this.unsigned && this.eq(MIN_VALUE))\r\n   return MIN_VALUE;\r\n   return this.not().add(ONE);\r\n};\r\n\r\n/**\r\n * Negates this Long's value. This is an alias of {@link Long#negate}.\r\n * @function\r\n * @returns {!Long} Negated Long\r\n */\r\nLongPrototype.neg = LongPrototype.negate;\r\n\r\n/**\r\n * Returns the sum of this and the specified Long.\r\n * @param {!Long|number|string} addend Addend\r\n * @returns {!Long} Sum\r\n */\r\nLongPrototype.add = function add(addend) {\r\n   if (!isLong(addend))\r\n   addend = fromValue(addend);\r\n\r\n   // Divide each number into 4 chunks of 16 bits, and then sum the chunks.\r\n\r\n   var a48 = this.high >>> 16;\r\n   var a32 = this.high & 0xFFFF;\r\n   var a16 = this.low >>> 16;\r\n   var a00 = this.low & 0xFFFF;\r\n\r\n   var b48 = addend.high >>> 16;\r\n   var b32 = addend.high & 0xFFFF;\r\n   var b16 = addend.low >>> 16;\r\n   var b00 = addend.low & 0xFFFF;\r\n\r\n   var c48 = 0, c32 = 0, c16 = 0, c00 = 0;\r\n   c00 += a00 + b00;\r\n   c16 += c00 >>> 16;\r\n   c00 &= 0xFFFF;\r\n   c16 += a16 + b16;\r\n   c32 += c16 >>> 16;\r\n   c16 &= 0xFFFF;\r\n   c32 += a32 + b32;\r\n   c48 += c32 >>> 16;\r\n   c32 &= 0xFFFF;\r\n   c48 += a48 + b48;\r\n   c48 &= 0xFFFF;\r\n   return fromBits((c16 << 16) | c00, (c48 << 16) | c32, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the difference of this and the specified Long.\r\n * @param {!Long|number|string} subtrahend Subtrahend\r\n * @returns {!Long} Difference\r\n */\r\nLongPrototype.subtract = function subtract(subtrahend) {\r\n   if (!isLong(subtrahend))\r\n   subtrahend = fromValue(subtrahend);\r\n   return this.add(subtrahend.neg());\r\n};\r\n\r\n/**\r\n * Returns the difference of this and the specified Long. This is an alias of {@link Long#subtract}.\r\n * @function\r\n * @param {!Long|number|string} subtrahend Subtrahend\r\n * @returns {!Long} Difference\r\n */\r\nLongPrototype.sub = LongPrototype.subtract;\r\n\r\n/**\r\n * Returns the product of this and the specified Long.\r\n * @param {!Long|number|string} multiplier Multiplier\r\n * @returns {!Long} Product\r\n */\r\nLongPrototype.multiply = function multiply(multiplier) {\r\n   if (this.isZero())\r\n return ZERO;\r\n if (!isLong(multiplier))\r\n multiplier = fromValue(multiplier);\r\n\r\n // use wasm support if present\r\n if (wasm) {\r\n var low = wasm.mul(this.low,\r\n this.high,\r\n multiplier.low,\r\n multiplier.high);\r\n return fromBits(low, wasm.get_high(), this.unsigned);\r\n }\r\n\r\n if (multiplier.isZero())\r\n return ZERO;\r\n if (this.eq(MIN_VALUE))\r\n return multiplier.isOdd() ? MIN_VALUE : ZERO;\r\n if (multiplier.eq(MIN_VALUE))\r\n return this.isOdd() ? MIN_VALUE : ZERO;\r\n\r\n if (this.isNegative()) {\r\n if (multiplier.isNegative())\r\n return this.neg().mul(multiplier.neg());\r\n else\r\n return this.neg().mul(multiplier).neg();\r\n } else if (multiplier.isNegative())\r\n return this.mul(multiplier.neg()).neg();\r\n\r\n // If both longs are small, use float multiplication\r\n if (this.lt(TWO_PWR_24) && multiplier.lt(TWO_PWR_24))\r\n return fromNumber(this.toNumber() * multiplier.toNumber(), this.unsigned);\r\n\r\n // Divide each long into 4 chunks of 16 bits, and then add up 4x4 products.\r\n // We can skip products that would overflow.\r\n\r\n var a48 = this.high >>> 16;\r\n var a32 = this.high & 0xFFFF;\r\n var a16 = this.low >>> 16;\r\n var a00 = this.low & 0xFFFF;\r\n\r\n var b48 = multiplier.high >>> 16;\r\n var b32 = multiplier.high & 0xFFFF;\r\n var b16 = multiplier.low >>> 16;\r\n var b00 = multiplier.low & 0xFFFF;\r\n\r\n var c48 = 0, c32 = 0, c16 = 0, c00 = 0;\r\n c00 += a00 * b00;\r\n c16 += c00 >>> 16;\r\n c00 &= 0xFFFF;\r\n c16 += a16 * b00;\r\n c32 += c16 >>> 16;\r\n c16 &= 0xFFFF;\r\n c16 += a00 * b16;\r\n c32 += c16 >>> 16;\r\n c16 &= 0xFFFF;\r\n c32 += a32 * b00;\r\n c48 += c32 >>> 16;\r\n c32 &= 0xFFFF;\r\n c32 += a16 * b16;\r\n c48 += c32 >>> 16;\r\n c32 &= 0xFFFF;\r\n c32 += a00 * b32;\r\n c48 += c32 >>> 16;\r\n c32 &= 0xFFFF;\r\n c48 += a48 * b00 + a32 * b16 + a16 * b32 + a00 * b48;\r\n c48 &= 0xFFFF;\r\n return fromBits((c16 << 16) | c00, (c48 << 16) | c32, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the product of this and the specified Long. This is an alias of {@link Long#multiply}.\r\n * @function\r\n * @param {!Long|number|string} multiplier Multiplier\r\n * @returns {!Long} Product\r\n */\r\nLongPrototype.mul = LongPrototype.multiply;\r\n\r\n/**\r\n * Returns this Long divided by the specified. The result is signed if this Long is signed or\r\n * unsigned if this Long is unsigned.\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Quotient\r\n */\r\nLongPrototype.divide = function divide(divisor) {\r\n if (!isLong(divisor))\r\n divisor = fromValue(divisor);\r\n if (divisor.isZero())\r\n throw Error('division by zero');\r\n\r\n // use wasm support if present\r\n if (wasm) {\r\n // guard against signed division overflow: the largest\r\n // negative number / -1 would be 1 larger than the largest\r\n // positive number, due to two's complement.\r\n if (!this.unsigned &&\r\n this.high === -0x80000000 &&\r\n divisor.low === -1 && divisor.high === -1) {\r\n // be consistent with non-wasm code path\r\n return this;\r\n }\r\n var low = (this.unsigned ? wasm.div_u : wasm.div_s)(\r\n this.low,\r\n this.high,\r\n divisor.low,\r\n divisor.high\r\n);\r\n return fromBits(low, wasm.get_high(), this.unsigned);\r\n }\r\n\r\n if (this.isZero())\r\n return this.unsigned ? UZERO : ZERO;\r\n var approx, rem, res;\r\n if (!this.unsigned) {\r\n // This section is only relevant for signed longs and is derived from the\r\n // closure library as a whole.\r\n if (this.eq(MIN_VALUE)) {\r\n if (divisor.eq(ONE) || divisor.eq(NEG_ONE))\r\n return MIN_VALUE; // recall that -MIN_VALUE == MIN_VALUE\r\n else if (divisor.eq(MIN_VALUE))\r\n return ONE;\r\n else {\r\n // At this point, we have |other| >= 2, so |this/other| < |MIN_VALUE|.\r\n var halfThis = this.shr(1);\r\n approx = halfThis.div(divisor).shl(1);\r\n if (approx.eq(ZERO)) {\r\n return divisor.isNegative() ? ONE : NEG_ONE;\r\n } else {\r\n rem = this.sub(divisor.mul(approx));\r\n res = approx.add(rem.div(divisor));\r\n return res;\r\n }\r\n }\r\n } else if (divisor.eq(MIN_VALUE))\r\n return this.unsigned ? UZERO : ZERO;\r\n if (this.isNegative()) {\r\n if (divisor.isNegative())\r\n return this.neg().div(divisor.neg());\r\n return this.neg().div(divisor).neg();\r\n } else if (divisor.isNegative())\r\n return this.div(divisor.neg()).neg();\r\n res = ZERO;\r\n } else {\r\n // The algorithm below has not been made for unsigned longs. It's therefore\r\n // required to take special care of the MSB prior to running it.\r\n if (!divisor.unsigned)\r\n divisor = divisor.toUnsigned();\r\n if (divisor.gt(this))\r\n return UZERO;\r\n if (divisor.gt(this.shru(1))) // 15 >>> 1 = 7 ; with divisor = 8 ; true\r\n return UONE;\r\n res = UZERO;\r\n }\r\n\r\n // Repeat the following until the remainder is less than other: find a\r\n // floating-point that

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approximates remainder / other *from below*, add this\r\n    // into the result, and subtract it from the remainder.  It
is critical that\r\n    // the approximate value is less than or equal to the real value so that the\r\n    // remainder never
becomes negative.\r\n    rem = this;\r\n    while (rem.gte(divisor)) {\r\n        // Approximate the result of division.
This may be a little greater or\r\n        // smaller than the actual value.\r\n        approx = Math.max(1,
Math.floor(rem.toNumber() / divisor.toNumber()));\r\n\r\n        // We will tweak the approximate result by changing
it in the 48-th digit or\r\n        // the smallest non-fractional digit, whichever is larger.\r\n        var log2 =
Math.ceil(Math.log(approx) / Math.LN2),\r\n            delta = (log2 <= 48) ? 1 : pow_dbl(2, log2 - 48),\r\n\r\n        //
Decrease the approximation until it is smaller than the remainder.  Note\r\n        // that if it is too large, the product
overflows and is negative.\r\n            approxRes = fromNumber(approx),\r\n            approxRem =
approxRes.mul(divisor);\r\n        while (approxRem.isNegative() || approxRem.gt(rem)) {\r\n            approx -=
delta;\r\n            approxRes = fromNumber(approx, this.unsigned);\r\n            approxRem =
approxRes.mul(divisor);\r\n        }\r\n\r\n        // We know the answer can't be zero... and actually, zero would
cause\r\n        // infinite recursion since we would make no progress.\r\n        if (approxRes.isZero())\r\n
approxRes = ONE;\r\n\r\n        res = res.add(approxRes);\r\n        rem = rem.sub(approxRem);\r\n    }\r\n    return
res;\r\n};\r\n\r\n/**\r\n * Returns this Long divided by the specified. This is an alias of {@link Long#divide}.\r\n *
@function\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Quotient\r\n
*/\r\nLongPrototype.div = LongPrototype.divide;\r\n\r\n/**\r\n * Returns this Long modulo the specified.\r\n *
@param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Remainder\r\n */\r\nLongPrototype.modulo
= function modulo(divisor) {\r\n    if (!isLong(divisor))\r\n        divisor = fromValue(divisor);\r\n\r\n    // use wasm
support if present\r\n    if (wasm) {\r\n        var low = (this.unsigned ? wasm.rem_u : wasm.rem_s)(\r\n
this.low,\r\n            this.high,\r\n            divisor.low,\r\n            divisor.high\r\n        );\r\n        return fromBits(low,
wasm.get_high(), this.unsigned);\r\n    }\r\n\r\n    return this.sub(this.div(divisor).mul(divisor));\r\n};\r\n\r\n/**\r\n *
Returns this Long modulo the specified. This is an alias of {@link Long#modulo}.\r\n * @function\r\n * @param
{!Long|number|string} divisor Divisor\r\n * @returns {!Long} Remainder\r\n */\r\nLongPrototype.mod =
LongPrototype.modulo;\r\n\r\n/**\r\n * Returns this Long modulo the specified. This is an alias of {@link
Long#modulo}.\r\n * @function\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long}
Remainder\r\n */\r\nLongPrototype.rem = LongPrototype.modulo;\r\n\r\n/**\r\n * Returns the bitwise NOT of this
Long.\r\n * @returns {!Long}\r\n */\r\nLongPrototype.not = function not() {\r\n    return fromBits(~this.low,
~this.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the bitwise AND of this Long and the specified.\r\n *
@param {!Long|number|string} other Other Long\r\n * @returns {!Long}\r\n */\r\nLongPrototype.and = function
and(other) {\r\n    if (!isLong(other))\r\n        other = fromValue(other);\r\n    return fromBits(this.low & other.low,
this.high & other.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the bitwise OR of this Long and the
specified.\r\n * @param {!Long|number|string} other Other Long\r\n * @returns {!Long}\r\n
*/\r\nLongPrototype.or = function or(other) {\r\n    if (!isLong(other))\r\n        other = fromValue(other);\r\n    return
fromBits(this.low | other.low, this.high | other.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the bitwise XOR of
this Long and the given one.\r\n * @param {!Long|number|string} other Other Long\r\n * @returns {!Long}\r\n
*/\r\nLongPrototype.xor = function xor(other) {\r\n    if (!isLong(other))\r\n        other = fromValue(other);\r\n
return fromBits(this.low ^ other.low, this.high ^ other.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns this Long
with bits shifted to the left by the given amount.\r\n * @param {number|!Long} numBits Number of bits\r\n *
@returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shiftLeft = function shiftLeft(numBits) {\r\n    if
(isLong(numBits))\r\n        numBits = numBits.toInt();\r\n    if ((numBits &= 63) === 0)\r\n        return this;\r\n
else if (numBits < 32)\r\n        return fromBits(this.low << numBits, (this.high << numBits) | (this.low >>> (32 -
numBits)), this.unsigned);\r\n    else\r\n        return fromBits(0, this.low << (numBits - 32),
this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns this Long with bits shifted to the left by the given amount. This is an
alias of {@link Long#shiftLeft}.\r\n * @function\r\n * @param {number|!Long} numBits Number of bits\r\n *
@returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shl = LongPrototype.shiftLeft;\r\n\r\n/**\r\n * Returns this
Long with bits arithmetically shifted to the right by the given amount.\r\n * @param {number|!Long} numBits
Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shiftRight = function
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shiftRight(numBits) {\r\n   if (isLong(numBits))\r\n   numBits = numBits.toInt();\r\n   if ((numBits &= 63) === 0)\r\n   return this;\r\n   else if (numBits < 32)\r\n   return fromBits((this.low >>> numBits) | (this.high << (32 - numBits)), this.high >> numBits, this.unsigned);\r\n   else\r\n   return fromBits(this.high >> (numBits - 32), this.high >= 0 ? 0 : -1, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns this Long with bits arithmetically shifted to the right by the given amount. This is an alias of {@link Long#shiftRight}.\r\n * @function\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shr = LongPrototype.shiftRight;\r\n\r\n/**\r\n * Returns this Long with bits logically shifted to the right by the given amount.\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shiftRightUnsigned = function shiftRightUnsigned(numBits) {\r\n   if (isLong(numBits))\r\n   numBits = numBits.toInt();\r\n   numBits &= 63;\r\n   if (numBits === 0)\r\n   return this;\r\n   else {\r\n   var high = this.high;\r\n   if (numBits < 32) {\r\n   var low = this.low;\r\n   return fromBits((low >>> numBits) | (high << (32 - numBits)), high >>> numBits, this.unsigned);\r\n   } else if (numBits === 32)\r\n   return fromBits(high, 0, this.unsigned);\r\n   else\r\n   return fromBits(high >>> (numBits - 32), 0, this.unsigned);\r\n   }\r\n};\r\n\r\n/**\r\n * Returns this Long with bits logically shifted to the right by the given amount. This is an alias of {@link Long#shiftRightUnsigned}.\r\n * @function\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shru = LongPrototype.shiftRightUnsigned;\r\n\r\n/**\r\n * Returns this Long with bits logically shifted to the right by the given amount. This is an alias of {@link Long#shiftRightUnsigned}.\r\n * @function\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shr_u = LongPrototype.shiftRightUnsigned;\r\n\r\n/**\r\n * Converts this Long to signed.\r\n * @returns {!Long} Signed long\r\n */\r\nLongPrototype.toSigned = function toSigned() {\r\n   if (!this.unsigned)\r\n   return this;\r\n   return fromBits(this.low, this.high, false);\r\n};\r\n\r\n/**\r\n * Converts this Long to unsigned.\r\n * @returns {!Long} Unsigned long\r\n */\r\nLongPrototype.toUnsigned = function toUnsigned() {\r\n   if (this.unsigned)\r\n   return this;\r\n   return fromBits(this.low, this.high, true);\r\n};\r\n\r\n/**\r\n * Converts this Long to its byte representation.\r\n * @param {boolean=} le Whether little or big endian, defaults to big endian\r\n * @returns {!Array.<number>} Byte representation\r\n */\r\nLongPrototype.toBytes = function toBytes(le) {\r\n   return le ? this.toBytesLE() : this.toBytesBE();\r\n};\r\n\r\n/**\r\n * Converts this Long to its little endian byte representation.\r\n * @returns {!Array.<number>} Little endian byte representation\r\n */\r\nLongPrototype.toBytesLE = function toBytesLE() {\r\n   var hi = this.high,\r\n   lo = this.low;\r\n   return [\r\n   lo   & 0xff,\r\n   lo >>> 8 & 0xff,\r\n   lo >>> 16 & 0xff,\r\n   lo >>> 24   ,\r\n   hi   & 0xff,\r\n   hi >>> 8 & 0xff,\r\n   hi >>> 16 & 0xff,\r\n   hi >>> 24\r\n   ];\r\n};\r\n\r\n/**\r\n * Converts this Long to its big endian byte representation.\r\n * @returns {!Array.<number>} Big endian byte representation\r\n */\r\nLongPrototype.toBytesBE = function toBytesBE() {\r\n   var hi = this.high,\r\n   lo = this.low;\r\n   return [\r\n   hi >>> 24   ,\r\n   hi >>> 16 & 0xff,\r\n   hi >>> 8 & 0xff,\r\n   hi   & 0xff,\r\n   lo >>> 24   ,\r\n   lo >>> 16 & 0xff,\r\n   lo >>> 8 & 0xff,\r\n   lo   & 0xff\r\n   ];\r\n};\r\n\r\n/**\r\n * Creates a Long from its byte representation.\r\n * @param {!Array.<number>} bytes Byte representation\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @param {boolean=} le Whether little or big endian, defaults to big endian\r\n * @returns {Long} The corresponding Long value\r\n */\r\nLong.fromBytes = function fromBytes(bytes, unsigned, le) {\r\n   return le ? Long.fromBytesLE(bytes, unsigned) : Long.fromBytesBE(bytes, unsigned);\r\n};\r\n\r\n/**\r\n * Creates a Long from its little endian byte representation.\r\n * @param {!Array.<number>} bytes Little endian byte representation\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {Long} The corresponding Long value\r\n */\r\nLong.fromBytesLE = function fromBytesLE(bytes, unsigned) {\r\n   return new Long(\r\n   bytes[0] |\r\n   bytes[1] << 8 |\r\n   bytes[2] << 16 |\r\n   bytes[3] << 24,\r\n   bytes[4] |\r\n   bytes[5] << 8 |\r\n   bytes[6] << 16 |\r\n   bytes[7] << 24,\r\n   unsigned\r\n   );\r\n};\r\n\r\n/**\r\n * Creates a Long from its big endian byte representation.\r\n * @param {!Array.<number>} bytes Big endian byte representation\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {Long} The corresponding Long value\r\n */\r\nLong.fromBytesBE = function fromBytesBE(bytes, unsigned) {\r\n return new Long(\r\n bytes[4] << 24 |\r\n bytes[5] << 16 |\r\n bytes[6] << 8 |\r\n bytes[7],\r\n bytes[0] << 24 |\r\n bytes[1] << 16 |\r\n bytes[2] << 8 |\r\n bytes[3],\r\n unsigned\r\n);\r\n};\r\n","/*eslint-disable block-scoped-var, id-length, no-control-regex, no-magic-numbers, no-prototype-builtins, no-redeclare, no-shadow, no-var, sort-vars*/\n\"use strict\";\n\nvar $protobuf = require(\"protobufjs/minimal\");\n\n// Common aliases\nvar $Reader = $protobuf.Reader, $Writer = $protobuf.Writer, $util = $protobuf.util;\n\n// Exported root namespace\nvar $root = $protobuf.roots[\"default\"] || ($protobuf.roots[\"default\"] = {});\n\n$root.onnx = (function() {\n\n /**\n * Namespace onnx.\n * @exports onnx\n * @namespace\n */\n var onnx = {};\n\n /**\n * Version enum.\n * @name onnx.Version\n * @enum {string}\n * @property {number} _START_VERSION=0 _START_VERSION value\n * @property {number} IR_VERSION_2017_10_10=1 IR_VERSION_2017_10_10 value\n * @property {number} IR_VERSION_2017_10_30=2 IR_VERSION_2017_10_30 value\n * @property {number} IR_VERSION_2017_11_3=3 IR_VERSION_2017_11_3 value\n * @property {number} IR_VERSION_2019_1_22=4 IR_VERSION_2019_1_22 value\n * @property {number} IR_VERSION=5 IR_VERSION value\n */\n onnx.Version = (function() {\n var valuesById = {}, values = Object.create(valuesById);\n values[valuesById[0] = \"_START_VERSION\"] = 0;\n values[valuesById[1] = \"IR_VERSION_2017_10_10\"] = 1;\n values[valuesById[2] = \"IR_VERSION_2017_10_30\"] = 2;\n values[valuesById[3] = \"IR_VERSION_2017_11_3\"] = 3;\n values[valuesById[4] = \"IR_VERSION_2019_1_22\"] = 4;\n values[valuesById[5] = \"IR_VERSION\"] = 5;\n return values;\n })();\n\n onnx.AttributeProto = (function() {\n\n /**\n * Properties of an AttributeProto.\n * @memberof onnx\n * @interface IAttributeProto\n * @property {string|null} [name] AttributeProto name\n * @property {string|null} [refAttrName] AttributeProto refAttrName\n * @property {string|null} [docString] AttributeProto docString\n * @property {onnx.AttributeProto.AttributeType|null} [type] AttributeProto type\n * @property {number|null} [f] AttributeProto f\n * @property {number|Long|null} [i] AttributeProto i\n * @property {Uint8Array|null} [s] AttributeProto s\n * @property {onnx.ITensorProto|null} [t] AttributeProto t\n * @property {onnx.IGraphProto|null} [g] AttributeProto g\n * @property {Array.<number>|null} [floats] AttributeProto floats\n * @property {Array.<number|Long>|null} [ints] AttributeProto ints\n * @property {Array.<Uint8Array>|null} [strings] AttributeProto strings\n * @property {Array.<onnx.ITensorProto>|null} [tensors] AttributeProto tensors\n * @property {Array.<onnx.IGraphProto>|null} [graphs] AttributeProto graphs\n */\n\n /**\n * Constructs a new AttributeProto.\n * @memberof onnx\n * @classdesc Represents an AttributeProto.\n * @implements IAttributeProto\n * @constructor\n * @param {onnx.IAttributeProto=} [properties] Properties to set\n */\n function AttributeProto(properties) {\n this.floats = [];\n this.ints = [];\n this.strings = [];\n this.tensors = [];\n this.graphs = [];\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * AttributeProto name.\n * @member {string} name\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.name = \"\";\n\n /**\n * AttributeProto refAttrName.\n * @member {string} refAttrName\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.refAttrName = \"\";\n\n /**\n * AttributeProto docString.\n * @member {string} docString\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.docString = \"\";\n\n /**\n * AttributeProto type.\n * @member {onnx.AttributeProto.AttributeType} type\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.type = 0;\n\n /**\n * AttributeProto f.\n * @member {number} f\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.f = 0;\n\n /**\n * AttributeProto i.\n * @member {number|Long} i\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.i = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n /**\n * AttributeProto s.\n * @member {Uint8Array} s\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.s = $util.newBuffer([]);\n\n /**\n * AttributeProto t.\n

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   * @member {onnx.ITensorProto|null|undefined} t\n         * @memberof onnx.AttributeProto\n         *
@instance\n         */\n        AttributeProto.prototype.t = null;\n\n        /**\n         * AttributeProto g.\n         *
@member {onnx.IGraphProto|null|undefined} g\n         * @memberof onnx.AttributeProto\n         * @instance\n
 */\n        AttributeProto.prototype.g = null;\n\n        /**\n         * AttributeProto floats.\n         * @member
{Array.<number>} floats\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.floats = $util.emptyArray;\n\n        /**\n         * AttributeProto ints.\n         * @member
{Array.<number|Long>} ints\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.ints = $util.emptyArray;\n\n        /**\n         * AttributeProto strings.\n         * @member
{Array.<Uint8Array>} strings\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.strings = $util.emptyArray;\n\n        /**\n         * AttributeProto tensors.\n         * @member
{Array.<onnx.ITensorProto>} tensors\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.tensors = $util.emptyArray;\n\n        /**\n         * AttributeProto graphs.\n         * @member
{Array.<onnx.IGraphProto>} graphs\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.graphs = $util.emptyArray;\n\n        /**\n         * Creates a new AttributeProto instance
using the specified properties.\n         * @function create\n         * @memberof onnx.AttributeProto\n         *
@static\n         * @param {onnx.IAttributeProto=} [properties] Properties to set\n         * @returns
{onnx.AttributeProto} AttributeProto instance\n         */\n        AttributeProto.create = function create(properties) {\n
         return new AttributeProto(properties);\n        };\n\n        /**\n         * Encodes the specified AttributeProto
message. Does not implicitly {@link onnx.AttributeProto.verify|verify} messages.\n         * @function encode\n
* @memberof onnx.AttributeProto\n         * @static\n         * @param {onnx.IAttributeProto} message
AttributeProto message or plain object to encode\n         * @param {$protobuf.Writer} [writer] Writer to encode
to\n         * @returns {$protobuf.Writer} Writer\n         */\n        AttributeProto.encode = function encode(message,
writer) {\n            if (!writer)\n                writer = $Writer.create();\n            if (message.name != null &&
message.hasOwnProperty(\"name\"))\n                writer.uint32(/* id 1, wireType 2 =*/10).string(message.name);\n
      if (message.f != null && message.hasOwnProperty(\"f\"))\n                writer.uint32(/* id 2, wireType 5
=*/21).float(message.f);\n            if (message.i != null && message.hasOwnProperty(\"i\"))\n
writer.uint32(/* id 3, wireType 0 =*/24).int64(message.i);\n            if (message.s != null &&
message.hasOwnProperty(\"s\"))\n                writer.uint32(/* id 4, wireType 2 =*/34).bytes(message.s);\n            if
(message.t != null && message.hasOwnProperty(\"t\"))\n                $root.onnx.TensorProto.encode(message.t,
writer.uint32(/* id 5, wireType 2 =*/42).fork()).ldelim();\n            if (message.g != null &&
message.hasOwnProperty(\"g\"))\n                $root.onnx.GraphProto.encode(message.g, writer.uint32(/* id 6,
wireType 2 =*/50).fork()).ldelim();\n            if (message.floats != null && message.floats.length) {\n
writer.uint32(/* id 7, wireType 2 =*/58).fork();\n                for (var i = 0; i < message.floats.length; ++i)\n
 writer.float(message.floats[i]);\n                writer.ldelim();\n            }\n            if (message.ints != null &&
message.ints.length) {\n                writer.uint32(/* id 8, wireType 2 =*/66).fork();\n                for (var i = 0; i <
message.ints.length; ++i)\n                    writer.int64(message.ints[i]);\n                writer.ldelim();\n            }\n
if (message.strings != null && message.strings.length)\n                for (var i = 0; i < message.strings.length; ++i)\n
            writer.uint32(/* id 9, wireType 2 =*/74).bytes(message.strings[i]);\n            if (message.tensors != null &&
message.tensors.length)\n                for (var i = 0; i < message.tensors.length; ++i)\n
$root.onnx.TensorProto.encode(message.tensors[i], writer.uint32(/* id 10, wireType 2 =*/82).fork()).ldelim();\n
   if (message.graphs != null && message.graphs.length)\n                for (var i = 0; i < message.graphs.length; ++i)\n
                $root.onnx.GraphProto.encode(message.graphs[i], writer.uint32(/* id 11, wireType 2
=*/90).fork()).ldelim();\n            if (message.docString != null && message.hasOwnProperty(\"docString\"))\n
    writer.uint32(/* id 13, wireType 2 =*/106).string(message.docString);\n            if (message.type != null &&
message.hasOwnProperty(\"type\"))\n                writer.uint32(/* id 20, wireType 0 =*/160).int32(message.type);\n
      if (message.refAttrName != null && message.hasOwnProperty(\"refAttrName\"))\n                writer.uint32(/* id
21, wireType 2 =*/170).string(message.refAttrName);\n            return writer;\n        };\n\n        /**\n         * Encodes
the specified AttributeProto message, length delimited. Does not implicitly {@link
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onnx.AttributeProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.AttributeProto\n * @static\n * @param {onnx.IAttributeProto} message AttributeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n AttributeProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes an AttributeProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.AttributeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.AttributeProto} AttributeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n AttributeProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.AttributeProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.name = reader.string();\n break;\n case 21:\n message.refAttrName = reader.string();\n break;\n case 13:\n message.docString = reader.string();\n break;\n case 20:\n message.type = reader.int32();\n break;\n case 2:\n message.f = reader.float();\n break;\n case 3:\n message.i = reader.int64();\n break;\n case 4:\n message.s = reader.bytes();\n break;\n case 5:\n message.t = $root.onnx.TensorProto.decode(reader, reader.uint32());\n break;\n case 6:\n message.g = $root.onnx.GraphProto.decode(reader, reader.uint32());\n break;\n case 7:\n if (!(message.floats && message.floats.length))\n message.floats = [];\n if ((tag & 7) === 2) {\n var end2 = reader.uint32() + reader.pos;\n while (reader.pos < end2)\n message.floats.push(reader.float());\n } else\n message.floats.push(reader.float());\n break;\n case 8:\n if (!(message.ints && message.ints.length))\n message.ints = [];\n if ((tag & 7) === 2) {\n var end2 = reader.uint32() + reader.pos;\n while (reader.pos < end2)\n message.ints.push(reader.int64());\n } else\n message.ints.push(reader.int64());\n break;\n case 9:\n if (!(message.strings && message.strings.length))\n message.strings = [];\n message.strings.push(reader.bytes());\n break;\n case 10:\n if (!(message.tensors && message.tensors.length))\n message.tensors = [];\n message.tensors.push($root.onnx.TensorProto.decode(reader, reader.uint32()));\n break;\n case 11:\n if (!(message.graphs && message.graphs.length))\n message.graphs = [];\n message.graphs.push($root.onnx.GraphProto.decode(reader, reader.uint32()));\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes an AttributeProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.AttributeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.AttributeProto} AttributeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n AttributeProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies an AttributeProto message.\n * @function verify\n * @memberof onnx.AttributeProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n AttributeProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.name != null && message.hasOwnProperty(\"name\"))\n if (!$util.isString(message.name))\n return \"name: string expected\";\n if (message.refAttrName != null &&

message.hasOwnProperty(\"refAttrName\"))\n if (!$util.isString(message.refAttrName))\n return \"refAttrName: string expected\";\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n if (!$util.isString(message.docString))\n return \"docString: string expected\";\n if (message.type != null && message.hasOwnProperty(\"type\"))\n switch (message.type) {\n default:\n return \"type: enum value expected\";\n case 0:\n case 1:\n case 2:\n case 3:\n case 4:\n case 5:\n case 6:\n case 7:\n case 8:\n case 9:\n case 10:\n break;\n }\n if (message.f != null && message.hasOwnProperty(\"f\"))\n if (typeof message.f !== \"number\")\n return \"f: number expected\";\n if (message.i != null && message.hasOwnProperty(\"i\"))\n if (!$util.isInteger(message.i) && !(message.i && $util.isInteger(message.i.low) && $util.isInteger(message.i.high)))\n return \"i: integer|Long expected\";\n if (message.s != null && message.hasOwnProperty(\"s\"))\n if (!(message.s && typeof message.s.length === \"number\" || $util.isString(message.s)))\n return \"s: buffer expected\";\n if (message.t != null && message.hasOwnProperty(\"t\")) {\n var error = $root.onnx.TensorProto.verify(message.t);\n if (error)\n return \"t.\" + error;\n }\n if (message.g != null && message.hasOwnProperty(\"g\")) {\n var error = $root.onnx.GraphProto.verify(message.g);\n if (error)\n return \"g.\" + error;\n }\n if (message.floats != null && message.hasOwnProperty(\"floats\")) {\n if (!Array.isArray(message.floats))\n return \"floats: array expected\";\n for (var i = 0; i < message.floats.length; ++i)\n if (typeof message.floats[i] !== \"number\")\n return \"floats: number[] expected\";\n }\n if (message.ints != null && message.hasOwnProperty(\"ints\")) {\n if (!Array.isArray(message.ints))\n return \"ints: array expected\";\n for (var i = 0; i < message.ints.length; ++i)\n if (!$util.isInteger(message.ints[i]) && !(message.ints[i] && $util.isInteger(message.ints[i].low) && $util.isInteger(message.ints[i].high)))\n return \"ints: integer|Long[] expected\";\n }\n if (message.strings != null && message.hasOwnProperty(\"strings\")) {\n if (!Array.isArray(message.strings))\n return \"strings: array expected\";\n for (var i = 0; i < message.strings.length; ++i)\n if (!(message.strings[i] && typeof message.strings[i].length === \"number\" || $util.isString(message.strings[i])))\n return \"strings: buffer[] expected\";\n }\n if (message.tensors != null && message.hasOwnProperty(\"tensors\")) {\n if (!Array.isArray(message.tensors))\n return \"tensors: array expected\";\n for (var i = 0; i < message.tensors.length; ++i) {\n var error = $root.onnx.TensorProto.verify(message.tensors[i]);\n if (error)\n return \"tensors.\" + error;\n }\n }\n if (message.graphs != null && message.hasOwnProperty(\"graphs\")) {\n if (!Array.isArray(message.graphs))\n return \"graphs: array expected\";\n for (var i = 0; i < message.graphs.length; ++i) {\n var error = $root.onnx.GraphProto.verify(message.graphs[i]);\n if (error)\n return \"graphs.\" + error;\n }\n }\n return null;\n };\n\n /**\n * Creates an AttributeProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.AttributeProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.AttributeProto} AttributeProto\n */\n AttributeProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.AttributeProto)\n return object;\n var message = new $root.onnx.AttributeProto();\n if (object.name != null)\n message.name = String(object.name);\n if (object.refAttrName != null)\n message.refAttrName = String(object.refAttrName);\n if (object.docString != null)\n message.docString = String(object.docString);\n switch (object.type) {\n case \"UNDEFINED\":\n case 0:\n message.type = 0;\n break;\n case \"FLOAT\":\n case 1:\n message.type = 1;\n break;\n case \"INT\":\n case 2:\n message.type = 2;\n break;\n case \"STRING\":\n case 3:\n message.type = 3;\n break;\n case \"TENSOR\":\n case 4:\n message.type = 4;\n break;\n case \"GRAPH\":\n case 5:\n

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message.type = 5;\n            break;\n          case \"FLOATS\":\n          case 6:\n            message.type = 6;\n
    break;\n          case \"INTS\":\n          case 7:\n            message.type = 7;\n            break;\n          case
\"STRINGS\":\n          case 8:\n            message.type = 8;\n            break;\n          case \"TENSORS\":\n
case 9:\n            message.type = 9;\n            break;\n          case \"GRAPHS\":\n          case 10:\n
message.type = 10;\n            break;\n          }\n          if (object.f != null)\n            message.f =
Number(object.f);\n          if (object.i != null)\n            if ($util.Long)\n              (message.i =
$util.Long.fromValue(object.i)).unsigned = false;\n            else if (typeof object.i === \"string\")\n
message.i = parseInt(object.i, 10);\n            else if (typeof object.i === \"number\")\n              message.i =
object.i;\n            else if (typeof object.i === \"object\")\n              message.i = new $util.LongBits(object.i.low
>>> 0, object.i.high >>> 0).toNumber();\n          if (object.s != null)\n            if (typeof object.s === \"string\")\n
          $util.base64.decode(object.s, message.s = $util.newBuffer($util.base64.length(object.s)), 0);\n
else if (object.s.length)\n              message.s = object.s;\n          if (object.t != null) {\n            if (typeof
object.t !== \"object\")\n              throw TypeError(\".onnx.AttributeProto.t: object expected\");\n
message.t = $root.onnx.TensorProto.fromObject(object.t);\n          }\n          if (object.g != null) {\n            if
(typeof object.g !== \"object\")\n              throw TypeError(\".onnx.AttributeProto.g: object expected\");\n
  message.g = $root.onnx.GraphProto.fromObject(object.g);\n          }\n          if (object.floats) {\n            if
(!Array.isArray(object.floats))\n              throw TypeError(\".onnx.AttributeProto.floats: array expected\");\n
    message.floats = [];\n            for (var i = 0; i < object.floats.length; ++i)\n              message.floats[i] =
Number(object.floats[i]);\n          }\n          if (object.ints) {\n            if (!Array.isArray(object.ints))\n
 throw TypeError(\".onnx.AttributeProto.ints: array expected\");\n            message.ints = [];\n            for (var i =
0; i < object.ints.length; ++i)\n              if ($util.Long)\n                (message.ints[i] =
$util.Long.fromValue(object.ints[i])).unsigned = false;\n              else if (typeof object.ints[i] === \"string\")\n
                message.ints[i] = parseInt(object.ints[i], 10);\n              else if (typeof object.ints[i] === \"number\")\n
                  message.ints[i] = object.ints[i];\n              else if (typeof object.ints[i] === \"object\")\n
  message.ints[i] = new $util.LongBits(object.ints[i].low >>> 0, object.ints[i].high >>> 0).toNumber();\n          }\n
       if (object.strings) {\n            if (!Array.isArray(object.strings))\n              throw
TypeError(\".onnx.AttributeProto.strings: array expected\");\n            message.strings = [];\n            for (var i =
0; i < object.strings.length; ++i)\n              if (typeof object.strings[i] === \"string\")\n
$util.base64.decode(object.strings[i], message.strings[i] = $util.newBuffer($util.base64.length(object.strings[i])),
0);\n              else if (object.strings[i].length)\n                message.strings[i] = object.strings[i];\n          }\n
    if (object.tensors) {\n            if (!Array.isArray(object.tensors))\n              throw
TypeError(\".onnx.AttributeProto.tensors: array expected\");\n            message.tensors = [];\n            for (var i =
0; i < object.tensors.length; ++i) {\n              if (typeof object.tensors[i] !== \"object\")\n                throw
TypeError(\".onnx.AttributeProto.tensors: object expected\");\n              message.tensors[i] =
$root.onnx.TensorProto.fromObject(object.tensors[i]);\n            }\n          }\n          if (object.graphs) {\n
 if (!Array.isArray(object.graphs))\n              throw TypeError(\".onnx.AttributeProto.graphs: array
expected\");\n            message.graphs = [];\n            for (var i = 0; i < object.graphs.length; ++i) {\n
if (typeof object.graphs[i] !== \"object\")\n                throw TypeError(\".onnx.AttributeProto.graphs: object
expected\");\n              message.graphs[i] = $root.onnx.GraphProto.fromObject(object.graphs[i]);\n            }\n
      }\n          return message;\n        };\n\n        /**\n         * Creates a plain object from an AttributeProto
message. Also converts values to other types if specified.\n         * @function toObject\n         * @memberof
onnx.AttributeProto\n         * @static\n         * @param {onnx.AttributeProto} message AttributeProto\n         *
@param {$protobuf.IConversionOptions} [options] Conversion options\n         * @returns {Object.<string,*>}
Plain object\n         */\n        AttributeProto.toObject = function toObject(message, options) {\n          if (!options)\n
          options = {};\n          var object = {};\n          if (options.arrays || options.defaults) {\n
object.floats = [];\n            object.ints = [];\n            object.strings = [];\n            object.tensors = [];\n
object.graphs = [];\n          }\n          if (options.defaults) {\n            object.name = \"\";\n            object.f = 0;\n
          if ($util.Long) {\n              var long = new $util.Long(0, 0, false);\n              object.i = options.longs
```

```
=== String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n                } else\n
object.i = options.longs === String ? \"0\" : 0;\n                if (options.bytes === String)\n                    object.s =
\"\";\n                else {\n                    object.s = [];\n                    if (options.bytes !== Array)\n                        object.s
= $util.newBuffer(object.s);\n                }\n                object.t = null;\n                object.g = null;\n
object.docString = \"\";\n                object.type = options.enums === String ? \"UNDEFINED\" : 0;\n
object.refAttrName = \"\";\n            }\n            if (message.name != null && message.hasOwnProperty(\"name\"))\n
            object.name = message.name;\n            if (message.f != null && message.hasOwnProperty(\"f\"))\n
object.f = options.json && !isFinite(message.f) ? String(message.f) : message.f;\n            if (message.i != null &&
message.hasOwnProperty(\"i\"))\n                if (typeof message.i === \"number\")\n                    object.i =
options.longs === String ? String(message.i) : message.i;\n                else\n                    object.i = options.longs ===
String ? $util.Long.prototype.toString.call(message.i) : options.longs === Number ? new
$util.LongBits(message.i.low >>> 0, message.i.high >>> 0).toNumber() : message.i;\n            if (message.s != null
&& message.hasOwnProperty(\"s\"))\n                object.s = options.bytes === String ?
$util.base64.encode(message.s, 0, message.s.length) : options.bytes === Array ?
Array.prototype.slice.call(message.s) : message.s;\n            if (message.t != null &&
message.hasOwnProperty(\"t\"))\n                object.t = $root.onnx.TensorProto.toObject(message.t, options);\n
if (message.g != null && message.hasOwnProperty(\"g\"))\n                object.g =
$root.onnx.GraphProto.toObject(message.g, options);\n            if (message.floats && message.floats.length) {\n
        object.floats = [];\n                for (var j = 0; j < message.floats.length; ++j)\n                    object.floats[j] =
options.json && !isFinite(message.floats[j]) ? String(message.floats[j]) : message.floats[j];\n            }\n            if
(message.ints && message.ints.length) {\n                object.ints = [];\n                for (var j = 0; j <
message.ints.length; ++j)\n                    if (typeof message.ints[j] === \"number\")\n                        object.ints[j] =
options.longs === String ? String(message.ints[j]) : message.ints[j];\n                    else\n                        object.ints[j]
= options.longs === String ? $util.Long.prototype.toString.call(message.ints[j]) : options.longs === Number ? new
$util.LongBits(message.ints[j].low >>> 0, message.ints[j].high >>> 0).toNumber() : message.ints[j];\n            }\n
    if (message.strings && message.strings.length) {\n                object.strings = [];\n                for (var j = 0; j <
message.strings.length; ++j)\n                    object.strings[j] = options.bytes === String ?
$util.base64.encode(message.strings[j], 0, message.strings[j].length) : options.bytes === Array ?
Array.prototype.slice.call(message.strings[j]) : message.strings[j];\n            }\n            if (message.tensors &&
message.tensors.length) {\n                object.tensors = [];\n                for (var j = 0; j < message.tensors.length; ++j)\n
                object.tensors[j] = $root.onnx.TensorProto.toObject(message.tensors[j], options);\n            }\n            if
(message.graphs && message.graphs.length) {\n                object.graphs = [];\n                for (var j = 0; j <
message.graphs.length; ++j)\n                    object.graphs[j] = $root.onnx.GraphProto.toObject(message.graphs[j],
options);\n            }\n            if (message.docString != null && message.hasOwnProperty(\"docString\"))\n
object.docString = message.docString;\n            if (message.type != null && message.hasOwnProperty(\"type\"))\n
          object.type = options.enums === String ? $root.onnx.AttributeProto.AttributeType[message.type] :
message.type;\n            if (message.refAttrName != null && message.hasOwnProperty(\"refAttrName\"))\n
object.refAttrName = message.refAttrName;\n            return object;\n        };\n\n        /**\n         * Converts this
AttributeProto to JSON.\n         * @function toJSON\n         * @memberof onnx.AttributeProto\n         *
@instance\n         * @returns {Object.<string,*>} JSON object\n         */\n        AttributeProto.prototype.toJSON =
function toJSON() {\n            return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n        };\n\n
/**\n         * AttributeType enum.\n         * @name onnx.AttributeProto.AttributeType\n         * @enum {string}\n
   * @property {number} UNDEFINED=0 UNDEFINED value\n         * @property {number} FLOAT=1 FLOAT
value\n         * @property {number} INT=2 INT value\n         * @property {number} STRING=3 STRING value\n
     * @property {number} TENSOR=4 TENSOR value\n         * @property {number} GRAPH=5 GRAPH value\n
     * @property {number} FLOATS=6 FLOATS value\n         * @property {number} INTS=7 INTS value\n         *
@property {number} STRINGS=8 STRINGS value\n         * @property {number} TENSORS=9 TENSORS
value\n         * @property {number} GRAPHS=10 GRAPHS value\n         */\n        AttributeProto.AttributeType =
```

```
(function() {\n        var valuesById = {}, values = Object.create(valuesById);\n        values[valuesById[0] =
\"UNDEFINED\"] = 0;\n        values[valuesById[1] = \"FLOAT\"] = 1;\n        values[valuesById[2] = \"INT\"]
= 2;\n        values[valuesById[3] = \"STRING\"] = 3;\n        values[valuesById[4] = \"TENSOR\"] = 4;\n
values[valuesById[5] = \"GRAPH\"] = 5;\n        values[valuesById[6] = \"FLOATS\"] = 6;\n
values[valuesById[7] = \"INTS\"] = 7;\n        values[valuesById[8] = \"STRINGS\"] = 8;\n
values[valuesById[9] = \"TENSORS\"] = 9;\n        values[valuesById[10] = \"GRAPHS\"] = 10;\n        return
values;\n    })();\n\n    return AttributeProto;\n  })();\n\n  onnx.ValueInfoProto = (function() {\n\n    /**\n
   * Properties of a ValueInfoProto.\n     * @memberof onnx\n     * @interface IValueInfoProto\n     *
@property {string|null} [name] ValueInfoProto name\n     * @property {onnx.ITypeProto|null} [type]
ValueInfoProto type\n     * @property {string|null} [docString] ValueInfoProto docString\n     */\n\n    /**\n
     * Constructs a new ValueInfoProto.\n     * @memberof onnx\n     * @classdesc Represents a
ValueInfoProto.\n     * @implements IValueInfoProto\n     * @constructor\n     * @param
{onnx.IValueInfoProto=} [properties] Properties to set\n     */\n    function ValueInfoProto(properties) {\n
 if (properties)\n            for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n            if
(properties[keys[i]] != null)\n                    this[keys[i]] = properties[keys[i]];\n    }\n\n    /**\n     *
ValueInfoProto name.\n     * @member {string} name\n     * @memberof onnx.ValueInfoProto\n     *
@instance\n     */\n    ValueInfoProto.prototype.name = \"\";\n\n    /**\n     * ValueInfoProto type.\n     *
@member {onnx.ITypeProto|null|undefined} type\n     * @memberof onnx.ValueInfoProto\n     * @instance\n
     */\n    ValueInfoProto.prototype.type = null;\n\n    /**\n     * ValueInfoProto docString.\n     *
@member {string} docString\n     * @memberof onnx.ValueInfoProto\n     * @instance\n     */\n
ValueInfoProto.prototype.docString = \"\";\n\n    /**\n     * Creates a new ValueInfoProto instance using the
specified properties.\n     * @function create\n     * @memberof onnx.ValueInfoProto\n     * @static\n     *
@param {onnx.IValueInfoProto=} [properties] Properties to set\n     * @returns {onnx.ValueInfoProto}
ValueInfoProto instance\n     */\n    ValueInfoProto.create = function create(properties) {\n        return new
ValueInfoProto(properties);\n    };\n\n    /**\n     * Encodes the specified ValueInfoProto message. Does not
implicitly {@link onnx.ValueInfoProto.verify|verify} messages.\n     * @function encode\n     * @memberof
onnx.ValueInfoProto\n     * @static\n     * @param {onnx.IValueInfoProto} message ValueInfoProto message
or plain object to encode\n     * @param {$protobuf.Writer} [writer] Writer to encode to\n     * @returns
{$protobuf.Writer} Writer\n     */\n    ValueInfoProto.encode = function encode(message, writer) {\n        if
(!writer)\n            writer = $Writer.create();\n        if (message.name != null &&
message.hasOwnProperty(\"name\"))\n            writer.uint32(/* id 1, wireType 2 =*/10).string(message.name);\n
      if (message.type != null && message.hasOwnProperty(\"type\"))\n
$root.onnx.TypeProto.encode(message.type, writer.uint32(/* id 2, wireType 2 =*/18).fork()).ldelim();\n        if
(message.docString != null && message.hasOwnProperty(\"docString\"))\n            writer.uint32(/* id 3, wireType
2 =*/26).string(message.docString);\n        return writer;\n    };\n\n    /**\n     * Encodes the specified
ValueInfoProto message, length delimited. Does not implicitly {@link onnx.ValueInfoProto.verify|verify}
messages.\n     * @function encodeDelimited\n     * @memberof onnx.ValueInfoProto\n     * @static\n
* @param {onnx.IValueInfoProto} message ValueInfoProto message or plain object to encode\n     * @param
{$protobuf.Writer} [writer] Writer to encode to\n     * @returns {$protobuf.Writer} Writer\n     */\n
ValueInfoProto.encodeDelimited = function encodeDelimited(message, writer) {\n        return
this.encode(message, writer).ldelim();\n    };\n\n    /**\n     * Decodes a ValueInfoProto message from the
specified reader or buffer.\n     * @function decode\n     * @memberof onnx.ValueInfoProto\n     * @static\n
     * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n     * @param {number}
[length] Message length if known beforehand\n     * @returns {onnx.ValueInfoProto} ValueInfoProto\n     *
@throws {Error} If the payload is not a reader or valid buffer\n     * @throws {$protobuf.util.ProtocolError} If
required fields are missing\n     */\n    ValueInfoProto.decode = function decode(reader, length) {\n        if
(!(reader instanceof $Reader))\n            reader = $Reader.create(reader);\n        var end = length === undefined
? reader.len : reader.pos + length, message = new $root.onnx.ValueInfoProto();\n        while (reader.pos < end)
```

```
{\n            var tag = reader.uint32();\n            switch (tag >>> 3) {\n            case 1:\n
message.name = reader.string();\n                break;\n            case 2:\n                message.type =
$root.onnx.TypeProto.decode(reader, reader.uint32());\n                break;\n            case 3:\n
message.docString = reader.string();\n                break;\n            default:\n                reader.skipType(tag &
7);\n                break;\n            }\n        }\n        return message;\n    };\n\n    /**\n     * Decodes a
ValueInfoProto message from the specified reader or buffer, length delimited.\n     * @function
decodeDelimited\n     * @memberof onnx.ValueInfoProto\n     * @static\n     * @param
{$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n     * @returns {onnx.ValueInfoProto}
ValueInfoProto\n     * @throws {Error} If the payload is not a reader or valid buffer\n     * @throws
{$protobuf.util.ProtocolError} If required fields are missing\n     */\n    ValueInfoProto.decodeDelimited =
function decodeDelimited(reader) {\n        if (!(reader instanceof $Reader))\n            reader = new
$Reader(reader);\n        return this.decode(reader, reader.uint32());\n    };\n\n    /**\n     * Verifies a
ValueInfoProto message.\n     * @function verify\n     * @memberof onnx.ValueInfoProto\n     * @static\n
   * @param {Object.<string,*>} message Plain object to verify\n     * @returns {string|null} `null` if valid,
otherwise the reason why it is not\n     */\n    ValueInfoProto.verify = function verify(message) {\n        if
(typeof message !== \"object\" || message === null)\n            return \"object expected\";\n        if (message.name
!= null && message.hasOwnProperty(\"name\"))\n            if (!$util.isString(message.name))\n                return
\"name: string expected\";\n        if (message.type != null && message.hasOwnProperty(\"type\")) {\n
var error = $root.onnx.TypeProto.verify(message.type);\n            if (error)\n                return \"type.\" + error;\n
        }\n        if (message.docString != null && message.hasOwnProperty(\"docString\"))\n            if
(!$util.isString(message.docString))\n                return \"docString: string expected\";\n        return null;\n
};\n\n    /**\n     * Creates a ValueInfoProto message from a plain object. Also converts values to their
respective internal types.\n     * @function fromObject\n     * @memberof onnx.ValueInfoProto\n     *
@static\n     * @param {Object.<string,*>} object Plain object\n     * @returns {onnx.ValueInfoProto}
ValueInfoProto\n     */\n    ValueInfoProto.fromObject = function fromObject(object) {\n        if (object
instanceof $root.onnx.ValueInfoProto)\n            return object;\n        var message = new
$root.onnx.ValueInfoProto();\n        if (object.name != null)\n            message.name = String(object.name);\n
      if (object.type != null) {\n            if (typeof object.type !== \"object\")\n                throw
TypeError(\".onnx.ValueInfoProto.type: object expected\");\n            message.type =
$root.onnx.TypeProto.fromObject(object.type);\n        }\n        if (object.docString != null)\n
message.docString = String(object.docString);\n        return message;\n    };\n\n    /**\n     * Creates a plain
object from a ValueInfoProto message. Also converts values to other types if specified.\n     * @function
toObject\n     * @memberof onnx.ValueInfoProto\n     * @static\n     * @param {onnx.ValueInfoProto}
message ValueInfoProto\n     * @param {$protobuf.IConversionOptions} [options] Conversion options\n     *
@returns {Object.<string,*>} Plain object\n     */\n    ValueInfoProto.toObject = function toObject(message,
options) {\n        if (!options)\n            options = {};\n        var object = {};\n        if (options.defaults) {\n
          object.name = \"\";\n            object.type = null;\n            object.docString = \"\";\n        }\n        if
(message.name != null && message.hasOwnProperty(\"name\"))\n            object.name = message.name;\n
if (message.type != null && message.hasOwnProperty(\"type\"))\n            object.type =
$root.onnx.TypeProto.toObject(message.type, options);\n        if (message.docString != null &&
message.hasOwnProperty(\"docString\"))\n            object.docString = message.docString;\n        return object;\n
      };\n\n    /**\n     * Converts this ValueInfoProto to JSON.\n     * @function toJSON\n     *
@memberof onnx.ValueInfoProto\n     * @instance\n     * @returns {Object.<string,*>} JSON object\n
*/\n    ValueInfoProto.prototype.toJSON = function toJSON() {\n        return this.constructor.toObject(this,
$protobuf.util.toJSONOptions);\n    };\n\n    return ValueInfoProto;\n  })();\n\n  onnx.NodeProto =
(function() {\n\n    /**\n     * Properties of a NodeProto.\n     * @memberof onnx\n     * @interface
INodeProto\n     * @property {Array.<string>|null} [input] NodeProto input\n     * @property
{Array.<string>|null} [output] NodeProto output\n     * @property {string|null} [name] NodeProto name\n     *
```

@property {string|null} [opType] NodeProto opType\n * @property {string|null} [domain] NodeProto domain\n * @property {Array.<onnx.IAttributeProto>|null} [attribute] NodeProto attribute\n * @property {string|null} [docString] NodeProto docString\n */\n\n /**\n * Constructs a new NodeProto.\n * @memberof onnx\n * @classdesc Represents a NodeProto.\n * @implements INodeProto\n * @constructor\n * @param {onnx.INodeProto=} [properties] Properties to set\n */\n function NodeProto(properties) {\n this.input = [];\n this.output = [];\n this.attribute = [];\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * NodeProto input.\n * @member {Array.<string>} input\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.input = $util.emptyArray;\n\n /**\n * NodeProto output.\n * @member {Array.<string>} output\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.output = $util.emptyArray;\n\n /**\n * NodeProto name.\n * @member {string} name\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.name = \"\";\n\n /**\n * NodeProto opType.\n * @member {string} opType\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.opType = \"\";\n\n /**\n * NodeProto domain.\n * @member {string} domain\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.domain = \"\";\n\n /**\n * NodeProto attribute.\n * @member {Array.<onnx.IAttributeProto>} attribute\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.attribute = $util.emptyArray;\n\n /**\n * NodeProto docString.\n * @member {string} docString\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.docString = \"\";\n\n /**\n * Creates a new NodeProto instance using the specified properties.\n * @function create\n * @memberof onnx.NodeProto\n * @static\n * @param {onnx.INodeProto=} [properties] Properties to set\n * @returns {onnx.NodeProto} NodeProto instance\n */\n NodeProto.create = function create(properties) {\n return new NodeProto(properties);\n };\n\n /**\n * Encodes the specified NodeProto message. Does not implicitly {@link onnx.NodeProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.NodeProto\n * @static\n * @param {onnx.INodeProto} message NodeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n NodeProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.input != null && message.input.length)\n for (var i = 0; i < message.input.length; ++i)\n writer.uint32(/* id 1, wireType 2 =*/10).string(message.input[i]);\n if (message.output != null && message.output.length)\n for (var i = 0; i < message.output.length; ++i)\n writer.uint32(/* id 2, wireType 2 =*/18).string(message.output[i]);\n if (message.name != null && message.hasOwnProperty(\"name\"))\n writer.uint32(/* id 3, wireType 2 =*/26).string(message.name);\n if (message.opType != null && message.hasOwnProperty(\"opType\"))\n writer.uint32(/* id 4, wireType 2 =*/34).string(message.opType);\n if (message.attribute != null && message.attribute.length)\n for (var i = 0; i < message.attribute.length; ++i)\n $root.onnx.AttributeProto.encode(message.attribute[i], writer.uint32(/* id 5, wireType 2 =*/42).fork()).ldelim();\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n writer.uint32(/* id 6, wireType 2 =*/50).string(message.docString);\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n writer.uint32(/* id 7, wireType 2 =*/58).string(message.domain);\n return writer;\n };\n\n /**\n * Encodes the specified NodeProto message, length delimited. Does not implicitly {@link onnx.NodeProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.NodeProto\n * @static\n * @param {onnx.INodeProto} message NodeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n NodeProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a NodeProto message from the specified reader or buffer.\n

* @function decode\n * @memberof onnx.NodeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.NodeProto} NodeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n NodeProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.NodeProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n if (!(message.input && message.input.length))\n message.input = [];\n message.input.push(reader.string());\n break;\n case 2:\n if (!(message.output && message.output.length))\n message.output = [];\n message.output.push(reader.string());\n break;\n case 3:\n message.name = reader.string();\n break;\n case 4:\n message.opType = reader.string();\n break;\n case 7:\n message.domain = reader.string();\n break;\n case 5:\n if (!(message.attribute && message.attribute.length))\n message.attribute = [];\n message.attribute.push($root.onnx.AttributeProto.decode(reader, reader.uint32()));\n break;\n case 6:\n message.docString = reader.string();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a NodeProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.NodeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.NodeProto} NodeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n NodeProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a NodeProto message.\n * @function verify\n * @memberof onnx.NodeProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n NodeProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.input != null && message.hasOwnProperty(\"input\")) {\n if (!Array.isArray(message.input))\n return \"input: array expected\";\n for (var i = 0; i < message.input.length; ++i)\n if (!$util.isString(message.input[i]))\n return \"input: string[] expected\";\n }\n if (message.output != null && message.hasOwnProperty(\"output\")) {\n if (!Array.isArray(message.output))\n return \"output: array expected\";\n for (var i = 0; i < message.output.length; ++i)\n if (!$util.isString(message.output[i]))\n return \"output: string[] expected\";\n }\n if (message.name != null && message.hasOwnProperty(\"name\"))\n if (!$util.isString(message.name))\n return \"name: string expected\";\n if (message.opType != null && message.hasOwnProperty(\"opType\"))\n if (!$util.isString(message.opType))\n return \"opType: string expected\";\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n if (!$util.isString(message.domain))\n return \"domain: string expected\";\n if (message.attribute != null && message.hasOwnProperty(\"attribute\")) {\n if (!Array.isArray(message.attribute))\n return \"attribute: array expected\";\n for (var i = 0; i < message.attribute.length; ++i) {\n var error = $root.onnx.AttributeProto.verify(message.attribute[i]);\n if (error)\n return \"attribute.\" + error;\n }\n }\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n if (!$util.isString(message.docString))\n return \"docString: string expected\";\n return null;\n };\n\n /**\n * Creates a NodeProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.NodeProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.NodeProto} NodeProto\n */\n NodeProto.fromObject = function

```
fromObject(object) {\n            if (object instanceof $root.onnx.NodeProto)\n                return object;\n            var
message = new $root.onnx.NodeProto();\n            if (object.input) {\n                if (!Array.isArray(object.input))\n
            throw TypeError(\".onnx.NodeProto.input: array expected\");\n                message.input = [];\n                for
(var i = 0; i < object.input.length; ++i)\n                    message.input[i] = String(object.input[i]);\n            }\n            if
(object.output) {\n                if (!Array.isArray(object.output))\n                    throw
TypeError(\".onnx.NodeProto.output: array expected\");\n                message.output = [];\n                for (var i = 0; i
< object.output.length; ++i)\n                    message.output[i] = String(object.output[i]);\n            }\n            if
(object.name != null)\n                message.name = String(object.name);\n            if (object.opType != null)\n
message.opType = String(object.opType);\n            if (object.domain != null)\n                message.domain =
String(object.domain);\n            if (object.attribute) {\n                if (!Array.isArray(object.attribute))\n
throw TypeError(\".onnx.NodeProto.attribute: array expected\");\n                message.attribute = [];\n                for
(var i = 0; i < object.attribute.length; ++i) {\n                    if (typeof object.attribute[i] !== \"object\")\n
throw TypeError(\".onnx.NodeProto.attribute: object expected\");\n                    message.attribute[i] =
$root.onnx.AttributeProto.fromObject(object.attribute[i]);\n                }\n            }\n            if (object.docString !=
null)\n                message.docString = String(object.docString);\n            return message;\n        };\n\n        /**\n
* Creates a plain object from a NodeProto message. Also converts values to other types if specified.\n         *
@function toObject\n         * @memberof onnx.NodeProto\n         * @static\n         * @param {onnx.NodeProto}
message NodeProto\n         * @param {$protobuf.IConversionOptions} [options] Conversion options\n         *
@returns {Object.<string,*>} Plain object\n         */\n        NodeProto.toObject = function toObject(message,
options) {\n            if (!options)\n                options = {};\n            var object = {};\n            if (options.arrays ||
options.defaults) {\n                object.input = [];\n                object.output = [];\n                object.attribute = [];\n
  }\n            if (options.defaults) {\n                object.name = \"\";\n                object.opType = \"\";\n
object.docString = \"\";\n                object.domain = \"\";\n            }\n            if (message.input &&
message.input.length) {\n                object.input = [];\n                for (var j = 0; j < message.input.length; ++j)\n
      object.input[j] = message.input[j];\n            }\n            if (message.output && message.output.length) {\n
   object.output = [];\n                for (var j = 0; j < message.output.length; ++j)\n                    object.output[j] =
message.output[j];\n            }\n            if (message.name != null && message.hasOwnProperty(\"name\"))\n
object.name = message.name;\n            if (message.opType != null && message.hasOwnProperty(\"opType\"))\n
      object.opType = message.opType;\n            if (message.attribute && message.attribute.length) {\n
object.attribute = [];\n                for (var j = 0; j < message.attribute.length; ++j)\n                    object.attribute[j] =
$root.onnx.AttributeProto.toObject(message.attribute[j], options);\n            }\n            if (message.docString != null
&& message.hasOwnProperty(\"docString\"))\n                object.docString = message.docString;\n            if
(message.domain != null && message.hasOwnProperty(\"domain\"))\n                object.domain =
message.domain;\n            return object;\n        };\n\n        /**\n         * Converts this NodeProto to JSON.\n         *
@function toJSON\n         * @memberof onnx.NodeProto\n         * @instance\n         * @returns
{Object.<string,*>} JSON object\n         */\n        NodeProto.prototype.toJSON = function toJSON() {\n
return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n        };\n\n        return NodeProto;\n
})();\n\n    onnx.ModelProto = (function() {\n\n        /**\n         * Properties of a ModelProto.\n         * @memberof
onnx\n         * @interface IModelProto\n         * @property {number|Long|null} [irVersion] ModelProto irVersion\n
     * @property {Array.<onnx.IOperatorSetIdProto>|null} [opsetImport] ModelProto opsetImport\n         *
@property {string|null} [producerName] ModelProto producerName\n         * @property {string|null}
[producerVersion] ModelProto producerVersion\n         * @property {string|null} [domain] ModelProto domain\n
   * @property {number|Long|null} [modelVersion] ModelProto modelVersion\n         * @property {string|null}
[docString] ModelProto docString\n         * @property {onnx.IGraphProto|null} [graph] ModelProto graph\n         *
@property {Array.<onnx.IStringStringEntryProto>|null} [metadataProps] ModelProto metadataProps\n         */\n\n
    /**\n         * Constructs a new ModelProto.\n         * @memberof onnx\n         * @classdesc Represents a
ModelProto.\n         * @implements IModelProto\n         * @constructor\n         * @param {onnx.IModelProto=}
[properties] Properties to set\n         */\n        function ModelProto(properties) {\n            this.opsetImport = [];\n
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  this.metadataProps = [];\n            if (properties)\n                for (var keys = Object.keys(properties), i = 0; i <
keys.length; ++i)\n                    if (properties[keys[i]] != null)\n                        this[keys[i]] = properties[keys[i]];\n
  }\n\n        /**\n         * ModelProto irVersion.\n         * @member {number|Long} irVersion\n         * @memberof
onnx.ModelProto\n         * @instance\n         */\n        ModelProto.prototype.irVersion = $util.Long ?
$util.Long.fromBits(0,0,false) : 0;\n\n        /**\n         * ModelProto opsetImport.\n         * @member
{Array.<onnx.IOperatorSetIdProto>} opsetImport\n         * @memberof onnx.ModelProto\n         * @instance\n
*/\n        ModelProto.prototype.opsetImport = $util.emptyArray;\n\n        /**\n         * ModelProto producerName.\n
     * @member {string} producerName\n         * @memberof onnx.ModelProto\n         * @instance\n         */\n
ModelProto.prototype.producerName = \"\";\n\n        /**\n         * ModelProto producerVersion.\n         * @member
{string} producerVersion\n         * @memberof onnx.ModelProto\n         * @instance\n         */\n
ModelProto.prototype.producerVersion = \"\";\n\n        /**\n         * ModelProto domain.\n         * @member
{string} domain\n         * @memberof onnx.ModelProto\n         * @instance\n         */\n
ModelProto.prototype.domain = \"\";\n\n        /**\n         * ModelProto modelVersion.\n         * @member
{number|Long} modelVersion\n         * @memberof onnx.ModelProto\n         * @instance\n         */\n
ModelProto.prototype.modelVersion = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n        /**\n         *
ModelProto docString.\n         * @member {string} docString\n         * @memberof onnx.ModelProto\n         *
@instance\n         */\n        ModelProto.prototype.docString = \"\";\n\n        /**\n         * ModelProto graph.\n         *
@member {onnx.IGraphProto|null|undefined} graph\n         * @memberof onnx.ModelProto\n         * @instance\n
   */\n        ModelProto.prototype.graph = null;\n\n        /**\n         * ModelProto metadataProps.\n         * @member
{Array.<onnx.IStringStringEntryProto>} metadataProps\n         * @memberof onnx.ModelProto\n         *
@instance\n         */\n        ModelProto.prototype.metadataProps = $util.emptyArray;\n\n        /**\n         * Creates a
new ModelProto instance using the specified properties.\n         * @function create\n         * @memberof
onnx.ModelProto\n         * @static\n         * @param {onnx.IModelProto=} [properties] Properties to set\n         *
@returns {onnx.ModelProto} ModelProto instance\n         */\n        ModelProto.create = function create(properties)
{\n            return new ModelProto(properties);\n        };\n\n        /**\n         * Encodes the specified ModelProto
message. Does not implicitly {@link onnx.ModelProto.verify|verify} messages.\n         * @function encode\n         *
@memberof onnx.ModelProto\n         * @static\n         * @param {onnx.IModelProto} message ModelProto
message or plain object to encode\n         * @param {$protobuf.Writer} [writer] Writer to encode to\n         *
@returns {$protobuf.Writer} Writer\n         */\n        ModelProto.encode = function encode(message, writer) {\n
  if (!writer)\n                writer = $Writer.create();\n            if (message.irVersion != null &&
message.hasOwnProperty(\"irVersion\"))\n                writer.uint32(/* id 1, wireType 0
=*/8).int64(message.irVersion);\n            if (message.producerName != null &&
message.hasOwnProperty(\"producerName\"))\n                writer.uint32(/* id 2, wireType 2
=*/18).string(message.producerName);\n            if (message.producerVersion != null &&
message.hasOwnProperty(\"producerVersion\"))\n                writer.uint32(/* id 3, wireType 2
=*/26).string(message.producerVersion);\n            if (message.domain != null &&
message.hasOwnProperty(\"domain\"))\n                writer.uint32(/* id 4, wireType 2
=*/34).string(message.domain);\n            if (message.modelVersion != null &&
message.hasOwnProperty(\"modelVersion\"))\n                writer.uint32(/* id 5, wireType 0
=*/40).int64(message.modelVersion);\n            if (message.docString != null &&
message.hasOwnProperty(\"docString\"))\n                writer.uint32(/* id 6, wireType 2
=*/50).string(message.docString);\n            if (message.graph != null && message.hasOwnProperty(\"graph\"))\n
        $root.onnx.GraphProto.encode(message.graph, writer.uint32(/* id 7, wireType 2 =*/58).fork()).ldelim();\n
  if (message.opsetImport != null && message.opsetImport.length)\n                for (var i = 0; i <
message.opsetImport.length; ++i)\n                    $root.onnx.OperatorSetIdProto.encode(message.opsetImport[i],
writer.uint32(/* id 8, wireType 2 =*/66).fork()).ldelim();\n            if (message.metadataProps != null &&
message.metadataProps.length)\n                for (var i = 0; i < message.metadataProps.length; ++i)\n
$root.onnx.StringStringEntryProto.encode(message.metadataProps[i], writer.uint32(/* id 14, wireType 2
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=*/114).fork()).ldelim();\n return writer;\n };\n\n /**\n * Encodes the specified ModelProto message, length delimited. Does not implicitly {@link onnx.ModelProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.ModelProto\n * @static\n * @param {onnx.IModelProto} message ModelProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n ModelProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a ModelProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.ModelProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.ModelProto} ModelProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n ModelProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.ModelProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.irVersion = reader.int64();\n break;\n case 8:\n if (!(message.opsetImport && message.opsetImport.length))\n message.opsetImport = [];\n message.opsetImport.push($root.onnx.OperatorSetIdProto.decode(reader, reader.uint32()));\n break;\n case 2:\n message.producerName = reader.string();\n break;\n case 3:\n message.producerVersion = reader.string();\n break;\n case 4:\n message.domain = reader.string();\n break;\n case 5:\n message.modelVersion = reader.int64();\n break;\n case 6:\n message.docString = reader.string();\n break;\n case 7:\n message.graph = $root.onnx.GraphProto.decode(reader, reader.uint32());\n break;\n case 14:\n if (!(message.metadataProps && message.metadataProps.length))\n message.metadataProps = [];\n message.metadataProps.push($root.onnx.StringStringEntryProto.decode(reader, reader.uint32()));\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a ModelProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.ModelProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.ModelProto} ModelProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n ModelProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a ModelProto message.\n * @function verify\n * @memberof onnx.ModelProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n ModelProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.irVersion != null && message.hasOwnProperty(\"irVersion\"))\n if (!$util.isInteger(message.irVersion) && !(message.irVersion && $util.isInteger(message.irVersion.low) && $util.isInteger(message.irVersion.high)))\n return \"irVersion: integer|Long expected\";\n if (message.opsetImport != null && message.hasOwnProperty(\"opsetImport\")) {\n if (!Array.isArray(message.opsetImport))\n return \"opsetImport: array expected\";\n for (var i = 0; i < message.opsetImport.length; ++i) {\n var error = $root.onnx.OperatorSetIdProto.verify(message.opsetImport[i]);\n if (error)\n return \"opsetImport.\" + error;\n }\n }\n if (message.producerName != null && message.hasOwnProperty(\"producerName\"))\n if (!$util.isString(message.producerName))\n return \"producerName: string expected\";\n if (message.producerVersion != null && message.hasOwnProperty(\"producerVersion\"))\n if (!$util.isString(message.producerVersion))\n

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   return \"producerVersion: string expected\";\n            if (message.domain != null &&
message.hasOwnProperty(\"domain\"))\n                if (!$util.isString(message.domain))\n                    return
\"domain: string expected\";\n            if (message.modelVersion != null &&
message.hasOwnProperty(\"modelVersion\"))\n                if (!$util.isInteger(message.modelVersion) &&
!(message.modelVersion && $util.isInteger(message.modelVersion.low) &&
$util.isInteger(message.modelVersion.high)))\n                    return \"modelVersion: integer|Long expected\";\n
if (message.docString != null && message.hasOwnProperty(\"docString\"))\n                if
(!$util.isString(message.docString))\n                    return \"docString: string expected\";\n            if (message.graph
!= null && message.hasOwnProperty(\"graph\")) {\n                var error =
$root.onnx.GraphProto.verify(message.graph);\n                if (error)\n                    return \"graph.\" + error;\n
}\n            if (message.metadataProps != null && message.hasOwnProperty(\"metadataProps\")) {\n                if
(!Array.isArray(message.metadataProps))\n                    return \"metadataProps: array expected\";\n                for
(var i = 0; i < message.metadataProps.length; ++i) {\n                    var error =
$root.onnx.StringStringEntryProto.verify(message.metadataProps[i]);\n                    if (error)\n                        return
\"metadataProps.\" + error;\n                }\n            }\n            return null;\n        };\n\n        /**\n         * Creates a
ModelProto message from a plain object. Also converts values to their respective internal types.\n         * @function
fromObject\n         * @memberof onnx.ModelProto\n         * @static\n         * @param {Object.<string,*>} object
Plain object\n         * @returns {onnx.ModelProto} ModelProto\n         */\n        ModelProto.fromObject = function
fromObject(object) {\n            if (object instanceof $root.onnx.ModelProto)\n                return object;\n            var
message = new $root.onnx.ModelProto();\n            if (object.irVersion != null)\n                if ($util.Long)\n
  (message.irVersion = $util.Long.fromValue(object.irVersion)).unsigned = false;\n                else if (typeof
object.irVersion === \"string\")\n                    message.irVersion = parseInt(object.irVersion, 10);\n                else if
(typeof object.irVersion === \"number\")\n                    message.irVersion = object.irVersion;\n                else if
(typeof object.irVersion === \"object\")\n                    message.irVersion = new $util.LongBits(object.irVersion.low
>>> 0, object.irVersion.high >>> 0).toNumber();\n            if (object.opsetImport) {\n                if
(!Array.isArray(object.opsetImport))\n                    throw TypeError(\".onnx.ModelProto.opsetImport: array
expected\");\n                message.opsetImport = [];\n                for (var i = 0; i < object.opsetImport.length; ++i) {\n
                if (typeof object.opsetImport[i] !== \"object\")\n                        throw
TypeError(\".onnx.ModelProto.opsetImport: object expected\");\n                    message.opsetImport[i] =
$root.onnx.OperatorSetIdProto.fromObject(object.opsetImport[i]);\n                }\n            }\n            if
(object.producerName != null)\n                message.producerName = String(object.producerName);\n            if
(object.producerVersion != null)\n                message.producerVersion = String(object.producerVersion);\n            if
(object.domain != null)\n                message.domain = String(object.domain);\n            if (object.modelVersion !=
null)\n                if ($util.Long)\n                    (message.modelVersion =
$util.Long.fromValue(object.modelVersion)).unsigned = false;\n                else if (typeof object.modelVersion ===
\"string\")\n                    message.modelVersion = parseInt(object.modelVersion, 10);\n                else if (typeof
object.modelVersion === \"number\")\n                    message.modelVersion = object.modelVersion;\n                else
if (typeof object.modelVersion === \"object\")\n                    message.modelVersion = new
$util.LongBits(object.modelVersion.low >>> 0, object.modelVersion.high >>> 0).toNumber();\n            if
(object.docString != null)\n                message.docString = String(object.docString);\n            if (object.graph != null)
{\n                if (typeof object.graph !== \"object\")\n                    throw TypeError(\".onnx.ModelProto.graph: object
expected\");\n                message.graph = $root.onnx.GraphProto.fromObject(object.graph);\n            }\n            if
(object.metadataProps) {\n                if (!Array.isArray(object.metadataProps))\n                    throw
TypeError(\".onnx.ModelProto.metadataProps: array expected\");\n                message.metadataProps = [];\n
 for (var i = 0; i < object.metadataProps.length; ++i) {\n                    if (typeof object.metadataProps[i] !==
\"object\")\n                        throw TypeError(\".onnx.ModelProto.metadataProps: object expected\");\n
message.metadataProps[i] = $root.onnx.StringStringEntryProto.fromObject(object.metadataProps[i]);\n                }\n
        }\n            return message;\n        };\n\n        /**\n         * Creates a plain object from a ModelProto message.
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Also converts values to other types if specified.\n         * @function toObject\n         * @memberof
onnx.ModelProto\n         * @static\n         * @param {onnx.ModelProto} message ModelProto\n         * @param
{$protobuf.IConversionOptions} [options] Conversion options\n         * @returns {Object.<string,*>} Plain object\n
       */\n        ModelProto.toObject = function toObject(message, options) {\n            if (!options)\n                options
= {};\n            var object = {};\n            if (options.arrays || options.defaults) {\n                object.opsetImport = [];\n
            object.metadataProps = [];\n            }\n            if (options.defaults) {\n                if ($util.Long) {\n
var long = new $util.Long(0, 0, false);\n                    object.irVersion = options.longs === String ? long.toString() :
options.longs === Number ? long.toNumber() : long;\n                } else\n                    object.irVersion =
options.longs === String ? \"0\" : 0;\n                object.producerName = \"\";\n                object.producerVersion =
\"\";\n                object.domain = \"\";\n                if ($util.Long) {\n                    var long = new $util.Long(0, 0,
false);\n                    object.modelVersion = options.longs === String ? long.toString() : options.longs === Number
? long.toNumber() : long;\n                } else\n                    object.modelVersion = options.longs === String ? \"0\" :
0;\n                object.docString = \"\";\n                object.graph = null;\n            }\n            if (message.irVersion !=
null && message.hasOwnProperty(\"irVersion\"))\n                if (typeof message.irVersion === \"number\")\n
       object.irVersion = options.longs === String ? String(message.irVersion) : message.irVersion;\n                else\n
                object.irVersion = options.longs === String ? $util.Long.prototype.toString.call(message.irVersion) :
options.longs === Number ? new $util.LongBits(message.irVersion.low >>> 0, message.irVersion.high >>>
0).toNumber() : message.irVersion;\n            if (message.producerName != null &&
message.hasOwnProperty(\"producerName\"))\n                object.producerName = message.producerName;\n
if (message.producerVersion != null && message.hasOwnProperty(\"producerVersion\"))\n
object.producerVersion = message.producerVersion;\n            if (message.domain != null &&
message.hasOwnProperty(\"domain\"))\n                object.domain = message.domain;\n            if
(message.modelVersion != null && message.hasOwnProperty(\"modelVersion\"))\n                if (typeof
message.modelVersion === \"number\")\n                    object.modelVersion = options.longs === String ?
String(message.modelVersion) : message.modelVersion;\n                else\n                    object.modelVersion =
options.longs === String ? $util.Long.prototype.toString.call(message.modelVersion) : options.longs === Number ?
new $util.LongBits(message.modelVersion.low >>> 0, message.modelVersion.high >>> 0).toNumber() :
message.modelVersion;\n            if (message.docString != null && message.hasOwnProperty(\"docString\"))\n
     object.docString = message.docString;\n            if (message.graph != null &&
message.hasOwnProperty(\"graph\"))\n                object.graph = $root.onnx.GraphProto.toObject(message.graph,
options);\n            if (message.opsetImport && message.opsetImport.length) {\n                object.opsetImport = [];\n
             for (var j = 0; j < message.opsetImport.length; ++j)\n                    object.opsetImport[j] =
$root.onnx.OperatorSetIdProto.toObject(message.opsetImport[j], options);\n            }\n            if
(message.metadataProps && message.metadataProps.length) {\n                object.metadataProps = [];\n                for
(var j = 0; j < message.metadataProps.length; ++j)\n                    object.metadataProps[j] =
$root.onnx.StringStringEntryProto.toObject(message.metadataProps[j], options);\n            }\n            return object;\n
       };\n\n        /**\n         * Converts this ModelProto to JSON.\n         * @function toJSON\n         * @memberof
onnx.ModelProto\n         * @instance\n         * @returns {Object.<string,*>} JSON object\n         */\n
ModelProto.prototype.toJSON = function toJSON() {\n            return this.constructor.toObject(this,
$protobuf.util.toJSONOptions);\n        };\n\n        return ModelProto;\n    })();\n\n    onnx.StringStringEntryProto =
(function() {\n\n        /**\n         * Properties of a StringStringEntryProto.\n         * @memberof onnx\n         *
@interface IStringStringEntryProto\n         * @property {string|null} [key] StringStringEntryProto key\n         *
@property {string|null} [value] StringStringEntryProto value\n         */\n\n        /**\n         * Constructs a new
StringStringEntryProto.\n         * @memberof onnx\n         * @classdesc Represents a StringStringEntryProto.\n
* @implements IStringStringEntryProto\n         * @constructor\n         * @param {onnx.IStringStringEntryProto=}
[properties] Properties to set\n         */\n        function StringStringEntryProto(properties) {\n            if (properties)\n
            for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n                    if (properties[keys[i]] !=
null)\n                        this[keys[i]] = properties[keys[i]];\n        }\n\n        /**\n         * StringStringEntryProto key.\n
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* @member {string} key\n * @memberof onnx.StringStringEntryProto\n * @instance\n */\n StringStringEntryProto.prototype.key = \"\";\n\n /**\n * StringStringEntryProto value.\n * @member {string} value\n * @memberof onnx.StringStringEntryProto\n * @instance\n */\n StringStringEntryProto.prototype.value = \"\";\n\n /**\n * Creates a new StringStringEntryProto instance using the specified properties.\n * @function create\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {onnx.IStringStringEntryProto=} [properties] Properties to set\n * @returns {onnx.StringStringEntryProto} StringStringEntryProto instance\n */\n StringStringEntryProto.create = function create(properties) {\n return new StringStringEntryProto(properties);\n };\n\n /**\n * Encodes the specified StringStringEntryProto message. Does not implicitly {@link onnx.StringStringEntryProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {onnx.IStringStringEntryProto} message StringStringEntryProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n StringStringEntryProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.key != null && message.hasOwnProperty(\"key\"))\n writer.uint32(/* id 1, wireType 2 =*/10).string(message.key);\n if (message.value != null && message.hasOwnProperty(\"value\"))\n writer.uint32(/* id 2, wireType 2 =*/18).string(message.value);\n return writer;\n };\n\n /**\n * Encodes the specified StringStringEntryProto message, length delimited. Does not implicitly {@link onnx.StringStringEntryProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {onnx.IStringStringEntryProto} message StringStringEntryProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n StringStringEntryProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a StringStringEntryProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.StringStringEntryProto} StringStringEntryProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n StringStringEntryProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.StringStringEntryProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.key = reader.string();\n break;\n case 2:\n message.value = reader.string();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a StringStringEntryProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.StringStringEntryProto} StringStringEntryProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n StringStringEntryProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a StringStringEntryProto message.\n * @function verify\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n StringStringEntryProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.key != null && message.hasOwnProperty(\"key\"))\n if (!$util.isString(message.key))\n return \"key: string

expected\";\n if (message.value != null && message.hasOwnProperty(\"value\"))\n if (!$util.isString(message.value))\n return \"value: string expected\";\n return null;\n };\n\n /**\n * Creates a StringStringEntryProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.StringStringEntryProto} StringStringEntryProto\n */\n StringStringEntryProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.StringStringEntryProto)\n return object;\n var message = new $root.onnx.StringStringEntryProto();\n if (object.key != null)\n message.key = String(object.key);\n if (object.value != null)\n message.value = String(object.value);\n return message;\n };\n\n /**\n * Creates a plain object from a StringStringEntryProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {onnx.StringStringEntryProto} message StringStringEntryProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n StringStringEntryProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.defaults) {\n object.key = \"\";\n object.value = \"\";\n }\n if (message.key != null && message.hasOwnProperty(\"key\"))\n object.key = message.key;\n if (message.value != null && message.hasOwnProperty(\"value\"))\n object.value = message.value;\n return object;\n };\n\n /**\n * Converts this StringStringEntryProto to JSON.\n * @function toJSON\n * @memberof onnx.StringStringEntryProto\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n StringStringEntryProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return StringStringEntryProto;\n })();\n\n onnx.TensorAnnotation = (function() {\n\n /**\n * Properties of a TensorAnnotation.\n * @memberof onnx\n * @interface ITensorAnnotation\n * @property {string|null} [tensorName] TensorAnnotation tensorName\n * @property {Array.<onnx.IStringStringEntryProto>|null} [quantParameterTensorNames] TensorAnnotation quantParameterTensorNames\n */\n\n /**\n * Constructs a new TensorAnnotation.\n * @memberof onnx\n * @classdesc Represents a TensorAnnotation.\n * @implements ITensorAnnotation\n * @constructor\n * @param {onnx.ITensorAnnotation=} [properties] Properties to set\n */\n function TensorAnnotation(properties) {\n this.quantParameterTensorNames = [];\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * TensorAnnotation tensorName.\n * @member {string} tensorName\n * @memberof onnx.TensorAnnotation\n * @instance\n */\n TensorAnnotation.prototype.tensorName = \"\";\n\n /**\n * TensorAnnotation quantParameterTensorNames.\n * @member {Array.<onnx.IStringStringEntryProto>} quantParameterTensorNames\n * @memberof onnx.TensorAnnotation\n * @instance\n */\n TensorAnnotation.prototype.quantParameterTensorNames = $util.emptyArray;\n\n /**\n * Creates a new TensorAnnotation instance using the specified properties.\n * @function create\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {onnx.ITensorAnnotation=} [properties] Properties to set\n * @returns {onnx.TensorAnnotation} TensorAnnotation instance\n */\n TensorAnnotation.create = function create(properties) {\n return new TensorAnnotation(properties);\n };\n\n /**\n * Encodes the specified TensorAnnotation message. Does not implicitly {@link onnx.TensorAnnotation.verify|verify} messages.\n * @function encode\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {onnx.ITensorAnnotation} message TensorAnnotation message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n TensorAnnotation.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.tensorName != null && message.hasOwnProperty(\"tensorName\"))\n writer.uint32(/* id 1, wireType 2

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=*/10).string(message.tensorName);\n            if (message.quantParameterTensorNames != null &&
message.quantParameterTensorNames.length)\n                for (var i = 0; i <
message.quantParameterTensorNames.length; ++i)\n
$root.onnx.StringStringEntryProto.encode(message.quantParameterTensorNames[i], writer.uint32(/* id 2, wireType
2 =*/18).fork()).ldelim();\n            return writer;\n        };\n\n        /**\n         * Encodes the specified
TensorAnnotation message, length delimited. Does not implicitly {@link onnx.TensorAnnotation.verify|verify}
messages.\n         * @function encodeDelimited\n         * @memberof onnx.TensorAnnotation\n         * @static\n
  * @param {onnx.ITensorAnnotation} message TensorAnnotation message or plain object to encode\n         *
@param {$protobuf.Writer} [writer] Writer to encode to\n         * @returns {$protobuf.Writer} Writer\n         */\n
  TensorAnnotation.encodeDelimited = function encodeDelimited(message, writer) {\n            return
this.encode(message, writer).ldelim();\n        };\n\n        /**\n         * Decodes a TensorAnnotation message from the
specified reader or buffer.\n         * @function decode\n         * @memberof onnx.TensorAnnotation\n         *
@static\n         * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @param
{number} [length] Message length if known beforehand\n         * @returns {onnx.TensorAnnotation}
TensorAnnotation\n         * @throws {Error} If the payload is not a reader or valid buffer\n         * @throws
{$protobuf.util.ProtocolError} If required fields are missing\n         */\n        TensorAnnotation.decode = function
decode(reader, length) {\n            if (!(reader instanceof $Reader))\n                reader = $Reader.create(reader);\n
   var end = length === undefined ? reader.len : reader.pos + length, message = new
$root.onnx.TensorAnnotation();\n            while (reader.pos < end) {\n                var tag = reader.uint32();\n
switch (tag >>> 3) {\n                case 1:\n                    message.tensorName = reader.string();\n                    break;\n
          case 2:\n                    if (!(message.quantParameterTensorNames &&
message.quantParameterTensorNames.length))\n                        message.quantParameterTensorNames = [];\n
       message.quantParameterTensorNames.push($root.onnx.StringStringEntryProto.decode(reader,
reader.uint32()));\n                    break;\n                default:\n                    reader.skipType(tag & 7);\n
break;\n                }\n            }\n            return message;\n        };\n\n        /**\n         * Decodes a TensorAnnotation
message from the specified reader or buffer, length delimited.\n         * @function decodeDelimited\n         *
@memberof onnx.TensorAnnotation\n         * @static\n         * @param {$protobuf.Reader|Uint8Array} reader
Reader or buffer to decode from\n         * @returns {onnx.TensorAnnotation} TensorAnnotation\n         * @throws
{Error} If the payload is not a reader or valid buffer\n         * @throws {$protobuf.util.ProtocolError} If required
fields are missing\n         */\n        TensorAnnotation.decodeDelimited = function decodeDelimited(reader) {\n
if (!(reader instanceof $Reader))\n                reader = new $Reader(reader);\n            return this.decode(reader,
reader.uint32());\n        };\n\n        /**\n         * Verifies a TensorAnnotation message.\n         * @function verify\n
  * @memberof onnx.TensorAnnotation\n         * @static\n         * @param {Object.<string,*>} message Plain
object to verify\n         * @returns {string|null} `null` if valid, otherwise the reason why it is not\n         */\n
TensorAnnotation.verify = function verify(message) {\n            if (typeof message !== \"object\" || message ===
null)\n                return \"object expected\";\n            if (message.tensorName != null &&
message.hasOwnProperty(\"tensorName\"))\n                if (!$util.isString(message.tensorName))\n                    return
\"tensorName: string expected\";\n            if (message.quantParameterTensorNames != null &&
message.hasOwnProperty(\"quantParameterTensorNames\")) {\n                if
(!Array.isArray(message.quantParameterTensorNames))\n                    return \"quantParameterTensorNames: array
expected\";\n                for (var i = 0; i < message.quantParameterTensorNames.length; ++i) {\n                    var error
= $root.onnx.StringStringEntryProto.verify(message.quantParameterTensorNames[i]);\n                    if (error)\n
            return \"quantParameterTensorNames.\" + error;\n                }\n            }\n            return null;\n        };\n\n
  /**\n         * Creates a TensorAnnotation message from a plain object. Also converts values to their respective
internal types.\n         * @function fromObject\n         * @memberof onnx.TensorAnnotation\n         * @static\n
* @param {Object.<string,*>} object Plain object\n         * @returns {onnx.TensorAnnotation} TensorAnnotation\n
       */\n        TensorAnnotation.fromObject = function fromObject(object) {\n            if (object instanceof
$root.onnx.TensorAnnotation)\n                return object;\n            var message = new
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$root.onnx.TensorAnnotation();\n            if (object.tensorName != null)\n                message.tensorName =
String(object.tensorName);\n            if (object.quantParameterTensorNames) {\n                if
(!Array.isArray(object.quantParameterTensorNames))\n                    throw
TypeError(\".onnx.TensorAnnotation.quantParameterTensorNames: array expected\");\n
message.quantParameterTensorNames = [];\n                for (var i = 0; i < object.quantParameterTensorNames.length;
++i) {\n                    if (typeof object.quantParameterTensorNames[i] !== \"object\")\n                        throw
TypeError(\".onnx.TensorAnnotation.quantParameterTensorNames: object expected\");\n
message.quantParameterTensorNames[i] =
$root.onnx.StringStringEntryProto.fromObject(object.quantParameterTensorNames[i]);\n                }\n            }\n
    return message;\n        };\n\n        /**\n         * Creates a plain object from a TensorAnnotation message. Also
converts values to other types if specified.\n         * @function toObject\n         * @memberof
onnx.TensorAnnotation\n         * @static\n         * @param {onnx.TensorAnnotation} message TensorAnnotation\n
    * @param {$protobuf.IConversionOptions} [options] Conversion options\n         * @returns {Object.<string,*>}
Plain object\n         */\n        TensorAnnotation.toObject = function toObject(message, options) {\n            if
(!options)\n                options = {};\n            var object = {};\n            if (options.arrays || options.defaults)\n
object.quantParameterTensorNames = [];\n            if (options.defaults)\n                object.tensorName = \"\";\n
if (message.tensorName != null && message.hasOwnProperty(\"tensorName\"))\n                object.tensorName =
message.tensorName;\n            if (message.quantParameterTensorNames &&
message.quantParameterTensorNames.length) {\n                object.quantParameterTensorNames = [];\n                for
(var j = 0; j < message.quantParameterTensorNames.length; ++j)\n
object.quantParameterTensorNames[j] =
$root.onnx.StringStringEntryProto.toObject(message.quantParameterTensorNames[j], options);\n            }\n
return object;\n        };\n\n        /**\n         * Converts this TensorAnnotation to JSON.\n         * @function toJSON\n
     * @memberof onnx.TensorAnnotation\n         * @instance\n         * @returns {Object.<string,*>} JSON
object\n         */\n        TensorAnnotation.prototype.toJSON = function toJSON() {\n            return
this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n        };\n\n        return TensorAnnotation;\n
})();\n\n    onnx.GraphProto = (function() {\n\n        /**\n         * Properties of a GraphProto.\n         * @memberof
onnx\n         * @interface IGraphProto\n         * @property {Array.<onnx.INodeProto>|null} [node] GraphProto
node\n         * @property {string|null} [name] GraphProto name\n         * @property
{Array.<onnx.ITensorProto>|null} [initializer] GraphProto initializer\n         * @property {string|null} [docString]
GraphProto docString\n         * @property {Array.<onnx.IValueInfoProto>|null} [input] GraphProto input\n         *
@property {Array.<onnx.IValueInfoProto>|null} [output] GraphProto output\n         * @property
{Array.<onnx.IValueInfoProto>|null} [valueInfo] GraphProto valueInfo\n         * @property
{Array.<onnx.ITensorAnnotation>|null} [quantizationAnnotation] GraphProto quantizationAnnotation\n         */\n\n
     /**\n         * Constructs a new GraphProto.\n         * @memberof onnx\n         * @classdesc Represents a
GraphProto.\n         * @implements IGraphProto\n         * @constructor\n         * @param {onnx.IGraphProto=}
[properties] Properties to set\n         */\n        function GraphProto(properties) {\n            this.node = [];\n
this.initializer = [];\n            this.input = [];\n            this.output = [];\n            this.valueInfo = [];\n
this.quantizationAnnotation = [];\n            if (properties)\n                for (var keys = Object.keys(properties), i = 0; i <
keys.length; ++i)\n                    if (properties[keys[i]] != null)\n                        this[keys[i]] = properties[keys[i]];\n
  }\n\n        /**\n         * GraphProto node.\n         * @member {Array.<onnx.INodeProto>} node\n         *
@memberof onnx.GraphProto\n         * @instance\n         */\n        GraphProto.prototype.node =
$util.emptyArray;\n\n        /**\n         * GraphProto name.\n         * @member {string} name\n         * @memberof
onnx.GraphProto\n         * @instance\n         */\n        GraphProto.prototype.name = \"\";\n\n        /**\n         *
GraphProto initializer.\n         * @member {Array.<onnx.ITensorProto>} initializer\n         * @memberof
onnx.GraphProto\n         * @instance\n         */\n        GraphProto.prototype.initializer = $util.emptyArray;\n\n
/**\n         * GraphProto docString.\n         * @member {string} docString\n         * @memberof onnx.GraphProto\n
     * @instance\n         */\n        GraphProto.prototype.docString = \"\";\n\n        /**\n         * GraphProto input.\n
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* @member {Array.<onnx.IValueInfoProto>} input\n * @memberof onnx.GraphProto\n * @instance\n */\n GraphProto.prototype.input = $util.emptyArray;\n\n /**\n * GraphProto output.\n * @member {Array.<onnx.IValueInfoProto>} output\n * @memberof onnx.GraphProto\n * @instance\n */\n GraphProto.prototype.output = $util.emptyArray;\n\n /**\n * GraphProto valueInfo.\n * @member {Array.<onnx.IValueInfoProto>} valueInfo\n * @memberof onnx.GraphProto\n * @instance\n */\n GraphProto.prototype.valueInfo = $util.emptyArray;\n\n /**\n * GraphProto quantizationAnnotation.\n * @member {Array.<onnx.ITensorAnnotation>} quantizationAnnotation\n * @memberof onnx.GraphProto\n * @instance\n */\n GraphProto.prototype.quantizationAnnotation = $util.emptyArray;\n\n /**\n * Creates a new GraphProto instance using the specified properties.\n * @function create\n * @memberof onnx.GraphProto\n * @static\n * @param {onnx.IGraphProto=} [properties] Properties to set\n * @returns {onnx.GraphProto} GraphProto instance\n */\n GraphProto.create = function create(properties) {\n return new GraphProto(properties);\n };\n\n /**\n * Encodes the specified GraphProto message. Does not implicitly {@link onnx.GraphProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.GraphProto\n * @static\n * @param {onnx.IGraphProto} message GraphProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n GraphProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.node != null && message.node.length)\n for (var i = 0; i < message.node.length; ++i)\n $root.onnx.NodeProto.encode(message.node[i], writer.uint32(/* id 1, wireType 2 =*/10).fork()).ldelim();\n if (message.name != null && message.hasOwnProperty(\"name\"))\n writer.uint32(/* id 2, wireType 2 =*/18).string(message.name);\n if (message.initializer != null && message.initializer.length)\n for (var i = 0; i < message.initializer.length; ++i)\n $root.onnx.TensorProto.encode(message.initializer[i], writer.uint32(/* id 5, wireType 2 =*/42).fork()).ldelim();\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n writer.uint32(/* id 10, wireType 2 =*/82).string(message.docString);\n if (message.input != null && message.input.length)\n for (var i = 0; i < message.input.length; ++i)\n $root.onnx.ValueInfoProto.encode(message.input[i], writer.uint32(/* id 11, wireType 2 =*/90).fork()).ldelim();\n if (message.output != null && message.output.length)\n for (var i = 0; i < message.output.length; ++i)\n $root.onnx.ValueInfoProto.encode(message.output[i], writer.uint32(/* id 12, wireType 2 =*/98).fork()).ldelim();\n if (message.valueInfo != null && message.valueInfo.length)\n for (var i = 0; i < message.valueInfo.length; ++i)\n $root.onnx.ValueInfoProto.encode(message.valueInfo[i], writer.uint32(/* id 13, wireType 2 =*/106).fork()).ldelim();\n if (message.quantizationAnnotation != null && message.quantizationAnnotation.length)\n for (var i = 0; i < message.quantizationAnnotation.length; ++i)\n $root.onnx.TensorAnnotation.encode(message.quantizationAnnotation[i], writer.uint32(/* id 14, wireType 2 =*/114).fork()).ldelim();\n return writer;\n };\n\n /**\n * Encodes the specified GraphProto message, length delimited. Does not implicitly {@link onnx.GraphProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.GraphProto\n * @static\n * @param {onnx.IGraphProto} message GraphProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n GraphProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a GraphProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.GraphProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.GraphProto} GraphProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n GraphProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.GraphProto();\n while (reader.pos < end) {\n var tag

= reader.uint32();\n switch (tag >>> 3) {\n case 1:\n if (!(message.node && message.node.length))\n message.node = [];\n message.node.push($root.onnx.NodeProto.decode(reader, reader.uint32()));\n break;\n case 2:\n message.name = reader.string();\n break;\n case 5:\n if (!(message.initializer && message.initializer.length))\n message.initializer = [];\n message.initializer.push($root.onnx.TensorProto.decode(reader, reader.uint32()));\n break;\n case 10:\n message.docString = reader.string();\n break;\n case 11:\n if (!(message.input && message.input.length))\n message.input = [];\n message.input.push($root.onnx.ValueInfoProto.decode(reader, reader.uint32()));\n break;\n case 12:\n if (!(message.output && message.output.length))\n message.output = [];\n message.output.push($root.onnx.ValueInfoProto.decode(reader, reader.uint32()));\n break;\n case 13:\n if (!(message.valueInfo && message.valueInfo.length))\n message.valueInfo = [];\n message.valueInfo.push($root.onnx.ValueInfoProto.decode(reader, reader.uint32()));\n break;\n case 14:\n if (!(message.quantizationAnnotation && message.quantizationAnnotation.length))\n message.quantizationAnnotation = [];\n message.quantizationAnnotation.push($root.onnx.TensorAnnotation.decode(reader, reader.uint32()));\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a GraphProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.GraphProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.GraphProto} GraphProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n GraphProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a GraphProto message.\n * @function verify\n * @memberof onnx.GraphProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n GraphProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.node != null && message.hasOwnProperty(\"node\")) {\n if (!Array.isArray(message.node))\n return \"node: array expected\";\n for (var i = 0; i < message.node.length; ++i) {\n var error = $root.onnx.NodeProto.verify(message.node[i]);\n if (error)\n return \"node.\" + error;\n }\n }\n if (message.name != null && message.hasOwnProperty(\"name\"))\n if (!$util.isString(message.name))\n return \"name: string expected\";\n if (message.initializer != null && message.hasOwnProperty(\"initializer\")) {\n if (!Array.isArray(message.initializer))\n return \"initializer: array expected\";\n for (var i = 0; i < message.initializer.length; ++i) {\n var error = $root.onnx.TensorProto.verify(message.initializer[i]);\n if (error)\n return \"initializer.\" + error;\n }\n }\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n if (!$util.isString(message.docString))\n return \"docString: string expected\";\n if (message.input != null && message.hasOwnProperty(\"input\")) {\n if (!Array.isArray(message.input))\n return \"input: array expected\";\n for (var i = 0; i < message.input.length; ++i) {\n var error = $root.onnx.ValueInfoProto.verify(message.input[i]);\n if (error)\n return \"input.\" + error;\n }\n }\n if (message.output != null && message.hasOwnProperty(\"output\")) {\n if (!Array.isArray(message.output))\n return \"output: array expected\";\n for (var i = 0; i < message.output.length; ++i) {\n var error = $root.onnx.ValueInfoProto.verify(message.output[i]);\n if (error)\n return \"output.\" + error;\n }\n }\n if (message.valueInfo != null && message.hasOwnProperty(\"valueInfo\")) {\n if (!Array.isArray(message.valueInfo))\n return \"valueInfo: array expected\";\n for (var i = 0; i < message.valueInfo.length; ++i) {\n var error =

$root.onnx.ValueInfoProto.verify(message.valueInfo[i]);\n if (error)\n return \"valueInfo.\" + error;\n }\n }\n if (message.quantizationAnnotation != null && message.hasOwnProperty(\"quantizationAnnotation\")) {\n if (!Array.isArray(message.quantizationAnnotation))\n return \"quantizationAnnotation: array expected\";\n for (var i = 0; i < message.quantizationAnnotation.length; ++i) {\n var error = $root.onnx.TensorAnnotation.verify(message.quantizationAnnotation[i]);\n if (error)\n return \"quantizationAnnotation.\" + error;\n }\n }\n return null;\n };\n\n /**\n * Creates a GraphProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.GraphProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.GraphProto} GraphProto\n */\n GraphProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.GraphProto)\n return object;\n var message = new $root.onnx.GraphProto();\n if (object.node) {\n if (!Array.isArray(object.node))\n throw TypeError(\".onnx.GraphProto.node: array expected\");\n message.node = [];\n for (var i = 0; i < object.node.length; ++i) {\n if (typeof object.node[i] !== \"object\")\n throw TypeError(\".onnx.GraphProto.node: object expected\");\n message.node[i] = $root.onnx.NodeProto.fromObject(object.node[i]);\n }\n }\n if (object.name != null)\n message.name = String(object.name);\n if (object.initializer) {\n if (!Array.isArray(object.initializer))\n throw TypeError(\".onnx.GraphProto.initializer: array expected\");\n message.initializer = [];\n for (var i = 0; i < object.initializer.length; ++i) {\n if (typeof object.initializer[i] !== \"object\")\n throw TypeError(\".onnx.GraphProto.initializer: object expected\");\n message.initializer[i] = $root.onnx.TensorProto.fromObject(object.initializer[i]);\n }\n }\n if (object.docString != null)\n message.docString = String(object.docString);\n if (object.input) {\n if (!Array.isArray(object.input))\n throw TypeError(\".onnx.GraphProto.input: array expected\");\n message.input = [];\n for (var i = 0; i < object.input.length; ++i) {\n if (typeof object.input[i] !== \"object\")\n throw TypeError(\".onnx.GraphProto.input: object expected\");\n message.input[i] = $root.onnx.ValueInfoProto.fromObject(object.input[i]);\n }\n }\n if (object.output) {\n if (!Array.isArray(object.output))\n throw TypeError(\".onnx.GraphProto.output: array expected\");\n message.output = [];\n for (var i = 0; i < object.output.length; ++i) {\n if (typeof object.output[i] !== \"object\")\n throw TypeError(\".onnx.GraphProto.output: object expected\");\n message.output[i] = $root.onnx.ValueInfoProto.fromObject(object.output[i]);\n }\n }\n if (object.valueInfo) {\n if (!Array.isArray(object.valueInfo))\n throw TypeError(\".onnx.GraphProto.valueInfo: array expected\");\n message.valueInfo = [];\n for (var i = 0; i < object.valueInfo.length; ++i) {\n if (typeof object.valueInfo[i] !== \"object\")\n throw TypeError(\".onnx.GraphProto.valueInfo: object expected\");\n message.valueInfo[i] = $root.onnx.ValueInfoProto.fromObject(object.valueInfo[i]);\n }\n }\n if (object.quantizationAnnotation) {\n if (!Array.isArray(object.quantizationAnnotation))\n throw TypeError(\".onnx.GraphProto.quantizationAnnotation: array expected\");\n message.quantizationAnnotation = [];\n for (var i = 0; i < object.quantizationAnnotation.length; ++i) {\n if (typeof object.quantizationAnnotation[i] !== \"object\")\n throw TypeError(\".onnx.GraphProto.quantizationAnnotation: object expected\");\n message.quantizationAnnotation[i] = $root.onnx.TensorAnnotation.fromObject(object.quantizationAnnotation[i]);\n }\n }\n return message;\n };\n\n /**\n * Creates a plain object from a GraphProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.GraphProto\n * @static\n * @param {onnx.GraphProto} message GraphProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n GraphProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.arrays || options.defaults) {\n object.node =

[];\n object.initializer = [];\n object.input = [];\n object.output = [];\n object.valueInfo = [];\n object.quantizationAnnotation = [];\n }\n if (options.defaults) {\n object.name = \"\";\n object.docString = \"\";\n }\n if (message.node && message.node.length) {\n object.node = [];\n for (var j = 0; j < message.node.length; ++j)\n object.node[j] = $root.onnx.NodeProto.toObject(message.node[j], options);\n }\n if (message.name != null && message.hasOwnProperty(\"name\"))\n object.name = message.name;\n if (message.initializer && message.initializer.length) {\n object.initializer = [];\n for (var j = 0; j < message.initializer.length; ++j)\n object.initializer[j] = $root.onnx.TensorProto.toObject(message.initializer[j], options);\n }\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n object.docString = message.docString;\n if (message.input && message.input.length) {\n object.input = [];\n for (var j = 0; j < message.input.length; ++j)\n object.input[j] = $root.onnx.ValueInfoProto.toObject(message.input[j], options);\n }\n if (message.output && message.output.length) {\n object.output = [];\n for (var j = 0; j < message.output.length; ++j)\n object.output[j] = $root.onnx.ValueInfoProto.toObject(message.output[j], options);\n }\n if (message.valueInfo && message.valueInfo.length) {\n object.valueInfo = [];\n for (var j = 0; j < message.valueInfo.length; ++j)\n object.valueInfo[j] = $root.onnx.ValueInfoProto.toObject(message.valueInfo[j], options);\n }\n if (message.quantizationAnnotation && message.quantizationAnnotation.length) {\n object.quantizationAnnotation = [];\n for (var j = 0; j < message.quantizationAnnotation.length; ++j)\n object.quantizationAnnotation[j] = $root.onnx.TensorAnnotation.toObject(message.quantizationAnnotation[j], options);\n }\n return object;\n };\n\n /**\n * Converts this GraphProto to JSON.\n * @function toJSON\n * @memberof onnx.GraphProto\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n GraphProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return GraphProto;\n })();\n\n onnx.TensorProto = (function() {\n\n /**\n * Properties of a TensorProto.\n * @memberof onnx\n * @interface ITensorProto\n * @property {Array.<number|Long>|null} [dims] TensorProto dims\n * @property {number|null} [dataType] TensorProto dataType\n * @property {onnx.TensorProto.ISegment|null} [segment] TensorProto segment\n * @property {Array.<number>|null} [floatData] TensorProto floatData\n * @property {Array.<number>|null} [int32Data] TensorProto int32Data\n * @property {Array.<Uint8Array>|null} [stringData] TensorProto stringData\n * @property {Array.<number|Long>|null} [int64Data] TensorProto int64Data\n * @property {string|null} [name] TensorProto name\n * @property {string|null} [docString] TensorProto docString\n * @property {Uint8Array|null} [rawData] TensorProto rawData\n * @property {Array.<onnx.IStringStringEntryProto>|null} [externalData] TensorProto externalData\n * @property {onnx.TensorProto.DataLocation|null} [dataLocation] TensorProto dataLocation\n * @property {Array.<number>|null} [doubleData] TensorProto doubleData\n * @property {Array.<number|Long>|null} [uint64Data] TensorProto uint64Data\n */\n\n /**\n * Constructs a new TensorProto.\n * @memberof onnx\n * @classdesc Represents a TensorProto.\n * @implements ITensorProto\n * @constructor\n * @param {onnx.ITensorProto=} [properties] Properties to set\n */\n function TensorProto(properties) {\n this.dims = [];\n this.floatData = [];\n this.int32Data = [];\n this.stringData = [];\n this.int64Data = [];\n this.externalData = [];\n this.doubleData = [];\n this.uint64Data = [];\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * TensorProto dims.\n * @member {Array.<number|Long>} dims\n * @memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.dims = $util.emptyArray;\n\n /**\n * TensorProto dataType.\n * @member {number} dataType\n * @memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.dataType = 0;\n\n /**\n *

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TensorProto segment.\n         * @member {onnx.TensorProto.ISegment|null|undefined} segment\n         *
@memberof onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.segment = null;\n\n
/**\n         * TensorProto floatData.\n         * @member {Array.<number>} floatData\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.floatData = $util.emptyArray;\n\n
/**\n         * TensorProto int32Data.\n         * @member {Array.<number>} int32Data\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.int32Data = $util.emptyArray;\n\n
/**\n         * TensorProto stringData.\n         * @member {Array.<Uint8Array>} stringData\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.stringData = $util.emptyArray;\n\n
/**\n         * TensorProto int64Data.\n         * @member {Array.<number|Long>} int64Data\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.int64Data = $util.emptyArray;\n\n
/**\n         * TensorProto name.\n         * @member {string} name\n         * @memberof onnx.TensorProto\n         *
@instance\n         */\n        TensorProto.prototype.name = \"\";\n\n        /**\n         * TensorProto docString.\n         *
@member {string} docString\n         * @memberof onnx.TensorProto\n         * @instance\n         */\n
TensorProto.prototype.docString = \"\";\n\n        /**\n         * TensorProto rawData.\n         * @member
{Uint8Array} rawData\n         * @memberof onnx.TensorProto\n         * @instance\n         */\n
TensorProto.prototype.rawData = $util.newBuffer([]);\n\n        /**\n         * TensorProto externalData.\n         *
@member {Array.<onnx.IStringStringEntryProto>} externalData\n         * @memberof onnx.TensorProto\n         *
@instance\n         */\n        TensorProto.prototype.externalData = $util.emptyArray;\n\n        /**\n         *
TensorProto dataLocation.\n         * @member {onnx.TensorProto.DataLocation} dataLocation\n         *
@memberof onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.dataLocation = 0;\n\n
/**\n         * TensorProto doubleData.\n         * @member {Array.<number>} doubleData\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.doubleData = $util.emptyArray;\n\n
 /**\n         * TensorProto uint64Data.\n         * @member {Array.<number|Long>} uint64Data\n         *
@memberof onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.uint64Data =
$util.emptyArray;\n\n        /**\n         * Creates a new TensorProto instance using the specified properties.\n         *
@function create\n         * @memberof onnx.TensorProto\n         * @static\n         * @param {onnx.ITensorProto=}
[properties] Properties to set\n         * @returns {onnx.TensorProto} TensorProto instance\n         */\n
TensorProto.create = function create(properties) {\n            return new TensorProto(properties);\n        };\n\n
/**\n         * Encodes the specified TensorProto message. Does not implicitly {@link
onnx.TensorProto.verify|verify} messages.\n         * @function encode\n         * @memberof onnx.TensorProto\n
  * @static\n         * @param {onnx.ITensorProto} message TensorProto message or plain object to encode\n         *
@param {$protobuf.Writer} [writer] Writer to encode to\n         * @returns {$protobuf.Writer} Writer\n         */\n
  TensorProto.encode = function encode(message, writer) {\n            if (!writer)\n                writer =
$Writer.create();\n            if (message.dims != null && message.dims.length) {\n                writer.uint32(/* id 1,
wireType 2 =*/10).fork();\n                for (var i = 0; i < message.dims.length; ++i)\n
writer.int64(message.dims[i]);\n                writer.ldelim();\n            }\n            if (message.dataType != null &&
message.hasOwnProperty(\"dataType\"))\n                writer.uint32(/* id 2, wireType 0
=*/16).int32(message.dataType);\n            if (message.segment != null &&
message.hasOwnProperty(\"segment\"))\n                $root.onnx.TensorProto.Segment.encode(message.segment,
writer.uint32(/* id 3, wireType 2 =*/26).fork()).ldelim();\n            if (message.floatData != null &&
message.floatData.length) {\n                writer.uint32(/* id 4, wireType 2 =*/34).fork();\n                for (var i = 0; i <
message.floatData.length; ++i)\n                    writer.float(message.floatData[i]);\n                writer.ldelim();\n
}\n            if (message.int32Data != null && message.int32Data.length) {\n                writer.uint32(/* id 5, wireType
2 =*/42).fork();\n                for (var i = 0; i < message.int32Data.length; ++i)\n
writer.int32(message.int32Data[i]);\n                writer.ldelim();\n            }\n            if (message.stringData != null
&& message.stringData.length)\n                for (var i = 0; i < message.stringData.length; ++i)\n
writer.uint32(/* id 6, wireType 2 =*/50).bytes(message.stringData[i]);\n            if (message.int64Data != null &&
message.int64Data.length) {\n                writer.uint32(/* id 7, wireType 2 =*/58).fork();\n                for (var i = 0; i <
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message.int64Data.length; ++i)\n            writer.int64(message.int64Data[i]);\n            writer.ldelim();\n
}\n        if (message.name != null && message.hasOwnProperty(\"name\"))\n            writer.uint32(/* id 8,
wireType 2 =*/66).string(message.name);\n        if (message.rawData != null &&
message.hasOwnProperty(\"rawData\"))\n            writer.uint32(/* id 9, wireType 2
=*/74).bytes(message.rawData);\n        if (message.doubleData != null && message.doubleData.length) {\n
   writer.uint32(/* id 10, wireType 2 =*/82).fork();\n            for (var i = 0; i < message.doubleData.length; ++i)\n
            writer.double(message.doubleData[i]);\n            writer.ldelim();\n        }\n        if
(message.uint64Data != null && message.uint64Data.length) {\n            writer.uint32(/* id 11, wireType 2
=*/90).fork();\n            for (var i = 0; i < message.uint64Data.length; ++i)\n
writer.uint64(message.uint64Data[i]);\n            writer.ldelim();\n        }\n        if (message.docString != null
&& message.hasOwnProperty(\"docString\"))\n            writer.uint32(/* id 12, wireType 2
=*/98).string(message.docString);\n        if (message.externalData != null && message.externalData.length)\n
      for (var i = 0; i < message.externalData.length; ++i)\n
$root.onnx.StringStringEntryProto.encode(message.externalData[i], writer.uint32(/* id 13, wireType 2
=*/106).fork()).ldelim();\n        if (message.dataLocation != null &&
message.hasOwnProperty(\"dataLocation\"))\n            writer.uint32(/* id 14, wireType 0
=*/112).int32(message.dataLocation);\n        return writer;\n    };\n\n    /**\n     * Encodes the specified
TensorProto message, length delimited. Does not implicitly {@link onnx.TensorProto.verify|verify} messages.\n
 * @function encodeDelimited\n     * @memberof onnx.TensorProto\n     * @static\n     * @param
{onnx.ITensorProto} message TensorProto message or plain object to encode\n     * @param {$protobuf.Writer}
[writer] Writer to encode to\n     * @returns {$protobuf.Writer} Writer\n     */\n
TensorProto.encodeDelimited = function encodeDelimited(message, writer) {\n        return this.encode(message,
writer).ldelim();\n    };\n\n    /**\n     * Decodes a TensorProto message from the specified reader or buffer.\n
      * @function decode\n     * @memberof onnx.TensorProto\n     * @static\n     * @param
{$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n     * @param {number} [length]
Message length if known beforehand\n     * @returns {onnx.TensorProto} TensorProto\n     * @throws {Error}
If the payload is not a reader or valid buffer\n     * @throws {$protobuf.util.ProtocolError} If required fields are
missing\n     */\n    TensorProto.decode = function decode(reader, length) {\n        if (!(reader instanceof
$Reader))\n            reader = $Reader.create(reader);\n        var end = length === undefined ? reader.len :
reader.pos + length, message = new $root.onnx.TensorProto();\n        while (reader.pos < end) {\n            var
tag = reader.uint32();\n            switch (tag >>> 3) {\n            case 1:\n                if (!(message.dims &&
message.dims.length))\n                    message.dims = [];\n                if ((tag & 7) === 2) {\n                    var
end2 = reader.uint32() + reader.pos;\n                    while (reader.pos < end2)\n
message.dims.push(reader.int64());\n                } else\n                    message.dims.push(reader.int64());\n
      break;\n            case 2:\n                message.dataType = reader.int32();\n                break;\n            case
3:\n                message.segment = $root.onnx.TensorProto.Segment.decode(reader, reader.uint32());\n
break;\n            case 4:\n                if (!(message.floatData && message.floatData.length))\n
message.floatData = [];\n                if ((tag & 7) === 2) {\n                    var end2 = reader.uint32() +
reader.pos;\n                    while (reader.pos < end2)\n                        message.floatData.push(reader.float());\n
            } else\n                    message.floatData.push(reader.float());\n                break;\n            case 5:\n
          if (!(message.int32Data && message.int32Data.length))\n                    message.int32Data = [];\n
 if ((tag & 7) === 2) {\n                    var end2 = reader.uint32() + reader.pos;\n                    while (reader.pos <
end2)\n                        message.int32Data.push(reader.int32());\n                } else\n
message.int32Data.push(reader.int32());\n                break;\n            case 6:\n                if
(!(message.stringData && message.stringData.length))\n                    message.stringData = [];\n
message.stringData.push(reader.bytes());\n                break;\n            case 7:\n                if
(!(message.int64Data && message.int64Data.length))\n                    message.int64Data = [];\n                if ((tag
& 7) === 2) {\n                    var end2 = reader.uint32() + reader.pos;\n                    while (reader.pos < end2)\n
```

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                    message.int64Data.push(reader.int64());\n                    } else\n
message.int64Data.push(reader.int64());\n                    break;\n                case 8:\n                    message.name =
reader.string();\n                    break;\n                case 12:\n                    message.docString = reader.string();\n
    break;\n                case 9:\n                    message.rawData = reader.bytes();\n                    break;\n                case
13:\n                    if (!(message.externalData && message.externalData.length))\n
message.externalData = [];\n
message.externalData.push($root.onnx.StringStringEntryProto.decode(reader, reader.uint32()));\n
break;\n                case 14:\n                    message.dataLocation = reader.int32();\n                    break;\n                case
10:\n                    if (!(message.doubleData && message.doubleData.length))\n                        message.doubleData =
[];\n                    if ((tag & 7) === 2) {\n                        var end2 = reader.uint32() + reader.pos;\n
while (reader.pos < end2)\n                            message.doubleData.push(reader.double());\n                    } else\n
          message.doubleData.push(reader.double());\n                    break;\n                case 11:\n                    if
(!(message.uint64Data && message.uint64Data.length))\n                        message.uint64Data = [];\n                    if
((tag & 7) === 2) {\n                        var end2 = reader.uint32() + reader.pos;\n                        while (reader.pos <
end2)\n                            message.uint64Data.push(reader.uint64());\n                    } else\n
message.uint64Data.push(reader.uint64());\n                    break;\n                default:\n
reader.skipType(tag & 7);\n                    break;\n                }\n            }\n            return message;\n        };\n\n
/**\n         * Decodes a TensorProto message from the specified reader or buffer, length delimited.\n         *
@function decodeDelimited\n         * @memberof onnx.TensorProto\n         * @static\n         * @param
{$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @returns {onnx.TensorProto}
TensorProto\n         * @throws {Error} If the payload is not a reader or valid buffer\n         * @throws
{$protobuf.util.ProtocolError} If required fields are missing\n         */\n        TensorProto.decodeDelimited =
function decodeDelimited(reader) {\n            if (!(reader instanceof $Reader))\n                reader = new
$Reader(reader);\n            return this.decode(reader, reader.uint32());\n        };\n\n        /**\n         * Verifies a
TensorProto message.\n         * @function verify\n         * @memberof onnx.TensorProto\n         * @static\n         *
@param {Object.<string,*>} message Plain object to verify\n         * @returns {string|null} `null` if valid, otherwise
the reason why it is not\n         */\n        TensorProto.verify = function verify(message) {\n            if (typeof message
!== \"object\" || message === null)\n                return \"object expected\";\n            if (message.dims != null &&
message.hasOwnProperty(\"dims\")) {\n                if (!Array.isArray(message.dims))\n                    return \"dims:
array expected\";\n                for (var i = 0; i < message.dims.length; ++i)\n                    if
(!$util.isInteger(message.dims[i]) && !(message.dims[i] && $util.isInteger(message.dims[i].low) &&
$util.isInteger(message.dims[i].high)))\n                        return \"dims: integer|Long[] expected\";\n            }\n
if (message.dataType != null && message.hasOwnProperty(\"dataType\"))\n                if
(!$util.isInteger(message.dataType))\n                    return \"dataType: integer expected\";\n            if
(message.segment != null && message.hasOwnProperty(\"segment\")) {\n                var error =
$root.onnx.TensorProto.Segment.verify(message.segment);\n                if (error)\n                    return \"segment.\" +
error;\n            }\n            if (message.floatData != null && message.hasOwnProperty(\"floatData\")) {\n                if
(!Array.isArray(message.floatData))\n                    return \"floatData: array expected\";\n                for (var i = 0; i <
message.floatData.length; ++i)\n                    if (typeof message.floatData[i] !== \"number\")\n                        return
\"floatData: number[] expected\";\n            }\n            if (message.int32Data != null &&
message.hasOwnProperty(\"int32Data\")) {\n                if (!Array.isArray(message.int32Data))\n                    return
\"int32Data: array expected\";\n                for (var i = 0; i < message.int32Data.length; ++i)\n                    if
(!$util.isInteger(message.int32Data[i]))\n                        return \"int32Data: integer[] expected\";\n            }\n
if (message.stringData != null && message.hasOwnProperty(\"stringData\")) {\n                if
(!Array.isArray(message.stringData))\n                    return \"stringData: array expected\";\n                for (var i = 0; i
< message.stringData.length; ++i)\n                    if (!(message.stringData[i] && typeof message.stringData[i].length
=== \"number\" || $util.isString(message.stringData[i])))\n                        return \"stringData: buffer[] expected\";\n
      }\n            if (message.int64Data != null && message.hasOwnProperty(\"int64Data\")) {\n                if
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(!Array.isArray(message.int64Data))\n                    return \"int64Data: array expected\";\n                for (var i = 0; i <
message.int64Data.length; ++i)\n                    if (!$util.isInteger(message.int64Data[i]) && !(message.int64Data[i]
&& $util.isInteger(message.int64Data[i].low) && $util.isInteger(message.int64Data[i].high)))\n
return \"int64Data: integer|Long[] expected\";\n            }\n            if (message.name != null &&
message.hasOwnProperty(\"name\"))\n                if (!$util.isString(message.name))\n                    return \"name:
string expected\";\n            if (message.docString != null && message.hasOwnProperty(\"docString\"))\n                if
(!$util.isString(message.docString))\n                    return \"docString: string expected\";\n            if
(message.rawData != null && message.hasOwnProperty(\"rawData\"))\n                if (!(message.rawData && typeof
message.rawData.length === \"number\" || $util.isString(message.rawData)))\n                    return \"rawData: buffer
expected\";\n            if (message.externalData != null && message.hasOwnProperty(\"externalData\")) {\n
if (!Array.isArray(message.externalData))\n                    return \"externalData: array expected\";\n                for (var i
= 0; i < message.externalData.length; ++i) {\n                    var error =
$root.onnx.StringStringEntryProto.verify(message.externalData[i]);\n                    if (error)\n                        return
\"externalData.\" + error;\n                }\n            }\n            if (message.dataLocation != null &&
message.hasOwnProperty(\"dataLocation\"))\n                switch (message.dataLocation) {\n                default:\n
        return \"dataLocation: enum value expected\";\n                case 0:\n                case 1:\n                    break;\n
       }\n            if (message.doubleData != null && message.hasOwnProperty(\"doubleData\")) {\n                if
(!Array.isArray(message.doubleData))\n                    return \"doubleData: array expected\";\n                for (var i = 0;
i < message.doubleData.length; ++i)\n                    if (typeof message.doubleData[i] !== \"number\")\n
return \"doubleData: number[] expected\";\n            }\n            if (message.uint64Data != null &&
message.hasOwnProperty(\"uint64Data\")) {\n                if (!Array.isArray(message.uint64Data))\n
return \"uint64Data: array expected\";\n                for (var i = 0; i < message.uint64Data.length; ++i)\n                    if
(!$util.isInteger(message.uint64Data[i]) && !(message.uint64Data[i] && $util.isInteger(message.uint64Data[i].low)
&& $util.isInteger(message.uint64Data[i].high)))\n                        return \"uint64Data: integer|Long[] expected\";\n
        }\n            return null;\n        };\n\n        /**\n         * Creates a TensorProto message from a plain object. Also
converts values to their respective internal types.\n         * @function fromObject\n         * @memberof
onnx.TensorProto\n         * @static\n         * @param {Object.<string,*>} object Plain object\n         * @returns
{onnx.TensorProto} TensorProto\n         */\n        TensorProto.fromObject = function fromObject(object) {\n
if (object instanceof $root.onnx.TensorProto)\n                return object;\n            var message = new
$root.onnx.TensorProto();\n            if (object.dims) {\n                if (!Array.isArray(object.dims))\n
throw TypeError(\".onnx.TensorProto.dims: array expected\");\n                message.dims = [];\n                for (var i =
0; i < object.dims.length; ++i)\n                    if ($util.Long)\n                        (message.dims[i] =
$util.Long.fromValue(object.dims[i])).unsigned = false;\n                    else if (typeof object.dims[i] === \"string\")\n
                    message.dims[i] = parseInt(object.dims[i], 10);\n                    else if (typeof object.dims[i] ===
\"number\")\n                        message.dims[i] = object.dims[i];\n                    else if (typeof object.dims[i] ===
\"object\")\n                        message.dims[i] = new $util.LongBits(object.dims[i].low >>> 0, object.dims[i].high >>>
0).toNumber();\n            }\n            if (object.dataType != null)\n                message.dataType = object.dataType |
0;\n            if (object.segment != null) {\n                if (typeof object.segment !== \"object\")\n                    throw
TypeError(\".onnx.TensorProto.segment: object expected\");\n                message.segment =
$root.onnx.TensorProto.Segment.fromObject(object.segment);\n            }\n            if (object.floatData) {\n
if (!Array.isArray(object.floatData))\n                    throw TypeError(\".onnx.TensorProto.floatData: array
expected\");\n                message.floatData = [];\n                for (var i = 0; i < object.floatData.length; ++i)\n
   message.floatData[i] = Number(object.floatData[i]);\n            }\n            if (object.int32Data) {\n                if
(!Array.isArray(object.int32Data))\n                    throw TypeError(\".onnx.TensorProto.int32Data: array
expected\");\n                message.int32Data = [];\n                for (var i = 0; i < object.int32Data.length; ++i)\n
    message.int32Data[i] = object.int32Data[i] | 0;\n            }\n            if (object.stringData) {\n                if
(!Array.isArray(object.stringData))\n                    throw TypeError(\".onnx.TensorProto.stringData: array
expected\");\n                message.stringData = [];\n                for (var i = 0; i < object.stringData.length; ++i)\n
```

if (typeof object.stringData[i] === \"string\")\n $util.base64.decode(object.stringData[i], message.stringData[i] = $util.newBuffer($util.base64.length(object.stringData[i])), 0);\n else if (object.stringData[i].length)\n message.stringData[i] = object.stringData[i];\n }\n if (object.int64Data) {\n if (!Array.isArray(object.int64Data))\n throw TypeError(\".onnx.TensorProto.int64Data: array expected\");\n message.int64Data = [];\n for (var i = 0; i < object.int64Data.length; ++i)\n if ($util.Long)\n (message.int64Data[i] = $util.Long.fromValue(object.int64Data[i])).unsigned = false;\n else if (typeof object.int64Data[i] === \"string\")\n message.int64Data[i] = parseInt(object.int64Data[i], 10);\n else if (typeof object.int64Data[i] === \"number\")\n message.int64Data[i] = object.int64Data[i];\n else if (typeof object.int64Data[i] === \"object\")\n message.int64Data[i] = new $util.LongBits(object.int64Data[i].low >>> 0, object.int64Data[i].high >>> 0).toNumber();\n }\n if (object.name != null)\n message.name = String(object.name);\n if (object.docString != null)\n message.docString = String(object.docString);\n if (object.rawData != null)\n if (typeof object.rawData === \"string\")\n $util.base64.decode(object.rawData, message.rawData = $util.newBuffer($util.base64.length(object.rawData)), 0);\n else if (object.rawData.length)\n message.rawData = object.rawData;\n if (object.externalData) {\n if (!Array.isArray(object.externalData))\n throw TypeError(\".onnx.TensorProto.externalData: array expected\");\n message.externalData = [];\n for (var i = 0; i < object.externalData.length; ++i) {\n if (typeof object.externalData[i] !== \"object\")\n throw TypeError(\".onnx.TensorProto.externalData: object expected\");\n message.externalData[i] = $root.onnx.StringStringEntryProto.fromObject(object.externalData[i]);\n }\n }\n switch (object.dataLocation) {\n case \"DEFAULT\":\n case 0:\n message.dataLocation = 0;\n break;\n case \"EXTERNAL\":\n case 1:\n message.dataLocation = 1;\n break;\n }\n if (object.doubleData) {\n if (!Array.isArray(object.doubleData))\n throw TypeError(\".onnx.TensorProto.doubleData: array expected\");\n message.doubleData = [];\n for (var i = 0; i < object.doubleData.length; ++i)\n message.doubleData[i] = Number(object.doubleData[i]);\n }\n if (object.uint64Data) {\n if (!Array.isArray(object.uint64Data))\n throw TypeError(\".onnx.TensorProto.uint64Data: array expected\");\n message.uint64Data = [];\n for (var i = 0; i < object.uint64Data.length; ++i)\n if ($util.Long)\n (message.uint64Data[i] = $util.Long.fromValue(object.uint64Data[i])).unsigned = true;\n else if (typeof object.uint64Data[i] === \"string\")\n message.uint64Data[i] = parseInt(object.uint64Data[i], 10);\n else if (typeof object.uint64Data[i] === \"number\")\n message.uint64Data[i] = object.uint64Data[i];\n else if (typeof object.uint64Data[i] === \"object\")\n message.uint64Data[i] = new $util.LongBits(object.uint64Data[i].low >>> 0, object.uint64Data[i].high >>> 0).toNumber(true);\n }\n return message;\n };\n\n /**\n * Creates a plain object from a TensorProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.TensorProto\n * @static\n * @param {onnx.TensorProto} message TensorProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n TensorProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.arrays || options.defaults) {\n object.dims = [];\n object.floatData = [];\n object.int32Data = [];\n object.stringData = [];\n object.int64Data = [];\n object.doubleData = [];\n object.uint64Data = [];\n object.externalData = [];\n }\n if (options.defaults) {\n object.dataType = 0;\n object.segment = null;\n object.name = \"\";\n if (options.bytes === String)\n object.rawData = \"\";\n else {\n object.rawData = [];\n if (options.bytes !== Array)\n object.rawData = $util.newBuffer(object.rawData);\n }\n object.docString = \"\";\n object.dataLocation = options.enums === String ? \"DEFAULT\" : 0;\n }\n if

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(message.dims && message.dims.length) {\n                object.dims = [];\n                for (var j = 0; j <
message.dims.length; ++j)\n                    if (typeof message.dims[j] === \"number\")\n                        object.dims[j]
= options.longs === String ? String(message.dims[j]) : message.dims[j];\n                    else\n
object.dims[j] = options.longs === String ? $util.Long.prototype.toString.call(message.dims[j]) : options.longs ===
Number ? new $util.LongBits(message.dims[j].low >>> 0, message.dims[j].high >>> 0).toNumber() :
message.dims[j];\n            }\n            if (message.dataType != null && message.hasOwnProperty(\"dataType\"))\n
          object.dataType = message.dataType;\n            if (message.segment != null &&
message.hasOwnProperty(\"segment\"))\n                object.segment =
$root.onnx.TensorProto.Segment.toObject(message.segment, options);\n            if (message.floatData &&
message.floatData.length) {\n                object.floatData = [];\n                for (var j = 0; j < message.floatData.length;
++j)\n                    object.floatData[j] = options.json && !isFinite(message.floatData[j]) ?
String(message.floatData[j]) : message.floatData[j];\n            }\n            if (message.int32Data &&
message.int32Data.length) {\n                object.int32Data = [];\n                for (var j = 0; j <
message.int32Data.length; ++j)\n                    object.int32Data[j] = message.int32Data[j];\n            }\n            if
(message.stringData && message.stringData.length) {\n                object.stringData = [];\n                for (var j = 0; j
< message.stringData.length; ++j)\n                    object.stringData[j] = options.bytes === String ?
$util.base64.encode(message.stringData[j], 0, message.stringData[j].length) : options.bytes === Array ?
Array.prototype.slice.call(message.stringData[j]) : message.stringData[j];\n            }\n            if (message.int64Data
&& message.int64Data.length) {\n                object.int64Data = [];\n                for (var j = 0; j <
message.int64Data.length; ++j)\n                    if (typeof message.int64Data[j] === \"number\")\n
object.int64Data[j] = options.longs === String ? String(message.int64Data[j]) : message.int64Data[j];\n
else\n                        object.int64Data[j] = options.longs === String ?
$util.Long.prototype.toString.call(message.int64Data[j]) : options.longs === Number ? new
$util.LongBits(message.int64Data[j].low >>> 0, message.int64Data[j].high >>> 0).toNumber() :
message.int64Data[j];\n            }\n            if (message.name != null && message.hasOwnProperty(\"name\"))\n
     object.name = message.name;\n            if (message.rawData != null &&
message.hasOwnProperty(\"rawData\"))\n                object.rawData = options.bytes === String ?
$util.base64.encode(message.rawData, 0, message.rawData.length) : options.bytes === Array ?
Array.prototype.slice.call(message.rawData) : message.rawData;\n            if (message.doubleData &&
message.doubleData.length) {\n                object.doubleData = [];\n                for (var j = 0; j <
message.doubleData.length; ++j)\n                    object.doubleData[j] = options.json &&
!isFinite(message.doubleData[j]) ? String(message.doubleData[j]) : message.doubleData[j];\n            }\n            if
(message.uint64Data && message.uint64Data.length) {\n                object.uint64Data = [];\n                for (var j = 0;
j < message.uint64Data.length; ++j)\n                    if (typeof message.uint64Data[j] === \"number\")\n
object.uint64Data[j] = options.longs === String ? String(message.uint64Data[j]) : message.uint64Data[j];\n
    else\n                        object.uint64Data[j] = options.longs === String ?
$util.Long.prototype.toString.call(message.uint64Data[j]) : options.longs === Number ? new
$util.LongBits(message.uint64Data[j].low >>> 0, message.uint64Data[j].high >>> 0).toNumber(true) :
message.uint64Data[j];\n            }\n            if (message.docString != null &&
message.hasOwnProperty(\"docString\"))\n                object.docString = message.docString;\n            if
(message.externalData && message.externalData.length) {\n                object.externalData = [];\n                for (var j
= 0; j < message.externalData.length; ++j)\n                    object.externalData[j] =
$root.onnx.StringStringEntryProto.toObject(message.externalData[j], options);\n            }\n            if
(message.dataLocation != null && message.hasOwnProperty(\"dataLocation\"))\n                object.dataLocation =
options.enums === String ? $root.onnx.TensorProto.DataLocation[message.dataLocation] :
message.dataLocation;\n            return object;\n        };\n\n        /**\n         * Converts this TensorProto to JSON.\n
   * @function toJSON\n         * @memberof onnx.TensorProto\n         * @instance\n         * @returns
{Object.<string,*>} JSON object\n         */\n        TensorProto.prototype.toJSON = function toJSON() {\n
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return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n        };\n\n        /**\n         * DataType
enum.\n         * @name onnx.TensorProto.DataType\n         * @enum {string}\n         * @property {number}
UNDEFINED=0 UNDEFINED value\n         * @property {number} FLOAT=1 FLOAT value\n         * @property
{number} UINT8=2 UINT8 value\n         * @property {number} INT8=3 INT8 value\n         * @property {number}
UINT16=4 UINT16 value\n         * @property {number} INT16=5 INT16 value\n         * @property {number}
INT32=6 INT32 value\n         * @property {number} INT64=7 INT64 value\n         * @property {number}
STRING=8 STRING value\n         * @property {number} BOOL=9 BOOL value\n         * @property {number}
FLOAT16=10 FLOAT16 value\n         * @property {number} DOUBLE=11 DOUBLE value\n         * @property
{number} UINT32=12 UINT32 value\n         * @property {number} UINT64=13 UINT64 value\n         *
@property {number} COMPLEX64=14 COMPLEX64 value\n         * @property {number} COMPLEX128=15
COMPLEX128 value\n         * @property {number} BFLOAT16=16 BFLOAT16 value\n         */\n
TensorProto.DataType = (function() {\n            var valuesById = {}, values = Object.create(valuesById);\n
values[valuesById[0] = \"UNDEFINED\"] = 0;\n            values[valuesById[1] = \"FLOAT\"] = 1;\n
values[valuesById[2] = \"UINT8\"] = 2;\n            values[valuesById[3] = \"INT8\"] = 3;\n
values[valuesById[4] = \"UINT16\"] = 4;\n            values[valuesById[5] = \"INT16\"] = 5;\n
values[valuesById[6] = \"INT32\"] = 6;\n            values[valuesById[7] = \"INT64\"] = 7;\n
values[valuesById[8] = \"STRING\"] = 8;\n            values[valuesById[9] = \"BOOL\"] = 9;\n
values[valuesById[10] = \"FLOAT16\"] = 10;\n            values[valuesById[11] = \"DOUBLE\"] = 11;\n
values[valuesById[12] = \"UINT32\"] = 12;\n            values[valuesById[13] = \"UINT64\"] = 13;\n
values[valuesById[14] = \"COMPLEX64\"] = 14;\n            values[valuesById[15] = \"COMPLEX128\"] = 15;\n
   values[valuesById[16] = \"BFLOAT16\"] = 16;\n            return values;\n        })();\n\n        TensorProto.Segment
= (function() {\n\n            /**\n             * Properties of a Segment.\n             * @memberof onnx.TensorProto\n
  * @interface ISegment\n             * @property {number|Long|null} [begin] Segment begin\n             * @property
{number|Long|null} [end] Segment end\n             */\n\n            /**\n             * Constructs a new Segment.\n             *
@memberof onnx.TensorProto\n             * @classdesc Represents a Segment.\n             * @implements ISegment\n
         * @constructor\n             * @param {onnx.TensorProto.ISegment=} [properties] Properties to set\n
*/\n            function Segment(properties) {\n                if (properties)\n                    for (var keys =
Object.keys(properties), i = 0; i < keys.length; ++i)\n                        if (properties[keys[i]] != null)\n
this[keys[i]] = properties[keys[i]];\n            }\n\n            /**\n             * Segment begin.\n             * @member
{number|Long} begin\n             * @memberof onnx.TensorProto.Segment\n             * @instance\n             */\n
 Segment.prototype.begin = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n            /**\n             * Segment
end.\n             * @member {number|Long} end\n             * @memberof onnx.TensorProto.Segment\n             *
@instance\n             */\n            Segment.prototype.end = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n
/**\n             * Creates a new Segment instance using the specified properties.\n             * @function create\n
* @memberof onnx.TensorProto.Segment\n             * @static\n             * @param {onnx.TensorProto.ISegment=}
[properties] Properties to set\n             * @returns {onnx.TensorProto.Segment} Segment instance\n             */\n
   Segment.create = function create(properties) {\n                return new Segment(properties);\n            };\n\n
/**\n             * Encodes the specified Segment message. Does not implicitly {@link
onnx.TensorProto.Segment.verify|verify} messages.\n             * @function encode\n             * @memberof
onnx.TensorProto.Segment\n             * @static\n             * @param {onnx.TensorProto.ISegment} message
Segment message or plain object to encode\n             * @param {$protobuf.Writer} [writer] Writer to encode to\n
      * @returns {$protobuf.Writer} Writer\n             */\n            Segment.encode = function encode(message, writer)
{\n                if (!writer)\n                    writer = $Writer.create();\n                if (message.begin != null &&
message.hasOwnProperty(\"begin\"))\n                    writer.uint32(/* id 1, wireType 0 =*/8).int64(message.begin);\n
           if (message.end != null && message.hasOwnProperty(\"end\"))\n                    writer.uint32(/* id 2, wireType
0 =*/16).int64(message.end);\n                return writer;\n            };\n\n            /**\n             * Encodes the specified
Segment message, length delimited. Does not implicitly {@link onnx.TensorProto.Segment.verify|verify}
messages.\n             * @function encodeDelimited\n             * @memberof onnx.TensorProto.Segment\n             *
```

@static\n * @param {onnx.TensorProto.ISegment} message Segment message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n Segment.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a Segment message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.TensorProto.Segment} Segment\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Segment.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.TensorProto.Segment();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.begin = reader.int64();\n break;\n case 2:\n message.end = reader.int64();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a Segment message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TensorProto.Segment} Segment\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Segment.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a Segment message.\n * @function verify\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n Segment.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.begin != null && message.hasOwnProperty(\"begin\"))\n if (!$util.isInteger(message.begin) && !(message.begin && $util.isInteger(message.begin.low) && $util.isInteger(message.begin.high)))\n return \"begin: integer|Long expected\";\n if (message.end != null && message.hasOwnProperty(\"end\"))\n if (!$util.isInteger(message.end) && !(message.end && $util.isInteger(message.end.low) && $util.isInteger(message.end.high)))\n return \"end: integer|Long expected\";\n return null;\n };\n\n /**\n * Creates a Segment message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.TensorProto.Segment} Segment\n */\n Segment.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.TensorProto.Segment)\n return object;\n var message = new $root.onnx.TensorProto.Segment();\n if (object.begin != null)\n if ($util.Long)\n (message.begin = $util.Long.fromValue(object.begin)).unsigned = false;\n else if (typeof object.begin === \"string\")\n message.begin = parseInt(object.begin, 10);\n else if (typeof object.begin === \"number\")\n message.begin = object.begin;\n else if (typeof object.begin === \"object\")\n message.begin = new $util.LongBits(object.begin.low >>> 0, object.begin.high >>> 0).toNumber();\n if (object.end != null)\n if ($util.Long)\n (message.end = $util.Long.fromValue(object.end)).unsigned = false;\n else if (typeof object.end === \"string\")\n message.end = parseInt(object.end, 10);\n else if (typeof object.end === \"number\")\n message.end = object.end;\n else if (typeof object.end === \"object\")\n message.end = new $util.LongBits(object.end.low >>> 0, object.end.high >>> 0).toNumber();\n return message;\n };\n\n /**\n * Creates a plain object from a Segment message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {onnx.TensorProto.Segment} message Segment\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n Segment.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.defaults) {\n if ($util.Long) {\n var long = new $util.Long(0, 0, false);\n object.begin = options.longs === String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n } else\n object.begin = options.longs === String ? \"0\" : 0;\n if ($util.Long) {\n var long = new $util.Long(0, 0, false);\n object.end = options.longs === String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n } else\n object.end = options.longs === String ? \"0\" : 0;\n }\n if (message.begin != null && message.hasOwnProperty(\"begin\"))\n if (typeof message.begin === \"number\")\n object.begin = options.longs === String ? String(message.begin) : message.begin;\n else\n object.begin = options.longs === String ? $util.Long.prototype.toString.call(message.begin) : options.longs === Number ? new $util.LongBits(message.begin.low >>> 0, message.begin.high >>> 0).toNumber() : message.begin;\n if (message.end != null && message.hasOwnProperty(\"end\"))\n if (typeof message.end === \"number\")\n object.end = options.longs === String ? String(message.end) : message.end;\n else\n object.end = options.longs === String ? $util.Long.prototype.toString.call(message.end) : options.longs === Number ? new $util.LongBits(message.end.low >>> 0, message.end.high >>> 0).toNumber() : message.end;\n return object;\n };\n\n /**\n * Converts this Segment to JSON.\n * @function toJSON\n * @memberof onnx.TensorProto.Segment\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n Segment.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return Segment;\n })();\n\n /**\n * DataLocation enum.\n * @name onnx.TensorProto.DataLocation\n * @enum {string}\n * @property {number} DEFAULT=0 DEFAULT value\n * @property {number} EXTERNAL=1 EXTERNAL value\n */\n TensorProto.DataLocation = (function() {\n var valuesById = {}, values = Object.create(valuesById);\n values[valuesById[0] = \"DEFAULT\"] = 0;\n values[valuesById[1] = \"EXTERNAL\"] = 1;\n return values;\n })();\n\n return TensorProto;\n })();\n\n onnx.TensorShapeProto = (function() {\n\n /**\n * Properties of a TensorShapeProto.\n * @memberof onnx\n * @interface ITensorShapeProto\n * @property {Array.<onnx.TensorShapeProto.IDimension>|null} [dim] TensorShapeProto dim\n */\n\n /**\n * Constructs a new TensorShapeProto.\n * @memberof onnx\n * @classdesc Represents a TensorShapeProto.\n * @implements ITensorShapeProto\n * @constructor\n * @param {onnx.ITensorShapeProto=} [properties] Properties to set\n */\n function TensorShapeProto(properties) {\n this.dim = [];\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * TensorShapeProto dim.\n * @member {Array.<onnx.TensorShapeProto.IDimension>} dim\n * @memberof onnx.TensorShapeProto\n * @instance\n */\n TensorShapeProto.prototype.dim = $util.emptyArray;\n\n /**\n * Creates a new TensorShapeProto instance using the specified properties.\n * @function create\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {onnx.ITensorShapeProto=} [properties] Properties to set\n * @returns {onnx.TensorShapeProto} TensorShapeProto instance\n */\n TensorShapeProto.create = function create(properties) {\n return new TensorShapeProto(properties);\n };\n\n /**\n * Encodes the specified TensorShapeProto message. Does not implicitly {@link onnx.TensorShapeProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {onnx.ITensorShapeProto} message TensorShapeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n TensorShapeProto.encode = function encode(message, writer) {\n if (!writer)\n writer =

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$Writer.create();\n        if (message.dim != null && message.dim.length)\n            for (var i = 0; i <
message.dim.length; ++i)\n                $root.onnx.TensorShapeProto.Dimension.encode(message.dim[i],
writer.uint32(/* id 1, wireType 2 =*/10).fork()).ldelim();\n        return writer;\n    };\n\n    /**\n     *
Encodes the specified TensorShapeProto message, length delimited. Does not implicitly {@link
onnx.TensorShapeProto.verify|verify} messages.\n     * @function encodeDelimited\n     * @memberof
onnx.TensorShapeProto\n     * @static\n     * @param {onnx.ITensorShapeProto} message TensorShapeProto
message or plain object to encode\n     * @param {$protobuf.Writer} [writer] Writer to encode to\n     *
@returns {$protobuf.Writer} Writer\n     */\n    TensorShapeProto.encodeDelimited = function
encodeDelimited(message, writer) {\n        return this.encode(message, writer).ldelim();\n    };\n\n    /**\n
 * Decodes a TensorShapeProto message from the specified reader or buffer.\n     * @function decode\n     *
@memberof onnx.TensorShapeProto\n     * @static\n     * @param {$protobuf.Reader|Uint8Array} reader
Reader or buffer to decode from\n     * @param {number} [length] Message length if known beforehand\n     *
@returns {onnx.TensorShapeProto} TensorShapeProto\n     * @throws {Error} If the payload is not a reader or
valid buffer\n     * @throws {$protobuf.util.ProtocolError} If required fields are missing\n     */\n
TensorShapeProto.decode = function decode(reader, length) {\n        if (!(reader instanceof $Reader))\n
reader = $Reader.create(reader);\n        var end = length === undefined ? reader.len : reader.pos + length, message
= new $root.onnx.TensorShapeProto();\n        while (reader.pos < end) {\n            var tag = reader.uint32();\n
     switch (tag >>> 3) {\n            case 1:\n                if (!(message.dim && message.dim.length))\n
   message.dim = [];\n                message.dim.push($root.onnx.TensorShapeProto.Dimension.decode(reader,
reader.uint32()));\n                break;\n            default:\n                reader.skipType(tag & 7);\n
break;\n            }\n        }\n        return message;\n    };\n\n    /**\n     * Decodes a TensorShapeProto
message from the specified reader or buffer, length delimited.\n     * @function decodeDelimited\n     *
@memberof onnx.TensorShapeProto\n     * @static\n     * @param {$protobuf.Reader|Uint8Array} reader
Reader or buffer to decode from\n     * @returns {onnx.TensorShapeProto} TensorShapeProto\n     * @throws
{Error} If the payload is not a reader or valid buffer\n     * @throws {$protobuf.util.ProtocolError} If required
fields are missing\n     */\n    TensorShapeProto.decodeDelimited = function decodeDelimited(reader) {\n
if (!(reader instanceof $Reader))\n            reader = new $Reader(reader);\n        return this.decode(reader,
reader.uint32());\n    };\n\n    /**\n     * Verifies a TensorShapeProto message.\n     * @function verify\n
  * @memberof onnx.TensorShapeProto\n     * @static\n     * @param {Object.<string,*>} message Plain
object to verify\n     * @returns {string|null} `null` if valid, otherwise the reason why it is not\n     */\n
TensorShapeProto.verify = function verify(message) {\n        if (typeof message !== \"object\" || message ===
null)\n            return \"object expected\";\n        if (message.dim != null && message.hasOwnProperty(\"dim\"))
{\n            if (!Array.isArray(message.dim))\n                return \"dim: array expected\";\n            for (var i = 0;
i < message.dim.length; ++i) {\n                var error =
$root.onnx.TensorShapeProto.Dimension.verify(message.dim[i]);\n                if (error)\n                    return
\"dim.\" + error;\n            }\n        }\n        return null;\n    };\n\n    /**\n     * Creates a
TensorShapeProto message from a plain object. Also converts values to their respective internal types.\n     *
@function fromObject\n     * @memberof onnx.TensorShapeProto\n     * @static\n     * @param
{Object.<string,*>} object Plain object\n     * @returns {onnx.TensorShapeProto} TensorShapeProto\n     */\n
  TensorShapeProto.fromObject = function fromObject(object) {\n        if (object instanceof
$root.onnx.TensorShapeProto)\n            return object;\n        var message = new
$root.onnx.TensorShapeProto();\n        if (object.dim) {\n            if (!Array.isArray(object.dim))\n
throw TypeError(\".onnx.TensorShapeProto.dim: array expected\");\n            message.dim = [];\n            for
(var i = 0; i < object.dim.length; ++i) {\n                if (typeof object.dim[i] !== \"object\")\n                    throw
TypeError(\".onnx.TensorShapeProto.dim: object expected\");\n                message.dim[i] =
$root.onnx.TensorShapeProto.Dimension.fromObject(object.dim[i]);\n            }\n        }\n        return
message;\n    };\n\n    /**\n     * Creates a plain object from a TensorShapeProto message. Also converts
values to other types if specified.\n     * @function toObject\n     * @memberof onnx.TensorShapeProto\n
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* @static\n         * @param {onnx.TensorShapeProto} message TensorShapeProto\n         * @param
{$protobuf.IConversionOptions} [options] Conversion options\n         * @returns {Object.<string,*>} Plain object\n
         */\n         TensorShapeProto.toObject = function toObject(message, options) {\n             if (!options)\n
options = {};\n             var object = {};\n             if (options.arrays || options.defaults)\n                 object.dim = [];\n
     if (message.dim && message.dim.length) {\n                 object.dim = [];\n                 for (var j = 0; j <
message.dim.length; ++j)\n                     object.dim[j] =
$root.onnx.TensorShapeProto.Dimension.toObject(message.dim[j], options);\n             }\n             return object;\n
};\n\n         /**\n         * Converts this TensorShapeProto to JSON.\n         * @function toJSON\n         * @memberof
onnx.TensorShapeProto\n         * @instance\n         * @returns {Object.<string,*>} JSON object\n         */\n
TensorShapeProto.prototype.toJSON = function toJSON() {\n             return this.constructor.toObject(this,
$protobuf.util.toJSONOptions);\n         };\n\n         TensorShapeProto.Dimension = (function() {\n\n             /**\n
   * Properties of a Dimension.\n             * @memberof onnx.TensorShapeProto\n             * @interface
IDimension\n             * @property {number|Long|null} [dimValue] Dimension dimValue\n             * @property
{string|null} [dimParam] Dimension dimParam\n             * @property {string|null} [denotation] Dimension
denotation\n             */\n\n             /**\n             * Constructs a new Dimension.\n             * @memberof
onnx.TensorShapeProto\n             * @classdesc Represents a Dimension.\n             * @implements IDimension\n
     * @constructor\n             * @param {onnx.TensorShapeProto.IDimension=} [properties] Properties to set\n
   */\n             function Dimension(properties) {\n                 if (properties)\n                     for (var keys =
Object.keys(properties), i = 0; i < keys.length; ++i)\n                         if (properties[keys[i]] != null)\n
this[keys[i]] = properties[keys[i]];\n             }\n\n             /**\n             * Dimension dimValue.\n             * @member
{number|Long} dimValue\n             * @memberof onnx.TensorShapeProto.Dimension\n             * @instance\n
   */\n             Dimension.prototype.dimValue = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n             /**\n
  * Dimension dimParam.\n             * @member {string} dimParam\n             * @memberof
onnx.TensorShapeProto.Dimension\n             * @instance\n             */\n             Dimension.prototype.dimParam =
\"\";\n\n             /**\n             * Dimension denotation.\n             * @member {string} denotation\n             *
@memberof onnx.TensorShapeProto.Dimension\n             * @instance\n             */\n
Dimension.prototype.denotation = \"\";\n\n             // OneOf field names bound to virtual getters and setters\n
var $oneOfFields;\n\n             /**\n             * Dimension value.\n             * @member
{\"dimValue\"|\"dimParam\"|undefined} value\n             * @memberof onnx.TensorShapeProto.Dimension\n
* @instance\n             */\n             Object.defineProperty(Dimension.prototype, \"value\", {\n                 get:
$util.oneOfGetter($oneOfFields = [\"dimValue\", \"dimParam\"]),\n                 set: $util.oneOfSetter($oneOfFields)\n
         });\n\n             /**\n             * Creates a new Dimension instance using the specified properties.\n             *
@function create\n             * @memberof onnx.TensorShapeProto.Dimension\n             * @static\n             *
@param {onnx.TensorShapeProto.IDimension=} [properties] Properties to set\n             * @returns
{onnx.TensorShapeProto.Dimension} Dimension instance\n             */\n             Dimension.create = function
create(properties) {\n                 return new Dimension(properties);\n             };\n\n             /**\n             * Encodes the
specified Dimension message. Does not implicitly {@link onnx.TensorShapeProto.Dimension.verify|verify}
messages.\n             * @function encode\n             * @memberof onnx.TensorShapeProto.Dimension\n             *
@static\n             * @param {onnx.TensorShapeProto.IDimension} message Dimension message or plain object to
encode\n             * @param {$protobuf.Writer} [writer] Writer to encode to\n             * @returns
{$protobuf.Writer} Writer\n             */\n             Dimension.encode = function encode(message, writer) {\n
if (!writer)\n                     writer = $Writer.create();\n                 if (message.dimValue != null &&
message.hasOwnProperty(\"dimValue\"))\n                     writer.uint32(/* id 1, wireType 0
=*/8).int64(message.dimValue);\n                 if (message.dimParam != null &&
message.hasOwnProperty(\"dimParam\"))\n                     writer.uint32(/* id 2, wireType 2
=*/18).string(message.dimParam);\n                 if (message.denotation != null &&
message.hasOwnProperty(\"denotation\"))\n                     writer.uint32(/* id 3, wireType 2
=*/26).string(message.denotation);\n                 return writer;\n             };\n\n             /**\n             * Encodes the
```

specified Dimension message, length delimited. Does not implicitly {@link onnx.TensorShapeProto.Dimension.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {onnx.TensorShapeProto.IDimension} message Dimension message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n Dimension.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a Dimension message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.TensorShapeProto.Dimension} Dimension\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Dimension.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.TensorShapeProto.Dimension();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.dimValue = reader.int64();\n break;\n case 2:\n message.dimParam = reader.string();\n break;\n case 3:\n message.denotation = reader.string();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a Dimension message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TensorShapeProto.Dimension} Dimension\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Dimension.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a Dimension message.\n * @function verify\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n Dimension.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n var properties = {};\n if (message.dimValue != null && message.hasOwnProperty(\"dimValue\")) {\n properties.value = 1;\n if (!$util.isInteger(message.dimValue) && !(message.dimValue && $util.isInteger(message.dimValue.low) && $util.isInteger(message.dimValue.high)))\n return \"dimValue: integer|Long expected\";\n }\n if (message.dimParam != null && message.hasOwnProperty(\"dimParam\")) {\n if (properties.value === 1)\n return \"value: multiple values\";\n properties.value = 1;\n if (!$util.isString(message.dimParam))\n return \"dimParam: string expected\";\n }\n if (message.denotation != null && message.hasOwnProperty(\"denotation\"))\n if (!$util.isString(message.denotation))\n return \"denotation: string expected\";\n return null;\n };\n\n /**\n * Creates a Dimension message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.TensorShapeProto.Dimension} Dimension\n */\n Dimension.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.TensorShapeProto.Dimension)\n return object;\n var message = new $root.onnx.TensorShapeProto.Dimension();\n if (object.dimValue != null)\n if ($util.Long)\n (message.dimValue = $util.Long.fromValue(object.dimValue)).unsigned = false;\n else if (typeof object.dimValue === \"string\")\n message.dimValue = parseInt(object.dimValue, 10);\n else if (typeof object.dimValue === \"number\")\n message.dimValue = object.dimValue;\n else if (typeof object.dimValue === \"object\")\n message.dimValue = new $util.LongBits(object.dimValue.low >>> 0, object.dimValue.high >>> 0).toNumber();\n if (object.dimParam != null)\n message.dimParam = String(object.dimParam);\n if (object.denotation != null)\n message.denotation = String(object.denotation);\n return message;\n };\n\n /**\n * Creates a plain object from a Dimension message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {onnx.TensorShapeProto.Dimension} message Dimension\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n Dimension.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.defaults)\n object.denotation = \"\";\n if (message.dimValue != null && message.hasOwnProperty(\"dimValue\")) {\n if (typeof message.dimValue === \"number\")\n object.dimValue = options.longs === String ? String(message.dimValue) : message.dimValue;\n else\n object.dimValue = options.longs === String ? $util.Long.prototype.toString.call(message.dimValue) : options.longs === Number ? new $util.LongBits(message.dimValue.low >>> 0, message.dimValue.high >>> 0).toNumber() : message.dimValue;\n if (options.oneofs)\n object.value = \"dimValue\";\n }\n if (message.dimParam != null && message.hasOwnProperty(\"dimParam\")) {\n object.dimParam = message.dimParam;\n if (options.oneofs)\n object.value = \"dimParam\";\n }\n if (message.denotation != null && message.hasOwnProperty(\"denotation\"))\n object.denotation = message.denotation;\n return object;\n };\n\n /**\n * Converts this Dimension to JSON.\n * @function toJSON\n * @memberof onnx.TensorShapeProto.Dimension\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n Dimension.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return Dimension;\n })();\n\n return TensorShapeProto;\n })();\n\n onnx.TypeProto = (function() {\n\n /**\n * Properties of a TypeProto.\n * @memberof onnx\n * @interface ITypeProto\n * @property {onnx.TypeProto.ITensor|null} [tensorType] TypeProto tensorType\n * @property {string|null} [denotation] TypeProto denotation\n */\n\n /**\n * Constructs a new TypeProto.\n * @memberof onnx\n * @classdesc Represents a TypeProto.\n * @implements ITypeProto\n * @constructor\n * @param {onnx.ITypeProto=} [properties] Properties to set\n */\n function TypeProto(properties) {\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * TypeProto tensorType.\n * @member {onnx.TypeProto.ITensor|null|undefined} tensorType\n * @memberof onnx.TypeProto\n * @instance\n */\n TypeProto.prototype.tensorType = null;\n\n /**\n * TypeProto denotation.\n * @member {string} denotation\n * @memberof onnx.TypeProto\n * @instance\n */\n TypeProto.prototype.denotation = \"\";\n\n // OneOf field names bound to virtual getters and setters\n var $oneOfFields;\n\n /**\n * TypeProto value.\n * @member {\"tensorType\"|undefined} value\n * @memberof onnx.TypeProto\n * @instance\n */\n Object.defineProperty(TypeProto.prototype, \"value\", {\n get: $util.oneOfGetter($oneOfFields = [\"tensorType\"]),\n set: $util.oneOfSetter($oneOfFields)\n });\n\n /**\n * Creates a new TypeProto instance using the specified properties.\n * @function create\n * @memberof onnx.TypeProto\n * @static\n * @param {onnx.ITypeProto=} [properties] Properties to set\n * @returns {onnx.TypeProto} TypeProto instance\n */\n TypeProto.create = function create(properties) {\n return new TypeProto(properties);\n };\n\n /**\n * Encodes the specified TypeProto message. Does not implicitly {@link onnx.TypeProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.TypeProto\n * @static\n * @param {onnx.ITypeProto} message TypeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n TypeProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.tensorType != null && message.hasOwnProperty(\"tensorType\"))\n $root.onnx.TypeProto.Tensor.encode(message.tensorType, writer.uint32(/* id 1, wireType 2 =*/10).fork()).ldelim();\n if (message.denotation != null && message.hasOwnProperty(\"denotation\"))\n writer.uint32(/* id 6, wireType 2 =*/50).string(message.denotation);\n return writer;\n };\n\n /**\n * Encodes the specified TypeProto message, length delimited. Does not implicitly {@link onnx.TypeProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.TypeProto\n * @static\n * @param {onnx.ITypeProto} message TypeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n TypeProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a TypeProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.TypeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.TypeProto} TypeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n TypeProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.TypeProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.tensorType = $root.onnx.TypeProto.Tensor.decode(reader, reader.uint32());\n break;\n case 6:\n message.denotation = reader.string();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a TypeProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TypeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TypeProto} TypeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n TypeProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a TypeProto message.\n * @function verify\n * @memberof onnx.TypeProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n TypeProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n var properties = {};\n if (message.tensorType != null && message.hasOwnProperty(\"tensorType\")) {\n properties.value = 1;\n {\n var error = $root.onnx.TypeProto.Tensor.verify(message.tensorType);\n if (error)\n return \"tensorType.\" + error;\n }\n }\n if (message.denotation != null && message.hasOwnProperty(\"denotation\"))\n if (!$util.isString(message.denotation))\n return \"denotation: string expected\";\n return null;\n };\n\n /**\n * Creates a TypeProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.TypeProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.TypeProto} TypeProto\n */\n TypeProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.TypeProto)\n return object;\n var message = new $root.onnx.TypeProto();\n if (object.tensorType != null) {\n if (typeof object.tensorType !== \"object\")\n throw TypeError(\".onnx.TypeProto.tensorType: object expected\");\n message.tensorType = $root.onnx.TypeProto.Tensor.fromObject(object.tensorType);\n }\n if (object.denotation != null)\n message.denotation = String(object.denotation);\n return message;\n };\n\n /**\n * Creates a plain object from a TypeProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.TypeProto\n * @static\n * @param {onnx.TypeProto} message TypeProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n TypeProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.defaults)\n object.denotation = \"\";\n if (message.tensorType != null && message.hasOwnProperty(\"tensorType\")) {\n object.tensorType = $root.onnx.TypeProto.Tensor.toObject(message.tensorType, options);\n if (options.oneofs)\n object.value = \"tensorType\";\n }\n if (message.denotation != null && message.hasOwnProperty(\"denotation\"))\n object.denotation = message.denotation;\n return object;\n };\n\n /**\n * Converts this TypeProto to JSON.\n * @function toJSON\n * @memberof onnx.TypeProto\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n TypeProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n TypeProto.Tensor = (function() {\n\n /**\n * Properties of a Tensor.\n * @memberof onnx.TypeProto\n * @interface ITensor\n * @property {number|null} [elemType] Tensor elemType\n * @property {onnx.ITensorShapeProto|null} [shape] Tensor shape\n */\n\n /**\n * Constructs a new Tensor.\n * @memberof onnx.TypeProto\n * @classdesc Represents a Tensor.\n * @implements ITensor\n * @constructor\n * @param {onnx.TypeProto.ITensor=} [properties] Properties to set\n */\n function Tensor(properties) {\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * Tensor elemType.\n * @member {number} elemType\n * @memberof onnx.TypeProto.Tensor\n * @instance\n */\n Tensor.prototype.elemType = 0;\n\n /**\n * Tensor shape.\n * @member {onnx.ITensorShapeProto|null|undefined} shape\n * @memberof onnx.TypeProto.Tensor\n * @instance\n */\n Tensor.prototype.shape = null;\n\n /**\n * Creates a new Tensor instance using the specified properties.\n * @function create\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {onnx.TypeProto.ITensor=} [properties] Properties to set\n * @returns {onnx.TypeProto.Tensor} Tensor instance\n */\n Tensor.create = function create(properties) {\n return new Tensor(properties);\n };\n\n /**\n * Encodes the specified Tensor message. Does not implicitly {@link onnx.TypeProto.Tensor.verify|verify} messages.\n * @function encode\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {onnx.TypeProto.ITensor} message Tensor message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n Tensor.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.elemType != null && message.hasOwnProperty(\"elemType\"))\n writer.uint32(/* id 1, wireType 0 =*/8).int32(message.elemType);\n if (message.shape != null && message.hasOwnProperty(\"shape\"))\n $root.onnx.TensorShapeProto.encode(message.shape, writer.uint32(/* id 2, wireType 2 =*/18).fork()).ldelim();\n return writer;\n };\n\n /**\n * Encodes the specified Tensor message, length delimited. Does not implicitly {@link onnx.TypeProto.Tensor.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {onnx.TypeProto.ITensor} message Tensor message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n Tensor.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a Tensor message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.TypeProto.Tensor} Tensor\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Tensor.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.TypeProto.Tensor();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.elemType = reader.int32();\n break;\n case 2:\n message.shape = $root.onnx.TensorShapeProto.decode(reader, reader.uint32());\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a Tensor message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TypeProto.Tensor} Tensor\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Tensor.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a Tensor message.\n * @function verify\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n Tensor.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.elemType != null && message.hasOwnProperty(\"elemType\"))\n if (!$util.isInteger(message.elemType))\n return \"elemType: integer expected\";\n if (message.shape != null && message.hasOwnProperty(\"shape\")) {\n var error = $root.onnx.TensorShapeProto.verify(message.shape);\n if (error)\n return \"shape.\" + error;\n }\n return null;\n };\n\n /**\n * Creates a Tensor message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.TypeProto.Tensor} Tensor\n */\n Tensor.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.TypeProto.Tensor)\n return object;\n var message = new $root.onnx.TypeProto.Tensor();\n if (object.elemType != null)\n message.elemType = object.elemType | 0;\n if (object.shape != null) {\n if (typeof object.shape !== \"object\")\n throw TypeError(\".onnx.TypeProto.Tensor.shape: object expected\");\n message.shape = $root.onnx.TensorShapeProto.fromObject(object.shape);\n }\n return message;\n };\n\n /**\n * Creates a plain object from a Tensor message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {onnx.TypeProto.Tensor} message Tensor\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n Tensor.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.defaults) {\n object.elemType = 0;\n object.shape = null;\n }\n if (message.elemType != null && message.hasOwnProperty(\"elemType\"))\n object.elemType = message.elemType;\n if (message.shape != null && message.hasOwnProperty(\"shape\"))\n object.shape = $root.onnx.TensorShapeProto.toObject(message.shape, options);\n return object;\n };\n\n /**\n * Converts this Tensor to JSON.\n * @function toJSON\n * @memberof onnx.TypeProto.Tensor\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n Tensor.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return Tensor;\n })();\n\n return TypeProto;\n })();\n\n onnx.OperatorSetIdProto = (function() {\n\n /**\n * Properties of an OperatorSetIdProto.\n * @memberof onnx\n * @interface IOperatorSetIdProto\n * @property {string|null} [domain]

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OperatorSetIdProto domain\n         * @property {number|Long|null} [version] OperatorSetIdProto version\n
*/\n\n        /**\n         * Constructs a new OperatorSetIdProto.\n         * @memberof onnx\n         * @classdesc
Represents an OperatorSetIdProto.\n         * @implements IOperatorSetIdProto\n         * @constructor\n         *
@param {onnx.IOperatorSetIdProto=} [properties] Properties to set\n         */\n        function
OperatorSetIdProto(properties) {\n            if (properties)\n                for (var keys = Object.keys(properties), i = 0; i
< keys.length; ++i)\n                    if (properties[keys[i]] != null)\n                        this[keys[i]] = properties[keys[i]];\n
      }\n\n        /**\n         * OperatorSetIdProto domain.\n         * @member {string} domain\n         * @memberof
onnx.OperatorSetIdProto\n         * @instance\n         */\n        OperatorSetIdProto.prototype.domain = \"\";\n\n
/**\n         * OperatorSetIdProto version.\n         * @member {number|Long} version\n         * @memberof
onnx.OperatorSetIdProto\n         * @instance\n         */\n        OperatorSetIdProto.prototype.version = $util.Long ?
$util.Long.fromBits(0,0,false) : 0;\n\n        /**\n         * Creates a new OperatorSetIdProto instance using the
specified properties.\n         * @function create\n         * @memberof onnx.OperatorSetIdProto\n         * @static\n
  * @param {onnx.IOperatorSetIdProto=} [properties] Properties to set\n         * @returns
{onnx.OperatorSetIdProto} OperatorSetIdProto instance\n         */\n        OperatorSetIdProto.create = function
create(properties) {\n            return new OperatorSetIdProto(properties);\n        };\n\n        /**\n         * Encodes the
specified OperatorSetIdProto message. Does not implicitly {@link onnx.OperatorSetIdProto.verify|verify}
messages.\n         * @function encode\n         * @memberof onnx.OperatorSetIdProto\n         * @static\n         *
@param {onnx.IOperatorSetIdProto} message OperatorSetIdProto message or plain object to encode\n         *
@param {$protobuf.Writer} [writer] Writer to encode to\n         * @returns {$protobuf.Writer} Writer\n         */\n
  OperatorSetIdProto.encode = function encode(message, writer) {\n            if (!writer)\n                writer =
$Writer.create();\n            if (message.domain != null && message.hasOwnProperty(\"domain\"))\n
writer.uint32(/* id 1, wireType 2 =*/10).string(message.domain);\n            if (message.version != null &&
message.hasOwnProperty(\"version\"))\n                writer.uint32(/* id 2, wireType 0
=*/16).int64(message.version);\n            return writer;\n        };\n\n        /**\n         * Encodes the specified
OperatorSetIdProto message, length delimited. Does not implicitly {@link onnx.OperatorSetIdProto.verify|verify}
messages.\n         * @function encodeDelimited\n         * @memberof onnx.OperatorSetIdProto\n         * @static\n
   * @param {onnx.IOperatorSetIdProto} message OperatorSetIdProto message or plain object to encode\n         *
@param {$protobuf.Writer} [writer] Writer to encode to\n         * @returns {$protobuf.Writer} Writer\n         */\n
  OperatorSetIdProto.encodeDelimited = function encodeDelimited(message, writer) {\n            return
this.encode(message, writer).ldelim();\n        };\n\n        /**\n         * Decodes an OperatorSetIdProto message from
the specified reader or buffer.\n         * @function decode\n         * @memberof onnx.OperatorSetIdProto\n         *
@static\n         * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @param
{number} [length] Message length if known beforehand\n         * @returns {onnx.OperatorSetIdProto}
OperatorSetIdProto\n         * @throws {Error} If the payload is not a reader or valid buffer\n         * @throws
{$protobuf.util.ProtocolError} If required fields are missing\n         */\n        OperatorSetIdProto.decode = function
decode(reader, length) {\n            if (!(reader instanceof $Reader))\n                reader = $Reader.create(reader);\n
   var end = length === undefined ? reader.len : reader.pos + length, message = new
$root.onnx.OperatorSetIdProto();\n            while (reader.pos < end) {\n                var tag = reader.uint32();\n
switch (tag >>> 3) {\n                case 1:\n                    message.domain = reader.string();\n                    break;\n
    case 2:\n                    message.version = reader.int64();\n                    break;\n                default:\n
reader.skipType(tag & 7);\n                    break;\n                }\n            }\n            return message;\n        };\n\n
/**\n         * Decodes an OperatorSetIdProto message from the specified reader or buffer, length delimited.\n         *
@function decodeDelimited\n         * @memberof onnx.OperatorSetIdProto\n         * @static\n         * @param
{$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @returns
{onnx.OperatorSetIdProto} OperatorSetIdProto\n         * @throws {Error} If the payload is not a reader or valid
buffer\n         * @throws {$protobuf.util.ProtocolError} If required fields are missing\n         */\n
OperatorSetIdProto.decodeDelimited = function decodeDelimited(reader) {\n            if (!(reader instanceof
$Reader))\n                reader = new $Reader(reader);\n            return this.decode(reader, reader.uint32());\n
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};\n\n /**\n * Verifies an OperatorSetIdProto message.\n * @function verify\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n OperatorSetIdProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n if (!$util.isString(message.domain))\n return \"domain: string expected\";\n if (message.version != null && message.hasOwnProperty(\"version\"))\n if (!$util.isInteger(message.version) && !(message.version && $util.isInteger(message.version.low) && $util.isInteger(message.version.high)))\n return \"version: integer|Long expected\";\n return null;\n };\n\n /**\n * Creates an OperatorSetIdProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.OperatorSetIdProto} OperatorSetIdProto\n */\n OperatorSetIdProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.OperatorSetIdProto)\n return object;\n var message = new $root.onnx.OperatorSetIdProto();\n if (object.domain != null)\n message.domain = String(object.domain);\n if (object.version != null)\n if ($util.Long)\n (message.version = $util.Long.fromValue(object.version)).unsigned = false;\n else if (typeof object.version === \"string\")\n message.version = parseInt(object.version, 10);\n else if (typeof object.version === \"number\")\n message.version = object.version;\n else if (typeof object.version === \"object\")\n message.version = new $util.LongBits(object.version.low >>> 0, object.version.high >>> 0).toNumber();\n return message;\n };\n\n /**\n * Creates a plain object from an OperatorSetIdProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {onnx.OperatorSetIdProto} message OperatorSetIdProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n OperatorSetIdProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.defaults) {\n object.domain = \"\";\n if ($util.Long) {\n var long = new $util.Long(0, 0, false);\n object.version = options.longs === String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n } else\n object.version = options.longs === String ? \"0\" : 0;\n }\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n object.domain = message.domain;\n if (message.version != null && message.hasOwnProperty(\"version\"))\n if (typeof message.version === \"number\")\n object.version = options.longs === String ? String(message.version) : message.version;\n else\n object.version = options.longs === String ? $util.Long.prototype.toString.call(message.version) : options.longs === Number ? new $util.LongBits(message.version.low >>> 0, message.version.high >>> 0).toNumber() : message.version;\n return object;\n };\n\n /**\n * Converts this OperatorSetIdProto to JSON.\n * @function toJSON\n * @memberof onnx.OperatorSetIdProto\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n OperatorSetIdProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return OperatorSetIdProto;\n })();\n\n return onnx;\n})();\n\nmodule.exports = $root;\n","// minimal library entry point.\n\n\"use strict\";\nmodule.exports = require(\"./src/index-minimal\");\n","\"use strict\";\nvar protobuf = exports;\n\n/**\n * Build type, one of `\"full\"`, `\"light\"` or `\"minimal\"`.\n * @name build\n * @type {string}\n * @const\n */\nprotobuf.build = \"minimal\";\n\n// Serialization\nprotobuf.Writer = require(\"./writer\");\nprotobuf.BufferWriter = require(\"./writer_buffer\");\nprotobuf.Reader = require(\"./reader\");\nprotobuf.BufferReader = require(\"./reader_buffer\");\n\n// Utility\nprotobuf.util = require(\"./util/minimal\");\nprotobuf.rpc = require(\"./rpc\");\nprotobuf.roots = require(\"./roots\");\nprotobuf.configure = configure;\n\n/* istanbul ignore next */\n/**\n * Reconfigures the library according to the environment.\n * @returns {undefined}\n */\nfunction configure() {\n

protobuf.util._configure();\n protobuf.Writer._configure(protobuf.BufferWriter);\n protobuf.Reader._configure(protobuf.BufferReader);\n}\n\n// Set up buffer utility according to the environment\nconfigure();\n","\"use strict\";\nmodule.exports = Reader;\n\nvar util = require(\"./util/minimal\");\n\nvar BufferReader; // cyclic\n\nvar LongBits = util.LongBits,\n utf8 = util.utf8;\n\n/* istanbul ignore next */\nfunction indexOutOfRange(reader, writeLength) {\n return RangeError(\"index out of range: \" + reader.pos + \" + \" + (writeLength || 1) + \" > \" + reader.len);\n}\n\n/**\n * Constructs a new reader instance using the specified buffer.\n * @classdesc Wire format reader using `Uint8Array` if available, otherwise `Array`.\n * @constructor\n * @param {Uint8Array} buffer Buffer to read from\n */\nfunction Reader(buffer) {\n\n /**\n * Read buffer.\n * @type {Uint8Array}\n */\n this.buf = buffer;\n\n /**\n * Read buffer position.\n * @type {number}\n */\n this.pos = 0;\n\n /**\n * Read buffer length.\n * @type {number}\n */\n this.len = buffer.length;\n}\n\nvar create_array = typeof Uint8Array !== \"undefined\"\n ? function create_typed_array(buffer) {\n if (buffer instanceof Uint8Array || Array.isArray(buffer))\n return new Reader(buffer);\n throw Error(\"illegal buffer\");\n }\n /* istanbul ignore next */\n : function create_array(buffer) {\n if (Array.isArray(buffer))\n return new Reader(buffer);\n throw Error(\"illegal buffer\");\n };\n\nvar create = function create() {\n return util.Buffer\n ? function create_buffer_setup(buffer) {\n return (Reader.create = function create_buffer(buffer) {\n return util.Buffer.isBuffer(buffer)\n ? new BufferReader(buffer)\n /* istanbul ignore next */\n : create_array(buffer);\n })(buffer);\n }\n /* istanbul ignore next */\n : create_array;\n};\n\n/**\n * Creates a new reader using the specified buffer.\n * @function\n * @param {Uint8Array|Buffer} buffer Buffer to read from\n * @returns {Reader|BufferReader} A {@link BufferReader} if `buffer` is a Buffer, otherwise a {@link Reader}\n * @throws {Error} If `buffer` is not a valid buffer\n */\nReader.create = create();\n\nReader.prototype._slice = util.Array.prototype.subarray || /* istanbul ignore next */ util.Array.prototype.slice;\n\n/**\n * Reads a varint as an unsigned 32 bit value.\n * @function\n * @returns {number} Value read\n */\nReader.prototype.uint32 = (function read_uint32_setup() {\n var value = 4294967295; // optimizer type-hint, tends to deopt otherwise (?!)\n return function read_uint32() {\n value = (this.buf[this.pos] & 127) >>> 0; if (this.buf[this.pos++] < 128) return value;\n value = (value | (this.buf[this.pos] & 127) << 7) >>> 0; if (this.buf[this.pos++] < 128) return value;\n value = (value | (this.buf[this.pos] & 127) << 14) >>> 0; if (this.buf[this.pos++] < 128) return value;\n value = (value | (this.buf[this.pos] & 127) << 21) >>> 0; if (this.buf[this.pos++] < 128) return value;\n value = (value | (this.buf[this.pos] & 15) << 28) >>> 0; if (this.buf[this.pos++] < 128) return value;\n\n /* istanbul ignore if */\n if ((this.pos += 5) > this.len) {\n this.pos = this.len;\n throw indexOutOfRange(this, 10);\n }\n return value;\n };\n})();\n\n/**\n * Reads a varint as a signed 32 bit value.\n * @returns {number} Value read\n */\nReader.prototype.int32 = function read_int32() {\n return this.uint32() | 0;\n};\n\n/**\n * Reads a zig-zag encoded varint as a signed 32 bit value.\n * @returns {number} Value read\n */\nReader.prototype.sint32 = function read_sint32() {\n var value = this.uint32();\n return value >>> 1 ^ -(value & 1) | 0;\n};\n\n/* eslint-disable no-invalid-this */\n\nfunction readLongVarint() {\n // tends to deopt with local vars for octet etc.\n var bits = new LongBits(0, 0);\n var i = 0;\n if (this.len - this.pos > 4) { // fast route (lo)\n for (; i < 4; ++i) {\n // 1st..4th\n bits.lo = (bits.lo | (this.buf[this.pos] & 127) << i * 7) >>> 0;\n if (this.buf[this.pos++] < 128)\n return bits;\n }\n // 5th\n bits.lo = (bits.lo | (this.buf[this.pos] & 127) << 28) >>> 0;\n bits.hi = (bits.hi | (this.buf[this.pos] & 127) >> 4) >>> 0;\n if (this.buf[this.pos++] < 128)\n return bits;\n i = 0;\n } else {\n for (; i < 3; ++i) {\n /* istanbul ignore if */\n if (this.pos >= this.len)\n throw indexOutOfRange(this);\n // 1st..3th\n bits.lo = (bits.lo | (this.buf[this.pos] & 127) << i * 7) >>> 0;\n if (this.buf[this.pos++] < 128)\n return bits;\n }\n // 4th\n bits.lo = (bits.lo | (this.buf[this.pos++] & 127) << i * 7) >>> 0;\n return bits;\n }\n if (this.len - this.pos > 4) { // fast route (hi)\n for (; i < 5; ++i) {\n // 6th..10th\n bits.hi = (bits.hi | (this.buf[this.pos] & 127) << i * 7 + 3) >>> 0;\n if (this.buf[this.pos++] < 128)\n return bits;\n }\n } else {\n for (; i < 5; ++i) {\n /* istanbul ignore if */\n if (this.pos >= this.len)\n throw indexOutOfRange(this);\n // 6th..10th\n bits.hi = (bits.hi | (this.buf[this.pos] & 127) << i * 7 + 3) >>>

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0;\n            if (this.buf[this.pos++] < 128)\n                return bits;\n        }\n    }\n    /* istanbul ignore next */\n
throw Error(\"invalid varint encoding\");\n}\n\n/* eslint-enable no-invalid-this */\n\n/**\n * Reads a varint as a
signed 64 bit value.\n * @name Reader#int64\n * @function\n * @returns {Long} Value read\n */\n\n/**\n * Reads
a varint as an unsigned 64 bit value.\n * @name Reader#uint64\n * @function\n * @returns {Long} Value read\n
*/\n\n/**\n * Reads a zig-zag encoded varint as a signed 64 bit value.\n * @name Reader#sint64\n * @function\n *
@returns {Long} Value read\n */\n\n/**\n * Reads a varint as a boolean.\n * @returns {boolean} Value read\n
*/\nReader.prototype.bool = function read_bool() {\n    return this.uint32() !== 0;\n};\n\nfunction
readFixed32_end(buf, end) { // note that this uses `end`, not `pos`\n    return (buf[end - 4]\n          | buf[end - 3] <<
8\n          | buf[end - 2] << 16\n          | buf[end - 1] << 24) >>> 0;\n}\n\n/**\n * Reads fixed 32 bits as an unsigned
32 bit integer.\n * @returns {number} Value read\n */\nReader.prototype.fixed32 = function read_fixed32() {\n\n
/* istanbul ignore if */\n    if (this.pos + 4 > this.len)\n        throw indexOutOfRange(this, 4);\n\n    return
readFixed32_end(this.buf, this.pos += 4);\n};\n\n/**\n * Reads fixed 32 bits as a signed 32 bit integer.\n * @returns
{number} Value read\n */\nReader.prototype.sfixed32 = function read_sfixed32() {\n\n    /* istanbul ignore if */\n
if (this.pos + 4 > this.len)\n        throw indexOutOfRange(this, 4);\n\n    return readFixed32_end(this.buf, this.pos +=
4) | 0;\n};\n\n/* eslint-disable no-invalid-this */\n\nfunction readFixed64(/* this: Reader */) {\n\n    /* istanbul
ignore if */\n    if (this.pos + 8 > this.len)\n        throw indexOutOfRange(this, 8);\n\n    return new
LongBits(readFixed32_end(this.buf, this.pos += 4), readFixed32_end(this.buf, this.pos += 4));\n}\n\n/* eslint-
enable no-invalid-this */\n\n/**\n * Reads fixed 64 bits.\n * @name Reader#fixed64\n * @function\n * @returns
{Long} Value read\n */\n\n/**\n * Reads zig-zag encoded fixed 64 bits.\n * @name Reader#sfixed64\n *
@function\n * @returns {Long} Value read\n */\n\n/**\n * Reads a float (32 bit) as a number.\n * @function\n *
@returns {number} Value read\n */\nReader.prototype.float = function read_float() {\n\n    /* istanbul ignore if */\n
 if (this.pos + 4 > this.len)\n        throw indexOutOfRange(this, 4);\n\n    var value = util.float.readFloatLE(this.buf,
this.pos);\n    this.pos += 4;\n    return value;\n};\n\n/**\n * Reads a double (64 bit float) as a number.\n *
@function\n * @returns {number} Value read\n */\nReader.prototype.double = function read_double() {\n\n    /*
istanbul ignore if */\n    if (this.pos + 8 > this.len)\n        throw indexOutOfRange(this, 4);\n\n    var value =
util.float.readDoubleLE(this.buf, this.pos);\n    this.pos += 8;\n    return value;\n};\n\n/**\n * Reads a sequence of
bytes preceeded by its length as a varint.\n * @returns {Uint8Array} Value read\n */\nReader.prototype.bytes =
function read_bytes() {\n    var length = this.uint32(),\n        start  = this.pos,\n        end    = this.pos + length;\n\n    /*
istanbul ignore if */\n    if (end > this.len)\n        throw indexOutOfRange(this, length);\n\n    this.pos += length;\n
if (Array.isArray(this.buf)) // plain array\n        return this.buf.slice(start, end);\n    return start === end // fix for IE
10/Win8 and others' subarray returning array of size 1\n        ? new this.buf.constructor(0)\n        :
this._slice.call(this.buf, start, end);\n};\n\n/**\n * Reads a string preceeded by its byte length as a varint.\n *
@returns {string} Value read\n */\nReader.prototype.string = function read_string() {\n    var bytes = this.bytes();\n
 return utf8.read(bytes, 0, bytes.length);\n};\n\n/**\n * Skips the specified number of bytes if specified, otherwise
skips a varint.\n * @param {number} [length] Length if known, otherwise a varint is assumed\n * @returns
{Reader} `this`\n */\nReader.prototype.skip = function skip(length) {\n    if (typeof length === \"number\") {\n
/* istanbul ignore if */\n        if (this.pos + length > this.len)\n            throw indexOutOfRange(this, length);\n
this.pos += length;\n    } else {\n        do {\n            /* istanbul ignore if */\n            if (this.pos >= this.len)\n
throw indexOutOfRange(this);\n        } while (this.buf[this.pos++] & 128);\n    }\n    return this;\n};\n\n/**\n * Skips
the next element of the specified wire type.\n * @param {number} wireType Wire type received\n * @returns
{Reader} `this`\n */\nReader.prototype.skipType = function(wireType) {\n    switch (wireType) {\n        case 0:\n
     this.skip();\n            break;\n        case 1:\n            this.skip(8);\n            break;\n        case 2:\n
this.skip(this.uint32());\n            break;\n        case 3:\n            while ((wireType = this.uint32() & 7) !== 4) {\n
    this.skipType(wireType);\n            }\n            break;\n        case 5:\n            this.skip(4);\n            break;\n\n        /*
istanbul ignore next */\n        default:\n            throw Error(\"invalid wire type \" + wireType + \" at offset \" +
this.pos);\n    }\n    return this;\n};\n\nReader._configure = function(BufferReader_) {\n    BufferReader =
BufferReader_;\n    Reader.create = create();\n    BufferReader._configure();\n\n    var fn = util.Long ? \"toLong\" :
/* istanbul ignore next */ \"toNumber\";\n    util.merge(Reader.prototype, {\n\n        int64: function read_int64() {\n
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return readLongVarint.call(this)[fn](false);\n },\n\n uint64: function read_uint64() {\n return readLongVarint.call(this)[fn](true);\n },\n\n sint64: function read_sint64() {\n return readLongVarint.call(this).zzDecode()[fn](false);\n },\n\n fixed64: function read_fixed64() {\n return readFixed64.call(this)[fn](true);\n },\n\n sfixed64: function read_sfixed64() {\n return readFixed64.call(this)[fn](false);\n }\n\n });\n};\n","\"use strict\";\nmodule.exports = BufferReader;\n\n// extends Reader\nvar Reader = require(\"./reader\");\n(BufferReader.prototype = Object.create(Reader.prototype)).constructor = BufferReader;\n\nvar util = require(\"./util/minimal\");\n\n/**\n * Constructs a new buffer reader instance.\n * @classdesc Wire format reader using node buffers.\n * @extends Reader\n * @constructor\n * @param {Buffer} buffer Buffer to read from\n */\nfunction BufferReader(buffer) {\n Reader.call(this, buffer);\n\n /**\n * Read buffer.\n * @name BufferReader#buf\n * @type {Buffer}\n */\n}\n\nBufferReader._configure = function () {\n /* istanbul ignore else */\n if (util.Buffer)\n BufferReader.prototype._slice = util.Buffer.prototype.slice;\n};\n\n\n/**\n * @override\n */\nBufferReader.prototype.string = function read_string_buffer() {\n var len = this.uint32(); // modifies pos\n return this.buf.utf8Slice\n ? this.buf.utf8Slice(this.pos, this.pos = Math.min(this.pos + len, this.len))\n : this.buf.toString(\"utf-8\", this.pos, this.pos = Math.min(this.pos + len, this.len));\n};\n\n/**\n * Reads a sequence of bytes preceeded by its length as a varint.\n * @name BufferReader#bytes\n * @function\n * @returns {Buffer} Value read\n */\n\nBufferReader._configure();\n","\"use strict\";\nmodule.exports = {};\n\n/**\n * Named roots.\n * This is where pbjs stores generated structures (the option `-r, --root` specifies a name).\n * Can also be used manually to make roots available accross modules.\n * @name roots\n * @type {Object.<string,Root>}\n * @example\n * // pbjs -r myroot -o compiled.js ...\n *\n * // in another module:\n * require(\"./compiled.js\");\n *\n * // in any subsequent module:\n * var root = protobuf.roots[\"myroot\"];\n */\n","\"use strict\";\n\n/**\n * Streaming RPC helpers.\n * @namespace\n */\nvar rpc = exports;\n\n/**\n * RPC implementation passed to {@link Service#create} performing a service request on network level, i.e. by utilizing http requests or websockets.\n * @typedef RPCImpl\n * @type {function}\n * @param {Method|rpc.ServiceMethod<Message<{}>,Message<{}>>} method Reflected or static method being called\n * @param {Uint8Array} requestData Request data\n * @param {RPCImplCallback} callback Callback function\n * @returns {undefined}\n * @example\n * function rpcImpl(method, requestData, callback) {\n * if (protobuf.util.lcFirst(method.name) !== \"myMethod\") // compatible with static code\n * throw Error(\"no such method\");\n * asynchronouslyObtainAResponse(requestData, function(err, responseData) {\n * callback(err, responseData);\n * });\n * }\n */\n\n/**\n * Node-style callback as used by {@link RPCImpl}.\n * @typedef RPCImplCallback\n * @type {function}\n * @param {Error|null} error Error, if any, otherwise `null`\n * @param {Uint8Array|null} [response] Response data or `null` to signal end of stream, if there hasn't been an error\n * @returns {undefined}\n */\n\nrpc.Service = require(\"./rpc/service\");\n","\"use strict\";\nmodule.exports = Service;\n\nvar util = require(\"../util/minimal\");\n\n// Extends EventEmitter\n(Service.prototype = Object.create(util.EventEmitter.prototype)).constructor = Service;\n\n/**\n * A service method callback as used by {@link rpc.ServiceMethod|ServiceMethod}.\n *\n * Differs from {@link RPCImplCallback} in that it is an actual callback of a service method which may not return `response = null`.\n * @typedef rpc.ServiceMethodCallback\n * @template TRes extends Message<TRes>\n * @type {function}\n * @param {Error|null} error Error, if any\n * @param {TRes} [response] Response message\n * @returns {undefined}\n */\n\n/**\n * A service method part of a {@link rpc.Service} as created by {@link Service.create}.\n * @typedef rpc.ServiceMethod\n * @template TReq extends Message<TReq>\n * @template TRes extends Message<TRes>\n * @type {function}\n * @param {TReq|Properties<TReq>} request Request message or plain object\n * @param {rpc.ServiceMethodCallback<TRes>} [callback] Node-style callback called with the error, if any, and the response message\n * @returns {Promise<Message<TRes>>} Promise if `callback` has been omitted, otherwise `undefined`\n */\n\n/**\n * Constructs a new RPC service instance.\n * @classdesc An RPC service as returned by {@link Service#create}.\n * @exports rpc.Service\n * @extends util.EventEmitter\n * @constructor\n * @param {RPCImpl} rpcImpl RPC implementation\n * @param {boolean} [requestDelimited=false] Whether requests are length-delimited\n * @param {boolean} [responseDelimited=false] Whether responses are length-delimited\n

*/\nfunction Service(rpcImpl, requestDelimited, responseDelimited) {\n\n   if (typeof rpcImpl !== \"function\")\n   throw TypeError(\"rpcImpl must be a function\");\n\n   util.EventEmitter.call(this);\n\n   /**\n   * RPC implementation. Becomes `null` once the service is ended.\n   * @type {RPCImpl|null}\n   */\n   this.rpcImpl = rpcImpl;\n\n   /**\n   * Whether requests are length-delimited.\n   * @type {boolean}\n   */\n   this.requestDelimited = Boolean(requestDelimited);\n\n   /**\n   * Whether responses are length-delimited.\n   * @type {boolean}\n   */\n   this.responseDelimited = Boolean(responseDelimited);\n}\n\n/**\n * Calls a service method through {@link rpc.Service#rpcImpl|rpcImpl}.\n * @param {Method|rpc.ServiceMethod<TReq,TRes>} method Reflected or static method\n * @param {Constructor<TReq>} requestCtor Request constructor\n * @param {Constructor<TRes>} responseCtor Response constructor\n * @param {TReq|Properties<TReq>} request Request message or plain object\n * @param {rpc.ServiceMethodCallback<TRes>} callback Service callback\n * @returns {undefined}\n * @template TReq extends Message<TReq>\n * @template TRes extends Message<TRes>\n */\nService.prototype.rpcCall = function rpcCall(method, requestCtor, responseCtor, request, callback) {\n\n   if (!request)\n   throw TypeError(\"request must be specified\");\n\n   var self = this;\n   if (!callback)\n   return util.asPromise(rpcCall, self, method, requestCtor, responseCtor, request);\n\n   if (!self.rpcImpl) {\n   setTimeout(function() { callback(Error(\"already ended\")); }, 0);\n   return undefined;\n   }\n\n   try {\n   return self.rpcImpl(\n   method,\n   requestCtor[self.requestDelimited ? \"encodeDelimited\" : \"encode\"](request).finish(),\n   function rpcCallback(err, response) {\n\n   if (err) {\n   self.emit(\"error\", err, method);\n   return callback(err);\n   }\n\n   if (response === null) {\n   self.end(/* endedByRPC */ true);\n   return undefined;\n   }\n\n   if (!(response instanceof responseCtor)) {\n   try {\n   response = responseCtor[self.responseDelimited ? \"decodeDelimited\" : \"decode\"](response);\n   } catch (err) {\n   self.emit(\"error\", err, method);\n   return callback(err);\n   }\n   }\n\n   self.emit(\"data\", response, method);\n   return callback(null, response);\n   }\n   );\n   } catch (err) {\n   self.emit(\"error\", err, method);\n   setTimeout(function() { callback(err); }, 0);\n   return undefined;\n   }\n};\n\n/**\n * Ends this service and emits the `end` event.\n * @param {boolean} [endedByRPC=false] Whether the service has been ended by the RPC implementation.\n * @returns {rpc.Service} `this`\n */\nService.prototype.end = function end(endedByRPC) {\n   if (this.rpcImpl) {\n   if (!endedByRPC) // signal end to rpcImpl\n   this.rpcImpl(null, null, null);\n   this.rpcImpl = null;\n   this.emit(\"end\").off();\n   }\n   return this;\n};\n","\"use strict\";\nmodule.exports = LongBits;\n\nvar util = require(\"../util/minimal\");\n\n/**\n * Constructs new long bits.\n * @classdesc Helper class for working with the low and high bits of a 64 bit value.\n * @memberof util\n * @constructor\n * @param {number} lo Low 32 bits, unsigned\n * @param {number} hi High 32 bits, unsigned\n */\nfunction LongBits(lo, hi) {\n\n   // note that the casts below are theoretically unnecessary as of today, but older statically\n   // generated converter code might still call the ctor with signed 32bits. kept for compat.\n\n   /**\n   * Low bits.\n   * @type {number}\n   */\n   this.lo = lo >>> 0;\n\n   /**\n   * High bits.\n   * @type {number}\n   */\n   this.hi = hi >>> 0;\n}\n\n/**\n * Zero bits.\n * @memberof util.LongBits\n * @type {util.LongBits}\n */\nvar zero = LongBits.zero = new LongBits(0, 0);\n\nzero.toNumber = function() { return 0; };\nzero.zzEncode = zero.zzDecode = function() { return this; };\nzero.length = function() { return 1; };\n\n/**\n * Zero hash.\n * @memberof util.LongBits\n * @type {string}\n */\nvar zeroHash = LongBits.zeroHash = \"\\0\\0\\0\\0\\0\\0\\0\\0\";\n\n/**\n * Constructs new long bits from the specified number.\n * @param {number} value Value\n * @returns {util.LongBits} Instance\n */\nLongBits.fromNumber = function fromNumber(value) {\n   if (value === 0)\n   return zero;\n   var sign = value < 0;\n   if (sign)\n   value = -value;\n   var lo = value >>> 0,\n   hi = (value - lo) / 4294967296 >>> 0;\n   if (sign) {\n   hi = ~hi >>> 0;\n   lo = ~lo >>> 0;\n   if (++lo > 4294967295) {\n   lo = 0;\n   if (++hi > 4294967295)\n   hi = 0;\n   }\n   }\n   return new LongBits(lo, hi);\n};\n\n/**\n * Constructs new long bits from a number, long or string.\n * @param {Long|number|string} value Value\n * @returns {util.LongBits} Instance\n */\nLongBits.from = function from(value) {\n   if (typeof value === \"number\")\n   return LongBits.fromNumber(value);\n   if (util.isString(value)) {\n   /* istanbul ignore else */\n   if (util.Long)\n   value = util.Long.fromString(value);\n   else\n   return

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LongBits.fromNumber(parseInt(value, 10));\n    }\n    return value.low || value.high ? new LongBits(value.low >>>
0, value.high >>> 0) : zero;\n};\n\n/**\n * Converts this long bits to a possibly unsafe JavaScript number.\n *
@param {boolean} [unsigned=false] Whether unsigned or not\n * @returns {number} Possibly unsafe number\n
*/\nLongBits.prototype.toNumber = function toNumber(unsigned) {\n    if (!unsigned && this.hi >>> 31) {\n
var lo = ~this.lo + 1 >>> 0,\n            hi = ~this.hi     >>> 0;\n        if (!lo)\n            hi = hi + 1 >>> 0;\n        return -(lo
+ hi * 4294967296);\n    }\n    return this.lo + this.hi * 4294967296;\n};\n\n/**\n * Converts this long bits to a
long.\n * @param {boolean} [unsigned=false] Whether unsigned or not\n * @returns {Long} Long\n
*/\nLongBits.prototype.toLong = function toLong(unsigned) {\n    return util.Long\n        ? new util.Long(this.lo | 0,
this.hi | 0, Boolean(unsigned))\n        /* istanbul ignore next */\n        : { low: this.lo | 0, high: this.hi | 0, unsigned:
Boolean(unsigned) };\n};\n\nvar charCodeAt = String.prototype.charCodeAt;\n\n/**\n * Constructs new long bits
from the specified 8 characters long hash.\n * @param {string} hash Hash\n * @returns {util.LongBits} Bits\n
*/\nLongBits.fromHash = function fromHash(hash) {\n    if (hash === zeroHash)\n        return zero;\n    return new
LongBits(\n        ( charCodeAt.call(hash, 0)\n        | charCodeAt.call(hash, 1) << 8\n        | charCodeAt.call(hash, 2)
<< 16\n        | charCodeAt.call(hash, 3) << 24) >>> 0\n    ,\n        ( charCodeAt.call(hash, 4)\n        |
charCodeAt.call(hash, 5) << 8\n        | charCodeAt.call(hash, 6) << 16\n        | charCodeAt.call(hash, 7) << 24) >>>
0\n    );\n};\n\n/**\n * Converts this long bits to a 8 characters long hash.\n * @returns {string} Hash\n
*/\nLongBits.prototype.toHash = function toHash() {\n    return String.fromCharCode(\n        this.lo        & 255,\n
  this.lo >>> 8  & 255,\n        this.lo >>> 16 & 255,\n        this.lo >>> 24      ,\n        this.hi        & 255,\n        this.hi
>>> 8  & 255,\n        this.hi >>> 16 & 255,\n        this.hi >>> 24\n    );\n};\n\n/**\n * Zig-zag encodes this long
bits.\n * @returns {util.LongBits} `this`\n */\nLongBits.prototype.zzEncode = function zzEncode() {\n    var mask =
 this.hi >> 31;\n    this.hi  = ((this.hi << 1 | this.lo >>> 31) ^ mask) >>> 0;\n    this.lo  = ( this.lo << 1                   ^
mask) >>> 0;\n    return this;\n};\n\n/**\n * Zig-zag decodes this long bits.\n * @returns {util.LongBits} `this`\n
*/\nLongBits.prototype.zzDecode = function zzDecode() {\n    var mask = -(this.lo & 1);\n    this.lo  = ((this.lo >>>
1 | this.hi << 31) ^ mask) >>> 0;\n    this.hi  = ( this.hi >>> 1                   ^ mask) >>> 0;\n    return this;\n};\n\n/**\n
* Calculates the length of this longbits when encoded as a varint.\n * @returns {number} Length\n
*/\nLongBits.prototype.length = function length() {\n    var part0 =  this.lo,\n        part1 = (this.lo >>> 28 | this.hi <<
4) >>> 0,\n        part2 =  this.hi >>> 24;\n    return part2 === 0\n         ? part1 === 0\n           ? part0 < 16384\n
 ? part0 < 128 ? 1 : 2\n             : part0 < 2097152 ? 3 : 4\n           : part1 < 16384\n             ? part1 < 128 ? 5 : 6\n
   : part1 < 2097152 ? 7 : 8\n         : part2 < 128 ? 9 : 10;\n};\n","\"use strict\";\nvar util = exports;\n\n// used to return
a Promise where callback is omitted\nutil.asPromise = require(\"@protobufjs/aspromise\");\n\n// converts to / from
base64 encoded strings\nutil.base64 = require(\"@protobufjs/base64\");\n\n// base class of
rpc.Service\nutil.EventEmitter = require(\"@protobufjs/eventemitter\");\n\n// float handling accross
browsers\nutil.float = require(\"@protobufjs/float\");\n\n// requires modules optionally and hides the call from
bundlers\nutil.inquire = require(\"@protobufjs/inquire\");\n\n// converts to / from utf8 encoded strings\nutil.utf8 =
require(\"@protobufjs/utf8\");\n\n// provides a node-like buffer pool in the browser\nutil.pool =
require(\"@protobufjs/pool\");\n\n// utility to work with the low and high bits of a 64 bit value\nutil.LongBits =
require(\"./longbits\");\n\n/**\n * Whether running within node or not.\n * @memberof util\n * @type {boolean}\n
*/\nutil.isNode = Boolean(typeof global !== \"undefined\"\n                   && global\n                   &&
global.process\n                   && global.process.versions\n                   && global.process.versions.node);\n\n/**\n *
Global object reference.\n * @memberof util\n * @type {Object}\n */\nutil.global = util.isNode && global\n
|| typeof window !== \"undefined\" && window\n           || typeof self   !== \"undefined\" && self\n           || this; //
eslint-disable-line no-invalid-this\n\n/**\n * An immuable empty array.\n * @memberof util\n * @type
{Array.<*>}\n * @const\n */\nutil.emptyArray = Object.freeze ? Object.freeze([]) : /* istanbul ignore next */ []; //
used on prototypes\n\n/**\n * An immutable empty object.\n * @type {Object}\n * @const\n */\nutil.emptyObject
= Object.freeze ? Object.freeze({}) : /* istanbul ignore next */ {}; // used on prototypes\n\n/**\n * Tests if the
specified value is an integer.\n * @function\n * @param {*} value Value to test\n * @returns {boolean} `true` if the
value is an integer\n */\nutil.isInteger = Number.isInteger || /* istanbul ignore next */ function isInteger(value) {\n
return typeof value === \"number\" && isFinite(value) && Math.floor(value) === value;\n};\n\n/**\n * Tests if the
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specified value is a string.\n * @param {*} value Value to test\n * @returns {boolean} `true` if the value is a string\n */\nutil.isString = function isString(value) {\n   return typeof value === \"string\" || value instanceof String;\n};\n\n/**\n * Tests if the specified value is a non-null object.\n * @param {*} value Value to test\n * @returns {boolean} `true` if the value is a non-null object\n */\nutil.isObject = function isObject(value) {\n   return value && typeof value === \"object\";\n};\n\n/**\n * Checks if a property on a message is considered to be present.\n * This is an alias of {@link util.isSet}.\n * @function\n * @param {Object} obj Plain object or message instance\n * @param {string} prop Property name\n * @returns {boolean} `true` if considered to be present, otherwise `false`\n */\nutil.isset =\n\n/**\n * Checks if a property on a message is considered to be present.\n * @param {Object} obj Plain object or message instance\n * @param {string} prop Property name\n * @returns {boolean} `true` if considered to be present, otherwise `false`\n */\nutil.isSet = function isSet(obj, prop) {\n   var value = obj[prop];\n   if (value != null && obj.hasOwnProperty(prop)) // eslint-disable-line eqeqeq, no-prototype-builtins\n   return typeof value !== \"object\" || (Array.isArray(value) ? value.length : Object.keys(value).length) > 0;\n   return false;\n};\n\n/**\n * Any compatible Buffer instance.\n * This is a minimal stand-alone definition of a Buffer instance. The actual type is that exported by node's typings.\n * @interface Buffer\n * @extends Uint8Array\n */\n\n/**\n * Node's Buffer class if available.\n * @type {Constructor<Buffer>}\n */\nutil.Buffer = (function() {\n   try {\n   var Buffer = util.inquire(\"buffer\").Buffer;\n   // refuse to use non-node buffers if not explicitly assigned (perf reasons):\n   return Buffer.prototype.utf8Write ? Buffer : /* istanbul ignore next */ null;\n   } catch (e) {\n   /* istanbul ignore next */\n   return null;\n   }\n})();\n\n// Internal alias of or polyfull for Buffer.from.\nutil._Buffer_from = null;\n\n// Internal alias of or polyfill for Buffer.allocUnsafe.\nutil._Buffer_allocUnsafe = null;\n\n/**\n * Creates a new buffer of whatever type supported by the environment.\n * @param {number|number[]} [sizeOrArray=0] Buffer size or number array\n * @returns {Uint8Array|Buffer} Buffer\n */\nutil.newBuffer = function newBuffer(sizeOrArray) {\n   /* istanbul ignore next */\n   return typeof sizeOrArray === \"number\"\n   ? util.Buffer\n   ? util._Buffer_allocUnsafe(sizeOrArray)\n   : new util.Array(sizeOrArray)\n   : util.Buffer\n   ? util._Buffer_from(sizeOrArray)\n   : typeof Uint8Array === \"undefined\"\n   ? sizeOrArray\n   : new Uint8Array(sizeOrArray);\n};\n\n/**\n * Array implementation used in the browser. `Uint8Array` if supported, otherwise `Array`.\n * @type {Constructor<Uint8Array>}\n */\nutil.Array = typeof Uint8Array !== \"undefined\" ? Uint8Array /* istanbul ignore next */ : Array;\n\n/**\n * Any compatible Long instance.\n * This is a minimal stand-alone definition of a Long instance. The actual type is that exported by long.js.\n * @interface Long\n * @property {number} low Low bits\n * @property {number} high High bits\n * @property {boolean} unsigned Whether unsigned or not\n */\n\n/**\n * Long.js's Long class if available.\n * @type {Constructor<Long>}\n */\nutil.Long = /* istanbul ignore next */ util.global.dcodeIO && /* istanbul ignore next */ util.global.dcodeIO.Long\n || /* istanbul ignore next */ util.global.Long\n || util.inquire(\"long\");\n\n/**\n * Regular expression used to verify 2 bit (`bool`) map keys.\n * @type {RegExp}\n * @const\n */\nutil.key2Re = /^true|false|0|1$/;\n\n/**\n * Regular expression used to verify 32 bit (`int32` etc.) map keys.\n * @type {RegExp}\n * @const\n */\nutil.key32Re = /^-?(?:0|[1-9][0-9]*)$/;\n\n/**\n * Regular expression used to verify 64 bit (`int64` etc.) map keys.\n * @type {RegExp}\n * @const\n */\nutil.key64Re = /^(?:[\\\\x00-\\\\xff]{8}|-?(?:0|[1-9][0-9]*))$/;\n\n/**\n * Converts a number or long to an 8 characters long hash string.\n * @param {Long|number} value Value to convert\n * @returns {string} Hash\n */\nutil.longToHash = function longToHash(value) {\n   return value\n   ? util.LongBits.from(value).toHash()\n   : util.LongBits.zeroHash;\n};\n\n/**\n * Converts an 8 characters long hash string to a long or number.\n * @param {string} hash Hash\n * @param {boolean} [unsigned=false] Whether unsigned or not\n * @returns {Long|number} Original value\n */\nutil.longFromHash = function longFromHash(hash, unsigned) {\n   var bits = util.LongBits.fromHash(hash);\n   if (util.Long)\n   return util.Long.fromBits(bits.lo, bits.hi, unsigned);\n   return bits.toNumber(Boolean(unsigned));\n};\n\n/**\n * Merges the properties of the source object into the destination object.\n * @memberof util\n * @param {Object.<string,*>} dst Destination object\n * @param {Object.<string,*>} src Source object\n * @param {boolean} [ifNotSet=false] Merges only if the key is not already set\n * @returns {Object.<string,*>} Destination object\n */\nfunction merge(dst, src, ifNotSet) { // used by converters\n   for (var keys = Object.keys(src), i = 0; i <

keys.length; ++i)\n   if (dst[keys[i]] === undefined || !ifNotSet)\n   dst[keys[i]] = src[keys[i]];\n   return dst;\n}\n\nutil.merge = merge;\n\n/**\n * Converts the first character of a string to lower case.\n * @param {string} str String to convert\n * @returns {string} Converted string\n */\nutil.lcFirst = function lcFirst(str) {\n   return str.charAt(0).toLowerCase() + str.substring(1);\n};\n\n/**\n * Creates a custom error constructor.\n * @memberof util\n * @param {string} name Error name\n * @returns {Constructor<Error>} Custom error constructor\n */\nfunction newError(name) {\n\n   function CustomError(message, properties) {\n\n   if (!(this instanceof CustomError))\n   return new CustomError(message, properties);\n\n   // Error.call(this, message);\n   // ^ just returns a new error instance because the ctor can be called as a function\n\n   Object.defineProperty(this, \"message\", { get: function() { return message; } });\n\n   /* istanbul ignore next */\n   if (Error.captureStackTrace) // node\n   Error.captureStackTrace(this, CustomError);\n   else\n   Object.defineProperty(this, \"stack\", { value: new Error().stack || \"\" });\n\n   if (properties)\n   merge(this, properties);\n   }\n\n   (CustomError.prototype = Object.create(Error.prototype)).constructor = CustomError;\n\n   Object.defineProperty(CustomError.prototype, \"name\", { get: function() { return name; } });\n\n   CustomError.prototype.toString = function toString() {\n   return this.name + \": \" + this.message;\n   };\n\n   return CustomError;\n}\n\nutil.newError = newError;\n\n/**\n * Constructs a new protocol error.\n * @classdesc Error subclass indicating a protocol specifc error.\n * @memberof util\n * @extends Error\n * @template T extends Message<T>\n * @constructor\n * @param {string} message Error message\n * @param {Object.<string,*>} [properties] Additional properties\n * @example\n * try {\n *   MyMessage.decode(someBuffer); // throws if required fields are missing\n * } catch (e) {\n *   if (e instanceof ProtocolError && e.instance)\n *   console.log(\"decoded so far: \" + JSON.stringify(e.instance));\n * }\n */\nutil.ProtocolError = newError(\"ProtocolError\");\n\n/**\n * So far decoded message instance.\n * @name util.ProtocolError#instance\n * @type {Message<T>}\n */\n\n/**\n * A OneOf getter as returned by {@link util.oneOfGetter}.\n * @typedef OneOfGetter\n * @type {function}\n * @returns {string|undefined} Set field name, if any\n */\n\n/**\n * Builds a getter for a oneof's present field name.\n * @param {string[]} fieldNames Field names\n * @returns {OneOfGetter} Unbound getter\n */\nutil.oneOfGetter = function getOneOf(fieldNames) {\n   var fieldMap = {};\n   for (var i = 0; i < fieldNames.length; ++i)\n   fieldMap[fieldNames[i]] = 1;\n\n   /**\n   * @returns {string|undefined} Set field name, if any\n   * @this Object\n   * @ignore\n   */\n   return function() { // eslint-disable-line consistent-return\n   for (var keys = Object.keys(this), i = keys.length - 1; i > -1; --i)\n   if (fieldMap[keys[i]] === 1 && this[keys[i]] !== undefined && this[keys[i]] !== null)\n   return keys[i];\n   };\n};\n\n/**\n * A OneOf setter as returned by {@link util.oneOfSetter}.\n * @typedef OneOfSetter\n * @type {function}\n * @param {string|undefined} value Field name\n * @returns {undefined}\n */\n\n/**\n * Builds a setter for a oneof's present field name.\n * @param {string[]} fieldNames Field names\n * @returns {OneOfSetter} Unbound setter\n */\nutil.oneOfSetter = function setOneOf(fieldNames) {\n\n   /**\n   * @param {string} name Field name\n   * @returns {undefined}\n   * @this Object\n   * @ignore\n   */\n   return function(name) {\n   for (var i = 0; i < fieldNames.length; ++i)\n   if (fieldNames[i] !== name)\n   delete this[fieldNames[i]];\n   };\n};\n\n/**\n * Default conversion options used for {@link Message#toJSON} implementations.\n *\n * These options are close to proto3's JSON mapping with the exception that internal types like Any are handled just like messages. More precisely:\n *\n * - Longs become strings\n * - Enums become string keys\n * - Bytes become base64 encoded strings\n * - (Sub-)Messages become plain objects\n * - Maps become plain objects with all string keys\n * - Repeated fields become arrays\n * - NaN and Infinity for float and double fields become strings\n *\n * @type {IConversionOptions}\n * @see https://developers.google.com/protocol-buffers/docs/proto3?hl=en#json\n */\nutil.toJSONOptions = {\n   longs: String,\n   enums: String,\n   bytes: String,\n   json: true\n};\n\n// Sets up buffer utility according to the environment (called in index-minimal)\nutil._configure = function() {\n   var Buffer = util.Buffer;\n   /* istanbul ignore if */\n   if (!Buffer) {\n   util._Buffer_from = util._Buffer_allocUnsafe = null;\n   return;\n   }\n   // because node 4.x buffers are incompatible & immutable\n   // see: https://github.com/dcodeIO/protobuf.js/pull/665\n   util._Buffer_from = Buffer.from !== Uint8Array.from && Buffer.from ||\n   /* istanbul ignore next */\n   function Buffer_from(value, encoding) {\n   return new Buffer(value, encoding);\n   };\n   util._Buffer_allocUnsafe = Buffer.allocUnsafe ||\n   /* istanbul ignore next

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*/\n        function Buffer_allocUnsafe(size) {\n            return new Buffer(size);\n        };\n};\n","\"use
strict\";\nmodule.exports = Writer;\n\nvar util      = require(\"./util/minimal\");\n\nvar BufferWriter; // cyclic\n\nvar
LongBits  = util.LongBits,\n    base64    = util.base64,\n    utf8      = util.utf8;\n\n/**\n * Constructs a new writer
operation instance.\n * @classdesc Scheduled writer operation.\n * @constructor\n * @param {function(*,
Uint8Array, number)} fn Function to call\n * @param {number} len Value byte length\n * @param {*} val Value
to write\n * @ignore\n */\nfunction Op(fn, len, val) {\n\n    /**\n     * Function to call.\n     * @type
{function(Uint8Array, number, *)}\n     */\n    this.fn = fn;\n\n    /**\n     * Value byte length.\n     * @type
{number}\n     */\n    this.len = len;\n\n    /**\n     * Next operation.\n     * @type {Writer.Op|undefined}\n     */\n
this.next = undefined;\n\n    /**\n     * Value to write.\n     * @type {*}\n     */\n    this.val = val; // type
varies\n}\n\n/* istanbul ignore next */\nfunction noop() {} // eslint-disable-line no-empty-function\n\n/**\n *
Constructs a new writer state instance.\n * @classdesc Copied writer state.\n * @memberof Writer\n *
@constructor\n * @param {Writer} writer Writer to copy state from\n * @ignore\n */\nfunction State(writer) {\n\n
/**\n     * Current head.\n     * @type {Writer.Op}\n     */\n    this.head = writer.head;\n\n    /**\n     * Current tail.\n
  * @type {Writer.Op}\n     */\n    this.tail = writer.tail;\n\n    /**\n     * Current buffer length.\n     * @type
{number}\n     */\n    this.len = writer.len;\n\n    /**\n     * Next state.\n     * @type {State|null}\n     */\n    this.next
= writer.states;\n}\n\n/**\n * Constructs a new writer instance.\n * @classdesc Wire format writer using
`Uint8Array` if available, otherwise `Array`.\n * @constructor\n */\nfunction Writer() {\n\n    /**\n     * Current
length.\n     * @type {number}\n     */\n    this.len = 0;\n\n    /**\n     * Operations head.\n     * @type {Object}\n
*/\n    this.head = new Op(noop, 0, 0);\n\n    /**\n     * Operations tail\n     * @type {Object}\n     */\n    this.tail =
this.head;\n\n    /**\n     * Linked forked states.\n     * @type {Object|null}\n     */\n    this.states = null;\n\n    //
When a value is written, the writer calculates its byte length and puts it into a linked\n    // list of operations to
perform when finish() is called. This both allows us to allocate\n    // buffers of the exact required size and reduces
the amount of work we have to do compared\n    // to first calculating over objects and then encoding over objects.
In our case, the encoding\n    // part is just a linked list walk calling operations with already prepared
values.\n}\n\nvar create = function create() {\n    return util.Buffer\n        ? function create_buffer_setup() {\n
return (Writer.create = function create_buffer() {\n                return new BufferWriter();\n            })();\n        }\n
/* istanbul ignore next */\n        : function create_array() {\n            return new Writer();\n        };\n};\n\n/**\n *
Creates a new writer.\n * @function\n * @returns {BufferWriter|Writer} A {@link BufferWriter} when Buffers are
supported, otherwise a {@link Writer}\n */\nWriter.create = create();\n\n/**\n * Allocates a buffer of the specified
size.\n * @param {number} size Buffer size\n * @returns {Uint8Array} Buffer\n */\nWriter.alloc = function
alloc(size) {\n    return new util.Array(size);\n};\n\n// Use Uint8Array buffer pool in the browser, just like node does
with buffers\n/* istanbul ignore else */\nif (util.Array !== Array)\n    Writer.alloc = util.pool(Writer.alloc,
util.Array.prototype.subarray);\n\n/**\n * Pushes a new operation to the queue.\n * @param {function(Uint8Array,
number, *)} fn Function to call\n * @param {number} len Value byte length\n * @param {number} val Value to
write\n * @returns {Writer} `this`\n * @private\n */\nWriter.prototype._push = function push(fn, len, val) {\n
this.tail = this.tail.next = new Op(fn, len, val);\n    this.len += len;\n    return this;\n};\n\nfunction writeByte(val, buf,
pos) {\n    buf[pos] = val & 255;\n}\n\nfunction writeVarint32(val, buf, pos) {\n    while (val > 127) {\n
buf[pos++] = val & 127 | 128;\n        val >>>= 7;\n    }\n    buf[pos] = val;\n}\n\n/**\n * Constructs a new varint
writer operation instance.\n * @classdesc Scheduled varint writer operation.\n * @extends Op\n * @constructor\n *
@param {number} len Value byte length\n * @param {number} val Value to write\n * @ignore\n */\nfunction
VarintOp(len, val) {\n    this.len = len;\n    this.next = undefined;\n    this.val = val;\n}\n\nVarintOp.prototype =
Object.create(Op.prototype);\nVarintOp.prototype.fn = writeVarint32;\n\n/**\n * Writes an unsigned 32 bit value as
a varint.\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.uint32 =
function write_uint32(value) {\n    // here, the call to this.push has been inlined and a varint specific Op subclass is
used.\n    // uint32 is by far the most frequently used operation and benefits significantly from this.\n    this.len +=
(this.tail = this.tail.next = new VarintOp(\n        (value = value >>> 0)\n                < 128       ? 1\n        : value <
16384     ? 2\n        : value < 2097152   ? 3\n        : value < 268435456 ? 4\n        :                   5,\n    value)).len;\n
return this;\n};\n\n/**\n * Writes a signed 32 bit value as a varint.\n * @function\n * @param {number} value
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Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.int32 = function write_int32(value) {\n   return value < 0\n   ? this._push(writeVarint64, 10, LongBits.fromNumber(value)) // 10 bytes per spec\n   : this.uint32(value);\n};\n\n/**\n * Writes a 32 bit value as a varint, zig-zag encoded.\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.sint32 = function write_sint32(value) {\n   return this.uint32((value << 1 ^ value >> 31) >>> 0);\n};\n\nfunction writeVarint64(val, buf, pos) {\n   while (val.hi) {\n   buf[pos++] = val.lo & 127 | 128;\n   val.lo = (val.lo >>> 7 | val.hi << 25) >>> 0;\n   val.hi >>>= 7;\n   }\n   while (val.lo > 127) {\n   buf[pos++] = val.lo & 127 | 128;\n   val.lo = val.lo >>> 7;\n   }\n   buf[pos++] = val.lo;\n}\n\n/**\n * Writes an unsigned 64 bit value as a varint.\n * @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n */\nWriter.prototype.uint64 = function write_uint64(value) {\n   var bits = LongBits.from(value);\n   return this._push(writeVarint64, bits.length(), bits);\n};\n\n/**\n * Writes a signed 64 bit value as a varint.\n * @function\n * @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n */\nWriter.prototype.int64 = Writer.prototype.uint64;\n\n/**\n * Writes a signed 64 bit value as a varint, zig-zag encoded.\n * @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n */\nWriter.prototype.sint64 = function write_sint64(value) {\n   var bits = LongBits.from(value).zzEncode();\n   return this._push(writeVarint64, bits.length(), bits);\n};\n\n/**\n * Writes a boolish value as a varint.\n * @param {boolean} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.bool = function write_bool(value) {\n   return this._push(writeByte, 1, value ? 1 : 0);\n};\n\nfunction writeFixed32(val, buf, pos) {\n   buf[pos   ] = val   & 255;\n   buf[pos + 1] = val >>> 8   & 255;\n   buf[pos + 2] = val >>> 16 & 255;\n   buf[pos + 3] = val >>> 24;\n}\n\n/**\n * Writes an unsigned 32 bit value as fixed 32 bits.\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.fixed32 = function write_fixed32(value) {\n   return this._push(writeFixed32, 4, value >>> 0);\n};\n\n/**\n * Writes a signed 32 bit value as fixed 32 bits.\n * @function\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.sfixed32 = Writer.prototype.fixed32;\n\n/**\n * Writes an unsigned 64 bit value as fixed 64 bits.\n * @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n */\nWriter.prototype.fixed64 = function write_fixed64(value) {\n   var bits = LongBits.from(value);\n   return this._push(writeFixed32, 4, bits.lo)._push(writeFixed32, 4, bits.hi);\n};\n\n/**\n * Writes a signed 64 bit value as fixed 64 bits.\n * @function\n * @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n */\nWriter.prototype.sfixed64 = Writer.prototype.fixed64;\n\n/**\n * Writes a float (32 bit).\n * @function\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.float = function write_float(value) {\n   return this._push(util.float.writeFloatLE, 4, value);\n};\n\n/**\n * Writes a double (64 bit float).\n * @function\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.double = function write_double(value) {\n   return this._push(util.float.writeDoubleLE, 8, value);\n};\n\nvar writeBytes = util.Array.prototype.set\n   ? function writeBytes_set(val, buf, pos) {\n   buf.set(val, pos); // also works for plain array values\n   }\n   /* istanbul ignore next */\n   : function writeBytes_for(val, buf, pos) {\n   for (var i = 0; i < val.length; ++i)\n   buf[pos + i] = val[i];\n   };\n\n/**\n * Writes a sequence of bytes.\n * @param {Uint8Array|string} value Buffer or base64 encoded string to write\n * @returns {Writer} `this`\n */\nWriter.prototype.bytes = function write_bytes(value) {\n   var len = value.length >>> 0;\n   if (!len)\n   return this._push(writeByte, 1, 0);\n   if (util.isString(value)) {\n   var buf = Writer.alloc(len = base64.length(value));\n   base64.decode(value, buf, 0);\n   value = buf;\n   }\n   return this.uint32(len)._push(writeBytes, len, value);\n};\n\n/**\n * Writes a string.\n * @param {string} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.string = function write_string(value) {\n   var len = utf8.length(value);\n   return len\n   ? this.uint32(len)._push(utf8.write, len, value)\n   : this._push(writeByte, 1, 0);\n};\n\n/**\n * Forks this writer's state by pushing it to a stack.\n * Calling {@link Writer#reset|reset} or {@link Writer#ldelim|ldelim} resets the writer to the previous state.\n * @returns {Writer} `this`\n */\nWriter.prototype.fork = function fork() {\n   this.states = new State(this);\n   this.head = this.tail = new

Op(noop, 0, 0);\n   this.len = 0;\n   return this;\n};\n\n/**\n * Resets this instance to the last state.\n * @returns {Writer} `this`\n */\nWriter.prototype.reset = function reset() {\n   if (this.states) {\n   this.head   = this.states.head;\n   this.tail   = this.states.tail;\n   this.len   = this.states.len;\n   this.states = this.states.next;\n   } else {\n   this.head = this.tail = new Op(noop, 0, 0);\n   this.len = 0;\n   }\n   return this;\n};\n\n/**\n * Resets to the last state and appends the fork state's current write length as a varint followed by its operations.\n * @returns {Writer} `this`\n */\nWriter.prototype.ldelim = function ldelim() {\n   var head = this.head,\n   tail = this.tail,\n   len = this.len;\n   this.reset().uint32(len);\n   if (len) {\n   this.tail.next = head.next; // skip noop\n   this.tail = tail;\n   this.len += len;\n   }\n   return this;\n};\n\n/**\n * Finishes the write operation.\n * @returns {Uint8Array} Finished buffer\n */\nWriter.prototype.finish = function finish() {\n   var head = this.head.next, // skip noop\n   buf = this.constructor.alloc(this.len),\n   pos = 0;\n   while (head) {\n   head.fn(head.val, buf, pos);\n   pos += head.len;\n   head = head.next;\n   }\n   // this.head = this.tail = null;\n   return buf;\n};\n\nWriter._configure = function(BufferWriter_) {\n   BufferWriter = BufferWriter_;\n   Writer.create = create();\n   BufferWriter._configure();\n};\n","\"use strict\";\nmodule.exports = BufferWriter;\n\n// extends Writer\nvar Writer = require(\"./writer\");\n(BufferWriter.prototype = Object.create(Writer.prototype)).constructor = BufferWriter;\n\nvar util = require(\"./util/minimal\");\n\n/**\n * Constructs a new buffer writer instance.\n * @classdesc Wire format writer using node buffers.\n * @extends Writer\n * @constructor\n */\nfunction BufferWriter() {\n   Writer.call(this);\n}\n\nBufferWriter._configure = function () {\n   /**\n   * Allocates a buffer of the specified size.\n   * @function\n   * @param {number} size Buffer size\n   * @returns {Buffer} Buffer\n   */\n   BufferWriter.alloc = util._Buffer_allocUnsafe;\n\n   BufferWriter.writeBytesBuffer = util.Buffer && util.Buffer.prototype instanceof Uint8Array && util.Buffer.prototype.set.name === \"set\"\n   ? function writeBytesBuffer_set(val, buf, pos) {\n   buf.set(val, pos); // faster than copy (requires node >= 4 where Buffers extend Uint8Array and set is properly inherited)\n   // also works for plain array values\n   }\n   /* istanbul ignore next */\n   : function writeBytesBuffer_copy(val, buf, pos) {\n   if (val.copy) // Buffer values\n   val.copy(buf, pos, 0, val.length);\n   else for (var i = 0; i < val.length;) // plain array values\n   buf[pos++] = val[i++];\n   };\n};\n\n\n/**\n * @override\n */\nBufferWriter.prototype.bytes = function write_bytes_buffer(value) {\n   if (util.isString(value))\n   value = util._Buffer_from(value, \"base64\");\n   var len = value.length >>> 0;\n   this.uint32(len);\n   if (len)\n   this._push(BufferWriter.writeBytesBuffer, len, value);\n   return this;\n};\n\nfunction writeStringBuffer(val, buf, pos) {\n   if (val.length < 40) // plain js is faster for short strings (probably due to redundant assertions)\n   util.utf8.write(val, buf, pos);\n   else if (buf.utf8Write)\n   buf.utf8Write(val, pos);\n   else\n   buf.write(val, pos);\n}\n\n/**\n * @override\n */\nBufferWriter.prototype.string = function write_string_buffer(value) {\n   var len = util.Buffer.byteLength(value);\n   this.uint32(len);\n   if (len)\n   this._push(writeStringBuffer, len, value);\n   return this;\n};\n\n\n/**\n * Finishes the write operation.\n * @name BufferWriter#finish\n * @function\n * @returns {Buffer} Finished buffer\n */\n\nBufferWriter._configure();\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\n/* eslint-disable import/no-internal-modules */\r\nimport {Backend, InferenceSession, SessionHandler} from 'onnxruntime-common';\r\nimport {Session} from './onnxjs/session';\r\nimport {OnnxjsSessionHandler} from './onnxjs/session-handler';\r\n\r\nclass OnnxjsBackend implements Backend {\r\n // eslint-disable-next-line @typescript-eslint/no-empty-function\r\n async init(): Promise<void> {}\r\n\r\n async createSessionHandler(pathOrBuffer: string|Uint8Array, options?: InferenceSession.SessionOptions):\r\n   Promise<SessionHandler> {\r\n   // NOTE: Session.Config(from onnx.js) is not compatible with InferenceSession.SessionOptions(from\r\n   // onnxruntime-common).\r\n   //   In future we should remove Session.Config and use InferenceSession.SessionOptions.\r\n   //   Currently we allow this to happen to make test runner work.\r\n   const session = new Session(options as unknown as Session.Config);\r\n\r\n   // typescript cannot merge method override correctly (so far in 4.2.3). need if-else to call the method.\r\n   if (typeof pathOrBuffer === 'string') {\r\n   await session.loadModel(pathOrBuffer);\r\n   } else {\r\n   await session.loadModel(pathOrBuffer);\r\n   }\r\n\r\n   return new OnnxjsSessionHandler(session);\r\n }\r\n}\r\n\r\nexport const onnxjsBackend = new OnnxjsBackend();\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {readFile} from 'fs';\r\nimport {Backend, env, InferenceSession, SessionHandler} from 'onnxruntime-common';\r\nimport {cpus} from 'os';\r\nimport {promisify} from 'util';\r\nimport {initWasm} from './wasm/proxy-wrapper';\r\n\r\nimport {OnnxruntimeWebAssemblySessionHandler} from './wasm/session-handler';\r\n\r\n\r\n/**\r\n * This function initializes all flags for WebAssembly.\r\n *\r\n * Those flags are accessible from `ort.env.wasm`. Users are allow to set those flags before the first inference session\r\n * being created, to override default value.\r\n */\r\nexport const initializeFlags = (): void => {\r\n if (typeof env.wasm.initTimeout !== 'number' || env.wasm.initTimeout < 0) {\r\n   env.wasm.initTimeout = 0;\r\n }\r\n\r\n if (typeof env.wasm.simd !== 'boolean') {\r\n   env.wasm.simd = true;\r\n }\r\n\r\n if (typeof env.wasm.proxy !== 'boolean') {\r\n   env.wasm.proxy = false;\r\n }\r\n\r\n if (typeof env.wasm.numThreads !== 'number' || !Number.isInteger(env.wasm.numThreads) || env.wasm.numThreads <= 0) {\r\n   const numCpuLogicalCores = typeof navigator === 'undefined' ? cpus().length : navigator.hardwareConcurrency;\r\n   env.wasm.numThreads = Math.min(4, Math.ceil((numCpuLogicalCores || 1) / 2));\r\n }\r\n};\r\n\r\nclass OnnxruntimeWebAssemblyBackend implements Backend {\r\n async init(): Promise<void> {\r\n   // populate wasm flags\r\n   initializeFlags();\r\n\r\n   // init wasm\r\n   await initWasm();\r\n }\r\n createSessionHandler(path: string, options?: InferenceSession.SessionOptions): Promise<SessionHandler>;\r\n createSessionHandler(buffer: Uint8Array, options?: InferenceSession.SessionOptions): Promise<SessionHandler>;\r\n async createSessionHandler(pathOrBuffer: string|Uint8Array, options?: InferenceSession.SessionOptions):\r\n   Promise<SessionHandler> {\r\n   let buffer: Uint8Array;\r\n   if (typeof pathOrBuffer === 'string') {\r\n   if (typeof fetch === 'undefined') {\r\n   // node\r\n   buffer = await promisify(readFile)(pathOrBuffer);\r\n   } else {\r\n   // browser\r\n   const response = await fetch(pathOrBuffer);\r\n   const arrayBuffer = await response.arrayBuffer();\r\n   buffer = new Uint8Array(arrayBuffer);\r\n   }\r\n   } else {\r\n   buffer = pathOrBuffer;\r\n   }\r\n\r\n   const handler = new OnnxruntimeWebAssemblySessionHandler();\r\n   await handler.loadModel(buffer, options);\r\n   return Promise.resolve(handler);\r\n }\r\n}\r\n\r\nexport const wasmBackend = new OnnxruntimeWebAssemblyBackend();\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nexport * from 'onnxruntime-common';\r\nimport {registerBackend} from 'onnxruntime-common';\r\nimport {onnxjsBackend} from './backend-onnxjs';\r\nimport {wasmBackend} from './backend-wasm';\r\n\r\nregisterBackend('webgl', onnxjsBackend, 1);\r\nregisterBackend('wasm', wasmBackend, 2);\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nclass AttributeWithCacheKeyImpl {\r\n constructor(attribute: Record<string, unknown>) {\r\n   Object.assign(this, attribute);\r\n }\r\n\r\n private _cacheKey: string;\r\n public get cacheKey(): string {\r\n   if (!this._cacheKey) {\r\n   this._cacheKey =\r\n   Object.getOwnPropertyNames(this).sort().map(name => `${(this as Record<string, unknown>)[name]}`).join(';');\r\n   }\r\n   return this._cacheKey;\r\n }\r\n}\r\n\r\nexport interface AttributeWithCacheKey {\r\n readonly cacheKey: string;\r\n}\r\n\r\nexport const createAttributeWithCacheKey = <T extends Record<string, unknown>>(attribute: T): T&AttributeWithCacheKey =>\r\n   new AttributeWithCacheKeyImpl(attribute) as unknown as T & AttributeWithCacheKey;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport Long from 'long';\r\nimport {onnx} from 'onnx-proto';\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\n\r\nimport {Tensor} from './tensor';\r\nimport {LongUtil} from './util';\r\n\r\nexport declare namespace Attribute {\r\n export interface DataTypeMap {\r\n   float: number;\r\n   int: number;\r\n   string: string;\r\n   tensor: Tensor;\r\n   floats: number[];\r\n   ints: number[];\r\n   strings: string[];\r\n   tensors: Tensor[];\r\n }\r\n\r\n export type DataType = keyof DataTypeMap;\r\n}\r\n\r\ntype ValueTypes = Attribute.DataTypeMap[Attribute.DataType];\r\n\r\ntype Value = [ValueTypes, Attribute.DataType];\r\n\r\nexport class Attribute {\r\n constructor(attributes: onnx.IAttributeProto[]|ortFbs.Attribute[]|null|undefined) {\r\n   this._attributes = new Map();\r\n   if (attributes !== null && attributes !== undefined) {\r\n   for (const attr of attributes) {\r\n   if (attr instanceof onnx.AttributeProto) {\r\n   this._attributes.set(attr.name, [Attribute.getValue(attr), Attribute.getType(attr)]);\r\n   } else if (attr instanceof ortFbs.Attribute) {\r\n   this._attributes.set(attr.name()!, [Attribute.getValue(attr),

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Attribute.getType(attr)]);\r\n        }\r\n      }\r\n      if (this._attributes.size < attributes.length) {\r\n        throw new
Error('duplicated attribute names');\r\n      }\r\n    }\r\n  }\r\n\r\n  set(key: string, type: Attribute.DataType, value:
ValueTypes): void {\r\n    this._attributes.set(key, [value, type]);\r\n  }\r\n  delete(key: string): void {\r\n
this._attributes.delete(key);\r\n  }\r\n  getFloat(key: string, defaultValue?: Attribute.DataTypeMap['float']) {\r\n
return this.get(key, 'float', defaultValue);\r\n  }\r\n\r\n  getInt(key: string, defaultValue?:
Attribute.DataTypeMap['int']) {\r\n    return this.get(key, 'int', defaultValue);\r\n  }\r\n\r\n  getString(key: string,
defaultValue?: Attribute.DataTypeMap['string']) {\r\n    return this.get(key, 'string', defaultValue);\r\n  }\r\n\r\n
getTensor(key: string, defaultValue?: Attribute.DataTypeMap['tensor']) {\r\n    return this.get(key, 'tensor',
defaultValue);\r\n  }\r\n\r\n  getFloats(key: string, defaultValue?: Attribute.DataTypeMap['floats']) {\r\n    return
this.get(key, 'floats', defaultValue);\r\n  }\r\n\r\n  getInts(key: string, defaultValue?: Attribute.DataTypeMap['ints'])
{\r\n    return this.get(key, 'ints', defaultValue);\r\n  }\r\n\r\n  getStrings(key: string, defaultValue?:
Attribute.DataTypeMap['strings']) {\r\n    return this.get(key, 'strings', defaultValue);\r\n  }\r\n\r\n  getTensors(key:
string, defaultValue?: Attribute.DataTypeMap['tensors']) {\r\n    return this.get(key, 'tensors', defaultValue);\r\n
}\r\n\r\n  private get<V extends Attribute.DataTypeMap[Attribute.DataType]>(\r\n      key: string, type:
Attribute.DataType, defaultValue?: V): V {\r\n    const valueAndType = this._attributes.get(key);\r\n    if
(valueAndType === undefined) {\r\n      if (defaultValue !== undefined) {\r\n        return defaultValue;\r\n      }\r\n
 throw new Error(`required attribute not found: ${key}`);\r\n    }\r\n    if (valueAndType[1] !== type) {\r\n      throw
new Error(`type mismatch: expected ${type} but got ${valueAndType[1]}`);\r\n    }\r\n    return valueAndType[0]
as V;\r\n  }\r\n\r\n  private static getType(attr: onnx.IAttributeProto|ortFbs.Attribute): Attribute.DataType {\r\n
const type = attr instanceof onnx.AttributeProto ? (attr).type : (attr as ortFbs.Attribute).type();\r\n    switch (type)
{\r\n      case onnx.AttributeProto.AttributeType.FLOAT:\r\n        return 'float';\r\n      case
onnx.AttributeProto.AttributeType.INT:\r\n        return 'int';\r\n      case
onnx.AttributeProto.AttributeType.STRING:\r\n        return 'string';\r\n      case
onnx.AttributeProto.AttributeType.TENSOR:\r\n        return 'tensor';\r\n      case
onnx.AttributeProto.AttributeType.FLOATS:\r\n        return 'floats';\r\n      case
onnx.AttributeProto.AttributeType.INTS:\r\n        return 'ints';\r\n      case
onnx.AttributeProto.AttributeType.STRINGS:\r\n        return 'strings';\r\n      case
onnx.AttributeProto.AttributeType.TENSORS:\r\n        return 'tensors';\r\n      default:\r\n        throw new
Error(`attribute type is not supported yet: ${onnx.AttributeProto.AttributeType[type]}`);\r\n    }\r\n  }\r\n\r\n  private
static getValue(attr: onnx.IAttributeProto|ortFbs.Attribute) {\r\n    const attrType = attr instanceof
onnx.AttributeProto ? attr.type : (attr as ortFbs.Attribute).type();\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.GRAPH || attrType === onnx.AttributeProto.AttributeType.GRAPHS) {\r\n
throw new Error('graph attribute is not supported yet');\r\n    }\r\n\r\n    const value =
this.getValueNoCheck(attr);\r\n\r\n    // cast LONG to number\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.INT && LongUtil.isLong(value)) {\r\n      return LongUtil.longToNumber(value
as Long | flatbuffers.Long);\r\n    }\r\n\r\n    // cast LONG[] to number[]\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.INTS) {\r\n      const arr = (value as Array<number|Long|flatbuffers.Long>);\r\n
  const numberValue: number[] = new Array<number>(arr.length);\r\n\r\n      for (let i = 0; i < arr.length; i++) {\r\n
    const maybeLong = arr[i];\r\n        numberValue[i] = LongUtil.longToNumber(maybeLong);\r\n      }\r\n\r\n
return numberValue;\r\n    }\r\n\r\n    // cast onnx.TensorProto to onnxjs.Tensor\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.TENSOR) {\r\n      return attr instanceof onnx.AttributeProto ?
Tensor.fromProto(value as onnx.ITensorProto) :\r\n                                                  Tensor.fromOrtTensor(value as
ortFbs.Tensor);\r\n    }\r\n\r\n    // cast onnx.TensorProto[] to onnxjs.Tensor[]\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.TENSORS) {\r\n      if (attr instanceof onnx.AttributeProto) {\r\n        const
tensorProtos = value as onnx.ITensorProto[];\r\n        return tensorProtos.map(value =>
Tensor.fromProto(value));\r\n      } else if (attr instanceof ortFbs.Attribute) {\r\n        const tensorProtos = value as
ortFbs.Tensor[];\r\n        return tensorProtos.map(value => Tensor.fromOrtTensor(value));\r\n      }\r\n    }\r\n\r\n    //
cast Uint8Array to string\r\n    if (attrType === onnx.AttributeProto.AttributeType.STRING) {\r\n      // string in
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onnx attribute is of uint8array type, so we need to convert it to string below. While in ort format,\r\n // string attributes are returned as string, so no conversion is needed.\r\n if (attr instanceof onnx.AttributeProto) {\r\n const utf8String = value as Uint8Array;\r\n return Buffer.from(utf8String.buffer, utf8String.byteOffset, utf8String.byteLength).toString();\r\n }\r\n }\r\n\r\n // cast Uint8Array[] to string[]\r\n if (attrType === onnx.AttributeProto.AttributeType.STRINGS) {\r\n // strings in onnx attribute is returned as uint8array[], so we need to convert it to string[] below. While in ort\r\n // format strings attributes are returned as string[], so no conversion is needed.\r\n if (attr instanceof onnx.AttributeProto) {\r\n const utf8Strings = value as Uint8Array[];\r\n return utf8Strings.map(\r\n utf8String => Buffer.from(utf8String.buffer, utf8String.byteOffset, utf8String.byteLength).toString());\r\n }\r\n }\r\n\r\n return value as ValueTypes;\r\n }\r\n\r\n private static getValueNoCheck(attr: onnx.IAttributeProto|ortFbs.Attribute) {\r\n return attr instanceof (onnx.AttributeProto) ? this.getValueNoCheckFromOnnxFormat(attr) :\r\n this.getValueNoCheckFromOrtFormat(attr as ortFbs.Attribute);\r\n }\r\n\r\n private static getValueNoCheckFromOnnxFormat(attr: onnx.IAttributeProto) {\r\n switch (attr.type!) {\r\n case onnx.AttributeProto.AttributeType.FLOAT:\r\n return attr.f;\r\n case onnx.AttributeProto.AttributeType.INT:\r\n return attr.i;\r\n case onnx.AttributeProto.AttributeType.STRING:\r\n return attr.s;\r\n case onnx.AttributeProto.AttributeType.TENSOR:\r\n return attr.t;\r\n case onnx.AttributeProto.AttributeType.GRAPH:\r\n return attr.g;\r\n case onnx.AttributeProto.AttributeType.FLOATS:\r\n return attr.floats;\r\n case onnx.AttributeProto.AttributeType.INTS:\r\n return attr.ints;\r\n case onnx.AttributeProto.AttributeType.STRINGS:\r\n return attr.strings;\r\n case onnx.AttributeProto.AttributeType.TENSORS:\r\n return attr.tensors;\r\n case onnx.AttributeProto.AttributeType.GRAPHS:\r\n return attr.graphs;\r\n default:\r\n throw new Error(`unsupported attribute type: ${onnx.AttributeProto.AttributeType[attr.type!]}`);\r\n }\r\n }\r\n\r\n private static getValueNoCheckFromOrtFormat(attr: ortFbs.Attribute) {\r\n switch (attr.type()) {\r\n case ortFbs.AttributeType.FLOAT:\r\n return attr.f();\r\n case ortFbs.AttributeType.INT:\r\n return attr.i();\r\n case ortFbs.AttributeType.STRING:\r\n return attr.s();\r\n case ortFbs.AttributeType.TENSOR:\r\n return attr.t();\r\n case ortFbs.AttributeType.GRAPH:\r\n return attr.g();\r\n case ortFbs.AttributeType.FLOATS:\r\n return attr.floatsArray();\r\n case ortFbs.AttributeType.INTS: {\r\n const ints = [];\r\n for (let i = 0; i < attr.intsLength(); i++) {\r\n ints.push(attr.ints(i)!);\r\n }\r\n return ints;\r\n }\r\n case ortFbs.AttributeType.STRINGS: {\r\n const strings = [];\r\n for (let i = 0; i < attr.stringsLength(); i++) {\r\n strings.push(attr.strings(i));\r\n }\r\n return strings;\r\n }\r\n case ortFbs.AttributeType.TENSORS: {\r\n const tensors = [];\r\n for (let i = 0; i < attr.tensorsLength(); i++) {\r\n tensors.push(attr.tensors(i)!);\r\n }\r\n return tensors;\r\n }\r\n // case ortFbs.AttributeType.GRAPHS:\r\n // TODO: Subgraph not supported yet.\r\n // const graphs = [];\r\n // for (let i = 0; i < attr.graphsLength(); i++) {\r\n // graphs.push(attr.graphs(i)!);\r\n // }\r\n // return graphs;\r\n default:\r\n throw new Error(`unsupported attribute type: ${ortFbs.AttributeType[attr.type()]}`);\r\n }\r\n }\r\n\r\n protected _attributes: Map<string, Value>;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {WebGLBackend} from './backends/backend-webgl';\r\nimport {Graph} from './graph';\r\nimport {Operator} from './operators';\r\nimport {OpSet} from './opset';\r\nimport {Session} from './session';\r\n\r\nexport interface InferenceHandler {\r\n /**\r\n * dispose the inference handler. it will be called as the last step in Session.run()\r\n */\r\n dispose(): void;\r\n}\r\n\r\nexport interface SessionHandler {\r\n /**\r\n * transform the graph at initialization time\r\n * @param graphTransformer the graph transformer to manipulate the model graph\r\n */\r\n transformGraph?(graphTransformer: Graph.Transformer): void;\r\n\r\n /**\r\n * create an instance of InferenceHandler to use in a Session.run() call\r\n */\r\n createInferenceHandler(): InferenceHandler;\r\n\r\n /**\r\n * dispose the session handler. it will be called when a session is being disposed explicitly\r\n */\r\n dispose(): void;\r\n\r\n /**\r\n * Resolves the operator from the name and opset version; backend specific\r\n *

@param node the node to resolve\r\n   * @param opsets a list of opsets that exported from the model\r\n   * @param graph the completely initialized graph\r\n   */\r\n resolve(node: Graph.Node, opsets: readonly OpSet[], graph: Graph): Operator;\r\n\r\n /**\r\n   * This method let's the sessionHandler know that the graph initialization is complete\r\n   * @param graph the completely initialized graph\r\n   */\r\n onGraphInitialized?(graph: Graph): void;\r\n\r\n /**\r\n   * a reference to the corresponding backend\r\n   */\r\n readonly backend: Backend;\r\n\r\n /**\r\n   * a reference to the session context\r\n   */\r\n readonly context: Session.Context;\r\n}\r\n\r\nexport interface Backend {\r\n /**\r\n   * initialize the backend. will be called only once, when the first time the\r\n   * backend it to be used\r\n   */\r\n initialize(): boolean|Promise<boolean>;\r\n\r\n /**\r\n   * create an instance of SessionHandler to use in a Session object's lifecycle\r\n   */\r\n createSessionHandler(context: Session.Context): SessionHandler;\r\n\r\n /**\r\n   * dispose the backend. currently this will not be called\r\n   */\r\n dispose(): void;\r\n}\r\n\r\n// caches all initialized backend instances\r\nconst backendsCache: Map<string, Backend> = new Map();\r\n\r\nexport const backend: {[name: string]: Backend} = {\r\n webgl: new WebGLBackend(),\r\n};\r\n\r\n/**\r\n * Resolve a reference to the backend. If a hint is specified, the corresponding\r\n * backend will be used.\r\n */\r\nexport async function resolveBackend(hint?: string|readonly string[]): Promise<Backend> {\r\n if (!hint) {\r\n   return resolveBackend(['webgl']);\r\n } else {\r\n   const hints = typeof hint === 'string' ? [hint] : hint;\r\n\r\n   for (const backendHint of hints) {\r\n   const cache = backendsCache.get(backendHint);\r\n   if (cache) {\r\n   return cache;\r\n   }\r\n\r\n   const backend = await tryLoadBackend(backendHint);\r\n   if (backend) {\r\n   return backend;\r\n   }\r\n   }\r\n }\r\n\r\n throw new Error('no available backend to use');\r\n}\r\n\r\nasync function tryLoadBackend(backendHint: string): Promise<Backend|undefined> {\r\n const backendObj = backend;\r\n\r\n if (typeof backendObj[backendHint] !== 'undefined' && isBackend(backendObj[backendHint])) {\r\n   const backend = backendObj[backendHint];\r\n   let init = backend.initialize();\r\n   if (typeof init === 'object' && 'then' in init) {\r\n   init = await init;\r\n   }\r\n   if (init) {\r\n   backendsCache.set(backendHint, backend);\r\n   return backend;\r\n   }\r\n }\r\n\r\n return undefined;\r\n}\r\n\r\nfunction isBackend(obj: unknown) {\r\n // eslint-disable-next-line @typescript-eslint/no-explicit-any\r\n const o = obj as any;\r\n\r\n // check if an object is a Backend instance\r\n if (\r\n   'initialize' in o && typeof o.initialize === 'function' &&   // initialize()\r\n   'createSessionHandler' in o && typeof o.createSessionHandler === 'function' && // createSessionHandler()\r\n   'dispose' in o && typeof o.dispose === 'function'   // dispose()\r\n) {\r\n   return true;\r\n }\r\n\r\n return false;\r\n}\r\n\r\nexport type BackendType = Backend;\r\nexport type SessionHandlerType = ReturnType<BackendType['createSessionHandler']>;\r\nexport type InferenceHandlerType = ReturnType<SessionHandlerType['createInferenceHandler']>;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env} from 'onnxruntime-common';\r\nimport {Backend, SessionHandler} from '../backend';\r\nimport {Logger} from '../instrument';\r\nimport {Session} from '../session';\r\n\r\nimport {WebGLSessionHandler} from './webgl/session-handler';\r\nimport {WebGLContext} from './webgl/webgl-context';\r\nimport {createWebGLContext} from './webgl/webgl-context-factory';\r\n\r\n/**\r\n * WebGLBackend is the entry point for all WebGL opeartions\r\n * When it starts it created the WebGLRenderingContext\r\n * and other main framework components such as Program and Texture Managers\r\n */\r\nexport class WebGLBackend implements Backend {\r\n glContext: WebGLContext;\r\n\r\n get contextId(): 'webgl'|'webgl2'|undefined {\r\n   return env.webgl.contextId;\r\n }\r\n set contextId(value: 'webgl'|'webgl2'|undefined) {\r\n   env.webgl.contextId = value;\r\n }\r\n\r\n get matmulMaxBatchSize(): number|undefined {\r\n   return env.webgl.matmulMaxBatchSize;\r\n }\r\n set matmulMaxBatchSize(value: number|undefined) {\r\n   env.webgl.matmulMaxBatchSize = value;\r\n }\r\n\r\n get textureCacheMode(): 'initializerOnly'|'full'|undefined {\r\n   return env.webgl.textureCacheMode;\r\n }\r\n set textureCacheMode(value: 'initializerOnly'|'full'|undefined) {\r\n   env.webgl.textureCacheMode = value;\r\n }\r\n\r\n get pack(): boolean|undefined {\r\n   return env.webgl.pack;\r\n }\r\n set pack(value: boolean|undefined) {\r\n   env.webgl.pack = value;\r\n }\r\n\r\n get async(): boolean|undefined {\r\n   return env.webgl.async;\r\n }\r\n set async(value: boolean|undefined) {\r\n   env.webgl.async = value;\r\n }\r\n\r\n initialize(): boolean {\r\n   try {\r\n   this.glContext = createWebGLContext(this.contextId);\r\n   if (typeof this.matmulMaxBatchSize !== 'number')

{\r\n this.matmulMaxBatchSize = 16;\r\n }\r\n if (typeof this.textureCacheMode !== 'string') {\r\n this.textureCacheMode = 'full';\r\n }\r\n if (typeof this.pack !== 'boolean') {\r\n this.pack = false;\r\n }\r\n if (typeof this.async !== 'boolean') {\r\n this.async = false;\r\n }\r\n\r\n Logger.setWithEnv(env);\r\n\r\n Logger.verbose(\r\n 'WebGLBackend',\r\n `Created WebGLContext: ${typeof this.glContext} with matmulMaxBatchSize: ${\r\n this.matmulMaxBatchSize}; textureCacheMode: ${this.textureCacheMode}; pack: ${this.pack}; async: ${\r\n this.async}.`);\r\n return true;\r\n } catch (e) {\r\n Logger.warning('WebGLBackend', `Unable to initialize WebGLBackend. ${e}`);\r\n return false;\r\n }\r\n }\r\n createSessionHandler(context: Session.Context): SessionHandler {\r\n return new WebGLSessionHandler(this, context);\r\n }\r\n dispose(): void {\r\n this.glContext.dispose();\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {ArrayUtil, BroadcastUtil, ShapeUtil} from '../../util';\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\nimport {getGlsl} from './glsl-source';\r\nimport {squeezeShape} from './texture-layout-strategy';\r\nimport {TextureLayout} from './types';\r\nimport {generateShaderFuncNameFromInputSamplerName, generateShaderFuncNameFromInputSamplerNameAtOutCoords, getCoordsDataType, getGlChannels, getSqueezedParams, squeezeInputShape} from './utils';\r\n\r\n/**\r\n * GLSL Library responsible for data types and routines for manipulating\r\n * coordinates and mapping to/from tensor indices\r\n */\r\nexport class CoordsGlslLib extends GlslLib {\r\n returnType: string;\r\n\r\n constructor(context: GlslContext) {\r\n super(context);\r\n }\r\n getFunctions(): {[name: string]: GlslLibRoutine} {\r\n return {\r\n ...this.offsetToCoords(),\r\n ...this.coordsToOffset(),\r\n ...this.toVec(),\r\n ...this.valueFrom(),\r\n // TODO return these only when packing is enabled.\r\n ...this.getCommonUtilFuncs(),\r\n ...this.getInputsSamplingSnippets(),\r\n ...this.getOutputSamplingSnippet()\r\n };\r\n }\r\n getCustomTypes() {\r\n return {};\r\n }\r\n /**\r\n * Produces a function that can map from\r\n * 2D normalzied coordinates (s,t) to a flat offset\r\n */\r\n protected offsetToCoords(): {[name: string]: GlslLibRoutine} {\r\n const funcName = 'offsetToCoords';\r\n return {\r\n offsetToCoords: new GlslLibRoutine(`\r\n vec2 ${funcName}(int offset, int width, int height) {\r\n int t = offset / width;\r\n int s = offset - t*width;\r\n vec2 coords = (vec2(s,t) + vec2(0.5,0.5)) / vec2(width, height);\r\n return coords;\r\n }\r\n `)\r\n };\r\n }\r\n\r\n /**\r\n * Produces a function that can map from\r\n * 2D normalzied coordinates (s,t) to a flat offset\r\n */\r\n protected coordsToOffset(): {[name: string]: GlslLibRoutine} {\r\n const funcName = 'coordsToOffset';\r\n return {\r\n coordsToOffset: new GlslLibRoutine(`\r\n int ${funcName}(vec2 coords, int width, int height) {\r\n float s = coords.s * float(width);\r\n float t = coords.t * float(height);\r\n int offset = int(t) * width + int(s);\r\n return offset;\r\n }\r\n `)\r\n };\r\n }\r\n\r\n /**\r\n * Generates code for output sampler.\r\n */\r\n\r\n protected getOutputSamplingSnippet(): {[name: string]: GlslLibRoutine} {\r\n const outputLayout = this.context.outputTextureLayout;\r\n if (outputLayout.isPacked) {\r\n return this.getPackedOutputSamplingSnippet(outputLayout);\r\n } else {\r\n return this.getUnpackedOutputSamplingSnippet(outputLayout);\r\n }\r\n }\r\n\r\n /**\r\n * Generates code for packed output sampler.\r\n */\r\n protected getPackedOutputSamplingSnippet(outputLayout: TextureLayout): {[name: string]: GlslLibRoutine} {\r\n const outShape = outputLayout.unpackedShape;\r\n const outTexShape = [outputLayout.width, outputLayout.height];\r\n const result: {[name: string]: GlslLibRoutine} = {};\r\n const funcName = 'getOutputCoords';\r\n switch (outShape.length) {\r\n case 0:\r\n result[funcName] = this.getOutputScalarCoords();\r\n break;\r\n case 1:\r\n result[funcName] = this.getOutputPacked1DCoords(outShape as [number], outTexShape as [number, number]);\r\n break;\r\n case 2:\r\n result[funcName] = this.getOutputPacked2DCoords(outShape as [number, number], outTexShape as [number, number]);\r\n break;\r\n case 3:\r\n result[funcName] =\r\n this.getOutputPacked3DCoords(outShape as [number, number, number], outTexShape as [number, number]);\r\n break;\r\n default:\r\n result[funcName] = this.getOutputPackedNDCoords(outShape, outTexShape as [number, number]);\r\n }\r\n const glsl = getGlsl(this.context.glContext.version);\r\n // TODO we need this to properly return a packed vec4 from kernels.\r\n // Replace all '{glsl.output} = result' with 'setOutput(result)' in all

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kernels.\r\n    const floatTextureSetRGBASource = `\r\n      void setOutput(vec4 val) {\r\n        ${glsl.output} =
val;\r\n      }\r\n    `;\r\n    const floatTextureSetRGBAFuncName = 'floatTextureSetRGBA';\r\n
result[floatTextureSetRGBAFuncName] = new GlslLibRoutine(floatTextureSetRGBASource);\r\n    return
result;\r\n  }\r\n\r\n  /**\r\n   * Generates code for unpacked output sampler.\r\n   */\r\n  protected
getUnpackedOutputSamplingSnippet(outputLayout: TextureLayout): {[name: string]: GlslLibRoutine} {\r\n    const
outShape = outputLayout.unpackedShape;\r\n    const outTexShape = [outputLayout.width,
outputLayout.height];\r\n    const result: {[name: string]: GlslLibRoutine} = {};\r\n    const funcName =
'getOutputCoords';\r\n    switch (outShape.length) {\r\n      case 0:\r\n        result[funcName] =
this.getOutputScalarCoords();\r\n        break;\r\n      case 1:\r\n        result[funcName] =
this.getOutputUnpacked1DCoords(outShape as [number], outTexShape as [number, number]);\r\n        break;\r\n
case 2:\r\n        result[funcName] =\r\n            this.getOutputUnpacked2DCoords(outShape as [number, number],
outTexShape as [number, number]);\r\n        break;\r\n      case 3:\r\n        result[funcName] =\r\n
this.getOutputUnpacked3DCoords(outShape as [number, number, number], outTexShape as [number, number]);\r\n
     break;\r\n      case 4:\r\n        result[funcName] = this.getOutputUnpacked4DCoords(\r\n            outShape as
[number, number, number, number], outTexShape as [number, number]);\r\n        break;\r\n      case 5:\r\n
result[funcName] = this.getOutputUnpacked5DCoords(\r\n            outShape as [number, number, number, number,
number], outTexShape as [number, number]);\r\n        break;\r\n      case 6:\r\n        result[funcName] =
this.getOutputUnpacked6DCoords(\r\n            outShape as [number, number, number, number, number, number],
outTexShape as [number, number]);\r\n        break;\r\n      default:\r\n        throw new Error(`Unsupported output
dimensionality: ${outShape.length}`);\r\n    }\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n    //
TODO we need this to properly return a packed vec4 from kernels.\r\n    // Replace all '{glsl.output} = result' with
'setOutput(result)' in all kernels.\r\n    const floatTextureSetRSource = `\r\n        void setOutput(float val) {\r\n
${glsl.output} = vec4(val, 0, 0, 0);\r\n        }\r\n    `;\r\n    const floatTextureSetRFuncName = 'floatTextureSetR';\r\n
  result[floatTextureSetRFuncName] = new GlslLibRoutine(floatTextureSetRSource);\r\n    return result;\r\n
}\r\n\r\n  /**\r\n   * Scalar output coordinates.\r\n   */\r\n  protected getOutputScalarCoords(): GlslLibRoutine {\r\n
return new GlslLibRoutine(`\r\n      int getOutputCoords() {\r\n        return 0;\r\n      }\r\n    `);\r\n  }\r\n\r\n  /**\r\n
* 1D packed output coordinates.\r\n   */\r\n  protected getOutputPacked1DCoords(shape: [number], texShape:
[number, number]): GlslLibRoutine {\r\n    const packedTexShape = texShape;\r\n    let source = '';\r\n    if
(packedTexShape[0] === 1) {\r\n      source = `\r\n          int getOutputCoords() {\r\n            return 2 *
int(TexCoords.y * ${packedTexShape[1]}.0);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source);\r\n
}\r\n\r\n    if (packedTexShape[1] === 1) {\r\n      source = `\r\n          int getOutputCoords() {\r\n            return 2 *
int(TexCoords.x * ${packedTexShape[0]}.0);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source);\r\n
}\r\n\r\n    source = `\r\n        int getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
              vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n          return 2 * (resTexRC.y *
${packedTexShape[0]} + resTexRC.x);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n
/**\r\n   * 2D packed output coordinates.\r\n   */\r\n  protected getOutputPacked2DCoords(shape: [number,
number], texShape: [number, number]): GlslLibRoutine {\r\n    let source = '';\r\n    if (ArrayUtil.arraysEqual(shape,
texShape)) {\r\n      source = `\r\n        ivec2 getOutputCoords() {\r\n          return 2 * ivec2(TexCoords.xy *
vec2(${texShape[0]}, ${texShape[1]}));\r\n        }\r\n      `;\r\n      return new GlslLibRoutine(source);\r\n    }\r\n\r\n
 const packedTexShape = texShape;\r\n    // texels needed to accommodate a logical row\r\n    const
texelsInLogicalRow = Math.ceil(shape[1] / 2);\r\n\r\n    /**\r\n     * getOutputCoords\r\n     *\r\n     * resTexRC: The
rows and columns of the texels. If you move over one\r\n     * texel to the right in the packed texture, you are
moving over one column\r\n     * (not two).\r\n     *\r\n     * index: The texel index\r\n     */\r\n    source = `\r\n
ivec2 getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n\r\n          int index = resTexRC.y *
${packedTexShape[0]} + resTexRC.x;\r\n\r\n          // reverse r and c order for packed texture\r\n          int r =
imod(index, ${texelsInLogicalRow}) * 2;\r\n          int c = 2 * (index / ${texelsInLogicalRow});\r\n\r\n          return
ivec2(r, c);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * 3D packed output
```

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coordinates.\r\n   */\r\n  protected getOutputPacked3DCoords(shape: [number, number, number], texShape:
[number, number]): GlslLibRoutine {\r\n    const packedTexShape = [texShape[0], texShape[1]];\r\n    const
texelsInLogicalRow = Math.ceil(shape[2] / 2);\r\n    const texelsInBatch = texelsInLogicalRow * Math.ceil(shape[1]
/ 2);\r\n    const source = `\r\n        ivec3 getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                              vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n          int index = resTexRC.y *
${packedTexShape[0]} + resTexRC.x;\r\n\r\n          int b = index / ${texelsInBatch};\r\n          index -= b *
${texelsInBatch};\r\n\r\n          // reverse r and c order for packed texture\r\n          int r = imod(index,
${texelsInLogicalRow}) * 2;\r\n          int c = 2 * (index / ${texelsInLogicalRow});\r\n\r\n          return ivec3(b, r,
c);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * ND packed output
coordinates.\r\n   */\r\n  protected getOutputPackedNDCoords(shape: readonly number[], texShape: [number,
number]): GlslLibRoutine {\r\n    const packedTexShape = [texShape[0], texShape[1]];\r\n\r\n    const
texelsInLogicalRow = Math.ceil(shape[shape.length - 1] / 2);\r\n    const texelsInBatch = texelsInLogicalRow *
Math.ceil(shape[shape.length - 2] / 2);\r\n    let texelsInBatchN = texelsInBatch;\r\n    let batches = '';\r\n    let coords
= 'b, r, c';\r\n\r\n    for (let b = 2; b < shape.length - 1; b++) {\r\n      texelsInBatchN *= shape[shape.length - b -
1];\r\n      batches = `\r\n      int b${b} = index / ${texelsInBatchN};\r\n      index -= b${b} * ${texelsInBatchN};\r\n
  ` + batches;\r\n      coords = `b${b}, ` + coords;\r\n    }\r\n    const source = `\r\n      ivec${shape.length}
getOutputCoords() {\r\n        ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n        int index = resTexRC.y * ${packedTexShape[0]} +
resTexRC.x;\r\n\r\n        ${batches}\r\n\r\n        int b = index / ${texelsInBatch};\r\n        index -= b *
${texelsInBatch};\r\n\r\n        // reverse r and c order for packed texture\r\n        int r = imod(index,
${texelsInLogicalRow}) * 2;\r\n        int c = 2 * (index / ${texelsInLogicalRow});\r\n\r\n        return
ivec${shape.length}(${coords});\r\n      }\r\n    `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   *
Unpacked 1D output coordinates.\r\n   */\r\n  protected getOutputUnpacked1DCoords(shape: [number], texShape:
[number, number]): GlslLibRoutine {\r\n    const source = `\r\n        int getOutputCoords() {\r\n          ivec2
resTexRC = ivec2(TexCoords.xy *\r\n                              vec2(${texShape[0]}, ${texShape[1]}));\r\n          return
resTexRC.y * ${texShape[0]} + resTexRC.x;\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n
}\r\n\r\n  /**\r\n   * Unpacked 2D output coordinates.\r\n   */\r\n  protected getOutputUnpacked2DCoords(shape:
[number, number], texShape: [number, number]): GlslLibRoutine {\r\n    const source = `\r\n        ivec2
getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
vec2(${texShape[0]}, ${texShape[1]}));\r\n          int index = resTexRC.y * ${texShape[0]} + resTexRC.x;\r\n
int r = index / ${shape[1]};\r\n          int c = index - r * ${shape[1]};\r\n          return ivec2(r, c);\r\n        }\r\n
`;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 3D output coordinates.\r\n   */\r\n
protected getOutputUnpacked3DCoords(shape: [number, number, number], texShape: [number, number]):
GlslLibRoutine {\r\n    let source = '';\r\n    const rank = shape.length;\r\n\r\n    let strides = null;\r\n    if (rank < 2)
{\r\n      strides = [];\r\n    }\r\n\r\n    strides = new Array(rank - 1);\r\n    strides[rank - 2] = shape[rank - 1];\r\n    for
(let i = rank - 3; i >= 0; --i) {\r\n      strides[i] = strides[i + 1] * shape[i + 1];\r\n    }\r\n    const coordsToCompute =
['r', 'c', 'd'];\r\n    const coordsFromIndexSnippet =\r\n        strides\r\n            .map((stride, i) => {\r\n              const
line1 = `int ${coordsToCompute[i]} = index / ${stride}`;\r\n              const line2 = i === strides.length - 1 ?\r\n
      `int ${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} * ${stride}` :\r\n                  `index -=
${coordsToCompute[i]} * ${stride}`;\r\n              return `${line1}; ${line2};`;\r\n            })\r\n
.join('');\r\n\r\n    source = `\r\n        ivec3 getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                              vec2(${texShape[0]}, ${texShape[1]}));\r\n          int index = resTexRC.y * ${texShape[0]} +
resTexRC.x;\r\n          ${coordsFromIndexSnippet}\r\n          return ivec3(r, c, d);\r\n        }\r\n      `;\r\n    return new
GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 4D output coordinates.\r\n   */\r\n  protected
getOutputUnpacked4DCoords(shape: [number, number, number, number], texShape: [number, number]):\r\n
GlslLibRoutine {\r\n    let source = '';\r\n    const rank = shape.length;\r\n\r\n    let strides = null;\r\n    if (rank < 2)
{\r\n      strides = [];\r\n    }\r\n\r\n    strides = new Array(rank - 1);\r\n    strides[rank - 2] = shape[rank - 1];\r\n    for
(let i = rank - 3; i >= 0; --i) {\r\n      strides[i] = strides[i + 1] * shape[i + 1];\r\n    }\r\n    const coordsToCompute =
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['r', 'c', 'd', 'd2'];\r\n    const coordsFromIndexSnippet =\r\n        strides\r\n            .map((stride, i) => {\r\n
const line1 = `int ${coordsToCompute[i]} = index / ${stride}`;\r\n              const line2 = i === strides.length - 1
?\r\n                  `int ${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} * ${stride}` :\r\n
`index -= ${coordsToCompute[i]} * ${stride}`;\r\n              return `${line1}; ${line2};`;\r\n            })\r\n
.join('');\r\n\r\n    source = `\r\n      ivec4 getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                          vec2(${texShape[0]}, ${texShape[1]}));\r\n          int index = resTexRC.y * ${texShape[0]} +
resTexRC.x;\r\n          ${coordsFromIndexSnippet}\r\n          return ivec4(r, c, d, d2);\r\n        }\r\n      `;\r\n    return
new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 5D output coordinates.\r\n   */\r\n  protected
getOutputUnpacked5DCoords(shape: [number, number, number, number, number], texShape: [number,
number]):\r\n      GlslLibRoutine {\r\n    let source = '';\r\n    const rank = shape.length;\r\n\r\n    let strides = null;\r\n
  if (rank < 2) {\r\n      strides = [];\r\n    }\r\n\r\n    strides = new Array(rank - 1);\r\n    strides[rank - 2] = shape[rank
- 1];\r\n    for (let i = rank - 3; i >= 0; --i) {\r\n      strides[i] = strides[i + 1] * shape[i + 1];\r\n    }\r\n    const
coordsToCompute = ['r', 'c', 'd', 'd2', 'd3'];\r\n    const coordsFromIndexSnippet =\r\n        strides\r\n
.map((stride, i) => {\r\n              const line1 = `int ${coordsToCompute[i]} = index / ${stride}`;\r\n              const
line2 = i === strides.length - 1 ?\r\n                  `int ${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} *
${stride}` :\r\n                  `index -= ${coordsToCompute[i]} * ${stride}`;\r\n              return `${line1};
${line2};`;\r\n            })\r\n            .join('');\r\n\r\n    source = `\r\n      ivec5 getOutputCoords() {\r\n          ivec2
resTexRC = ivec2(TexCoords.xy *\r\n                              vec2(${texShape[0]}, ${texShape[1]}));\r\n          int
index = resTexRC.y * ${texShape[0]} + resTexRC.x;\r\n          ${coordsFromIndexSnippet}\r\n          return ivec5(r,
c, d, d2, d3);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 6D
output coordinates.\r\n   */\r\n  protected getOutputUnpacked6DCoords(shape: [number, number, number, number,
number, number], texShape: [\r\n    number, number\r\n  ]): GlslLibRoutine {\r\n    let source = '';\r\n    const rank =
shape.length;\r\n\r\n    let strides = null;\r\n    if (rank < 2) {\r\n      strides = [];\r\n    }\r\n\r\n    strides = new
Array(rank - 1);\r\n    strides[rank - 2] = shape[rank - 1];\r\n    for (let i = rank - 3; i >= 0; --i) {\r\n      strides[i] =
strides[i + 1] * shape[i + 1];\r\n    }\r\n    const coordsToCompute = ['r', 'c', 'd', 'd2', 'd3', 'd4'];\r\n    const
coordsFromIndexSnippet =\r\n        strides\r\n            .map((stride, i) => {\r\n              const line1 = `int
${coordsToCompute[i]} = index / ${stride}`;\r\n              const line2 = i === strides.length - 1 ?\r\n                  `int
${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} * ${stride}` :\r\n                  `index -=
${coordsToCompute[i]} * ${stride}`;\r\n              return `${line1}; ${line2};`;\r\n            })\r\n
.join('');\r\n\r\n    source = `\r\n     ivec6 getOutputCoords() {\r\n         ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                        vec2(${texShape[0]}, ${texShape[1]}));\r\n         int index = resTexRC.y * ${texShape[0]} +
resTexRC.x;\r\n         ${coordsFromIndexSnippet}\r\n         return ivec6(r, c, d, d2, d3, d4);\r\n       }\r\n     `;\r\n
return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Generates code for common UV coords computation
utility functions.\r\n   */\r\n  protected getCommonUtilFuncs(): {[name: string]: GlslLibRoutine} {\r\n    const
result: {[name: string]: GlslLibRoutine} = {};\r\n    let funcName = 'uvFromFlat';\r\n    result[funcName] = new
GlslLibRoutine(`\r\n    vec2 uvFromFlat(int texNumR, int texNumC, int index) {\r\n      int texC = index /
texNumR;\r\n      int texR = index - texC * texNumR;\r\n      // TODO: swap texR, texC order in following function
so row is corresponding to u and column is corresponding to\r\n      //       v.\r\n      return (vec2(texR, texC) +
halfCR) / vec2(texNumR, texNumC);\r\n    }\r\n    `);\r\n    funcName = 'packedUVfrom1D';\r\n    result[funcName]
= new GlslLibRoutine(`\r\n      vec2 packedUVfrom1D(int texNumR, int texNumC, int index) {\r\n        int
texelIndex = index / 2;\r\n        int texR = texelIndex / texNumC;\r\n        int texC = texelIndex - texR *
texNumC;\r\n        return (vec2(texC, texR) + halfCR) / vec2(texNumC, texNumR);\r\n      }\r\n      `);\r\n
funcName = 'packedUVfrom2D';\r\n    result[funcName] = new GlslLibRoutine(`\r\n      vec2 packedUVfrom2D(int
texNumR, int texNumC, int texelsInLogicalRow, int row, int col) {\r\n        int texelIndex = (row / 2) *
texelsInLogicalRow + (col / 2);\r\n        int texR = texelIndex / texNumC;\r\n        int texC = texelIndex - texR *
texNumC;\r\n        return (vec2(texC, texR) + halfCR) / vec2(texNumC, texNumR);\r\n      }\r\n      `);\r\n
funcName = 'packedUVfrom3D';\r\n    result[funcName] = new GlslLibRoutine(`\r\n      vec2 packedUVfrom3D(int
texNumR, int texNumC,\r\n          int texelsInBatch, int texelsInLogicalRow, int b,\r\n          int row, int col) {\r\n
```

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int index = b * texelsInBatch + (row / 2) * texelsInLogicalRow + (col / 2);\r\n        int texR = index / texNumC;\r\n
   int texC = index - texR * texNumC;\r\n        return (vec2(texC, texR) + halfCR) / vec2(texNumC, texNumR);\r\n
 }\r\n      `);\r\n    funcName = 'sampleTexture';\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n
result[funcName] = new GlslLibRoutine(`\r\n        float sampleTexture(sampler2D textureSampler, vec2 uv) {\r\n
     return ${glsl.texture2D}(textureSampler, uv).r;\r\n        }`);\r\n    return result;\r\n  }\r\n\r\n  /**\r\n   *
Constructing snippets for inputs\r\n   */\r\n  protected getInputsSamplingSnippets(): {[name: string]:
GlslLibRoutine} {\r\n    const result: {[name: string]: GlslLibRoutine} = {};\r\n    const outputLayout =
this.context.outputTextureLayout;\r\n    this.context.programInfo.inputNames.forEach((samplerName, i) => {\r\n
const inputLayout = this.context.inputTextureLayouts[i];\r\n      const funcName =
generateShaderFuncNameFromInputSamplerName(samplerName);\r\n      if (inputLayout.isPacked) {\r\n
result[funcName] = this.getPackedSamplerFromInput(funcName, samplerName, inputLayout);\r\n      } else {\r\n
 result[funcName] = this.getUnpackedSamplerFromInput(funcName, samplerName, inputLayout);\r\n      }\r\n\r\n
const outCoordFuncName = generateShaderFuncNameFromInputSamplerNameAtOutCoords(samplerName);\r\n
if (inputLayout.unpackedShape.length <= outputLayout.unpackedShape.length) {\r\n        if (inputLayout.isPacked)
{\r\n          result[outCoordFuncName] =\r\n              this.getPackedSamplerAtOutputCoords(outCoordFuncName,
inputLayout, outputLayout, samplerName);\r\n        } else {\r\n          result[outCoordFuncName] =\r\n
this.getUnpackedSamplerAtOutputCoords(outCoordFuncName, inputLayout, outputLayout, samplerName);\r\n
}\r\n      }\r\n    });\r\n\r\n    return result;\r\n  }\r\n\r\n  /**\r\n   * Constructing snippets for output coordinates of
samplers\r\n   */\r\n  protected getPackedSamplerAtOutputCoords(\r\n      funcName: string, inputLayout:
TextureLayout, outputLayout: TextureLayout, name: string): GlslLibRoutine {\r\n    const inShape =
inputLayout.unpackedShape;\r\n    const outShape = outputLayout.unpackedShape;\r\n    const texName = name;\r\n
  const texFuncSnippet = generateShaderFuncNameFromInputSamplerName(texName);\r\n\r\n    const inRank =
inShape.length;\r\n    const outRank = outShape.length;\r\n\r\n    const broadcastDims =
BroadcastUtil.getBroadcastDims(inShape, outShape);\r\n\r\n    const type = getCoordsDataType(outRank);\r\n
const rankDiff = outRank - inRank;\r\n    let coordsSnippet: string;\r\n    const fields = getGlChannels();\r\n\r\n    if
(inRank === 0) {\r\n      coordsSnippet = '';\r\n    } else if (outRank < 2 && broadcastDims.length >= 1) {\r\n
coordsSnippet = 'coords = 0;';\r\n    } else {\r\n      coordsSnippet = broadcastDims.map(d => `coords.${fields[d +
rankDiff]} = 0;`).join('\\n');\r\n    }\r\n    let unpackedCoordsSnippet = '';\r\n    if (outRank < 2 && inRank > 0) {\r\n
   unpackedCoordsSnippet = 'coords';\r\n    } else {\r\n      unpackedCoordsSnippet = inShape.map((s, i) =>
`coords.${fields[i + rankDiff]}`).join(', ');\r\n    }\r\n\r\n    let output = 'return outputValue;';\r\n    const inSize =
ShapeUtil.size(inShape);\r\n    const isInputScalar = inSize === 1;\r\n    const outSize =
ShapeUtil.size(outShape);\r\n    const isOutputScalar = outSize === 1;\r\n\r\n    if (inRank === 1 && !isInputScalar
&& !isOutputScalar) {\r\n      output = `\r\n        return vec4(outputValue.xy, outputValue.xy);\r\n      `;\r\n    } else if
(isInputScalar && !isOutputScalar) {\r\n      if (outRank === 1) {\r\n        output = `\r\n          return
vec4(outputValue.x, outputValue.x, 0., 0.);\r\n        `;\r\n      } else {\r\n        output = `\r\n          return
vec4(outputValue.x);\r\n        `;\r\n      }\r\n    } else if (broadcastDims.length) {\r\n      const rows = inRank - 2;\r\n
 const cols = inRank - 1;\r\n\r\n      if (broadcastDims.indexOf(rows) > -1 && broadcastDims.indexOf(cols) > -1)
{\r\n        output = 'return vec4(outputValue.x);';\r\n      } else if (broadcastDims.indexOf(rows) > -1) {\r\n
output = 'return vec4(outputValue.x, outputValue.y, ' +\r\n            'outputValue.x, outputValue.y);';\r\n      } else if
(broadcastDims.indexOf(cols) > -1) {\r\n        output = 'return vec4(outputValue.xx, outputValue.zz);';\r\n      }\r\n
}\r\n\r\n    const swapLastDimsSnippet = `\r\n        int lastDim = coords.${fields[outRank - 1]};\r\n
coords.${fields[outRank - 1]} = coords.${fields[outRank - 2]};\r\n        coords.${fields[outRank - 2]} = lastDim;\r\n
    `;\r\n    const source = `\r\n      vec4 ${funcName}() {\r\n        ${type} coords = getOutputCoords();\r\n
${swapLastDimsSnippet}\r\n        ${coordsSnippet}\r\n        vec4 outputValue =
${texFuncSnippet}(${unpackedCoordsSnippet});\r\n        ${output}\r\n      }\r\n    `;\r\n    return new
GlslLibRoutine(source, ['coordinates.getOutputCoords']);\r\n  }\r\n\r\n  /**\r\n   * Constructing snippets for
unpacked output coordinates of samplers\r\n   */\r\n  protected getUnpackedSamplerAtOutputCoords(\r\n
funcName: string, inputLayout: TextureLayout, outputLayout: TextureLayout, name: string): GlslLibRoutine {\r\n
```

const outTexShape = [outputLayout.width, outputLayout.height];\r\n const inTexShape = [inputLayout.width, inputLayout.height];\r\n const inRank = inputLayout.unpackedShape.length;\r\n const outRank = outputLayout.unpackedShape.length;\r\n const inShape = inputLayout.unpackedShape;\r\n const outShape = outputLayout.unpackedShape;\r\n const texFuncSnippet = generateShaderFuncNameFromInputSamplerName(name);\r\n\r\n if (inRank === outRank && ArrayUtil.arraysEqual(inTexShape, outTexShape)) {\r\n const source = `\r\n float ${funcName}() {\r\n return sampleTexture(${name}, TexCoords);\r\n }\r\n `;\r\n return new GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n }\r\n\r\n const type = getCoordsDataType(outRank);\r\n const broadcastDims = BroadcastUtil.getBroadcastDims(inShape, outShape);\r\n const rankDiff = outRank - inRank;\r\n let coordsSnippet: string;\r\n const fields = getGlChannels();\r\n\r\n if (inRank === 0) {\r\n coordsSnippet = '';\r\n } else if (outRank < 2 && broadcastDims.length >= 1) {\r\n coordsSnippet = 'coords = 0;';\r\n } else {\r\n coordsSnippet = broadcastDims.map(d => `coords.${fields[d + rankDiff]} = 0;`).join('\\n');\r\n }\r\n let unpackedCoordsSnippet = '';\r\n if (outRank < 2 && inRank > 0) {\r\n unpackedCoordsSnippet = 'coords';\r\n } else {\r\n unpackedCoordsSnippet = inputLayout.unpackedShape.map((s, i) => `coords.${fields[i + rankDiff]}`).join(', ');\r\n }\r\n const source = `\r\n float ${funcName}() {\r\n ${type} coords = getOutputCoords();\r\n ${coordsSnippet}\r\n return ${texFuncSnippet}(${unpackedCoordsSnippet});\r\n }\r\n `;\r\n return new GlslLibRoutine(source, ['coordinates.getOutputCoords']);\r\n }\r\n\r\n /**\r\n * Constructing snippets for packed operations.\r\n */\r\n protected getPackedSamplerFromInput(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n switch (inputLayout.unpackedShape.length) {\r\n case 0:\r\n return this.getPackedSamplerScalar(funcName, name);\r\n case 1:\r\n return this.getPackedSampler1D(funcName, name, inputLayout);\r\n case 2:\r\n return this.getPackedSampler2D(funcName, name, inputLayout);\r\n case 3:\r\n return this.getPackedSampler3D(funcName, name, inputLayout);\r\n default:\r\n return this.getPackedSamplerND(funcName, name, inputLayout);\r\n }\r\n }\r\n\r\n /**\r\n * Constructing snippets for unpacked operations.\r\n */\r\n protected getUnpackedSamplerFromInput(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n const shape = inputLayout.unpackedShape;\r\n switch (shape.length) {\r\n case 0:\r\n return this.getUnpackedSamplerScalar(funcName, name, inputLayout);\r\n case 1:\r\n return this.getUnpackedSampler1D(funcName, name, inputLayout);\r\n case 2:\r\n return this.getUnpackedSampler2D(funcName, name, inputLayout);\r\n case 3:\r\n return this.getUnpackedSampler3D(funcName, name, inputLayout);\r\n case 4:\r\n return this.getUnpackedSampler4D(funcName, name, inputLayout);\r\n case 5:\r\n return this.getUnpackedSampler5D(funcName, name, inputLayout);\r\n case 6:\r\n return this.getUnpackedSampler6D(funcName, name, inputLayout);\r\n default:\r\n // TODO support more dimensionalities\r\n throw new Error(`Unsupported dimension ${shape.length}-D`);\r\n }\r\n }\r\n\r\n /**\r\n * Packed scalar snippet.\r\n */\r\n protected getPackedSamplerScalar(funcName: string, name: string): GlslLibRoutine {\r\n const glsl = getGlsl(this.context.glContext.version);\r\n const source = `\r\n vec4 ${funcName}() {\r\n return ${glsl.texture2D}(${name}, halfCR);\r\n }\r\n `;\r\n return new GlslLibRoutine(source);\r\n }\r\n\r\n /**\r\n * Packed 1D snippet.\r\n */\r\n protected getPackedSampler1D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n const texShape = [inputLayout.width, inputLayout.height];\r\n const packedTexShape = [texShape[1], texShape[0]];\r\n const glsl = getGlsl(this.context.glContext.version);\r\n\r\n const packedSampler = `vec4 ${funcName}(int index) {\r\n vec2 uv = packedUVfrom1D(\r\n ${packedTexShape[0]}, ${packedTexShape[1]}, index);\r\n return ${glsl.texture2D}(${name}, uv);\r\n }`;\r\n const source = packedSampler;\r\n return new GlslLibRoutine(source, ['coordinates.packedUVfrom1D']);\r\n }\r\n\r\n /**\r\n * Packed 2D snippet.\r\n */\r\n protected getPackedSampler2D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n const shape = inputLayout.unpackedShape;\r\n const texShape = [inputLayout.width, inputLayout.height];\r\n const glsl = getGlsl(this.context.glContext.version);\r\n const texNumR = texShape[0];\r\n const texNumC = texShape[1];\r\n\r\n if (texShape != null && ArrayUtil.arraysEqual(shape, texShape)) {\r\n const

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packedSampler = `vec4 ${funcName}(int row, int col) {\r\n        vec2 uv = (vec2(col, row) + halfCR) /
vec2(${texNumC}.0, ${texNumR}.0);\r\n        return ${glsl.texture2D}(${name}, uv);\r\n      }`;\r\n\r\n      return
new GlslLibRoutine(packedSampler);\r\n    }\r\n    const packedTexShape = texShape;\r\n    const valuesPerRow =
Math.ceil(shape[1] / 2);\r\n    const packedSampler = `vec4 ${funcName}(int row, int col) {\r\n      vec2 uv =
packedUVfrom2D(${packedTexShape[1]}, ${packedTexShape[0]}, ${valuesPerRow}, row, col);\r\n      return
${glsl.texture2D}(${name}, uv);\r\n    }`;\r\n    const source = packedSampler;\r\n    return new
GlslLibRoutine(source, ['coordinates.packedUVfrom2D']);\r\n  }\r\n\r\n  /**\r\n   * Packed 3D snippet.\r\n   */\r\n
protected getPackedSampler3D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n
 const shape = inputLayout.unpackedShape;\r\n    const texShape = [inputLayout.width, inputLayout.height];\r\n
const packedTexShape = [texShape[0], texShape[1]];\r\n    const glsl =
getGlsl(this.context.glContext.version);\r\n\r\n    if (shape[0] === 1) {\r\n      const squeezedShape =
shape.slice(1);\r\n      const keptDims = [1, 2];\r\n      const newInputShape = squeezeInputShape(shape,
squeezedShape);\r\n      const params = ['b', 'row', 'col'];\r\n      // Deep copy of input texture layout.\r\n      const
newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
newInputLayout.unpackedShape = newInputShape;\r\n      const samplerRoutine =
this.getPackedSamplerFromInput(funcName, name, newInputLayout);\r\n      const packedSampler =
`${samplerRoutine.routineBody}\r\n      vec4 ${funcName}(int b, int row, int col) {\r\n        return
${funcName}(${getSqueezedParams(params, keptDims)});\r\n      } `;\r\n      const source = packedSampler;\r\n
return new GlslLibRoutine(source, samplerRoutine.dependencies);\r\n    }\r\n    const texNumR =
packedTexShape[0];\r\n    const texNumC = packedTexShape[1];\r\n\r\n    const valuesPerRow =
Math.ceil(shape[2] / 2);\r\n    const texelsInBatch = valuesPerRow * Math.ceil(shape[1] / 2);\r\n\r\n    const
packedSampler = `vec4 ${funcName}(int b, int row, int col) {\r\n      vec2 uv = packedUVfrom3D(\r\n
${texNumC}, ${texNumR}, ${texelsInBatch}, ${valuesPerRow}, b, row, col);\r\n      return
${glsl.texture2D}(${name}, uv);}`;\r\n    const source = packedSampler;\r\n    return new GlslLibRoutine(source,
['coordinates.packedUVfrom3D']);\r\n  }\r\n  /*\r\n   * Packed ND snippet.\r\n   */\r\n  protected
getPackedSamplerND(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    const
shape = inputLayout.unpackedShape;\r\n    const rank = shape.length;\r\n    const texShape = [inputLayout.width,
inputLayout.height];\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n\r\n    const packedTexShape =
[texShape[0], texShape[1]];\r\n    const texNumR = packedTexShape[1];\r\n    const texNumC =
packedTexShape[0];\r\n    const valuesPerRow = Math.ceil(shape[rank - 1] / 2);\r\n    let texelsInBatch =
valuesPerRow * Math.ceil(shape[rank - 2] / 2);\r\n    let params = 'int b, int row, int col';\r\n    let index = `b *
${texelsInBatch} + (row / 2) * ${valuesPerRow} + (col / 2)`;\r\n    for (let b = 2; b < rank - 1; b++) {\r\n      params
= `int b${b}, ` + params;\r\n      texelsInBatch *= shape[rank - b - 1];\r\n      index = `b${b} * ${texelsInBatch} + ` +
index;\r\n    }\r\n    const packedSampler = `vec4 ${funcName}(${params}) {\r\n      int index = ${index};\r\n      int
texR = index / ${texNumC};\r\n      int texC = index - texR * ${texNumC};\r\n      vec2 uv = (vec2(texC, texR) +
halfCR) / vec2(${texNumC}, ${texNumR});\r\n      return ${glsl.texture2D}(${name}, uv);\r\n    }`;\r\n    const
source = packedSampler;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked scalar
snippet.\r\n   */\r\n  protected getUnpackedSamplerScalar(funcName: string, name: string, inputLayout:
TextureLayout): GlslLibRoutine {\r\n    const [texNumR, texNumC] = [inputLayout.width, inputLayout.height];\r\n
 if (texNumR === 1 && texNumC === 1) {\r\n      const source = `\r\n          float ${funcName}() {\r\n            return
sampleTexture(${name}, halfCR);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source,
['coordinates.sampleTexture']);\r\n    }\r\n\r\n    const source = `\r\n        float ${funcName}() {\r\n          int
offset_${name} = coordsToOffset(TexCoords, ${texNumR}, ${texNumC});\r\n          vec2 uv =
uvFromFlat(${texNumR}, ${texNumC}, offset_${name});\r\n          return sampleTexture(${name}, uv);\r\n
}\r\n      `;\r\n    return new GlslLibRoutine(\r\n        source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture',
'coordinates.coordsToOffset']);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 1D snippet.\r\n   */\r\n  protected
getUnpackedSampler1D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    const
tNumR = inputLayout.width;\r\n    const tNumC = inputLayout.height;\r\n\r\n    if (tNumC === 1 && tNumR ===
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1) {\r\n      const source = `\r\n        float ${funcName}(int index) {\r\n          return sampleTexture(${name},
halfCR);\r\n        }\r\n      `;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n\r\n
if (tNumC === 1) {\r\n      const source = `\r\n          float ${funcName}(int index) {\r\n            vec2 uv =
vec2((float(index) + 0.5) / ${tNumR}.0, 0.5);\r\n            return sampleTexture(${name}, uv);\r\n          }\r\n
`;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n    if (tNumR === 1) {\r\n
const source = `\r\n          float ${funcName}(int index) {\r\n            vec2 uv = vec2(0.5, (float(index) + 0.5) /
${tNumC}.0);\r\n            return sampleTexture(${name}, uv);\r\n          }\r\n        `;\r\n      return new
GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n    const source = `\r\n        float ${funcName}(int
index) {\r\n          vec2 uv = uvFromFlat(${tNumR}, ${tNumC}, index);\r\n          return sampleTexture(${name},
uv);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source, ['coordinates.uvFromFlat',
'coordinates.sampleTexture']);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 2D snippet.\r\n   */\r\n\r\n  protected
getUnpackedSampler2D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    const
shape = inputLayout.unpackedShape;\r\n\r\n    // TODO: modify row/col order for other dimensions.\r\n    const
texShape = [inputLayout.height, inputLayout.width];\r\n\r\n    if (texShape != null && ArrayUtil.arraysEqual(shape,
texShape)) {\r\n      const texNumR = texShape[1];\r\n      const texNumC = texShape[0];\r\n      const source = `\r\n
       float ${funcName}(int row, int col) {\r\n            vec2 uv = (vec2(row, col) + halfCR) / vec2(${texNumR}.0,
${texNumC}.0);\r\n            return sampleTexture(${name}, uv);\r\n          }\r\n        `;\r\n      return new
GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n\r\n    const {newShape, keptDims} =
squeezeShape(shape as number[]);\r\n    const squeezedShape = newShape;\r\n    if (squeezedShape.length <
shape.length) {\r\n      const newInputShape = squeezeInputShape(shape, squeezedShape);\r\n      // Deep copy of
input texture layout.\r\n      const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
  newInputLayout.unpackedShape = newInputShape;\r\n\r\n      const params = ['col', 'row'];\r\n      const source =
`\r\n          ${this.getUnpackedSamplerFromInput(funcName, name, newInputLayout).routineBody}\r\n          float
${funcName}(int row, int col) {\r\n            return ${funcName}(${getSqueezedParams(params, keptDims)});\r\n
  }\r\n        `;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n\r\n    const
texNumR = texShape[1];\r\n    const texNumC = texShape[0];\r\n    if (texNumC === 1) {\r\n      const source = `\r\n
        float ${funcName}(int row, int col) {\r\n            int offset_${name} = coordsToOffset(TexCoords,
${texNumR}, ${texNumC});\r\n            float index = dot(vec3(row, col, offset_${name}), vec3(${shape[1]}, 1,
1));\r\n            vec2 uv = vec2(0.5, (index + 0.5) / ${texNumR}.0);\r\n            return sampleTexture(${name},
uv);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture',
'coordinates.coordsToOffset']);\r\n    }\r\n\r\n    if (texNumR === 1) {\r\n      const source = `\r\n          float
${funcName}(int row, int col) {\r\n            int offset_${name} = coordsToOffset(TexCoords, ${texNumR},
${texNumC});\r\n            float index = dot(vec3(row, col, offset_${name}), vec3(${shape[1]}, 1, 1));\r\n
vec2 uv = vec2((index + 0.5) / ${texNumC}.0, 0.5);\r\n            return sampleTexture(${name}, uv);\r\n          }\r\n
  `;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n
}\r\n\r\n    const source = `\r\n        float ${funcName}(int row, int col) {\r\n          int index = col * ${shape[1]} +
row;\r\n          vec2 uv = uvFromFlat(${texNumR}, ${texNumC}, index);\r\n          return sampleTexture(${name},
uv);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(\r\n        source, ['coordinates.uvFromFlat',
'coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 3D snippet.\r\n
*/\r\n\r\n  protected getUnpackedSampler3D(funcName: string, name: string, inputLayout: TextureLayout):
GlslLibRoutine {\r\n    const shape = inputLayout.unpackedShape;\r\n    const stride0 = shape[1] * shape[2];\r\n
const stride1 = shape[2];\r\n\r\n    const {newShape, keptDims} = squeezeShape(shape as number[]);\r\n    const
squeezedShape = newShape;\r\n    if (squeezedShape.length < shape.length) {\r\n      const newInputShape =
squeezeInputShape(shape, squeezedShape);\r\n      const params = ['batch', 'col', 'row'];\r\n      // Deep copy of input
texture layout.\r\n      const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
newInputLayout.unpackedShape = newInputShape;\r\n      const routine =
this.getUnpackedSamplerFromInput(funcName, name, newInputLayout);\r\n      // TODO: revisit the logic here to
make it simpler\r\n      const revDims = keptDims.reverse();\r\n      const source = `\r\n
```

${routine.routineBody}\r\n float ${funcName}(int batch, int row, int col) {\r\n return ${funcName}(${getSqueezedParams(params, revDims)});\r\n }\r\n `;\r\n return new GlslLibRoutine(source, routine.dependencies);\r\n }\r\n\r\n const texNumR = inputLayout.width;\r\n const texNumC = inputLayout.height;\r\n const source = `\r\n float ${funcName}(int depth, int row, int col) {\r\n // Explicitly use integer operations as dot() only works on floats.\r\n int index = depth * ${stride0} + col * ${stride1} + row;\r\n vec2 uv = uvFromFlat(${texNumR}, ${texNumC}, index);\r\n return sampleTexture(${name}, uv);\r\n }\r\n `;\r\n return new GlslLibRoutine(\r\n source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n }\r\n\r\n /**\r\n * Unpacked 4D snippet.\r\n */\r\n\r\n protected getUnpackedSampler4D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n const shape = inputLayout.unpackedShape;\r\n const stride2 = shape[3];\r\n const stride1 = shape[2] * stride2;\r\n const stride0 = shape[1] * stride1;\r\n\r\n //\r\n // TODO: re-enable this shortcut once the index calculation bug is fixed.\r\n //\r\n // const {newShape, keptDims} = squeezeShape(shape as number[]);\r\n // if (newShape.length < shape.length) {\r\n // const newInputShape = squeezeInputShape(shape, newShape);\r\n // const params = ['row', 'col', 'depth', 'depth2'];\r\n // // Deep copy of input texture layout.\r\n // const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n // newInputLayout.unpackedShape = newInputShape;\r\n // const source = `\r\n // ${this.getUnpackedSamplerFromInput(funcName, name, newInputLayout).routineBody}\r\n // float ${funcName}(int row, int col, int depth, int depth2) {\r\n // return ${funcName}(${getSqueezedParams(params, keptDims)});\r\n // }\r\n // `;\r\n // return new GlslLibRoutine(\r\n // source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n // }\r\n\r\n const texNumR = inputLayout.width;\r\n const texNumC = inputLayout.height;\r\n const source = `\r\n float ${funcName}(int row, int col, int depth, int depth2) {\r\n int index = row * ${stride0} + col * ${stride1} +\r\n depth2 * ${stride2} + depth;\r\n vec2 uv = uvFromFlat(${texNumR}, ${texNumC}, index);\r\n return sampleTexture(${name}, uv);\r\n }\r\n `;\r\n return new GlslLibRoutine(source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture']);\r\n }\r\n\r\n /**\r\n * Unpacked 5D snippet.\r\n */\r\n protected getUnpackedSampler5D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n const shape = inputLayout.unpackedShape;\r\n const stride3 = shape[4];\r\n const stride2 = shape[3] * stride3;\r\n const stride1 = shape[2] * stride2;\r\n const stride0 = shape[1] * stride1;\r\n\r\n const {newShape, keptDims} = squeezeShape(shape as number[]);\r\n if (newShape.length < shape.length) {\r\n const newInputShape = squeezeInputShape(shape, newShape);\r\n const params = ['row', 'col', 'depth', 'depth2', 'depth3'];\r\n // Deep copy of input texture layout.\r\n const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n newInputLayout.unpackedShape = newInputShape;\r\n\r\n const source = `\r\n ${this.getUnpackedSamplerFromInput(funcName, name, newInputLayout).routineBody}\r\n float ${funcName}(int row, int col, int depth, int depth2, int depth3) {\r\n return ${funcName}(${getSqueezedParams(params, keptDims)});\r\n }\r\n `;\r\n return new GlslLibRoutine(source, ['coordinates.sampleTexture', 'coordinates.uvFromFlat']);\r\n }\r\n\r\n const texNumR = inputLayout.width;\r\n const texNumC = inputLayout.height;\r\n const source = `\r\n float ${funcName}(int row, int col, int depth, int depth2, int depth3) {\r\n int index = row * ${stride0} + col * ${stride1} + depth * ${stride2} +\r\n depth3 * ${stride3} + depth2;\r\n vec2 uv = uvFromFlat(${texNumR}, ${texNumC}, index);\r\n return sampleTexture(${name}, uv);\r\n }\r\n `;\r\n return new GlslLibRoutine(source, ['coordinates.sampleTexture', 'coordinates.uvFromFlat']);\r\n }\r\n\r\n /**\r\n * Unpacked 6D snippet.\r\n */\r\n protected getUnpackedSampler6D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n const shape = inputLayout.unpackedShape;\r\n const stride4 = shape[5];\r\n const stride3 = shape[4] * stride4;\r\n const stride2 = shape[3] * stride3;\r\n const stride1 = shape[2] * stride2;\r\n const stride0 = shape[1] * stride1;\r\n\r\n const {newShape, keptDims} = squeezeShape(shape as number[]);\r\n if (newShape.length < shape.length) {\r\n const newInputShape = squeezeInputShape(shape, newShape);\r\n const params = ['row', 'col', 'depth', 'depth2', 'depth3', 'depth4'];\r\n // Deep copy of input texture layout.\r\n

```
const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
newInputLayout.unpackedShape = newInputShape;\r\n\r\n      const source = `\r\n
${this.getUnpackedSamplerFromInput(funcName, name, newInputLayout).routineBody}\r\n            float
${funcName}(int row, int col, int depth,\r\n              int depth2, int depth3, int depth4) {\r\n              return
${funcName}(${getSqueezedParams(params, keptDims)});\r\n            }\r\n          `;\r\n      return new
GlslLibRoutine(source, ['coordinates.sampleTexture', 'coordinates.uvFromFlat']);\r\n    }\r\n\r\n    const texNumR =
inputLayout.width;\r\n    const texNumC = inputLayout.height;\r\n    const source = `\r\n          float
${funcName}(int row, int col, int depth,\r\n            int depth2, int depth3, int depth4) {\r\n            int index = row *
${stride0} + col * ${stride1} + depth * ${stride2} +\r\n            depth2 * ${stride3} + depth3 * ${stride4} +
depth4;\r\n            vec2 uv = uvFromFlat(${texNumR}, ${texNumC}, index);\r\n            return
sampleTexture(${name}, uv);\r\n          }\r\n        `;\r\n    return new GlslLibRoutine(\r\n        source,
['coordinates.uvFromFlat', 'coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n  }\r\n\r\n  /**\r\n   * This
is the main function to map from the given texture coordiantes (s,t)\r\n   * to logical indices for the output\r\n   *
There will only be one single variation of this\r\n   * Also see coordsToOffset and offsetToIndices for input-specific
versions\r\n   */\r\n  protected toVec(): {[name: string]: GlslLibRoutine} {\r\n    const output =
this.context.outputTextureLayout;\r\n    const rank = output.shape.length;\r\n    const strides = output.strides;\r\n
const xScale = output.width;\r\n    const yScale = output.height;\r\n\r\n    const stridesBlock = [];\r\n    for (let i = 0; i
< rank - 1; ++i) {\r\n      stridesBlock.push(`\r\n        c[${i}] = offset / ${strides[i]};`);\r\n      stridesBlock.push(`\r\n
    offset -= c[${i}] * ${strides[i]};`);\r\n    }\r\n    stridesBlock.push(`\r\n        c[${rank - 1}] = offset;`);\r\n    const
body = `\r\n      void toVec(vec2 texCoords, out int c[${rank}]) {\r\n        int offset = coordsToOffset(texCoords,
${xScale}, ${yScale});\r\n        ${stridesBlock.join('')}\r\n      }\r\n      void toVec(int offset, out int c[${rank}]) {\r\n
      ${stridesBlock.join('')}\r\n      }\r\n    `;\r\n    return {toVec: new GlslLibRoutine(body,
['coordinates.coordsToOffset'])};\r\n  }\r\n  /**\r\n   * These are value getter functions generated for each input\r\n
* Each function is hardwired to the name and dimensions of the input\r\n   * An '_T' variation is also produced
which accesses values as if the\r\n   * input was transposed\r\n   */\r\n  protected valueFrom(): {[name: string]:
GlslLibRoutine} {\r\n    const result: {[name: string]: GlslLibRoutine} = {};\r\n
this.context.programInfo.inputNames.forEach((name, i) => {\r\n      const layout =
this.context.inputTextureLayouts[i];\r\n      const shape = layout.unpackedShape.length > 0 ? layout.unpackedShape
: layout.shape;\r\n      const rank = shape.length;\r\n      let funcName = `_${name}`;\r\n      result[funcName] = new
GlslLibRoutine(\r\n          this.getValueFromSingle(name, rank, layout.width, layout.height, false),\r\n
[`shapeUtils.indicesToOffset${funcName}`, 'coordinates.offsetToCoords', 'fragcolor.getColorAsFloat']);\r\n
funcName = funcName + '_T';\r\n      result[funcName] = new GlslLibRoutine(\r\n
this.getValueFromSingle(name, rank, layout.width, layout.height, true),\r\n
[`shapeUtils.indicesToOffset${funcName}`, 'coordinates.offsetToCoords', 'fragcolor.getColorAsFloat']);\r\n    });\r\n
  return result;\r\n  }\r\n  /**\r\n   * Produces one value getter function for the name and rank given\r\n   * If a
transpose is set proper offsetToCoords mapping will be used\r\n   * @param name name of the function\r\n   *
@param rank rank of the input\r\n   * @param transpose whether or not should generate a transpose variation\r\n
*/\r\n  protected getValueFromSingle(varName: string, rank: number, width: number, height: number, transpose:
boolean):\r\n      string {\r\n    let name = `_${varName}`;\r\n    if (transpose) {\r\n      name = name + '_T';\r\n
}\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n    return `\r\n        float ${name}(int m[${rank}])
{\r\n          int offset = indicesToOffset${name}(m);\r\n          vec2 coords = offsetToCoords(offset, ${width},
${height});\r\n          float value = getColorAsFloat(${glsl.texture2D}(${varName}, coords));\r\n          return
value;\r\n        }\r\n        `;\r\n  }\r\n\r\n  /**\r\n   * Produces a packed value getter function for the name and rank
given\r\n   * If a transpose is set proper offsetToCoords mapping will be used\r\n   * @param name name of the
function\r\n   * @param rank rank of the input\r\n   * @param transpose whether or not should generate a transpose
variation\r\n   */\r\n  protected getPackedValueFrom(varName: string, rank: number, width: number, height:
number, transpose: boolean):\r\n      string {\r\n    let name = `_${varName}_Pack`;\r\n    if (transpose) {\r\n
name = name + '_T';\r\n    }\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n    return `\r\n        vec4
```

${name}(int m[${rank}]) {\r\n int offset = indicesToOffset_${varName}(m);\r\n vec2 coords = offsetToCoords(offset, ${width}, ${height});\r\n return ${glsl.texture2D}(${varName}, coords);\r\n }\r\n `;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {ProgramInfo, TextureLayout} from './types';\r\nimport {WebGLContext} from './webgl-context';\r\n\r\n/* eslint-disable @typescript-eslint/naming-convention */\r\nexport enum FunctionType {\r\n ValueBased,\r\n Positional\r\n}\r\nexport interface GlslFunction<T extends FunctionType> {\r\n body: string;\r\n name: string;\r\n type: T;\r\n}\r\nexport type GlslValueFunction = GlslFunction<FunctionType.ValueBased>;\r\nexport interface GlslPositionalFunction extends GlslFunction<FunctionType.Positional> {\r\n inputShape: readonly number[];\r\n outputShape: readonly number[];\r\n}\r\n\r\nexport class GlslContext {\r\n constructor(\r\n public glContext: WebGLContext, public programInfo: ProgramInfo, public inputTextureLayouts: TextureLayout[],\r\n public outputTextureLayout: TextureLayout) {}\r\n}\r\nexport abstract class GlslLib {\r\n constructor(public context: GlslContext) {}\r\n abstract getFunctions(): {[name: string]: GlslLibRoutine};\r\n abstract getCustomTypes(): {[name: string]: string};\r\n}\r\n\r\n// abstraction to represent a GLSL library routine and it's dependencies\r\nexport class GlslLibRoutine {\r\n constructor(public routineBody: string, public dependencies?: string[]) {}\r\n}\r\n\r\n// abstraction to represent a GLSL library routine and it's dependencies AS GRAPH Nodes\r\n// this level of abstraction is used to topologically sort routines before fragment shade inclusion\r\nexport class GlslLibRoutineNode {\r\n dependencies: GlslLibRoutineNode[];\r\n routineBody: string;\r\n constructor(public name: string, routineBody?: string, dependencies?: GlslLibRoutineNode[]) {\r\n if (dependencies) {\r\n this.dependencies = dependencies;\r\n } else {\r\n this.dependencies = [];\r\n }\r\n\r\n if (routineBody) {\r\n this.routineBody = routineBody;\r\n }\r\n }\r\n addDependency(node: GlslLibRoutineNode) {\r\n if (node) {\r\n this.dependencies.push(node);\r\n }\r\n }\r\n}\r\n\r\n// topologically sort GLSL library routines (graph nodes abstraction) before shader script inclusion\r\nexport class TopologicalSortGlslRoutines {\r\n static returnOrderedNodes(nodes: GlslLibRoutineNode[]): GlslLibRoutineNode[] {\r\n if (!nodes || nodes.length === 0) {\r\n return [];\r\n }\r\n\r\n if (nodes.length === 1) {\r\n return nodes;\r\n }\r\n\r\n const cycleCheck = new Set<string>();\r\n const alreadyTraversed = new Set<string>();\r\n const result = new Array<GlslLibRoutineNode>();\r\n\r\n this.createOrderedNodes(nodes, cycleCheck, alreadyTraversed, result);\r\n return result;\r\n }\r\n\r\n private static createOrderedNodes(\r\n graphNodes: GlslLibRoutineNode[], cycleCheck: Set<string>, alreadyTraversed: Set<string>,\r\n result: GlslLibRoutineNode[]) {\r\n for (let i = 0; i < graphNodes.length; ++i) {\r\n this.dfsTraverse(graphNodes[i], cycleCheck, alreadyTraversed, result);\r\n }\r\n }\r\n\r\n private static dfsTraverse(\r\n root: GlslLibRoutineNode, cycleCheck: Set<string>, alreadyTraversed: Set<string>, result: GlslLibRoutineNode[]) {\r\n // if this root has already been traversed return\r\n if (!root || alreadyTraversed.has(root.name)) {\r\n return;\r\n }\r\n\r\n // cyclic dependency has been detected\r\n if (cycleCheck.has(root.name)) {\r\n throw new Error('Cyclic dependency detected. Can\\'t topologically sort routines needed for shader.');\r\n }\r\n\r\n // hold this node to detect cycles if any\r\n cycleCheck.add(root.name);\r\n\r\n // traverse children in a dfs fashion\r\n const dependencies = root.dependencies;\r\n if (dependencies && dependencies.length > 0) {\r\n for (let i = 0; i < dependencies.length; ++i) {\r\n this.dfsTraverse(dependencies[i], cycleCheck, alreadyTraversed, result);\r\n }\r\n }\r\n\r\n // add to result holder\r\n result.push(root);\r\n\r\n // mark this node as traversed so that we don't traverse from this again\r\n alreadyTraversed.add(root.name);\r\n\r\n // release the hold\r\n cycleCheck.delete(root.name);\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\n\r\n/**\r\n * This GLSL library handles routines converting\r\n * float32 to/from Unsigned byte or float 16\r\n */\r\nexport class EncodingGlslLib extends GlslLib {\r\n constructor(context: GlslContext) {\r\n super(context);\r\n }\r\n getFunctions(): {[name: string]: GlslLibRoutine} {\r\n return {...this.encodeFloat32(), ...this.decodeFloat32()};\r\n }\r\n getCustomTypes(): {[name: string]: string} {\r\n return {};\r\n }\r\n protected encodeFloat32(): {[name: string]: GlslLibRoutine} {\r\n return {\r\n encode: new GlslLibRoutine(`highp vec4 encode(highp float f) {\r\n return vec4(f, 0.0, 0.0, 0.0);\r\n }\r\n `)\r\n };\r\n }\r\n protected

```
decodeFloat32(): {[name: string]: GlslLibRoutine} {\r\n    return {\r\n      decode: new GlslLibRoutine(`highp float
decode(highp vec4 rgba) {\r\n        return rgba.r;\r\n      }\r\n        `)\r\n    };\r\n  }\r\n  /**\r\n   * returns the routine to
encode encode a 32bit float to a vec4 (of unsigned bytes)\r\n   * @credit:
https://stackoverflow.com/questions/7059962/how-do-i-convert-a-vec4-rgba-value-to-a-float\r\n   */\r\n  protected
encodeUint8(): {[name: string]: GlslLibRoutine} {\r\n    const endianness = EncodingGlslLib.isLittleEndian() ?
'rgba.rgba=rgba.abgr;' : '';\r\n    return {\r\n      encode: new GlslLibRoutine(`\r\n      highp vec4 encode(highp float f)
{\r\n        highp float F = abs(f);\r\n        highp float Sign = step(0.0,-f);\r\n        highp float Exponent =
floor(log2(F));\r\n        highp float Mantissa = (exp2(- Exponent) * F);\r\n        Exponent = floor(log2(F) + 127.0) +
floor(log2(Mantissa));\r\n        highp vec4 rgba;\r\n        rgba[0] = 128.0 * Sign  + floor(Exponent*exp2(-1.0));\r\n
  rgba[1] = 128.0 * mod(Exponent,2.0) + mod(floor(Mantissa*128.0),128.0);\r\n        rgba[2] =
floor(mod(floor(Mantissa*exp2(23.0 -8.0)),exp2(8.0)));\r\n        rgba[3] = floor(exp2(23.0)*mod(Mantissa,exp2(-
15.0)));\r\n        ${endianness}\r\n        rgba = rgba / 255.0; // values need to be normalized to [0,1]\r\n        return
rgba;\r\n    }\r\n        `)\r\n    };\r\n  }\r\n  /**\r\n   * returns the routine to encode a vec4 of unsigned bytes to
float32\r\n   * @credit: https://stackoverflow.com/questions/7059962/how-do-i-convert-a-vec4-rgba-value-to-a-
float\r\n   */\r\n  protected decodeUint8(): {[name: string]: GlslLibRoutine} {\r\n    const endianness =
EncodingGlslLib.isLittleEndian() ? 'rgba.rgba=rgba.abgr;' : '';\r\n    return {\r\n      decode: new GlslLibRoutine(`\r\n
      highp float decode(highp vec4 rgba) {\r\n          rgba = rgba * 255.0; // values need to be de-normalized from
[0,1] to [0,255]\r\n          ${endianness}\r\n          highp float Sign = 1.0 - step(128.0,rgba[0])*2.0;\r\n          highp
float Exponent = 2.0 * mod(rgba[0],128.0) + step(128.0,rgba[1]) - 127.0;\r\n          highp float Mantissa =
mod(rgba[1],128.0)*65536.0 + rgba[2]*256.0 +rgba[3] + float(0x800000);\r\n          highp float Result =  Sign *
exp2(Exponent) * (Mantissa * exp2(-23.0 ));\r\n          return Result;\r\n      }\r\n        `)\r\n    };\r\n  }\r\n  /**\r\n   *
Determines if the machine is little endian or not\r\n   * @credit: https://gist.github.com/TooTallNate/4750953\r\n
*/\r\n  static isLittleEndian(): boolean {\r\n    const b = new ArrayBuffer(4);\r\n    const a = new Uint32Array(b);\r\n
 const c = new Uint8Array(b);\r\n    a[0] = 0xdeadbeef;\r\n    if (c[0] === 0xef) {\r\n      return true;\r\n    }\r\n    if
(c[0] === 0xde) {\r\n      return false;\r\n    }\r\n    throw new Error('unknown endianness');\r\n  }\r\n}\r\n","//
Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\nimport {getGlsl} from './glsl-
source';\r\n\r\n/**\r\n * This GLSL library handles routines around reading a texlet and writing to it\r\n * Reading
and writing could be more than just dealing with one channel\r\n * It may require encoding/decoding to/from 4
channels into one\r\n */\r\nexport class FragColorGlslLib extends GlslLib {\r\n  constructor(context: GlslContext)
{\r\n    super(context);\r\n  }\r\n  getFunctions(): {[name: string]: GlslLibRoutine} {\r\n    return
{...this.setFragColor(), ...this.getColorAsFloat()};\r\n  }\r\n  getCustomTypes(): {[name: string]: string} {\r\n
return {};\r\n  }\r\n  protected setFragColor(): {[name: string]: GlslLibRoutine} {\r\n    const glsl =
getGlsl(this.context.glContext.version);\r\n    return {\r\n      setFragColor: new GlslLibRoutine(\r\n          `\r\n
void setFragColor(float value) {\r\n            ${glsl.output} = encode(value);\r\n        }\r\n        `,\r\n
['encoding.encode'])\r\n    };\r\n  }\r\n  protected getColorAsFloat(): {[name: string]: GlslLibRoutine} {\r\n    return
{\r\n      getColorAsFloat: new GlslLibRoutine(\r\n          `\r\n        float getColorAsFloat(vec4 color) {\r\n
return decode(color);\r\n        }\r\n        `,\r\n          ['encoding.decode'])\r\n    };\r\n  }\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nconst
INLINE_FUNC_DEF_REGEX = /@inline[\\s\\n\\r]+(\\w+)[\\s\\n\\r]+([0-9a-zA-
Z_]+)\\s*\\(([^)]*)\\)\\s*{(([^}]|[\\n\\r])*)}/gm;\r\nconst FUNC_CALL_REGEX = '(\\\\w+)?\\\\s+([_0-9a-zA-
Z]+)\\\\s+=\\\\s+__FUNC__\\\\((.*)\\\\)\\\\s*;';\r\n/**\r\n * GLSL preprocessor responsible for resolving @inline
directives\r\n */\r\nexport function replaceInlines(script: string): string {\r\n  const inlineDefs: {[name: string]:
{params: Array<{type: string; name: string}|null>; body: string}} = {};\r\n  let match;\r\n  while ((match =
INLINE_FUNC_DEF_REGEX.exec(script)) !== null) {\r\n    const params = match[3]\r\n                       .split(',')\r\n
                   .map(s => {\r\n                         const tokens = s.trim().split(' ');\r\n                         if (tokens &&
tokens.length === 2) {\r\n                           return {type: tokens[0], name: tokens[1]};\r\n                         }\r\n
         return null;\r\n                       })\r\n                       .filter(v => v !== null);\r\n    inlineDefs[match[2]] =
```

{params, body: match[4]};\r\n }\r\n for (const name in inlineDefs) {\r\n const regexString = FUNC_CALL_REGEX.replace('__FUNC__', name);\r\n const regex = new RegExp(regexString, 'gm');\r\n while ((match = regex.exec(script)) !== null) {\r\n const type = match[1];\r\n const variable = match[2];\r\n const params = match[3].split(',');\r\n const declLine = (type) ? `${type} ${variable};` : '';\r\n let newBody: string = inlineDefs[name].body;\r\n let paramRedecLine = '';\r\n inlineDefs[name].params.forEach((v, i) => {\r\n if (v) {\r\n paramRedecLine += `${v.type} ${v.name} = ${params[i]};\\n`;\r\n }\r\n });\r\n newBody = `${paramRedecLine}\\n ${newBody}`;\r\n newBody = newBody.replace('return', `${variable} = `);\r\n const replacement = `\r\n ${declLine}\r\n {\r\n ${newBody}\r\n }\r\n `;\r\n script = script.replace(match[0], replacement);\r\n }\r\n }\r\n script = script.replace(INLINE_FUNC_DEF_REGEX, '');\r\n return script;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutineNode, TopologicalSortGlslRoutines} from './glsl-definitions';\r\nimport {replaceInlines} from './glsl-function-inliner';\r\nimport {glslRegistry} from './glsl-registered-libs';\r\nimport {getDefaultFragShaderMain, getFragShaderPreamble} from './glsl-source';\r\nimport {ProgramInfo, TextureLayout, VariableInfo} from './types';\r\nimport {WebGLContext} from './webgl-context';\r\n\r\n/**\r\n * Preprocessor for the additions to the GLSL language\r\n * It deals with:\r\n * @include directives\r\n * @inline\r\n * Loop unrolling (not implemented)\r\n * Macro resolution (not implemented)\r\n */\r\nexport class GlslPreprocessor {\r\n readonly context: GlslContext;\r\n readonly libs: {[name: string]: GlslLib} = {};\r\n readonly glslLibRoutineDependencyGraph: {[routineName: string]: GlslLibRoutineNode} = {};\r\n\r\n constructor(\r\n glContext: WebGLContext, programInfo: ProgramInfo, inputTextureLayouts: TextureLayout[],\r\n outputTextureLayout: TextureLayout) {\r\n this.context = new GlslContext(glContext, programInfo, inputTextureLayouts, outputTextureLayout);\r\n\r\n // construct GlslLibs\r\n Object.keys(glslRegistry).forEach((name: string) => {\r\n const lib = new glslRegistry[name](this.context);\r\n this.libs[name] = lib;\r\n });\r\n\r\n // construct GlslRoutineDependencyGraph\r\n const map = this.glslLibRoutineDependencyGraph;\r\n for (const libName in this.libs) {\r\n const lib = this.libs[libName];\r\n const routinesInLib = lib.getFunctions();\r\n for (const routine in routinesInLib) {\r\n const key = libName + '.' + routine;\r\n let currentNode: GlslLibRoutineNode;\r\n if (map[key]) {\r\n currentNode = map[key];\r\n currentNode.routineBody = routinesInLib[routine].routineBody;\r\n } else {\r\n currentNode = new GlslLibRoutineNode(key, routinesInLib[routine].routineBody);\r\n map[key] = currentNode;\r\n }\r\n const dependencies = routinesInLib[routine].dependencies;\r\n if (dependencies) {\r\n for (let i = 0; i < dependencies.length; ++i) {\r\n if (!map[dependencies[i]]) {\r\n const node = new GlslLibRoutineNode(dependencies[i]);\r\n map[dependencies[i]] = node;\r\n currentNode.addDependency(node);\r\n } else {\r\n currentNode.addDependency(map[dependencies[i]]);\r\n }\r\n }\r\n }\r\n }\r\n }\r\n }\r\n\r\n preprocess(): string {\r\n const programInfo = this.context.programInfo;\r\n let source = programInfo.shaderSource;\r\n\r\n // append main() function\r\n if (!this.context.programInfo.hasMain) {\r\n source = `${source}\r\n ${getDefaultFragShaderMain(this.context.glContext.version, this.context.outputTextureLayout.shape.length)}`;\r\n }\r\n // replace inlines\r\n source = replaceInlines(source);\r\n\r\n // concat final source string\r\n return `${getFragShaderPreamble(this.context.glContext.version)}\r\n ${this.getUniforms(programInfo.inputNames, programInfo.variables)}\r\n ${this.getImports(source)}\r\n ${source}`;\r\n }\r\n\r\n protected getImports(script: string): string {\r\n const routinesIncluded = this.selectGlslLibRoutinesToBeIncluded(script);\r\n\r\n if (routinesIncluded.length === 0) {\r\n return '';\r\n }\r\n\r\n let routines = '';\r\n for (let i = 0; i < routinesIncluded.length; ++i) {\r\n if (routinesIncluded[i].routineBody) {\r\n routines += routinesIncluded[i].routineBody + '\\n';\r\n } else {\r\n throw new Error(`Missing body for the Glsl Library routine: ${routinesIncluded[i].name}`);\r\n }\r\n }\r\n\r\n return routines;\r\n }\r\n private selectGlslLibRoutinesToBeIncluded(script: string): GlslLibRoutineNode[] {\r\n const nodes: GlslLibRoutineNode[] = [];\r\n\r\n Object.keys(this.glslLibRoutineDependencyGraph).forEach(classAndRoutine => {\r\n const routine = classAndRoutine.split('.')[1];\r\n if (script.indexOf(routine) !== -1) {\r\n

```
nodes.push(this.glslLibRoutineDependencyGraph[classAndRoutine]);\r\n      }\r\n    });\r\n\r\n    return
TopologicalSortGlslRoutines.returnOrderedNodes(nodes);\r\n  }\r\n\r\n  protected getUniforms(samplers?: string[],
variables?: VariableInfo[]): string {\r\n    const uniformLines: string[] = [];\r\n    if (samplers) {\r\n      for (const
sampler of samplers) {\r\n        uniformLines.push(`uniform sampler2D ${sampler};`);\r\n      }\r\n    }\r\n    if
(variables) {\r\n      for (const variable of variables) {\r\n        uniformLines.push(\r\n            `uniform
${variable.type} ${variable.name}${variable.arrayLength ? `[${variable.arrayLength}]` : ''};`);\r\n      }\r\n    }\r\n
return uniformLines.join('\\n');\r\n  }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n//
Licensed under the MIT License.\r\n\r\nimport {CoordsGlslLib} from './glsl-coordinate-lib';\r\nimport {GlslContext,
GlslLib} from './glsl-definitions';\r\nimport {EncodingGlslLib} from './glsl-encoding-lib';\r\nimport
{FragColorGlslLib} from './glsl-fragcolor-lib';\r\nimport {ShapeUtilsGlslLib} from './glsl-shape-utils-lib';\r\nimport
{VecGlslLib} from './glsl-vec-lib';\r\n\r\nexport const glslRegistry: {[name: string]: new (context: GlslContext) =>
GlslLib} = {\r\n  'encoding': EncodingGlslLib,\r\n  'fragcolor': FragColorGlslLib,\r\n  'vec': VecGlslLib,\r\n
'shapeUtils': ShapeUtilsGlslLib,\r\n  'coordinates': CoordsGlslLib,\r\n  //  'arrays': ArrayGlslSLib\r\n};\r\n","//
Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\n\r\n/**\r\n * GLSL Library responsible for data
types and routines for manipulating\r\n * coordinates and mapping to/from tensor indices\r\n */\r\nexport class
ShapeUtilsGlslLib extends GlslLib {\r\n  constructor(context: GlslContext) {\r\n    super(context);\r\n  }\r\n
getFunctions(): {[name: string]: GlslLibRoutine} {\r\n    return {\r\n      ...this.bcastIndex(),\r\n
...this.bcastMatmulIndex(),\r\n      ...this.offsetToIndices(),\r\n      ...this.indicesToOffset(),\r\n
...this.incrementIndices()\r\n    };\r\n  }\r\n  getCustomTypes() {\r\n    return {};\r\n  }\r\n  protected bcastIndex():
{[name: string]: GlslLibRoutine} {\r\n    const outputRank = this.context.outputTextureLayout.shape.length;\r\n
const result: {[name: string]: GlslLibRoutine} = {};\r\n    this.context.programInfo.inputNames.forEach((name, i)
=> {\r\n      const shape = this.context.inputTextureLayouts[i].unpackedShape;\r\n      if (shape.length <=
outputRank) {\r\n        const rank = shape.length;\r\n        const dimOffset = outputRank - rank;\r\n        const
funcName = `bcastIndices_${name}`;\r\n        let block = '';\r\n        for (let i = 0; i < rank; ++i) {\r\n          block +=
`\r\n          realIndices[${i}] = int( mod(float(bcastedIndices[${dimOffset + i}]), ${shape[i]}.0) );\r\n          `;\r\n
}\r\n        const body = `\r\n        void ${funcName} (int bcastedIndices[${outputRank}], out int
realIndices[${rank}]) {\r\n          ${block}\r\n        }\r\n        `;\r\n        result[funcName] = new
GlslLibRoutine(body);\r\n      }\r\n    });\r\n    return result;\r\n  }\r\n  protected bcastMatmulIndex(): {[name:
string]: GlslLibRoutine} {\r\n    const outputRank = this.context.outputTextureLayout.shape.length;\r\n    const
result: {[name: string]: GlslLibRoutine} = {};\r\n    this.context.programInfo.inputNames.forEach((name, i) => {\r\n
    const shape = this.context.inputTextureLayouts[i].shape;\r\n      if (!(shape.length < 2 || shape.length >
outputRank)) {\r\n        const rank = shape.length;\r\n        const dimOffset = outputRank - rank;\r\n        const
funcName = `bcastMatmulIndices_${name}`;\r\n        let block = '';\r\n        for (let i = 0; i < rank - 2; ++i) {\r\n
block += `\r\n          realIndices[${i}] = int( mod(float(bcastedIndices[${dimOffset + i}]), ${shape[i]}.0) );\r\n
`;\r\n        }\r\n        const body = `\r\n        void ${funcName}(int bcastedIndices[${outputRank}], out int
realIndices[${rank}]) {\r\n          ${block}\r\n          realIndices[${rank - 1}] = bcastedIndices[${outputRank -
1}];\r\n          realIndices[${rank - 2}] = bcastedIndices[${outputRank - 2}];\r\n        }\r\n        `;\r\n
result[funcName] = new GlslLibRoutine(body);\r\n      }\r\n    });\r\n    return result;\r\n  }\r\n  protected
indicesToOffset(): {[name: string]: GlslLibRoutine} {\r\n    const result: {[name: string]: GlslLibRoutine} = {};\r\n
this.context.programInfo.inputNames.forEach((name, i) => {\r\n      const shape =
this.context.inputTextureLayouts[i].shape;\r\n      const strides = this.context.inputTextureLayouts[i].strides;\r\n
const rank = shape.length;\r\n      let funcName = `indicesToOffset_${name}`;\r\n      result[funcName] = new
GlslLibRoutine(ShapeUtilsGlslLib.indexToOffsetSingle(funcName, rank, strides));\r\n      funcName =
`indicesToOffset_${name}_T`;\r\n      result[funcName] =\r\n          new
GlslLibRoutine(ShapeUtilsGlslLib.indexToOffsetSingle(funcName, rank, strides.slice().reverse()));\r\n    });\r\n
return result;\r\n  }\r\n  static indexToOffsetSingle(name: string, rank: number, strides: readonly number[]): string
{\r\n    let block = '';\r\n    for (let i = rank - 1; i >= 0; --i) {\r\n      block += `\r\n        offset += indices[${i}] *
```

```
${strides[i]};\r\n        `;\r\n    }\r\n    return `\r\n      int ${name}(int indices[${rank}]) {\r\n        int offset = 0;\r\n
${block}\r\n        return offset;\r\n      }\r\n      `;\r\n  }\r\n  protected offsetToIndices(): {[name: string]:
GlslLibRoutine} {\r\n    const result: {[name: string]: GlslLibRoutine} = {};\r\n
this.context.programInfo.inputNames.forEach((name, i) => {\r\n      const shape =
this.context.inputTextureLayouts[i].shape;\r\n      const strides = this.context.inputTextureLayouts[i].strides;\r\n
const rank = shape.length;\r\n      let funcName = `offsetToIndices_${name}`;\r\n      result[funcName] = new
GlslLibRoutine(ShapeUtilsGlslLib.offsetToIndicesSingle(funcName, rank, strides));\r\n      funcName =
`offsetToIndices_${name}_T`;\r\n      result[funcName] =\r\n          new
GlslLibRoutine(ShapeUtilsGlslLib.offsetToIndicesSingle(funcName, rank, strides.slice().reverse()));\r\n    });\r\n
return result;\r\n  }\r\n  static offsetToIndicesSingle(name: string, rank: number, strides: readonly number[]): string
{\r\n    const stridesBlock = [];\r\n    for (let i = 0; i < rank - 1; ++i) {\r\n      stridesBlock.push(`\r\n      indices[${i}]
= offset / ${strides[i]};`);\r\n      stridesBlock.push(`\r\n        offset -= indices[${i}] * ${strides[i]};`);\r\n    }\r\n
stridesBlock.push(`\r\n      indices[${rank - 1}] = offset;`);\r\n    return `\r\n      void ${name}(int offset, out int
indices[${rank}]) {\r\n        ${stridesBlock.join('')}\r\n        }\r\n      `;\r\n  }\r\n  protected incrementIndices():
{[name: string]: GlslLibRoutine} {\r\n    const result: {[name: string]: GlslLibRoutine} = {};\r\n
this.context.programInfo.inputNames.forEach((name, i) => {\r\n      const shape =
this.context.inputTextureLayouts[i].shape;\r\n      const rank = shape.length;\r\n      const funcName =
`incrementIndices_${name}`;\r\n      let shapeInit = '';\r\n      for (let i = 0; i < rank; ++i) {\r\n        shapeInit += `\r\n
    shape[${i}] = ${shape[i]};`;\r\n      }\r\n      const body = `\r\n        void ${funcName}(int axis, out int
indices[${rank}]) {\r\n          int shape[${rank}];\r\n          ${shapeInit};\r\n          for(int i = ${rank} -1 ; i >= 0; --i)
{\r\n            if(i > axis) continue;\r\n            indices[i] += 1;\r\n            if(indices[i] < shape[i]) {\r\n
break;\r\n            }\r\n            indices[i] = 0;\r\n          }\r\n        }\r\n        `;\r\n      result[funcName] = new
GlslLibRoutine(body);\r\n    });\r\n    return result;\r\n  }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights
reserved.\r\n// Licensed under the MIT License.\r\n\r\n/**\r\n * represent a version irrelevant abstraction of for
GLSL source code\r\n */\r\nexport interface Glsl {\r\n  readonly version: string;\r\n  readonly attribute: string;\r\n
readonly varyingVertex: string;\r\n  readonly varyingFrag: string;\r\n  readonly texture2D: string;\r\n  readonly
output: string;\r\n  readonly outputDeclaration: string;\r\n}\r\n\r\nconst GLSL_ES_2_0: Glsl = {\r\n  version: '',\r\n
attribute: 'attribute',\r\n  varyingVertex: 'varying',\r\n  varyingFrag: 'varying',\r\n  texture2D: 'texture2D',\r\n  output:
'gl_FragColor',\r\n  outputDeclaration: '',\r\n};\r\nconst GLSL_ES_3_0: Glsl = {\r\n  version: '#version 300 es',\r\n
attribute: 'in',\r\n  varyingVertex: 'out',\r\n  varyingFrag: 'in',\r\n  texture2D: 'texture',\r\n  output: 'outputColor',\r\n
outputDeclaration: 'out vec4 outputColor;',\r\n};\r\n\r\nexport function getGlsl(version: 1|2) {\r\n  return version
=== 1 ? GLSL_ES_2_0 : GLSL_ES_3_0;\r\n}\r\n\r\nexport function getVertexShaderSource(version: 1|2): string
{\r\n  const glsl = getGlsl(version);\r\n  return `${glsl.version}\r\n      precision highp float;\r\n      ${glsl.attribute}
vec3 position;\r\n      ${glsl.attribute} vec2 textureCoord;\r\n\r\n      ${glsl.varyingVertex} vec2 TexCoords;\r\n\r\n
  void main()\r\n      {\r\n          gl_Position = vec4(position, 1.0);\r\n          TexCoords = textureCoord;\r\n
}`;\r\n}\r\n\r\nexport function getFragShaderPreamble(version: 1|2): string {\r\n  const glsl = getGlsl(version);\r\n
return `${glsl.version}\r\n    precision highp float;\r\n    precision highp int;\r\n    precision highp sampler2D;\r\n
${glsl.varyingFrag} vec2 TexCoords;\r\n    ${glsl.outputDeclaration}\r\n    const vec2 halfCR = vec2(0.5,
0.5);\r\n\r\n    // Custom vector types to handle higher dimenalities.\r\n    struct ivec5\r\n    {\r\n      int x;\r\n      int
y;\r\n      int z;\r\n      int w;\r\n      int u;\r\n    };\r\n\r\n    struct ivec6\r\n    {\r\n      int x;\r\n      int y;\r\n      int z;\r\n
   int w;\r\n      int u;\r\n      int v;\r\n    };\r\n\r\n    int imod(int x, int y) {\r\n      return x - y * (x / y);\r\n    }\r\n\r\n
`;\r\n}\r\n\r\nexport function getDefaultFragShaderMain(version: 1|2, outputShapeLength: number): string {\r\n
const glsl = getGlsl(version);\r\n  return `\r\n  void main() {\r\n    int indices[${outputShapeLength}];\r\n
toVec(TexCoords, indices);\r\n    vec4 result = vec4(process(indices));\r\n    ${glsl.output} = result;\r\n  }\r\n
`;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\n\r\n/**\r\n * GLSL
Library responsible for vec routines\r\n * Vec is an varible length int array. The length is fixed at the time of\r\n *
generating the library functions from the dimensions of the output.\r\n */\r\nexport class VecGlslLib extends GlslLib
```

```
{\r\n  constructor(context: GlslContext) {\r\n    super(context);\r\n  }\r\n  getCustomTypes(): {[name: string]: string}
{\r\n    return {};\r\n  }\r\n  getFunctions(): {[name: string]: GlslLibRoutine} {\r\n    return
{...this.binaryVecFunctions(), ...this.copyVec(), ...this.setVecItem(), ...this.getVecItem()};\r\n  }\r\n  protected
binaryVecFunctions(): {[name: string]: GlslLibRoutine} {\r\n    const outputLayout =
this.context.outputTextureLayout;\r\n    const rank = outputLayout.shape.length;\r\n    const nameOp: {[name:
string]: string} = {add: '+=', sub: '-=', mul: '*=', div: '/='};\r\n    const result: {[name: string]: GlslLibRoutine} =
{};\r\n    for (const name in nameOp) {\r\n      const fname = `${name}Vec`;\r\n      let assignmentBlock = '';\r\n
for (let i = 0; i < rank; ++i) {\r\n        assignmentBlock += `\r\n          dest[${i}] ${nameOp[name]} src[${i}];\r\n
 `;\r\n      }\r\n      const body = `\r\n        void ${fname}(int src[${rank}], out int dest[${rank}]) {\r\n
${assignmentBlock}\r\n        }\r\n        `;\r\n      result[fname] = new GlslLibRoutine(body);\r\n    }\r\n\r\n    return
result;\r\n  }\r\n  protected copyVec(): {[name: string]: GlslLibRoutine} {\r\n    const outputLayout =
this.context.outputTextureLayout;\r\n    const rank = outputLayout.shape.length;\r\n    let assignmentBlock = '';\r\n
for (let i = 0; i < rank; ++i) {\r\n      assignmentBlock += `\r\n        dest[${i}] = src[${i}];\r\n        `;\r\n    }\r\n
const body = `\r\n      void copyVec(int src[${rank}], out int dest[${rank}]) {\r\n        ${assignmentBlock}\r\n
}\r\n      `;\r\n    return {copyVec: new GlslLibRoutine(body)};\r\n  }\r\n\r\n  protected setVecItem(): {[name:
string]: GlslLibRoutine} {\r\n    const outputLayout = this.context.outputTextureLayout;\r\n    const rank =
outputLayout.shape.length;\r\n    let block = `\r\n        if(index < 0)\r\n            index =${rank} + index;\r\n        if
(index == 0)\r\n            m[0] = value;\r\n        `;\r\n    for (let i = 1; i < rank - 1; ++i) {\r\n      block += `\r\n        else
if (index == ${i})\r\n            m[${i}] = value;\r\n            `;\r\n    }\r\n    block += `\r\n        else\r\n            m[${rank -
1}] = value;\r\n        `;\r\n    const body = `\r\n      void setVecItem(out int m[${rank}], int index, int value) {\r\n
${block}\r\n      }\r\n        `;\r\n    return {setVecItem: new GlslLibRoutine(body)};\r\n  }\r\n  protected
getVecItem(): {[name: string]: GlslLibRoutine} {\r\n    const outputLayout = this.context.outputTextureLayout;\r\n
const rank = outputLayout.shape.length;\r\n    let block = `\r\n        if(index < 0)\r\n            index = ${rank} +
index;\r\n        if (index == 0)\r\n            return m[0];\r\n      `;\r\n    for (let i = 1; i < rank - 1; ++i) {\r\n      block +=
`\r\n        else if (index == ${i})\r\n            return m[${i}];\r\n      `;\r\n    }\r\n    block += `\r\n        else\r\n
return m[${rank - 1}];\r\n        `;\r\n    const body = `\r\n      int getVecItem(int m[${rank}], int index) {\r\n
${block}\r\n      }\r\n    `;\r\n    return {getVecItem: new GlslLibRoutine(body)};\r\n  }\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceHandler}
from '../../backend';\r\nimport {Logger} from '../../instrument';\r\nimport {Tensor} from '../../tensor';\r\nimport
{ShapeUtil} from '../../util';\r\nimport {createPackProgramInfoLoader} from './ops/pack';\r\nimport
{createPackedReshape3DProgramInfoLoader, isReshapeCheap, processDims3D} from './ops/reshape-
packed';\r\n\r\nimport {encodeAsUint8} from './ops/uint8-encode';\r\nimport {createUnpackProgramInfoLoader}
from './ops/unpack';\r\nimport {WebGLSessionHandler} from './session-handler';\r\nimport {Encoder} from
'./texture-data-encoder';\r\nimport {calculateTextureWidthAndHeight, createTextureLayoutFromShape,
createTextureLayoutFromTextureType} from './texture-layout';\r\nimport {Artifact, ProgramInfo,
ProgramInfoLoader, TextureData, TextureLayout, TextureType} from './types';\r\n\r\nconst
getProgramInfoUniqueKey =\r\n    (programInfo: ProgramInfo|ProgramInfoLoader, inputTextureDatas:
TextureData[]): string => {\r\n      const inputs =\r\n          inputTextureDatas.map(texture =>
`${texture.unpackedShape.join(',')};${texture.width}x${texture.height}`)\r\n              .join('_');\r\n      let key =
programInfo.name;\r\n      if (programInfo.cacheHint) {\r\n        key += '[' + programInfo.cacheHint + ']';\r\n      }\r\n
    key += ':' + inputs;\r\n      return key;\r\n    };\r\n\r\nexport class WebGLInferenceHandler implements
InferenceHandler {\r\n  private packedTextureDataCache: Map<Tensor.Id, TextureData>;\r\n  private
unpackedTextureDataCache: Map<Tensor.Id, TextureData>;\r\n  constructor(public session:
WebGLSessionHandler) {\r\n    this.packedTextureDataCache = new Map();\r\n    this.unpackedTextureDataCache
= new Map();\r\n  }\r\n\r\n  /**\r\n   * @returns [width, height]\r\n   */\r\n  calculateTextureWidthAndHeight(shape:
readonly number[], textureType: TextureType): [number, number] {\r\n    return
calculateTextureWidthAndHeight(this.session.layoutStrategy, shape, textureType);\r\n  }\r\n\r\n
executeProgram(program: ProgramInfo|ProgramInfoLoader, inputs: readonly Tensor[]): TextureData {\r\n    if
```

(inputs.length < program.inputNames.length) {\r\n   throw new Error(`Input size mustn't be less than ${program.inputNames.length}.`);\r\n   }\r\n   if (program.inputNames.length !== program.inputTypes.length) {\r\n   throw new Error('input names size does not match input types');\r\n   }\r\n\r\n   // create texture info for input\r\n   const inputTextureDatas: TextureData[] = [];\r\n   for (let i = 0; i < program.inputNames.length; ++i) {\r\n   inputTextureDatas[i] = this.getOrCreateTextureData(inputs[i], program.inputTypes[i]);\r\n   }\r\n\r\n   const key = getProgramInfoUniqueKey(program, inputTextureDatas);\r\n   let artifact = this.session.programManager.getArtifact(key);\r\n   const programInfo = artifact ?\r\n   artifact.programInfo :\r\n   (typeof (program as ProgramInfoLoader).get === 'function' ? (program as ProgramInfoLoader).get() :\r\n   (program as ProgramInfo));\r\n\r\n   // create texture info for output\r\n   const outputTextureLayout = createTextureLayoutFromTextureType(\r\n   this.session.layoutStrategy, programInfo.output.dims, programInfo.output.textureType);\r\n   const outputTextureData = this.createTextureData(outputTextureLayout, programInfo.output.type);\r\n\r\n   if (!artifact) {\r\n   artifact = this.session.programManager.build(programInfo, inputTextureDatas, outputTextureData);\r\n   this.session.programManager.setArtifact(key, artifact);\r\n   }\r\n\r\n   this.runProgram(artifact, inputTextureDatas, outputTextureData);\r\n   return outputTextureData;\r\n }\r\n\r\n run(program: ProgramInfoLoader, inputs: readonly Tensor[]): Tensor {\r\n   const outputTextureData = this.executeProgram(program, inputs);\r\n   return outputTextureData.tensor;\r\n }\r\n\r\n private runProgram(artifact: Artifact, inputs: TextureData[], output: TextureData): void {\r\n   // input should match\r\n   for (let i = 0; i < inputs.length; ++i) {\r\n   if (!!inputs[i].isPacked !== (artifact.programInfo.inputTypes[i] === TextureType.packed)) {\r\n   throw new Error(`input[${i}] property packed inconsistent`);\r\n   }\r\n   }\r\n\r\n   // output should match\r\n   if (!!output.isPacked !== (artifact.programInfo.output.textureType === TextureType.packed)) {\r\n   throw new Error('output property packed inconsistent');\r\n   }\r\n\r\n   this.session.programManager.run(artifact, inputs, output);\r\n }\r\n\r\n /**\r\n   * Create a TextureData object from a tensor.\r\n   * Usage = Encoder.Usage.UploadOnly.\r\n   * If a related texture data is found in cache, returns it;\r\n   * Otherwise:\r\n   *   Creates a new texture layout if not provided;\r\n   *   Creates WebGLTexture with the layout;\r\n   *   Upload tensor data to the texture;\r\n   *   Creates a texture data object associated with the given tensor.\r\n   * @param tensor the tensor with data to upload\r\n   */\r\n private getOrCreateTextureData(tensor: Tensor, textureType: TextureType) {\r\n   let td = this.getTextureData(tensor.dataId, textureType === TextureType.packed);\r\n\r\n   if (!td) {\r\n   // check if we have texture data in different type\r\n   td = this.getTextureData(tensor.dataId, textureType !== TextureType.packed);\r\n   if (td) {\r\n   if (textureType === TextureType.packed) {\r\n   return this.pack(td);\r\n   } else {\r\n   return this.unpack(td);\r\n   }\r\n   }\r\n   }\r\n\r\n   if (!td) {\r\n   const layout = createTextureLayoutFromTextureType(this.session.layoutStrategy, tensor.dims, textureType);\r\n\r\n   if (textureType === TextureType.packedLastDimension) {\r\n   const group = 1;\r\n   const channels = 4;\r\n   const shape = tensor.dims;\r\n   if (shape.length === 4) {\r\n   // pre-processing for kernel data of Conv.\r\n   //\r\n   // TODO: currently this is a hacking to overwrite Conv's weight. The correct way to do this should be:\r\n   // 1. implement texture based const-folding\r\n   // 2. create a WebGL program \"preprocessConvWeight\" to do the same work as below\r\n   // 3. run the program before dotProduct.\r\n   //\r\n   const adjustedKernelShape = [shape[0], Math.ceil((shape[1] * shape[2] * shape[3]) / channels)];\r\n   const adjustedLayout =\r\n   createTextureLayoutFromTextureType(this.session.layoutStrategy, adjustedKernelShape, textureType);\r\n   let buffer = tensor.numberData;\r\n   if (shape[1] * shape[2] * shape[3] % channels !== 0) {\r\n   const numFeatureMaps = shape[0];\r\n   const oldRowSize = shape[1] * shape[2] * shape[3];\r\n   const newRowSize = Math.ceil(oldRowSize * group / channels) * channels;\r\n   const newSize = numFeatureMaps * newRowSize;\r\n   buffer = new Float32Array(newSize);\r\n   for (let f = 0; f < numFeatureMaps; ++f) {\r\n   const oldOffset = f * oldRowSize;\r\n   const newOffset = f * newRowSize + f % group * oldRowSize;\r\n   buffer.set(tensor.numberData.subarray(oldOffset, oldOffset + oldRowSize), newOffset);\r\n   }\r\n   }\r\n   return this.createTextureData(adjustedLayout, tensor.type, buffer, tensor, Encoder.Usage.UploadOnly);\r\n   }\r\n   }\r\n\r\n   if (textureType === TextureType.packed) {\r\n   const unpackedTextureLayout =\r\n createTextureLayoutFromShape(this.session.layoutStrategy, tensor.dims, 1, [], {reverseWH: true});\r\n const unpackedTextureData = this.createTextureData(\r\n unpackedTextureLayout, tensor.type, tensor.numberData, tensor, Encoder.Usage.UploadOnly);\r\n td = this.pack(unpackedTextureData);\r\n } else {\r\n td = this.createTextureData(layout, tensor.type, tensor.numberData, tensor, Encoder.Usage.UploadOnly);\r\n }\r\n }\r\n return td;\r\n }\r\n\r\n /**\r\n * Create a TextureData object using the given data and bind to the given tensor.\r\n * Usage = Encoder.Usage.UploadOnly.\r\n * NOTE: this function is a hack for Conv implementation. should remove this function, after rewriting Conv\r\n * implementation by Graph.Transformer\r\n * @param dataType the tensor data type\r\n * @param data the actual data to upload\r\n * @param tensor the tensor to bind. tensor's data is ignored.\r\n */\r\n createTextureDataFromLayoutBindTensor(\r\n layout: TextureLayout, dataType: Tensor.DataType, data: Tensor.NumberType, tensor: Tensor): TextureData {\r\n return this.createTextureData(layout, dataType, data, tensor, Encoder.Usage.UploadOnly);\r\n }\r\n\r\n private createTextureData(\r\n layout: TextureLayout, dataType: Tensor.DataType, data?: Tensor.NumberType, tensor?: Tensor,\r\n usage?: Encoder.Usage): TextureData {\r\n Logger.verbose('InferenceHandler', `Creating TextureData: layout:[${JSON.stringify(layout)}]`);\r\n const texture = this.session.textureManager.createTextureFromLayout(dataType, layout, data, usage);\r\n return this.createTextureDataFromTexture(layout, dataType, texture, tensor);\r\n }\r\n\r\n reshapeUnpacked(input: Tensor, reshapedDims: readonly number[]): Tensor {\r\n const inputTD = this.getOrCreateTextureData(input, TextureType.unpacked);\r\n const newTextureLayout: TextureLayout = {\r\n channels: inputTD.channels,\r\n height: inputTD.height,\r\n width: inputTD.width,\r\n // handle reshaping into scalar Tensors\r\n shape: reshapedDims.length !== 0 ? reshapedDims : [1],\r\n strides: ShapeUtil.computeStrides(reshapedDims),\r\n unpackedShape: reshapedDims,\r\n };\r\n const newTextureData = this.createTextureDataFromTexture(newTextureLayout, input.type, inputTD.texture);\r\n return newTextureData.tensor;\r\n }\r\n\r\n reshapePacked(input: Tensor, reshapedDims: readonly number[]): Tensor {\r\n const inputTD = this.getOrCreateTextureData(input, TextureType.packed);\r\n\r\n // check if the reshape is 'cheap'\r\n if (isReshapeCheap(input.dims, reshapedDims)) {\r\n const newTextureLayout: TextureLayout = {\r\n channels: inputTD.channels,\r\n height: inputTD.height,\r\n width: inputTD.width,\r\n // handle reshaping into scalar Tensors\r\n shape: reshapedDims.length !== 0 ? reshapedDims : [1],\r\n strides: ShapeUtil.computeStrides(reshapedDims),\r\n unpackedShape: reshapedDims,\r\n isPacked: true\r\n };\r\n const newTextureData = this.createTextureDataFromTexture(newTextureLayout, input.type, inputTD.texture);\r\n return newTextureData.tensor;\r\n }\r\n\r\n const squeezedInputShape = processDims3D(input.dims);\r\n const squeezedOutputShape = processDims3D(reshapedDims);\r\n\r\n const squeezedInputTensor = this.reshapePacked(input, squeezedInputShape);\r\n const squeezedOutputTensor = this.run(\r\n createPackedReshape3DProgramInfoLoader(this, squeezedInputTensor, squeezedOutputShape), [squeezedInputTensor]);\r\n const outputTensor = this.reshapePacked(squeezedOutputTensor, reshapedDims);\r\n return outputTensor;\r\n }\r\n\r\n private createTextureDataFromTexture(\r\n layout: TextureLayout, dataType: Tensor.DataType, texture: WebGLTexture, tensor?: Tensor, tensorId?: Tensor.Id) {\r\n const textureData: TextureData = {\r\n ...layout,\r\n tensor: tensor ||\r\n new Tensor(\r\n layout.unpackedShape, dataType, (_id: Tensor.Id) => this.readTexture(textureData),\r\n async (_id: Tensor.Id) => this.readTextureAsync(textureData), undefined, tensorId),\r\n texture\r\n };\r\n this.setTextureData(textureData.tensor.dataId, textureData, layout.isPacked);\r\n return textureData;\r\n }\r\n\r\n private getTextureData(tensorId: Tensor.Id, isPacked = false): TextureData|undefined {\r\n return this.session.isInitializer(tensorId) ?\r\n this.session.getTextureData(tensorId, isPacked) :\r\n isPacked ? this.packedTextureDataCache.get(tensorId) : this.unpackedTextureDataCache.get(tensorId);\r\n }\r\n setTextureData(tensorId: Tensor.Id, td: TextureData, isPacked = false): void {\r\n if (this.session.isInitializer(tensorId)) {\r\n this.session.setTextureData(tensorId, td, isPacked);\r\n } else {\r\n (isPacked ? this.packedTextureDataCache : this.unpackedTextureDataCache).set(tensorId, td);\r\n }\r\n }\r\n isTextureLayoutCached(tensor: Tensor, isPacked = false): boolean {\r\n return !!this.getTextureData(tensor.dataId, isPacked);\r\n }\r\n\r\n dispose(): void {\r\n this.session.textureManager.clearActiveTextures();\r\n   this.packedTextureDataCache.forEach(td => this.session.textureManager.releaseTexture(td));\r\n   this.packedTextureDataCache = new Map();\r\n   this.unpackedTextureDataCache.forEach(td => this.session.textureManager.releaseTexture(td));\r\n   this.unpackedTextureDataCache = new Map();\r\n }\r\n\r\n readTexture(textureData: TextureData): Tensor.NumberType {\r\n   if (textureData.isPacked) {\r\n   return this.readTexture(this.unpack(textureData));\r\n   }\r\n   if (!this.session.backend.glContext.isFloat32DownloadSupported) {\r\n   return this.session.textureManager.readUint8TextureAsFloat(encodeAsUint8(this, textureData));\r\n   }\r\n   return this.session.textureManager.readTexture(textureData, textureData.tensor.type, textureData.channels);\r\n }\r\n\r\n async readTextureAsync(textureData: TextureData): Promise<Tensor.NumberType> {\r\n   if (textureData.isPacked) {\r\n   return this.readTextureAsync(this.unpack(textureData));\r\n   }\r\n   if (!this.session.backend.glContext.isFloat32DownloadSupported) {\r\n   return this.session.textureManager.readUint8TextureAsFloat(encodeAsUint8(this, textureData));\r\n   }\r\n   return this.session.textureManager.readTextureAsync(textureData, textureData.tensor.type, textureData.channels);\r\n }\r\n\r\n pack(input: TextureData): TextureData {\r\n   const outputTextureData = this.executeProgram(createPackProgramInfoLoader(this, input.tensor), [input.tensor]);\r\n   return outputTextureData;\r\n }\r\n\r\n unpack(input: TextureData): TextureData {\r\n   const outputTextureData = this.executeProgram(createUnpackProgramInfoLoader(this, input.tensor), [input.tensor]);\r\n   return outputTextureData;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {OpSet} from '../../opset';\r\n\r\nimport {batchNormalization, parseBatchNormalizationAttributes} from './ops/batch-normalization';\r\nimport * as binaryOps from './ops/binary-op';\r\nimport {concat, parseConcatAttributes} from './ops/concat';\r\nimport {conv, parseConvAttributes} from './ops/conv';\r\nimport {depthToSpace, parseDepthToSpaceAttributes} from './ops/depth-to-space';\r\nimport {flatten, parseFlattenAttributes} from './ops/flatten';\r\nimport {gather, parseGatherAttributes} from './ops/gather';\r\nimport {gemm, parseGemmAttributesV11, parseGemmAttributesV7} from './ops/gemm';\r\nimport {imageScaler, parseImageScalerAttributes} from './ops/image-scaler';\r\nimport {instanceNormalization, parseInstanceNormalizationAttributes} from './ops/instance-normalization';\r\nimport {matMul, parseMatMulAttributes} from './ops/matmul';\r\nimport {pad, parsePadAttributes} from './ops/pad';\r\nimport {averagePool, parseAveragePoolAttributes} from './ops/pool';\r\nimport {globalAveragePool, parseGlobalAveragePoolAttributes} from './ops/pool';\r\nimport {maxPool, parseMaxPoolAttributes} from './ops/pool';\r\nimport {globalMaxPool} from './ops/pool';\r\nimport {reduceLogSum, reduceLogSumSquare, reduceMax, reduceMean, reduceMin, reduceProd, reduceSum} from './ops/reduce';\r\nimport {parseReduceAttributes} from './ops/reduce';\r\nimport {reshape} from './ops/reshape';\r\nimport {parseResizeAttributesV10, parseResizeAttributesV11, resize} from './ops/resize-packed';\r\nimport {shape} from './ops/shape';\r\nimport {parseSliceAttributes, slice, sliceV10} from './ops/slice';\r\nimport {parseSoftmaxAttributes, softmax} from './ops/softmax';\r\nimport {parseSplitAttributes, split} from './ops/split';\r\nimport {parseSqueezeAttributes, squeeze} from './ops/squeeze';\r\nimport {sum} from './ops/sum';\r\nimport {tile} from './ops/tile';\r\nimport {parseTransposeAttributes, transpose} from './ops/transpose';\r\nimport * as unaryOps from './ops/unary-op';\r\nimport {parseUnsqueezeAttributes, unsqueeze} from './ops/unsqueeze';\r\nimport {parseUpsampleAttributesV7, parseUpsampleAttributesV9, upsample} from './ops/upsample';\r\n\r\nexport const WEBGL_OP_RESOLVE_RULES: readonly OpSet.ResolveRule[] = [\r\n ['Abs', '', '6+', unaryOps.abs],\r\n ['Acos', '', '7+', unaryOps.acos],\r\n ['Add', '', '7+', binaryOps.add],\r\n ['And', '', '7+', binaryOps.and],\r\n ['Asin', '', '7+', unaryOps.asin],\r\n ['Atan', '', '7+', unaryOps.atan],\r\n // TODO: support new attributes for AveragePool-10\r\n ['AveragePool', '', '7-10', averagePool, parseAveragePoolAttributes],\r\n ['BatchNormalization', '', '7+', batchNormalization, parseBatchNormalizationAttributes],\r\n ['Ceil', '', '6+', unaryOps.ceil],\r\n ['Clip', '', '6-10', unaryOps.clip, unaryOps.parseClipAttributes],\r\n ['Concat', '', '4+', concat, parseConcatAttributes],\r\n ['Conv', '', '1+', conv, parseConvAttributes],\r\n ['Cos', '', '7+', unaryOps.cos],\r\n ['Div', '', '7+', binaryOps.div],\r\n ['Dropout', '', '7+', unaryOps.identity],\r\n ['DepthToSpace', '', '1+', depthToSpace, parseDepthToSpaceAttributes],\r\n ['Equal', '', '7+', binaryOps.equal],\r\n ['Elu', '', '6+', unaryOps.elu, unaryOps.parseEluAttributes],\r\n ['Exp', '', '6+', unaryOps.exp],\r\n ['Flatten', '', '1+', flatten, parseFlattenAttributes],\r\n ['Floor', '', '6+', unaryOps.floor],\r\n ['Gather', '', '1+', gather, parseGatherAttributes],\r\n ['Gemm', '', '7-10', gemm, parseGemmAttributesV7],\r\n ['Gemm', '', '11+', gemm, parseGemmAttributesV11],\r\n ['GlobalAveragePool', '', '1+', globalAveragePool, parseGlobalAveragePoolAttributes],\r\n ['GlobalMaxPool', '', '1+', globalMaxPool],\r\n ['Greater', '', '7+', binaryOps.greater],\r\n ['Identity', '', '1+', unaryOps.identity],\r\n ['ImageScaler', '', '1+', imageScaler, parseImageScalerAttributes],\r\n ['InstanceNormalization', '', '6+', instanceNormalization, parseInstanceNormalizationAttributes],\r\n ['LeakyRelu', '', '6+', unaryOps.leakyRelu, unaryOps.parseLeakyReluAttributes],\r\n ['Less', '', '7+', binaryOps.less],\r\n ['Log', '', '6+', unaryOps.log],\r\n ['MatMul', '', '1+', matMul, parseMatMulAttributes],\r\n // TODO: support new attributes for MaxPool-8 and MaxPool-10\r\n ['MaxPool', '', '1-9', maxPool, parseMaxPoolAttributes],\r\n ['Mul', '', '7+', binaryOps.mul],\r\n ['Neg', '', '6+', unaryOps.neg],\r\n ['Not', '', '1+', unaryOps.not],\r\n ['Or', '', '7+', binaryOps.or],\r\n ['Pad', '', '2-10', pad, parsePadAttributes],\r\n ['Pow', '', '7+', binaryOps.pow],\r\n ['PRelu', '', '7+', binaryOps.pRelu],\r\n ['ReduceLogSum', '', '1+', reduceLogSum, parseReduceAttributes],\r\n ['ReduceMax', '', '1+', reduceMax, parseReduceAttributes],\r\n ['ReduceMean', '', '1+', reduceMean, parseReduceAttributes],\r\n ['ReduceMin', '', '1+', reduceMin, parseReduceAttributes],\r\n ['ReduceProd', '', '1+', reduceProd, parseReduceAttributes],\r\n ['ReduceSum', '', '1+', reduceSum, parseReduceAttributes],\r\n ['ReduceSumSquare', '', '1+', reduceLogSumSquare, parseReduceAttributes],\r\n ['Relu', '', '6+', unaryOps.relu],\r\n ['Reshape', '', '5+', reshape],\r\n ['Resize', '', '10', resize, parseResizeAttributesV10],\r\n ['Resize', '', '11+', resize, parseResizeAttributesV11],\r\n ['Shape', '', '1+', shape],\r\n ['Sigmoid', '', '6+', unaryOps.sigmoid],\r\n ['Sin', '', '7+', unaryOps.sin],\r\n ['Slice', '', '10+', sliceV10], // TODO: support 'steps' for Slice-10\r\n ['Slice', '', '1-9', slice, parseSliceAttributes],\r\n ['Softmax', '', '1+', softmax, parseSoftmaxAttributes],\r\n // 'Split' operator has an optional attribute 'split'\r\n // this attribute determines how the specified axis of input data is split.\r\n // When the attribute is missing, we need the count of number of outputs\r\n // so that we can determine the 'split' attribute from the runtime input to the Operator\r\n ['Split', '', '2+', split, parseSplitAttributes],\r\n ['Sqrt', '', '6+', unaryOps.sqrt],\r\n ['Squeeze', '', '1+', squeeze, parseSqueezeAttributes],\r\n ['Sub', '', '7+', binaryOps.sub],\r\n ['Sum', '', '6+', sum],\r\n ['Tan', '', '7+', unaryOps.tan],\r\n ['Tanh', '', '6+', unaryOps.tanh],\r\n ['Tile', '', '6+', tile],\r\n ['Transpose', '', '1+', transpose, parseTransposeAttributes],\r\n ['Upsample', '', '7-8', upsample, parseUpsampleAttributesV7],\r\n ['Upsample', '', '9', upsample, parseUpsampleAttributesV9],\r\n ['Unsqueeze', '', '1+', unsqueeze, parseUnsqueezeAttributes],\r\n ['Xor', '', '7+', binaryOps.xor],\r\n];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface BatchNormalizationAttributes extends AttributeWithCacheKey {\r\n epsilon: number;\r\n momentum: number;\r\n spatial: number;\r\n}\r\n\r\nconst batchNormalizationProgramMetadata = {\r\n name: 'BatchNormalization',\r\n inputNames: ['A', 'Scale', 'B', 'Mean', 'Variance'],\r\n inputTypes:\r\n [TextureType.unpacked, TextureType.unpacked, TextureType.unpacked, TextureType.unpacked, TextureType.unpacked]\r\n};\r\n\r\nexport const batchNormalization: OperatorImplementation<BatchNormalizationAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: BatchNormalizationAttributes): Tensor[] => {\r\n validateInputs(inputs);\r\n const output = inferenceHandler.run(\r\n {\r\n ...batchNormalizationProgramMetadata,\r\n cacheHint: attributes.cacheKey,\r\n get: () => createBatchNormalizationProgramInfo(inferenceHandler, inputs, attributes)\r\n },\r\n inputs);\r\n return [output];\r\n };\r\n\r\nexport const parseBatchNormalizationAttributes: OperatorInitialization<BatchNormalizationAttributes> =\r\n (node: Graph.Node): BatchNormalizationAttributes => {\r\n const epsilon = node.attributes.getFloat('epsilon', 1e-5);\r\n const momentum = node.attributes.getFloat('momentum', 0.9);\r\n const spatial = node.attributes.getInt('spatial', 1);\r\n return createAttributeWithCacheKey({epsilon, momentum, spatial});\r\n };\r\n\r\nconst createBatchNormalizationProgramInfo =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],

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attributes: BatchNormalizationAttributes):\r\n        ProgramInfo => {\r\n          const glsl =
getGlsl(inferenceHandler.session.backend.glContext.version);\r\n          const rank = inputs[0].dims.length;\r\n
const [scaleWidth, scaleHeight] =\r\n              inferenceHandler.calculateTextureWidthAndHeight(inputs[1].dims,
TextureType.unpacked);\r\n          const shaderSource = `\r\n  float process(int[${rank}] indices) {\r\n    vec2
position = offsetToCoords(indices[1], ${scaleWidth}, ${scaleHeight});\r\n    float scale =
getColorAsFloat(${glsl.texture2D}(Scale, position));\r\n    float mean = getColorAsFloat(${glsl.texture2D}(Mean,
position));\r\n    float variance = getColorAsFloat(${glsl.texture2D}(Variance, position));\r\n    float b =
getColorAsFloat(${glsl.texture2D}(B, position));\r\n\r\n    return scale * ( (_A(indices) - mean) / sqrt(variance +
float(${attributes.epsilon})) ) + b;\r\n  }`;\r\n          return {\r\n            ...batchNormalizationProgramMetadata,\r\n
     output: {dims: inputs[0].dims, type: inputs[0].type, textureType: TextureType.unpacked},\r\n
shaderSource\r\n          };\r\n        };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs ||
inputs.length !== 5) {\r\n    throw new Error('BatchNormalization requires 5 inputs.');\r\n  }\r\n\r\n  const X =
inputs[0];\r\n  const scale = inputs[1];\r\n  const B = inputs[2];\r\n  const mean = inputs[3];\r\n  const var_ =
inputs[4];\r\n\r\n  // input should atleast have three dimensions - N,C,dim1,...,dimn\r\n  // other inputs can have only
one dimensions\r\n  if (X.dims.length < 3 || scale.dims.length !== 1 || B.dims.length !== 1 || mean.dims.length !== 1
||\r\n      var_.dims.length !== 1) {\r\n    throw new Error('invalid input shape.');\r\n  }\r\n  if (scale.dims[0] !==
X.dims[1] || B.dims[0] !== X.dims[1] || mean.dims[0] !== X.dims[1] ||\r\n      var_.dims[0] !== X.dims[1]) {\r\n
throw new Error('invalid input shape.');\r\n  }\r\n  if ((X.type !== 'float32' && X.type !== 'float64') || (scale.type !==
'float32' && scale.type !== 'float64') ||\r\n      (B.type !== 'float32' && B.type !== 'float64') || (mean.type !==
'float32' && mean.type !== 'float64') ||\r\n      (var_.type !== 'float32' && var_.type !== 'float64')) {\r\n    throw new
Error('invalid input tensor types.');\r\n  }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n//
Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {BroadcastUtil, ShapeUtil}
from '../../../util';\r\nimport {FunctionType, GlslValueFunction} from '../glsl-definitions';\r\nimport {getGlsl} from
'../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo,
ProgramInfoLoader, TextureType} from '../types';\r\n\r\nexport function glslAdd(): GlslValueFunction {\r\n  const
name = 'add_';\r\n  const body = `\r\n  float ${name}(float a, float b) {\r\n    return a + b;\r\n  }\r\n  vec4
${name}(vec4 v1, vec4 v2) {\r\n    return v1 + v2;\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\nexport function glslDiv(): GlslValueFunction {\r\n  const name = 'div_';\r\n
const body = `\r\n  float ${name}(float a, float b) {\r\n    return a / b;\r\n  }\r\n  vec4 ${name}(vec4 v1, vec4 v2)
{\r\n    return v1 / v2;\r\n  }\r\n  `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function
glslMul(): GlslValueFunction {\r\n  const name = 'mul_';\r\n  const body = `\r\n  float ${name}(float a, float b) {\r\n
 return a * b;\r\n  }\r\n  vec4 ${name}(vec4 v1, vec4 v2) {\r\n    return v1 * v2;\r\n  }\r\n  `;\r\n  return {body, name,
type: FunctionType.ValueBased};\r\n}\r\nexport function glslSub(): GlslValueFunction {\r\n  const name =
'sub_';\r\n  const body = `\r\n  float ${name}(float a, float b) {\r\n    return a - b;\r\n  }\r\n  vec4 ${name}(vec4 v1,
vec4 v2) {\r\n    return v1 - v2;\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\nexport function glslEqual(): GlslValueFunction {\r\n  const name = 'equal_';\r\n
const body = `\r\n  float ${name}(float a, float b) {\r\n    return float(a == b);\r\n  }\r\n  vec4 ${name}(vec4 v1, vec4
v2) {\r\n    return vec4(equal(v1, v2));\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\nexport function glslGreater(): GlslValueFunction {\r\n  const name =
'greater_';\r\n  const body = `\r\n  float ${name}(float a, float b) {\r\n    return float(a > b);\r\n  }\r\n  vec4
${name}(vec4 v1, vec4 v2) {\r\n    return vec4( v1.r > v2.r ,\r\n      v1.g > v2.g,\r\n      v1.b > v2.b,\r\n      v1.a > v2.a
);\r\n  }\r\n  `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslLess():
GlslValueFunction {\r\n  const name = 'less_';\r\n  const body = `\r\n  float ${name}(float a, float b) {\r\n    return
float(a < b);\r\n  }\r\n  vec4 ${name}(vec4 v1, vec4 v2) {\r\n    return vec4( v1.r < v2.r ,\r\n                v1.g < v2.g,\r\n
              v1.b < v2.b,\r\n                v1.a < v2.a );\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\nexport function glslAnd(): GlslValueFunction {\r\n  const name = 'and_';\r\n
const body = `\r\n  float ${name}(float a, float b) {\r\n    return float( bool(a) && bool(b) );\r\n  }\r\n  vec4
${name}(vec4 v1, vec4 v2) {\r\n    bvec4 b1 = bvec4(v1);\r\n    bvec4 b2 = bvec4(v2);\r\n    return vec4( b1.r &&
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b2.r ,\r\n               b1.g && b2.g,\r\n               b1.b && b2.b,\r\n               b1.a && b2.a );\r\n  }\r\n  `;\r\n  return
{body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslOr(): GlslValueFunction {\r\n  const
name = 'or_';\r\n  const body = `\r\n  float ${name}(float a, float b) {\r\n    return float( bool(a) || bool(b) );\r\n  }\r\n
vec4 ${name}(vec4 v1, vec4 v2) {\r\n    bvec4 b1 = bvec4(v1);\r\n    bvec4 b2 = bvec4(v2);\r\n    return vec4( b1.r ||
b2.r ,\r\n               b1.g || b2.g,\r\n               b1.b || b2.b,\r\n               b1.a || b2.a );\r\n  }\r\n  `;\r\n  return {body,
name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslXor(): GlslValueFunction {\r\n  const name =
'xor_';\r\n  const body = `\r\n  float ${name}(float a, float b) {\r\n    return float( bool(a) ^^ bool(b) );\r\n  }\r\n  vec4
${name}(vec4 v1, vec4 v2) {\r\n    bvec4 b1 = bvec4(v1);\r\n    bvec4 b2 = bvec4(v2);\r\n    return vec4( b1.r ^^ b2.r
,\r\n               b1.g ^^ b2.g,\r\n               b1.b ^^ b2.b,\r\n               b1.a ^^ b2.a );\r\n  }\r\n  `;\r\n  return {body,
name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslPow(): GlslValueFunction {\r\n  return
glslBuiltinBinary('pow');\r\n}\r\nexport function glslPRelu(): GlslValueFunction {\r\n  const name = 'prelu_';\r\n
const body = `\r\n  float ${name}(float a, float b) {\r\n    return a < 0.0 ? a * b: a;\r\n  }\r\n  vec4 ${name}(vec4 v1,
vec4 v2) {\r\n    return vec4(\r\n      v1.r < 0.0 ? v1.r * v2.r: v1.r,\r\n      v1.g < 0.0 ? v1.g * v2.g: v1.g,\r\n      v1.b <
0.0 ? v1.b * v2.b: v1.b,\r\n      v1.a < 0.0 ? v1.a * v2.a: v1.a\r\n      );\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\n\r\nfunction glslBuiltinBinary(fname: string): GlslValueFunction {\r\n  const
name = `${fname}_`;\r\n  const body = `\r\n  float ${name}(float a, float b) {\r\n    return ${fname}(a, b);\r\n  }\r\n
vec4 ${name}(vec4 v1, vec4 v2) {\r\n    return ${fname}(v1, v2);\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\n\r\nconst createBinaryProgramInfoLoader =\r\n    (handler:
WebGLInferenceHandler, inputs: Tensor[], glslFunc: GlslValueFunction,\r\n     outputTensorType:
Tensor.DataType = inputs[0].type, cacheKey?: string): ProgramInfoLoader => {\r\n      const textureType =
handler.session.pack ? TextureType.packed : TextureType.unpacked;\r\n      return {\r\n        name:
glslFunc.name,\r\n        inputNames: ['A', 'B'],\r\n        inputTypes: [textureType, textureType],\r\n        cacheHint:
cacheKey,\r\n        get: () => createBinaryProgramInfo(handler, inputs, glslFunc, outputTensorType)\r\n      };\r\n
};\r\n\r\nconst createBinaryProgramInfo =\r\n    (handler: WebGLInferenceHandler, inputs: Tensor[], glslFunc:
GlslValueFunction,\r\n     outputTensorType: Tensor.DataType = inputs[0].type): ProgramInfo => {\r\n      const
textureType = handler.session.pack ? TextureType.packed : TextureType.unpacked;\r\n      const isBroadcast =
!ShapeUtil.areEqual(inputs[0].dims, inputs[1].dims);\r\n      let outputShape = inputs[0].dims;\r\n\r\n      const
usePackedTexture = handler.session.pack;\r\n\r\n      if (isBroadcast) {\r\n        const calculatedShape =
BroadcastUtil.calcShape(inputs[0].dims, inputs[1].dims, false);\r\n        if (!calculatedShape) {\r\n          throw new
Error('Can\\'t perform binary op on the given tensors');\r\n        }\r\n        outputShape = calculatedShape;\r\n
const outputRank = outputShape.length;\r\n        const aRank = inputs[0].dims.length !== 0 ? inputs[0].dims.length :
1;\r\n        const bRank = inputs[1].dims.length !== 0 ? inputs[1].dims.length : 1;\r\n        const aBcast =
inputs[0].dims.length !== 0 ? 'bcastIndices_A(indices, aindices);' : 'aindices[0] = 0;';\r\n        const bBcast =
inputs[1].dims.length !== 0 ? 'bcastIndices_B(indices, bindices);' : 'bindices[0] = 0;';\r\n\r\n        const glsl =
getGlsl(handler.session.backend.glContext.version);\r\n        const shaderSource = usePackedTexture ? `\r\n
${glslFunc.body}\r\n      void main() {\r\n        vec4 a = getAAtOutCoords();\r\n        vec4 b =
getBAtOutCoords();\r\n        vec4 result = ${glslFunc.name}(a, b);\r\n        ${glsl.output} = result;\r\n      }` :\r\n
                              `\r\n      ${glslFunc.body}\r\n      float process(int indices[${outputRank}]) {\r\n        int
aindices[${aRank}];\r\n        int bindices[${bRank}];\r\n        ${aBcast}\r\n        ${bBcast}\r\n        return
${glslFunc.name}(_A(aindices), _B(bindices));\r\n      }`;\r\n\r\n        return {\r\n          name: glslFunc.name,\r\n
  inputNames: ['A', 'B'],\r\n          inputTypes: [textureType, textureType],\r\n          output: {dims: outputShape,
type: outputTensorType, textureType},\r\n          shaderSource,\r\n          hasMain: usePackedTexture\r\n        };\r\n
 }\r\n      const glsl = getGlsl(handler.session.backend.glContext.version);\r\n      const shaderSource = `\r\n
${glslFunc.body}\r\n    void main() {\r\n      vec4 v1 = ${glsl.texture2D}(A, TexCoords);\r\n      vec4 v2 =
${glsl.texture2D}(B, TexCoords);\r\n      vec4 result = ${glslFunc.name}(v1, v2);\r\n      ${glsl.output} = result;\r\n
 }\r\n    `;\r\n\r\n      return {\r\n        name: glslFunc.name,\r\n        inputNames: ['A', 'B'],\r\n        inputTypes:
[textureType, textureType],\r\n        output: {dims: inputs[0].dims, type: outputTensorType, textureType},\r\n
shaderSource,\r\n        hasMain: true\r\n      };\r\n    };\r\n\r\nexport const add = (handler: WebGLInferenceHandler,
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inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslAdd()), inputs)];\r\n\r\nexport const and = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslAnd(), 'bool'), inputs)];\r\n\r\nexport const div = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslDiv()), inputs)];\r\n\r\nexport const equal = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslEqual(), 'bool'), inputs)];\r\n\r\nexport const greater = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslGreater(), 'bool'), inputs)];\r\n\r\nexport const less = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslLess(), 'bool'), inputs)];\r\n\r\nexport const mul = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslMul()), inputs)];\r\n\r\nexport const or = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslOr(), 'bool'), inputs)];\r\n\r\nexport const pow = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslPow()), inputs)];\r\n\r\nexport const pRelu = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslPRelu()), inputs)];\r\n\r\nexport const sub = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslSub()), inputs)];\r\n\r\nexport const xor = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslXor(), 'bool'), inputs)];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport {getCoordsDataType, getGlChannels} from '../utils';\r\nimport {ConcatAttributes} from './concat';\r\n\r\nimport {getChannels, unpackFromChannel} from './packing-utils';\r\n\r\nconst createPackedConcatProgramMetadata = (inputCount: number, cacheHint: string) => ({\r\n name: 'Concat (packed)',\r\n inputNames: Array.from({length: inputCount}, (v, i) => `X${i}`),\r\n inputTypes: Array(inputCount).fill(TextureType.packed),\r\n cacheHint\r\n});\r\n\r\nconst createPackedConcatProgramInfo =\r\n   (handler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: Tensor[], axis: number): ProgramInfo => {\r\n   const inputShape = inputs[0].dims.slice();\r\n   if (axis >= inputShape.length || axis < (-1 * inputShape.length)) {\r\n   throw new Error('axis specified for concat doesn\\\'t match input dimensionality');\r\n   }\r\n   if (axis < 0) {\r\n   axis = inputShape.length + axis;\r\n   }\r\n   // ensure all of the non-concatenated axes match each other\r\n   // calculate the shape of the output tensor while we do that\r\n   const outputShape = inputShape.slice(0);\r\n   for (let i = 1; i < inputs.length; i++) {\r\n   const dataNShape = inputs[i].dims.slice();\r\n   for (let axisIndex = 0; axisIndex < inputShape.length; axisIndex++) {\r\n   // add to the placeholder for computing output shape\r\n   if (axisIndex === axis) {\r\n   outputShape[axis] += dataNShape[axisIndex];\r\n   }\r\n   // ensure all non-cancatenated axes match each other\r\n   else if (inputShape[axisIndex] !== dataNShape[axisIndex]) {\r\n   throw new Error('non concat dimensions must match');\r\n   }\r\n   }\r\n   }\r\n\r\n   const rank = outputShape.length;\r\n   const coords = getChannels('coords', rank);\r\n   const dtype = getCoordsDataType(rank);\r\n   const unpackChannel = unpackFromChannel();\r\n\r\n   const shapes = inputs.map(i => i.dims);\r\n   const channels = getGlChannels(rank);\r\n   const offsets: number[] = new Array(shapes.length - 1);\r\n\r\n   offsets[0] = shapes[0][axis];\r\n   for (let i = 1; i < offsets.length; i++) {\r\n   offsets[i] = offsets[i - 1] + shapes[i][axis];\r\n   }\r\n\r\n   const channel = channels[axis];\r\n   const lastChannels = channels.slice(-2);\r\n   const allChannels = channels.join();\r\n\r\n   let getValueSnippet = `if (${channel} < ${offsets[0]}) {\r\n   return getChannel(\r\n   getX0(${allChannels}),

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vec2(${lastChannels.join()}));\r\n        }`;\r\n      for (let i = 1; i < offsets.length; i++) {\r\n        const shift = offsets[i
- 1];\r\n        getValueSnippet += `\r\n            if (${channel} < ${offsets[i]}  && ${channel} >= ${offsets[i - 1]})
{\r\n              return getChannel(\r\n                getX${i}(${getShiftedChannelsSnippet(channels, channel, shift)}),\r\n
              vec2(${getShiftedChannelsSnippet(lastChannels, channel, shift)}));\r\n            }`;\r\n      }\r\n      const
lastIndex = offsets.length;\r\n      const shift = offsets[offsets.length - 1];\r\n      getValueSnippet += `\r\n
return getChannel(\r\n              getX${lastIndex}(${getShiftedChannelsSnippet(channels, channel, shift)}),\r\n
  vec2(${getShiftedChannelsSnippet(lastChannels, channel, shift)}));`;\r\n\r\n      const glsl =
getGlsl(handler.session.backend.glContext.version);\r\n\r\n      const shaderSource = `\r\n
${unpackChannel}\r\n          float getValue(${channels.map(x => 'int ' + x)}) {\r\n            ${getValueSnippet}\r\n
   }\r\n\r\n          void main() {\r\n            ${dtype} coords = getOutputCoords();\r\n            int lastDim =
coords.${channels[rank - 1]};\r\n            coords.${channels[rank - 1]} = coords.${channels[rank - 2]};\r\n
coords.${channels[rank - 2]} = lastDim;\r\n\r\n            vec4 result = vec4(getValue(${coords}), 0., 0., 0.);\r\n\r\n
   ${coords[rank - 1]} = ${coords[rank - 1]} + 1;\r\n            if (${coords[rank - 1]} < ${outputShape[rank - 1]})
{\r\n              result.g = getValue(${coords});\r\n            }\r\n\r\n            ${coords[rank - 2]} = ${coords[rank - 2]} +
1;\r\n            if (${coords[rank - 2]} < ${outputShape[rank - 2]}) {\r\n              result.a = getValue(${coords});\r\n
      }\r\n\r\n            ${coords[rank - 1]} = ${coords[rank - 1]} - 1;\r\n            if (${coords[rank - 2]} <
${outputShape[rank - 2]} &&\r\n                ${coords[rank - 1]} < ${outputShape[rank - 1]}) {\r\n              result.b =
getValue(${coords});\r\n            }\r\n            ${glsl.output} = result;\r\n          }\r\n        `;\r\n\r\n      return {\r\n
...metadata,\r\n        output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.packed},\r\n
shaderSource,\r\n        hasMain: true,\r\n      };\r\n    };\r\n\r\nexport const createPackedConcatProgramInfoLoader
=\r\n    (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: ConcatAttributes): ProgramInfoLoader =>
{\r\n      const metadata = createPackedConcatProgramMetadata(inputs.length, attributes.cacheKey);\r\n      return
{...metadata, get: () => createPackedConcatProgramInfo(handler, metadata, inputs, attributes.axis)};\r\n
};\r\n\r\nconst getShiftedChannelsSnippet = (channels: string[], channel: string, shift: number): string => {\r\n  const
channelIdx = channels.indexOf(channel);\r\n  const res = channels.map((c, idx) => {\r\n    if (idx === channelIdx)
{\r\n      return `${c} - ${shift}`;\r\n    } else {\r\n      return c;\r\n    }\r\n  });\r\n  return res.join();\r\n};\r\n","//
Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph}
from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport
{Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport
{ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nimport
{createPackedConcatProgramInfoLoader} from './concat-packed';\r\n\r\nexport interface ConcatAttributes extends
AttributeWithCacheKey {\r\n  readonly axis: number;\r\n}\r\n\r\nexport const concat:
OperatorImplementation<ConcatAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: ConcatAttributes): Tensor[] => {\r\n      validateInputs(inputs);\r\n      if (inferenceHandler.session.pack
&& inputs[0].dims.length > 1) {\r\n        const output =\r\n
inferenceHandler.run(createPackedConcatProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n
return [output];\r\n      } else {\r\n        const output =\r\n
inferenceHandler.run(createUnpackedConcatProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n
  return [output];\r\n      }\r\n    };\r\n\r\nconst createUnpackedConcatProgramMetadata = (inputCount: number,
cacheHint: string) => ({\r\n  name: 'Concat',\r\n  inputNames: Array.from({length: inputCount}, (v, i) =>
`X${i}`),\r\n  inputTypes: Array(inputCount).fill(TextureType.unpacked),\r\n  cacheHint\r\n});\r\n\r\nconst
createUnpackedConcatProgramInfo =\r\n    (handler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs:
Tensor[], axis: number): ProgramInfo => {\r\n      const inputShape = inputs[0].dims.slice();\r\n      if (axis >=
inputShape.length || axis < (-1 * inputShape.length)) {\r\n        throw new Error('axis specified for concat doesn\\'t
match input dimensionality');\r\n      }\r\n      if (axis < 0) {\r\n        axis = inputShape.length + axis;\r\n      }\r\n      //
ensure all of the non-concatenated axes match each other\r\n      // calculate the shape of the output tensor while we
do that\r\n      const outputShape = inputShape.slice(0);\r\n      for (let i = 1; i < inputs.length; i++) {\r\n        const
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dataNShape = inputs[i].dims.slice();\r\n        for (let axisIndex = 0; axisIndex < inputShape.length; axisIndex++)
{\r\n          // add to the placeholder for computing output shape\r\n          if (axisIndex === axis) {\r\n
outputShape[axis] += dataNShape[axisIndex];\r\n          }\r\n          // ensure all non-cancatenated axes match each
other\r\n          else if (inputShape[axisIndex] !== dataNShape[axisIndex]) {\r\n            throw new Error('non concat
dimensions must match');\r\n          }\r\n        }\r\n      }\r\n\r\n      const rank = outputShape.length;\r\n\r\n      const
sizeInConcatAxis = new Array<number>(inputs.length);\r\n      let previousSum = 0;\r\n      for (let i = 0; i <
sizeInConcatAxis.length; ++i) {\r\n        previousSum += inputs[i].dims[axis];\r\n        sizeInConcatAxis[i] =
previousSum;\r\n      }\r\n\r\n      let getTextureIndexWhereDataResidesMethod = '';\r\n      // in most cases linear
search is sufficient, as in most scenarios, only 2 tensors are concatenated\r\n      if (inputs.length < 5) {\r\n
getTextureIndexWhereDataResidesMethod =
getTextureIndexWhereDataResidesLinearSearch(sizeInConcatAxis);\r\n      } else {\r\n
getTextureIndexWhereDataResidesMethod =
getTextureIndexWhereDataResidesBinarySearch(sizeInConcatAxis);\r\n      }\r\n\r\n      const
fetchDataFromCorrectTextureMethod = getFetchDataFromCorrectTextureMethod(inputs.length, rank);\r\n      const
getSizeInConcatAxisValueFromIndexMethod =
getGetSizeInConcatAxisValueFromIndexMethod(sizeInConcatAxis);\r\n      const shaderSource = `\r\n
${fetchDataFromCorrectTextureMethod}\r\n        ${getSizeInConcatAxisValueFromIndexMethod}\r\n
${getTextureIndexWhereDataResidesMethod}\r\n        float process(int indices[${rank}]) {\r\n          int
textureIndex = getTextureWhereDataResides (indices[${axis}]);\r\n\r\n          if(textureIndex != 0) {\r\n
indices[${axis}] = indices[${axis}] - int(getSizeInConcatAxisValueFromIndex(textureIndex-int(1)));\r\n
}\r\n\r\n          return fetchDataFromCorrectTexture(textureIndex, indices);\r\n        }`;\r\n      return {\r\n
...metadata,\r\n        output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n
shaderSource,\r\n      };\r\n    };\r\n\r\nconst createUnpackedConcatProgramInfoLoader =\r\n    (handler:
WebGLInferenceHandler, inputs: Tensor[], attributes: ConcatAttributes): ProgramInfoLoader => {\r\n      const
metadata = createUnpackedConcatProgramMetadata(inputs.length, attributes.cacheKey);\r\n      return {...metadata,
get: () => createUnpackedConcatProgramInfo(handler, metadata, inputs, attributes.axis)};\r\n    };\r\n\r\nconst
getTextureIndexWhereDataResidesLinearSearch = (sizeInConcatAxis: number[]): string => {\r\n  const searchAxis
= sizeInConcatAxis.map((size, i) => `if(index<${size}) {return ${i};}\r\n`);\r\n  return `int
getTextureWhereDataResides(int index) {\r\n      ${searchAxis.join('')}\r\n    }`;\r\n};\r\n\r\n// TODO: Implement
BinarySearch in GLSL\r\nconst getTextureIndexWhereDataResidesBinarySearch = (sizeInConcatAxis: number[]):
string =>\r\n    getTextureIndexWhereDataResidesLinearSearch(sizeInConcatAxis);\r\n\r\nconst
getFetchDataFromCorrectTextureMethod = (numberOfTensors: number, tensorRank: number) => {\r\n  const
codeLines: string[] = [`float fetchDataFromCorrectTexture(int textureIndex, int indices[${tensorRank}]) {`];\r\n  for
(let i = 0; i < numberOfTensors; ++i) {\r\n    if (i === 0) {\r\n      codeLines.push(\r\n          '\\t' +\r\n          `if
(textureIndex == ${i}) { return _X${i}(indices); }`);\r\n    } else if (i === numberOfTensors - 1) {\r\n
codeLines.push(\r\n          '\\t' +\r\n          `else { return _X${i}(indices); }`);\r\n    } else {\r\n      codeLines.push(\r\n
      '\\t' +\r\n          `else if (textureIndex == ${i}) { return _X${i}(indices); }`);\r\n    }\r\n  }\r\n
codeLines.push(\r\n      '\\t' +\r\n      '}');\r\n  return codeLines.join('\\n');\r\n};\r\n\r\nconst
getGetSizeInConcatAxisValueFromIndexMethod = (sizeInConcatAxis: number[]): string => {\r\n  const codeLines:
string[] = ['int getSizeInConcatAxisValueFromIndex(int index) {'];\r\n  for (let i = 0; i < sizeInConcatAxis.length;
++i) {\r\n    if (i === 0) {\r\n      codeLines.push(\r\n          '\\t' +\r\n          `if (index == ${i}) { return
${sizeInConcatAxis[i]}; }`);\r\n    } else if (i === sizeInConcatAxis.length - 1) {\r\n      codeLines.push(\r\n
'\\t' +\r\n          `else { return ${sizeInConcatAxis[i]}; }`);\r\n    } else {\r\n      codeLines.push(\r\n          '\\t' +\r\n
 `else if (index == ${i}) { return ${sizeInConcatAxis[i]}; }`);\r\n    }\r\n  }\r\n  codeLines.push(\r\n      '\\t' +\r\n
'}');\r\n\r\n  return codeLines.join('\\n');\r\n};\r\n\r\nexport const parseConcatAttributes:
OperatorInitialization<ConcatAttributes> = (node: Graph.Node): ConcatAttributes =>\r\n
createAttributeWithCacheKey({axis: node.attributes.getInt('axis')});\r\n\r\nconst validateInputs = (inputs: Tensor[]):
void => {\r\n  if (!inputs || inputs.length < 1) {\r\n    throw new Error('too few inputs');\r\n  }\r\n\r\n  const inputType
```

= inputs[0].type;\r\n const inputDimensionality = inputs[0].dims.length;\r\n\r\n // TODO: Support string concat\r\n if (inputType === 'string') {\r\n   throw new Error('string tensor is not supported yet');\r\n }\r\n\r\n for (const input of inputs) {\r\n   // make sure types of all inputs match\r\n   if (input.type !== inputType) {\r\n   throw new Error('input tensors should be one type');\r\n   }\r\n\r\n   // make sure the dimensionality of all inputs are the same\r\n   if (input.dims.length !== inputDimensionality) {\r\n   throw new Error('input tensors should have the same shape');\r\n   }\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Logger} from '../../../instrument';\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nimport {calculateOutputShape, ConvAttributes} from './conv';\r\nimport {getActicationSnippet} from './fuse-utils';\r\n\r\nconst createUnpackedGroupedConvProgramMetadata = (hasBias: boolean, cacheHint: string): ProgramMetadata => ({\r\n name: 'GroupedConv',\r\n inputNames: hasBias ? ['X', 'W', 'Bias'] : ['X', 'W'],\r\n inputTypes: hasBias ? [TextureType.unpacked, TextureType.unpacked, TextureType.unpacked] :\r\n   [TextureType.unpacked, TextureType.unpacked],\r\n cacheHint\r\n});\r\n\r\nconst createUnpackedGroupedConvProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], metadata: ProgramMetadata,\r\n   attributes: ConvAttributes): ProgramInfo => {\r\n   const hasBias = inputs.length > 2;\r\n   const processBias = hasBias ? 'value += getBias(output_channel);' : '';\r\n   const xShape = inputs[0].dims.slice();\r\n   const wShape = inputs[1].dims.slice();\r\n   const outputChannelsPerGroup = wShape[0] / attributes.group;\r\n   Logger.verbose(\r\n   'GroupedConv',\r\n   `autpPad:${attributes.autoPad}, dilations:${attributes.dilations}, group:${attributes.group}, kernelShape:${\r\n              attributes.kernelShape}, pads:${attributes.pads}, strides:${attributes.strides}`);\r\n   const outputShape =\r\n   calculateOutputShape(xShape, wShape, attributes.dilations, attributes.pads, attributes.strides);\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const {activationFunction, applyActivation} = getActicationSnippet(attributes);\r\n\r\n   const shaderSource = `\r\n const ivec2 strides = ivec2(${attributes.strides[0]}, ${attributes.strides[1]});\r\n const ivec2 pads = ivec2(${attributes.pads[0]}, ${attributes.pads[1]});\r\n ${activationFunction}\r\n void main() {\r\n   ivec4 coords = getOutputCoords();\r\n   int batch = coords.x;\r\n   int output_channel = coords.y;\r\n   ivec2 xRCCorner = coords.zw * strides - pads;\r\n   int group_id = output_channel / ${outputChannelsPerGroup};\r\n\r\n   float value = 0.0;\r\n   for (int wInChannel = 0; wInChannel < ${wShape[1]}; wInChannel++) {\r\n   int input_channel = group_id * ${wShape[1]} + wInChannel;\r\n   for (int wHeight = 0; wHeight < ${wShape[2]}; wHeight++) {\r\n   int xHeight = xRCCorner.x + wHeight * ${attributes.dilations[0]};\r\n\r\n   if (xHeight < 0 || xHeight >= ${xShape[2]}) {\r\n   continue;\r\n   }\r\n\r\n   for (int wWidth = 0; wWidth < ${wShape[3]}; wWidth++) {\r\n   int xWidth = xRCCorner.y + wWidth * ${attributes.dilations[1]};\r\n   if (xWidth < 0 || xWidth >= ${xShape[3]}) {\r\n   continue;\r\n   }\r\n\r\n   float xVal = getX(batch, input_channel, xWidth, xHeight);\r\n   float wVal = getW(output_channel, wInChannel, wWidth, wHeight);\r\n   value += xVal*wVal;\r\n   }\r\n   }\r\n   }\r\n ${processBias}\r\n ${applyActivation}\r\n ${glsl.output} = vec4(value, .0, .0, .0);\r\n }\r\n`;\r\n   return {\r\n   ...metadata,\r\n   output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n   shaderSource,\r\n   hasMain: true,\r\n   };\r\n   };\r\n\r\nexport const createUnpackedGroupedConvProgramInfoLoader =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes):\r\n   ProgramInfoLoader => {\r\n   const metadata = createUnpackedGroupedConvProgramMetadata(inputs.length > 2, attributes.cacheKey);\r\n   return {\r\n   ...metadata,\r\n   get: () => createUnpackedGroupedConvProgramInfo(inferenceHandler, inputs, metadata, attributes)\r\n   };\r\n   };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {calculateOutputShape, ConvAttributes} from './conv';\r\nimport {createPackedIm2ColProgramInfoLoader} from './im2col-pack';\r\nimport {createPackedMatmulProgramInfoLoader} from './matmul-pack';\r\n\r\nexport const conv2DPackedPointwise =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes): Tensor =>

{\r\n   const xshape = inputs[0].dims;\r\n   const kshape = inputs[1].dims;\r\n   const outputShape =\r\n calculateOutputShape(xshape, kshape, attributes.dilations, attributes.pads, attributes.strides);\r\n   const reshapedX = inferenceHandler.reshapePacked(inputs[0], [xshape[1], xshape[2] * xshape[3]]);\r\n   const reshapedK = inferenceHandler.reshapePacked(inputs[1], [kshape[0], kshape[1]]);\r\n\r\n   const matmulInputs = inputs.length > 2 ? [reshapedK, reshapedX, inputs[2]] : [reshapedK, reshapedX];\r\n   const matmulOutput = inferenceHandler.run(\r\n   createPackedMatmulProgramInfoLoader(inferenceHandler, matmulInputs, attributes), matmulInputs);\r\n   return inferenceHandler.reshapePacked(matmulOutput, outputShape);\r\n };\r\n\r\nexport const conv2DPacked =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes): Tensor => {\r\n   const xshape = inputs[0].dims;\r\n   const kshape = inputs[1].dims;\r\n   const outputShape =\r\n   calculateOutputShape(xshape, kshape, attributes.dilations, attributes.pads, attributes.strides);\r\n\r\n   // run im2col\r\n   const im2colOutput = inferenceHandler.run(\r\n createPackedIm2ColProgramInfoLoader(inferenceHandler, inputs[0], inputs[1], outputShape, attributes),\r\n [inputs[0]]);\r\n\r\n   // reshape kernel\r\n   const kernelReshaped = inferenceHandler.reshapePacked(inputs[1], [kshape[0], kshape[1] * kshape[2] * kshape[3]]);\r\n\r\n   // run matmul\r\n   const matmulInputs =\r\n (inputs.length === 3) ? [kernelReshaped, im2colOutput, inputs[2]] : [kernelReshaped, im2colOutput];\r\n   const matmulOutput = inferenceHandler.run(\r\n   createPackedMatmulProgramInfoLoader(inferenceHandler, matmulInputs, attributes), matmulInputs);\r\n\r\n   // reshape output\r\n   const outputReshaped = inferenceHandler.reshapePacked(matmulOutput, outputShape);\r\n   return outputReshaped;\r\n };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {InferenceHandler} from '../../../backend';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {PoolConvUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nimport {createUnpackedGroupedConvProgramInfoLoader} from './conv-grouped';\r\nimport {conv2DPacked} from './conv-pack';\r\nimport {createDotProductProgramInfoLoader} from './dot-product';\r\nimport {InternalActivationAttributes, parseInternalActivationAttributes} from './fuse-utils';\r\nimport {createIm2ColProgramInfoLoader} from './im2col';\r\nimport {createMatmulProgramInfoLoader} from './matmul';\r\n\r\n\r\nexport const calculateOutputShape =\r\n (inputShape: readonly number[], kernelShape: readonly number[], dilations: readonly number[],\r\n   adjustPads: readonly number[], strides: readonly number[]): number[] => {\r\n   const batchSize = inputShape[0];\r\n   const inputSpatialShape = inputShape.slice(2);\r\n const spatialRank = inputSpatialShape.length;\r\n   const outChannels = kernelShape[0];\r\n   const kernelSpatialShape = kernelShape.slice(2);\r\n   const dilatedKernelShape = kernelSpatialShape.map((v, i) => v + (v - 1) * (dilations[i] - 1));\r\n   const inputSpatialShapeWithPad = inputSpatialShape.map((v, i) => v + adjustPads[i] + adjustPads[i + spatialRank]);\r\n   const outputSpatialShape =\r\n inputSpatialShapeWithPad.map((v, i) => Math.floor((v - dilatedKernelShape[i] + strides[i]) / strides[i]));\r\n const outputShape = [batchSize, outChannels].concat(...outputSpatialShape);\r\n   return outputShape;\r\n };\r\n\r\nexport interface ConvAttributes extends InternalActivationAttributes, AttributeWithCacheKey {\r\n readonly autoPad: string;\r\n readonly dilations: readonly number[];\r\n readonly group: number;\r\n readonly kernelShape: readonly number[];\r\n readonly pads: readonly number[];\r\n readonly strides: readonly number[];\r\n}\r\n\r\nexport const conv: OperatorImplementation<ConvAttributes> =\r\n (inferenceHandler: InferenceHandler, inputs: Tensor[], attributes: ConvAttributes): Tensor[] => {\r\n   validateInputs(inputs, attributes); // currently will fail if not conv2D\r\n   return conv2d(inferenceHandler, inputs, attributes);\r\n };\r\n\r\nconst conv2d: OperatorImplementation<ConvAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ConvAttributes): Tensor[] => {\r\n   const adjustedAttributes = getAdjustedConvAttributes(attributes, inputs);\r\n   const packMode = inferenceHandler.session.pack;\r\n   const isPointwise = adjustedAttributes.kernelShape[0] === 1 && adjustedAttributes.kernelShape[1] === 1;\r\n   if (adjustedAttributes.group > 1) {\r\n   const result = inferenceHandler.run(\r\n   createUnpackedGroupedConvProgramInfoLoader(inferenceHandler, inputs,

adjustedAttributes), inputs);\r\n return [result];\r\n } else if (isPointwise && packMode) {\r\n return [conv2DUnpackedPointwise(inferenceHandler, inputs, adjustedAttributes)];\r\n } else if (packMode && inputs[0].dims.length === 4 && inputs[0].dims[0] === 1 && !isPointwise) {\r\n return [conv2DPacked(inferenceHandler, inputs, adjustedAttributes)];\r\n } else {\r\n return [conv2DUnpacked(inferenceHandler, inputs, adjustedAttributes)];\r\n }\r\n };\r\n\r\nconst conv2DUnpackedPointwise =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes): Tensor => {\r\n const xshape = inputs[0].dims;\r\n const kshape = inputs[1].dims;\r\n const outputShape =\r\n calculateOutputShape(xshape, kshape, attributes.dilations, attributes.pads, attributes.strides);\r\n const reshapedX = inferenceHandler.reshapeUnpacked(inputs[0], [xshape[1], xshape[2] * xshape[3]]);\r\n const reshapedK = inferenceHandler.reshapeUnpacked(inputs[1], [kshape[0], kshape[1]]);\r\n\r\n const matmulInputs = inputs.length > 2 ? [reshapedK, reshapedX, inputs[2]] : [reshapedK, reshapedX];\r\n const matmulOutput = inferenceHandler.run(createMatmulProgramInfoLoader(matmulInputs, attributes), matmulInputs);\r\n return inferenceHandler.reshapeUnpacked(matmulOutput, outputShape);\r\n };\r\n\r\nconst conv2DUnpacked =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes): Tensor => {\r\n const xshape = inputs[0].dims;\r\n const kshape = inputs[1].dims;\r\n const outputShape =\r\n calculateOutputShape(xshape, kshape, attributes.dilations, attributes.pads, attributes.strides);\r\n const xIm2Col = inferenceHandler.run(\r\n createIm2ColProgramInfoLoader(inferenceHandler, inputs[0], inputs[1], outputShape, attributes), [inputs[0]]);\r\n\r\n const dotProductInputs = inputs.length === 3 ? [xIm2Col, inputs[1], inputs[2]] : [xIm2Col, inputs[1]];\r\n const output = inferenceHandler.run(\r\n createDotProductProgramInfoLoader(inferenceHandler, inputs, outputShape, attributes), dotProductInputs);\r\n return output;\r\n };\r\n\r\nconst getAdjustedConvAttributes = <T extends ConvAttributes>(attributes: T, inputs: Tensor[]): T => {\r\n const kernelShape = attributes.kernelShape.slice();\r\n // if kernelShape is not specified in the attributes of this op, infer it from the weight tensor dims\r\n if (attributes.kernelShape.length === 0) {\r\n for (let i = 2; i < inputs[1].dims.length; ++i) {\r\n kernelShape.push(inputs[1].dims[i]);\r\n }\r\n }\r\n const pads = attributes.pads.slice();\r\n PoolConvUtil.adjustPadsBasedOnAutoPad(\r\n inputs[0].dims, attributes.strides, attributes.dilations, kernelShape, pads, attributes.autoPad);\r\n\r\n // always return a new object so does not modify the original attributes\r\n const newAttributes: T = Object.assign({}, attributes);\r\n Object.assign(newAttributes, {kernelShape, pads, cacheKey: attributes.cacheKey});\r\n return newAttributes;\r\n};\r\n\r\nexport const parseConvAttributes: OperatorInitialization<ConvAttributes> = (node: Graph.Node): ConvAttributes => {\r\n const attributes = node.attributes;\r\n const activationAttributes = parseInternalActivationAttributes(attributes);\r\n // TODO : Make this generic enough to compute default attributes for multi-dimensional conv\r\n const autoPad = attributes.getString('auto_pad', 'NOTSET');\r\n const dilations = attributes.getInts('dilations', [1, 1]);\r\n const group = attributes.getInt('group', 1);\r\n const kernelShape = attributes.getInts('kernel_shape', []);\r\n const pads = attributes.getInts('pads', [0, 0, 0, 0]);\r\n const strides = attributes.getInts('strides', [1, 1]);\r\n\r\n return createAttributeWithCacheKey({autoPad, dilations, group, kernelShape, pads, strides, ...activationAttributes});\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[], attributes: ConvAttributes): void => {\r\n // Refer to the below link for all input checks\r\n // https://github.com/onnx/onnx/blob/master/docs/Operators.md#Conv\r\n if (!inputs || (inputs.length !== 2 && inputs.length !== 3)) {\r\n throw new Error('Conv requires 2 or 3 inputs');\r\n }\r\n\r\n // TODO : Need to add support for multi-dimensional conv\r\n if (inputs[0].dims.length !== 4 || inputs[1].dims.length !== 4) {\r\n throw new Error('currently only support 2-dimensional conv');\r\n }\r\n\r\n // FILTER_IN_CHANNEL should be equal to DATA_CHANNEL\r\n const dataChannel = inputs[0].dims[1];\r\n const filterInChannel = inputs[1].dims[1] * attributes.group;\r\n if (dataChannel !== filterInChannel) {\r\n throw new Error('FILTER_IN_CHANNEL should be equal to DATA_CHANNEL');\r\n }\r\n\r\n // if bias is provided it should be 1D and the number of elements should be equal to the number of feature maps\r\n if (inputs.length === 3 && (inputs[2].dims.length !== 1 || inputs[1].dims[0] !== inputs[2].dims[0])) {\r\n throw new Error('invalid bias');\r\n }\r\n\r\n const spatialRank = inputs[0].dims.length - 2;\r\n // wrong dilations dimension\r\n if (attributes.dilations.length !== spatialRank) {\r\n

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throw new Error(`dilations should be ${spatialRank}D`);\r\n  }\r\n\r\n  // Wrong strides dimension\r\n  if
(attributes.strides.length !== spatialRank) {\r\n    throw new Error(`strides should be ${spatialRank}D`);\r\n
}\r\n\r\n  // Wrong pads dimension\r\n  if (attributes.pads.length !== spatialRank * 2) {\r\n    throw new Error(`pads
should be ${spatialRank * 2}D`);\r\n  }\r\n\r\n  // if kernelShape is specified, it's data length must be 2 less than
dims length of the weights tensor\r\n  // (the first 2 dims are batch_size and channels)\r\n  if
(attributes.kernelShape.length !== 0 && attributes.kernelShape.length !== inputs[1].dims.length - 2) {\r\n    throw
new Error('invalid kernel shape');\r\n  }\r\n\r\n  // TODO : Need to add support for float64\r\n  if (inputs[0].type !==
'float32' || inputs[1].type !== 'float32') {\r\n    throw new Error('Conv input(X,W) should be float tensor');\r\n
}\r\n\r\n  if (inputs.length === 3 && inputs[2].type !== 'float32') {\r\n    throw new Error('Conv input(bias) should
be float tensor');\r\n  }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under
the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation,
OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\n\r\nimport {transpose, TransposeAttributes} from
'./transpose';\r\n\r\nexport interface DepthToSpaceAttributes {\r\n  mode: 'DCR'|'CRD';\r\n  blocksize:
number;\r\n}\r\n\r\nexport const depthToSpace: OperatorImplementation<DepthToSpaceAttributes> =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: DepthToSpaceAttributes): Tensor[] =>
{\r\n      validateInputs(inputs);\r\n      const blocksize = attributes.blocksize;\r\n      const blocksizeSqr = blocksize *
blocksize;\r\n      const transposePerm = attributes.mode === 'DCR' ? [0, 3, 4, 1, 5, 2] : [0, 1, 4, 2, 5, 3];\r\n      const
firstReshapeShape = attributes.mode === 'DCR' ?\r\n          [\r\n            inputs[0].dims[0], blocksize, blocksize,
inputs[0].dims[1] / blocksizeSqr, inputs[0].dims[2],\r\n            inputs[0].dims[3]\r\n          ] :\r\n          [\r\n
inputs[0].dims[0], inputs[0].dims[1] / blocksizeSqr, blocksize, blocksize, inputs[0].dims[2],\r\n
inputs[0].dims[3]\r\n          ];\r\n\r\n      // const transpose = new WebGLTranspose();\r\n      // const attributes = new
Attribute(undefined);\r\n      // attributes.set('perm', 'ints', transposePerm);\r\n      //
transpose.initialize(attributes);\r\n\r\n      // First reshape\r\n      const firstReshapedTensor =
inferenceHandler.reshapeUnpacked(inputs[0], firstReshapeShape);\r\n\r\n      // transpose\r\n      const
transposeAttributes: TransposeAttributes = {perm: transposePerm, cacheKey: `${transposePerm}`};\r\n      const
[transposeOutput] = transpose(inferenceHandler, [firstReshapedTensor], transposeAttributes);\r\n\r\n      // Second
reshape\r\n      const secondReshapeShape = [\r\n        inputs[0].dims[0], inputs[0].dims[1] / blocksizeSqr,
inputs[0].dims[2] * blocksize,\r\n        inputs[0].dims[3] * blocksize\r\n      ];\r\n      const result =
inferenceHandler.reshapeUnpacked(transposeOutput, secondReshapeShape);\r\n      return [result];\r\n
};\r\n\r\nexport const parseDepthToSpaceAttributes: OperatorInitialization<DepthToSpaceAttributes> =\r\n    (node:
Graph.Node): DepthToSpaceAttributes => {\r\n      // processing node attributes\r\n      const blocksize =
node.attributes.getInt('blocksize');\r\n      if (blocksize < 1) {\r\n        throw new Error(`blocksize must be >= 1, but
got : ${blocksize} for DepthToSpace`);\r\n      }\r\n      const mode = node.attributes.getString('mode', 'DCR');\r\n
if (mode !== 'DCR' && mode !== 'CRD') {\r\n        throw new Error(`unrecognized mode: ${mode} for
DepthToSpace`);\r\n      }\r\n      return {mode, blocksize};\r\n    };\r\n\r\nconst validateInputs = (inputs: Tensor[]):
void => {\r\n  if (inputs.length !== 1) {\r\n    throw new Error(`DepthToSpace expect 1 inputs, but got
${inputs.length}`);\r\n  }\r\n\r\n  // Input has to be a 4-D tensor\r\n  // TODO: Support string depth-to-space.\r\n  if
(inputs[0].type === 'string' || inputs[0].dims.length !== 4) {\r\n    throw new TypeError('DepthToSpace input should
be a 4-D numeric tensor');\r\n  }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n//
Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from
'../../../util';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-
handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport
{getActicationSnippet, InternalActivationAttributes} from './fuse-utils';\r\nimport {calculateIm2ColDims} from
'./im2col';\r\n\r\nconst createDotProductProgramMetadata = (hasBias: boolean, attributes:
InternalActivationAttributes) => ({\r\n  name: 'ConvDotProduct',\r\n  inputNames: hasBias ? ['Im2Col', 'K', 'B'] :
['Im2Col', 'K'],\r\n  inputTypes: hasBias ? [TextureType.unpacked, TextureType.packedLastDimension,
TextureType.unpacked] :\r\n                          [TextureType.unpacked, TextureType.packedLastDimension],\r\n
```

cacheKey: attributes.activationCacheKey\r\n});\r\n\r\nconst createDotProductProgramInfo =\r\n (inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: readonly Tensor[],\r\n outputShape: number[], attributes: InternalActivationAttributes): ProgramInfo => {\r\n const xshape = inputs[0].dims;\r\n const kshape = inputs[1].dims;\r\n const adjustedKernelShape = [kshape[0], Math.ceil((xshape[1] * kshape[2] * kshape[3]) / 4)];\r\n const im2colShape = calculateIm2ColDims(xshape, kshape, outputShape);\r\n const [kWidth, kHeight] =\r\n inferenceHandler.calculateTextureWidthAndHeight(adjustedKernelShape, TextureType.packedLastDimension);\r\n\r\n const im2colStrides = ShapeUtil.computeStrides(im2colShape);\r\n const [im2colWidth, im2colHeight] =\r\n inferenceHandler.calculateTextureWidthAndHeight(im2colShape, TextureType.packedLastDimension);\r\n const rank = outputShape.length;\r\n\r\n const initValue = (inputs.length < 3) ? '0.0' : '_B(b)';\r\n const sharedDim = Math.ceil(xshape[1] * kshape[2] * kshape[3] / 4);\r\n const {activationFunction, applyActivation} = getActicationSnippet(attributes);\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n const shaderSource = `\r\n${activationFunction}\r\nfloat process(int indices[${rank}]) {\r\n int b[1];\r\n b[0] = indices[1];\r\n int im2col[4];\r\n im2col[0] = indices[0];\r\n im2col[1] = indices[2];\r\n im2col[2] = indices[3];\r\n int im2colOffset = im2col[0] * ${im2colStrides[0]} + im2col[1] * ${im2colStrides[1]} + im2col[2] * ${\r\n im2colStrides[2]};\r\n int kernelOffset = indices[1] * ${adjustedKernelShape[1]};\r\n float value = ${initValue};\r\n for (int i = 0; i < ${sharedDim}; ++i) {\r\n vec2 im2colCoords = offsetToCoords(im2colOffset, ${im2colWidth}, ${im2colHeight});\r\n vec2 kernelCoords = offsetToCoords(kernelOffset, ${kWidth}, ${kHeight});\r\n value += dot(${glsl.texture2D}(Im2Col, im2colCoords), ${glsl.texture2D}(K, kernelCoords));\r\n ++im2colOffset;\r\n ++kernelOffset;\r\n }\r\n ${applyActivation}\r\n return value;\r\n}`;\r\n return {\r\n ...metadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\nexport const createDotProductProgramInfoLoader =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], outputShape: number[],\r\n attributes: InternalActivationAttributes): ProgramInfoLoader => {\r\n const metadata = createDotProductProgramMetadata(inputs.length > 2, attributes);\r\n return {\r\n ...metadata,\r\n get: () => createDotProductProgramInfo(inferenceHandler, metadata, inputs, outputShape, attributes)\r\n };\r\n };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const flatten: OperatorImplementation<number> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axis: number): Tensor[] => {\r\n validateInputs(inputs, axis);\r\n\r\n const outputDims = ShapeUtil.flattenShape(inputs[0].dims, axis);\r\n return [inferenceHandler.reshapeUnpacked(inputs[0], outputDims)];\r\n };\r\n\r\nexport const parseFlattenAttributes: OperatorInitialization<number> = (node: Graph.Node): number =>\r\n node.attributes.getInt('axis', 1); // default axis is 1\r\n\r\nconst validateInputs = (inputs: Tensor[], axis: number): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n throw new Error('Flatten requires 1 input.');\r\n }\r\n\r\n const r = inputs[0].dims.length;\r\n if (r === 0) {\r\n throw new Error('scalar tensor is not supported.');\r\n }\r\n\r\n if (axis < -r || axis > r) {\r\n throw new Error('Invalid axis');\r\n }\r\n\r\n // TODO: Support string type\r\n if (inputs[0].type === 'string') {\r\n throw new Error('string tensor is not supported.');\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Attribute} from '../../../attribute';\r\nimport {GlslValueFunction} from '../glsl-definitions';\r\nimport {glslClip, glslRelu, glslSigmoid} from './unary-op';\r\n\r\nexport interface InternalActivationAttributes {\r\n readonly activation: string;\r\n readonly clipMin?: number;\r\n readonly clipMax?: number;\r\n readonly activationCacheKey: string;\r\n}\r\n\r\nexport function getActicationSnippet(attributes: InternalActivationAttributes) {\r\n let func: GlslValueFunction;\r\n switch (attributes.activation) {\r\n case 'Relu':\r\n func = glslRelu();\r\n break;\r\n case 'Sigmoid':\r\n func = glslSigmoid();\r\n break;\r\n case 'Clip':\r\n func = glslClip(attributes.clipMin!, attributes.clipMax!);\r\n

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break;\r\n    // TODO: adding other activations that can be fused.\r\n    default:\r\n      return {activationFunction: '',
applyActivation: ''};\r\n  }\r\n\r\n  const activationName = func.name;\r\n  const activationFunction = func.body;\r\n
const applyActivation = `value = ${activationName}_(value);`;\r\n  return {activationFunction,
applyActivation};\r\n}\r\n\r\nexport const parseInternalActivationAttributes = (attributes: Attribute):
InternalActivationAttributes => {\r\n  const activation = attributes.getString('__internal_activation', '');\r\n\r\n  if
(activation === 'Clip') {\r\n    const clipMax = attributes.getFloat('__clip_max', 3.402823e+38);\r\n    const clipMin
= attributes.getFloat('__clip_min', -3.402823e+38);\r\n    return {activation, clipMax, clipMin, activationCacheKey:
`${activation}:${clipMin},${clipMax}`};\r\n  }\r\n  return {activation, activationCacheKey:
activation};\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-
key';\r\nimport {Graph} from '../../../graph';\r\nimport {NUMBER_TYPES, OperatorImplementation,
OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from
'../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo,
ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\ninterface GatherAttributes extends
AttributeWithCacheKey {\r\n  readonly axis: number;\r\n}\r\n\r\nexport const gather:
OperatorImplementation<GatherAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: GatherAttributes): Tensor[] => {\r\n      validateInputs(inputs, attributes.axis);\r\n      const output =
inferenceHandler.run(createGatherProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n      return
[output];\r\n    };\r\n\r\nexport const parseGatherAttributes: OperatorInitialization<GatherAttributes> = (node:
Graph.Node): GatherAttributes =>\r\n    createAttributeWithCacheKey({axis: node.attributes.getInt('axis',
0)});\r\n\r\nconst gatherProgramMetadata = {\r\n  name: 'Gather',\r\n  inputNames: ['A', 'B'],\r\n  inputTypes:
[TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nconst createGatherProgramInfo =\r\n    (handler:
WebGLInferenceHandler, metadata: ProgramMetadata, inputs: Tensor[], axis: number): ProgramInfo => {\r\n
const inputShape = inputs[0].dims.slice();\r\n      const indexDataShape = inputs[1].dims.slice();\r\n      const
outputShape = new Array(inputShape.length + indexDataShape.length - 1);\r\n\r\n      axis =
ShapeUtil.normalizeAxis(axis, inputShape.length);\r\n      const indexCopyOps: string[] = [];\r\n      for (let i = 0; i <
outputShape.length; i++) {\r\n        // outputShape is divided into three parts: A, B, C\r\n        // |0        axis|  axis +
indexDataShape.length |          end|\r\n        // |     A       |             B                 |      C      |\r\n        //\r\n        // inputIdx:
[A, inputs[1][B], C]\r\n        if (i < axis) {  // A\r\n          outputShape[i] = inputShape[i];\r\n
indexCopyOps.push(`inputIdx[${i}] = outputIdx[${i}];`);\r\n        } else {\r\n          if (i < axis +
indexDataShape.length) {  // B\r\n            outputShape[i] = indexDataShape[i - axis];\r\n
indexCopyOps.push(`indexDataIdx[${i - axis}] = outputIdx[${i}];`);\r\n          } else {
    // C\r\n            outputShape[i] = inputShape[i - indexDataShape.length + 1];  // skip 1 for axis\r\n
indexCopyOps.push(`inputIdx[${i - indexDataShape.length + 1}] = outputIdx[${i}];`);\r\n          }\r\n        }\r\n
}\r\n\r\n      const orank = outputShape.length || 1;\r\n      const irank = inputShape.length;\r\n      const iDrank =
indexDataShape.length || 1;\r\n      const shaderSource = `\r\n      float process(int outputIdx[${orank}]) {\r\n        int
inputIdx[${irank}];\r\n        int indexDataIdx[${iDrank}];\r\n        indexDataIdx[0] = 0;\r\n
${indexCopyOps.join('\\n        ')}\r\n        int idx = int(_B(indexDataIdx));\r\n        inputIdx[${axis}] = idx < 0 ? idx
+ ${inputShape[axis]} : idx;\r\n        return _A(inputIdx);\r\n      }`;\r\n      return {\r\n        ...metadata,\r\n
output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n        shaderSource\r\n
};\r\n    };\r\n\r\nconst createGatherProgramInfoLoader =\r\n    (handler: WebGLInferenceHandler, inputs: Tensor[],
attributes: GatherAttributes): ProgramInfoLoader => {\r\n      const metadata = {...gatherProgramMetadata,
cacheHint: attributes.cacheKey};\r\n      return {...metadata, get: () => createGatherProgramInfo(handler, metadata,
inputs, attributes.axis)};\r\n    };\r\n\r\nconst validateInputs = (inputs: Tensor[], axis: number): void => {\r\n  if
(!inputs || inputs.length !== 2) {\r\n    throw new Error('Gather requires 2 inputs.');\r\n  }\r\n  const tensorRank =
inputs[0].dims.length;\r\n  if (tensorRank < 1) {\r\n    throw new Error('Invalid input shape.');\r\n  }\r\n  if (axis < -
tensorRank || axis > tensorRank - 1) {\r\n    throw new Error('Invalid axis.');\r\n  }\r\n  if
(NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n    throw new Error('Invaid input type.');\r\n  }\r\n  if
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(inputs[1].type !== 'int32' && inputs[1].type !== 'int16') {\r\n    throw new Error('Invaid input type.');\r\n
}\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-
key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from
'../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {GemmUtil} from '../../../util';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader,
ProgramMetadata, TextureType} from '../types';\r\n\r\nexport interface GemmAttributes extends
AttributeWithCacheKey {\r\n  transA: boolean;\r\n  transB: boolean;\r\n  alpha: number;\r\n  beta: number;\r\n
isOptionalC: boolean;  // in opset 11, C becomes optional\r\n}\r\n\r\nexport const gemm:
OperatorImplementation<GemmAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: GemmAttributes): Tensor[] => {\r\n      validateInputs(inputs, attributes);\r\n      const output =
inferenceHandler.run(createGemmProgramInfoLoader(inputs, attributes), inputs);\r\n      return [output];\r\n
};\r\n\r\nconst parseGemmAttributes = (node: Graph.Node, isOptionalC: boolean): GemmAttributes => {\r\n  const
transA = node.attributes.getInt('transA', 0) !== 0;\r\n  const transB = node.attributes.getInt('transB', 0) !== 0;\r\n
const alpha = node.attributes.getFloat('alpha', 1.0);\r\n  const beta = node.attributes.getFloat('beta', 1.0);\r\n  return
createAttributeWithCacheKey({transA, transB, alpha, beta, isOptionalC});\r\n};\r\n\r\nexport const
parseGemmAttributesV7: OperatorInitialization<GemmAttributes> = (node: Graph.Node): GemmAttributes =>\r\n
parseGemmAttributes(node, false);\r\n\r\nexport const parseGemmAttributesV11:
OperatorInitialization<GemmAttributes> = (node: Graph.Node): GemmAttributes =>\r\n
parseGemmAttributes(node, true);\r\n\r\nconst createGemmProgramInfoLoader = (inputs: Tensor[], attributes:
GemmAttributes): ProgramInfoLoader => {\r\n  const metadata = {\r\n    name: 'Gemm',\r\n    inputNames:
inputs.length === 3 ? ['A', 'B', 'C'] : ['A', 'B'],\r\n    inputTypes: inputs.length === 3 ? [TextureType.unpacked,
TextureType.unpacked, TextureType.unpacked] :\r\n                                   [TextureType.unpacked,
TextureType.unpacked],\r\n    key: attributes.cacheKey\r\n  };\r\n\r\n  return {...metadata, get: () =>
createGemmProgramInfo(metadata, inputs, attributes)};\r\n};\r\n\r\nconst createGemmProgramInfo =\r\n
(metadata: ProgramMetadata, inputs: Tensor[], attributes: GemmAttributes): ProgramInfo => {\r\n      const aShape
= inputs[0].dims.slice();\r\n      const bShape = inputs[1].dims.slice();\r\n      const [M, N] =
GemmUtil.getShapeOfGemmResult(\r\n          aShape, attributes.transA, bShape, attributes.transB, inputs.length
=== 3 ? inputs[2].dims : undefined);\r\n      const outputShape = [M, N];\r\n      if (!outputShape) {\r\n        throw
new Error('Can\\'t use gemm on the given tensors');\r\n      }\r\n      let sharedDim = aShape[aShape.length - 1];\r\n
let line = '';\r\n      if (attributes.transA) {\r\n        sharedDim = aShape[0];\r\n      }\r\n      if (attributes.transA &&
attributes.transB) {\r\n        line = 'value += _A_T(a) * _B_T(b);';\r\n      } else if (attributes.transA &&
!attributes.transB) {\r\n        line = 'value += _A_T(a) * _B(b);';\r\n      } else if (!attributes.transA &&
attributes.transB) {\r\n        line = 'value += _A(a) * _B_T(b);';\r\n      } else if (!attributes.transA &&
!attributes.transB) {\r\n        line = 'value += _A(a) * _B(b);';\r\n      }\r\n      const rank = outputShape.length;\r\n
const declareC = inputs.length === 3 ? `int c[${inputs[2].dims.length}];` : '';\r\n      const broadcastC = inputs.length
=== 3 ? 'bcastIndices_C(indices, c);' : '';\r\n      const calculateC = inputs.length === 3 ? 'value += beta * _C(c);' :
'';\r\n      const shaderSource = `\r\n      float process(int indices[${rank}]) {\r\n          int a[${rank}];\r\n          int
b[${rank}];\r\n          ${declareC}\r\n\r\n          copyVec(indices, a);\r\n          copyVec(indices, b);\r\n
${broadcastC}\r\n\r\n          float value = 0.0;\r\n          for (int k=0; k<${sharedDim}; ++k) {\r\n              a[${rank -
1}] = k;\r\n              b[${rank - 2}] = k;\r\n              ${line}\r\n          }\r\n\r\n          value = value * alpha;\r\n
${calculateC}\r\n          return value;\r\n      }`;\r\n      return {\r\n        ...metadata,\r\n        output: {dims:
outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n        variables: [\r\n          {name:
'alpha', type: 'float', data: attributes.alpha}, {name: 'beta', type: 'float', data: attributes.beta}\r\n        ],\r\n
shaderSource\r\n      };\r\n    };\r\n\r\nconst validateInputs = (inputs: Tensor[], attributes: GemmAttributes): void =>
{\r\n  if (!inputs) {\r\n    throw new Error('Input is missing');\r\n  }\r\n  if (attributes.isOptionalC && (inputs.length <
2 || inputs.length > 3)) {\r\n    throw new Error('Invaid input shape.');\r\n  }\r\n  if (!attributes.isOptionalC &&
inputs.length !== 3) {\r\n    throw new Error('Gemm requires 3 inputs');\r\n  }\r\n\r\n  // 'C' can be of dimensionality
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1 or 2 only\r\n if (inputs.length === 3 && inputs[2].dims.length !== 1 && inputs[2].dims.length !== 2) {\r\n   throw new Error('Invalid input shape of C');\r\n }\r\n\r\n if ((inputs[0].type !== 'float32' && inputs[0].type !== 'float64') ||\r\n   (inputs[1].type !== 'float32' && inputs[1].type !== 'float64') ||\r\n   (inputs.length === 3 && inputs[2].type !== 'float32' && inputs[2].type !== 'float64')) {\r\n   throw new Error('Invalid input type.');\r\n }\r\n\r\n if ((inputs[0].type !== inputs[1].type) || (inputs.length === 3 && inputs[0].type !== inputs[2].type)) {\r\n   throw new Error('Input types are mismatched');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport {ConvAttributes} from './conv';\r\nimport {unpackFromChannel} from './packing-utils';\r\n\r\nconst createPackedIm2ColProgramMetadata = (cacheHint: string) => ({\r\n name: 'Im2Col (packed)',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.packed],\r\n cacheHint,\r\n});\r\n\r\nconst createPackedIm2ColProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, x: Tensor, w: Tensor,\r\n   outputShape: readonly number[], attributes: ConvAttributes): ProgramInfo => {\r\n   const xshape = x.dims;\r\n   const wshape = w.dims;\r\n   const rowDim = 2;\r\n   const colDim = 3;\r\n   const rank = outputShape.length;\r\n   const im2colShape = [wshape[1] * wshape[2] * wshape[3], outputShape[2] * outputShape[3]];\r\n   const kernelSize = wshape[2] * wshape[3];\r\n   const unpackChannel = unpackFromChannel();\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   let unrolled = '';\r\n\r\n   for (let row = 0; row <= 1; row++) {\r\n   for (let col = 0; col <= 1; col++) {\r\n   unrolled += `\r\n   blockIndex = rc.x + ${col};\r\n   pos = rc.y + ${row};\r\n\r\n   if(blockIndex < ${im2colShape[1]} && pos < ${im2colShape[0]}) {\r\n   offsetY = int(blockIndex / (${outputShape[rank - 1]})) * ${attributes.strides[0]} - ${\r\n   attributes.pads[0]};\r\n   d0 = offsetY + ${attributes.dilations[0]} * (imod(pos, ${kernelSize}) / ${wshape[2]});\r\n\r\n   if(d0 < ${xshape[rowDim]} && d0 >= 0) {\r\n   offsetX = imod(blockIndex, ${outputShape[rank - 1]}) * ${attributes.strides[1]} - ${\r\n   attributes.pads[1]};\r\n   d1 = offsetX + ${attributes.dilations[1]} * imod(imod(pos, ${kernelSize}), ${wshape[2]});\r\n\r\n   if(d1 < ${xshape[colDim]} && d1 >= 0) {\r\n\r\n   ch = int(float(pos)/ ${kernelSize}.);\r\n   innerDims = vec2(d0, d1);\r\n   result[${row * 2 + col}] = getChannel(\r\n   getA(0, ch, int(innerDims.x),\r\n   int(innerDims.y)), innerDims);\r\n   }\r\n   }\r\n   }\r\n\r\n   `;\r\n        }\r\n      }\r\n\r\n      const shaderSource = `\r\n ${unpackChannel}\r\n\r\n   void main() {\r\n   ivec2 rc = getOutputCoords();\r\n   vec4 result = vec4(0.0);\r\n   int blockIndex, pos, offsetY, d0, offsetX, d1, ch;\r\n   vec2 innerDims;\r\n ${unrolled}\r\n ${glsl.output} = result;\r\n   }\r\n   `;\r\n   return {\r\n   ...metadata,\r\n   output: {dims: im2colShape, type: x.type, textureType: TextureType.packed},\r\n   shaderSource,\r\n   hasMain: true\r\n   };\r\n   };\r\n\r\nexport const createPackedIm2ColProgramInfoLoader =\r\n   (inferenceHandler: WebGLInferenceHandler, x: Tensor, w: Tensor, outputShape: readonly number[],\r\n   attributes: ConvAttributes): ProgramInfoLoader => {\r\n   const metadata = createPackedIm2ColProgramMetadata(attributes.cacheKey);\r\n   return {\r\n   ...metadata,\r\n   get: () => createPackedIm2ColProgramInfo(inferenceHandler, metadata, x, w, outputShape, attributes)\r\n   };\r\n   };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport {ConvAttributes} from './conv';\r\n\r\nconst createIm2ColProgramMetadata = (cacheHint: string) => ({\r\n name: 'Im2Col',\r\n inputNames: ['X'],\r\n inputTypes: [TextureType.unpacked],\r\n cacheHint,\r\n});\r\n\r\nconst createIm2ColProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, x: Tensor, w: Tensor,\r\n   outputShape: readonly number[], attributes: ConvAttributes): ProgramInfo => {\r\n   const xshape = x.dims;\r\n   const wshape = w.dims;\r\n\r\n   const rank = outputShape.length;\r\n   const im2colDims = calculateIm2ColDims(xshape, wshape, outputShape, 4);\r\n\r\n   const shaderSource = `\r\n   const int XC = ${xshape[1]};\r\n   const int XH = ${xshape[2]};\r\n   const int XW = ${xshape[3]};\r\n   const int KH = ${attributes.kernelShape[0]};\r\n   const int KW =

${attributes.kernelShape[1]};\r\n const int dilationH = ${attributes.dilations[0]};\r\n const int dilationW = ${attributes.dilations[1]};\r\n const int strideH = ${attributes.strides[0]};\r\n const int strideW = ${attributes.strides[1]};\r\n const int padH = ${attributes.pads[0]};\r\n const int padW = ${attributes.pads[1]};\r\n const int KHKW = KH*KW;\r\n const int XCKHKW = XC * KHKW;\r\n const int outputChannels = 4;\r\n vec4 process(int indices[${rank}]) {\r\n int b = indices[0]; // batch size\r\n int oh = indices[1] * strideH - padH; //output height\r\n int ow = indices[2] * strideW - padW; //output width\r\n int p = indices[3] * outputChannels; //patch\r\n vec4 value = vec4(0.0);\r\n for(int i=0; i < outputChannels; ++i) {\r\n if(p < XCKHKW) {\r\n int patchC = p / KHKW;\r\n int patchH = (p - patchC*KHKW) / KW;\r\n int patchW = (p - patchC*KHKW) - patchH * KW;\r\n int xh2 = oh + patchH * dilationH;\r\n int xw2 = ow + patchW * dilationW;\r\n int x[${xshape.length}];\r\n x[0] = b;\r\n x[1] = patchC;\r\n x[2] = xh2;\r\n x[3] = xw2;\r\n if(xh2 >= 0 &&\r\n xh2 < XH &&\r\n xw2 >= 0 &&\r\n xw2 < XW) {\r\n value[i] = _X(x);\r\n }\r\n }\r\n ++p;\r\n }\r\n return value;\r\n }\r\n `;\r\n return {\r\n ...metadata,\r\n output: {dims: im2colDims, type: x.type, textureType: TextureType.packedLastDimension},\r\n shaderSource\r\n };\r\n };\r\n\r\nexport const createIm2ColProgramInfoLoader =\r\n (inferenceHandler: WebGLInferenceHandler, x: Tensor, w: Tensor, outputShape: readonly number[],\r\n attributes: ConvAttributes): ProgramInfoLoader => {\r\n const metadata = createIm2ColProgramMetadata(attributes.cacheKey);\r\n return {\r\n ...metadata,\r\n get: () => createIm2ColProgramInfo(inferenceHandler, metadata, x, w, outputShape, attributes)\r\n };\r\n };\r\n\r\n\r\nexport const calculateIm2ColDims =\r\n (inputShape: readonly number[], kernelShape: readonly number[], outputShape: readonly number[], channels = 4):\r\n number[] =>\r\n [outputShape[0], outputShape[2], outputShape[3],\r\n Math.ceil(inputShape[1] * kernelShape[2] * kernelShape[3] / channels)];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport interface ImageScalerAttributes extends AttributeWithCacheKey {\r\n scale: number;\r\n bias: number[];\r\n}\r\n\r\nexport const imageScaler: OperatorImplementation<ImageScalerAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ImageScalerAttributes): Tensor[] => {\r\n validateInputs(inputs);\r\n const output =\r\n inferenceHandler.run(createImageScalerProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n return [output];\r\n };\r\n\r\nexport const parseImageScalerAttributes: OperatorInitialization<ImageScalerAttributes> =\r\n (node: Graph.Node): ImageScalerAttributes => {\r\n const scale = node.attributes.getFloat('scale');\r\n const bias = node.attributes.getFloats('bias');\r\n return createAttributeWithCacheKey({scale, bias});\r\n };\r\n\r\nconst imageScalerProgramMetadata = {\r\n name: 'ImageScaler',\r\n inputNames: ['X'],\r\n inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nconst createImageScalerProgramInfo =\r\n (handler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: Tensor[], attributes: ImageScalerAttributes):\r\n ProgramInfo => {\r\n const outputShape = inputs[0].dims.slice();\r\n const rank = outputShape.length;\r\n const getBiasMethod = createGetBiasMethod(attributes.bias.length);\r\n const shaderSource = `\r\n ${getBiasMethod}\r\n float process(int indices[${rank}]) {\r\n return _X(indices) * scale + getBias(bias, indices[1]);\r\n }`;\r\n return {\r\n ...metadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n variables: [\r\n {name: 'bias', type: 'float', arrayLength: attributes.bias.length, data: attributes.bias},\r\n {name: 'scale', type: 'float', data: attributes.scale}\r\n],\r\n shaderSource\r\n };\r\n };\r\n\r\nconst createImageScalerProgramInfoLoader =\r\n (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: ImageScalerAttributes): ProgramInfoLoader => {\r\n const metadata = {...imageScalerProgramMetadata, cacheHint: attributes.cacheKey};\r\n return {...metadata, get: () =>

createImageScalerProgramInfo(handler, metadata, inputs, attributes)};\r\n   };\r\n\r\nconst createGetBiasMethod = (numChannels: number): string => {\r\n const codeLines: string[] = [`float getBias(float bias[${numChannels}], int channel) {`];\r\n for (let i = 0; i < numChannels; ++i) {\r\n   if (i === 0) {\r\n   codeLines.push(\r\n   '\\t' +\r\n   `if (channel == ${i}) { return bias[${i}]; }`);\r\n   } else if (i === numChannels - 1) {\r\n   codeLines.push(\r\n   '\\t' +\r\n   `else { return bias[${i}]; }`);\r\n   } else {\r\n   codeLines.push(\r\n   '\\t' +\r\n   `else if (channel == ${i}) { return bias[${i}]; }`);\r\n   }\r\n }\r\n codeLines.push(\r\n   '\\t' +\r\n   '}');\r\n return codeLines.join('\\n');\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('ImageScaler requires 1 input.');\r\n }\r\n if (inputs[0].dims.length !== 4) {\r\n   throw new Error('Invalid input shape.');\r\n }\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n   throw new Error('Invalid input type.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport const instanceNormalization: OperatorImplementation<number> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], epsilon: number): Tensor[] => {\r\n   validateInputs(inputs);\r\n\r\n   const meanAndVariance = inferenceHandler.run(createMeanAndVarianceProgramInfoLoader(inputs[0]), inputs);\r\n   const output = inferenceHandler.run(\r\n   createComputeOutputProgramInfoLoader(inferenceHandler, inputs[0], epsilon, meanAndVariance.dims),\r\n   [inputs[0], meanAndVariance, inputs[1], inputs[2]]);\r\n   return [output];\r\n   };\r\n\r\nexport const parseInstanceNormalizationAttributes: OperatorInitialization<number> = (node: Graph.Node): number =>\r\n   node.attributes.getFloat('epsilon', 1e-5);\r\n\r\nconst meanAndVarianceProgramMetadata = {\r\n name: 'InstanceNormalization_MeanAndVariance',\r\n inputNames: ['X'],\r\n inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nconst createMeanAndVarianceProgramInfo = (metadata: ProgramMetadata, input: Tensor): ProgramInfo => {\r\n const xDims = input.dims.slice();\r\n const channel = xDims[1];\r\n const channelSize = xDims[2] * xDims[3];\r\n const outputShape = [xDims[0], channel];\r\n\r\n const shaderSource = `\r\n   vec4 process(int[2] indices) {\r\n   vec4 v = vec4(0.0);\r\n   int a[4];\r\n   a[0] = indices[0];\r\n   a[1] = indices[1];\r\n   float temp = 0.0;\r\n   for(int a2=0; a2<${xDims[2]}; a2++) {\r\n   a[2] = a2;\r\n   for(int a3=0; a3<${xDims[3]}; a3++) {\r\n   a[3] = a3;\r\n   float x = _X(a);\r\n   temp += x;\r\n   }\r\n   }\r\n   float mean = temp / float(${channelSize});\r\n   temp = 0.0;\r\n   for(int a2=0; a2<${xDims[2]}; a2++) {\r\n   a[2] = a2;\r\n   for(int a3=0; a3<${xDims[3]}; a3++) {\r\n   a[3] = a3;\r\n   float x = _X(a);\r\n   temp += (x - mean) * (x - mean);\r\n   }\r\n   }\r\n   v.r = mean;\r\n   v.g = temp / float(${channelSize});\r\n\r\n   return v;\r\n   }`;\r\n return {\r\n   ...metadata,\r\n   output: {dims: outputShape, type: input.type, textureType: TextureType.packedLastDimension},\r\n   shaderSource\r\n };\r\n};\r\n\r\nconst createMeanAndVarianceProgramInfoLoader = (input: Tensor): ProgramInfoLoader => ({\r\n ...meanAndVarianceProgramMetadata,\r\n get: () => createMeanAndVarianceProgramInfo(meanAndVarianceProgramMetadata, input)\r\n});\r\n\r\nconst computeOutputProgramMetadata = {\r\n name: 'InstanceNormalization_ComputeOutput',\r\n inputNames: ['X', 'MeanAndVariance', 'Scale', 'B'],\r\n inputTypes: [TextureType.unpacked, TextureType.packedLastDimension, TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nconst createComputeOutputProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, input: Tensor, epsilon: number,\r\n   meanAndVarianceShape: readonly number[]): ProgramInfo => {\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const [textureWidth, textureHeight] =\r\n   inferenceHandler.calculateTextureWidthAndHeight(meanAndVarianceShape, TextureType.packedLastDimension);\r\n   const [meanAndVarianceWidth, meanAndVarianceHeight] = [textureWidth / 4, textureHeight];\r\n   const shaderSource = `\r\n   vec4 get_MeanAndVariance(int[2] mv) {\r\n   int offset = indicesToOffset_MeanAndVariance(mv);\r\n   vec2 coords = offsetToCoords(offset, ${meanAndVarianceWidth}, ${meanAndVarianceHeight});\r\n   return ${glsl.texture2D}(MeanAndVariance,

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coords);\r\n      }\r\n\r\n      float process(int[4] indices) {\r\n        int mv[2];\r\n        mv[0] = indices[0];\r\n
mv[1] = indices[1];\r\n        vec4 mean_and_variance = get_MeanAndVariance(mv);\r\n        float mean =
mean_and_variance.r;\r\n        float variance = mean_and_variance.g;\r\n\r\n        int sb[1];\r\n        sb[0] =
indices[1];\r\n        float scale = _Scale(sb);\r\n        float b = _B(sb);\r\n\r\n        return scale * (_X(indices) - mean) /
sqrt(variance + epsilon) + b;\r\n      }`;\r\n      return {\r\n        ...metadata,\r\n        output: {dims: input.dims, type:
input.type, textureType: TextureType.unpacked},\r\n        variables: [{name: 'epsilon', type: 'float', data:
epsilon}],\r\n        shaderSource\r\n      };\r\n    };\r\n\r\nconst createComputeOutputProgramInfoLoader =\r\n
(inferenceHandler: WebGLInferenceHandler, input: Tensor, epsilon: number, meanAndVarianceShape: readonly
number[]):\r\n        ProgramInfoLoader => {\r\n          const metadata = {...computeOutputProgramMetadata,
cacheHint: `${epsilon}`};\r\n          return {\r\n            ...metadata,\r\n            get: () =>
createComputeOutputProgramInfo(inferenceHandler, metadata, input, epsilon, meanAndVarianceShape)\r\n
};\r\n        };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length !== 3) {\r\n
throw new Error('InstanceNormalization requires 3 inputs.');\r\n  }\r\n\r\n  const X = inputs[0];\r\n  const scale =
inputs[1];\r\n  const B = inputs[2];\r\n\r\n  // input should at least have three dimensions - N,C,dim1,...,dimn\r\n  //
other inputs can have only one dimensions\r\n  if (X.dims.length < 3 || scale.dims.length !== 1 || B.dims.length !==
1) {\r\n    throw new Error('Invalid input shape.');\r\n  }\r\n  if (scale.dims[0] !== X.dims[1] || B.dims[0] !==
X.dims[1]) {\r\n    throw new Error('Input shapes are mismatched.');\r\n  }\r\n  if ((X.type !== 'float32' && X.type
!== 'float64') || (scale.type !== 'float32' && scale.type !== 'float64') ||\r\n      (B.type !== 'float32' && B.type !==
'float64')) {\r\n    throw new Error('Invalid input type.');\r\n  }\r\n  if (inputs[0].dims.length !== 4) {\r\n    throw new
Error('Only support 4-D input shape.');\r\n  }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights
reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport
{BroadcastUtil} from '../../../util';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl} from '../glsl-
source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo,
ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport {getCoordsDataType,
getGlChannels} from '../utils';\r\n\r\nimport {getActicationSnippet, InternalActivationAttributes} from './fuse-
utils';\r\nimport {getBiasForMatmul} from './matmul';\r\n\r\nconst createPackedMatmulProgramMetadata =
(hasBias: boolean, cacheHint: string) => ({\r\n  name: 'MatMul (packed)',\r\n  inputNames: hasBias ? ['A', 'B', 'Bias']
: ['A', 'B'],\r\n  inputTypes: hasBias ? [TextureType.packed, TextureType.packed, TextureType.packed] :\r\n
        [TextureType.packed, TextureType.packed],\r\n  cacheHint\r\n});\r\n\r\nconst
createPackedMatmulProgramInfo =\r\n    (inferenceHandler: WebGLInferenceHandler, metadata:
ProgramMetadata, inputs: Tensor[],\r\n     activationAttributes: InternalActivationAttributes): ProgramInfo => {\r\n
  const hasBias = inputs.length > 2;\r\n      const processBias = hasBias ? 'value += getBiasForMatmul();' : '';\r\n
const aShape = inputs[0].dims;\r\n      const bShape = inputs[1].dims;\r\n      const outputShape =
BroadcastUtil.calcShape(aShape, bShape, true);\r\n      const isBroadcast = !ShapeUtil.areEqual(inputs[0].dims,
inputs[1].dims);\r\n\r\n      if (!outputShape) {\r\n        throw new Error('Can\\'t use matmul on the given tensors');\r\n
    }\r\n      const sharedDim = aShape[aShape.length - 1];\r\n      const sharedDimIndex = Math.ceil(sharedDim /
2);\r\n      const aRank = aShape.length;\r\n      const bRank = bShape.length;\r\n\r\n      const glsl =
getGlsl(inferenceHandler.session.backend.glContext.version);\r\n      const coordsDataType =
getCoordsDataType(outputShape.length);\r\n      const outRank = outputShape.length;\r\n      const allGlChannels =
getGlChannels();\r\n      const {activationFunction, applyActivation} =
getActicationSnippet(activationAttributes);\r\n\r\n      const getBiasForMatmulSnippet =\r\n          hasBias ?
`${getBiasForMatmul(coordsDataType, allGlChannels, inputs[2].dims, outputShape, true)}` : '';\r\n\r\n      const
getBcastedSamplerForMatmulSnippet =\r\n          isBroadcast ? `${getBcastSamplerForMatmul(coordsDataType,
allGlChannels, inputs, outputShape)}` : '';\r\n\r\n      const getSamplerAInLoopSnippet = isBroadcast ?
'getAAtOutCoordsMatmul(i)' : `getA(${getA(allGlChannels, aRank)})`;\r\n      const getSamplerBInLoopSnippet =
isBroadcast ? 'getBAtOutCoordsMatmul(i)' : `getB(${getB(allGlChannels, bRank)})`;\r\n      const
getOutputCoordsSnippet = isBroadcast ? '' : `${coordsDataType} rc =\r\n          getOutputCoords(); int lastDim =
rc.${allGlChannels[outRank - 1]}; rc.${allGlChannels[outRank - 1]} =\r\n          rc.${allGlChannels[outRank - 2]};
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rc.${allGlChannels[outRank - 2]} = lastDim;\r\n      `;\r\n      const shaderSource = `\r\n
${getBcastedSamplerForMatmulSnippet}\r\n          ${getBiasForMatmulSnippet}\r\n
${activationFunction}\r\n          void main() {\r\n            ${getOutputCoordsSnippet}\r\n\r\n            vec4 value =
vec4(0);\r\n            for (int i = 0; i < ${sharedDimIndex}; i++) {\r\n              vec4 a =
${getSamplerAInLoopSnippet};\r\n              vec4 b = ${getSamplerBInLoopSnippet};\r\n\r\n              value +=
(a.rrbb * b.rgrg);\r\n              value += (a.ggaa * b.baba);\r\n            }\r\n            ${processBias}\r\n
${applyActivation}\r\n            ${glsl.output} = value;\r\n          }`;\r\n      return {\r\n        ...metadata,\r\n
output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.packed},\r\n        shaderSource,\r\n
hasMain: true\r\n      };\r\n    };\r\n\r\nexport const createPackedMatmulProgramInfoLoader =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],\r\n     activationAttributes:
InternalActivationAttributes): ProgramInfoLoader => {\r\n      const metadata =
createPackedMatmulProgramMetadata(inputs.length > 2, activationAttributes.activationCacheKey);\r\n      return
{\r\n        ...metadata,\r\n        get: () => createPackedMatmulProgramInfo(inferenceHandler, metadata, inputs,
activationAttributes)\r\n      };\r\n    };\r\n\r\nfunction getBcastSamplerForMatmul(\r\n    coordsDataType: string,
allGlChannels: readonly string[], inputs: Tensor[], outShape: readonly number[]): string {\r\n  let
unpackedACoordsSnippet = [];\r\n  let unpackedBCoordsSnippet = [];\r\n\r\n  const inAShape = inputs[0].dims;\r\n
const inBShape = inputs[1].dims;\r\n\r\n  const inARank = inAShape.length;\r\n  const inBRank =
inBShape.length;\r\n\r\n  const outRank = outShape.length;\r\n  const rankADiff = outRank - inARank;\r\n  const
rankBDiff = outRank - inBRank;\r\n\r\n  unpackedACoordsSnippet = inAShape.map((s, i) =>
`coords.${allGlChannels[i + rankADiff]}`);\r\n  unpackedACoordsSnippet[inARank - 1] = 'i*2';\r\n
unpackedACoordsSnippet.join(', ');\r\n  unpackedBCoordsSnippet = inBShape.map((s, i) =>
`coords.${allGlChannels[i + rankBDiff]}`);\r\n  unpackedBCoordsSnippet[inBRank - 2] = 'i*2';\r\n
unpackedBCoordsSnippet.join(', ');\r\n\r\n  const broadcastADims = BroadcastUtil.getBroadcastDims(inAShape,
outShape);\r\n  const broadcastBDims = BroadcastUtil.getBroadcastDims(inBShape, outShape);\r\n\r\n  const
coordsASnippet = broadcastADims.map(d => `coords.${allGlChannels[d + rankADiff]} = 0;`).join('\\n');\r\n  const
coordsBSnippet = broadcastBDims.map(d => `coords.${allGlChannels[d + rankBDiff]} = 0;`).join('\\n');\r\n  const
swapDimSnippet = `int lastDim = coords.${allGlChannels[outRank - 1]};\r\n  coords.${allGlChannels[outRank -
1]} = coords.${allGlChannels[outRank - 2]};\r\n  coords.${allGlChannels[outRank - 2]} = lastDim;`;\r\n\r\n  const
getBcastSamplerMatmulSource = `\r\nvec4 getAAtOutCoordsMatmul(int i) {\r\n  ${coordsDataType} coords =
getOutputCoords();\r\n  ${swapDimSnippet}\r\n  ${coordsASnippet}\r\n  vec4 outputValue =
getA(${unpackedACoordsSnippet});\r\n  return outputValue;\r\n}\r\n\r\nvec4 getBAtOutCoordsMatmul(int i) {\r\n
${coordsDataType} coords = getOutputCoords();\r\n  ${swapDimSnippet}\r\n  ${coordsBSnippet}\r\n  vec4
outputValue = getB(${unpackedBCoordsSnippet});\r\n  return outputValue;\r\n}`;\r\n\r\n  return
getBcastSamplerMatmulSource;\r\n}\r\n\r\nfunction getA(allGlChannels: string[], rank: number): string {\r\n  let res
= '';\r\n  for (let i = 0; i < rank - 2; i++) {\r\n    res += `rc.${allGlChannels[i]}, `;\r\n  }\r\n  res +=
`rc.${allGlChannels[rank - 2]}, ` +\r\n      'i*2';\r\n  return res;\r\n}\r\n\r\nfunction getB(allGlChannels: string[],
rank: number): string {\r\n  let res = '';\r\n  for (let i = 0; i < rank - 2; i++) {\r\n    res += `rc.${allGlChannels[i]},
`;\r\n  }\r\n  res += 'i*2, ' +\r\n      `rc.${allGlChannels[rank - 1]}`;\r\n  return res;\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from
'../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor}
from '../../../tensor';\r\nimport {BroadcastUtil, ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler}
from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from
'../types';\r\nimport {getCoordsDataType, getGlChannels} from '../utils';\r\nimport {getActicationSnippet,
InternalActivationAttributes, parseInternalActivationAttributes} from './fuse-utils';\r\nimport
{createPackedMatmulProgramInfoLoader} from './matmul-pack';\r\n\r\nexport const matMul:
OperatorImplementation<InternalActivationAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs:
Tensor[], attributes: InternalActivationAttributes): Tensor[] => {\r\n      validateInputs(inputs);\r\n\r\n      if
(inferenceHandler.session.pack) {\r\n        return [inferenceHandler.run(\r\n
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createPackedMatmulProgramInfoLoader(inferenceHandler, inputs, attributes), inputs)];\r\n      } else {\r\n        return
[inferenceHandler.run(createMatmulProgramInfoLoader(inputs, attributes), inputs)];\r\n      }\r\n    };\r\n\r\nexport
const parseMatMulAttributes: OperatorInitialization<InternalActivationAttributes> =\r\n    (node: Graph.Node):
InternalActivationAttributes => parseInternalActivationAttributes(node.attributes);\r\n\r\nconst
createMatmulProgramMetadata = (hasBias: boolean, cacheHint: string) => ({\r\n  name: 'MatMul',\r\n  inputNames:
hasBias ? ['A', 'B', 'Bias'] : ['A', 'B'],\r\n  inputTypes: hasBias ? [TextureType.unpacked, TextureType.unpacked,
TextureType.unpacked] :\r\n                          [TextureType.unpacked, TextureType.unpacked],\r\n
cacheHint\r\n});\r\n\r\nfunction createMatmulProgramInfo(\r\n    metadata: ProgramMetadata, inputs: Tensor[],
activationAttributes: InternalActivationAttributes): ProgramInfo {\r\n  const aShape = inputs[0].dims;\r\n  const
bShape = inputs[1].dims;\r\n  const outputShape = BroadcastUtil.calcShape(aShape, bShape, true);\r\n  if
(!outputShape) {\r\n    throw new Error('Can\\'t use matmul on the given tensors');\r\n  }\r\n  const coordsDataType
= getCoordsDataType(outputShape.length);\r\n  const allGlChannels = getGlChannels();\r\n  const
{activationFunction, applyActivation} = getActicationSnippet(activationAttributes);\r\n\r\n  const hasBias =
inputs.length > 2;\r\n  const processBias = hasBias ? 'value += getBiasForMatmul();' : '';\r\n  const
getBiasForMatmulSnippet =\r\n      hasBias ? `${getBiasForMatmul(coordsDataType, allGlChannels,
inputs[2].dims, outputShape, false)}` : '';\r\n\r\n  const rank = outputShape.length;\r\n  const arank =
aShape.length;\r\n  const brank = bShape.length;\r\n  const sharedDim = aShape[aShape.length - 1];\r\n  const
shaderSource = `\r\n    ${activationFunction}\r\n    ${getBiasForMatmulSnippet}\r\n    float process(int
indices[${rank}]) {\r\n        int a[${arank}];\r\n        int b[${brank}];\r\n        bcastMatmulIndices_A(indices, a);\r\n
    bcastMatmulIndices_B(indices, b);\r\n\r\n        float value;\r\n        for (int k=0; k<${sharedDim}; ++k) {\r\n
 a[${arank - 1}] = k;\r\n            b[${brank - 2}] = k;\r\n            value += _A(a) * _B(b);\r\n        }\r\n
${processBias}\r\n        ${applyActivation}\r\n        return value;\r\n    }`;\r\n  return {\r\n    ...metadata,\r\n    output:
{dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n    shaderSource,\r\n
};\r\n}\r\n\r\nexport function createMatmulProgramInfoLoader(\r\n    inputs: Tensor[], activationAttributes:
InternalActivationAttributes): ProgramInfoLoader {\r\n  const metadata =
createMatmulProgramMetadata(inputs.length > 2, activationAttributes.activationCacheKey);\r\n  return
{...metadata, get: () => createMatmulProgramInfo(metadata, inputs, activationAttributes)};\r\n}\r\n\r\nconst
validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length !== 2) {\r\n    throw new Error('MatMul
requires 2 inputs.');\r\n  }\r\n\r\n  if (inputs[0].dims[inputs[0].dims.length - 1] !==
inputs[1].dims[inputs[1].dims.length - 2]) {\r\n    throw new Error('shared dimension does not match.');\r\n  }\r\n\r\n
if ((inputs[0].type !== 'float32' && inputs[0].type !== 'float64') ||\r\n      (inputs[1].type !== 'float32' &&
inputs[1].type !== 'float64')) {\r\n    throw new Error('inputs should be float type');\r\n  }\r\n\r\n  if (inputs[0].type
!== inputs[1].type) {\r\n    throw new Error('inputs types should match');\r\n  }\r\n};\r\n\r\nexport function
getBiasForMatmul(\r\n    coordsDataType: string, allGlChannels: readonly string[], inShape: readonly number[],
outShape: readonly number[],\r\n    isPacked: boolean): string {\r\n  let unpackedCoordsSnippet = '';\r\n  const
inRank = inShape.length;\r\n  const outRank = outShape.length;\r\n  const rankDiff = outRank - inRank;\r\n  if
(outRank < 2 && inRank > 0) {\r\n    unpackedCoordsSnippet = 'coords';\r\n  } else {\r\n    unpackedCoordsSnippet
= inShape.map((s, i) => `coords.${allGlChannels[i + rankDiff]}`).join(', ');\r\n  }\r\n  const broadcastDims =
BroadcastUtil.getBroadcastDims(inShape, outShape);\r\n  const coordsSnippet = broadcastDims.map(d =>
`coords.${allGlChannels[d + rankDiff]} = 0;`).join('\\n');\r\n  const inSize = ShapeUtil.size(inShape);\r\n  const
isInputScalar = inSize === 1;\r\n  let output = 'vec4(outputValue.xx, outputValue.yy)';\r\n  if (isInputScalar) {\r\n
output = 'vec4(outputValue.x)';\r\n  }\r\n  const getBiasForMatmulSource = isPacked ? `\r\nvec4
getBiasForMatmul() {\r\n  ${coordsDataType} coords = getOutputCoords();\r\n  ${coordsSnippet}\r\n  vec4
outputValue = getBias(${unpackedCoordsSnippet});\r\n  return ${output};\r\n}` :\r\n
`\r\nfloat getBiasForMatmul() {\r\n  ${coordsDataType} coords = getOutputCoords();\r\n  ${coordsSnippet}\r\n
return getBias(coords.x);\r\n}`;\r\n\r\n  return getBiasForMatmulSource;\r\n}\r\n","// Copyright (c) Microsoft
Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from
'../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-
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handler';\r\nimport {ProgramInfo, ProgramInfoLoader, TextureType} from '../types';\r\nimport
{getCoordsDataType} from '../utils';\r\n\r\nimport {getChannels} from './packing-utils';\r\n\r\nconst
packProgramMetadata = {\r\n name: 'pack',\r\n inputNames: ['A'],\r\n inputTypes:
[TextureType.unpackedReversed]\r\n};\r\n\r\nconst createPackProgramInfo = (handler: WebGLInferenceHandler,
input: Tensor): ProgramInfo => {\r\n const glsl = getGlsl(handler.session.backend.glContext.version);\r\n const
inputShape = input.dims;\r\n\r\n const inputRank = inputShape.length;\r\n // createTextureLayoutFromShape won't
change output rank. Need to verify by running tests\r\n const outputRank = input.dims.length;\r\n\r\n const
coordsDataType = getCoordsDataType(outputRank);\r\n const channels = getChannels('rc', outputRank);\r\n const
setup = getSetup(outputRank, channels, inputShape[inputShape.length - 2], inputShape[inputShape.length -
1]);\r\n\r\n let reversedInputWH;\r\n if (inputRank === 0) {\r\n   reversedInputWH = [1, 1];\r\n } else if
(inputRank === 1) {\r\n   reversedInputWH = [inputShape[0], 1];\r\n } else {\r\n   reversedInputWH =
[inputShape[outputRank - 1], inputShape[outputRank - 2]];\r\n }\r\n const outOfBoundsCondition =
getOutOfBoundsCondition(outputRank, reversedInputWH, channels);\r\n const output = getOutput(inputShape,
channels);\r\n\r\n const shaderSource = `\r\n   void main() {\r\n ${coordsDataType} rc =
getOutputCoords();\r\n\r\n   if(${outOfBoundsCondition}) {\r\n ${glsl.output} = vec4(0);\r\n   } else
{\r\n ${setup}\r\n\r\n ${glsl.output} = vec4(${output});\r\n   }\r\n   }\r\n   `;\r\n return {\r\n
...packProgramMetadata,\r\n   hasMain: true,\r\n   output: {dims: input.dims, type: input.type, textureType:
TextureType.packed},\r\n   shaderSource\r\n };\r\n};\r\n\r\nexport const createPackProgramInfoLoader = (handler:
WebGLInferenceHandler, input: Tensor): ProgramInfoLoader =>\r\n   ({...packProgramMetadata, get: () =>
createPackProgramInfo(handler, input)});\r\n\r\n/**\r\n * check output coordinate location and return false if it is
outside input's width/height boundary\r\n */\r\nfunction getOutOfBoundsCondition(rank: number, shape: readonly
number[], dims: string[]): string {\r\n if (rank === 0) {\r\n   return 'false';\r\n }\r\n if (rank === 1) {\r\n   return `rc
> ${shape[0]}`;\r\n  }\r\n\r\n  let cond = '';\r\n  for (let i = rank - 2; i < rank; i++) {\r\n    cond += `${dims[i]} >=
${shape[i - rank + 2]}`;\r\n   if (i < rank - 1) {\r\n   cond += '||';\r\n   }\r\n }\r\n\r\n return cond;\r\n}\r\n\r\n/**\r\n
* code snippet to sample input texture with output coordiantes\r\n */\r\nfunction getOutput(shape: readonly
number[], dims: string[]): string {\r\n const rank = shape.length;\r\n\r\n if (rank === 0) {\r\n   return 'getA(), 0, 0,
0';\r\n }\r\n\r\n if (rank === 1) {\r\n   return `getA(rc),\r\n   rc + 1 >= ${shape[0]} ? 0. : getA(rc + 1),\r\n
  0, 0`;\r\n }\r\n\r\n const coord00 = 'r, c';\r\n const coord01 = 'r, cp1';\r\n const coord10 = 'rp1, c';\r\n const
coord11 = 'rp1, cp1';\r\n let D = '';\r\n if (rank > 2) {\r\n   for (let i = 0; i < rank - 2; ++i) {\r\n   D = D +
`${dims[i]},`;\r\n   }\r\n }\r\n return `getA(${D}${coord00}),\r\n   rEdge ? 0. : getA(${D}${coord10}),\r\n
   cEdge ? 0. : getA(${D}${coord01}),\r\n   rEdge || cEdge ? 0. : getA(${D}${coord11})`;\r\n}\r\n\r\n/**\r\n *
code snippet to setup 4 coordinates and edge conditions\r\n */\r\nfunction getSetup(rank: number, dims: string[],
rows: number, cols: number): string {\r\n if (rank === 0 || rank === 1) {\r\n   return '';\r\n }\r\n // rank >= 2 for
width+height pack.\r\n else {\r\n   const setup = `\r\n   int r = ${dims[rank - 2]};\r\n   int c = ${dims[rank - 1]};\r\n
  int rp1 = ${dims[rank - 2]} + 1;\r\n   int cp1 = ${dims[rank - 1]} + 1;\r\n   bool rEdge = rp1 >= ${cols};\r\n   bool
cEdge = cp1 >= ${rows};\r\n   `;\r\n   return setup;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All
rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {getGlChannels} from '../utils';\r\n\r\nexport
function getVecChannels(name: string, rank: number): string[] {\r\n return getGlChannels(rank).map(d =>
`${name}.${d}`);\r\n}\r\n\r\nexport function getChannels(name: string, rank: number): string[] {\r\n if (rank === 1)
{\r\n   return [name];\r\n }\r\n return getVecChannels(name, rank);\r\n}\r\n\r\nexport function
unpackFromChannel(): string {\r\n return `\r\n   float getChannel(vec4 frag, int dim) {\r\n   int modCoord =
imod(dim, 2);\r\n   return modCoord == 0 ? frag.r : frag.g;\r\n   }\r\n\r\n   float getChannel(vec4 frag, vec2
innerDims) {\r\n   vec2 modCoord = mod(innerDims, 2.);\r\n   return modCoord.x == 0. ?\r\n   (modCoord.y
== 0. ? frag.r : frag.g) :\r\n   (modCoord.y == 0. ? frag.b : frag.a);\r\n   }\r\n `;\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph}
from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport
{Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl, Glsl} from '../glsl-

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source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType}
from '../types';\r\n\r\nexport interface PadAttributes extends AttributeWithCacheKey {\r\n  readonly mode:
string;\r\n  readonly pads: number[];\r\n  readonly value: number;\r\n}\r\n\r\nconst padProgramMetadata = {\r\n
name: 'Pad',\r\n  inputNames: ['A'],\r\n  inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nexport const pad:
OperatorImplementation<PadAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: PadAttributes): Tensor[] => {\r\n      validateInputs(inputs);\r\n      const output =
inferenceHandler.run(\r\n          {\r\n            ...padProgramMetadata,\r\n            cacheHint: attributes.cacheKey,\r\n
      get: () => createPadProgramInfo(inferenceHandler, inputs, attributes)\r\n          },\r\n          inputs);\r\n      return
[output];\r\n    };\r\n\r\nexport const parsePadAttributes: OperatorInitialization<PadAttributes> = (node:
Graph.Node): PadAttributes => {\r\n  const mode = node.attributes.getString('mode', 'constant');\r\n  const value =
node.attributes.getFloat('value', 0.0);\r\n  const pads = node.attributes.getInts('pads');\r\n  return
createAttributeWithCacheKey({mode, value, pads});\r\n};\r\n\r\nconst createPadProgramInfo =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: PadAttributes): ProgramInfo => {\r\n
const outputShape = ShapeUtil.padShape(inputs[0].dims.slice(), attributes.pads);\r\n      const rank =
outputShape.length;\r\n      const padFunction = getPadFunction(inferenceHandler, inputs[0], attributes);\r\n
const shaderSource = `\r\n      ${padFunction}\r\n      float process(int[${rank}] indices) {\r\n          return
padA(indices);\r\n      }`;\r\n      return {\r\n        name: 'Pad',\r\n        inputNames: ['A'],\r\n        inputTypes:
[TextureType.unpacked],\r\n        output: {dims: outputShape, type: inputs[0].type, textureType:
TextureType.unpacked},\r\n        shaderSource\r\n      };\r\n    };\r\n\r\nconst validateInputs = (inputs: Tensor[]):
void => {\r\n  if (!inputs || inputs.length !== 1) {\r\n    throw new Error('Pad requires 1 input');\r\n  }\r\n  if
(inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n    throw new Error('Invalid input type.');\r\n
}\r\n};\r\n\r\nconst getPadFunction = (inferenceHandler: WebGLInferenceHandler, input: Tensor, attributes:
PadAttributes): string => {\r\n  const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n  const
[width, height] = inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n  const
strides = ShapeUtil.computeStrides(input.dims);\r\n\r\n  switch (attributes.mode) {\r\n    case 'constant':\r\n      return
getPadConstant(glsl, input.dims, strides, width, height, attributes.pads, attributes.value);\r\n    case 'reflect':\r\n
return getPadReflect(glsl, input.dims, strides, width, height, attributes.pads);\r\n    case 'edge':\r\n      return
getPadEdge(glsl, input.dims, strides, width, height, attributes.pads);\r\n    default:\r\n      throw new Error('Invalid
mode');\r\n  }\r\n};\r\n\r\nconst getPadConstant =\r\n    (glsl: Glsl, shape: readonly number[], strides: readonly
number[], width: number, height: number, pads: number[],\r\n     value: number): string => {\r\n      const rank =
shape.length;\r\n      let block = '';\r\n      for (let i = rank - 1; i >= 0; --i) {\r\n        block += `\r\n        k = m[${i}] -
${pads[i]};\r\n        if (k < 0)  return constant;\r\n        if (k >= ${shape[i]}) return constant;\r\n        offset += k *
${strides[i]};\r\n        `;\r\n      }\r\n      return `\r\n      float padA(int m[${rank}]) {\r\n        const float constant =
float(${value});\r\n        int offset = 0;\r\n        int k = 0;\r\n        ${block}\r\n        vec2 coords =
offsetToCoords(offset, ${width}, ${height});\r\n        float value = getColorAsFloat(${glsl.texture2D}(A,
coords));\r\n        return value;\r\n      }\r\n      `;\r\n    };\r\n\r\nconst getPadReflect =\r\n    (glsl: Glsl, shape:
readonly number[], strides: readonly number[], width: number, height: number, pads: number[]):\r\n        string =>
{\r\n          const rank = shape.length;\r\n\r\n          let block = '';\r\n          for (let i = rank - 1; i >= 0; --i) {\r\n
block += `\r\n        k = m[${i}] - ${pads[i]};\r\n        if (k < 0) { k = -k; }\r\n        {\r\n          const int _2n_1 = ${2 *
(shape[i] - 1)};\r\n          k = int( mod( float(k), float(_2n_1) ) ) ;\r\n          if(k >= ${shape[i]}) { k = _2n_1 - k; }\r\n
    }\r\n        offset += k * ${strides[i]};\r\n        `;\r\n          }\r\n          return `\r\n      float padA(int m[${rank}])
{\r\n        int offset = 0;\r\n        int k = 0;\r\n        ${block}\r\n        vec2 coords = offsetToCoords(offset, ${width},
${height});\r\n        float value = getColorAsFloat(${glsl.texture2D}(A, coords));\r\n        return value;\r\n      }\r\n
 `;\r\n        };\r\n\r\nconst getPadEdge =\r\n    (glsl: Glsl, shape: readonly number[], strides: readonly number[],
width: number, height: number, pads: number[]):\r\n        string => {\r\n          const rank = shape.length;\r\n\r\n
let block = '';\r\n          for (let i = rank - 1; i >= 0; --i) {\r\n            block += `\r\n        k = m[${i}] - ${pads[i]};\r\n
 if (k < 0)  k = 0;\r\n        if (k >= ${shape[i]}) k = ${shape[i] - 1};\r\n        offset += k * ${strides[i]};\r\n      `;\r\n
   }\r\n          return `\r\n      float padA(int m[${rank}]) {\r\n        int offset = 0;\r\n        int k = 0;\r\n
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${block}\r\n        vec2 coords = offsetToCoords(offset, ${width}, ${height});\r\n        float value =
getColorAsFloat(${glsl.texture2D}(A, coords));\r\n        return value;\r\n      }\r\n      `;\r\n      };\r\n","// Copyright
(c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph}
from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport
{Tensor} from '../../../tensor';\r\nimport {PoolConvUtil, ShapeUtil} from '../../../util';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramMetadata, TextureType}
from '../types';\r\n\r\nexport interface AveragePoolAttributes extends AttributeWithCacheKey {\r\n  readonly
autoPad: string;\r\n  readonly ceilMode: number;\r\n  readonly countIncludePad: boolean;\r\n  readonly kernelShape:
number[];\r\n  readonly strides: number[];\r\n  readonly pads: number[];\r\n}\r\n\r\nexport const averagePool:
OperatorImplementation<AveragePoolAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs:
Tensor[], attributes: AveragePoolAttributes): Tensor[] => {\r\n      validateInputs(inputs);\r\n      const metadata
=\r\n          {name: 'AveragePool', inputNames: ['X'], inputTypes: [TextureType.unpacked], cacheHint:
attributes.cacheKey};\r\n      const output = inferenceHandler.run(\r\n          {...metadata, get: () =>
createAveragePoolProgramInfo(inputs, metadata, false, attributes)}, inputs);\r\n      return [output];\r\n
};\r\n\r\nexport const parseAveragePoolAttributes: OperatorInitialization<AveragePoolAttributes> =\r\n    (node:
Graph.Node): AveragePoolAttributes => {\r\n      const autoPad = node.attributes.getString('auto_pad',
'NOTSET');\r\n      const ceilMode = node.attributes.getInt('ceil_mode', 0);\r\n      const countIncludePad =
(node.attributes.getInt('count_include_pad', 0) === 0 ? false : true);\r\n      const kernelShape =
node.attributes.getInts('kernel_shape');\r\n      const strides = node.attributes.getInts('strides', []);\r\n      const pads =
node.attributes.getInts('pads', []);\r\n\r\n      // TODO: support attribute 'ceil_mode'\r\n      if (ceilMode !== 0) {\r\n
  throw new Error('using ceil() in shape computation is not yet supported for AveragePool');\r\n      }\r\n\r\n      return
createAttributeWithCacheKey({autoPad, ceilMode, countIncludePad, kernelShape, strides, pads});\r\n
};\r\n\r\nconst createAveragePoolProgramInfo =\r\n    (inputs: Tensor[], metadata: ProgramMetadata,
isGlobalOperator: boolean, attributes: AveragePoolAttributes):\r\n        ProgramInfo => {\r\n          const inputShape
= inputs[0].dims.slice();\r\n          PoolConvUtil.adjustPoolAttributes(\r\n              isGlobalOperator, inputShape,
attributes.kernelShape, attributes.strides, attributes.pads);\r\n          const outputShape =
PoolConvUtil.computePoolOutputShape(\r\n              isGlobalOperator, inputShape, attributes.strides,
attributes.kernelShape, attributes.pads,\r\n              attributes.autoPad);\r\n          const kernelSize =
ShapeUtil.size(attributes.kernelShape);\r\n          const op1 = 'value += _X(x);';\r\n          let op2 = '';\r\n          if
(attributes.countIncludePad) {\r\n            op2 += `value /= float(${kernelSize});`;\r\n          } else {\r\n            op2 +=
`value /= float(${kernelSize} - pad);`;\r\n          }\r\n          const poolingCode =
generatePoolingCode(inputs[0].dims, attributes, op1, op2, '0.0');\r\n          const shaderSource = `\r\n
${poolingCode}\r\n      `;\r\n          return {\r\n            ...metadata,\r\n            output: {dims: outputShape, type:
inputs[0].type, textureType: TextureType.unpacked},\r\n            shaderSource\r\n          };\r\n        };\r\n\r\nexport
const globalAveragePool: OperatorImplementation<AveragePoolAttributes> =\r\n    (inferenceHandler:
WebGLInferenceHandler, inputs: Tensor[], attributes: AveragePoolAttributes): Tensor[] => {\r\n
validateInputs(inputs);\r\n      const metadata = {\r\n        name: 'GlobalAveragePool',\r\n        inputNames: ['X'],\r\n
   inputTypes: [TextureType.unpacked],\r\n        cacheHint: `${attributes.countIncludePad}`\r\n      };\r\n      const
output = inferenceHandler.run(\r\n          {...metadata, get: () => createAveragePoolProgramInfo(inputs, metadata,
true, attributes)}, inputs);\r\n      return [output];\r\n    };\r\n\r\nexport const parseGlobalAveragePoolAttributes:
OperatorInitialization<AveragePoolAttributes> =\r\n    (node: Graph.Node): AveragePoolAttributes => {\r\n
const countIncludePad = (node.attributes.getInt('count_include_pad', 0) === 0 ? false : true);\r\n      return
createAttributeWithCacheKey(\r\n          {autoPad: '', ceilMode: 0, countIncludePad, kernelShape: [], strides: [],
pads: []});\r\n    };\r\n\r\nexport interface MaxPoolAttributes extends AveragePoolAttributes {\r\n  readonly
storageOrder: number;\r\n}\r\n\r\nexport const maxPool: OperatorImplementation<MaxPoolAttributes> =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: MaxPoolAttributes): Tensor[] => {\r\n
validateInputs(inputs);\r\n      const metadata =\r\n          {name: 'MaxPool', inputNames: ['X'], inputTypes:
```

[TextureType.unpacked], cacheHint: attributes.cacheKey};\r\n   const output = inferenceHandler.run(\r\n {...metadata, get: () => createMaxPoolProgramInfo(inputs, metadata, false, attributes)}, inputs);\r\n   return [output];\r\n   };\r\n\r\nexport const parseMaxPoolAttributes: OperatorInitialization<MaxPoolAttributes> =\r\n (node: Graph.Node): MaxPoolAttributes => {\r\n   const autoPad = node.attributes.getString('auto_pad', 'NOTSET');\r\n   const ceilMode = node.attributes.getInt('ceil_mode', 0);\r\n   const kernelShape = node.attributes.getInts('kernel_shape');\r\n   const strides = node.attributes.getInts('strides', []);\r\n   const pads = node.attributes.getInts('pads', []);\r\n   const storageOrder = node.attributes.getInt('storage_order', 0);\r\n\r\n   // TODO: support attribute 'ceil_mode' and 'storage_order'\r\n   if (storageOrder !== 0) {\r\n   throw new Error('column major storage order is not yet supported for MaxPool');\r\n   }\r\n   if (ceilMode !== 0) {\r\n throw new Error('using ceil() in shape computation is not yet supported for MaxPool');\r\n   }\r\n\r\n   return createAttributeWithCacheKey(\r\n   {autoPad, ceilMode, countIncludePad: false, kernelShape, strides, pads, storageOrder});\r\n   };\r\n\r\nconst createMaxPoolProgramInfo =\r\n   (inputs: Tensor[], metadata: ProgramMetadata, isGlobalOperator: boolean, attributes: MaxPoolAttributes):\r\n   ProgramInfo => {\r\n const inputShape = inputs[0].dims.slice();\r\n   PoolConvUtil.adjustPoolAttributes(\r\n isGlobalOperator, inputShape, attributes.kernelShape, attributes.strides, attributes.pads);\r\n   const outputShape = PoolConvUtil.computePoolOutputShape(\r\n   isGlobalOperator, inputShape, attributes.strides, attributes.kernelShape, attributes.pads,\r\n   attributes.autoPad);\r\n   const op1 = `\r\n      value = max(_X(x), value);\r\n    `;\r\n   const op2 = '';\r\n   const poolingCode = generatePoolingCode(inputShape, attributes, op1, op2, '-1e5');\r\n   const shaderSource = `\r\n      ${poolingCode}\r\n    `;\r\n   return {\r\n   ...metadata,\r\n   output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst globalMaxPoolAttributes = {\r\n autoPad: '',\r\n ceilMode: 0,\r\n countIncludePad: false,\r\n kernelShape: [],\r\n strides: [],\r\n pads: [],\r\n storageOrder: 0,\r\n cacheKey: ''\r\n};\r\n\r\nconst globalMaxPoolMetadata = {\r\n name: 'GlobalMaxPool',\r\n inputNames: ['X'],\r\n inputTypes: [TextureType.unpacked]\r\n};\r\n\r\nexport const globalMaxPool = (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n validateInputs(inputs);\r\n const output = inferenceHandler.run(\r\n   {\r\n ...globalMaxPoolMetadata,\r\n   get: () => createMaxPoolProgramInfo(inputs, globalMaxPoolMetadata, true, globalMaxPoolAttributes)\r\n   },\r\n   inputs);\r\n return [output];\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Pool ops requires 1 input.');\r\n }\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n   throw new Error('Invalid input type.');\r\n }\r\n};\r\n\r\nconst generatePoolingCode =\r\n   (inputDims: readonly number[], attributes: AveragePoolAttributes, op1: string, op2: string, start: string):\r\n   string => {\r\n   const rank = inputDims.length;\r\n   if (attributes.kernelShape.length <= 2) {\r\n   const kw = attributes.kernelShape[attributes.kernelShape.length - 1];\r\n   const sw = attributes.strides[attributes.strides.length - 1];\r\n   const pwStart = attributes.pads[attributes.pads.length / 2 - 1];\r\n   const pwEnd = attributes.pads[attributes.pads.length - 1];\r\n   const dimW = inputDims[rank - 1];\r\n   let codeW = '';\r\n   let codeH = '';\r\n   let codeHEnd = '';\r\n   if (pwStart + pwEnd !== 0) {\r\n   codeW = `\r\n          for (int i = 0; i < ${kw}; i++) {\r\n            x[${rank} - 1] = indices[${rank} - 1] * ${sw} - ${pwStart} + i;\r\n            if (x[${rank} - 1] < 0 || x[${rank} - 1] >= ${dimW}) {\r\n pad++;\r\n              continue;\r\n            }\r\n            ${op1}\r\n          }`;\r\n   } else {\r\n   codeW = `\r\n        for (int i = 0; i < ${kw}; i++) {\r\n            x[${rank} - 1] = indices[${rank} - 1] * ${sw} - ${pwStart} + i;\r\n      ${op1}\r\n          }`;\r\n   }\r\n\r\n   if (attributes.kernelShape.length === 2) {\r\n   const kh = attributes.kernelShape[attributes.kernelShape.length - 2];\r\n   const sh = attributes.strides[attributes.strides.length - 2];\r\n   const phStart = attributes.pads[attributes.pads.length / 2 - 2];\r\n   const phEnd = attributes.pads[attributes.pads.length - 2];\r\n   const dimH = inputDims[rank - 2];\r\n   if (phStart + phEnd !== 0) {\r\n   codeH = `\r\n          for (int j = 0; j < ${kh}; j++) {\r\n    x[${rank} - 2] = indices[${rank} - 2] * ${sh} - ${phStart} + j;\r\n            if (x[${rank} - 2] < 0 || x[${rank} - 2] >= ${dimH}) {\r\n              pad+= ${kw};\r\n              continue;\r\n            }\r\n          `;\r\n   } else {\r\n   codeH = `\r\n   for (int j = 0; j < ${kh}; j++) {\r\n   x[${rank} - 2] = indices[${rank} - 2] * ${sh}

```
- ${phStart} + j;\r\n            `;\r\n              }\r\n              codeHEnd = `\r\n          }\r\n        `;\r\n            }\r\n\r\n
const poolingCode = `\r\n        float process(int indices[${rank}]) {\r\n          int x[${rank}];\r\n
copyVec(indices, x);\r\n\r\n          float value = ${start};\r\n          int pad = 0;\r\n          ${codeH}\r\n
${codeW}\r\n          ${codeHEnd}\r\n          ${op2}\r\n          return value;\r\n        }\r\n      `;\r\n            return
poolingCode;\r\n          } else {\r\n            const kernelSize = ShapeUtil.size(attributes.kernelShape);\r\n            const
kernelStrides = ShapeUtil.computeStrides(attributes.kernelShape);\r\n            const stridesRank =
kernelStrides.length;\r\n            const padsRank = attributes.pads.length;\r\n            const offsetToIndicesFunction =
offsetToIndices(stridesRank);\r\n            const copyInputDims = copyArray(inputDims, 'inputDims');\r\n
const copyPads = copyArray(attributes.pads, 'pads');\r\n            const copyKernelStrides = copyArray(kernelStrides,
'kernelStrides');\r\n            const copyStrides = copyArray(attributes.strides, 'strides');\r\n            const hasPads =
attributes.pads.reduce((sum, cur) => sum + cur);\r\n            let padCode = '';\r\n            if (hasPads) {\r\n
padCode = `\r\n            if (x[j] >= inputDims[j] || x[j] < 0) {\r\n              pad++;\r\n              isPad = true;\r\n
break;\r\n            }\r\n          }\r\n          if (!isPad) {\r\n            ${op1}\r\n          }`;\r\n            } else {\r\n
padCode = `\r\n          }\r\n          ${op1}\r\n        `;\r\n            }\r\n            const poolingCode = `\r\n
${offsetToIndicesFunction}\r\n        float process(int indices[${rank}]) {\r\n          int x[${rank}];\r\n
copyVec(indices, x);\r\n          int offset[${stridesRank}];\r\n          int pads[${padsRank}];\r\n          int
inputDims[${rank}];\r\n          int kernelStrides[${stridesRank}];\r\n          int strides[${stridesRank}];\r\n
${copyPads}\r\n          ${copyInputDims}\r\n          ${copyStrides}\r\n          ${copyKernelStrides}\r\n\r\n
float value = ${start};\r\n          int pad = 0;\r\n          bool isPad = false;\r\n          for (int i = 0; i < ${kernelSize};
i++) {\r\n            offsetToIndices(i, kernelStrides, offset);\r\n            isPad = false;\r\n            for (int j = ${rank} -
${stridesRank}; j < ${rank}; j++) {\r\n              x[j] = indices[j] * strides[j - ${rank} + ${stridesRank}]\r\n
+ offset[j - ${rank} + ${stridesRank}] - pads[j - 2];\r\n              ${padCode}\r\n          }\r\n          ${op2}\r\n\r\n
return value;\r\n        }\r\n      `;\r\n            return poolingCode;\r\n          }\r\n        };\r\n\r\nconst copyArray = (array:
readonly number[], arrayName: string): string => {\r\n  let block = '';\r\n  for (let i = 0; i < array.length; i++) {\r\n
block += `\r\n      ${arrayName}[${i}] = ${array[i]};\r\n    `;\r\n  }\r\n  return block;\r\n};\r\n\r\nconst
offsetToIndices = (rank: number): string => `\r\n  void offsetToIndices(int offset, int[${rank}] strides, out
int[${rank}] indices) {\r\n    if (${rank} == 0) {\r\n      return;\r\n    }\r\n    for (int i = 0; i < ${rank} - 1; ++i) {\r\n
indices[i] = offset / strides[i];\r\n      offset -= indices[i] * strides[i];\r\n    }\r\n    indices[${rank} - 1] = offset;\r\n
}`;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-
key';\r\nimport {Graph} from '../../../graph';\r\nimport {NUMBER_TYPES, OperatorImplementation,
OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from
'../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo,
ProgramMetadata, TextureType} from '../types';\r\n\r\nexport interface ReduceAttributes extends
AttributeWithCacheKey {\r\n  readonly axes: number[];\r\n  readonly keepDims: boolean;\r\n}\r\n\r\n// return [init
ops, reduce ops, final ops]\r\ntype ReduceOp = (inputs: Tensor[], axes: number[]) => string[];\r\n\r\nconst reduce
=\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes, name: string,\r\n
   reduceOp: ReduceOp): Tensor[] => {\r\n      validateInputs(inputs);\r\n\r\n      const reduceProgramMetadata =
{\r\n        name,\r\n        inputNames: ['A'],\r\n        inputTypes: [TextureType.unpacked],\r\n      };\r\n\r\n      const
output = inferenceHandler.run(\r\n          {\r\n            ...reduceProgramMetadata,\r\n            cacheHint:
attributes.cacheKey,\r\n            get: () =>\r\n                createReduceProgramInfo(inferenceHandler, inputs,
attributes, name, reduceOp, reduceProgramMetadata)\r\n          },\r\n          inputs);\r\n      return [output];\r\n
};\r\n\r\nexport const parseReduceAttributes: OperatorInitialization<ReduceAttributes> = (node: Graph.Node):
ReduceAttributes => {\r\n  const axes = node.attributes.getInts('axes', []);\r\n  const keepDims =
node.attributes.getInt('keepdims', 1) === 1;\r\n  return createAttributeWithCacheKey({axes,
keepDims});\r\n};\r\n\r\nconst createReduceProgramInfo =\r\n    (handler: WebGLInferenceHandler, inputs:
Tensor[], attributes: ReduceAttributes, name: string, reduceOp: ReduceOp,\r\n     reduceProgramMetadata:
ProgramMetadata): ProgramInfo => {\r\n      const outputShape: number[] = [];\r\n      const iRank =
```

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inputs[0].dims.length || 1;\r\n\r\n      const idxCopy = [];  // copy output indexes to input indexes\r\n\r\n      const axes
= ShapeUtil.normalizeAxes(attributes.axes, inputs[0].dims.length);\r\n      const ops = reduceOp(inputs, axes);\r\n
let reduceOps = ops[1];\r\n\r\n      for (let k = 0; k < inputs[0].dims.length; k++) {\r\n        // if this axis is reduced\r\n
      if (axes.indexOf(k) >= 0 || axes.length === 0) {\r\n          if (attributes.keepDims) {\r\n
outputShape.push(1);\r\n          }  // else { remove the axis from outputShape; }\r\n\r\n          // loop over the d-th
axis\r\n          reduceOps = `\r\n          for(int j${k} = 0; j${k} < ${inputs[0].dims[k]}; j${k}++) {\r\n
inputIdx[${k}] = j${k};\r\n            ${reduceOps}\r\n          }`;\r\n        } else {\r\n
idxCopy.push(`inputIdx[${k}] = outputIdx[${outputShape.length}];`);\r\n\r\n
outputShape.push(inputs[0].dims[k]);\r\n        }\r\n      }\r\n\r\n      const oRank = outputShape.length || 1;\r\n\r\n
const shaderSource = `\r\n      float process(int outputIdx[${oRank}]) {\r\n        float value;                 // final
result\r\n        int inputIdx[${iRank}];      // addressing input data\r\n        ${idxCopy.join('\\n')}\r\n        ${ops[0]}
// init ops for reduce max/min\r\n        ${reduceOps}\r\n        ${ops[2]}       // final computation for reduce mean\r\n
    return value;\r\n      }`;\r\n\r\n      return {\r\n        ...reduceProgramMetadata,\r\n        output: {dims: outputShape,
type: inputs[0].type, textureType: TextureType.unpacked},\r\n        shaderSource\r\n      };\r\n    };\r\n\r\nconst
validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length !== 1) {\r\n    throw new Error('Reduce
op requires 1 input.');\r\n  }\r\n\r\n  if (NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n    throw new
Error('Invalid input type.');\r\n  }\r\n};\r\n\r\nexport const reduceSum: OperatorImplementation<ReduceAttributes>
=\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] =>
{\r\n      const reduceOp: ReduceOp = (): string[] => ['value = 0.0;', 'value += _A(inputIdx);', ''];\r\n      return
reduce(inferenceHandler, inputs, attributes, 'ReduceSum', reduceOp);\r\n    };\r\n\r\nexport const reduceMean:
OperatorImplementation<ReduceAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: ReduceAttributes): Tensor[] => {\r\n      const reduceOp: ReduceOp = (inputs: Tensor[], axes: number[]):
string[] => {\r\n        let size = 1.0;\r\n        for (let k = 0; k < inputs[0].dims.length; k++) {\r\n          if
(axes.indexOf(k) >= 0 || axes.length === 0) {\r\n            size *= inputs[0].dims[k];\r\n          }\r\n        }\r\n\r\n
return ['value = 0.0;', 'value += _A(inputIdx);', `value /= ${size}.;`];  // ensure real number with `.`\r\n      };\r\n
return reduce(inferenceHandler, inputs, attributes, 'ReduceMean', reduceOp);\r\n    };\r\n\r\nexport const reduceMax:
OperatorImplementation<ReduceAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: ReduceAttributes): Tensor[] => {\r\n      const reduceOp: ReduceOp = (inputs: Tensor[], axes: number[]):
string[] => {\r\n        const idxZero = [];\r\n        for (let k = 0; k < inputs[0].dims.length; k++) {\r\n          if
(axes.indexOf(k) >= 0 || axes.length === 0) {\r\n            idxZero.push(`inputIdx[${k}] = 0;`);  // first element\r\n
 }\r\n        }\r\n\r\n        return [`${idxZero.join('\\n')}\\nvalue = _A(inputIdx);`, 'value = max(value, _A(inputIdx));',
''];\r\n      };\r\n      return reduce(inferenceHandler, inputs, attributes, 'ReduceMax', reduceOp);\r\n    };\r\n\r\nexport
const reduceMin: OperatorImplementation<ReduceAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler,
inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n      const reduceOp: ReduceOp = (inputs: Tensor[],
axes: number[]): string[] => {\r\n        const idxZero = [];\r\n        for (let k = 0; k < inputs[0].dims.length; k++) {\r\n
       if (axes.indexOf(k) >= 0 || axes.length === 0) {\r\n            idxZero.push(`inputIdx[${k}] = 0;`);  // first
element\r\n          }\r\n        }\r\n\r\n        return [`${idxZero.join('\\n')}\\nvalue = _A(inputIdx);`, 'value = min(value,
_A(inputIdx));', ''];\r\n      };\r\n      return reduce(inferenceHandler, inputs, attributes, 'ReduceMin', reduceOp);\r\n
};\r\n\r\nexport const reduceProd: OperatorImplementation<ReduceAttributes> =\r\n    (inferenceHandler:
WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n      const reduceOp:
ReduceOp = (): string[] => ['value = 1.0;', 'value *= _A(inputIdx);', ''];\r\n      return reduce(inferenceHandler, inputs,
attributes, 'ReduceProd', reduceOp);\r\n    };\r\n\r\nexport const reduceLogSum:
OperatorImplementation<ReduceAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: ReduceAttributes): Tensor[] => {\r\n      const reduceOp: ReduceOp = (): string[] => ['value = 0.0;', 'value
+= _A(inputIdx);', 'value = log(value);'];\r\n      return reduce(inferenceHandler, inputs, attributes, 'ReduceLogSum',
reduceOp);\r\n    };\r\n\r\nexport const reduceLogSumSquare: OperatorImplementation<ReduceAttributes> =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n
const reduceOp: ReduceOp = (): string[] => ['float t; value = 0.0;', 't = _A(inputIdx); value += t * t;', ''];\r\n      return
```

```
reduce(inferenceHandler, inputs, attributes, 'ReduceLogSumSquare', reduceOp);\r\n    };","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from
'../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl} from '../glsl-source';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader,
ProgramMetadata, TextureType} from '../types';\r\n\r\nimport {unpackFromChannel} from './packing-
utils';\r\n\r\nconst createPackedReshape3DProgramMetadata = (outputShape3D: readonly number[]) =>\r\n
({name: 'Reshape (packed)', inputTypes: [TextureType.packed], inputNames: ['A'], cacheHint:
`${outputShape3D}`});\r\n\r\nconst createPackedReshape3DProgramInfo =\r\n    (handler:
WebGLInferenceHandler, input3D: Tensor, metadata: ProgramMetadata, outputShape3D: readonly number[]):\r\n
   ProgramInfo => {\r\n          const inputShape3D = input3D.dims as [number, number, number];\r\n          const
squeezedOutputShape = outputShape3D as [number, number, number];\r\n\r\n          let mainLoop = '';\r\n          for
(let i = 0; i < 4; i++) {\r\n            let outputCoords = '';\r\n            switch (i) {\r\n              case 0:\r\n
outputCoords = 'outputCoords = rc;';\r\n                break;\r\n              case 1:\r\n                outputCoords =
'outputCoords = ivec3(rc.x, rc.y+1, rc.z);';\r\n                break;\r\n              case 2:\r\n                outputCoords =
'outputCoords = ivec3(rc.x, rc.y, rc.z+1);';\r\n                break;\r\n              case 3:\r\n                outputCoords =
'outputCoords = ivec3(rc.x, rc.y+1, rc.z+1);';\r\n                break;\r\n              default:\r\n                throw new
Error();\r\n            }\r\n\r\n            mainLoop += `\r\n        ${outputCoords}\r\n        ${i > 0 ? 'if(outputCoords.y <
rows && outputCoords.z < cols){' : ''}\r\n          int flattenedIndex = getFlattenedIndex(outputCoords);\r\n\r\n
ivec3 inputRC = inputCoordsFromReshapedOutCoords(flattenedIndex);\r\n          vec2 innerDims =
vec2(float(inputRC.y),float(inputRC.z));\r\n\r\n          result[${i}] = getChannel(getA(inputRC.x, inputRC.y,
inputRC.z), innerDims);\r\n\r\n        ${i > 0 ? '}' : ''}\r\n      `;\r\n          }\r\n          const glsl =
getGlsl(handler.session.backend.glContext.version);\r\n\r\n          const shaderSource = `\r\n
${getReshapedInputCoords(inputShape3D)}\r\n      ${getFlattenedIndexFrom3D(squeezedOutputShape)}\r\n
${unpackFromChannel()}\r\n\r\n      void main() {\r\n        ivec3 rc = getOutputCoords();\r\n\r\n        vec4 result =
vec4(0.0);\r\n\r\n        ivec3 outputCoords;\r\n        int rows = ${squeezedOutputShape[2]};\r\n        int cols =
${squeezedOutputShape[1]};\r\n\r\n        ${mainLoop}\r\n        ${glsl.output} = result;\r\n      }\r\n    `;\r\n\r\n
return {\r\n            ...metadata,\r\n            output: {dims: squeezedOutputShape, type: input3D.type, textureType:
TextureType.packed},\r\n            shaderSource,\r\n            hasMain: true\r\n          };\r\n        };\r\n\r\nexport const
createPackedReshape3DProgramInfoLoader =\r\n    (handler: WebGLInferenceHandler, input3D: Tensor,
outputShape3D: readonly number[]): ProgramInfoLoader => {\r\n      const metadata =
createPackedReshape3DProgramMetadata(outputShape3D);\r\n      return {...metadata, get: () =>
createPackedReshape3DProgramInfo(handler, input3D, metadata, outputShape3D)};\r\n    };\r\n\r\nexport function
processDims3D(shape: ArrayLike<number>): [number, number, number] {\r\n  if (shape.length === 0) {\r\n
return [1, 1, 1];\r\n  }\r\n  // TODO: squeeze other shapes to 2D case\r\n  let batch = 1;\r\n  for (let i = 0; i <
shape.length - 2; ++i) {\r\n    batch *= shape[i];\r\n  }\r\n  return [batch, shape.length > 1 ? shape[shape.length - 2] :
1, shape[shape.length - 1]];\r\n}\r\n\r\n// For packed reshape, we need to re-arrange texel data for output shape.\r\n//
Our pack is designed to pack a 2x2 tile in last h and w dimension, so\r\n// for the reshaped new tensor, we just need
to re-arrange the last h and\r\n// w dimension. For any shape that is not in 3D, i.e. [batch, W, H], we\r\n// first
convert it to 3D by collapsing other dimension to batch dim, then\r\n// process with the last two dimensions.\r\n//
Note: we only need the shape tensor to calculate output shape, so the\r\n// content in shape tensor is never uploaded
to GPU. It is always kept in CPU.\r\n// TODO: optimize the algorithm -- in some cases, if the last two dims are\r\n//
the same between input shape and output shape, the packed reshape can be\r\n// treated as no-op.\r\nexport function
isReshapeCheap(dims: readonly number[], reshapedDims: readonly number[]) {\r\n  let isCheapReshape = false;\r\n
if (dims.length === 0 || reshapedDims.length === 0) {  // scalar\r\n    isCheapReshape = true;\r\n  } else if
(dims.length < 2 || reshapedDims.length < 2) {  // 1D\r\n    isCheapReshape = dims[dims.length - 1] ===
reshapedDims[reshapedDims.length - 1];\r\n  } else {  // 2D +\r\n    isCheapReshape = dims[dims.length - 1] ===
reshapedDims[reshapedDims.length - 1] &&\r\n        dims[dims.length - 2] === reshapedDims[reshapedDims.length
- 2];\r\n  }\r\n\r\n  return isCheapReshape;\r\n}\r\n\r\nfunction getReshapedInputCoords(shape: [number, number,
```

```
number]): string {\r\n  const strides = ShapeUtil.computeStrides(shape);\r\n  const coords = ['b', 'r', 'c'];\r\n  const
index = 'index';\r\n  const coordsFromIndexSnippet = strides\r\n                              .map((stride, i) => {\r\n
                              const line1 = `int ${coords[i]} = ${index} / ${stride}`;\r\n                              const line2 = i
=== strides.length - 1 ?\r\n                              `int ${coords[i + 1]} = ${index} - ${coords[i]} * ${stride}`
:\r\n                              `index -= ${coords[i]} * ${stride}`;\r\n                              return `${line1};
${line2};`;\r\n                              })\r\n                              .join('');\r\n\r\n  return `\r\n    ivec3
inputCoordsFromReshapedOutCoords(int index) {\r\n      ${coordsFromIndexSnippet}\r\n      return ivec3(b, r,
c);\r\n    }\r\n  `;\r\n}\r\n\r\nfunction getFlattenedIndexFrom3D(shape: [number, number, number]): string {\r\n
const strides = ShapeUtil.computeStrides(shape);\r\n\r\n  return `\r\n  int getFlattenedIndex(ivec3 coords) {\r\n    //
reverse y, z order\r\n    return coords.x * ${strides[0]} + coords.z * ${strides[1]} + coords.y;\r\n  }\r\n`;\r\n}\r\n","//
Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from
'../inference-handler';\r\n\r\nexport const reshape = (handler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[]
=> {\r\n  const reshapedDims = ShapeUtil.calculateReshapedDims(inputs[0].dims, inputs[1].integerData);\r\n  if
(handler.session.pack) {\r\n    return [handler.reshapePacked(inputs[0], reshapedDims)];\r\n  } else {\r\n    return
[handler.reshapeUnpacked(inputs[0], reshapedDims)];\r\n  }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All
rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport
{OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from
'../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-
handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\nimport {getCoordsDataType} from
'../utils';\r\n\r\nimport {unpackFromChannel} from './packing-utils';\r\nimport {parseUpsampleAttributes,
scalesValidation, UpsampleAttributes, validateInputs} from './upsample';\r\n\r\nconst resizeProgramMetadata =
{\r\n  name: 'Resize',\r\n  inputNames: ['A'],\r\n  inputTypes: [TextureType.packed]\r\n};\r\n\r\nexport const resize:
OperatorImplementation<UpsampleAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs:
Tensor[], attributes: UpsampleAttributes): Tensor[] => {\r\n      validateInputs(inputs, attributes);\r\n      const output
= inferenceHandler.run(\r\n          {\r\n            ...resizeProgramMetadata,\r\n            cacheHint:
attributes.cacheKey,\r\n            get: () => createPackedResizeProgramInfo(inferenceHandler, inputs, attributes)\r\n
    },\r\n          inputs);\r\n      return [output];\r\n    };\r\n\r\nexport const parseResizeAttributesV10:
OperatorInitialization<UpsampleAttributes> =\r\n    (node: Graph.Node): UpsampleAttributes =>
parseUpsampleAttributes(node, 10);\r\n\r\nexport const parseResizeAttributesV11:
OperatorInitialization<UpsampleAttributes> =\r\n    (node: Graph.Node): UpsampleAttributes =>
parseUpsampleAttributes(node, 11);\r\n\r\nconst createPackedResizeProgramInfo =\r\n    (inferenceHandler:
WebGLInferenceHandler, inputs: Tensor[], attributes: UpsampleAttributes): ProgramInfo => {\r\n      const glsl =
getGlsl(inferenceHandler.session.backend.glContext.version);\r\n      const [scales, outputShape] =
prepareInputs(inputs, attributes);\r\n\r\n      const isSame =\r\n          scales.every((s: number) => s === 1) &&
attributes.coordinateTransformMode !== 'tf_crop_and_resize';\r\n      if (isSame) {\r\n        return {\r\n
...resizeProgramMetadata,\r\n          output: {dims: outputShape, type: inputs[0].type, textureType:
TextureType.packed},\r\n          hasMain: true,\r\n          shaderSource: `void main() {\r\n                    vec4 v =
${glsl.texture2D}(X, TexCoords);\r\n                    ${glsl.output} = v;\r\n                }`\r\n        };\r\n      }\r\n\r\n
const dim = outputShape.length;\r\n      if (dim < 2) {\r\n        throw new Error(`output dimension should be at least
2, but got ${dim}`);\r\n      }\r\n\r\n      const outputHeight = outputShape[dim - 2];\r\n      const outputWidth =
outputShape[dim - 1];\r\n\r\n      const inputShape = inputs[0].dims;\r\n      if (dim !== inputShape.length) {\r\n
throw new Error(`output dimension should match input ${inputShape.length}, but got ${dim}`);\r\n      }\r\n
const inputHeight = inputShape[dim - 2];\r\n      const inputWidth = inputShape[dim - 1];\r\n\r\n      const
scalesHeight = scales[dim - 2];\r\n      const scalesWidth = scales[dim - 1];\r\n\r\n      let getSourceFracIndex =
'';\r\n\r\n      if (attributes.mode !== 'linear') {\r\n        // TODO: support other modes\r\n        throw new Error(`resize
(packed) does not support mode: '${attributes.mode}'`);\r\n      }\r\n      switch
(attributes.coordinateTransformMode) {\r\n        case 'asymmetric':\r\n          getSourceFracIndex = `\r\n
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vec4 getSourceFracIndex(ivec4 coords) {\r\n            return vec4(coords) / scaleWHWH;\r\n          }\r\n
      `;\r\n      break;\r\n    case 'half_pixel':\r\n      getSourceFracIndex = `\r\n          vec4
getSourceFracIndex(ivec4 coords) {\r\n            return (vec4(coords) + 0.5) / scaleWHWH - 0.5;\r\n
 }\r\n          `;\r\n      break;\r\n    case 'align_corners':\r\n      getSourceFracIndex = `\r\n          vec4
getSourceFracIndex(ivec4 coords) {\r\n            vec4 resized = vec4(${outputWidth}.0 - 1.0,
${outputHeight}.0 - 1.0, ${outputWidth}.0 - 1.0,\r\n              ${outputHeight}.0 - 1.0);\r\n
vec4 original = vec4(${inputWidth}.0 - 1.0, ${inputHeight}.0 - 1.0, ${inputWidth}.0 - 1.0,\r\n
${inputHeight}.0 - 1.0);\r\n            vec4 new_scale = original / resized;\r\n            return vec4(coords)
* new_scale;\r\n          }\r\n          `;\r\n      break;\r\n    default:\r\n      // TODO:supporting other
coordinateTransformModes\r\n      throw new Error(`resize (packed) does not support coordinateTransformMode:
\\\r\n                            '${attributes.coordinateTransformMode}'`);\r\n  }\r\n\r\n  const coordsDataType =
getCoordsDataType(dim);\r\n  const unpackChannel = unpackFromChannel();\r\n  const shaderSource = `\r\n
   const vec2 inputWH = vec2(${inputHeight}.0, ${inputWidth}.0);\r\n        const vec4 scaleWHWH =
vec4(${scalesHeight}.0, ${scalesWidth}.0, ${scalesHeight}.0, ${scalesWidth}.0);\r\n        ${unpackChannel}\r\n
     ${getSourceFracIndex}\r\n        float getAValue(int x10, int r, int c, int d) {\r\n          return
getChannel(getA(x10, r, c, d), vec2(c, d));\r\n        }\r\n        void main() {\r\n          ${coordsDataType} rc
= getOutputCoords();\r\n\r\n          int batch = rc[0];\r\n          int depth = rc[1];\r\n\r\n          // retrieve the
4 coordinates that is used in the 4 packed output values.\r\n          ivec4 coords = ivec4(rc.wz, rc.w + 1, rc.z +
1);\r\n\r\n          // calculate the source index in fraction\r\n          vec4 sourceFrac =
getSourceFracIndex(coords);\r\n\r\n          // get the lower and upper bound of the 4 values that will be packed
into one texel.\r\n          ivec4 x00 = ivec4(max(sourceFrac.xy, vec2(0.0)), min(inputWH - 1.0,
ceil(sourceFrac.xy)));\r\n          ivec4 x01 = ivec4(max(sourceFrac.xw, vec2(0.0)), min(inputWH - 1.0,
ceil(sourceFrac.xw)));\r\n          ivec4 x10 = ivec4(max(sourceFrac.zy, vec2(0.0)), min(inputWH - 1.0,
ceil(sourceFrac.zy)));\r\n          ivec4 x11 = ivec4(max(sourceFrac.zw, vec2(0.0)), min(inputWH - 1.0,
ceil(sourceFrac.zw)));\r\n\r\n          bool hasNextRow = rc.w < ${outputHeight - 1};\r\n          bool
hasNextCol = rc.z < ${outputWidth - 1};\r\n\r\n          // pack x00, x01, x10, x11's top-left corner into one vec4
structure\r\n          vec4 topLeft = vec4(\r\n            getAValue(batch, depth, x00.x, x00.y),\r\n
hasNextCol ? getAValue(batch, depth, x01.x, x01.y) : 0.0,\r\n            hasNextRow ? getAValue(batch, depth,
x10.x, x10.y) : 0.0,\r\n            (hasNextRow && hasNextCol) ? getAValue(batch, depth, x11.x, x11.y) :
0.0);\r\n\r\n          // pack x00, x01, x10, x11's top-right corner into one vec4 structure\r\n          vec4 topRight
= vec4(\r\n            getAValue(batch, depth, x00.x, x00.w),\r\n            hasNextCol ? getAValue(batch,
depth, x01.x, x01.w) : 0.0,\r\n            hasNextRow ? getAValue(batch, depth, x10.x, x10.w) : 0.0,\r\n
 (hasNextRow && hasNextCol) ? getAValue(batch, depth, x11.x, x11.w) : 0.0);\r\n\r\n          // pack x00, x01,
x10, x11's bottom-left corner into one vec4 structure\r\n          vec4 bottomLeft = vec4(\r\n
getAValue(batch, depth, x00.z, x00.y),\r\n            hasNextCol ? getAValue(batch, depth, x01.z, x01.y) : 0.0,\r\n
           hasNextRow ? getAValue(batch, depth, x10.z, x10.y) : 0.0,\r\n            (hasNextRow &&
hasNextCol) ? getAValue(batch, depth, x11.z, x11.y) : 0.0);\r\n\r\n          // pack x00, x01, x10, x11's bottom-
right corner into one vec4 structure\r\n          vec4 bottomRight = vec4(\r\n            getAValue(batch, depth,
x00.z, x00.w),\r\n            hasNextCol ? getAValue(batch, depth, x01.z, x01.w) : 0.0,\r\n
hasNextRow ? getAValue(batch, depth, x10.z, x10.w) : 0.0,\r\n            (hasNextRow && hasNextCol) ?
getAValue(batch, depth, x11.z, x11.w) : 0.0);\r\n\r\n          // calculate the interpolation fraction on u and v
direction\r\n          vec4 frac = vec4(sourceFrac) - floor(sourceFrac);\r\n          vec4 clampFrac = clamp(frac,
vec4(0.0), vec4(1.0));\r\n\r\n          vec4 top = mix(topLeft, topRight, clampFrac.ywyw);\r\n          vec4
bottom = mix(bottomLeft, bottomRight, clampFrac.ywyw);\r\n          vec4 newValue = mix(top, bottom,
clampFrac.xxzz);\r\n\r\n          ${glsl.output} = vec4(newValue);\r\n        }\r\n      `;\r\n    return {\r\n
...resizeProgramMetadata,\r\n      output: {dims: outputShape, type: inputs[0].type, textureType:
TextureType.packed},\r\n      hasMain: true,\r\n      shaderSource\r\n    };\r\n  };\r\n\r\n\r\nconst prepareInputs =
(inputs: Tensor[], attributes: UpsampleAttributes): [readonly number[], readonly number[]] => {\r\n  const x =
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inputs[0];\r\n const xDims = x.dims;\r\n\r\n let scales = attributes.scales;\r\n let outputSizes:
number[]|undefined;\r\n if (scales.length === 0) {\r\n   const scalesTensor = inputs[attributes.scalesInputIdx];\r\n
if (scalesTensor && scalesTensor.size !== 0) {\r\n   if (inputs[attributes.sizesInputIdx]) {\r\n   throw new
Error('Only one of scales or sizes must be provided as input.');\r\n   }\r\n   scales =
parseScalesData(scalesTensor, attributes.mode, attributes.isResize);\r\n   } else {\r\n   const sizesTensor =
inputs[attributes.sizesInputIdx];\r\n   if (!sizesTensor || sizesTensor.size === 0) {\r\n   throw new Error('Either
scales or sizes MUST be provided as input.');\r\n   }\r\n\r\n   outputSizes =
Array.from(sizesTensor.integerData);\r\n   scales = parseScalesDataFromOutputSize(outputSizes, xDims,
attributes.mode, attributes.isResize);\r\n   }\r\n } else {\r\n   if (inputs[attributes.sizesInputIdx]) {\r\n   throw new
Error('Only one of scales or sizes must be provided as input.');\r\n   }\r\n }\r\n\r\n const yDims = outputSizes ||
(xDims.map((dim, i) => Math.floor(dim * scales[i])));\r\n\r\n return [scales, yDims];\r\n};\r\n\r\nconst
parseScalesData = (scale: Tensor, mode: string, isResize: boolean): number[] => {\r\n const scales =
Array.from(scale.floatData);\r\n scalesValidation(scales, mode, isResize);\r\n return scales;\r\n};\r\n\r\nconst
parseScalesDataFromOutputSize =\r\n   (yDims: readonly number[], xDims: readonly number[], mode: string,
isResize: boolean): number[] => {\r\n   const length = xDims.length;\r\n   const scales = new
Array<number>(length);\r\n\r\n   for (let i = 0, end = length; i < end; i++) {\r\n   if (xDims[i] === 0) {\r\n
if (yDims[i] !== 0) {\r\n   throw new Error('Input dim is zero but required output dim is non-zero.');\r\n
}\r\n   scales[i] = 1;\r\n   } else {\r\n   scales[i] = yDims[i] / xDims[i];\r\n   }\r\n   }\r\n
scalesValidation(scales, mode, isResize);\r\n   return scales;\r\n   };\r\n\r\n// roi data is not used yet. but leave here
for future usage.\r\n// const getRoi = (inputs: Tensor[], attributes: UpsampleAttributes) : number[] => {\r\n//   let
roi: number[] = [];\r\n//   if (attributes.needRoiInput) {\r\n//   if (attributes.roiInputIdx <= 0) {\r\n//
throw new Error('Invalid roi input index.');\r\n//   }\r\n//   const roiTensor =
inputs[attributes.roiInputIdx];\r\n//   roi = roiTensor.size > 0 ? Array.from(roiTensor.floatData) : [];\r\n//   } else
{\r\n//   roi = new Array(inputs[0].dims.length * 2).fill(0);\r\n//   }\r\n//   return roi;\r\n// };","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from
'../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const shape =
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n validateInputs(inputs);\r\n return
[new Tensor([inputs[0].dims.length], 'int32', undefined, undefined, new
Int32Array(inputs[0].dims))];\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs ||
inputs.length !== 1) {\r\n   throw new Error('Shape requires 1 input.');\r\n }\r\n};","// Copyright (c) Microsoft
Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey,
createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from
'../../../graph';\r\nimport {NUMBER_TYPES, OperatorImplementation, OperatorInitialization} from
'../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from
'../types';\r\n\r\nexport interface SliceAttributes extends AttributeWithCacheKey {\r\n readonly axes: number[];\r\n
readonly ends: number[];\r\n readonly starts: number[];\r\n}\r\n\r\nconst sliceProgramMetadata = {\r\n name:
'Slice',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked]\r\n};\r\n\r\nexport const slice:
OperatorImplementation<SliceAttributes> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: SliceAttributes): Tensor[] => {\r\n   validateInputs(inputs);\r\n   const output =
inferenceHandler.run(\r\n   {\r\n   ...sliceProgramMetadata,\r\n   cacheHint: attributes.cacheKey,\r\n
get: () => createSliceProgramInfo(inferenceHandler, inputs[0], attributes)\r\n   },\r\n   inputs);\r\n
return [output];\r\n   };\r\n\r\nexport const parseSliceAttributes: OperatorInitialization<SliceAttributes> = (node:
Graph.Node): SliceAttributes => {\r\n const starts = node.attributes.getInts('starts');\r\n const ends =
node.attributes.getInts('ends');\r\n const axes = node.attributes.getInts('axes', []);\r\n return
createAttributeWithCacheKey({starts, ends, axes});\r\n};\r\n\r\nconst createSliceProgramInfo =\r\n
(inferenceHandler: WebGLInferenceHandler, input: Tensor, attributes: SliceAttributes): ProgramInfo => {\r\n
const axes = (attributes.axes.length === 0) ? input.dims.slice(0).map((val, i) => i) : attributes.axes;\r\n   const

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normalizedAxes = ShapeUtil.normalizeAxes(axes, input.dims.length);\r\n      const starts =
attributes.starts.map((start, i) => {\r\n        if (start > input.dims[normalizedAxes[i]] - 1) {\r\n          return
input.dims[normalizedAxes[i]];\r\n        }\r\n        return ShapeUtil.normalizeAxis(start,
input.dims[normalizedAxes[i]]);\r\n      });\r\n      const ends = attributes.ends.map((end, i) => {\r\n        if (end >
input.dims[normalizedAxes[i]] - 1) {\r\n          return input.dims[normalizedAxes[i]];\r\n        }\r\n        return
ShapeUtil.normalizeAxis(end, input.dims[normalizedAxes[i]]);\r\n      });\r\n\r\n      const outputShape =
input.dims.slice();\r\n\r\n      const sliceOps: string[] = [];\r\n      for (let i = 0; i < normalizedAxes.length; i++) {\r\n
    outputShape[normalizedAxes[i]] = ends[i] - starts[i];\r\n        if (starts[i] > 0) {\r\n
sliceOps.push(`outputIdx[${normalizedAxes[i]}] += ${starts[i]};`);\r\n        }  // else {
sliceOps.push(`outputIdx[${normalizedAxes[i]}] += 0;`); }\r\n      }\r\n\r\n      const rank = outputShape.length;\r\n
  const shaderSource = `\r\n      float process(int outputIdx[${rank}]) {\r\n        ${sliceOps.join('\\n      ')}\r\n
return _A(outputIdx);\r\n      }`;\r\n      return {\r\n        ...sliceProgramMetadata,\r\n        output: {dims: outputShape,
type: input.type, textureType: TextureType.unpacked},\r\n        shaderSource\r\n      };\r\n    };\r\n\r\nconst
validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length !== 1) {\r\n    throw new Error('Slice
requires 1 input.');\r\n  }\r\n  if (NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n    throw new
Error('Invalid input type.');\r\n  }\r\n};\r\n\r\nexport const sliceV10 = (inferenceHandler: WebGLInferenceHandler,
inputs: Tensor[]): Tensor[] => {\r\n  validateInputsV10(inputs);\r\n  const attributes =
generateSliceAttributesFromInputs(inferenceHandler, inputs);\r\n  const output = inferenceHandler.run(\r\n      {\r\n
      ...sliceProgramMetadata,\r\n        cacheHint: attributes.cacheKey,\r\n        get: () =>
createSliceProgramInfo(inferenceHandler, inputs[0], attributes)\r\n      },\r\n      [inputs[0]]);\r\n  return
[output];\r\n};\r\n\r\nconst generateSliceAttributesFromInputs =\r\n    (inferenceHandler: WebGLInferenceHandler,
inputs: Tensor[]): SliceAttributes => {\r\n      if (!inferenceHandler.session.isInitializer(inputs[1].dataId) ||\r\n
!inferenceHandler.session.isInitializer(inputs[2].dataId) ||\r\n          (inputs.length >= 4 &&
!inferenceHandler.session.isInitializer(inputs[3].dataId)) ||\r\n          (inputs.length >= 5 &&
!inferenceHandler.session.isInitializer(inputs[4].dataId))) {\r\n        throw new Error('dynamic slice attributes are not
allowed');\r\n      }\r\n\r\n      if (inputs.length >= 5 && inputs[4].integerData.some((i: number) => i !== 1)) {\r\n
throw new Error('currently non-1 steps is not supported for Slice');\r\n      }\r\n\r\n      const starts =
Array.from(inputs[1].integerData);\r\n      const ends = Array.from(inputs[2].integerData);\r\n      const axes =
inputs.length >= 4 ? Array.from(inputs[3].integerData) : [];\r\n      const cacheKey =
`${axes};${starts};${ends}`;\r\n      return {starts, ends, axes, cacheKey};\r\n    };\r\n\r\nconst validateInputsV10 =
(inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length < 3 || inputs.length > 5) {\r\n    throw new Error('Invalid
input number.');\r\n  }\r\n  if (inputs[1].type !== 'int32' || inputs[1].dims.length !== 1) {\r\n    throw new
Error('Invalid input type.');\r\n  }\r\n  if (inputs[2].type !== 'int32' || inputs[2].dims.length !== 1) {\r\n    throw new
Error('Invalid input type.');\r\n  }\r\n  if (inputs.length >= 4 && (inputs[3].type !== 'int32' || inputs[3].dims.length
!== 1)) {\r\n    throw new Error('Invalid input type.');\r\n  }\r\n  if (inputs.length >= 5 && (inputs[4].type !== 'int32'
|| inputs[4].dims.length !== 1)) {\r\n    throw new Error('Invalid input type.');\r\n  }\r\n};\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph}
from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport
{Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl} from '../glsl-
source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType}
from '../types';\r\n\r\nexport interface SoftmaxAttributes extends AttributeWithCacheKey {\r\n  readonly axis:
number;\r\n}\r\n\r\nconst softmaxComputeMaxProgramMetadata = {\r\n  name: 'SoftmaxComputeMax',\r\n
inputNames: ['A'],\r\n  inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nconst
softmaxComputeScaleProgramMetadata = {\r\n  name: 'SoftmaxComputeScale',\r\n  inputNames: ['A', 'Max'],\r\n
inputTypes: [TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nconst softmaxProgramMetadata = {\r\n
name: 'SoftMax',\r\n  inputNames: ['A', 'Max', 'Norm'],\r\n  inputTypes: [TextureType.unpacked,
TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nexport const softmax:
```

OperatorImplementation<SoftmaxAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: SoftmaxAttributes): Tensor[] => {\r\n validateInputs(inputs);\r\n\r\n const inputShape = inputs[0].dims.slice();\r\n const axis = ShapeUtil.normalizeAxis(attributes.axis, inputShape.length);\r\n const N = ShapeUtil.sizeToDimension(inputShape, axis);\r\n const D = ShapeUtil.sizeFromDimension(inputShape, axis);\r\n\r\n const computeMaxProgramInfo = createComputeMaxProgramInfo(inferenceHandler, inputs[0], N, D, [N]);\r\n const max = inferenceHandler.run(\r\n {...softmaxComputeMaxProgramMetadata, cacheHint: attributes.cacheKey, get: () => computeMaxProgramInfo},\r\n inputs);\r\n\r\n const computeScaleProgramInfo =\r\n createComputScaleProgramInfo(inferenceHandler, inputs[0], N, D, computeMaxProgramInfo.output.dims, [N]);\r\n const scale = inferenceHandler.run(\r\n {...softmaxComputeScaleProgramMetadata, cacheHint: attributes.cacheKey, get: () => computeScaleProgramInfo},\r\n [inputs[0], max]);\r\n\r\n const softMaxProgramInfo = createSoftMaxProgramInfo(\r\n inferenceHandler, inputs[0], N, D, computeMaxProgramInfo.output.dims, computeScaleProgramInfo.output.dims);\r\n const output = inferenceHandler.run(\r\n {...softmaxProgramMetadata, cacheHint: attributes.cacheKey, get: () => softMaxProgramInfo},\r\n [inputs[0], max, scale]);\r\n return [output];\r\n };\r\n\r\nexport const parseSoftmaxAttributes: OperatorInitialization<SoftmaxAttributes> =\r\n (node: Graph.Node): SoftmaxAttributes => createAttributeWithCacheKey({axis: node.attributes.getInt('axis', 1)});\r\n\r\n/**\r\n * Create a texture that contains the maximum value of each of the 'N' rows\r\n */\r\nconst createComputeMaxProgramInfo =\r\n // eslint-disable-next-line @typescript-eslint/naming-convention\r\n (inferenceHandler: WebGLInferenceHandler, input: Tensor, N: number, D: number, outputShape: number[]):\r\n ProgramInfo => {\r\n const [textureWidth, textureHeight] =\r\n inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n const rank = outputShape.length;\r\n\r\n if (N < 1 || D < 1) {\r\n throw new Error('Logical row count N and feature count D must be greater than or equal to 1');\r\n }\r\n\r\n if (outputShape.length !== 1) {\r\n throw new Error('Dimensionality of the output should be 1');\r\n }\r\n\r\n if (outputShape[0] !== N) {\r\n throw new Error('Shape of the output should be equal to logical row count');\r\n }\r\n\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n const shaderSource = `\r\n float process(int[${rank}] indices) {\r\n int logical_row_start_offset = indices[0] * ${D};\r\n\r\n float max = getColorAsFloat(${glsl.texture2D}(A, offsetToCoords(logical_row_start_offset, ${textureWidth},\r\n ${textureHeight})));\r\n for(int i=1; i<${D}; ++i)\r\n {\r\n float current = getColorAsFloat(${glsl.texture2D}(A, offsetToCoords(logical_row_start_offset + i,\r\n ${textureWidth}, ${textureHeight})));\r\n if(current > max)\r\n max = current;\r\n }\r\n\r\n return max;\r\n }`;\r\n return {\r\n ...softmaxComputeMaxProgramMetadata,\r\n output: {dims: outputShape, type: input.type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\n/**\r\n * Create a texture that contains the normalization factor for each of the 'N' rows\r\n */\r\nconst createComputScaleProgramInfo =\r\n // eslint-disable-next-line @typescript-eslint/naming-convention\r\n (inferenceHandler: WebGLInferenceHandler, input: Tensor, N: number, D: number,\r\n maxElementPerLogicalRow: readonly number[], outputShape: number[]): ProgramInfo => {\r\n const [textureWidth, textureHeight] =\r\n inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n const rank = outputShape.length;\r\n\r\n if (N < 1 || D < 1) {\r\n throw new Error('Logical row count N and feature count D must be greater than or equal to 1');\r\n }\r\n\r\n if (outputShape.length !== 1) {\r\n throw new Error('Dimensionality of the output should be 1');\r\n }\r\n\r\n if (outputShape[0] !== N) {\r\n throw new Error('Shape of the output should be equal to logical row count');\r\n }\r\n\r\n if (maxElementPerLogicalRow.length !== 1) {\r\n throw new Error('Dimensionality of the intermediate results should be 1');\r\n }\r\n\r\n if (maxElementPerLogicalRow[0] !== N) {\r\n throw new Error('Shape of the intermediate results should be equal to logical row count');\r\n }\r\n\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n const shaderSource = `\r\n float process(int[${rank}] indices) {\r\n int logical_row_start_offset = indices[0] * ${D};\r\n\r\n float

```
norm_factor = 0.0;\r\n        float max = _Max(indices);\r\n        for(int i=0; i<${D}; ++i)\r\n        {\r\n
norm_factor += exp(getColorAsFloat(${glsl.texture2D}(A, offsetToCoords(logical_row_start_offset + i,\r\n
${textureWidth}, ${textureHeight}))) - max);\r\n        }\r\n\r\n        return norm_factor;\r\n      }`;\r\n      return {\r\n
    ...softmaxComputeScaleProgramMetadata,\r\n        output: {dims: outputShape, type: input.type, textureType:
TextureType.unpacked},\r\n        shaderSource\r\n      };\r\n    };\r\n\r\nconst createSoftMaxProgramInfo =\r\n    //
eslint-disable-next-line @typescript-eslint/naming-convention\r\n    (inferenceHandler: WebGLInferenceHandler,
input: Tensor, N: number, D: number,\r\n     maxElementPerLogicalRow: readonly number[],
normalizationPerLogicalRow: readonly number[]): ProgramInfo => {\r\n      const [textureWidth, textureHeight]
=\r\n          inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n      const
rank = input.dims.length;\r\n\r\n      if (N < 1 || D < 1) {\r\n        throw new Error('Logical row count N and feature
count D must be greater than or equal to 1');\r\n      }\r\n\r\n      if (maxElementPerLogicalRow.length !== 1 ||
normalizationPerLogicalRow.length !== 1) {\r\n        throw new Error('Dimensionality of the intermediate results
should be 1');\r\n      }\r\n\r\n      if (maxElementPerLogicalRow[0] !== N || normalizationPerLogicalRow[0] !== N)
{\r\n        throw new Error('Shape of the intermediate results should be equal to logical row count');\r\n      }\r\n\r\n
 const shaderSource = `\r\n      float process(int[${rank}] indices) {\r\n\r\n      // get offset of current logical tensor
index from the 2-D texture coordinates (TexCoords)\r\n      int offset = coordsToOffset(TexCoords,
${textureWidth}, ${textureHeight});\r\n\r\n      //determine the logical row for this index\r\n      int
logical_row_index[1];\r\n      logical_row_index[0] = offset / ${D};\r\n\r\n      float norm_factor =
_Norm(logical_row_index);\r\n\r\n      // avoid possible division by 0\r\n      // if norm_facor is 0, all elements are
zero\r\n      // if so, return 0\r\n      if(norm_factor == 0.0)\r\n        return 0.0;\r\n\r\n      return exp(_A(indices) -
_Max(logical_row_index)) / norm_factor;\r\n    }`;\r\n      return {\r\n        ...softmaxProgramMetadata,\r\n
output: {dims: input.dims, type: input.type, textureType: TextureType.unpacked},\r\n        shaderSource\r\n      };\r\n
  };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length !== 1) {\r\n    throw new
Error('Softmax requires 1 input.');\r\n  }\r\n\r\n  if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n
 throw new Error('Invalid input type');\r\n  }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n//
Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from
'../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation,
OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil,
SplitUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport
{ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface SplitAttributes extends AttributeWithCacheKey
{\r\n  readonly axis: number;\r\n  readonly split: number[];\r\n  readonly numOutputs: number;\r\n}\r\n\r\nconst
splitProgramMetadata = {\r\n  name: 'Split',\r\n  inputNames: ['A'],\r\n  inputTypes:
[TextureType.unpacked],\r\n};\r\n\r\nexport const split: OperatorImplementation<SplitAttributes> =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: SplitAttributes): Tensor[] => {\r\n
validateInputs(inputs);\r\n\r\n      const axis = ShapeUtil.normalizeAxis(attributes.axis, inputs[0].dims.length);\r\n
const count = getProgramCount(inferenceHandler, inputs, axis, attributes);\r\n      const output: Tensor[] = [];\r\n
for (let i = 0; i < count; ++i) {\r\n        output.push(inferenceHandler.run(\r\n            {\r\n
...splitProgramMetadata,\r\n              cacheHint: `${attributes.cacheKey};${i}`,\r\n              get: () =>
createSplitProgramInfo(inferenceHandler, inputs[0], attributes, axis, i)\r\n            },\r\n            inputs));\r\n
}\r\n\r\n      return output;\r\n    };\r\n\r\nexport const parseSplitAttributes: OperatorInitialization<SplitAttributes> =
(node: Graph.Node): SplitAttributes => {\r\n  const axis = node.attributes.getInt('axis', 0);\r\n  const split =
node.attributes.getInts('split', []);\r\n  const numOutputs = node.outputs.length;\r\n  return
createAttributeWithCacheKey({axis, split, numOutputs});\r\n};\r\n\r\nconst getProgramCount =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axis: number, attributes: SplitAttributes): number =>
{\r\n      const [, offsets] = SplitUtil.splitShape(inputs[0].dims, axis, attributes.split, attributes.numOutputs);\r\n
return offsets.length;\r\n    };\r\n\r\nconst createSplitProgramInfo =\r\n    (inferenceHandler:
WebGLInferenceHandler, input: Tensor, attributes: SplitAttributes, axis: number, index: number):\r\n
ProgramInfo => {\r\n          const [shapes, offsets] = SplitUtil.splitShape(input.dims, axis, attributes.split,
```

attributes.numOutputs);\r\n const offset = offsets[index];\r\n const outputShape = shapes[index];\r\n const rank = outputShape.length;\r\n const shaderSource = `\r\n float process(int indices[${rank}]) {\r\n indices[${axis}] += ${offset};\r\n return _A(indices);\r\n }\r\n `;\r\n return {\r\n ...splitProgramMetadata,\r\n cacheHint: `${attributes.cacheKey}:${index}`,\r\n output: {dims: outputShape, type: input.type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n throw new Error('Split requires one input.');\r\n }\r\n\r\n if (inputs[0].type !== 'int8' && inputs[0].type !== 'uint8' && inputs[0].type !== 'int16' &&\r\n inputs[0].type !== 'uint16' && inputs[0].type !== 'int32' && inputs[0].type !== 'uint32' &&\r\n inputs[0].type !== 'float32' && inputs[0].type !== 'float64' && inputs[0].type !== 'bool') {\r\n throw new Error('Invalid input type.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const squeeze: OperatorImplementation<number[]> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axes: number[]): Tensor[] => {\r\n validateInputs(inputs);\r\n const outputShape = ShapeUtil.squeezeShape(inputs[0].dims, axes);\r\n const output = inferenceHandler.reshapeUnpacked(inputs[0], outputShape);\r\n return [output];\r\n };\r\n\r\nexport const parseSqueezeAttributes: OperatorInitialization<number[]> = (node: Graph.Node): number[] =>\r\n node.attributes.getInts('axes');\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n throw new Error('Squeeze requires 1 input.');\r\n }\r\n\r\n if (inputs[0].type === 'string') {\r\n throw new Error('invalid input tensor types.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport const sum = (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n validateInputs(inputs);\r\n\r\n const sumProgramMetadata = {\r\n name: 'Sum',\r\n inputNames: inputs.map((v, i) => `X${i}`),\r\n inputTypes: new Array(inputs.length).fill(TextureType.unpacked)\r\n };\r\n\r\n const output = inferenceHandler.run(\r\n {...sumProgramMetadata, get: () => createSumProgramInfo(inferenceHandler, inputs, sumProgramMetadata)}, inputs);\r\n return [output];\r\n};\r\n\r\nconst createSumProgramInfo =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], sumProgramMetadata: ProgramMetadata): ProgramInfo => {\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n const outputShape = inputs[0].dims.slice();\r\n const sumLine = inputs.map((v, i) => `${glsl.texture2D}(X${i},TexCoords)`).join(' + ');\r\n const shaderSource = `\r\n void main() {\r\n vec4 result = ${sumLine};\r\n ${glsl.output} = result;\r\n }\r\n `;\r\n return {\r\n ...sumProgramMetadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n hasMain: true,\r\n shaderSource\r\n };\r\n };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length === 0) {\r\n throw new Error('Sum requires inputs.');\r\n }\r\n\r\n const length = inputs[0].dims.length;\r\n for (let i = 1; i < inputs.length; i++) {\r\n if (length !== inputs[i].dims.length) {\r\n throw new Error('Input shapes are mismatched.');\r\n }\r\n\r\n for (let j = 0; j < length; j++) {\r\n if (inputs[0].dims[j] !== inputs[i].dims[j]) {\r\n throw new Error('Input shapes are not matched.');\r\n }\r\n }\r\n }\r\n\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n throw new Error('Invalid input type.');\r\n }\r\n for (let i = 1; i < inputs.length; i++) {\r\n if (inputs[0].type !== inputs[i].type) {\r\n throw new Error('Input types are not matched.');\r\n }\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {NUMBER_TYPES} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport const tile = (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n validateInputs(inputs);\r\n\r\n const tileProgramMetadata = {\r\n name: 'Tile',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked],\r\n };\r\n\r\n const output = inferenceHandler.run(\r\n

{...tileProgramMetadata, get: () => createTileProgramInfo(inferenceHandler, inputs, tileProgramMetadata)},\r\n inputs);\r\n return [output];\r\n};\r\n\r\nconst createTileProgramInfo =\r\n   (handler: WebGLInferenceHandler, inputs: Tensor[], tileProgramMetadata: ProgramMetadata): ProgramInfo => {\r\n   const inputShape = inputs[0].dims.slice();\r\n   const outputShape = new Array(inputShape.length);\r\n\r\n   const tileOps: string[] = [];\r\n   for (let i = 0; i < inputShape.length; i++) {\r\n   outputShape[i] = inputShape[i] * inputs[1].numberData[i];\r\n   tileOps.push(`inputIdx[${i}] = int(mod(float(outputIdx[${i}]), ${inputShape[i]}.));`);\r\n   }\r\n\r\n   const rank = outputShape.length;\r\n   const shaderSource = `\r\n      float process(int outputIdx[${rank}]) {\r\n        int inputIdx[${rank}];\r\n        ${tileOps.join('\\n')}\r\n        return _A(inputIdx);\r\n      }\r\n    `;\r\n   return {\r\n   ...tileProgramMetadata,\r\n   output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 2) {\r\n   throw new Error('Tile requires 2 input.');\r\n }\r\n if (inputs[1].dims.length !== 1) {\r\n   throw new Error('The second input shape must 1 dimension.');\r\n }\r\n if (inputs[1].dims[0] !== inputs[0].dims.length) {\r\n   throw new Error('Invalid input shape.');\r\n }\r\n if (NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n   throw new Error('Invalid input type.');\r\n }\r\n if (inputs[1].type !== 'int32' && inputs[1].type !== 'int16') {\r\n   throw new Error('Invalid repeat type.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface TransposeAttributes extends AttributeWithCacheKey {\r\n readonly perm: number[];\r\n}\r\n\r\nconst transposeProgramMetadata = {\r\n name: 'Transpose',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked]\r\n};\r\n\r\nexport const transpose: OperatorImplementation<TransposeAttributes> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: TransposeAttributes): Tensor[] => {\r\n   validateInputs(inputs);\r\n   const output = inferenceHandler.run(\r\n   {\r\n   ...transposeProgramMetadata,\r\n   cacheHint: attributes.cacheKey,\r\n   get: () => createTransposeProgramInfo(inferenceHandler, inputs[0], attributes.perm)\r\n   },\r\n   inputs);\r\n   return [output];\r\n   };\r\n\r\nexport const parseTransposeAttributes: OperatorInitialization<TransposeAttributes> =\r\n   (node: Graph.Node): TransposeAttributes => createAttributeWithCacheKey({perm: node.attributes.getInts('perm', [])});\r\n\r\nconst createTransposeProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, input: Tensor, perm: number[]): ProgramInfo => {\r\n   const inputShape = input.dims;\r\n   perm = getAdjustedPerm(inputShape, perm);\r\n   const unpackedOutputShape = getOutputShape(inputShape, perm);\r\n   const rank = inputShape.length;\r\n   // A dims=[${inputs[0].dims.toString()}]\r\n   // out Dims=[${unpackedOutputShape.toString()}]\r\n   // based on perm=[${perm.toString()}]\r\n   const shaderSource = `\r\n      ${getPermFunctionBody('perm', perm, rank)}\r\n      float process(int indices[${rank}]) {\r\n        int a[${rank}];\r\n        perm(a, indices);\r\n        return _A(a);\r\n      }`;\r\n   return {\r\n   ...transposeProgramMetadata,\r\n   output: {dims: unpackedOutputShape, type: input.type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst getAdjustedPerm = (inputShape: readonly number[], perm: number[]): number[] => {\r\n if (perm && perm.length !== inputShape.length) {\r\n   perm = [...(inputShape.keys())].reverse();\r\n }\r\n return perm;\r\n};\r\n\r\nconst getOutputShape = (inputShape: readonly number[], perm: number[]): readonly number[] => {\r\n perm = getAdjustedPerm(inputShape, perm);\r\n return ShapeUtil.sortBasedOnPerm(inputShape, perm);\r\n};\r\n\r\nconst getPermFunctionBody = (name: string, perm: number[], rank: number): string => {\r\n const reverseFunc = [];\r\n reverseFunc.push(`void ${name}(out int a[${rank}], int src[${rank}]) {`);\r\n for (let i = 0; i < rank; ++i) {\r\n reverseFunc.push(`\\ta[${perm[i]}]=src[${i}];`);\r\n }\r\n reverseFunc.push('\\t}');\r\n return reverseFunc.join('\\n');\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Transpose requires 1 input.');\r\n }\r\n\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n   throw new Error('input should be float tensor');\r\n }\r\n};\r\n","// Copyright (c)

Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {TextureData, TextureType} from '../types';\r\n\r\nexport const encodeAsUint8 = (inferenceHandler: WebGLInferenceHandler, input: TextureData): TextureData => {\r\n const outputShape = input.shape;\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n /**\r\n * https://github.com/tensorflow/tfjs-core/blob/master/src/kernels/webgl/encode_float_gpu.ts\r\n */\r\n const shaderSource = `\r\n const float FLOAT_MAX = 1.70141184e38;\r\n const float FLOAT_MIN = 1.17549435e-38;\r\n\r\n bool isNaN(float val) {\r\n return (val < 1.0 || 0.0 < val || val == 0.0) ? false : true;\r\n }\r\n\r\n highp vec4 encodeAsUint8(highp float v) {\r\n if (isNaN(v)) {\r\n return vec4(255, 255, 255, 255);\r\n }\r\n\r\n highp float av = abs(v);\r\n\r\n if(av < FLOAT_MIN) {\r\n return vec4(0.0, 0.0, 0.0, 0.0);\r\n } else if(v > FLOAT_MAX) {\r\n return vec4(0.0, 0.0, 128.0, 127.0) / 255.0;\r\n } else if(v < -FLOAT_MAX) {\r\n return vec4(0.0, 0.0, 128.0, 255.0) / 255.0;\r\n }\r\n\r\n highp vec4 c = vec4(0,0,0,0);\r\n\r\n highp float e = floor(log2(av));\r\n highp float m = exp2(fract(log2(av))) - 1.0;\r\n\r\n c[2] = floor(128.0 * m);\r\n m -= c[2] / 128.0;\r\n c[1] = floor(32768.0 * m);\r\n m -= c[1] / 32768.0;\r\n c[0] = floor(8388608.0 * m);\r\n\r\n highp float ebias = e + 127.0;\r\n c[3] = floor(ebias / 2.0);\r\n ebias -= c[3] * 2.0;\r\n c[2] += floor(ebias) * 128.0;\r\n\r\n c[3] += 128.0 * step(0.0, -v);\r\n\r\n return c / 255.0;\r\n }\r\n\r\n void main() {\r\n float value = ${glsl.texture2D}(X,TexCoords).r;\r\n ${glsl.output} = encodeAsUint8(value);\r\n }`;\r\n const programInfo = {\r\n name: 'Uint8Encode',\r\n inputTypes: [TextureType.unpacked],\r\n inputNames: ['X'],\r\n output: {dims: outputShape, type: input.tensor.type, textureType: TextureType.downloadUint8AsFloat},\r\n shaderSource,\r\n hasMain: true\r\n };\r\n return inferenceHandler.executeProgram(programInfo, [input.tensor]);\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {Tensor} from '../../../tensor';\r\nimport {FunctionType, GlslValueFunction} from '../glsl-definitions';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport function glslAbs(): GlslValueFunction {\r\n return glslBuiltinUnary('abs');\r\n}\r\nexport function glslAcos(): GlslValueFunction {\r\n return glslBuiltinUnary('acos');\r\n}\r\nexport function glslAsin(): GlslValueFunction {\r\n return glslBuiltinUnary('asin');\r\n}\r\nexport function glslAtan(): GlslValueFunction {\r\n return glslBuiltinUnary('atan');\r\n}\r\nexport function glslCeil(): GlslValueFunction {\r\n return glslBuiltinUnary('ceil');\r\n}\r\nexport function glslCos(): GlslValueFunction {\r\n return glslBuiltinUnary('cos');\r\n}\r\nexport function glslElu(alpha: number): GlslValueFunction {\r\n const name = 'elu';\r\n const body = `\r\n const float alpha = float(${alpha});\r\n\r\n float ${name}_(float a) {\r\n return a >= 0.0 ? a: (exp(a) - 1.0) * alpha;\r\n }\r\n vec4 ${name}_(vec4 v) {\r\n return vec4(${name}_(v.x), ${name}_(v.y), ${name}_(v.z), ${name}_(v.w));\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslExp(): GlslValueFunction {\r\n return glslBuiltinUnary('exp');\r\n}\r\nexport function glslFloor(): GlslValueFunction {\r\n return glslBuiltinUnary('floor');\r\n}\r\nexport function glslClip(min: number, max: number): GlslValueFunction {\r\n const name = 'clip';\r\n const body = `\r\n const float min = float(${min});\r\n const float max = float(${max});\r\n\r\n float ${name}_(float a) {\r\n return clamp(a, min, max);\r\n }\r\n vec4 ${name}_(vec4 v) {\r\n return clamp(v, min, max);\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslIdentity(): GlslValueFunction {\r\n const name = 'indentity';\r\n const body = `\r\n float ${name}_(float a) {\r\n return a;\r\n }\r\n vec4 ${name}_(vec4 v) {\r\n return v;\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslLeakyRelu(alpha: number): GlslValueFunction {\r\n const name = 'leakyRelu';\r\n const body = `\r\n const float alpha = float(${alpha});\r\n\r\n float ${name}_(float a) {\r\n return a < 0.0 ? a * alpha : a;\r\n }\r\n vec4 ${name}_(vec4 v) {\r\n return vec4(${name}_(v.x), ${name}_(v.y), ${name}_(v.z), ${name}_(v.w));\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslLog(): GlslValueFunction

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{\r\n  return glslBuiltinUnary('log');\r\n}\r\nexport function glslNeg(): GlslValueFunction {\r\n  const name =
'neg';\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return -a;\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n
return -v;\r\n  }\r\n  `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslNot():
GlslValueFunction {\r\n  const name = 'not';\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return float( !
bool(a) );\r\n  }\r\n  bool ${name}_(bool a) {\r\n    return !a;\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n    return
vec4(!bool(v.x), !bool(v.y), !bool(v.z), !bool(v.w));\r\n  }\r\n  bvec4 ${name}_(bvec4 v) {\r\n    return bvec4(!v.x,
!v.y, !v.z, !v.w);\r\n  }\r\n  `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function
glslSin(): GlslValueFunction {\r\n  return glslBuiltinUnary('sin');\r\n}\r\nexport function glslRelu():
GlslValueFunction {\r\n  const name = 'relu';\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return max( a,
0.0 );\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n    return max( v, 0.0 );\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\nexport function glslSigmoid(): GlslValueFunction {\r\n  const name =
'sigmoid';\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return 1.0 / (1.0 + exp(-a));\r\n  }\r\n  vec4
${name}_(vec4 v) {\r\n    return 1.0 / (1.0 + exp(-v));\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\nexport function glslSqrt(): GlslValueFunction {\r\n  return
glslBuiltinUnary('sqrt');\r\n}\r\nexport function glslTan(): GlslValueFunction {\r\n  return
glslBuiltinUnary('tan');\r\n}\r\nexport function glslTanh(): GlslValueFunction {\r\n  const name = 'tanh';\r\n  const
body = `\r\n  float ${name}_(float a) {\r\n    a = clamp(a, -10., 10.);\r\n    a = exp(2.*a);\r\n    return (a - 1.) / (a +
1.);\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n    v = clamp(v, -10., 10.);\r\n    v = exp(2.*v);\r\n    return (v - 1.) / (v +
1.);\r\n  }\r\n  `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nfunction glslBuiltinUnary(name:
string): GlslValueFunction {\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return ${name}(a);\r\n  }\r\n
vec4 ${name}_(vec4 v) {\r\n    return ${name}(v);\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\n\r\n/////\r\n/////\r\n/////\r\n\r\nconst createElementwiseProgramInfo =\r\n
(handler: WebGLInferenceHandler, metadata: ProgramMetadata, input: Tensor, glslFunc: GlslValueFunction):\r\n
   ProgramInfo => {\r\n          const textureType = handler.session.pack ? TextureType.packed :
TextureType.unpacked;\r\n          const glsl = getGlsl(handler.session.backend.glContext.version);\r\n          return
{\r\n            ...metadata,\r\n            output: {dims: input.dims, type: input.type, textureType},\r\n
shaderSource: `\r\n     ${glslFunc.body}\r\n     void main() {\r\n       vec4 v = ${glsl.texture2D}(A, TexCoords);\r\n
   v = ${glslFunc.name}_(v);\r\n       ${glsl.output} = v;\r\n     }\r\n     `,\r\n            hasMain: true\r\n          };\r\n
};\r\n\r\nconst createElementwiseProgramInfoLoader =\r\n    (handler: WebGLInferenceHandler, input: Tensor,
glslFunc: GlslValueFunction, cacheKey?: string):\r\n        ProgramInfoLoader => {\r\n          const textureType =
handler.session.pack ? TextureType.packed : TextureType.unpacked;\r\n          const metadata = {name:
glslFunc.name, inputTypes: [textureType], inputNames: ['A'], cacheHint: cacheKey};\r\n          return {...metadata,
get: () => createElementwiseProgramInfo(handler, metadata, input, glslFunc)};\r\n        };\r\n\r\nexport const abs =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAbs()), inputs)];\r\n\r\nexport const acos
= (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAcos()), inputs)];\r\n\r\nexport const asin
= (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAsin()), inputs)];\r\n\r\nexport const atan
= (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAtan()), inputs)];\r\n\r\nexport interface
ClipAttributes extends AttributeWithCacheKey {\r\n  readonly min: number;\r\n  readonly max:
number;\r\n}\r\n\r\nexport const clip =\r\n    (handler: WebGLInferenceHandler, inputs: Tensor[], attributes:
ClipAttributes): Tensor[] => [handler.run(\r\n        createElementwiseProgramInfoLoader(\r\n            handler,
inputs[0], glslClip(attributes.min, attributes.max), attributes.cacheKey),\r\n        inputs)];\r\n\r\nexport const
parseClipAttributes = (node: Graph.Node): ClipAttributes => createAttributeWithCacheKey({\r\n  min:
node.attributes.getFloat('min', -3.4028234663852886e+38),\r\n  max: node.attributes.getFloat('max',
3.4028234663852886e+38)\r\n});\r\n\r\nexport const ceil = (handler: WebGLInferenceHandler, inputs:
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Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslCeil()), inputs)];\r\n\r\nexport const cos = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslCos()), inputs)];\r\n\r\nexport interface EluAttributes extends AttributeWithCacheKey {\r\n readonly alpha: number;\r\n}\r\n\r\nexport const elu =\r\n (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: EluAttributes): Tensor[] => [handler.run(\r\n createElementwiseProgramInfoLoader(handler, inputs[0], glslElu(attributes.alpha), attributes.cacheKey),\r\n inputs)];\r\n\r\nexport const parseEluAttributes = (node: Graph.Node): EluAttributes =>\r\n createAttributeWithCacheKey({alpha: node.attributes.getFloat('alpha', 1.0)});\r\n\r\nexport const exp = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslExp()), inputs)];\r\n\r\nexport const floor = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslFloor()), inputs)];\r\n\r\nexport const identity = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslIdentity()), inputs)];\r\n\r\nexport interface LeakyReluAttributes extends AttributeWithCacheKey {\r\n readonly alpha: number;\r\n}\r\n\r\nexport const leakyRelu =\r\n   (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: LeakyReluAttributes): Tensor[] => [handler.run(\r\n   createElementwiseProgramInfoLoader(handler, inputs[0], glslLeakyRelu(attributes.alpha), attributes.cacheKey),\r\n   inputs)];\r\n\r\nexport const parseLeakyReluAttributes = (node: Graph.Node): LeakyReluAttributes =>\r\n createAttributeWithCacheKey({alpha: node.attributes.getFloat('alpha', 0.01)});\r\n\r\nexport const log = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslLog()), inputs)];\r\n\r\nexport const neg = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslNeg()), inputs)];\r\n\r\nexport const not = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslNot()), inputs)];\r\n\r\nexport const relu = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslRelu()), inputs)];\r\n\r\nexport const sigmoid = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslSigmoid()), inputs)];\r\n\r\nexport const sin = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslSin()), inputs)];\r\n\r\nexport const sqrt = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslSqrt()), inputs)];\r\n\r\nexport const tan = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslTan()), inputs)];\r\n\r\nexport const tanh = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslTanh()), inputs)];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, TextureType} from '../types';\r\nimport {getCoordsDataType} from '../utils';\r\nimport {getChannels, unpackFromChannel} from './packing-utils';\r\n\r\nconst unpackProgramMetadata = {\r\n name: 'unpack',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.packed]\r\n};\r\n\r\nexport const createUnpackProgramInfo = (handler: WebGLInferenceHandler, input: Tensor): ProgramInfo => {\r\n const rank = input.dims.length;\r\n\r\n const channels = getChannels('rc', rank);\r\n const innerDims = channels.slice(-2);\r\n const coordsDataType = getCoordsDataType(rank);\r\n const unpackChannel = unpackFromChannel();\r\n const isScalar = (input.dims.length === 0);\r\n const sourceCoords = isScalar ? '' : getSourceCoords(rank, channels);\r\n const coords = rank <= 1 ? 'rc' :

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`vec2(${innerDims.join(',')})`;\r\n  const glsl = getGlsl(handler.session.backend.glContext.version);\r\n  const
shaderSource = `\r\n    ${unpackChannel}\r\n    void main() {\r\n      ${coordsDataType} rc =
getOutputCoords();\r\n\r\n       // Sample the texture with the coords to get the rgba channel value.\r\n       vec4
packedInput = getA(${sourceCoords});\r\n\r\n       ${glsl.output} = vec4(getChannel(packedInput, ${coords}), 0, 0,
0);\r\n     }\r\n   `;\r\n\r\n  return {\r\n    ...unpackProgramMetadata,\r\n    hasMain: true,\r\n    output: {dims:
input.dims, type: input.type, textureType: TextureType.unpacked},\r\n    shaderSource\r\n  };\r\n};\r\n\r\nexport
const createUnpackProgramInfoLoader = (handler: WebGLInferenceHandler, input: Tensor): ProgramInfoLoader
=>\r\n    ({...unpackProgramMetadata, get: () => createUnpackProgramInfo(handler, input)});\r\n\r\nfunction
getSourceCoords(rank: number, dims: string[]): string {\r\n  if (rank === 1) {\r\n    return 'rc';\r\n  }\r\n\r\n  let
coords = '';\r\n  for (let i = 0; i < rank; i++) {\r\n    coords += dims[i];\r\n    if (i < rank - 1) {\r\n      coords += ',';\r\n
}\r\n  }\r\n  return coords;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under
the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation,
OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from
'../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const unsqueeze:
OperatorImplementation<number[]> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axes:
number[]): Tensor[] => {\r\n      validateInputs(inputs);\r\n      const outputShape =
ShapeUtil.unsqueezeShape(inputs[0].dims, axes);\r\n      const output =
inferenceHandler.reshapeUnpacked(inputs[0], outputShape);\r\n      return [output];\r\n    };\r\n\r\nexport const
parseUnsqueezeAttributes: OperatorInitialization<number[]> = (node: Graph.Node): number[] =>\r\n
node.attributes.getInts('axes');\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs ||
inputs.length !== 1) {\r\n    throw new Error('Unsqueeze requires 1 input.');\r\n  }\r\n\r\n  if (inputs[0].type ===
'string') {\r\n    throw new Error('invalid input tensor types.');\r\n  }\r\n};","// Copyright (c) Microsoft Corporation.
All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey,
createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from
'../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor}
from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from
'../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface
UpsampleAttributes extends AttributeWithCacheKey {\r\n  readonly opset: number;\r\n  readonly isResize:
boolean;\r\n  readonly mode: string;\r\n  readonly scales: number[];\r\n  readonly extrapolationValue: number;\r\n
readonly coordinateTransformMode: string;\r\n  readonly useExtrapolation: boolean;\r\n  readonly needRoiInput:
boolean;\r\n  readonly nearestMode: string;\r\n  readonly cubicCoefficientA: number;\r\n  readonly excludeOutside:
boolean;\r\n  readonly useNearest2xOptimization: boolean;\r\n  readonly roiInputIdx: number;\r\n  readonly
scalesInputIdx: number;\r\n  readonly sizesInputIdx: number;\r\n}\r\n\r\nconst upsampleProgramMetadata = {\r\n
name: 'Upsample',\r\n  inputNames: ['X'],\r\n  inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nexport const
upsample: OperatorImplementation<UpsampleAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler,
inputs: Tensor[], attributes: UpsampleAttributes): Tensor[] => {\r\n      validateInputs(inputs, attributes);\r\n      const
output = inferenceHandler.run(\r\n          {\r\n            ...upsampleProgramMetadata,\r\n            cacheHint:
attributes.cacheKey,\r\n            get: () => createUpsampleProgramInfo(inferenceHandler, inputs, attributes)\r\n
},\r\n          inputs);\r\n      return [output];\r\n    };\r\n\r\nexport const parseUpsampleAttributesV7:
OperatorInitialization<UpsampleAttributes> =\r\n    (node: Graph.Node): UpsampleAttributes =>
parseUpsampleAttributes(node, 7);\r\n\r\nexport const parseUpsampleAttributesV9:
OperatorInitialization<UpsampleAttributes> =\r\n    (node: Graph.Node): UpsampleAttributes =>
parseUpsampleAttributes(node, 9);\r\n\r\nexport const parseUpsampleAttributes = (node: Graph.Node, opset:
number): UpsampleAttributes => {\r\n  const isResize = (opset >= 10);\r\n\r\n  // processing node attributes\r\n
const mode = node.attributes.getString('mode', 'nearest');\r\n  if (mode !== 'nearest' && mode !== 'linear' && (opset
< 11 || mode !== 'cubic')) {\r\n    throw new Error(`unrecognized mode: ${mode}`);\r\n  }\r\n\r\n  let scales:
number[] = [];\r\n  if (opset < 9) {\r\n    scales = node.attributes.getFloats('scales');\r\n    scalesValidation(scales,
mode, isResize);\r\n  }\r\n\r\n  const extrapolationValue = node.attributes.getFloat('extrapolation_value', 0.0);\r\n\r\n
```

const coordinateTransformMode =\r\n   opset > 10 ? node.attributes.getString('coordinate_transformation_mode', 'half_pixel') : 'asymmetric';\r\n if ([\r\n   'asymmetric', 'pytorch_half_pixel', 'tf_half_pixel_for_nn', 'align_corners', 'tf_crop_and_resize', 'half_pixel'\r\n   ].indexOf(coordinateTransformMode) === -1) {\r\n   throw new Error(`coordinate_transform_mode '${coordinateTransformMode}' is not supported`);\r\n }\r\n const needRoiInput = (coordinateTransformMode === 'tf_crop_and_resize');\r\n const useExtrapolation = needRoiInput;\r\n\r\n const nearestMode =\r\n   (mode === 'nearest' && opset >= 11) ? node.attributes.getString('nearest_mode', 'round_prefer_floor') : '';\r\n if (['round_prefer_floor', 'round_prefer_ceil', 'floor', 'ceil', ''].indexOf(nearestMode) === -1) {\r\n   throw new Error(`nearest_mode '${nearestMode}' is not supported`);\r\n }\r\n\r\n const cubicCoefficientA = node.attributes.getFloat('cubic_coeff_a', -0.75);\r\n const excludeOutside = node.attributes.getInt('exclude_outside', 0) !== 0;\r\n if (excludeOutside && mode !== 'cubic') {\r\n   throw new Error('exclude_outside can be set to 1 only when mode is CUBIC.');\r\n }\r\n\r\n const useNearest2xOptimization =\r\n   (opset < 11) ? true : (mode === 'nearest' && coordinateTransformMode === 'asymmetric' && nearestMode === 'floor');\r\n\r\n let roiInputIdx = 0;\r\n let scalesInputIdx = 0;\r\n let sizesInputIdx = 0;\r\n\r\n if (opset > 10) {\r\n   roiInputIdx = 1;\r\n   scalesInputIdx = 2;\r\n   sizesInputIdx = 3;\r\n } else if (opset === 9) {\r\n   scalesInputIdx = 1;\r\n }\r\n\r\n return createAttributeWithCacheKey({\r\n   opset,\r\n   isResize,\r\n   mode,\r\n   scales,\r\n   extrapolationValue,\r\n   coordinateTransformMode,\r\n   useExtrapolation,\r\n   needRoiInput,\r\n   nearestMode,\r\n   cubicCoefficientA,\r\n   excludeOutside,\r\n   useNearest2xOptimization,\r\n   roiInputIdx,\r\n   scalesInputIdx,\r\n   sizesInputIdx\r\n });\r\n};\r\n\r\nconst createUpsampleProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: UpsampleAttributes): ProgramInfo => {\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const [inputWidth, inputHeight] =\r\n   inferenceHandler.calculateTextureWidthAndHeight(inputs[0].dims, TextureType.unpacked);\r\n\r\n   const outputShape = inputs[0].dims.map((dim, i) => Math.floor(dim * attributes.scales[i]));\r\n   const [outputWidth, outputHeight] =\r\n   inferenceHandler.calculateTextureWidthAndHeight(outputShape, TextureType.unpacked);\r\n   const dim = outputShape.length;\r\n\r\n   const outputPitches = new Array<number>(dim);\r\n   const inputPitches = new Array<number>(dim);\r\n   let precalculatedPitches = `\r\n   int output_pitches[${dim}];\r\n      int input_pitches[${dim}];\r\n      `;\r\n   for (let d = dim - 1; d >= 0; d--) {\r\n   outputPitches[d] = (d === dim - 1) ? 1 : outputPitches[d + 1] * outputShape[d + 1];\r\n   inputPitches[d] = (d === dim - 1) ? 1 : inputPitches[d + 1] * inputs[0].dims[d + 1];\r\n\r\n   precalculatedPitches += `\r\n output_pitches[${d}] = ${outputPitches[d]};\r\n        input_pitches[${d}] = ${inputPitches[d]};\r\n        `;\r\n }\r\n   const getInputFloatFunction = `\r\n      float getInputFloat(int index) {\r\n        vec2 coords = offsetToCoords(index, ${inputWidth}, ${inputHeight});\r\n        float value = getColorAsFloat(${glsl.texture2D}(X, coords));\r\n        return value;\r\n      }\r\n      `;\r\n\r\n   const shaderSource = attributes.mode === 'nearest' ?\r\n   // nearest\r\n   `\r\n ${getInputFloatFunction}\r\n   float process(int indices[${dim}]) {\r\n   int input_index = 0;\r\n   int output_index = coordsToOffset(TexCoords, ${outputWidth}, ${outputHeight});\r\n\r\n ${precalculatedPitches}\r\n\r\n   int d, m;\r\n   for (int dim = 0; dim < ${dim}; ++dim) {\r\n   d = output_index / output_pitches[dim];\r\n   m = output_index - d * output_pitches[dim];\r\n   output_index = m;\r\n\r\n   if (scales[dim] != 1 && d > 0) {\r\n   int d2 = d / scales[dim];\r\n   m = d - d2 * scales[dim];\r\n   d = d2;\r\n   }\r\n   input_index += input_pitches[dim] * d;\r\n   }\r\n\r\n   return getInputFloat(input_index);\r\n   }` :\r\n          dim === 4 ?\r\n // bilinear 4D\r\n              `\r\n ${getInputFloatFunction}\r\n   float process(int indices[4]) {\r\n   int input_index = 0;\r\n   int output_index = coordsToOffset(TexCoords, ${outputWidth}, ${outputHeight});\r\n\r\n ${precalculatedPitches}\r\n\r\n   int m;\r\n   int index_of_dim0, index_of_dim1, index_of_dim2, index_of_dim3;\r\n   index_of_dim0 = output_index / output_pitches[0];\r\n   m = output_index - index_of_dim0 * output_pitches[0];\r\n   index_of_dim1 = m / output_pitches[1];\r\n   m = m - index_of_dim1 * output_pitches[1];\r\n   index_of_dim2 = m / output_pitches[2];\r\n   m = m - index_of_dim2 * output_pitches[2];\r\n   index_of_dim3 = m;\r\n\r\n   int index_of_input_dim2, index_of_input_dim3, x_offset, y_offset;\r\n   index_of_input_dim2 = index_of_dim2 / scales[2];\r\n   y_offset = index_of_dim2 -

index_of_input_dim2 * scales[2];\r\n index_of_input_dim3 = index_of_dim3 / scales[3];\r\n x_offset = index_of_dim3 - index_of_input_dim3 * scales[3];\r\n\r\n input_index = index_of_dim0 * input_pitches[0] +\r\n index_of_dim1 * input_pitches[1] +\r\n index_of_input_dim2 * input_pitches[2] +\r\n index_of_input_dim3;\r\n\r\n float x00 = getInputFloat(input_index);\r\n float x10, x01, x11;\r\n\r\n bool end_of_dim2 = false;\r\n if (index_of_input_dim2 == (${inputs[0].dims[2]} - 1)) {\r\n // It's the end in dimension 2\r\n x01 = x00;\r\n end_of_dim2 = true;\r\n } else {\r\n x01 = getInputFloat(input_index + input_pitches[2]);\r\n }\r\n\r\n if (index_of_input_dim3 == (input_pitches[2] - 1)) {\r\n // It's the end in dimension 3\r\n x10 = x00;\r\n x11 = x01;\r\n }\r\n else {\r\n x10 = getInputFloat(input_index + 1);\r\n x11 = end_of_dim2 ? x10 : getInputFloat(input_index + input_pitches[2] + 1);\r\n }\r\n\r\n float y0 = x00 + float(y_offset) * (x01 - x00) / float(scales[2]);\r\n float y1 = x10 + float(y_offset) * (x11 - x10) / float(scales[2]);\r\n return y0 + float(x_offset) * (y1 - y0) / float(scales[3]);\r\n }` :\r\n // bilinear 2D\r\n `\r\n ${getInputFloatFunction}\r\n float process(int indices[2]) {\r\n int input_index = 0;\r\n int output_index = coordsToOffset(TexCoords, ${outputWidth}, ${outputHeight});\r\n\r\n ${precalculatedPitches}\r\n\r\n int m;\r\n int index_of_dim0, index_of_dim1;\r\n index_of_dim0 = output_index / output_pitches[0];\r\n m = output_index - index_of_dim0 * output_pitches[0];\r\n index_of_dim1 = m;\r\n\r\n int index_of_input_dim0, index_of_input_dim1, x_offset, y_offset;\r\n index_of_input_dim0 = index_of_dim0 / scales[0];\r\n y_offset = index_of_dim0 - index_of_input_dim0 * scales[0];\r\n index_of_input_dim1 = index_of_dim1 / scales[1];\r\n x_offset = index_of_dim1 - index_of_input_dim1 * scales[1];\r\n\r\n input_index = index_of_input_dim0 * input_pitches[0] + index_of_input_dim1;\r\n\r\n float x00 = getInputFloat(input_index);\r\n float x10, x01, x11;\r\n\r\n bool end_of_dim0 = false;\r\n if (index_of_input_dim0 == (${inputs[0].dims[0]} - 1)) {\r\n // It's the end in dimension 0\r\n x01 = x00;\r\n end_of_dim0 = true;\r\n } else {\r\n x01 = getInputFloat(input_index + input_pitches[0]);\r\n }\r\n\r\n if (index_of_input_dim1 == (input_pitches[0] - 1)) {\r\n // It's the end in dimension 1\r\n x10 = x00;\r\n x11 = x01;\r\n }\r\n else {\r\n x10 = getInputFloat(input_index + 1);\r\n x11 = end_of_dim0 ? x10 : getInputFloat(input_index + input_pitches[0] + 1);\r\n }\r\n\r\n float y0 = x00 + float(y_offset) * (x01 - x00) / float(scales[0]);\r\n float y1 = x10 + float(y_offset) * (x11 - x10) / float(scales[0]);\r\n return y0 + float(x_offset) * (y1 - y0) / float(scales[1]);\r\n }`;\r\n return {\r\n ...upsampleProgramMetadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n shaderSource,\r\n variables: [{\r\n name: 'scales',\r\n type: 'int',\r\n arrayLength: attributes.scales.length,\r\n data: attributes.scales.map(x => Math.ceil(x))\r\n }]\r\n };\r\n };\r\n\r\nexport const validateInputs = (inputs: Tensor[], attribute: UpsampleAttributes): void => {\r\n if (!inputs || (attribute.opset < 9 && inputs.length !== 1) ||\r\n (attribute.opset >= 9 && attribute.opset < 11 && inputs.length !== 2) ||\r\n (attribute.opset >= 11 && inputs.length !== 3 && inputs.length !== 4)) {\r\n throw new Error('invalid inputs.');\r\n }\r\n\r\n if (attribute.scales.length > 0 && inputs[0].dims.length !== attribute.scales.length) {\r\n throw new Error('Invalid input shape.');\r\n }\r\n\r\n if (inputs[0].type === 'string') {\r\n throw new Error('Invalid input tensor types.');\r\n }\r\n};\r\n\r\nexport const scalesValidation = (scales: number[], mode: string, isResize: boolean): void => {\r\n if (!isResize) {\r\n for (const scale of scales) {\r\n if (scale < 1) {\r\n throw new Error('Scale value should be greater than or equal to 1.');\r\n }\r\n }\r\n } else {\r\n for (const scale of scales) {\r\n if (scale <= 0) {\r\n throw new Error('Scale value should be greater than 0.');\r\n }\r\n }\r\n }\r\n if (mode === 'linear' || mode === 'cubic') {\r\n if (scales.length !== 2 && (scales.length !== 4 || scales[0] !== 1 || scales[1] !== 1)) {\r\n throw new Error(`'Linear' mode and 'Cubic' mode only support 2-D inputs ('Bilinear', 'Bicubic') \\\r\n or 4-D inputs with the corresponding outermost 2 scale values being 1 \\\r\n in the ${isResize ? 'Resize' : 'Upsample'} opeartor.`);\r\n }\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env} from 'onnxruntime-common';\r\nimport {Logger, Profiler} from '../../instrument';\r\n\r\nimport {GlslPreprocessor} from './glsl-preprocessor';\r\nimport {getVertexShaderSource} from './glsl-source';\r\nimport {TextureLayoutStrategy} from './texture-layout-strategy';\r\nimport {Artifact, ProgramInfo, ProgramVariable, TextureData, TextureLayout, VariableInfo} from './types';\r\nimport {WebGLContext} from './webgl-context';\r\n\r\n/**\r\n * ProgramManager is

```
the main class behind running computations\r\n * It builds ProgramInfo's into Artifacts\r\n * It compiles given
ProgramInfo's into WebGL Prorams (cached as Artifacts)\r\n * Uses the artifact to run the computation by calling
Draw on\r\n * the WebGL drawing buffer\r\n * ProgramManager automatically maps (binds) input variables to
their\r\n * corresponding Location's in the binary program\r\n */\r\nexport class ProgramManager {\r\n  repo:
Map<unknown, Artifact>;  // this should be per-session object\r\n  vertexShader: WebGLShader;\r\n
attributesBound: boolean;\r\n\r\n  constructor(\r\n      public profiler: Readonly<Profiler>, public glContext:
WebGLContext,\r\n      public textureLayoutStrategy: TextureLayoutStrategy) {\r\n    this.repo = new Map();\r\n
this.attributesBound = false;\r\n  }\r\n  getArtifact(key: unknown): Artifact|undefined {\r\n    return
this.repo.get(key);\r\n  }\r\n  setArtifact(key: unknown, artifact: Artifact): void {\r\n    this.repo.set(key, artifact);\r\n
}\r\n  run(buildArtifact: Artifact, inputs: TextureData[], output: TextureData): void {\r\n    this.profiler.event('op',
`ProgramManager.run ${buildArtifact.programInfo.name ?? 'unknown kernel'}`, () => {\r\n      const gl =
this.glContext.gl;\r\n      const program = buildArtifact.program;\r\n      gl.useProgram(program);\r\n      try {\r\n
this.bindOutput(output);\r\n        if (!this.attributesBound) {\r\n
this.bindAttributes(buildArtifact.attribLocations);\r\n        }\r\n
this.bindUniforms(buildArtifact.uniformLocations, buildArtifact.programInfo.variables ?? [], inputs);\r\n      } catch
(err) {\r\n        Logger.error('ProgramManager', buildArtifact.programInfo.shaderSource);\r\n        throw err;\r\n
}\r\n      this.profiler.event('backend', 'GlContext.draw()', () => {\r\n        this.glContext.draw();\r\n      });\r\n    },
this.glContext);\r\n  }\r\n  dispose(): void {\r\n    if (this.vertexShader) {\r\n
this.glContext.deleteShader(this.vertexShader);\r\n    }\r\n    this.repo.forEach(a =>
this.glContext.deleteProgram(a.program));\r\n  }\r\n  build(programInfo: ProgramInfo, inputTextureLayouts:
TextureLayout[], outputTextureLayout: TextureLayout): Artifact {\r\n    return this.profiler.event('backend',
'ProgramManager.build', () => {\r\n      const preprocessor = new GlslPreprocessor(this.glContext, programInfo,
inputTextureLayouts, outputTextureLayout);\r\n      const fragScript = preprocessor.preprocess();\r\n      const
program = this.compile(fragScript);\r\n      const artifact = {\r\n        programInfo,\r\n        program,\r\n
uniformLocations: this.getUniformLocations(\r\n            program, preprocessor.context.programInfo.inputNames,
preprocessor.context.programInfo.variables),\r\n        attribLocations: this.getAttribLocations(program)\r\n      };\r\n
   return artifact;\r\n    });\r\n  }\r\n  protected compile(fragShaderScript: string): WebGLProgram {\r\n    if
(!this.vertexShader) {\r\n      Logger.verbose('ProrgramManager', 'Compiling and caching Vertex shader for the first
time');\r\n      const vertexShaderScript = getVertexShaderSource(this.glContext.version);\r\n      this.vertexShader =
this.glContext.compileShader(vertexShaderScript, this.glContext.gl.VERTEX_SHADER);\r\n    }\r\n    if
(env.debug) {\r\n      Logger.verbose('ProrgramManager', `FragShader:\r\n${fragShaderScript}\r\n`);\r\n    }\r\n
const fragShader = this.glContext.compileShader(fragShaderScript, this.glContext.gl.FRAGMENT_SHADER);\r\n
const program = this.glContext.createProgram(this.vertexShader, fragShader);\r\n
this.glContext.deleteShader(fragShader);\r\n    return program;\r\n  }\r\n  bindOutput(td: TextureData): void {\r\n
const width = td.width;\r\n    const height = td.height;\r\n    Logger.verbose(\r\n        'ProrgramManager',\r\n
`Binding output texture to Framebuffer: w/h=${width}/${height}, shape=${td.shape}, type=${td.tensor.type}`);\r\n
 this.glContext.attachFramebuffer(td.texture, width, height);\r\n  }\r\n  bindAttributes(attribLocations:
Artifact.AttribLocations): void {\r\n    const positionHandle = attribLocations.position;\r\n    const
textureCoordHandle = attribLocations.textureCoord;\r\n    this.glContext.setVertexAttributes(positionHandle,
textureCoordHandle);\r\n    this.attributesBound = true;\r\n  }\r\n  bindUniforms(uniformLocations:
Artifact.UniformLocations, variables: ProgramVariable[], textures: TextureData[]):\r\n      void {\r\n    const gl =
this.glContext.gl;\r\n    let texturePosition = 0;\r\n    for (const {name, type, location, arrayLength} of
uniformLocations) {\r\n      const value = variables.find(v => v.name === name)?.data;\r\n      if (type !==
'sampler2D' && !value) {\r\n        throw new Error(`variable '${name}' does not have data defined in program
info`);\r\n      }\r\n      switch (type) {\r\n        case 'sampler2D':\r\n          this.bindTexture(textures[texturePosition],
location, texturePosition);\r\n          texturePosition++;\r\n          break;\r\n        case 'float':\r\n          if (arrayLength)
{\r\n            gl.uniform1fv(location, value as number[]);\r\n          } else {\r\n            gl.uniform1f(location, value as
number);\r\n          }\r\n          break;\r\n        case 'int':\r\n          if (arrayLength) {\r\n            gl.uniform1iv(location,
```

value as number[]);\r\n   } else {\r\n   gl.uniform1i(location, value as number);\r\n   }\r\n   break;\r\n   default:\r\n   throw new Error(`Uniform not implemented: ${type}`);\r\n   }\r\n   }\r\n }\r\n bindTexture(td: TextureData, uniformHandle: WebGLUniformLocation, position: number): void {\r\n   this.glContext.bindTextureToUniform(td.texture, position, uniformHandle);\r\n }\r\n getAttribLocations(program: WebGLProgram): Artifact.AttribLocations {\r\n   return {\r\n   position: this.getAttribLocation(program, 'position'),\r\n   textureCoord: this.getAttribLocation(program, 'textureCoord')\r\n   };\r\n }\r\n getUniformLocations(program: WebGLProgram, samplers?: string[], variables?: VariableInfo[]):\r\n   Artifact.UniformLocations {\r\n   const uniformLocations: Artifact.UniformLocations = [];\r\n   if (samplers) {\r\n   for (const sampler of samplers) {\r\n   uniformLocations.push({name: sampler, type: 'sampler2D', location: this.getUniformLocation(program, sampler)});\r\n   }\r\n   }\r\n   if (variables) {\r\n   for (const variable of variables) {\r\n   uniformLocations.push({...variable, location: this.getUniformLocation(program, variable.name)});\r\n   }\r\n   }\r\n   return uniformLocations;\r\n }\r\n getUniformLocation(program: WebGLProgram, name: string): WebGLUniformLocation {\r\n   const gl = this.glContext.gl;\r\n   const reference = gl.getUniformLocation(program, name);\r\n   if (reference === null) {\r\n   throw new Error(`Uniform ${name} not found.`);\r\n   }\r\n   return reference;\r\n }\r\n getAttribLocation(program: WebGLProgram, name: string): number {\r\n   const gl = this.glContext.gl;\r\n   const attributeLocation: number = gl.getAttribLocation(program, name);\r\n   return attributeLocation;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {SessionHandler} from '../../backend';\r\nimport {Graph} from '../../graph';\r\nimport {Logger} from '../../instrument';\r\nimport {Operator} from '../../operators';\r\nimport {OpSet, resolveOperator} from '../../opset';\r\nimport {Session} from '../../session';\r\nimport {Tensor} from '../../tensor';\r\nimport {WebGLBackend} from '../backend-webgl';\r\n\r\nimport {WebGLInferenceHandler} from './inference-handler';\r\nimport {WEBGL_OP_RESOLVE_RULES} from './op-resolve-rules';\r\nimport {ProgramManager} from './program-manager';\r\nimport {PreferLogicalStrategy, TextureLayoutStrategy} from './texture-layout-strategy';\r\nimport {TextureManager} from './texture-manager';\r\nimport {TextureData} from './types';\r\n\r\nexport class WebGLSessionHandler implements SessionHandler {\r\n programManager: ProgramManager;\r\n textureManager: TextureManager;\r\n layoutStrategy: TextureLayoutStrategy;\r\n packedTextureDataCache: Map<Tensor.Id, TextureData>;\r\n unpackedTextureDataCache: Map<Tensor.Id, TextureData>;\r\n pack2unpackMap: Map<Tensor.Id, Tensor.Id>;\r\n unpack2packMap: Map<Tensor.Id, Tensor.Id>;\r\n initializers: Set<Tensor.Id>;\r\n pack?: boolean;\r\n\r\n constructor(public readonly backend: WebGLBackend, public readonly context: Session.Context) {\r\n   this.layoutStrategy = new PreferLogicalStrategy(backend.glContext.maxTextureSize);\r\n   this.programManager = new ProgramManager(this.context.profiler, backend.glContext, this.layoutStrategy);\r\n   this.textureManager = new TextureManager(\r\n   backend.glContext, this.layoutStrategy, this.context.profiler,\r\n   {reuseTextures: backend.textureCacheMode === 'full'});\r\n   this.packedTextureDataCache = new Map();\r\n   this.unpackedTextureDataCache = new Map();\r\n   this.pack = backend.pack;\r\n   this.pack2unpackMap = new Map();\r\n   this.unpack2packMap = new Map();\r\n }\r\n\r\n createInferenceHandler() {\r\n   return new WebGLInferenceHandler(this);\r\n }\r\n onGraphInitialized(graph: Graph): void {\r\n   const initializers = graph.getValues().filter(v => v.from === -1 && v.tensor).map(v => v.tensor!.dataId);\r\n   this.initializers = new Set(initializers);\r\n }\r\n isInitializer(tensorId: Tensor.Id): boolean {\r\n   return this.initializers ? this.initializers.has(tensorId) : false;\r\n }\r\n addInitializer(tensorId: Tensor.Id): void {\r\n   this.initializers.add(tensorId);\r\n }\r\n getTextureData(tensorId: Tensor.Id, isPacked: boolean): TextureData|undefined {\r\n   if (isPacked) {\r\n   return this.packedTextureDataCache.get(tensorId);\r\n   } else {\r\n   return this.unpackedTextureDataCache.get(tensorId);\r\n   }\r\n }\r\n setTextureData(tensorId: Tensor.Id, textureData: TextureData, isPacked = false): void {\r\n   Logger.verbose('WebGLSessionHandler', 'Storing Texture data in cache');\r\n   if (isPacked) {\r\n   this.packedTextureDataCache.set(tensorId, textureData);\r\n   } else {\r\n   this.unpackedTextureDataCache.set(tensorId, textureData);\r\n   }\r\n }\r\n dispose(): void {\r\n   this.programManager.dispose();\r\n   this.textureManager.clearActiveTextures();\r\n

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this.packedTextureDataCache.forEach(td => this.textureManager.releaseTexture(td, true));\r\n
this.packedTextureDataCache = new Map();\r\n    this.unpackedTextureDataCache.forEach(td =>
this.textureManager.releaseTexture(td, true));\r\n    this.unpackedTextureDataCache = new Map();\r\n  }\r\n
resolve(node: Graph.Node, opsets: readonly OpSet[], graph: Graph): Operator {\r\n    const op =
resolveOperator(node, opsets, WEBGL_OP_RESOLVE_RULES);\r\n    return {impl: op.opImpl, context: op.opInit
? op.opInit(node, graph) : node};\r\n  }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n//
Licensed under the MIT License.\r\n\r\nimport {Logger} from '../../instrument';\r\n\r\nexport declare namespace
Encoder {\r\n  export interface DataTypeMap {\r\n    float: Float32Array;\r\n    byte: Uint8Array;\r\n    int:
Uint32Array;\r\n  }\r\n  export type DataType = keyof DataTypeMap;\r\n  type DataArrayType =
DataTypeMap[DataType];\r\n\r\n  /* eslint-disable @typescript-eslint/naming-convention */\r\n  export const enum
Usage {\r\n    Default = 0,\r\n    UploadOnly,\r\n    Download4BytesAsFloat32,\r\n  }\r\n}\r\n\r\n/**\r\n *
Abstraction for mapping data types to texture texlets\r\n * Encoding means how a Float32 is mapped to 1 or 4
channels for each texlet\r\n * Decoding means how a texlet's channels are mapped to a resulting Float32\r\n
*/\r\nexport interface DataEncoder {\r\n  internalFormat: number;\r\n  format: number;\r\n  textureType: number;\r\n
channelSize: number;\r\n  encode(src: Encoder.DataArrayType, textureSize: number): Encoder.DataArrayType;\r\n
allocate(size: number): Encoder.DataArrayType;\r\n  decode(buffer: Encoder.DataArrayType, dataSize: number):
Encoder.DataArrayType;\r\n}\r\n/**\r\n * WebGL2 data encoder\r\n * Uses R32F as the format for texlet\r\n
*/\r\nexport class RedFloat32DataEncoder implements DataEncoder {\r\n  internalFormat: number;\r\n  format:
number;\r\n  textureType: number;\r\n  channelSize: number;\r\n  constructor(gl: WebGL2RenderingContext,
channels = 1) {\r\n    if (channels === 1) {\r\n      this.internalFormat = gl.R32F;\r\n      this.format = gl.RED;\r\n
this.textureType = gl.FLOAT;\r\n      this.channelSize = channels;\r\n    } else if (channels === 4) {\r\n
this.internalFormat = gl.RGBA32F;\r\n      this.format = gl.RGBA;\r\n      this.textureType = gl.FLOAT;\r\n
this.channelSize = channels;\r\n    } else {\r\n      throw new Error(`Invalid number of channels: ${channels}`);\r\n
}\r\n  }\r\n  encode(src: Encoder.DataArrayType, textureSize: number): Encoder.DataArrayType {\r\n    let result:
Float32Array;\r\n    let source: Float32Array;\r\n    if (src.constructor !== Float32Array) {\r\n
Logger.warning('Encoder', 'data was not of type Float32; creating new Float32Array');\r\n      source = new
Float32Array(src);\r\n    }\r\n    if (textureSize * this.channelSize > src.length) {\r\n      Logger.warning('Encoder',
'Source data too small. Allocating larger array');\r\n      source = src as Float32Array;\r\n      result =
this.allocate(textureSize * this.channelSize) as Float32Array;\r\n      source.forEach((v, i) => result[i] = v);\r\n    }
else {\r\n      source = src as Float32Array;\r\n      result = source;\r\n    }\r\n    return result;\r\n  }\r\n  allocate(size:
number): Encoder.DataArrayType {\r\n    return new Float32Array(size * 4);\r\n  }\r\n  decode(buffer:
Encoder.DataArrayType, dataSize: number): Float32Array {\r\n    if (this.channelSize === 1) {\r\n      const
filteredData = (buffer as Float32Array).filter((value, index) => index % 4 === 0).subarray(0, dataSize);\r\n      return
filteredData;\r\n    }\r\n    return buffer.subarray(0, dataSize) as Float32Array;\r\n  }\r\n}\r\n/**\r\n * Data encoder
for WebGL 1 with support for floating point texture\r\n */\r\nexport class RGBAFloatDataEncoder implements
DataEncoder {\r\n  internalFormat: number;\r\n  format: number;\r\n  textureType: number;\r\n  channelSize:
number;\r\n  constructor(gl: WebGLRenderingContext, channels = 1, textureType?: number) {\r\n    if (channels !==
1 && channels !== 4) {\r\n      throw new Error(`Invalid number of channels: ${channels}`);\r\n    }\r\n
this.internalFormat = gl.RGBA;\r\n    this.format = gl.RGBA;\r\n    this.channelSize = channels;\r\n
this.textureType = textureType || gl.FLOAT;\r\n  }\r\n  encode(src: Float32Array, textureSize: number):
Encoder.DataArrayType {\r\n    let dest = src;\r\n    if (this.channelSize === 1) {\r\n      Logger.verbose('Encoder',
'Exploding into a larger array');\r\n      dest = this.allocate(textureSize) as Float32Array;\r\n      src.forEach((v, i) =>
dest[i * 4] = v);\r\n    }\r\n    return dest;\r\n  }\r\n  allocate(size: number): Encoder.DataArrayType {\r\n    return
new Float32Array(size * 4);\r\n  }\r\n  decode(buffer: Encoder.DataArrayType, dataSize: number): Float32Array
{\r\n    if (this.channelSize === 1) {\r\n      const filteredData = (buffer as Float32Array).filter((value, index) =>
index % 4 === 0).subarray(0, dataSize);\r\n      return filteredData;\r\n    }\r\n    return buffer.subarray(0, dataSize)
as Float32Array;\r\n  }\r\n}\r\n\r\nexport class Uint8DataEncoder implements DataEncoder {\r\n  internalFormat:
number;\r\n  format: number;\r\n  textureType: number;\r\n  channelSize = 4;\r\n  constructor(gl:
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WebGLRenderingContext, channels = 1) {\r\n   if (channels === 1) {\r\n   this.internalFormat = gl.ALPHA;\r\n this.format = gl.ALPHA; // not tested\r\n   this.textureType = gl.UNSIGNED_BYTE;\r\n   this.channelSize = channels;\r\n   } else if (channels === 4) {\r\n   this.internalFormat = gl.RGBA;\r\n   this.format = gl.RGBA;\r\n   this.textureType = gl.UNSIGNED_BYTE;\r\n   this.channelSize = channels;\r\n   } else {\r\n   throw new Error(`Invalid number of channels: ${channels}`);\r\n   }\r\n }\r\n encode(src: Uint8Array, _textureSize: number): Encoder.DataArrayType {\r\n   return new Uint8Array(src.buffer, src.byteOffset, src.byteLength);\r\n }\r\n allocate(size: number): Encoder.DataArrayType {\r\n   return new Uint8Array(size * this.channelSize);\r\n }\r\n decode(buffer: Encoder.DataArrayType, dataSize: number): Uint8Array {\r\n   if (buffer instanceof Uint8Array) {\r\n   return buffer.subarray(0, dataSize);\r\n   }\r\n   throw new Error(`Invalid array type: ${buffer.constructor}`);\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Logger} from '../../instrument';\r\nimport {assert} from '../../util';\r\n/** Layout preferences */\r\nexport interface WidthHeightPrefs {\r\n breakAxis?: number;\r\n isPacked?: boolean;\r\n reverseWH?: boolean;\r\n}\r\n/**\r\n * TextureLayoutStrategy is an abstraction for different plans\r\n * for mapping n-dimensional arrays to 2D textures (and back)\r\n */\r\nexport interface TextureLayoutStrategy {\r\n computeTextureWH(shape: readonly number[], prefs?: WidthHeightPrefs): [number, number];\r\n}\r\n\r\n/**\r\n * This strategy try to find the minimal max(W,H) that fulfills (W * H == totalSize)\r\n */\r\nexport class AlwaysKeepOriginalSizeStrategy implements TextureLayoutStrategy {\r\n constructor(public maxTextureSize: number) {}\r\n computeTextureWH(shape: readonly number[], prefs?: WidthHeightPrefs): [number, number] {\r\n // scalar tensor\r\n   if (shape.length === 0) {\r\n   return [1, 1];\r\n   }\r\n   const maxTextureSize = this.maxTextureSize;\r\n   if (prefs && prefs.breakAxis !== undefined) {\r\n   // check to see if dims fit\r\n const wsize = prefs.breakAxis >= shape.length ? 1 : shape.slice(prefs.breakAxis).reduce((a, b) => a * b);\r\n const hsize = prefs.breakAxis <= 0 ? 1 : shape.slice(0, prefs.breakAxis).reduce((a, b) => a * b);\r\n   if (wsize > maxTextureSize || hsize > maxTextureSize) {\r\n   // ignore preferences\r\n   // continue with default layout\r\n   Logger.verbose(\r\n   'TextureLayout',\r\n   `Given width/height preferences were unattainable: shape:${shape}, breakAxis:${prefs.breakAxis}`);\r\n   } else {\r\n   return [wsize, hsize];\r\n   }\r\n   }\r\n const totalSize = shape.reduce((a, b) => a * b);\r\n\r\n   let width = Math.floor(Math.sqrt(totalSize));\r\n\r\n   for (; width < maxTextureSize && width < totalSize; width++) {\r\n   if (totalSize % width === 0) {\r\n   break;\r\n }\r\n   }\r\n\r\n   if (width >= maxTextureSize || totalSize % width !== 0) {\r\n   throw new Error(`The given dimensions are outside this GPU's boundaries: ${shape}`);\r\n   }\r\n   return [width, totalSize / width];\r\n }\r\n}\r\n\r\nexport class PreferLogicalStrategy implements TextureLayoutStrategy {\r\n constructor(public maxTextureSize: number) {}\r\n computeTextureWH(shape: readonly number[], prefs?: WidthHeightPrefs): [number, number] {\r\n   const wh = this.computeTexture(shape, prefs);\r\n   if (prefs && prefs.isPacked) {\r\n wh[0] /= 2;\r\n   wh[1] /= 2;\r\n   }\r\n   if (prefs && prefs.reverseWH) {\r\n   return [wh[1], wh[0]];\r\n   }\r\n return wh;\r\n }\r\n\r\n computeTexture(shape: readonly number[], prefs?: WidthHeightPrefs): [number, number] {\r\n   const isPacked = prefs && prefs.isPacked;\r\n   // scalar tensor\r\n   if (shape.length === 0) {\r\n   return isPacked ? [2, 2] : [1, 1];\r\n   }\r\n   let maxTextureSize = this.maxTextureSize;\r\n   if (prefs && prefs.breakAxis !== undefined) {\r\n   // check to see if dims fit\r\n   const wsize = prefs.breakAxis >= shape.length ? 1 : shape.slice(prefs.breakAxis).reduce((a, b) => a * b);\r\n   const hsize = prefs.breakAxis <= 0 ? 1 : shape.slice(0, prefs.breakAxis).reduce((a, b) => a * b);\r\n   if (wsize > maxTextureSize || hsize > maxTextureSize) {\r\n   // ignore preferences\r\n   // continue with default layout\r\n   Logger.verbose(\r\n   'TextureLayout',\r\n   `Given width/height preferences were unattainable: shape:${shape}, breakAxis:${prefs.breakAxis}`);\r\n   } else {\r\n   return [wsize, hsize];\r\n   }\r\n   }\r\n   let logShape = shape.slice(0);\r\n   if (isPacked) {\r\n maxTextureSize = maxTextureSize * 2;\r\n\r\n   // This logic ensures we accurately count the number of packed texels needed\r\n   // to accommodate the tensor. We can only pack values in the same texel if\r\n   // they are from adjacent pairs of rows/cols within the same batch. So if a\r\n   // tensor has 3 rows, we pretend it has 4 rows in order to account for the\r\n   // fact that the texels containing the third row are half empty.\r\n   logShape = logShape.map(\r\n   (d, i) => i >= logShape.length - 2 ? (logShape[i] % 2 === 0 ? logShape[i] : logShape[i] + 1) : logShape[i]);\r\n\r\n   // Packed texture height is at least 2 (the channel height of a single\r\n   // texel).\r\n   if

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(logShape.length === 1) {\r\n        logShape = [2, logShape[0]];\r\n      }\r\n    }\r\n\r\n    // If logical shape is 2, we
don't squeeze, since we want to match physical.\r\n    if (logShape.length !== 2) {\r\n      const squeezeResult =
squeezeShape(logShape);\r\n      logShape = squeezeResult.newShape;\r\n    }\r\n\r\n    const size =
sizeFromShape(logShape);\r\n    if (logShape.length <= 1 && size <= maxTextureSize) {\r\n      return [1, size];\r\n
} else if (logShape.length === 2 && logShape[0] <= maxTextureSize && logShape[1] <= maxTextureSize) {\r\n
return logShape as [number, number];\r\n    } else if (logShape.length === 3 && logShape[0] * logShape[1] <=
maxTextureSize && logShape[2] <= maxTextureSize) {\r\n      return [logShape[0] * logShape[1], logShape[2]];\r\n
  } else if (logShape.length === 3 && logShape[0] <= maxTextureSize && logShape[1] * logShape[2] <=
maxTextureSize) {\r\n      return [logShape[0], logShape[1] * logShape[2]];\r\n    } else if (\r\n        logShape.length
=== 4 && logShape[0] * logShape[1] * logShape[2] <= maxTextureSize &&\r\n        logShape[3] <=
maxTextureSize) {\r\n      return [logShape[0] * logShape[1] * logShape[2], logShape[3]];\r\n    } else if (\r\n
logShape.length === 4 && logShape[0] <= maxTextureSize &&\r\n        logShape[1] * logShape[2] * logShape[3]
<= maxTextureSize) {\r\n      return [logShape[0], logShape[1] * logShape[2] * logShape[3]];\r\n    } else {\r\n      if
(isPacked) {\r\n        // For packed textures size equals the number of channels required to\r\n        // accommodate
the texture data. However in order to squarify such that\r\n        // inner dimensions stay even, we rewrite size to
equal the number of\r\n        // texels. Then in the return statement we rehydrate the squarified\r\n        // dimensions
to channel units.\r\n        return sizeToSquarishShape(size / 4).map(d => d * 2) as [number, number];\r\n      }\r\n
return sizeToSquarishShape(size);\r\n    }\r\n  }\r\n}\r\n\r\nexport function squeezeShape(shape: number[], axis?:
number[]): {newShape: number[]; keptDims: number[]} {\r\n  const newShape: number[] = [];\r\n  const keptDims:
number[] = [];\r\n  const isEmptyArray = axis != null && Array.isArray(axis) && axis.length === 0;\r\n  const axes
= (axis == null || isEmptyArray) ? null : parseAxisParam(axis, shape).sort();\r\n  let j = 0;\r\n  for (let i = 0; i <
shape.length; ++i) {\r\n    if (axes != null) {\r\n      if (axes[j] === i && shape[i] !== 1) {\r\n        throw new
Error(`Can't squeeze axis ${i} since its dim '${shape[i]}' is not 1`);\r\n      }\r\n      if ((axes[j] == null || axes[j] > i)
&& shape[i] === 1) {\r\n        newShape.push(shape[i]);\r\n        keptDims.push(i);\r\n      }\r\n      if (axes[j] <= i)
{\r\n        j++;\r\n      }\r\n    }\r\n    if (shape[i] !== 1) {\r\n      newShape.push(shape[i]);\r\n
keptDims.push(i);\r\n    }\r\n  }\r\n  return {newShape, keptDims};\r\n}\r\n\r\nexport function parseAxisParam(axis:
number|number[], shape: number[]): number[] {\r\n  const rank = shape.length;\r\n\r\n  // Normalize input\r\n  axis =
axis == null ? shape.map((s, i) => i) : ([] as number[]).concat(axis);\r\n\r\n  // Check for valid range\r\n  assert(\r\n
axis.every(ax => ax >= -rank && ax < rank),\r\n      () => `All values in axis param must be in range [-${rank},
${rank}) but ` +\r\n          `got axis ${axis}`);\r\n\r\n  // Check for only integers\r\n  assert(\r\n
axis.every(isInt),\r\n      () => 'All values in axis param must be integers but ' +\r\n          `got axis ${axis}`);\r\n\r\n
// Handle negative axis.\r\n  return axis.map(a => a < 0 ? rank + a : a);\r\n}\r\nexport function isInt(a: number):
boolean {\r\n  return a % 1 === 0;\r\n}\r\nexport function sizeFromShape(shape: number[]): number {\r\n  if
(shape.length === 0) {\r\n    // Scalar.\r\n    return 1;\r\n  }\r\n  let size = shape[0];\r\n  for (let i = 1; i < shape.length;
i++) {\r\n    size *= shape[i];\r\n  }\r\n  return size;\r\n}\r\nexport function getRowsCols(shape: number[]): [number,
number] {\r\n  if (shape.length === 0) {\r\n    throw Error('Cannot get rows and columns of an empty shape
array.');\r\n  }\r\n\r\n  return [shape.length > 1 ? shape[shape.length - 2] : 1, shape[shape.length - 1]];\r\n}\r\nexport
function sizeToSquarishShape(size: number): [number, number] {\r\n  const width = Math.ceil(Math.sqrt(size));\r\n
return [width, Math.ceil(size / width)];\r\n}\r\nexport function getBatchDim(shape: number[], dimsToSkip = 2):
number {\r\n  return sizeFromShape(shape.slice(0, shape.length - dimsToSkip));\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {ShapeUtil} from
'../../util';\r\nimport {TextureLayoutStrategy, WidthHeightPrefs} from './texture-layout-strategy';\r\nimport
{TextureLayout, TextureType} from './types';\r\n\r\nexport const createTextureLayoutFromTextureType =\r\n
(textureLayoutStrategy: TextureLayoutStrategy, shape: readonly number[],\r\n     textureType: TextureType):
TextureLayout => {\r\n      const channel = (textureType === TextureType.unpacked || textureType ===
TextureType.unpackedReversed) ? 1 : 4;\r\n      const isPacked = textureType === TextureType.packed;\r\n      const
reverseWH = (textureType === TextureType.unpackedReversed || textureType === TextureType.packed);\r\n
const breakAxis = textureType === TextureType.packedLastDimension ? shape.length - 1 : undefined;\r\n      const
```

unpackedShape = textureType === TextureType.packedLastDimension ?\r\n shape.map((d, i) => i === shape.length - 1 ? d * 4 : d) :\r\n undefined;\r\n return createTextureLayoutFromShape(\r\n textureLayoutStrategy, shape, channel, unpackedShape, {isPacked, reverseWH, breakAxis});\r\n };\r\n\r\nexport const calculateTextureWidthAndHeight =\r\n (textureLayoutStrategy: TextureLayoutStrategy, shape: readonly number[], textureType: TextureType):\r\n [number, number] => {\r\n const layout = createTextureLayoutFromTextureType(textureLayoutStrategy, shape, textureType);\r\n return [layout.width, layout.height];\r\n };\r\n\r\n/**\r\n * Create a TextureLayout object from shape.\r\n */\r\nexport const createTextureLayoutFromShape =\r\n (textureLayoutStrategy: TextureLayoutStrategy, shape: readonly number[], channels: 1|4 = 1,\r\n unpackedShape?: readonly number[], prefs?: WidthHeightPrefs): TextureLayout => {\r\n const isPacked = !!(prefs && prefs.isPacked);\r\n const [width, height] = textureLayoutStrategy.computeTextureWH(isPacked ? unpackedShape || shape : shape, prefs);\r\n const rank = shape.length;\r\n let inferredDims = shape.slice(0);\r\n if (rank === 0) {\r\n inferredDims = [1];\r\n }\r\n if (channels === 1) {\r\n // unpackedShape will take `shape` and not `inferredDims` so as to create a scalar Tensor if need be\r\n unpackedShape = shape;\r\n } else if (isPacked) {\r\n if (channels !== 4) {\r\n throw new Error('a packed texture must be 4-channel');\r\n }\r\n unpackedShape = shape;\r\n if (rank > 0) {\r\n inferredDims[rank - 1] = Math.ceil(inferredDims[rank - 1] / 2);\r\n }\r\n if (rank > 1) {\r\n inferredDims[rank - 2] = Math.ceil(inferredDims[rank - 2] / 2);\r\n }\r\n } else if (!unpackedShape) {\r\n throw new Error('Unpacked shape is needed when using channels > 1');\r\n }\r\n return {\r\n width,\r\n height,\r\n channels,\r\n isPacked,\r\n shape: inferredDims,\r\n strides: ShapeUtil.computeStrides(inferredDims),\r\n unpackedShape,\r\n reversedWH: (prefs && prefs.reverseWH)\r\n };\r\n };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Logger, Profiler} from '../../instrument';\r\nimport {Tensor} from '../../tensor';\r\n\r\nimport {Encoder} from './texture-data-encoder';\r\nimport {TextureLayoutStrategy} from './texture-layout-strategy';\r\nimport {TextureData, TextureLayout} from './types';\r\nimport {WebGLContext} from './webgl-context';\r\n\r\nexport interface TextureManagerConfig {\r\n reuseTextures?: boolean;\r\n}\r\n\r\n/**\r\n * TextureManager is the mainly responsible for caching Textures\r\n * Textures are cached in 2 levels:\r\n * 1. the texures which are associated with a dataId (from Tensor)\r\n * Caching these is crucial to performance. These are In-use Textures\r\n * 2. textures which are not in use by any current ProgramInfo/Tensor\r\n * These are called Free Textures\r\n * TextureManager is also used to help creating textures. For this it\r\n * uses WebGLContext and TextureLayoutStrategy\r\n */\r\nexport class TextureManager {\r\n private readonly inUseTextures: Map<string, WebGLTexture[]>;\r\n private readonly idleTextures: Map<string, WebGLTexture[]>;\r\n private readonly textureLookup: Map<WebGLTexture, string>;\r\n private readonly pendingRead: Map<Tensor.Id, Array<(arr: Tensor.NumberType) => void>> = new Map();\r\n\r\n constructor(\r\n public glContext: WebGLContext, public layoutStrategy: TextureLayoutStrategy, public profiler: Readonly<Profiler>,\r\n private config: TextureManagerConfig) {\r\n if (config.reuseTextures) {\r\n this.inUseTextures = new Map();\r\n this.idleTextures = new Map();\r\n this.textureLookup = new Map();\r\n }\r\n }\r\n createTextureFromLayout(\r\n dataType: Tensor.DataType, layout: TextureLayout, data?: Tensor.NumberType, usage?: Encoder.Usage) {\r\n const textureDataType = this.toEncoderType(dataType);\r\n\r\n const encoder = this.glContext.getEncoder(textureDataType, layout.channels || 1, usage);\r\n if (layout.isPacked && usage === Encoder.Usage.UploadOnly) {\r\n throw new Error('not implemented');\r\n }\r\n const width = layout.width;\r\n const height = layout.height;\r\n\r\n let key: string|undefined;\r\n let inUseTextures: WebGLTexture[]|undefined;\r\n if (this.config.reuseTextures) {\r\n key = `${width}x${height}_${encoder.format}_${encoder.internalFormat}_${encoder.textureType}`;\r\n inUseTextures = this.inUseTextures.get(key);\r\n if (!inUseTextures) {\r\n inUseTextures = [];\r\n this.inUseTextures.set(key, inUseTextures);\r\n }\r\n\r\n const idleTextures = this.idleTextures.get(key);\r\n if (idleTextures && idleTextures.length > 0) {\r\n const texture = idleTextures.pop()!;\r\n inUseTextures.push(texture);\r\n if (usage === Encoder.Usage.UploadOnly) {\r\n this.glContext.updateTexture(texture, width, height, encoder, this.toTextureData(dataType, data)!);\r\n }\r\n

```
return texture;\r\n      }\r\n    }\r\n\r\n    Logger.verbose('TextureManager', `Creating new texture of size
${layout.width}x${layout.height}`);\r\n    const texture = this.glContext.allocateTexture(width, height, encoder,
this.toTextureData(dataType, data));\r\n\r\n    if (this.config.reuseTextures) {\r\n
inUseTextures!.push(texture);\r\n      this.textureLookup.set(texture, key!);\r\n    }\r\n    return texture;\r\n  }\r\n
readTexture(td: TextureData, dataType: Tensor.DataType, channels?: number): Tensor.NumberType {\r\n    if
(!channels) {\r\n      channels = 1;\r\n    }\r\n    return this.profiler.event('backend', 'TextureManager.readTexture', ()
=> {\r\n      const dataSize = td.shape.reduce((a, b) => a * b) * channels!;\r\n      const data =
this.glContext.readTexture(\r\n          td.texture, td.width, td.height, dataSize, this.toEncoderType(dataType),
channels!);\r\n      return this.toTensorData(dataType, data);\r\n    });\r\n  }\r\n  async readTextureAsync(td:
TextureData, dataType: Tensor.DataType, channels?: number): Promise<Tensor.NumberType> {\r\n    const dataId
= td.tensor.dataId;\r\n    if (!channels) {\r\n      channels = 1;\r\n    }\r\n    if (this.pendingRead.has(dataId)) {\r\n
const subscribers = this.pendingRead.get(dataId);\r\n      return new Promise<Tensor.NumberType>(resolve =>
subscribers?.push(resolve));\r\n    }\r\n    return this.profiler.event('backend', 'TextureManager.readTextureAsync',
async () => {\r\n      this.pendingRead.set(dataId, []);\r\n      const dataSize = td.shape.reduce((a, b) => a * b) *
channels!;\r\n      // add a fence waiting for the data to be ready\r\n      await
this.glContext.createAndWaitForFence();\r\n      const data = this.glContext.readTexture(\r\n          td.texture,
td.width, td.height, dataSize, this.toEncoderType(dataType), channels!);\r\n      const tensorData =
this.toTensorData(dataType, data);\r\n      const subscribers = this.pendingRead.get(dataId);\r\n
this.pendingRead.delete(dataId);\r\n      subscribers?.forEach(resolve => resolve(tensorData));\r\n      return
tensorData;\r\n    });\r\n  }\r\n  readUint8TextureAsFloat(td: TextureData): Float32Array {\r\n    return
this.profiler.event('backend', 'TextureManager.readUint8TextureAsFloat', () => {\r\n      const dataSize =
td.shape.reduce((a, b) => a * b);\r\n      const data = this.glContext.readTexture(td.texture, td.width, td.height,
dataSize * 4, 'byte', 4);\r\n      return new Float32Array(data.buffer, data.byteOffset, dataSize);\r\n    });\r\n  }\r\n
releaseTexture(textureData: TextureData, deleteTexture?: boolean): void {\r\n    let key: string|undefined;\r\n    if
(this.config.reuseTextures) {\r\n      key = this.textureLookup.get(textureData.texture);\r\n      if (key) {\r\n        if
(deleteTexture) {\r\n          this.textureLookup.delete(key);\r\n        }\r\n        const inUseTextures =
this.inUseTextures.get(key);\r\n        if (inUseTextures) {\r\n          const index =
inUseTextures.indexOf(textureData.texture);\r\n          if (index !== -1) {\r\n            inUseTextures.splice(index,
1);\r\n            let idleTextures = this.idleTextures.get(key);\r\n            if (!idleTextures) {\r\n              idleTextures =
[];\r\n              this.idleTextures.set(key, idleTextures);\r\n            }\r\n
idleTextures.push(textureData.texture);\r\n          }\r\n        }\r\n      }\r\n    }\r\n\r\n    if (!key || deleteTexture) {\r\n
 Logger.verbose('TextureManager', `Deleting texture of size ${textureData.width}x${textureData.height}`);\r\n
this.glContext.deleteTexture(textureData.texture);\r\n    }\r\n  }\r\n  toTensorData(dataType: Tensor.DataType, data:
Encoder.DataArrayType): Tensor.NumberType {\r\n    switch (dataType) {\r\n      case 'int16':\r\n        return data
instanceof Int16Array ? data : Int16Array.from(data);\r\n      case 'int32':\r\n        return data instanceof Int32Array ?
data : Int32Array.from(data);\r\n      case 'int8':\r\n        return data instanceof Int8Array ? data :
Int8Array.from(data);\r\n      case 'uint16':\r\n        return data instanceof Uint16Array ? data :
Uint16Array.from(data);\r\n      case 'uint32':\r\n        return data instanceof Uint32Array ? data :
Uint32Array.from(data);\r\n      case 'uint8':\r\n      case 'bool':\r\n        return data instanceof Uint8Array ? data :
Uint8Array.from(data);\r\n      case 'float32':\r\n        return data instanceof Float32Array ? data :
Float32Array.from(data);\r\n      case 'float64':\r\n        return data instanceof Float64Array ? data :
Float64Array.from(data);\r\n      default:\r\n        throw new Error(`TensorData type ${dataType} is not
supported`);\r\n    }\r\n  }\r\n  toTextureData(dataType: Tensor.DataType, data: Tensor.NumberType|undefined):
Encoder.DataArrayType|undefined {\r\n    if (!data) {\r\n      return undefined;\r\n    }\r\n    return (data instanceof
Float32Array) ? data : new Float32Array(data);\r\n    /*\r\n    switch (dataType) {\r\n      case 'int16':\r\n      case
'int32':\r\n      case 'uint16':\r\n      case 'uint32':\r\n        return (data.constructor === Uint32Array) ? data as
Uint32Array : new Uint32Array(data);\r\n      case 'int8':\r\n      case 'uint8':\r\n      case 'bool':\r\n        return
(data.constructor === Uint8Array) ? data as Uint8Array : new Uint8Array(data);\r\n      case 'float32':\r\n      case
```

'float64':\r\n   return (data.constructor === Float32Array) ? data as Float32Array : new Float32Array(data);\r\n   default:\r\n   throw new Error(`TensorData type ${dataType} is not supported`);\r\n   }\r\n   */\r\n }\r\n toEncoderType(_dataType: Tensor.DataType): Encoder.DataType {\r\n   return 'float';\r\n   // switch (dataType) {\r\n   //   case 'int16':\r\n   //   case 'int32':\r\n   //   case 'uint16':\r\n   //   case 'uint32':\r\n   //   return 'int';\r\n   //   case 'uint8':\r\n   //   case 'bool':\r\n   //   return 'byte';\r\n   //   case 'float32':\r\n   //   case 'float64':\r\n   //   return 'float';\r\n   //   default:\r\n   //   throw new Error(`TensorData type ${dataType} is not supported`);\r\n   // }\r\n }\r\n clearActiveTextures(): void {\r\n   this.glContext.clearActiveTextures();\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../tensor';\r\n\r\n/**\r\n * Layout info is used for mapping n-dimensional array to 2D textures\r\n * The layout is created by the TextureLayoutStrategy based on\r\n * the Tensor's dimensions and strides\r\n */\r\nexport interface TextureLayout {\r\n width: number;\r\n height: number;\r\n /**\r\n   * specify the number of value that encoded in a single pixel\r\n   */\r\n channels: 1|2|3|4;\r\n /**\r\n   * whether in packed mode or not\r\n   */\r\n isPacked?: boolean;\r\n /**\r\n   * the normalized shape\r\n   */\r\n shape: readonly number[];\r\n /**\r\n   * the stride of each dimensions, calculated according to shape\r\n   */\r\n strides: readonly number[];\r\n /**\r\n   * the original shape(dims) of the corresponding tensor\r\n   */\r\n unpackedShape: readonly number[];\r\n\r\n reversedWH?: boolean;\r\n}\r\nexport interface TextureData extends TextureLayout {\r\n tensor: Tensor;\r\n texture: WebGLTexture;\r\n}\r\n\r\nexport enum TextureType {\r\n unpacked,   // <-- normal unpacked texture\r\n unpackedReversed,   // <-- unpacked texture used in old ONNX.js implementation (deprecated)\r\n packed,   // <-- normal packed texture\r\n downloadUint8AsFloat, // <-- ONLY used in texture downloading for iOS devices\r\n packedLastDimension   // <-- ONLY used in old ONNX.js Conv implementation for input W (deprecated)\r\n}\r\n\r\nexport interface TensorInfo {\r\n id?: Tensor.Id;\r\n dims: readonly number[];\r\n type: Tensor.DataType;\r\n textureType: TextureType;\r\n}\r\n\r\nexport interface ProgramVariable {\r\n type: 'float'|'int';\r\n name: string;\r\n arrayLength?: number;\r\n data: number|number[];\r\n}\r\n\r\n/**\r\n * A set of metadata of a shader program.\r\n */\r\nexport interface ProgramMetadata {\r\n /**\r\n   * the name of the program. used for debugging and profiling\r\n   */\r\n name: string;\r\n /**\r\n   * texture types for each input\r\n   */\r\n inputTypes: TextureType[];\r\n /**\r\n   * names of each input\r\n   */\r\n inputNames: string[];\r\n /**\r\n   * an optional string as a cache hint in the artifact cache\r\n   */\r\n cacheHint?: string;\r\n}\r\n\r\n/**\r\n * A ProgramInfoLoader allows\r\n */\r\nexport interface ProgramInfoLoader extends ProgramMetadata {\r\n /**\r\n   * a function to get the program info\r\n   */\r\n get(): ProgramInfo;\r\n}\r\n\r\n/**\r\n * A set of data that represent a shader program\r\n */\r\nexport interface ProgramInfo extends ProgramMetadata {\r\n /**\r\n   * information of uniform variables\r\n   */\r\n variables?: ProgramVariable[];\r\n /**\r\n   * tensor info for output\r\n   */\r\n output: TensorInfo;\r\n /**\r\n   * the shader's processing source code\r\n   */\r\n shaderSource: string;\r\n /**\r\n   * whether the shader source contains a customized main function implementation\r\n   */\r\n hasMain?: boolean;\r\n}\r\n\r\nexport interface VariableInfo {\r\n type: 'float'|'int';\r\n name: string;\r\n arrayLength?: number;\r\n}\r\n\r\nexport interface ProgramVariable {\r\n type: 'float'|'int';\r\n name: string;\r\n arrayLength?: number;\r\n data: number|number[];\r\n}\r\n\r\n/**\r\n * Information of uniforms that shader uses\r\n */\r\nexport interface UniformInfo {\r\n type: 'sampler2D'|VariableInfo['type'];\r\n name: string;\r\n arrayLength?: number;\r\n}\r\n\r\nexport interface UniformLocation extends UniformInfo {\r\n location: WebGLUniformLocation;\r\n}\r\n\r\n/**\r\n * Artifact is the result of compilation\r\n * It does not contain input of output data\r\n * However anything that could be run as a \"program\"\r\n */\r\nexport interface Artifact {\r\n programInfo: ProgramInfo;\r\n program: WebGLProgram;\r\n uniformLocations: UniformLocation[];\r\n attribLocations: {position: number; textureCoord: number};\r\n}\r\nexport declare namespace Artifact {\r\n type UniformLocations = Artifact['uniformLocations'];\r\n type AttribLocations = Artifact['attribLocations'];\r\n}\r\n\r\nexport interface UniformData {\r\n [name: string]: number|number[];\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {assert} from '../../util';\r\n/**\r\n * Given a non RGBA shape calculate the R version\r\n * It is assumed that the dimensions are multiples of given channels\r\n * NOTE: it is always the last dim that gets packed.\r\n * @param unpackedShape original shape to create a packed version from\r\n */\r\nexport function

```
getPackedShape(unpackedShape: readonly number[]): readonly number[] {\r\n  const len =
unpackedShape.length;\r\n  return unpackedShape.slice(0, len - 1).concat(unpackedShape[len - 1] /
4);\r\n}\r\n\r\nexport async function repeatedTry(\r\n    checkFn: () => boolean, delayFn = (_counter: number) => 0,
maxCounter?: number): Promise<void> {\r\n  return new Promise<void>((resolve, reject) => {\r\n    let tryCount =
0;\r\n\r\n    const tryFn = () => {\r\n      if (checkFn()) {\r\n        resolve();\r\n        return;\r\n      }\r\n\r\n
tryCount++;\r\n\r\n      const nextBackoff = delayFn(tryCount);\r\n\r\n      if (maxCounter != null && tryCount >=
maxCounter) {\r\n        reject();\r\n        return;\r\n      }\r\n      setTimeout(tryFn, nextBackoff);\r\n    };\r\n\r\n
tryFn();\r\n  });\r\n}\r\n\r\n/**\r\n * Generates the function name from an input sampler name.\r\n * @param
samplerName Name of the sampler.\r\n */\r\nexport function
generateShaderFuncNameFromInputSamplerName(samplerName: string): string {\r\n  assert(typeof samplerName
!== 'undefined' && samplerName.length !== 0, () => 'empty string found for sampler name');\r\n  return 'get' +
samplerName.charAt(0).toUpperCase() + samplerName.slice(1);\r\n}\r\n\r\n/**\r\n * Generates the function name
from an input sampler name at output coordinates.\r\n * @param samplerName Name of the sampler.\r\n
*/\r\nexport function generateShaderFuncNameFromInputSamplerNameAtOutCoords(samplerName: string): string
{\r\n  assert(typeof samplerName !== 'undefined' && samplerName.length !== 0, () => 'empty string found for
sampler name');\r\n  return 'get' + samplerName.charAt(0).toUpperCase() + samplerName.slice(1) +
'AtOutCoords';\r\n}\r\n\r\n/** Returns a new input shape (a copy) that has a squeezed logical shape. */\r\nexport
function squeezeInputShape(inputShape: readonly number[], squeezedShape: number[]): number[] {\r\n  // Deep
copy.\r\n  let newInputShape: number[] = JSON.parse(JSON.stringify(inputShape));\r\n  newInputShape =
squeezedShape;\r\n  return newInputShape;\r\n}\r\n\r\n/** Returns a list of squeezed parameters for shader functions
*/\r\nexport function getSqueezedParams(params: string[], keptDims: number[]): string {\r\n  return
keptDims.map(d => params[d]).join(', ');\r\n}\r\n\r\n/** Returns the data type for different ranks. */\r\nexport
function getCoordsDataType(rank: number): string {\r\n  if (rank <= 1) {\r\n    return 'int';\r\n  } else if (rank === 2)
{\r\n    return 'ivec2';\r\n  } else if (rank === 3) {\r\n    return 'ivec3';\r\n  } else if (rank === 4) {\r\n    return
'ivec4';\r\n  } else if (rank === 5) {\r\n    return 'ivec5';\r\n  } else if (rank === 6) {\r\n    return 'ivec6';\r\n  } else
{\r\n    throw Error(`GPU for rank ${rank} is not yet supported`);\r\n  }\r\n}\r\n\r\nexport function
getGlChannels(rank = 6): string[] {\r\n  return ['x', 'y', 'z', 'w', 'u', 'v'].slice(0, rank);\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Logger} from
'../../instrument';\r\n\r\nimport {WebGLContext} from './webgl-context';\r\n\r\nconst cache: {[contextId: string]:
WebGLContext} = {};\r\n\r\n/**\r\n * This factory function creates proper WebGLRenderingContext based on\r\n *
the current browsers capabilities\r\n * The order is from higher/most recent versions to most basic\r\n */\r\nexport
function createWebGLContext(contextId?: 'webgl'|'webgl2'): WebGLContext {\r\n  let context:
WebGLContext|undefined;\r\n  if ((!contextId || contextId === 'webgl2') && 'webgl2' in cache) {\r\n    context =
cache.webgl2;\r\n  } else if ((!contextId || contextId === 'webgl') && 'webgl' in cache) {\r\n    context =
cache.webgl;\r\n  }\r\n\r\n  context = context || createNewWebGLContext(contextId);\r\n  contextId = contextId ||
context.version === 1 ? 'webgl' : 'webgl2';\r\n  const gl = context.gl;\r\n\r\n  cache[contextId] = context;\r\n\r\n  if
(gl.isContextLost()) {\r\n    delete cache[contextId];\r\n    return createWebGLContext(contextId);\r\n  }\r\n\r\n
gl.disable(gl.DEPTH_TEST);\r\n  gl.disable(gl.STENCIL_TEST);\r\n  gl.disable(gl.BLEND);\r\n
gl.disable(gl.DITHER);\r\n  gl.disable(gl.POLYGON_OFFSET_FILL);\r\n
gl.disable(gl.SAMPLE_COVERAGE);\r\n  gl.enable(gl.SCISSOR_TEST);\r\n  gl.enable(gl.CULL_FACE);\r\n
gl.cullFace(gl.BACK);\r\n\r\n  return context;\r\n}\r\n\r\nexport function createNewWebGLContext(contextId?:
'webgl'|'webgl2'): WebGLContext {\r\n  const canvas = createCanvas();\r\n  const contextAttributes:
WebGLContextAttributes = {\r\n    alpha: false,\r\n    depth: false,\r\n    antialias: false,\r\n    stencil: false,\r\n
preserveDrawingBuffer: false,\r\n    premultipliedAlpha: false,\r\n    failIfMajorPerformanceCaveat: false\r\n  };\r\n
let gl: WebGLRenderingContext|null;\r\n  const ca = contextAttributes;\r\n  if (!contextId || contextId === 'webgl2')
{\r\n    gl = canvas.getContext('webgl2', ca);\r\n    if (gl) {\r\n      try {\r\n        return new WebGLContext(gl, 2);\r\n
    } catch (err) {\r\n        Logger.warning('GlContextFactory', `failed to create WebGLContext using contextId
'webgl2'. Error: ${err}`);\r\n      }\r\n    }\r\n  }\r\n  if (!contextId || contextId === 'webgl') {\r\n    gl =
```

canvas.getContext('webgl', ca) || canvas.getContext('experimental-webgl', ca) as WebGLRenderingContext;\r\n if (gl) {\r\n try {\r\n return new WebGLContext(gl, 1);\r\n } catch (err) {\r\n Logger.warning(\r\n 'GlContextFactory',\r\n `failed to create WebGLContext using contextId 'webgl' or 'experimental-webgl'. Error: ${err}`);\r\n }\r\n }\r\n }\r\n\r\n throw new Error('WebGL is not supported');\r\n}\r\n\r\nfunction createCanvas(): HTMLCanvasElement {\r\n const canvas: HTMLCanvasElement = document.createElement('canvas');\r\n canvas.width = 1;\r\n canvas.height = 1;\r\n return canvas;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env} from 'onnxruntime-common';\r\n\r\nimport * as DataEncoders from './texture-data-encoder';\r\nimport {DataEncoder, Encoder} from './texture-data-encoder';\r\nimport {repeatedTry} from './utils';\r\n\r\nexport interface FenceContext {\r\n query: WebGLSync|null;\r\n isFencePassed(): boolean;\r\n}\r\n\r\ntype PollItem = {\r\n isDoneFn: () => boolean; resolveFn: () => void;\r\n};\r\n\r\nexport function linearSearchLastTrue(arr: Array<() => boolean>): number {\r\n let i = 0;\r\n for (; i < arr.length; ++i) {\r\n const isDone = arr[i]();\r\n if (!isDone) {\r\n break;\r\n }\r\n }\r\n return i - 1;\r\n}\r\n\r\n/**\r\n * Abstraction and wrapper around WebGLRenderingContext and its operations\r\n */\r\nexport class WebGLContext {\r\n gl: WebGLRenderingContext;\r\n version: 1|2;\r\n\r\n private vertexbuffer: WebGLBuffer;\r\n private framebuffer: WebGLFramebuffer;\r\n\r\n // WebGL flags and vital parameters\r\n private isFloatTextureAttachableToFrameBuffer: boolean;\r\n isFloat32DownloadSupported: boolean;\r\n isRenderFloat32Supported: boolean;\r\n isBlendSupported: boolean;\r\n maxTextureSize: number;\r\n // private maxCombinedTextureImageUnits: number;\r\n private maxTextureImageUnits: number;\r\n // private maxCubeMapTextureSize: number;\r\n // private shadingLanguageVersion: string;\r\n // private webglVendor: string;\r\n // private webglVersion: string;\r\n\r\n // WebGL2 flags and vital parameters\r\n // private max3DTextureSize: number;\r\n // private maxArrayTextureLayers: number;\r\n // private maxColorAttachments: number;\r\n // private maxDrawBuffers: number;\r\n\r\n // WebGL extensions\r\n // eslint-disable-next-line camelcase\r\n textureFloatExtension: OES_texture_float|null;\r\n // eslint-disable-next-line camelcase\r\n textureHalfFloatExtension: OES_texture_half_float|null;\r\n\r\n // WebGL2 extensions\r\n colorBufferFloatExtension: unknown|null;\r\n // eslint-disable-next-line @typescript-eslint/naming-convention\r\n disjointTimerQueryWebgl2Extension: {TIME_ELAPSED_EXT: GLenum; GPU_DISJOINT_EXT: GLenum}|null;\r\n\r\n private disposed: boolean;\r\n private frameBufferBound = false;\r\n\r\n constructor(gl: WebGLRenderingContext, version: 1|2) {\r\n this.gl = gl;\r\n this.version = version;\r\n\r\n this.getExtensions();\r\n this.vertexbuffer = this.createVertexbuffer();\r\n this.framebuffer = this.createFramebuffer();\r\n this.queryVitalParameters();\r\n }\r\n\r\n allocateTexture(width: number, height: number, encoder: DataEncoder, data?: Encoder.DataArrayType): WebGLTexture {\r\n const gl = this.gl;\r\n // create the texture\r\n const texture = gl.createTexture();\r\n // bind the texture so the following methods effect this texture.\r\n gl.bindTexture(gl.TEXTURE_2D, texture);\r\n gl.texParameteri(gl.TEXTURE_2D, gl.TEXTURE_MIN_FILTER, gl.NEAREST);\r\n gl.texParameteri(gl.TEXTURE_2D, gl.TEXTURE_MAG_FILTER, gl.NEAREST);\r\n gl.texParameteri(gl.TEXTURE_2D, gl.TEXTURE_WRAP_S, gl.CLAMP_TO_EDGE);\r\n gl.texParameteri(gl.TEXTURE_2D, gl.TEXTURE_WRAP_T, gl.CLAMP_TO_EDGE);\r\n const buffer = data ? encoder.encode(data, width * height) : null;\r\n gl.texImage2D(\r\n gl.TEXTURE_2D,\r\n 0, // Level of detail.\r\n encoder.internalFormat, width, height,\r\n 0, // Always 0 in OpenGL ES.\r\n encoder.format, encoder.textureType, buffer);\r\n this.checkError();\r\n return texture as WebGLTexture;\r\n }\r\n updateTexture(\r\n texture: WebGLTexture, width: number, height: number, encoder: DataEncoder, data: Encoder.DataArrayType): void {\r\n const gl = this.gl;\r\n gl.bindTexture(gl.TEXTURE_2D, texture);\r\n const buffer = encoder.encode(data, width * height);\r\n gl.texSubImage2D(\r\n gl.TEXTURE_2D,\r\n 0, // level\r\n 0, // xoffset\r\n 0, // yoffset\r\n width, height, encoder.format, encoder.textureType, buffer);\r\n this.checkError();\r\n }\r\n attachFramebuffer(texture: WebGLTexture, width: number, height: number): void {\r\n const gl = this.gl;\r\n // Make it the target for framebuffer operations - including rendering.\r\n gl.bindTexture(gl.TEXTURE_2D, texture);\r\n gl.bindFramebuffer(gl.FRAMEBUFFER, this.framebuffer);\r\n gl.framebufferTexture2D(\r\n

```
gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0, gl.TEXTURE_2D, texture,\r\n        0);  // 0, we aren't using
MIPMAPs\r\n    this.checkError();\r\n    gl.viewport(0, 0, width, height);\r\n    gl.scissor(0, 0, width, height);\r\n
}\r\n  readTexture(\r\n      texture: WebGLTexture, width: number, height: number, dataSize: number, dataType:
Encoder.DataType,\r\n      channels: number): Encoder.DataArrayType {\r\n    const gl = this.gl;\r\n    if (!channels)
{\r\n      channels = 1;\r\n    }\r\n    if (!this.frameBufferBound) {\r\n      this.attachFramebuffer(texture, width,
height);\r\n    }\r\n    const encoder = this.getEncoder(dataType, channels);\r\n    const buffer =
encoder.allocate(width * height);\r\n    // bind texture to framebuffer\r\n    gl.bindTexture(gl.TEXTURE_2D,
texture);\r\n    gl.framebufferTexture2D(\r\n        gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0,
gl.TEXTURE_2D, texture,\r\n        0);  // 0, we aren't using MIPMAPs\r\n    // TODO: Check if framebuffer is
ready\r\n    gl.readPixels(0, 0, width, height, gl.RGBA, encoder.textureType, buffer);\r\n    this.checkError();\r\n    //
unbind FB\r\n    return encoder.decode(buffer, dataSize);\r\n  }\r\n\r\n  isFramebufferReady(): boolean {\r\n    //
TODO: Implement logic to check if the framebuffer is ready\r\n    return true;\r\n  }\r\n  getActiveTexture(): string
{\r\n    const gl = this.gl;\r\n    const n = gl.getParameter(this.gl.ACTIVE_TEXTURE);\r\n    return `TEXTURE${(n
- gl.TEXTURE0)}`;\r\n  }\r\n  getTextureBinding(): WebGLTexture {\r\n    return
this.gl.getParameter(this.gl.TEXTURE_BINDING_2D);\r\n  }\r\n  getFramebufferBinding(): WebGLFramebuffer
{\r\n    return this.gl.getParameter(this.gl.FRAMEBUFFER_BINDING);\r\n  }\r\n
setVertexAttributes(positionHandle: number, textureCoordHandle: number): void {\r\n    const gl = this.gl;\r\n
gl.vertexAttribPointer(positionHandle, 3, gl.FLOAT, false, 20, 0);\r\n
gl.enableVertexAttribArray(positionHandle);\r\n    if (textureCoordHandle !== -1) {\r\n
gl.vertexAttribPointer(textureCoordHandle, 2, gl.FLOAT, false, 20, 12);\r\n
gl.enableVertexAttribArray(textureCoordHandle);\r\n    }\r\n    this.checkError();\r\n  }\r\n  createProgram(\r\n
vertexShader: WebGLShader,\r\n      fragShader: WebGLShader,\r\n      ): WebGLProgram {\r\n    const gl =
this.gl;\r\n    const program = gl.createProgram()!;\r\n\r\n    // the program consists of our shaders\r\n
gl.attachShader(program, vertexShader);\r\n    gl.attachShader(program, fragShader);\r\n
gl.linkProgram(program);\r\n    return program;\r\n  }\r\n  compileShader(shaderSource: string, shaderType:
number): WebGLShader {\r\n    const gl = this.gl;\r\n    const shader = gl.createShader(shaderType);\r\n    if
(!shader) {\r\n      throw new Error(`createShader() returned null with type ${shaderType}`);\r\n    }\r\n\r\n
gl.shaderSource(shader, shaderSource);\r\n    gl.compileShader(shader);\r\n    if (gl.getShaderParameter(shader,
gl.COMPILE_STATUS) === false) {\r\n      throw new Error(`Failed to compile shader:
${gl.getShaderInfoLog(shader)}\r\nShader source:\r\n${shaderSource}`);\r\n    }\r\n    return shader;\r\n  }\r\n
deleteShader(shader: WebGLShader): void {\r\n    this.gl.deleteShader(shader);\r\n  }\r\n
bindTextureToUniform(texture: WebGLTexture, position: number, uniformHandle: WebGLUniformLocation): void
{\r\n    const gl = this.gl;\r\n    gl.activeTexture(gl.TEXTURE0 + position);\r\n    this.checkError();\r\n
gl.bindTexture(gl.TEXTURE_2D, texture);\r\n    this.checkError();\r\n    gl.uniform1i(uniformHandle, position);\r\n
 this.checkError();\r\n  }\r\n  draw(): void {\r\n    this.gl.drawArrays(this.gl.TRIANGLE_STRIP, 0, 4);\r\n
this.checkError();\r\n  }\r\n  checkError(): void {\r\n    if (env.debug) {\r\n      const gl = this.gl;\r\n      const error =
gl.getError();\r\n      let label = '';\r\n      switch (error) {\r\n        case (gl.NO_ERROR):\r\n          return;\r\n        case
(gl.INVALID_ENUM):\r\n          label = 'INVALID_ENUM';\r\n          break;\r\n        case
(gl.INVALID_VALUE):\r\n          label = 'INVALID_VALUE';\r\n          break;\r\n        case
(gl.INVALID_OPERATION):\r\n          label = 'INVALID_OPERATION';\r\n          break;\r\n        case
(gl.INVALID_FRAMEBUFFER_OPERATION):\r\n          label =
'INVALID_FRAMEBUFFER_OPERATION';\r\n          break;\r\n        case (gl.OUT_OF_MEMORY):\r\n
label = 'OUT_OF_MEMORY';\r\n          break;\r\n        case (gl.CONTEXT_LOST_WEBGL):\r\n          label =
'CONTEXT_LOST_WEBGL';\r\n          break;\r\n        default:\r\n          label = `Unknown WebGL Error:
${error.toString(16)}`;\r\n      }\r\n      throw new Error(label);\r\n    }\r\n  }\r\n  deleteTexture(texture:
WebGLTexture): void {\r\n    this.gl.deleteTexture(texture);\r\n  }\r\n  deleteProgram(program: WebGLProgram):
void {\r\n    this.gl.deleteProgram(program);\r\n  }\r\n  getEncoder(dataType: Encoder.DataType, channels: number,
usage: Encoder.Usage = Encoder.Usage.Default): DataEncoder {\r\n    if (this.version === 2) {\r\n      return new
```

```
DataEncoders.RedFloat32DataEncoder(this.gl as WebGL2RenderingContext, channels);\r\n    }\r\n\r\n    switch
(dataType) {\r\n      case 'float':\r\n        if (usage === Encoder.Usage.UploadOnly || this.isRenderFloat32Supported)
{\r\n          return new DataEncoders.RGBAFloatDataEncoder(this.gl, channels);\r\n        } else {\r\n          return
new DataEncoders.RGBAFloatDataEncoder(\r\n              this.gl, channels,
this.textureHalfFloatExtension!.HALF_FLOAT_OES);\r\n        }\r\n      case 'int':\r\n        throw new Error('not
implemented');\r\n      case 'byte':\r\n        return new DataEncoders.Uint8DataEncoder(this.gl, channels);\r\n
default:\r\n        throw new Error(`Invalid dataType: ${dataType}`);\r\n    }\r\n  }\r\n  clearActiveTextures(): void
{\r\n    const gl = this.gl;\r\n    for (let unit = 0; unit < this.maxTextureImageUnits; ++unit) {\r\n
gl.activeTexture(gl.TEXTURE0 + unit);\r\n      gl.bindTexture(gl.TEXTURE_2D, null);\r\n    }\r\n  }\r\n  dispose():
void {\r\n    if (this.disposed) {\r\n      return;\r\n    }\r\n    const gl = this.gl;\r\n
gl.bindFramebuffer(gl.FRAMEBUFFER, null);\r\n    gl.deleteFramebuffer(this.framebuffer);\r\n
gl.bindBuffer(gl.ARRAY_BUFFER, null);\r\n    gl.deleteBuffer(this.vertexbuffer);\r\n
gl.bindBuffer(gl.ELEMENT_ARRAY_BUFFER, null);\r\n    gl.finish();\r\n    this.disposed = true;\r\n  }\r\n\r\n
private createDefaultGeometry(): Float32Array {\r\n    // Sets of x,y,z(=0),s,t coordinates.\r\n    return new
Float32Array([\r\n      -1.0, 1.0,  0.0, 0.0, 1.0,  // upper left\r\n      -1.0, -1.0, 0.0, 0.0, 0.0,  // lower left\r\n      1.0,
1.0,  0.0, 1.0, 1.0,  // upper right\r\n      1.0,  -1.0, 0.0, 1.0, 0.0   // lower right\r\n    ]);\r\n  }\r\n  private
createVertexbuffer(): WebGLBuffer {\r\n    const gl = this.gl;\r\n    const buffer = gl.createBuffer();\r\n    if (!buffer)
{\r\n      throw new Error('createBuffer() returned null');\r\n    }\r\n    const geometry =
this.createDefaultGeometry();\r\n    gl.bindBuffer(gl.ARRAY_BUFFER, buffer);\r\n
gl.bufferData(gl.ARRAY_BUFFER, geometry, gl.STATIC_DRAW);\r\n    this.checkError();\r\n    return buffer;\r\n
}\r\n  private createFramebuffer(): WebGLFramebuffer {\r\n    const fb = this.gl.createFramebuffer();\r\n    if (!fb)
{\r\n      throw new Error('createFramebuffer returned null');\r\n    }\r\n    return fb;\r\n  }\r\n\r\n  private
queryVitalParameters(): void {\r\n    const gl = this.gl;\r\n\r\n    this.isFloatTextureAttachableToFrameBuffer =
this.checkFloatTextureAttachableToFrameBuffer();\r\n    this.isRenderFloat32Supported =
this.checkRenderFloat32();\r\n    this.isFloat32DownloadSupported = this.checkFloat32Download();\r\n\r\n    if
(this.version === 1 && !this.textureHalfFloatExtension && !this.isRenderFloat32Supported) {\r\n      throw new
Error('both float32 and float16 TextureType are not supported');\r\n    }\r\n\r\n    this.isBlendSupported =
!this.isRenderFloat32Supported || this.checkFloat32Blend();\r\n\r\n    // this.maxCombinedTextureImageUnits =
gl.getParameter(gl.MAX_COMBINED_TEXTURE_IMAGE_UNITS);\r\n    this.maxTextureSize =
gl.getParameter(gl.MAX_TEXTURE_SIZE);\r\n    this.maxTextureImageUnits =
gl.getParameter(gl.MAX_TEXTURE_IMAGE_UNITS);\r\n    // this.maxCubeMapTextureSize =
gl.getParameter(gl.MAX_CUBE_MAP_TEXTURE_SIZE);\r\n    // this.shadingLanguageVersion =
gl.getParameter(gl.SHADING_LANGUAGE_VERSION);\r\n    // this.webglVendor =
gl.getParameter(gl.VENDOR);\r\n    // this.webglVersion = gl.getParameter(gl.VERSION);\r\n\r\n    if (this.version
=== 2) {\r\n      // this.max3DTextureSize =
gl.getParameter(WebGL2RenderingContext.MAX_3D_TEXTURE_SIZE);\r\n      // this.maxArrayTextureLayers =
gl.getParameter(WebGL2RenderingContext.MAX_ARRAY_TEXTURE_LAYERS);\r\n      //
this.maxColorAttachments = gl.getParameter(WebGL2RenderingContext.MAX_COLOR_ATTACHMENTS);\r\n
 // this.maxDrawBuffers = gl.getParameter(WebGL2RenderingContext.MAX_DRAW_BUFFERS);\r\n    }\r\n  }\r\n
private getExtensions(): void {\r\n    if (this.version === 2) {\r\n      this.colorBufferFloatExtension =
this.gl.getExtension('EXT_color_buffer_float');\r\n      this.disjointTimerQueryWebgl2Extension =
this.gl.getExtension('EXT_disjoint_timer_query_webgl2');\r\n    } else {\r\n      this.textureFloatExtension =
this.gl.getExtension('OES_texture_float');\r\n      this.textureHalfFloatExtension =
this.gl.getExtension('OES_texture_half_float');\r\n    }\r\n  }\r\n\r\n  private
checkFloatTextureAttachableToFrameBuffer(): boolean {\r\n    // test whether Float32 texture is supported:\r\n    //
STEP.1 create a float texture\r\n    const gl = this.gl;\r\n    const texture = gl.createTexture();\r\n
gl.bindTexture(gl.TEXTURE_2D, texture);\r\n    // eslint-disable-next-line @typescript-eslint/naming-
convention\r\n    const internalFormat = this.version === 2 ? (gl as unknown as {RGBA32F: number}).RGBA32F :
```

gl.RGBA;\r\n   gl.texImage2D(gl.TEXTURE_2D, 0, internalFormat, 1, 1, 0, gl.RGBA, gl.FLOAT, null);\r\n   // STEP.2 bind a frame buffer\r\n   const frameBuffer = gl.createFramebuffer();\r\n   gl.bindFramebuffer(gl.FRAMEBUFFER, frameBuffer);\r\n   // STEP.3 attach texture to framebuffer\r\n   gl.framebufferTexture2D(gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0, gl.TEXTURE_2D, texture, 0);\r\n   // STEP.4 test whether framebuffer is complete\r\n   const isComplete = gl.checkFramebufferStatus(gl.FRAMEBUFFER) === gl.FRAMEBUFFER_COMPLETE;\r\n   gl.bindTexture(gl.TEXTURE_2D, null);\r\n   gl.bindFramebuffer(gl.FRAMEBUFFER, null);\r\n   gl.deleteTexture(texture);\r\n   gl.deleteFramebuffer(frameBuffer);\r\n   return isComplete;\r\n }\r\n\r\n private checkRenderFloat32(): boolean {\r\n   if (this.version === 2) {\r\n   if (!this.colorBufferFloatExtension) {\r\n   return false;\r\n   }\r\n   } else {\r\n   if (!this.textureFloatExtension) {\r\n   return false;\r\n   }\r\n   }\r\n   return this.isFloatTextureAttachableToFrameBuffer;\r\n }\r\n\r\n private checkFloat32Download(): boolean {\r\n   if (this.version === 2) {\r\n   if (!this.colorBufferFloatExtension) {\r\n   return false;\r\n   }\r\n   } else {\r\n   if (!this.textureFloatExtension) {\r\n   return false;\r\n   }\r\n   if (!this.gl.getExtension('WEBGL_color_buffer_float')) {\r\n   return false;\r\n   }\r\n   }\r\n   return this.isFloatTextureAttachableToFrameBuffer;\r\n }\r\n\r\n /**\r\n   * Check whether GL_BLEND is supported\r\n   */\r\n private checkFloat32Blend(): boolean {\r\n   // it looks like currently (2019-05-08) there is no easy way to detect whether BLEND is supported\r\n   // https://github.com/microsoft/onnxjs/issues/145\r\n\r\n   const gl = this.gl;\r\n\r\n   let texture: WebGLTexture|null|undefined;\r\n   let frameBuffer: WebGLFramebuffer|null|undefined;\r\n   let vertexShader: WebGLShader|null|undefined;\r\n   let fragmentShader: WebGLShader|null|undefined;\r\n   let program: WebGLProgram|null|undefined;\r\n\r\n   try {\r\n   texture = gl.createTexture();\r\n   frameBuffer = gl.createFramebuffer();\r\n   gl.bindTexture(gl.TEXTURE_2D, texture);\r\n\r\n   // eslint-disable-next-line @typescript-eslint/naming-convention\r\n   const internalFormat = this.version === 2 ? (gl as unknown as {RGBA32F: number}).RGBA32F : gl.RGBA;\r\n   gl.texImage2D(gl.TEXTURE_2D, 0, internalFormat, 1, 1, 0, gl.RGBA, gl.FLOAT, null);\r\n\r\n   gl.bindFramebuffer(gl.FRAMEBUFFER, frameBuffer);\r\n   gl.framebufferTexture2D(gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0, gl.TEXTURE_2D, texture, 0);\r\n\r\n   gl.enable(gl.BLEND);\r\n\r\n   vertexShader = gl.createShader(gl.VERTEX_SHADER);\r\n   if (!vertexShader) {\r\n   return false;\r\n   }\r\n   gl.shaderSource(vertexShader, 'void main(){}');\r\n   gl.compileShader(vertexShader);\r\n\r\n   fragmentShader = gl.createShader(gl.FRAGMENT_SHADER);\r\n   if (!fragmentShader) {\r\n   return false;\r\n   }\r\n   gl.shaderSource(fragmentShader, 'precision highp float;void main(){gl_FragColor=vec4(0.5);}');\r\n   gl.compileShader(fragmentShader);\r\n\r\n   program = gl.createProgram();\r\n   if (!program) {\r\n   return false;\r\n   }\r\n   gl.attachShader(program, vertexShader);\r\n   gl.attachShader(program, fragmentShader);\r\n   gl.linkProgram(program);\r\n   gl.useProgram(program);\r\n\r\n   gl.drawArrays(gl.POINTS, 0, 1);\r\n   return gl.getError() === gl.NO_ERROR;\r\n\r\n   } finally {\r\n   gl.disable(gl.BLEND);\r\n\r\n   if (program) {\r\n   gl.deleteProgram(program);\r\n   }\r\n   if (vertexShader) {\r\n   gl.deleteShader(vertexShader);\r\n   }\r\n   if (fragmentShader) {\r\n   gl.deleteShader(fragmentShader);\r\n   }\r\n   if (frameBuffer) {\r\n   gl.bindFramebuffer(gl.FRAMEBUFFER, null);\r\n   gl.deleteFramebuffer(frameBuffer);\r\n   }\r\n   if (texture) {\r\n   gl.bindTexture(gl.TEXTURE_2D, null);\r\n   gl.deleteTexture(texture);\r\n   }\r\n   }\r\n }\r\n\r\n beginTimer(): WebGLQuery {\r\n   if (this.version === 2 && this.disjointTimerQueryWebgl2Extension) {\r\n   const gl2 = this.gl as WebGL2RenderingContext;\r\n   const ext = this.disjointTimerQueryWebgl2Extension;\r\n\r\n   const query = gl2.createQuery() as WebGLQuery;\r\n   gl2.beginQuery(ext.TIME_ELAPSED_EXT, query);\r\n   return query;\r\n   } else {\r\n   // TODO: add webgl 1 handling.\r\n   throw new Error('WebGL1 profiling currently not supported.');\r\n   }\r\n }\r\n\r\n endTimer() {\r\n   if (this.version === 2 && this.disjointTimerQueryWebgl2Extension) {\r\n   const gl2 = this.gl as WebGL2RenderingContext;\r\n   const ext = this.disjointTimerQueryWebgl2Extension;\r\n   gl2.endQuery(ext.TIME_ELAPSED_EXT);\r\n   return;\r\n   } else {\r\n   // TODO: add webgl 1 handling.\r\n   throw new Error('WebGL1 profiling currently not supported');\r\n   }\r\n }\r\n\r\n isTimerResultAvailable(query:

```
WebGLQuery): boolean {\r\n    let available = false, disjoint = false;\r\n    if (this.version === 2 &&
this.disjointTimerQueryWebgl2Extension) {\r\n      const gl2 = this.gl as WebGL2RenderingContext;\r\n      const
ext = this.disjointTimerQueryWebgl2Extension;\r\n\r\n      available = gl2.getQueryParameter(query,
gl2.QUERY_RESULT_AVAILABLE);\r\n      disjoint = gl2.getParameter(ext.GPU_DISJOINT_EXT);\r\n    } else
{\r\n      // TODO: add webgl 1 handling.\r\n      throw new Error('WebGL1 profiling currently not supported');\r\n
}\r\n\r\n    return available && !disjoint;\r\n  }\r\n\r\n  getTimerResult(query: WebGLQuery): number {\r\n    let
timeElapsed = 0;\r\n    if (this.version === 2) {\r\n      const gl2 = this.gl as WebGL2RenderingContext;\r\n
timeElapsed = gl2.getQueryParameter(query, gl2.QUERY_RESULT);\r\n      gl2.deleteQuery(query);\r\n    } else
{\r\n      // TODO: add webgl 1 handling.\r\n      throw new Error('WebGL1 profiling currently not supported');\r\n
}\r\n    // return miliseconds\r\n    return timeElapsed / 1000000;\r\n  }\r\n\r\n  async
waitForQueryAndGetTime(query: WebGLQuery): Promise<number> {\r\n    await repeatedTry(() =>
this.isTimerResultAvailable(query));\r\n    return this.getTimerResult(query);\r\n  }\r\n\r\n  public async
createAndWaitForFence(): Promise<void> {\r\n    const fenceContext = this.createFence(this.gl);\r\n    return
this.pollFence(fenceContext);\r\n  }\r\n\r\n  private createFence(gl: WebGLRenderingContext): FenceContext {\r\n
let isFencePassed: () => boolean;\r\n    const gl2 = gl as WebGL2RenderingContext;\r\n    const query =
gl2.fenceSync(gl2.SYNC_GPU_COMMANDS_COMPLETE, 0);\r\n    gl.flush();\r\n    if (query === null) {\r\n
isFencePassed = () => true;\r\n    } else {\r\n      isFencePassed = () => {\r\n        const status =
gl2.clientWaitSync(query, 0, 0);\r\n        return status === gl2.ALREADY_SIGNALED || status ===
gl2.CONDITION_SATISFIED;\r\n      };\r\n    }\r\n    return {query, isFencePassed};\r\n  }\r\n\r\n  async
pollFence(fenceContext: FenceContext) {\r\n    return new Promise<void>(resolve => {\r\n      void
this.addItemToPoll(() => fenceContext.isFencePassed(), () => resolve());\r\n    });\r\n  }\r\n\r\n  private itemsToPoll:
PollItem[] = [];\r\n\r\n  pollItems(): void {\r\n    // Find the last query that has finished.\r\n    const index =
linearSearchLastTrue(this.itemsToPoll.map(x => x.isDoneFn));\r\n    for (let i = 0; i <= index; ++i) {\r\n      const
{resolveFn} = this.itemsToPoll[i];\r\n      resolveFn();\r\n    }\r\n    this.itemsToPoll = this.itemsToPoll.slice(index +
1);\r\n  }\r\n\r\n  private async addItemToPoll(isDoneFn: () => boolean, resolveFn: () => void) {\r\n
this.itemsToPoll.push({isDoneFn, resolveFn});\r\n    if (this.itemsToPoll.length > 1) {\r\n      // We already have a
running loop that polls.\r\n      return;\r\n    }\r\n    // Start a new loop that polls.\r\n    await repeatedTry(() => {\r\n
 this.pollItems();\r\n      // End the loop if no more items to poll.\r\n      return this.itemsToPoll.length === 0;\r\n
});\r\n  }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {SessionHandler} from './backend';\r\nimport {Graph} from './graph';\r\nimport {Logger,
Profiler} from './instrument';\r\nimport {Operator} from './operators';\r\nimport {Tensor} from './tensor';\r\n\r\nclass
KernelOp {\r\n  constructor(public op: Operator, public node: Graph.Node) {}\r\n}\r\n\r\nexport class
ExecutionPlan {\r\n  constructor(private graph: Graph, ops: Operator[], private profiler: Readonly<Profiler>) {\r\n
this.initialize(ops);\r\n  }\r\n\r\n  initialize(ops: Operator[]) {\r\n    this.profiler.event('session',
'ExecutionPlan.initialize', () => {\r\n      const graphNodes = this.graph.getNodes();\r\n      if (graphNodes.length !==
ops.length) {\r\n        throw new Error('The size of nodes and OPs do not match.');\r\n      }\r\n\r\n      this._ops =
ops.map((op, i) => new KernelOp(op, graphNodes[i]));\r\n      this.reset();\r\n\r\n      // look for starter node(s)\r\n
this._starter = [];\r\n      this._ops.forEach((op, i) => {\r\n        let resolved = true;\r\n        for (const input of
op.node.inputs) {\r\n          if (\r\n              !this._values[input]                           // not an initialized input\r\n
    && this.graph.getInputIndices().indexOf(input) === -1  // not model input\r\n          ) {\r\n            resolved =
false;\r\n            break;\r\n          }\r\n        }\r\n        if (resolved) {\r\n          this._starter.push(i);\r\n        }\r\n
});\r\n    });\r\n  }\r\n\r\n  reset() {\r\n    this._values = this.graph.getValues().map(i => i.tensor);\r\n  }\r\n\r\n  async
execute(sessionHandler: SessionHandler, modelInputs: Tensor[]): Promise<Tensor[]> {\r\n    return
this.profiler.event('session', 'ExecutionPlan.execute', async () => {\r\n      // reset mediem result\r\n
this.reset();\r\n\r\n      // create inference handler\r\n      const inferenceHandler =
sessionHandler.createInferenceHandler();\r\n\r\n      // populate inputs value\r\n      const graphInputs =
this.graph.getInputIndices();\r\n      if (modelInputs.length !== graphInputs.length) {\r\n        throw new
Error(`number of input tensors don't match the number of inputs to the model: actual: ${\r\n
```

modelInputs.length} expected: ${graphInputs.length}`);\r\n   }\r\n\r\n   modelInputs.forEach((input, i) => {\r\n   const index = graphInputs[i];\r\n   this._values[index] = input;\r\n   });\r\n\r\n   // prepare running sequence\r\n   const sequence: number[] = this._starter.slice(0);\r\n\r\n   // execution iterations\r\n   const graphValues = this.graph.getValues();\r\n   const graphNodes = this.graph.getNodes();\r\n\r\n   let rear = 0;\r\n   while (rear < sequence.length) {\r\n   const thisOpIndex = sequence[rear++];\r\n   const thisOp = this._ops[thisOpIndex];\r\n\r\n   // check input\r\n   const inputList = thisOp.node.inputs.map(i => this._values[i]);\r\n   if (inputList.indexOf(undefined) !== -1) {\r\n   throw new Error(`unresolved input detected: op: ${thisOp.node}`);\r\n   }\r\n\r\n   // run\r\n   const inputTensors = inputList as Tensor[];\r\n   Logger.verbose(\r\n   'ExecPlan',\r\n   `Runing op:${thisOp.node.name} (${\r\n                inputTensors.map((t, i) => `'${thisOp.node.inputs[i]}': ${t.type}[${t.dims.join(',')}]`).join(', ')})`);\r\n\r\n   const outputList = await this.profiler.event(\r\n   'node', thisOp.node.name, async () => thisOp.op.impl(inferenceHandler, inputTensors, thisOp.op.context));\r\n\r\n   // check output\r\n   if (outputList.length !== thisOp.node.outputs.length) {\r\n   throw new Error('the size of output does not match model definition.');\r\n   }\r\n\r\n   // fill value\r\n   outputList.forEach((output, i) => {\r\n   const j = thisOp.node.outputs[i];\r\n   if (this._values[j]) {\r\n   throw new Error(`output [${j}] already has value: op:${thisOp.node.name}`);\r\n   }\r\n   this._values[j] = output;\r\n   });\r\n\r\n   // resolve downstream nodes\r\n   const downstreamNodes = new Set<number>();\r\n   outputList.forEach((output, i) => {\r\n   const j = thisOp.node.outputs[i];\r\n   for (const currentDownstreamNodeIndex of graphValues[j].to) {\r\n   const currentDownstreamNode = graphNodes[currentDownstreamNodeIndex];\r\n   let resolved = true;\r\n   for (const k of currentDownstreamNode.inputs) {\r\n   if (!this._values[k]) {\r\n   resolved = false;\r\n   break;\r\n   }\r\n   }\r\n   if (resolved) {\r\n   downstreamNodes.add(currentDownstreamNodeIndex);\r\n   }\r\n   }\r\n   });\r\n   sequence.push(...downstreamNodes);\r\n   }\r\n\r\n   const output: Tensor[] = [];\r\n   for (let i = 0; i < this.graph.getOutputIndices().length; i++) {\r\n   const outputIndex = this.graph.getOutputIndices()[i];\r\n   const outputTensor = this._values[outputIndex];\r\n   if (outputTensor === undefined) {\r\n   throw new Error(`required output [${outputIndex}] does not have value`);\r\n   }\r\n   if (outputIndex === 0) {\r\n   await outputTensor.getData();\r\n   } else {\r\n   // eslint-disable-next-line no-unused-expressions\r\n   outputTensor.data;\r\n   }\r\n   output.push(outputTensor);\r\n   }\r\n   Logger.verbose('ExecPlan', 'disposing of inferenceHandler');\r\n   inferenceHandler.dispose();\r\n   return output;\r\n   });\r\n }\r\n\r\n _values: Array<Tensor|undefined>;\r\n _ops: KernelOp[];\r\n _starter: number[];\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {onnx} from 'onnx-proto';\r\n\r\nimport {Attribute} from './attribute';\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\nimport {Tensor} from './tensor';\r\nimport {LongUtil, ProtoUtil} from './util';\r\n\r\nexport declare namespace Graph {\r\n export interface Shape {\r\n   readonly dims: readonly number[];\r\n }\r\n export interface ValueType {\r\n   readonly tensorType: Tensor.DataType;\r\n   readonly shape: Shape;\r\n }\r\n export interface Value {\r\n   // the tensor data. empty for non-initialized inputs\r\n   readonly tensor?: Tensor;\r\n\r\n   // index to the Node where the value comes from. -1 for initializer.\r\n   readonly from: number;\r\n\r\n   // indices to the Nodes where the values go to.\r\n   readonly to: readonly number[];\r\n\r\n   // value type specification. empty for non-input values.\r\n   readonly type?: ValueType;\r\n }\r\n export interface Node {\r\n   // name of the node\r\n   readonly name: string;\r\n\r\n   // the operator type\r\n   readonly opType: string;\r\n\r\n   // indices to the Values where the inputs come from.\r\n   readonly inputs: readonly number[];\r\n\r\n   // indices to the Values where the outpus go to.\r\n   readonly outputs: readonly number[];\r\n\r\n   // the attributes that used by the operator\r\n   readonly attributes: Attribute;\r\n }\r\n\r\n /**\r\n   * a Transformer is an instance that allows all possible transformation operations that applied to a graph\r\n   */\r\n export interface Transformer {\r\n   removeAllIdentityNodes(): void;\r\n   removeAllDropoutNodes(): void;\r\n   fuseConvActivationNodes(): void;\r\n   // TODO: add generic functions to manipulate the graph\r\n }\r\n\r\n // an initializer can use transformer to transform the graph\r\n export interface Initializer {\r\n   transformGraph(transformer: Transformer): void;\r\n }\r\n}\r\n\r\n// eslint-disable-next-line

@typescript-eslint/no-redeclare\r\nexport interface Graph {\r\n getInputIndices(): readonly number[];\r\n getInputNames(): readonly string[];\r\n getOutputIndices(): readonly number[];\r\n getOutputNames(): readonly string[];\r\n getValues(): readonly Graph.Value[];\r\n getNodes(): readonly Graph.Node[];\r\n}\r\n\r\n// eslint-disable-next-line @typescript-eslint/naming-convention, @typescript-eslint/no-redeclare\r\nexport const Graph = {\r\n /**\r\n   * construct a graph from a graph protobuf type\r\n   */\r\n from: (graphProto: onnx.IGraphProto|ortFbs.Graph, initializer?: Graph.Initializer) =>\r\n   new GraphImpl(graphProto, initializer),\r\n};\r\n\r\nclass Value implements Graph.Value {\r\n constructor(valueInfo?: onnx.IValueInfoProto) {\r\n   this._from = undefined;\r\n   this._to = [];\r\n   this.tensor = undefined;\r\n   this.type = undefined;\r\n\r\n if (valueInfo) {\r\n   this.type = ProtoUtil.tensorValueTypeFromProto(valueInfo.type!.tensorType!);\r\n   }\r\n }\r\n\r\n _from?: number; // -1 represent from initializer\r\n get from() {\r\n   return this._from!;\r\n }\r\n _to: number[];\r\n get to() {\r\n   return this._to;\r\n }\r\n type?: Graph.ValueType;\r\n tensor?: Tensor;\r\n}\r\n\r\nclass Node implements Graph.Node {\r\n constructor(_nodeProto: onnx.INodeProto|ortFbs.Node, name?: string) {\r\n   if (_nodeProto instanceof onnx.NodeProto) {\r\n   this.name = _nodeProto.name;\r\n   this.opType = _nodeProto.opType;\r\n   this.attributes = new Attribute(_nodeProto.attribute);\r\n   } else if (_nodeProto instanceof ortFbs.Node) {\r\n   this.name = name ?? _nodeProto.name()!;\r\n   this.opType = _nodeProto.opType()!;\r\n   this.attributes = new Attribute(ProtoUtil.tensorAttributesFromORTFormat(_nodeProto));\r\n   }\r\n\r\n   this.inputs = [];\r\n this.outputs = [];\r\n   this.executeNode = true;\r\n }\r\n\r\n name: string;\r\n opType: string;\r\n inputs: number[];\r\n outputs: number[];\r\n attributes: Attribute;\r\n executeNode: boolean;\r\n}\r\n\r\nclass GraphImpl implements Graph, Graph.Transformer {\r\n private _allData: Value[];\r\n\r\n private _allInputIndices: number[];\r\n private _allInputNames: string[];\r\n\r\n private _allOutputIndices: number[];\r\n private _allOutputNames: string[];\r\n\r\n private _nodes: Node[];\r\n\r\n constructor(graph: onnx.IGraphProto|ortFbs.Graph, graphInitializer?: Graph.Initializer) {\r\n   if (!graph) {\r\n   throw new TypeError('graph is empty');\r\n   }\r\n\r\n   // build the graph - will throw exceptions if something fatal is detected\r\n   this.buildGraph(graph);\r\n\r\n   // execute any transformation logic for the graph (if applicable)\r\n this.transformGraph(graphInitializer);\r\n\r\n   // check for cycles and other inconsistencies - will throw exceptions if something fatal is detected\r\n   this.checkIsAcyclic();\r\n }\r\n\r\n getInputIndices(): readonly number[] {\r\n return this._allInputIndices;\r\n }\r\n\r\n getInputNames(): readonly string[] {\r\n   return this._allInputNames;\r\n }\r\n\r\n getOutputIndices(): readonly number[] {\r\n   return this._allOutputIndices;\r\n }\r\n\r\n getOutputNames(): readonly string[] {\r\n   return this._allOutputNames;\r\n }\r\n\r\n getValues(): readonly Graph.Value[] {\r\n   return this._allData;\r\n }\r\n\r\n getNodes(): readonly Graph.Node[] {\r\n   return this._nodes;\r\n }\r\n\r\n private buildGraph(graph: onnx.IGraphProto|ortFbs.Graph) {\r\n   // build the graph - will throw exceptions if something fatal is detected\r\n   if (graph instanceof onnx.GraphProto) {\r\n this.buildGraphFromOnnxFormat(graph);\r\n   } else if (graph instanceof ortFbs.Graph) {\r\n this.buildGraphFromOrtFormat(graph);\r\n   } else {\r\n   throw new TypeError('Graph type is not supported.');\r\n   }\r\n }\r\n private buildGraphFromOnnxFormat(graph: onnx.IGraphProto) {\r\n   const dataIndices = new Map<string, number>();\r\n   this._allData = [];\r\n\r\n   this._allInputIndices = [];\r\n this._allInputNames = [];\r\n\r\n   this._allOutputIndices = [];\r\n   this._allOutputNames = [];\r\n\r\n   this._nodes = [];\r\n\r\n   const nodesIndices = new Map<string, number>();\r\n\r\n   // scan all inputs\r\n   if (!graph.input) {\r\n   throw new Error('missing information in graph: input');\r\n   }\r\n   const inputValueNames = [];\r\n   for (const i of graph.input) {\r\n   if (dataIndices.has(i.name!)) {\r\n   throw new Error(`duplicated input name: ${i.name}`);\r\n   }\r\n   const currentIndex = this._allData.push(new Value(i)) - 1;\r\n dataIndices.set(i.name!, currentIndex);\r\n   inputValueNames.push(i.name!);\r\n   }\r\n\r\n   // scan all initializers\r\n   if (!graph.initializer) {\r\n   throw new Error('missing information in graph: initializer');\r\n   }\r\n   for (const i of graph.initializer) {\r\n   let index = dataIndices.get(i.name!);\r\n   if (index === undefined) {\r\n   const value = new Value();\r\n   value.type = {\r\n   shape: {dims: ProtoUtil.tensorDimsFromProto(i.dims!)},\r\n   tensorType: ProtoUtil.tensorDataTypeFromProto(i.dataType!)\r\n   };\r\n   index = this._allData.push(value) - 1;\r\n

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dataIndices.set(i.name!, index);\r\n      }\r\n      this._allData[index]._from = -1;\r\n      this._allData[index].tensor =
Tensor.fromProto(i);\r\n    }\r\n\r\n    // filter out input indices\r\n    for (let i = 0; i < this._allData.length; i++) {\r\n
 if (!this._allData[i].tensor) {\r\n        this._allInputIndices.push(i);\r\n
this._allInputNames.push(inputValueNames[i]);\r\n      }\r\n    }\r\n\r\n    // scan all outputs\r\n    if (!graph.output)
{\r\n      throw new Error('missing information in graph: output');\r\n    }\r\n    for (const i of graph.output) {\r\n      if
(dataIndices.has(i.name!)) {\r\n        throw new Error(`duplicated output name: ${i.name}`);\r\n      }\r\n      const
currentIndex = this._allData.push(new Value(i)) - 1;\r\n      dataIndices.set(i.name!, currentIndex);\r\n
this._allOutputIndices.push(currentIndex);\r\n      this._allOutputNames.push(i.name!);\r\n    }\r\n\r\n    // scan all
nodes\r\n    if (!graph.node) {\r\n      throw new Error('missing information in graph: node');\r\n    }\r\n    for (const
nodeProto of graph.node) {\r\n      if (!nodeProto.name) {\r\n        // assign a name to the node if it doesn't have
one\r\n        for (let pick = 0;; pick++) {\r\n          const name = `unnamed_${nodeProto.opType}_${pick}`;\r\n
if (!nodesIndices.has(name)) {\r\n            nodeProto.name = name;\r\n            break;\r\n          }\r\n        }\r\n
}\r\n\r\n      if (nodesIndices.has(nodeProto.name)) {\r\n        throw new Error(`duplicated node name:
${nodeProto.name}`);\r\n      }\r\n      const currentIndex = this._nodes.push(new Node(nodeProto)) - 1;\r\n
nodesIndices.set(nodeProto.name, currentIndex);\r\n    }\r\n\r\n    // scan node's outputs\r\n    for (let i = 0; i <
this._nodes.length; i++) {\r\n      const node = this._nodes[i];\r\n      const nodeProto = graph.node[i];\r\n      if
(!nodeProto.output) {\r\n        throw new Error(`missing output for node: ${nodeProto.name}`);\r\n      }\r\n      for
(const output of nodeProto.output) {\r\n        let dataIndex = dataIndices.get(output);\r\n        if (typeof dataIndex
=== 'undefined') {\r\n          dataIndex = this._allData.push(new Value()) - 1;\r\n          dataIndices.set(output,
dataIndex);\r\n        }\r\n        node.outputs.push(dataIndex);\r\n\r\n        if (this._allData[dataIndex]._from !==
undefined) {\r\n          throw new Error(`multiple nodes output to one data value: ${dataIndex}`);\r\n        }\r\n
this._allData[dataIndex]._from = i;\r\n\r\n        // for the 'Constant' operator, just create a new edge in the graph
corresponding to the 'output' of the\r\n        // operator and ignore the node from the graph\r\n        if
(nodeProto.opType === 'Constant') {\r\n          if (!nodeProto.attribute || nodeProto.attribute.length !== 1 ||
!nodeProto.attribute[0].t) {\r\n            throw new Error('missing attributes or missing tensor value in attributes for
this Constant operator');\r\n          }\r\n          if (!nodeProto.output || nodeProto.output.length !== 1) {\r\n
throw new Error('missing output or incorrect number of outputs for this Constant operator');\r\n          }\r\n
node.outputs.pop();\r\n          node.executeNode = false;\r\n\r\n          this._allData[dataIndex]._from = -1;\r\n
this._allData[dataIndex].tensor = Tensor.fromProto(nodeProto.attribute[0].t);\r\n        }\r\n      }\r\n    }\r\n\r\n    //
scan node's inputs\r\n    for (let i = 0; i < this._nodes.length; i++) {\r\n      const node = this._nodes[i];\r\n      const
nodeProto = graph.node[i];\r\n\r\n      if (!nodeProto.input) {\r\n        throw new Error(`missing input for node:
${nodeProto.name}`);\r\n      }\r\n      for (const input of nodeProto.input) {\r\n        const dataIndex =
dataIndices.get(input);\r\n        if (typeof dataIndex === 'undefined') {\r\n          throw new Error(`unrecognized
input '${input}' for node: ${nodeProto.name}`);\r\n        }\r\n        node.inputs.push(dataIndex);\r\n\r\n
this._allData[dataIndex]._to.push(i);\r\n      }\r\n    }\r\n\r\n    return true;\r\n  }\r\n\r\n  private
buildGraphFromOrtFormat(graph: ortFbs.Graph) {\r\n    const dataIndices = new Map<string, number>();\r\n
this._allData = [];\r\n\r\n    this._allInputIndices = [];\r\n    this._allInputNames = [];\r\n\r\n    this._allOutputIndices
= [];\r\n    this._allOutputNames = [];\r\n\r\n    this._nodes = [];\r\n\r\n    const nodesIndices = new Map<string,
number>();\r\n\r\n    // scan all inputs\r\n    const inputValueNames = [];\r\n    for (let i = 0; i < graph.inputsLength();
i++) {\r\n      const inputName = graph.inputs(i);\r\n      if (dataIndices.has(inputName)) {\r\n        throw new
Error(`duplicated input name: ${inputName}`);\r\n      }\r\n      // Find the input typeInfo from nodeargs\r\n      for
(let j = 0; j < graph.nodeArgsLength(); j++) {\r\n        if (graph.nodeArgs(j)?.name() === inputName) {\r\n
const value = new Value();\r\n          const valueType = graph.nodeArgs(j)?.type()?.valueType();\r\n          if
(valueType !== ortFbs.TypeInfoValue.tensor_type) {\r\n            throw new Error('Unexpected value type for the
nodeArg.');\r\n          }\r\n          const valueInfo = graph.nodeArgs(j)!.type()!.value(new
ortFbs.TensorTypeAndShape())!;\r\n          const type =
ProtoUtil.tensorDataTypeFromProto(valueInfo.elemType());\r\n          const shape = valueInfo.shape()!;\r\n
const dims = [];\r\n          for (let k = 0; k < shape.dimLength()!; k++) {\r\n
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dims.push(LongUtil.longToNumber(shape.dim(k)!.value()!.dimValue()!));\r\n          }\r\n          value.type = {shape:
{dims}, tensorType: type};\r\n          const currentIndex = this._allData.push(value) - 1;\r\n
dataIndices.set(inputName, currentIndex);\r\n          inputValueNames.push(inputName);\r\n        }\r\n      }\r\n
}\r\n    // check initializers\r\n    for (let i = 0; i < graph.initializersLength(); i++) {\r\n      const initializer =
graph.initializers(i)!;\r\n      let index = dataIndices.get(initializer.name()!);\r\n      if (index === undefined) {\r\n
const value = new Value();\r\n        const dims = ProtoUtil.tensorDimsFromORTFormat(initializer);\r\n        const
type = ProtoUtil.tensorDataTypeFromProto(initializer.dataType());\r\n        value.type = {shape: {dims},
tensorType: type};\r\n        index = this._allData.push(value) - 1;\r\n        dataIndices.set(initializer.name()!,
index);\r\n      }\r\n      this._allData[index]._from = -1;\r\n      this._allData[index].tensor =
Tensor.fromOrtTensor(initializer);\r\n    }\r\n\r\n    // filter out input indices\r\n    for (let i = 0; i <
this._allData.length; i++) {\r\n      if (!this._allData[i].tensor) {\r\n        this._allInputIndices.push(i);\r\n
this._allInputNames.push(inputValueNames[i]);\r\n      }\r\n    }\r\n\r\n    // scan all outputs\r\n    for (let i = 0; i <
graph.outputsLength(); i++) {\r\n      const outputName = graph.outputs(i);\r\n      if (dataIndices.has(outputName))
{\r\n        throw new Error(`duplicated output name: ${outputName}`);\r\n      }\r\n      const currentIndex =
this._allData.push(new Value()) - 1;\r\n      dataIndices.set(outputName, currentIndex);\r\n
this._allOutputIndices.push(currentIndex);\r\n      this._allOutputNames.push(outputName);\r\n    }\r\n\r\n    // scan
all nodes\r\n    if (!graph.nodes) {\r\n      throw new Error('missing information in graph: node');\r\n    }\r\n    for (let
i = 0; i < graph.nodesLength(); i++) {\r\n      const nodeProto = graph.nodes(i);\r\n      let name =
nodeProto!.name();\r\n      if (!name) {\r\n        // assign a name to the node if it doesn't have one\r\n        for (let pick
= 0;; pick++) {\r\n          name = `unnamed_${nodeProto!.opType()}_${pick}`;\r\n          if
(!nodesIndices.has(name)) {\r\n            // an unique name is found. break.\r\n            break;\r\n          }\r\n        }\r\n
 }\r\n\r\n      if (nodesIndices.has(name)) {\r\n        throw new Error(`duplicated node name: ${name}`);\r\n      }\r\n
  const currentIndex = this._nodes.push(new Node(nodeProto!, name)) - 1;\r\n      nodesIndices.set(name,
currentIndex);\r\n    }\r\n\r\n    // scan node's outputs\r\n    for (let i = 0; i < this._nodes.length; i++) {\r\n      const
node = this._nodes[i];\r\n      const nodeProto = graph.nodes(i);\r\n      if (nodeProto == null) {\r\n        throw new
Error(`No node exists at index ${i}`);\r\n      }\r\n      if (nodeProto?.outputsLength() === 0) {\r\n        throw new
Error(`missing output for node: ${nodeProto.name}`);\r\n      }\r\n      for (let j = 0; j < nodeProto?.outputsLength();
j++) {\r\n        const output = nodeProto?.outputs(j);\r\n        let dataIndex = dataIndices.get(output);\r\n        if
(typeof dataIndex === 'undefined') {\r\n          dataIndex = this._allData.push(new Value()) - 1;\r\n
dataIndices.set(output, dataIndex);\r\n        }\r\n        node.outputs.push(dataIndex);\r\n\r\n        if
(this._allData[dataIndex]._from !== undefined) {\r\n          throw new Error(`multiple nodes output to one data
value: ${dataIndex}`);\r\n        }\r\n        this._allData[dataIndex]._from = i;\r\n\r\n        // for the 'Constant' operator,
just create a new edge in the graph corresponding to the 'output' of the\r\n        // operator and ignore the node from
the graph\r\n        if (nodeProto.opType() === 'Constant') {\r\n          if (nodeProto.attributesLength() !== 1 ||
!nodeProto.attributes(0)!.t()) {\r\n            throw new Error('missing attributes or missing tensor value in attributes for
this Constant operator');\r\n          }\r\n          if (nodeProto.outputsLength() !== 1) {\r\n            throw new
Error('missing output or incorrect number of outputs for this Constant operator');\r\n          }\r\n
node.outputs.pop();\r\n          node.executeNode = false;\r\n\r\n          this._allData[dataIndex]._from = -1;\r\n
this._allData[dataIndex].tensor = Tensor.fromOrtTensor(nodeProto.attributes(0)!.t()!);\r\n        }\r\n      }\r\n
}\r\n\r\n    // scan node's inputs\r\n    for (let i = 0; i < this._nodes.length; i++) {\r\n      const node =
this._nodes[i];\r\n      const nodeProto = graph.nodes(i)!;\r\n\r\n      if (nodeProto.inputsLength() === 0) {\r\n
throw new Error(`missing input for node: ${nodeProto.name}`);\r\n      }\r\n      for (let j = 0; j <
nodeProto.inputsLength()!; j++) {\r\n        const input = nodeProto.inputs(j)!;\r\n        const dataIndex =
dataIndices.get(input);\r\n        if (typeof dataIndex === 'undefined') {\r\n          throw new Error(`unrecognized
input '${input}' for node: ${nodeProto!.name()}`);\r\n        }\r\n        node.inputs.push(dataIndex);\r\n\r\n
this._allData[dataIndex]._to.push(i);\r\n      }\r\n    }\r\n  }\r\n\r\n  private checkIsAcyclic() {\r\n    // go through the
graph and check for cycles or other fatal inconsistencies\r\n    const starters: Set<number> = new
Set<number>();\r\n    this._allInputIndices.forEach(i => {\r\n      const data = this._allData[i];\r\n
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data._to.forEach(j => {\r\n starters.add(j);\r\n });\r\n });\r\n\r\n // Iterative DFS to check for cycles\r\n const nodesStack = Array.from(starters);\r\n const nodesState = new Array<string>(this._nodes.length).fill('white');\r\n\r\n while (nodesStack.length > 0) {\r\n const nodeIndex = nodesStack.pop()!;\r\n // this node has now been processed completely. Mark this node 'black' to denote this.\r\n if (nodesState[nodeIndex] === 'gray') {\r\n nodesState[nodeIndex] = 'black';\r\n } else {\r\n // this node is under processing stage. mark this node 'gray' to denote this.\r\n nodesStack.push(nodeIndex);\r\n nodesState[nodeIndex] = 'gray';\r\n\r\n this._nodes[nodeIndex].outputs.forEach((outgoingEdgeIndex) => {\r\n const data = this._allData[outgoingEdgeIndex];\r\n if (typeof data.tensor !== 'undefined') {\r\n throw new Error('node outputs should not be initialized');\r\n }\r\n if (data._from !== nodeIndex) {\r\n throw new Error('from property of the Value object doesn\\'t match index of Node being processed');\r\n }\r\n data._to.forEach((downstreamNodeIndex) => {\r\n // back edge found - cyclic\r\n if (nodesState[downstreamNodeIndex] === 'gray') {\r\n throw new Error('model graph is cyclic');\r\n }\r\n // tree edge found - continue processing by adding it to stack\r\n else if (nodesState[downstreamNodeIndex] === 'white') {\r\n nodesStack.push(downstreamNodeIndex);\r\n }\r\n });\r\n });\r\n }\r\n }\r\n }\r\n\r\n private transformGraph(graphInitializer?: Graph.Initializer): void {\r\n // apply common transform\r\n this.removeAllIdentityNodes();\r\n this.removeAllDropoutNodes();\r\n this.fuseConvActivationNodes();\r\n // apply initializer specific transform\r\n if (graphInitializer) {\r\n graphInitializer.transformGraph(this);\r\n }\r\n\r\n // finalize graph\r\n this.finalizeGraph();\r\n }\r\n\r\n /**\r\n * finalize the graph.\r\n *\r\n * this function should be called after all the transformation completed.\r\n * this function removes all unnecessary nodes and values from the graph\r\n */\r\n finalizeGraph() {\r\n let offset = 0;\r\n // delete all nodes that are not being executed\r\n for (let i = 0; i < this._nodes.length; i++) {\r\n if (!this._nodes[i].executeNode) {\r\n // delete this node and shift all subsequent nodes up\r\n offset++;\r\n // delete all output values\r\n this._nodes[i].outputs.forEach(ind => {\r\n this._allData[ind]._from = -2;\r\n });\r\n this._nodes.splice(i, 1);\r\n i--;\r\n continue;\r\n }\r\n if (offset > 0) {\r\n // update the value table\r\n this._nodes[i].inputs.forEach(value => {\r\n const ind = this._allData[value]._to.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._allData[value]._to[ind] = i;\r\n }\r\n });\r\n this._nodes[i].outputs.forEach(value => {\r\n if (this._allData[value]._from && this._allData[value]._from! === i + offset) {\r\n this._allData[value]._from! = i;\r\n }\r\n });\r\n }\r\n }\r\n offset = 0;\r\n // delete all values that are not being referenced\r\n for (let i = 0; i < this._allData.length; i++) {\r\n // if current value is neither linked to next node, nor an output value, remove it.\r\n if (this._allData[i].from === -2 && this._allOutputIndices.indexOf(i + offset) === -1) {\r\n offset++;\r\n this._allData.splice(i, 1);\r\n i--;\r\n continue;\r\n }\r\n if (offset > 0) {\r\n let ind = -1;\r\n // if current value is neither an input value nor an initializer, find the node it's\r\n // coming from and update the corresponding node output\r\n if (this._allData[i].from !== undefined && this._allData[i].from !== -1) {\r\n ind = this._nodes[this._allData[i].from].outputs.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._nodes[this._allData[i].from].outputs[ind] = i;\r\n }\r\n } else {\r\n // if current value is an input value, update its reference in inputIndices\r\n ind = this._allInputIndices.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._allInputIndices[ind] = i;\r\n }\r\n }\r\n\r\n // find the node that the current value is linking to and update its input reference\r\n this._allData[i].to.forEach(node => {\r\n ind = this._nodes[node].inputs.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._nodes[node].inputs[ind] = i;\r\n }\r\n });\r\n if (this._allData[i].to.length === 0) {\r\n // if current value is a graph output, update its reference in outputIndices\r\n ind = this._allOutputIndices.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._allOutputIndices[ind] = i;\r\n }\r\n }\r\n }\r\n }\r\n }\r\n\r\n /**\r\n * Delete the specifed node. Assume the node has only one input and the first output connected to other nodes\r\n * @param nodeIndex The index of node to be deleted\r\n */\r\n private deleteNode(nodeIndex: number) {\r\n const node = this._nodes[nodeIndex];\r\n if (node.inputs.length > 1) {\r\n throw new Error('Node deletion with multiple inputs is not supported. ');\r\n }\r\n if (node.outputs.length > 1) {\r\n for (let i = 1; i < node.outputs.length;

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i++) {\r\n        if (this._allData[node.outputs[i]].to.length > 0) {\r\n          throw new Error('Node deletion with more
than one output connected to other nodes is not supported. ');\r\n        }\r\n      }\r\n    }\r\n\r\n    // this node wil not
be executed\r\n    node.executeNode = false;\r\n    const inputValueIndex = node.inputs[0];\r\n    const
outputValueIndex = node.outputs[0];\r\n    const nodesConsumingOutput =
this._allData[outputValueIndex].to;\r\n\r\n    // remove this node from the to property of the input Value\r\n    const
delIndex = this._allData[inputValueIndex].to.indexOf(nodeIndex);\r\n    // should not happen\r\n    if (delIndex ===
-1) {\r\n      throw new Error('The Value object doesn\\'t have the current Node in it\\'s \\'to\\' property ');\r\n    }\r\n
this._allData[inputValueIndex].to.splice(delIndex, 1);\r\n\r\n    // clear node indices consuming this output Value\r\n
 this._allData[outputValueIndex]._to = [];\r\n\r\n    // if the output of this node is a graph output, adjust the index
appropriately\r\n    const index = this._allOutputIndices.indexOf(outputValueIndex);\r\n    if (index !== -1) {\r\n
this._allOutputIndices[index] = inputValueIndex;\r\n    }\r\n\r\n    // override the inputs for nodes consuming this
node's output with the input to this node\r\n    if (nodesConsumingOutput && nodesConsumingOutput.length > 0)
{\r\n      for (const nodeIndex of nodesConsumingOutput) {\r\n        const replaceIndex =
this._nodes[nodeIndex].inputs.indexOf(outputValueIndex);\r\n        // should not happen\r\n        if (replaceIndex
=== -1) {\r\n          throw new Error('The Node object doesn\\'t have the output Value in it\\'s \\'inputs\\' property
');\r\n        }\r\n        this._nodes[nodeIndex].inputs[replaceIndex] = inputValueIndex;\r\n
this._allData[inputValueIndex].to.push(nodeIndex);\r\n      }\r\n    }\r\n  }\r\n\r\n  removeAllDropoutNodes() {\r\n
let nodeIndex = 0;\r\n    for (const node of this._nodes) {\r\n      // weed out 'Dropout' nodes so that no time is wasted
in execution\r\n      if (node.opType === 'Dropout') {\r\n        // the node should have exactly 1 input and 1 or 2
outputs\r\n        if (node.inputs.length !== 1) {\r\n          throw new Error('Dropout nodes should only contain one
input. ');\r\n        }\r\n        if (node.outputs.length !== 1 && node.outputs.length !== 2) {\r\n          throw new
Error('Dropout nodes should contain either 1 or 2 output(s)');\r\n        }\r\n        // the second output should not be
referenced by any other node\r\n        if (node.outputs.length === 2 && this._allData[node.outputs[1]]._to.length
!== 0) {\r\n          throw new Error('Dropout nodes\\'s second output should not be referenced by other nodes');\r\n
  }\r\n        this.deleteNode(nodeIndex);\r\n      }\r\n      nodeIndex++;\r\n    }\r\n  }\r\n\r\n  removeAllIdentityNodes()
{\r\n    let nodeIndex = 0;\r\n    for (const node of this._nodes) {\r\n      // weed out 'Identity' nodes so that no time is
wasted in execution\r\n      if (node.opType === 'Identity') {\r\n        this.deleteNode(nodeIndex);\r\n      }\r\n
nodeIndex++;\r\n    }\r\n  }\r\n\r\n  isActivation(n: Node): boolean {\r\n    switch (n.opType) {\r\n      // TODO: add
other activation methods\r\n      case 'Relu':\r\n      case 'Sigmoid':\r\n      case 'Clip':\r\n        return true;\r\n
default:\r\n        return false;\r\n    }\r\n  }\r\n\r\n  fuseConvActivationNodes() {\r\n    for (const node of this._nodes)
{\r\n      if (node.opType === 'Conv') {\r\n        const next = this._allData[node.outputs[0]]._to;\r\n        if
(next.length === 1 && this.isActivation(this._nodes[next[0]])) {\r\n          const child = this._nodes[next[0]];\r\n
 node.attributes.set('__internal_activation', 'string', (child.opType));\r\n          // TODO: need add support for Clip
after opset 11, which has min/max as inputs\r\n          if (child.opType === 'Clip') {\r\n
node.attributes.set('__clip_min', 'float', child.attributes.getFloat('min'));\r\n            node.attributes.set('__clip_max',
'float', child.attributes.getFloat('max'));\r\n          }\r\n          this.deleteNode(next[0]);\r\n        }\r\n      }\r\n    }\r\n
}\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {Env} from 'onnxruntime-common';\r\n\r\nimport {WebGLContext} from
'./backends/webgl/webgl-context';\r\n\r\nexport declare namespace Logger {\r\n  export interface SeverityTypeMap
{\r\n    verbose: 'v';\r\n    info: 'i';\r\n    warning: 'w';\r\n    error: 'e';\r\n    fatal: 'f';\r\n  }\r\n\r\n  export type Severity
= keyof SeverityTypeMap;\r\n\r\n  export type Provider = 'none'|'console';\r\n\r\n  /**\r\n   * Logging config that
used to control the behavior of logger\r\n   */\r\n  export interface Config {\r\n    /**\r\n     * Specify the logging
provider. 'console' by default\r\n     */\r\n    provider?: Provider;\r\n    /**\r\n     * Specify the minimal logger
serverity. 'warning' by default\r\n     */\r\n    minimalSeverity?: Logger.Severity;\r\n    /**\r\n     * Whether to output
date time in log. true by default\r\n     */\r\n    logDateTime?: boolean;\r\n    /**\r\n     * Whether to output source
information (Not yet supported). false by default\r\n     */\r\n    logSourceLocation?: boolean;\r\n  }\r\n\r\n  export
interface CategorizedLogger {\r\n    verbose(content: string): void;\r\n    info(content: string): void;\r\n
warning(content: string): void;\r\n    error(content: string): void;\r\n    fatal(content: string): void;\r\n  }\r\n}\r\n\r\n//
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eslint-disable-next-line @typescript-eslint/no-redeclare\r\nexport interface Logger {\r\n (category: string): Logger.CategorizedLogger;\r\n\r\n verbose(content: string): void;\r\n verbose(category: string, content: string): void;\r\n info(content: string): void;\r\n info(category: string, content: string): void;\r\n warning(content: string): void;\r\n warning(category: string, content: string): void;\r\n error(content: string): void;\r\n error(category: string, content: string): void;\r\n fatal(content: string): void;\r\n fatal(category: string, content: string): void;\r\n\r\n /**\r\n * Reset the logger configuration.\r\n * @param config specify an optional default config\r\n */\r\n reset(config?: Logger.Config): void;\r\n /**\r\n * Set the logger's behavior on the given category\r\n * @param category specify a category string. If '*' is specified, all previous configuration will be overwritten. If\r\n * '' is specified, the default behavior will be updated.\r\n * @param config the config object to indicate the logger's behavior\r\n */\r\n set(category: string, config: Logger.Config): void;\r\n\r\n /**\r\n * Set the logger's behavior from ort-common env\r\n * @param env the env used to set logger. Currently only setting loglevel is supported through Env.\r\n */\r\n setWithEnv(env: Env): void;\r\n}\r\n\r\ninterface LoggerProvider {\r\n log(severity: Logger.Severity, content: string, category?: string): void;\r\n}\r\nclass NoOpLoggerProvider implements LoggerProvider {\r\n log(_severity: Logger.Severity, _content: string, _category?: string) {\r\n // do nothing\r\n }\r\n}\r\nclass ConsoleLoggerProvider implements LoggerProvider {\r\n log(severity: Logger.Severity, content: string, category?: string) {\r\n // eslint-disable-next-line no-console\r\n console.log(`${this.color(severity)} ${category ? '\\x1b[35m' + category + '\\x1b[0m ' : ''}${content}`);\r\n }\r\n\r\n private color(severity: Logger.Severity) {\r\n switch (severity) {\r\n case 'verbose':\r\n return '\\x1b[34;40mv\\x1b[0m';\r\n case 'info':\r\n return '\\x1b[32mi\\x1b[0m';\r\n case 'warning':\r\n return '\\x1b[30;43mw\\x1b[0m';\r\n case 'error':\r\n return '\\x1b[31;40me\\x1b[0m';\r\n case 'fatal':\r\n return '\\x1b[101mf\\x1b[0m';\r\n default:\r\n throw new Error(`unsupported severity: ${severity}`);\r\n }\r\n }\r\n}\r\n\r\nconst SEVERITY_VALUE = {\r\n verbose: 1000,\r\n info: 2000,\r\n warning: 4000,\r\n error: 5000,\r\n fatal: 6000\r\n};\r\n\r\nconst LOGGER_PROVIDER_MAP: {readonly [provider: string]: Readonly<LoggerProvider>} = {\r\n ['none']: new NoOpLoggerProvider(),\r\n ['console']: new ConsoleLoggerProvider()\r\n};\r\nconst LOGGER_DEFAULT_CONFIG = {\r\n provider: 'console',\r\n minimalSeverity: 'warning',\r\n logDateTime: true,\r\n logSourceLocation: false\r\n};\r\nlet LOGGER_CONFIG_MAP:\r\n {[category: string]: Readonly<Required<Logger.Config>>} = {['']: LOGGER_DEFAULT_CONFIG as Required<Logger.Config>};\r\n\r\nfunction log(category: string): Logger.CategorizedLogger;\r\nfunction log(severity: Logger.Severity, content: string): void;\r\nfunction log(severity: Logger.Severity, category: string, content: string): void;\r\nfunction log(severity: Logger.Severity, arg1: string, arg2?: string): void;\r\nfunction log(\r\n arg0: string|Logger.Severity, arg1?: string, arg2?: string|number, arg3?: number): Logger.CategorizedLogger|void {\r\n if (arg1 === undefined) {\r\n // log(category: string): Logger.CategorizedLogger;\r\n return createCategorizedLogger(arg0);\r\n } else if (arg2 === undefined) {\r\n // log(severity, content);\r\n logInternal(arg0 as Logger.Severity, arg1, 1);\r\n } else if (typeof arg2 === 'number' && arg3 === undefined) {\r\n // log(severity, content, stack)\r\n logInternal(arg0 as Logger.Severity, arg1, arg2);\r\n } else if (typeof arg2 === 'string' && arg3 === undefined) {\r\n // log(severity, category, content)\r\n logInternal(arg0 as Logger.Severity, arg2, 1, arg1);\r\n } else if (typeof arg2 === 'string' && typeof arg3 === 'number') {\r\n // log(severity, category, content, stack)\r\n logInternal(arg0 as Logger.Severity, arg2, arg3, arg1);\r\n } else {\r\n throw new TypeError('input is valid');\r\n }\r\n}\r\n\r\nfunction createCategorizedLogger(category: string): Logger.CategorizedLogger {\r\n return {\r\n verbose: log.verbose.bind(null, category),\r\n info: log.info.bind(null, category),\r\n warning: log.warning.bind(null, category),\r\n error: log.error.bind(null, category),\r\n fatal: log.fatal.bind(null, category)\r\n };\r\n}\r\n\r\n// NOTE: argument 'category' is put the last parameter beacause typescript\r\n// doesn't allow optional argument put in front of required argument. This\r\n// order is different from a usual logging API.\r\nfunction logInternal(severity: Logger.Severity, content: string, stack: number, category?: string) {\r\n const config = LOGGER_CONFIG_MAP[category || ''] || LOGGER_CONFIG_MAP[''];\r\n if (SEVERITY_VALUE[severity] < SEVERITY_VALUE[config.minimalSeverity]) {\r\n return;\r\n }\r\n\r\n if (config.logDateTime) {\r\n content = `${new Date().toISOString()}|${content}`;\r\n }\r\n\r\n if (config.logSourceLocation) {\r\n // TODO: calculate source location from 'stack'\r\n }\r\n\r\n LOGGER_PROVIDER_MAP[config.provider].log(severity, content, category);\r\n}\r\n\r\n// eslint-disable-next-line @typescript-eslint/no-namespace\r\nnamespace log {\r\n export function verbose(content: string): void;\r\n export function verbose(category: string, content: string): void;\r\n export function verbose(arg0: string, arg1?: string) {\r\n log('verbose', arg0, arg1);\r\n }\r\n export function info(content: string): void;\r\n export function info(category: string, content: string): void;\r\n export function info(arg0: string, arg1?: string) {\r\n log('info', arg0, arg1);\r\n }\r\n export function warning(content: string): void;\r\n export function warning(category: string, content: string): void;\r\n export function warning(arg0: string, arg1?: string) {\r\n log('warning', arg0, arg1);\r\n }\r\n export function error(content: string): void;\r\n export function error(category: string, content: string): void;\r\n export function error(arg0: string, arg1?: string) {\r\n log('error', arg0, arg1);\r\n }\r\n export function fatal(content: string): void;\r\n export function fatal(category: string, content: string): void;\r\n export function fatal(arg0: string, arg1?: string) {\r\n log('fatal', arg0, arg1);\r\n }\r\n\r\n export function reset(config?: Logger.Config): void {\r\n LOGGER_CONFIG_MAP = {};\r\n set('', config || {});\r\n }\r\n export function set(category: string, config: Logger.Config): void {\r\n if (category === '*') {\r\n reset(config);\r\n } else {\r\n const previousConfig = LOGGER_CONFIG_MAP[category] || LOGGER_DEFAULT_CONFIG;\r\n LOGGER_CONFIG_MAP[category] = {\r\n provider: config.provider || previousConfig.provider,\r\n minimalSeverity: config.minimalSeverity || previousConfig.minimalSeverity,\r\n logDateTime: (config.logDateTime === undefined) ? previousConfig.logDateTime : config.logDateTime,\r\n logSourceLocation: (config.logSourceLocation === undefined) ? previousConfig.logSourceLocation :\r\n config.logSourceLocation\r\n };\r\n }\r\n\r\n // TODO: we want to support wildcard or regex?\r\n }\r\n\r\n export function setWithEnv(env: Env): void {\r\n const config: Logger.Config = {};\r\n if (env.logLevel) {\r\n config.minimalSeverity = env.logLevel as Logger.Severity;\r\n }\r\n set('', config);\r\n }\r\n}\r\n\r\n// eslint-disable-next-line @typescript-eslint/no-redeclare, @typescript-eslint/naming-convention\r\nexport const Logger: Logger = log;\r\n\r\nexport declare namespace Profiler {\r\n export interface Config {\r\n maxNumberEvents?: number;\r\n flushBatchSize?: number;\r\n flushIntervalInMilliseconds?: number;\r\n }\r\n\r\n export type EventCategory = 'session'|'node'|'op'|'backend';\r\n\r\n export interface Event {\r\n end(): void|Promise<void>;\r\n }\r\n}\r\n// TODO\r\n// class WebGLEvent implements Profiler.Event {}\r\n\r\nclass Event implements Profiler.Event {\r\n constructor(\r\n public category: Profiler.EventCategory, public name: string, public startTime: number,\r\n private endCallback: (e: Event) => void|Promise<void>, public timer?: WebGLQuery, public ctx?: WebGLContext) {}\r\n\r\n end() {\r\n return this.endCallback(this);\r\n }\r\n\r\n async checkTimer(): Promise<number> {\r\n if (this.ctx === undefined || this.timer === undefined) {\r\n throw new Error('No webgl timer found');\r\n } else {\r\n this.ctx.endTimer();\r\n return this.ctx.waitForQueryAndGetTime(this.timer);\r\n }\r\n }\r\n}\r\n\r\nclass EventRecord {\r\n constructor(\r\n public category: Profiler.EventCategory, public name: string, public startTime: number, public endTime: number) {}\r\n}\r\n\r\nexport class Profiler {\r\n static create(config?: Profiler.Config): Profiler {\r\n if (config === undefined) {\r\n return new this();\r\n }\r\n return new this(config.maxNumberEvents, config.flushBatchSize, config.flushIntervalInMilliseconds);\r\n }\r\n\r\n private constructor(maxNumberEvents?: number, flushBatchSize?: number, flushIntervalInMilliseconds?: number) {\r\n this._started = false;\r\n this._maxNumberEvents = maxNumberEvents === undefined ? 10000 : maxNumberEvents;\r\n this._flushBatchSize = flushBatchSize === undefined ? 10 : flushBatchSize;\r\n this._flushIntervalInMilliseconds = flushIntervalInMilliseconds === undefined ? 5000 : flushIntervalInMilliseconds;\r\n }\r\n\r\n // start profiling\r\n start() {\r\n this._started = true;\r\n this._timingEvents = [];\r\n this._flushTime = now();\r\n this._flushPointer = 0;\r\n }\r\n\r\n // stop profiling\r\n stop() {\r\n this._started = false;\r\n for (; this._flushPointer < this._timingEvents.length; this._flushPointer++) {\r\n this.logOneEvent(this._timingEvents[this._flushPointer]);\r\n }\r\n }\r\n\r\n // create an event scope for the specific function\r\n event<T>(category: Profiler.EventCategory, name: string, func: () => T, ctx?: WebGLContext): T;\r\n event<T>(category: Profiler.EventCategory, name: string, func: () => Promise<T>, ctx?: WebGLContext): Promise<T>;\r\n\r\n event<T>(category: Profiler.EventCategory, name: string, func: () => T | Promise<T>, ctx?: WebGLContext): T\r\n |Promise<T> {\r\n const event = this._started ? this.begin(category,

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name, ctx) : undefined;\r\n    let isPromise = false;\r\n\r\n    const res = func();\r\n\r\n    // we consider a then-able
object is a promise\r\n    if (res && typeof (res as Promise<T>).then === 'function') {\r\n      isPromise = true;\r\n
return new Promise<T>((resolve, reject) => {\r\n        (res as Promise<T>)\r\n            .then(\r\n                async value
=> {  // fulfilled\r\n                  if (event) {\r\n                    await event.end();\r\n                  }\r\n
resolve(value);\r\n                },\r\n                async reason => {  // rejected\r\n                  if (event) {\r\n
await event.end();\r\n                  }\r\n                  reject(reason);\r\n                });\r\n      });\r\n    }\r\n    if (!isPromise
&& event) {\r\n      const eventRes = event.end();\r\n      if (eventRes && typeof eventRes.then === 'function') {\r\n
     return new Promise<T>((resolve, reject) => {\r\n          (eventRes).then(\r\n              () => {  // fulfilled\r\n
  resolve(res);\r\n              },\r\n              (reason) => {  // rejected\r\n                reject(reason);\r\n              });\r\n
});\r\n      }\r\n    }\r\n    return res;\r\n  }\r\n\r\n  // begin an event\r\n  begin(category: Profiler.EventCategory, name:
string, ctx?: WebGLContext): Event {\r\n    if (!this._started) {\r\n      throw new Error('profiler is not started
yet');\r\n    }\r\n    if (ctx === undefined) {\r\n      const startTime = now();\r\n      this.flush(startTime);\r\n      return
new Event(category, name, startTime, e => this.endSync(e));\r\n    } else {\r\n      const timer: WebGLQuery =
ctx.beginTimer();\r\n      return new Event(category, name, 0, async e => this.end(e), timer, ctx);\r\n    }\r\n  }\r\n\r\n
// end the specific event\r\n  private async end(event: Event): Promise<void> {\r\n    const endTime: number = await
event.checkTimer();\r\n    if (this._timingEvents.length < this._maxNumberEvents) {\r\n
this._timingEvents.push(new EventRecord(event.category, event.name, event.startTime, endTime));\r\n
this.flush(endTime);\r\n    }\r\n  }\r\n\r\n  private endSync(event: Event): void {\r\n    const endTime: number =
now();\r\n    if (this._timingEvents.length < this._maxNumberEvents) {\r\n      this._timingEvents.push(new
EventRecord(event.category, event.name, event.startTime, endTime));\r\n      this.flush(endTime);\r\n    }\r\n
}\r\n\r\n  private logOneEvent(event: EventRecord) {\r\n    Logger.verbose(\r\n        `Profiler.${event.category}`,\r\n
      `${(event.endTime - event.startTime).toFixed(2)}ms on event '${event.name}' at
${event.endTime.toFixed(2)}`);\r\n  }\r\n\r\n  private flush(currentTime: number) {\r\n    if
(this._timingEvents.length - this._flushPointer >= this._flushBatchSize ||\r\n        currentTime - this._flushTime >=
this._flushIntervalInMilliseconds) {\r\n      // should flush when either batch size accumlated or interval
elepsed\r\n\r\n      for (const previousPointer = this._flushPointer; this._flushPointer < previousPointer +
this._flushBatchSize &&\r\n           this._flushPointer < this._timingEvents.length;\r\n           this._flushPointer++)
{\r\n        this.logOneEvent(this._timingEvents[this._flushPointer]);\r\n      }\r\n\r\n      this._flushTime = now();\r\n
}\r\n  }\r\n\r\n  get started() {\r\n    return this._started;\r\n  }\r\n  private _started = false;\r\n  private _timingEvents:
EventRecord[];\r\n\r\n  private readonly _maxNumberEvents: number;\r\n\r\n  private readonly _flushBatchSize:
number;\r\n  private readonly _flushIntervalInMilliseconds: number;\r\n\r\n  private _flushTime: number;\r\n
private _flushPointer = 0;\r\n}\r\n\r\n/**\r\n * returns a number to represent the current timestamp in a resolution as
high as possible.\r\n */\r\nexport const now = (typeof performance !== 'undefined' && performance.now) ? () =>
performance.now() : Date.now;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed
under the MIT License.\r\n\r\nimport {flatbuffers} from 'flatbuffers';\r\nimport {onnx} from 'onnx-
proto';\r\n\r\nimport {Graph} from './graph';\r\nimport {OpSet} from './opset';\r\nimport {onnxruntime} from './ort-
schema/ort-generated';\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\nimport {LongUtil} from
'./util';\r\n\r\nexport class Model {\r\n  // empty model\r\n  constructor() {}\r\n\r\n  load(buf: Uint8Array,
graphInitializer?: Graph.Initializer, isOrtFormat?: boolean): void {\r\n    if (!isOrtFormat) {\r\n      // isOrtFormat
=== false || isOrtFormat === undefined\r\n      try {\r\n        this.loadFromOnnxFormat(buf, graphInitializer);\r\n
return;\r\n      } catch (e) {\r\n        if (isOrtFormat !== undefined) {\r\n          throw e;\r\n        }\r\n      }\r\n
}\r\n\r\n    this.loadFromOrtFormat(buf, graphInitializer);\r\n  }\r\n\r\n  private loadFromOnnxFormat(buf:
Uint8Array, graphInitializer?: Graph.Initializer): void {\r\n    const modelProto = onnx.ModelProto.decode(buf);\r\n
 const irVersion = LongUtil.longToNumber(modelProto.irVersion);\r\n    if (irVersion < 3) {\r\n      throw new
Error('only support ONNX model with IR_VERSION>=3');\r\n    }\r\n\r\n    this._opsets =\r\n
modelProto.opsetImport.map(i => ({domain: i.domain as string, version:
LongUtil.longToNumber(i.version!)}));\r\n\r\n    this._graph = Graph.from(modelProto.graph!, graphInitializer);\r\n
}\r\n\r\n  private loadFromOrtFormat(buf: Uint8Array, graphInitializer?: Graph.Initializer): void {\r\n    const fb =
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new flatbuffers.ByteBuffer(buf);\r\n   const ortModel = ortFbs.InferenceSession.getRootAsInferenceSession(fb).model()!;\r\n   const irVersion = LongUtil.longToNumber(ortModel.irVersion());\r\n   if (irVersion < 3) {\r\n   throw new Error('only support ONNX model with IR_VERSION>=3');\r\n   }\r\n   this._opsets = [];\r\n   for (let i = 0; i < ortModel.opsetImportLength(); i++) {\r\n   const opsetId = ortModel.opsetImport(i)!;\r\n this._opsets.push({domain: opsetId?.domain() as string, version: LongUtil.longToNumber(opsetId.version()!)});\r\n }\r\n\r\n   this._graph = Graph.from(ortModel.graph()!, graphInitializer);\r\n }\r\n\r\n private _graph: Graph;\r\n get graph(): Graph {\r\n   return this._graph;\r\n }\r\n\r\n private _opsets: OpSet[];\r\n get opsets(): readonly OpSet[] {\r\n   return this._opsets;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceHandler} from './backend';\r\nimport {Graph} from './graph';\r\nimport {Tensor} from './tensor';\r\n\r\nexport type OperatorImplementation<T> = (inferenceHandler: InferenceHandler, inputs: Tensor[], context: T) => Tensor[];\r\nexport type OperatorInitialization<T> = (node: Graph.Node, graph: Graph) => T;\r\n\r\nexport interface Operator {\r\n readonly impl: OperatorImplementation<unknown>;\r\n readonly context: Graph.Node|unknown;\r\n}\r\n\r\nexport const NUMBER_TYPES: readonly Tensor.DataType[] =\r\n   ['float32', 'float64', 'int32', 'int16', 'int8', 'uint16', 'uint32', 'uint8'];\r\nexport const INT_TYPES: readonly Tensor.DataType[] = ['int32', 'int16', 'int8', 'uint16', 'uint32', 'uint8'];\r\nexport const FLOAT_TYPES: readonly Tensor.DataType[] = ['float32', 'float64'];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from './graph';\r\nimport {OperatorImplementation, OperatorInitialization} from './operators';\r\n\r\nexport interface OpSet {\r\n domain: string;\r\n version: number;\r\n}\r\n\r\nexport declare namespace OpSet {\r\n /**\r\n   * Domain of an opset, it can be an empty string(default value, represent for ai.onnx), or 'ai.onnx.ml'\r\n   */\r\n type Domain = ''|'ai.onnx.ml';\r\n\r\n /**\r\n   * A resolve rule consists of 4 or 5 items: opType, opSetDomain, versionSelector, operatorImplementation and\r\n   * operatorInitialization (optional)\r\n   */\r\n type ResolveRule = [\r\n   string, Domain, string, OperatorImplementation<Graph.Node>\r\n]|[string, Domain, string, OperatorImplementation<unknown>, OperatorInitialization<unknown>];\r\n}\r\n\r\nexport function resolveOperator(node: Graph.Node, opsets: readonly OpSet[], rules: readonly OpSet.ResolveRule[]) {\r\n for (const rule of rules) {\r\n   const opType = rule[0];\r\n   const domain = rule[1];\r\n   const versionSelector = rule[2];\r\n const opImpl = rule[3];\r\n   const opInit = rule[4];\r\n\r\n   if (node.opType === opType) { // operator type matches\r\n   for (const opset of opsets) {\r\n   // opset '' and 'ai.onnx' are considered the same.\r\n   if (opset.domain === domain || (opset.domain === 'ai.onnx' && domain === '')) { // opset domain found\r\n   if (matchSelector(opset.version, versionSelector)) {\r\n   return {opImpl, opInit};\r\n   }\r\n   }\r\n }\r\n   }\r\n }\r\n\r\n throw new TypeError(`cannot resolve operator '${node.opType}' with opsets: ${\r\n opsets.map(set => `${set.domain || 'ai.onnx'} v${set.version}`).join(', ')}`);\r\n}\r\n\r\nfunction matchSelector(version: number, selector: string): boolean {\r\n if (selector.endsWith('+')) {\r\n   // minimum version match ('7+' expects version>=7)\r\n   const rangeStart = Number.parseInt(selector.substring(0, selector.length - 1), 10);\r\n   return !isNaN(rangeStart) && rangeStart <= version;\r\n } else if (selector.split('-').length === 2) {\r\n   // range match ('6-8' expects 6<=version<=8)\r\n   const pair = selector.split('-');\r\n   const rangeStart = Number.parseInt(pair[0], 10);\r\n   const rangeEnd = Number.parseInt(pair[1], 10);\r\n   return !isNaN(rangeStart) && !isNaN(rangeEnd) && rangeStart <= version && version <= rangeEnd;\r\n } else {\r\n   // exact match ('7' expects version===7)\r\n   return Number.parseInt(selector, 10) === version;\r\n }\r\n}\r\n","// automatically generated by the FlatBuffers compiler, do not modify\r\n/* eslint-disable */\r\n\r\nimport {flatbuffers} from 'flatbuffers';\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export enum AttributeType {\r\n   UNDEFINED = 0,\r\n   FLOAT = 1,\r\n   INT = 2,\r\n   STRING = 3,\r\n TENSOR = 4,\r\n   GRAPH = 5,\r\n   FLOATS = 6,\r\n   INTS = 7,\r\n   STRINGS = 8,\r\n   TENSORS = 9,\r\n GRAPHS = 10,\r\n   SPARSE_TENSOR = 11,\r\n   SPARSE_TENSORS = 12\r\n }\r\n}\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export enum DimensionValueType {UNKNOWN = 0, VALUE = 1, PARAM = 2}\r\n}\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export enum TensorDataType {\r\n   UNDEFINED = 0,\r\n   FLOAT = 1,\r\n

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UINT8 = 2,\r\n    INT8 = 3,\r\n    UINT16 = 4,\r\n    INT16 = 5,\r\n    INT32 = 6,\r\n    INT64 = 7,\r\n    STRING =
8,\r\n    BOOL = 9,\r\n    FLOAT16 = 10,\r\n    DOUBLE = 11,\r\n    UINT32 = 12,\r\n    UINT64 = 13,\r\n
COMPLEX64 = 14,\r\n    COMPLEX128 = 15,\r\n    BFLOAT16 = 16\r\n  }\r\n}\r\n\r\n/**\r\n * @enum
{number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export enum NodeType {Primitive = 0,
Fused = 1}\r\n}\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n
export enum TypeInfoValue {NONE = 0, tensor_type = 1, sequence_type = 2, map_type = 3}\r\n}\r\n\r\n/**\r\n *
@constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class Shape {\r\n    bb:
flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @returns Shape\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): Shape
{\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param Shape= obj\r\n     * @returns Shape\r\n     */\r\n    static
getRootAsShape(bb: flatbuffers.ByteBuffer, obj?: Shape): Shape {\r\n      return (obj || new
Shape()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param Shape= obj\r\n     * @returns Shape\r\n     */\r\n    static
getSizePrefixedRootAsShape(bb: flatbuffers.ByteBuffer, obj?: Shape): Shape {\r\n      bb.setPosition(bb.position() +
flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new Shape()).__init(bb.readInt32(bb.position()) +
bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.Dimension= obj\r\n     * @returns onnxruntime.experimental.fbs.Dimension\r\n
*/\r\n    dim(index: number, obj?: onnxruntime.experimental.fbs.Dimension):
onnxruntime.experimental.fbs.Dimension|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return
offset ? (obj || new onnxruntime.experimental.fbs.Dimension())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    dimLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startShape(builder: flatbuffers.Builder) {\r\n
builder.startObject(1);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset dimOffset\r\n     */\r\n    static addDim(builder: flatbuffers.Builder, dimOffset: flatbuffers.Offset)
{\r\n      builder.addFieldOffset(0, dimOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
  * @param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createDimVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startDimVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static endShape(builder:
flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n
static createShape(builder: flatbuffers.Builder, dimOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
Shape.startShape(builder);\r\n      Shape.addDim(builder, dimOffset);\r\n      return Shape.endShape(builder);\r\n
}\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class
Dimension {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number
i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @returns Dimension\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): Dimension {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param Dimension= obj\r\n     * @returns Dimension\r\n
*/\r\n    static getRootAsDimension(bb: flatbuffers.ByteBuffer, obj?: Dimension): Dimension {\r\n      return (obj ||
new Dimension()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param Dimension= obj\r\n     * @returns Dimension\r\n     */\r\n    static
getSizePrefixedRootAsDimension(bb: flatbuffers.ByteBuffer, obj?: Dimension): Dimension {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
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Dimension()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.DimensionValue= obj\r\n     * @returns
onnxruntime.experimental.fbs.DimensionValue|null\r\n     */\r\n    value(obj?:
onnxruntime.experimental.fbs.DimensionValue): onnxruntime.experimental.fbs.DimensionValue|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.DimensionValue())\r\n                           .__init(this.bb!.__indirect(this.bb_pos +
offset), this.bb!) :\r\n                       null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Encoding=
optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    denotation(): string|null;\r\n
denotation(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n    denotation(optionalEncoding?:
any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ?
this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     */\r\n    static startDimension(builder: flatbuffers.Builder) {\r\n
builder.startObject(2);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset valueOffset\r\n     */\r\n    static addValue(builder: flatbuffers.Builder, valueOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, valueOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset denotationOffset\r\n     */\r\n    static
addDenotation(builder: flatbuffers.Builder, denotationOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1,
denotationOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns
flatbuffers.Offset\r\n     */\r\n    static endDimension(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let
offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createDimension(\r\n        builder:
flatbuffers.Builder, valueOffset: flatbuffers.Offset,\r\n        denotationOffset: flatbuffers.Offset): flatbuffers.Offset
{\r\n      Dimension.startDimension(builder);\r\n      Dimension.addValue(builder, valueOffset);\r\n
Dimension.addDenotation(builder, denotationOffset);\r\n      return Dimension.endDimension(builder);\r\n    }\r\n
}\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class
DimensionValue {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param
number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @returns DimensionValue\r\n     */\r\n    __init(i:
number, bb: flatbuffers.ByteBuffer): DimensionValue {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return
this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param DimensionValue= obj\r\n     *
@returns DimensionValue\r\n     */\r\n    static getRootAsDimensionValue(bb: flatbuffers.ByteBuffer, obj?:
DimensionValue): DimensionValue {\r\n      return (obj || new DimensionValue()).__init(bb.readInt32(bb.position())
+ bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param
DimensionValue= obj\r\n     * @returns DimensionValue\r\n     */\r\n    static
getSizePrefixedRootAsDimensionValue(bb: flatbuffers.ByteBuffer, obj?: DimensionValue): DimensionValue {\r\n
  bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
DimensionValue()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @returns
onnxruntime.experimental.fbs.DimensionValueType\r\n     */\r\n    dimType():
onnxruntime.experimental.fbs.DimensionValueType {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? /**  */ (this.bb!.readInt8(this.bb_pos + offset)) :\r\n
onnxruntime.experimental.fbs.DimensionValueType.UNKNOWN;\r\n    }\r\n\r\n    /**\r\n     * @returns
flatbuffers.Long\r\n     */\r\n    dimValue(): flatbuffers.Long {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
    return offset ? this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n
dimParam(): string|null;\r\n    dimParam(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
dimParam(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 8);\r\n
   return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     */\r\n    static startDimensionValue(builder: flatbuffers.Builder) {\r\n
builder.startObject(3);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
onnxruntime.experimental.fbs.DimensionValueType dimType\r\n     */\r\n    static addDimType(builder:
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flatbuffers.Builder, dimType: onnxruntime.experimental.fbs.DimensionValueType) {\r\n      builder.addFieldInt8(0,
dimType, onnxruntime.experimental.fbs.DimensionValueType.UNKNOWN);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Long dimValue\r\n     */\r\n    static addDimValue(builder:
flatbuffers.Builder, dimValue: flatbuffers.Long) {\r\n      builder.addFieldInt64(1, dimValue, builder.createLong(0,
0));\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset
dimParamOffset\r\n     */\r\n    static addDimParam(builder: flatbuffers.Builder, dimParamOffset: flatbuffers.Offset)
{\r\n      builder.addFieldOffset(2, dimParamOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static endDimensionValue(builder: flatbuffers.Builder):
flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static
createDimensionValue(\r\n        builder: flatbuffers.Builder, dimType:
onnxruntime.experimental.fbs.DimensionValueType,\r\n        dimValue: flatbuffers.Long, dimParamOffset:
flatbuffers.Offset): flatbuffers.Offset {\r\n      DimensionValue.startDimensionValue(builder);\r\n
DimensionValue.addDimType(builder, dimType);\r\n      DimensionValue.addDimValue(builder, dimValue);\r\n
DimensionValue.addDimParam(builder, dimParamOffset);\r\n      return
DimensionValue.endDimensionValue(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport
namespace onnxruntime.experimental.fbs {\r\n  export class TensorTypeAndShape {\r\n    bb:
flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @returns TensorTypeAndShape\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): TensorTypeAndShape {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param TensorTypeAndShape= obj\r\n     *
@returns TensorTypeAndShape\r\n     */\r\n    static getRootAsTensorTypeAndShape(bb: flatbuffers.ByteBuffer,
obj?: TensorTypeAndShape): TensorTypeAndShape {\r\n      return (obj || new
TensorTypeAndShape()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.ByteBuffer bb\r\n     * @param TensorTypeAndShape= obj\r\n     * @returns
TensorTypeAndShape\r\n     */\r\n    static getSizePrefixedRootAsTensorTypeAndShape(bb: flatbuffers.ByteBuffer,
obj?: TensorTypeAndShape):\r\n        TensorTypeAndShape {\r\n      bb.setPosition(bb.position() +
flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
TensorTypeAndShape()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     *
@returns onnxruntime.experimental.fbs.TensorDataType\r\n     */\r\n    elemType():
onnxruntime.experimental.fbs.TensorDataType {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return
offset ? /**  */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n
onnxruntime.experimental.fbs.TensorDataType.UNDEFINED;\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.Shape= obj\r\n     * @returns onnxruntime.experimental.fbs.Shape|null\r\n     */\r\n
shape(obj?: onnxruntime.experimental.fbs.Shape): onnxruntime.experimental.fbs.Shape|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Shape())\r\n
          .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     */\r\n    static startTensorTypeAndShape(builder: flatbuffers.Builder) {\r\n
    builder.startObject(2);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
onnxruntime.experimental.fbs.TensorDataType elemType\r\n     */\r\n    static addElemType(builder:
flatbuffers.Builder, elemType: onnxruntime.experimental.fbs.TensorDataType) {\r\n      builder.addFieldInt32(0,
elemType, onnxruntime.experimental.fbs.TensorDataType.UNDEFINED);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset shapeOffset\r\n     */\r\n    static addShape(builder:
flatbuffers.Builder, shapeOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1, shapeOffset, 0);\r\n    }\r\n\r\n
 /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
endTensorTypeAndShape(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset =
builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createTensorTypeAndShape(\r\n        builder:
flatbuffers.Builder, elemType: onnxruntime.experimental.fbs.TensorDataType,\r\n        shapeOffset:
flatbuffers.Offset): flatbuffers.Offset {\r\n      TensorTypeAndShape.startTensorTypeAndShape(builder);\r\n
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TensorTypeAndShape.addElemType(builder, elemType);\r\n      TensorTypeAndShape.addShape(builder,
shapeOffset);\r\n      return TensorTypeAndShape.endTensorTypeAndShape(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n *
@constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class MapType {\r\n    bb:
flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @returns MapType\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer):
MapType {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param MapType= obj\r\n     * @returns MapType\r\n     */\r\n    static
getRootAsMapType(bb: flatbuffers.ByteBuffer, obj?: MapType): MapType {\r\n      return (obj || new
MapType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param MapType= obj\r\n     * @returns MapType\r\n     */\r\n    static
getSizePrefixedRootAsMapType(bb: flatbuffers.ByteBuffer, obj?: MapType): MapType {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
MapType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @returns
onnxruntime.experimental.fbs.TensorDataType\r\n     */\r\n    keyType():
onnxruntime.experimental.fbs.TensorDataType {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return
offset ? /**  */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n
onnxruntime.experimental.fbs.TensorDataType.UNDEFINED;\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.TypeInfo= obj\r\n     * @returns onnxruntime.experimental.fbs.TypeInfo|null\r\n
*/\r\n    valueType(obj?: onnxruntime.experimental.fbs.TypeInfo): onnxruntime.experimental.fbs.TypeInfo|null {\r\n
    let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.TypeInfo())\r\n                    .__init(this.bb!.__indirect(this.bb_pos + offset),
this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static
startMapType(builder: flatbuffers.Builder) {\r\n      builder.startObject(2);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param onnxruntime.experimental.fbs.TensorDataType keyType\r\n     */\r\n
static addKeyType(builder: flatbuffers.Builder, keyType: onnxruntime.experimental.fbs.TensorDataType) {\r\n
builder.addFieldInt32(0, keyType, onnxruntime.experimental.fbs.TensorDataType.UNDEFINED);\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset valueTypeOffset\r\n     */\r\n
static addValueType(builder: flatbuffers.Builder, valueTypeOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, valueTypeOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
* @returns flatbuffers.Offset\r\n     */\r\n    static endMapType(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n
  let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createMapType(\r\n        builder:
flatbuffers.Builder, keyType: onnxruntime.experimental.fbs.TensorDataType,\r\n        valueTypeOffset:
flatbuffers.Offset): flatbuffers.Offset {\r\n      MapType.startMapType(builder);\r\n
MapType.addKeyType(builder, keyType);\r\n      MapType.addValueType(builder, valueTypeOffset);\r\n      return
MapType.endMapType(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n  export class SequenceType {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n
  bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @returns
SequenceType\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): SequenceType {\r\n      this.bb_pos =
i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     *
@param SequenceType= obj\r\n     * @returns SequenceType\r\n     */\r\n    static getRootAsSequenceType(bb:
flatbuffers.ByteBuffer, obj?: SequenceType): SequenceType {\r\n      return (obj || new
SequenceType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param SequenceType= obj\r\n     * @returns SequenceType\r\n     */\r\n    static
getSizePrefixedRootAsSequenceType(bb: flatbuffers.ByteBuffer, obj?: SequenceType): SequenceType {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
SequenceType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.TypeInfo= obj\r\n     * @returns onnxruntime.experimental.fbs.TypeInfo|null\r\n
*/\r\n    elemType(obj?: onnxruntime.experimental.fbs.TypeInfo): onnxruntime.experimental.fbs.TypeInfo|null {\r\n
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   let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.TypeInfo())\r\n                          .__init(this.bb!.__indirect(this.bb_pos + offset),
this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static
startSequenceType(builder: flatbuffers.Builder) {\r\n      builder.startObject(1);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset elemTypeOffset\r\n     */\r\n    static
addElemType(builder: flatbuffers.Builder, elemTypeOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(0,
elemTypeOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns
flatbuffers.Offset\r\n     */\r\n    static endSequenceType(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let
offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createSequenceType(builder:
flatbuffers.Builder, elemTypeOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
SequenceType.startSequenceType(builder);\r\n      SequenceType.addElemType(builder, elemTypeOffset);\r\n
return SequenceType.endSequenceType(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport
namespace onnxruntime.experimental.fbs {\r\n  export class EdgeEnd {\r\n    bb: flatbuffers.ByteBuffer|null =
null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     *
@returns EdgeEnd\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): EdgeEnd {\r\n      this.bb_pos = i;\r\n
    this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodeIndex(): number
{\r\n      return this.bb!.readUint32(this.bb_pos);\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n
srcArgIndex(): number {\r\n      return this.bb!.readInt32(this.bb_pos + 4);\r\n    }\r\n\r\n    /**\r\n     * @returns
number\r\n     */\r\n    dstArgIndex(): number {\r\n      return this.bb!.readInt32(this.bb_pos + 8);\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     * @param number node_index\r\n     * @param number
src_arg_index\r\n     * @param number dst_arg_index\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createEdgeEnd(\r\n        builder: flatbuffers.Builder, node_index: number, src_arg_index: number,\r\n
dst_arg_index: number): flatbuffers.Offset {\r\n      builder.prep(4, 12);\r\n      builder.writeInt32(dst_arg_index);\r\n
    builder.writeInt32(src_arg_index);\r\n      builder.writeInt32(node_index);\r\n      return builder.offset();\r\n    }\r\n
}\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class
NodeEdge {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n
   * @param flatbuffers.ByteBuffer bb\r\n     * @returns NodeEdge\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): NodeEdge {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param NodeEdge= obj\r\n     * @returns NodeEdge\r\n
*/\r\n    static getRootAsNodeEdge(bb: flatbuffers.ByteBuffer, obj?: NodeEdge): NodeEdge {\r\n      return (obj ||
new NodeEdge()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param NodeEdge= obj\r\n     * @returns NodeEdge\r\n     */\r\n    static
getSizePrefixedRootAsNodeEdge(bb: flatbuffers.ByteBuffer, obj?: NodeEdge): NodeEdge {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
NodeEdge()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @returns
number\r\n     */\r\n    nodeIndex(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset
? this.bb!.readUint32(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.EdgeEnd= obj\r\n     * @returns onnxruntime.experimental.fbs.EdgeEnd\r\n     */\r\n
inputEdges(index: number, obj?: onnxruntime.experimental.fbs.EdgeEnd):
onnxruntime.experimental.fbs.EdgeEnd|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return
offset ? (obj || new onnxruntime.experimental.fbs.EdgeEnd())\r\n
.__init(this.bb!.__vector(this.bb_pos + offset) + index * 12, this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n
* @returns number\r\n     */\r\n    inputEdgesLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos,
6);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param number
index\r\n     * @param onnxruntime.experimental.fbs.EdgeEnd= obj\r\n     * @returns
onnxruntime.experimental.fbs.EdgeEnd\r\n     */\r\n    outputEdges(index: number, obj?:
onnxruntime.experimental.fbs.EdgeEnd): onnxruntime.experimental.fbs.EdgeEnd|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.EdgeEnd())\r\n
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.__init(this.bb!.__vector(this.bb_pos + offset) + index * 12, this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n outputEdgesLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startNodeEdge(builder: flatbuffers.Builder) {\r\n builder.startObject(3);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number nodeIndex\r\n */\r\n static addNodeIndex(builder: flatbuffers.Builder, nodeIndex: number) {\r\n builder.addFieldInt32(0, nodeIndex, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset inputEdgesOffset\r\n */\r\n static addInputEdges(builder: flatbuffers.Builder, inputEdgesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, inputEdgesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startInputEdgesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(12, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset outputEdgesOffset\r\n */\r\n static addOutputEdges(builder: flatbuffers.Builder, outputEdgesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, outputEdgesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startOutputEdgesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(12, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endNodeEdge(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createNodeEdge(\r\n builder: flatbuffers.Builder, nodeIndex: number, inputEdgesOffset: flatbuffers.Offset,\r\n outputEdgesOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n NodeEdge.startNodeEdge(builder);\r\n NodeEdge.addNodeIndex(builder, nodeIndex);\r\n NodeEdge.addInputEdges(builder, inputEdgesOffset);\r\n NodeEdge.addOutputEdges(builder, outputEdgesOffset);\r\n return NodeEdge.endNodeEdge(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class Node {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns Node\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): Node {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Node= obj\r\n * @returns Node\r\n */\r\n static getRootAsNode(bb: flatbuffers.ByteBuffer, obj?: Node): Node {\r\n return (obj || new Node()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Node= obj\r\n * @returns Node\r\n */\r\n static getSizePrefixedRootAsNode(bb: flatbuffers.ByteBuffer, obj?: Node): Node {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new Node()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n name(): string|null;\r\n name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n name(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n docString(): string|null;\r\n docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n docString(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n domain(): string|null;\r\n domain(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n domain(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n sinceVersion(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 10);\r\n return offset ? this.bb!.readInt32(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n index(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 12);\r\n return offset ?

this.bb!.readUint32(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n opType(): string|null;\r\n opType(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n opType(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 14);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @returns onnxruntime.experimental.fbs.NodeType\r\n */\r\n type(): onnxruntime.experimental.fbs.NodeType {\r\n let offset = this.bb!.__offset(this.bb_pos, 16);\r\n return offset ? /** */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n onnxruntime.experimental.fbs.NodeType.Primitive;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n executionProviderType(): string|null;\r\n executionProviderType(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n executionProviderType(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 18);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array\r\n */\r\n inputs(index: number): string;\r\n inputs(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n inputs(index: number, optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 20);\r\n return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n inputsLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 20);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array\r\n */\r\n outputs(index: number): string;\r\n outputs(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n outputs(index: number, optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 22);\r\n return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n outputsLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 22);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param onnxruntime.experimental.fbs.Attribute= obj\r\n * @returns onnxruntime.experimental.fbs.Attribute\r\n */\r\n attributes(index: number, obj?: onnxruntime.experimental.fbs.Attribute): onnxruntime.experimental.fbs.Attribute\r\n |null {\r\n let offset = this.bb!.__offset(this.bb_pos, 24);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Attribute())\r\n .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n attributesLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 24);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @returns number\r\n */\r\n inputArgCounts(index: number): number|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 26);\r\n return offset ? this.bb!.readInt32(this.bb!.__vector(this.bb_pos + offset) + index * 4) : 0;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n inputArgCountsLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 26);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @returns Int32Array\r\n */\r\n inputArgCountsArray(): Int32Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 26);\r\n return offset ?\r\n new Int32Array(\r\n this.bb!.bytes().buffer, this.bb!.bytes().byteOffset + this.bb!.__vector(this.bb_pos + offset),\r\n this.bb!.__vector_len(this.bb_pos + offset)) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array\r\n */\r\n implicitInputs(index: number): string;\r\n implicitInputs(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n implicitInputs(index: number, optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 28);\r\n return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n implicitInputsLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 28);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n

/**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startNode(builder: flatbuffers.Builder) {\r\n builder.startObject(13);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nameOffset\r\n */\r\n static addName(builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, nameOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset docStringOffset\r\n */\r\n static addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, docStringOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset domainOffset\r\n */\r\n static addDomain(builder: flatbuffers.Builder, domainOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, domainOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number sinceVersion\r\n */\r\n static addSinceVersion(builder: flatbuffers.Builder, sinceVersion: number) {\r\n builder.addFieldInt32(3, sinceVersion, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number index\r\n */\r\n static addIndex(builder: flatbuffers.Builder, index: number) {\r\n builder.addFieldInt32(4, index, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset opTypeOffset\r\n */\r\n static addOpType(builder: flatbuffers.Builder, opTypeOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(5, opTypeOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param onnxruntime.experimental.fbs.NodeType type\r\n */\r\n static addType(builder: flatbuffers.Builder, type: onnxruntime.experimental.fbs.NodeType) {\r\n builder.addFieldInt32(6, type, onnxruntime.experimental.fbs.NodeType.Primitive);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset executionProviderTypeOffset\r\n */\r\n static addExecutionProviderType(builder: flatbuffers.Builder, executionProviderTypeOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(7, executionProviderTypeOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset inputsOffset\r\n */\r\n static addInputs(builder: flatbuffers.Builder, inputsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(8, inputsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createInputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startInputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset outputsOffset\r\n */\r\n static addOutputs(builder: flatbuffers.Builder, outputsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(9, outputsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createOutputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startOutputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset attributesOffset\r\n */\r\n static addAttributes(builder: flatbuffers.Builder, attributesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(10, attributesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createAttributesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startAttributesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset inputArgCountsOffset\r\n */\r\n static

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addInputArgCounts(builder: flatbuffers.Builder, inputArgCountsOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(11, inputArgCountsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param Array.<number> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createInputArgCountsVector(builder: flatbuffers.Builder, data: number[]|Uint8Array): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addInt32(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startInputArgCountsVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4,
numElems, 4);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset
implicitInputsOffset\r\n     */\r\n    static addImplicitInputs(builder: flatbuffers.Builder, implicitInputsOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(12, implicitInputsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n
*/\r\n    static createImplicitInputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset
{\r\n      builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startImplicitInputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4,
numElems, 4);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns
flatbuffers.Offset\r\n     */\r\n    static endNode(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset =
builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createNode(\r\n        builder: flatbuffers.Builder,
nameOffset: flatbuffers.Offset, docStringOffset: flatbuffers.Offset,\r\n        domainOffset: flatbuffers.Offset,
sinceVersion: number, index: number, opTypeOffset: flatbuffers.Offset,\r\n        type:
onnxruntime.experimental.fbs.NodeType, executionProviderTypeOffset: flatbuffers.Offset,\r\n        inputsOffset:
flatbuffers.Offset, outputsOffset: flatbuffers.Offset, attributesOffset: flatbuffers.Offset,\r\n
inputArgCountsOffset: flatbuffers.Offset, implicitInputsOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
Node.startNode(builder);\r\n      Node.addName(builder, nameOffset);\r\n      Node.addDocString(builder,
docStringOffset);\r\n      Node.addDomain(builder, domainOffset);\r\n      Node.addSinceVersion(builder,
sinceVersion);\r\n      Node.addIndex(builder, index);\r\n      Node.addOpType(builder, opTypeOffset);\r\n
Node.addType(builder, type);\r\n      Node.addExecutionProviderType(builder, executionProviderTypeOffset);\r\n
Node.addInputs(builder, inputsOffset);\r\n      Node.addOutputs(builder, outputsOffset);\r\n
Node.addAttributes(builder, attributesOffset);\r\n      Node.addInputArgCounts(builder, inputArgCountsOffset);\r\n
  Node.addImplicitInputs(builder, implicitInputsOffset);\r\n      return Node.endNode(builder);\r\n    }\r\n
}\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class
ValueInfo {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n
  * @param flatbuffers.ByteBuffer bb\r\n     * @returns ValueInfo\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): ValueInfo {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param ValueInfo= obj\r\n     * @returns ValueInfo\r\n
*/\r\n    static getRootAsValueInfo(bb: flatbuffers.ByteBuffer, obj?: ValueInfo): ValueInfo {\r\n      return (obj || new
ValueInfo()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param ValueInfo= obj\r\n     * @returns ValueInfo\r\n     */\r\n    static
getSizePrefixedRootAsValueInfo(bb: flatbuffers.ByteBuffer, obj?: ValueInfo): ValueInfo {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
ValueInfo()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    name():
string|null;\r\n    name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
name(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    docString():
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string|null;\r\n    docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
docString(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
  return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.TypeInfo= obj\r\n     * @returns onnxruntime.experimental.fbs.TypeInfo|null\r\n
*/\r\n    type(obj?: onnxruntime.experimental.fbs.TypeInfo): onnxruntime.experimental.fbs.TypeInfo|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.TypeInfo())\r\n                        .__init(this.bb!.__indirect(this.bb_pos + offset),
this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static
startValueInfo(builder: flatbuffers.Builder) {\r\n      builder.startObject(3);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset nameOffset\r\n     */\r\n    static addName(builder:
flatbuffers.Builder, nameOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, nameOffset, 0);\r\n    }\r\n\r\n
 /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset docStringOffset\r\n     */\r\n
static addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, docStringOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
* @param flatbuffers.Offset typeOffset\r\n     */\r\n    static addType(builder: flatbuffers.Builder, typeOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(2, typeOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static endValueInfo(builder:
flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n
static createValueInfo(\r\n        builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset, docStringOffset:
flatbuffers.Offset,\r\n        typeOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
ValueInfo.startValueInfo(builder);\r\n      ValueInfo.addName(builder, nameOffset);\r\n
ValueInfo.addDocString(builder, docStringOffset);\r\n      ValueInfo.addType(builder, typeOffset);\r\n      return
ValueInfo.endValueInfo(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n  export class TypeInfo {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n
bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @returns
TypeInfo\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): TypeInfo {\r\n      this.bb_pos = i;\r\n
this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param
TypeInfo= obj\r\n     * @returns TypeInfo\r\n     */\r\n    static getRootAsTypeInfo(bb: flatbuffers.ByteBuffer, obj?:
TypeInfo): TypeInfo {\r\n      return (obj || new TypeInfo()).__init(bb.readInt32(bb.position()) + bb.position(),
bb);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param TypeInfo= obj\r\n     * @returns
TypeInfo\r\n     */\r\n    static getSizePrefixedRootAsTypeInfo(bb: flatbuffers.ByteBuffer, obj?: TypeInfo):
TypeInfo {\r\n      bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
TypeInfo()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    denotation():
string|null;\r\n    denotation(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
denotation(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
   return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     *
@returns onnxruntime.experimental.fbs.TypeInfoValue\r\n     */\r\n    valueType():
onnxruntime.experimental.fbs.TypeInfoValue {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return
offset ? /**  */ (this.bb!.readUint8(this.bb_pos + offset)) :\r\n
onnxruntime.experimental.fbs.TypeInfoValue.NONE;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Table obj\r\n
  * @returns ?flatbuffers.Table\r\n     */\r\n    value<T extends flatbuffers.Table>(obj: T): T|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.__union(obj, this.bb_pos + offset) : null;\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startTypeInfo(builder:
flatbuffers.Builder) {\r\n      builder.startObject(3);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param flatbuffers.Offset denotationOffset\r\n     */\r\n    static addDenotation(builder:
flatbuffers.Builder, denotationOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, denotationOffset, 0);\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
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onnxruntime.experimental.fbs.TypeInfoValue valueType\r\n */\r\n static addValueType(builder: flatbuffers.Builder, valueType: onnxruntime.experimental.fbs.TypeInfoValue) {\r\n builder.addFieldInt8(1, valueType, onnxruntime.experimental.fbs.TypeInfoValue.NONE);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset valueOffset\r\n */\r\n static addValue(builder: flatbuffers.Builder, valueOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, valueOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endTypeInfo(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createTypeInfo(\r\n builder: flatbuffers.Builder, denotationOffset: flatbuffers.Offset,\r\n valueType: onnxruntime.experimental.fbs.TypeInfoValue, valueOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n TypeInfo.startTypeInfo(builder);\r\n TypeInfo.addDenotation(builder, denotationOffset);\r\n TypeInfo.addValueType(builder, valueType);\r\n TypeInfo.addValue(builder, valueOffset);\r\n return TypeInfo.endTypeInfo(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class OperatorSetId {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns OperatorSetId\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): OperatorSetId {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param OperatorSetId= obj\r\n * @returns OperatorSetId\r\n */\r\n static getRootAsOperatorSetId(bb: flatbuffers.ByteBuffer, obj?: OperatorSetId): OperatorSetId {\r\n return (obj || new OperatorSetId()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param OperatorSetId= obj\r\n * @returns OperatorSetId\r\n */\r\n static getSizePrefixedRootAsOperatorSetId(bb: flatbuffers.ByteBuffer, obj?: OperatorSetId): OperatorSetId {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new OperatorSetId()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n domain(): string|null;\r\n domain(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n domain(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @returns flatbuffers.Long\r\n */\r\n version(): flatbuffers.Long {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startOperatorSetId(builder: flatbuffers.Builder) {\r\n builder.startObject(2);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset domainOffset\r\n */\r\n static addDomain(builder: flatbuffers.Builder, domainOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, domainOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Long version\r\n */\r\n static addVersion(builder: flatbuffers.Builder, version: flatbuffers.Long) {\r\n builder.addFieldInt64(1, version, builder.createLong(0, 0));\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endOperatorSetId(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createOperatorSetId(\r\n builder: flatbuffers.Builder, domainOffset: flatbuffers.Offset, version: flatbuffers.Long): flatbuffers.Offset {\r\n OperatorSetId.startOperatorSetId(builder);\r\n OperatorSetId.addDomain(builder, domainOffset);\r\n OperatorSetId.addVersion(builder, version);\r\n return OperatorSetId.endOperatorSetId(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class Tensor {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns Tensor\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): Tensor {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Tensor= obj\r\n * @returns Tensor\r\n */\r\n static getRootAsTensor(bb: flatbuffers.ByteBuffer, obj?: Tensor): Tensor {\r\n return (obj || new Tensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param

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flatbuffers.ByteBuffer bb\r\n     * @param Tensor= obj\r\n     * @returns Tensor\r\n     */\r\n    static
getSizePrefixedRootAsTensor(bb: flatbuffers.ByteBuffer, obj?: Tensor): Tensor {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
Tensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    name():
string|null;\r\n    name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
name(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    docString():
string|null;\r\n    docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
docString(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
  return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
number index\r\n     * @returns flatbuffers.Long\r\n     */\r\n    dims(index: number): flatbuffers.Long|null {\r\n
let offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.readInt64(this.bb!.__vector(this.bb_pos +
offset) + index * 8) :\r\n                          this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n
*/\r\n    dimsLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ?
this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns
onnxruntime.experimental.fbs.TensorDataType\r\n     */\r\n    dataType():
onnxruntime.experimental.fbs.TensorDataType {\r\n      let offset = this.bb!.__offset(this.bb_pos, 10);\r\n      return
offset ? /**  */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n
onnxruntime.experimental.fbs.TensorDataType.UNDEFINED;\r\n    }\r\n\r\n    /**\r\n     * @param number
index\r\n     * @returns number\r\n     */\r\n    rawData(index: number): number|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ? this.bb!.readUint8(this.bb!.__vector(this.bb_pos + offset) +
index) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    rawDataLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @returns Uint8Array\r\n     */\r\n    rawDataArray(): Uint8Array|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ?\r\n          new Uint8Array(\r\n              this.bb!.bytes().buffer,
this.bb!.bytes().byteOffset + this.bb!.__vector(this.bb_pos + offset),\r\n              this.bb!.__vector_len(this.bb_pos +
offset)) :\r\n          null;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param flatbuffers.Encoding=
optionalEncoding\r\n     * @returns string|Uint8Array\r\n     */\r\n    stringData(index: number): string;\r\n
stringData(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n    stringData(index:
number, optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 14);\r\n
 return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    stringDataLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 14);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startTensor(builder: flatbuffers.Builder) {\r\n
builder.startObject(6);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset nameOffset\r\n     */\r\n    static addName(builder: flatbuffers.Builder, nameOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, nameOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset docStringOffset\r\n     */\r\n    static
addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1,
docStringOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset dimsOffset\r\n     */\r\n    static addDims(builder: flatbuffers.Builder, dimsOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(2, dimsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param Array.<flatbuffers.Long> data\r\n     * @returns flatbuffers.Offset\r\n
*/\r\n    static createDimsVector(builder: flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n
builder.startVector(8, data.length, 8);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addInt64(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
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flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startDimsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(8, numElems, 8);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param onnxruntime.experimental.fbs.TensorDataType dataType\r\n */\r\n static addDataType(builder: flatbuffers.Builder, dataType: onnxruntime.experimental.fbs.TensorDataType) {\r\n builder.addFieldInt32(3, dataType, onnxruntime.experimental.fbs.TensorDataType.UNDEFINED);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset rawDataOffset\r\n */\r\n static addRawData(builder: flatbuffers.Builder, rawDataOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(4, rawDataOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<number> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createRawDataVector(builder: flatbuffers.Builder, data: number[]|Uint8Array): flatbuffers.Offset {\r\n builder.startVector(1, data.length, 1);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addInt8(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startRawDataVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(1, numElems, 1);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset stringDataOffset\r\n */\r\n static addStringData(builder: flatbuffers.Builder, stringDataOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(5, stringDataOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createStringDataVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startStringDataVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endTensor(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createTensor(\r\n builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset, docStringOffset: flatbuffers.Offset,\r\n dimsOffset: flatbuffers.Offset, dataType: onnxruntime.experimental.fbs.TensorDataType,\r\n rawDataOffset: flatbuffers.Offset, stringDataOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n Tensor.startTensor(builder);\r\n Tensor.addName(builder, nameOffset);\r\n Tensor.addDocString(builder, docStringOffset);\r\n Tensor.addDims(builder, dimsOffset);\r\n Tensor.addDataType(builder, dataType);\r\n Tensor.addRawData(builder, rawDataOffset);\r\n Tensor.addStringData(builder, stringDataOffset);\r\n return Tensor.endTensor(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class SparseTensor {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns SparseTensor\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): SparseTensor {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param SparseTensor= obj\r\n * @returns SparseTensor\r\n */\r\n static getRootAsSparseTensor(bb: flatbuffers.ByteBuffer, obj?: SparseTensor): SparseTensor {\r\n return (obj || new SparseTensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param SparseTensor= obj\r\n * @returns SparseTensor\r\n */\r\n static getSizePrefixedRootAsSparseTensor(bb: flatbuffers.ByteBuffer, obj?: SparseTensor): SparseTensor {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new SparseTensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.Tensor= obj\r\n * @returns onnxruntime.experimental.fbs.Tensor|null\r\n */\r\n values(obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n *

@param onnxruntime.experimental.fbs.Tensor= obj\r\n * @returns onnxruntime.experimental.fbs.Tensor|null\r\n */\r\n indices(obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @returns flatbuffers.Long\r\n */\r\n dims(index: number): flatbuffers.Long|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.readInt64(this.bb!.__vector(this.bb_pos + offset) + index * 8) :\r\n this.bb!.createLong(0, 0);\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n dimsLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startSparseTensor(builder: flatbuffers.Builder) {\r\n builder.startObject(3);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset valuesOffset\r\n */\r\n static addValues(builder: flatbuffers.Builder, valuesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, valuesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset indicesOffset\r\n */\r\n static addIndices(builder: flatbuffers.Builder, indicesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, indicesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset dimsOffset\r\n */\r\n static addDims(builder: flatbuffers.Builder, dimsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, dimsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Long> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createDimsVector(builder: flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n builder.startVector(8, data.length, 8);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addInt64(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startDimsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(8, numElems, 8);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endSparseTensor(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createSparseTensor(\r\n builder: flatbuffers.Builder, valuesOffset: flatbuffers.Offset, indicesOffset: flatbuffers.Offset,\r\n dimsOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n SparseTensor.startSparseTensor(builder);\r\n SparseTensor.addValues(builder, valuesOffset);\r\n SparseTensor.addIndices(builder, indicesOffset);\r\n SparseTensor.addDims(builder, dimsOffset);\r\n return SparseTensor.endSparseTensor(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class Attribute {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns Attribute\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): Attribute {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Attribute= obj\r\n * @returns Attribute\r\n */\r\n static getRootAsAttribute(bb: flatbuffers.ByteBuffer, obj?: Attribute): Attribute {\r\n return (obj || new Attribute()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Attribute= obj\r\n * @returns Attribute\r\n */\r\n static getSizePrefixedRootAsAttribute(bb: flatbuffers.ByteBuffer, obj?: Attribute): Attribute {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new Attribute()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n name(): string|null;\r\n name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n name(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n docString(): string|null;\r\n docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n docString(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n

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  return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @returns
onnxruntime.experimental.fbs.AttributeType\r\n     */\r\n    type(): onnxruntime.experimental.fbs.AttributeType {\r\n
    let offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? /**  */ (this.bb!.readInt32(this.bb_pos + offset))
:\r\n                      onnxruntime.experimental.fbs.AttributeType.UNDEFINED;\r\n    }\r\n\r\n    /**\r\n     * @returns
number\r\n     */\r\n    f(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 10);\r\n      return offset ?
this.bb!.readFloat32(this.bb_pos + offset) : 0.0;\r\n    }\r\n\r\n    /**\r\n     * @returns flatbuffers.Long\r\n     */\r\n
i(): flatbuffers.Long {\r\n      let offset = this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ?
this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    s(): string|null;\r\n
s(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n    s(optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 14);\r\n      return offset ?
this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.Tensor= obj\r\n     * @returns onnxruntime.experimental.fbs.Tensor|null\r\n     */\r\n
t(obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 16);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n
             .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                      null;\r\n    }\r\n\r\n    /**\r\n     *
@param onnxruntime.experimental.fbs.Graph= obj\r\n     * @returns onnxruntime.experimental.fbs.Graph|null\r\n
*/\r\n    g(obj?: onnxruntime.experimental.fbs.Graph): onnxruntime.experimental.fbs.Graph|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 18);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Graph())\r\n
             .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                      null;\r\n    }\r\n\r\n    /**\r\n     *
@param number index\r\n     * @returns number\r\n     */\r\n    floats(index: number): number|null {\r\n      let offset
= this.bb!.__offset(this.bb_pos, 20);\r\n      return offset ? this.bb!.readFloat32(this.bb!.__vector(this.bb_pos +
offset) + index * 4) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    floatsLength(): number {\r\n
let offset = this.bb!.__offset(this.bb_pos, 20);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) :
0;\r\n    }\r\n\r\n    /**\r\n     * @returns Float32Array\r\n     */\r\n    floatsArray(): Float32Array|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 20);\r\n      return offset ?\r\n          new Float32Array(\r\n
this.bb!.bytes().buffer, this.bb!.bytes().byteOffset + this.bb!.__vector(this.bb_pos + offset),\r\n
this.bb!.__vector_len(this.bb_pos + offset)) :\r\n          null;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n
* @returns flatbuffers.Long\r\n     */\r\n    ints(index: number): flatbuffers.Long|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 22);\r\n      return offset ? this.bb!.readInt64(this.bb!.__vector(this.bb_pos + offset) +
index * 8) :\r\n                      this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n
intsLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 22);\r\n      return offset ?
this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array\r\n     */\r\n    strings(index: number):
string;\r\n    strings(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n    strings(index:
number, optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 24);\r\n
 return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    stringsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 24);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.Tensor= obj\r\n     * @returns
onnxruntime.experimental.fbs.Tensor\r\n     */\r\n    tensors(index: number, obj?:
onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 26);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n
             .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n
null;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    tensorsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 26);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.Graph= obj\r\n     * @returns
onnxruntime.experimental.fbs.Graph\r\n     */\r\n    graphs(index: number, obj?:
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onnxruntime.experimental.fbs.Graph): onnxruntime.experimental.fbs.Graph|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 28);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Graph())\r\n
            .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n
null;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    graphsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 28);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startAttribute(builder: flatbuffers.Builder) {\r\n
   builder.startObject(13);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset nameOffset\r\n     */\r\n    static addName(builder: flatbuffers.Builder, nameOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, nameOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset docStringOffset\r\n     */\r\n    static
addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1,
docStringOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
onnxruntime.experimental.fbs.AttributeType type\r\n     */\r\n    static addType(builder: flatbuffers.Builder, type:
onnxruntime.experimental.fbs.AttributeType) {\r\n      builder.addFieldInt32(2, type,
onnxruntime.experimental.fbs.AttributeType.UNDEFINED);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number f\r\n     */\r\n    static addF(builder: flatbuffers.Builder, f:
number) {\r\n      builder.addFieldFloat32(3, f, 0.0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param flatbuffers.Long i\r\n     */\r\n    static addI(builder: flatbuffers.Builder, i: flatbuffers.Long)
{\r\n      builder.addFieldInt64(4, i, builder.createLong(0, 0));\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset sOffset\r\n     */\r\n    static addS(builder:
flatbuffers.Builder, sOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(5, sOffset, 0);\r\n    }\r\n\r\n    /**\r\n
  * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset tOffset\r\n     */\r\n    static addT(builder:
flatbuffers.Builder, tOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(6, tOffset, 0);\r\n    }\r\n\r\n    /**\r\n
 * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset gOffset\r\n     */\r\n    static addG(builder:
flatbuffers.Builder, gOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(7, gOffset, 0);\r\n    }\r\n\r\n    /**\r\n
   * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset floatsOffset\r\n     */\r\n    static
addFloats(builder: flatbuffers.Builder, floatsOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(8,
floatsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param Array.<number>
data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static createFloatsVector(builder: flatbuffers.Builder, data:
number[]|Uint8Array): flatbuffers.Offset {\r\n      builder.startVector(4, data.length, 4);\r\n      for (let i = data.length
- 1; i >= 0; i--) {\r\n        builder.addFloat32(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startFloatsVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n
 }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset intsOffset\r\n     */\r\n
 static addInts(builder: flatbuffers.Builder, intsOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(9,
intsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
Array.<flatbuffers.Long> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static createIntsVector(builder:
flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n      builder.startVector(8, data.length, 8);\r\n
for (let i = data.length - 1; i >= 0; i--) {\r\n        builder.addInt64(data[i]);\r\n      }\r\n      return
builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param number
numElems\r\n     */\r\n    static startIntsVector(builder: flatbuffers.Builder, numElems: number) {\r\n
builder.startVector(8, numElems, 8);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     *
@param flatbuffers.Offset stringsOffset\r\n     */\r\n    static addStrings(builder: flatbuffers.Builder, stringsOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(10, stringsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n
*/\r\n    static createStringsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
```

flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startStringsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset tensorsOffset\r\n */\r\n static addTensors(builder: flatbuffers.Builder, tensorsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(11, tensorsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createTensorsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startTensorsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset graphsOffset\r\n */\r\n static addGraphs(builder: flatbuffers.Builder, graphsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(12, graphsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createGraphsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startGraphsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endAttribute(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createAttribute(\r\n builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset, docStringOffset: flatbuffers.Offset,\r\n type: onnxruntime.experimental.fbs.AttributeType, f: number, i: flatbuffers.Long, sOffset: flatbuffers.Offset,\r\n tOffset: flatbuffers.Offset, gOffset: flatbuffers.Offset, floatsOffset: flatbuffers.Offset,\r\n intsOffset: flatbuffers.Offset, stringsOffset: flatbuffers.Offset, tensorsOffset: flatbuffers.Offset,\r\n graphsOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n Attribute.startAttribute(builder);\r\n Attribute.addName(builder, nameOffset);\r\n Attribute.addDocString(builder, docStringOffset);\r\n Attribute.addType(builder, type);\r\n Attribute.addF(builder, f);\r\n Attribute.addI(builder, i);\r\n Attribute.addS(builder, sOffset);\r\n Attribute.addT(builder, tOffset);\r\n Attribute.addG(builder, gOffset);\r\n Attribute.addFloats(builder, floatsOffset);\r\n Attribute.addInts(builder, intsOffset);\r\n Attribute.addStrings(builder, stringsOffset);\r\n Attribute.addTensors(builder, tensorsOffset);\r\n Attribute.addGraphs(builder, graphsOffset);\r\n return Attribute.endAttribute(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class Graph {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns Graph\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): Graph {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Graph= obj\r\n * @returns Graph\r\n */\r\n static getRootAsGraph(bb: flatbuffers.ByteBuffer, obj?: Graph): Graph {\r\n return (obj || new Graph()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Graph= obj\r\n * @returns Graph\r\n */\r\n static getSizePrefixedRootAsGraph(bb: flatbuffers.ByteBuffer, obj?: Graph): Graph {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new Graph()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param onnxruntime.experimental.fbs.Tensor= obj\r\n * @returns onnxruntime.experimental.fbs.Tensor\r\n */\r\n initializers(index: number, obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n

```
initializersLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ?
this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.ValueInfo= obj\r\n     * @returns onnxruntime.experimental.fbs.ValueInfo\r\n
*/\r\n    nodeArgs(index: number, obj?: onnxruntime.experimental.fbs.ValueInfo):
onnxruntime.experimental.fbs.ValueInfo|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return
offset ? (obj || new onnxruntime.experimental.fbs.ValueInfo())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodeArgsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.Node= obj\r\n     * @returns
onnxruntime.experimental.fbs.Node\r\n     */\r\n    nodes(index: number, obj?: onnxruntime.experimental.fbs.Node):
onnxruntime.experimental.fbs.Node|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ?
(obj || new onnxruntime.experimental.fbs.Node())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodesLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    maxNodeIndex(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 10);\r\n      return offset ? this.bb!.readUint32(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.NodeEdge= obj\r\n     * @returns
onnxruntime.experimental.fbs.NodeEdge\r\n     */\r\n    nodeEdges(index: number, obj?:
onnxruntime.experimental.fbs.NodeEdge): onnxruntime.experimental.fbs.NodeEdge|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.NodeEdge())\r\n
                  .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n
 null;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodeEdgesLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns
string|Uint8Array\r\n     */\r\n    inputs(index: number): string;\r\n    inputs(index: number, optionalEncoding:
flatbuffers.Encoding): string|Uint8Array;\r\n    inputs(index: number, optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 14);\r\n      return offset ?
this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    inputsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 14);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns
string|Uint8Array\r\n     */\r\n    outputs(index: number): string;\r\n    outputs(index: number, optionalEncoding:
flatbuffers.Encoding): string|Uint8Array;\r\n    outputs(index: number, optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 16);\r\n      return offset ?
this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    outputsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 16);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.SparseTensor= obj\r\n     *
@returns onnxruntime.experimental.fbs.SparseTensor\r\n     */\r\n    sparseInitializers(index: number, obj?:
onnxruntime.experimental.fbs.SparseTensor):\r\n        onnxruntime.experimental.fbs.SparseTensor|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 18);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.SparseTensor())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    sparseInitializersLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 18);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startGraph(builder: flatbuffers.Builder) {\r\n
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builder.startObject(8);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset initializersOffset\r\n */\r\n static addInitializers(builder: flatbuffers.Builder, initializersOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, initializersOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createInitializersVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startInitializersVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nodeArgsOffset\r\n */\r\n static addNodeArgs(builder: flatbuffers.Builder, nodeArgsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, nodeArgsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createNodeArgsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startNodeArgsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nodesOffset\r\n */\r\n static addNodes(builder: flatbuffers.Builder, nodesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, nodesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createNodesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startNodesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number maxNodeIndex\r\n */\r\n static addMaxNodeIndex(builder: flatbuffers.Builder, maxNodeIndex: number) {\r\n builder.addFieldInt32(3, maxNodeIndex, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nodeEdgesOffset\r\n */\r\n static addNodeEdges(builder: flatbuffers.Builder, nodeEdgesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(4, nodeEdgesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createNodeEdgesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startNodeEdgesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset inputsOffset\r\n */\r\n static addInputs(builder: flatbuffers.Builder, inputsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(5, inputsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createInputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startInputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset outputsOffset\r\n */\r\n static addOutputs(builder: flatbuffers.Builder, outputsOffset:

flatbuffers.Offset) {\r\n builder.addFieldOffset(6, outputsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createOutputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startOutputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset sparseInitializersOffset\r\n */\r\n static addSparseInitializers(builder: flatbuffers.Builder, sparseInitializersOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(7, sparseInitializersOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createSparseInitializersVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]):\r\n flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startSparseInitializersVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endGraph(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createGraph(\r\n builder: flatbuffers.Builder, initializersOffset: flatbuffers.Offset, nodeArgsOffset: flatbuffers.Offset,\r\n nodesOffset: flatbuffers.Offset, maxNodeIndex: number, nodeEdgesOffset: flatbuffers.Offset,\r\n inputsOffset: flatbuffers.Offset, outputsOffset: flatbuffers.Offset,\r\n sparseInitializersOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n Graph.startGraph(builder);\r\n Graph.addInitializers(builder, initializersOffset);\r\n Graph.addNodeArgs(builder, nodeArgsOffset);\r\n Graph.addNodes(builder, nodesOffset);\r\n Graph.addMaxNodeIndex(builder, maxNodeIndex);\r\n Graph.addNodeEdges(builder, nodeEdgesOffset);\r\n Graph.addInputs(builder, inputsOffset);\r\n Graph.addOutputs(builder, outputsOffset);\r\n Graph.addSparseInitializers(builder, sparseInitializersOffset);\r\n return Graph.endGraph(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class Model {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns Model\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): Model {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Model= obj\r\n * @returns Model\r\n */\r\n static getRootAsModel(bb: flatbuffers.ByteBuffer, obj?: Model): Model {\r\n return (obj || new Model()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Model= obj\r\n * @returns Model\r\n */\r\n static getSizePrefixedRootAsModel(bb: flatbuffers.ByteBuffer, obj?: Model): Model {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new Model()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @returns flatbuffers.Long\r\n */\r\n irVersion(): flatbuffers.Long {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param onnxruntime.experimental.fbs.OperatorSetId= obj\r\n * @returns onnxruntime.experimental.fbs.OperatorSetId\r\n */\r\n opsetImport(index: number, obj?: onnxruntime.experimental.fbs.OperatorSetId):\r\n onnxruntime.experimental.fbs.OperatorSetId|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.OperatorSetId())\r\n .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n opsetImportLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n

```
producerName(): string|null;\r\n    producerName(optionalEncoding: flatbuffers.Encoding):
string|Uint8Array|null;\r\n    producerName(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) :
null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns
string|Uint8Array|null\r\n     */\r\n    producerVersion(): string|null;\r\n    producerVersion(optionalEncoding:
flatbuffers.Encoding): string|Uint8Array|null;\r\n    producerVersion(optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 10);\r\n      return offset ?
this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    domain():
string|null;\r\n    domain(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
domain(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 12);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @returns
flatbuffers.Long\r\n     */\r\n    modelVersion(): flatbuffers.Long {\r\n      let offset = this.bb!.__offset(this.bb_pos,
14);\r\n      return offset ? this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n
  * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n
docString(): string|null;\r\n    docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
docString(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 16);\r\n
    return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     *
@param onnxruntime.experimental.fbs.Graph= obj\r\n     * @returns onnxruntime.experimental.fbs.Graph|null\r\n
*/\r\n    graph(obj?: onnxruntime.experimental.fbs.Graph): onnxruntime.experimental.fbs.Graph|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 18);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.Graph())\r\n                          .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!)
:\r\n                      null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     *
@returns string|Uint8Array|null\r\n     */\r\n    graphDocString(): string|null;\r\n
graphDocString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
graphDocString(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos,
20);\r\n      return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     */\r\n    static startModel(builder: flatbuffers.Builder) {\r\n
builder.startObject(9);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Long irVersion\r\n     */\r\n    static addIrVersion(builder: flatbuffers.Builder, irVersion: flatbuffers.Long)
{\r\n      builder.addFieldInt64(0, irVersion, builder.createLong(0, 0));\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset opsetImportOffset\r\n     */\r\n    static
addOpsetImport(builder: flatbuffers.Builder, opsetImportOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, opsetImportOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
 * @param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createOpsetImportVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startOpsetImportVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset producerNameOffset\r\n     */\r\n    static
addProducerName(builder: flatbuffers.Builder, producerNameOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(2, producerNameOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param flatbuffers.Offset producerVersionOffset\r\n     */\r\n    static addProducerVersion(builder:
flatbuffers.Builder, producerVersionOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(3,
producerVersionOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset domainOffset\r\n     */\r\n    static addDomain(builder: flatbuffers.Builder, domainOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(4, domainOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
```

flatbuffers.Builder builder\r\n   * @param flatbuffers.Long modelVersion\r\n   */\r\n   static addModelVersion(builder: flatbuffers.Builder, modelVersion: flatbuffers.Long) {\r\n   builder.addFieldInt64(5, modelVersion, builder.createLong(0, 0));\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset docStringOffset\r\n   */\r\n   static addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(6, docStringOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset graphOffset\r\n   */\r\n   static addGraph(builder: flatbuffers.Builder, graphOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(7, graphOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset graphDocStringOffset\r\n   */\r\n   static addGraphDocString(builder: flatbuffers.Builder, graphDocStringOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(8, graphDocStringOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @returns flatbuffers.Offset\r\n   */\r\n   static endModel(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n   let offset = builder.endObject();\r\n   return offset;\r\n   }\r\n\r\n   static createModel(\r\n   builder: flatbuffers.Builder, irVersion: flatbuffers.Long, opsetImportOffset: flatbuffers.Offset,\r\n   producerNameOffset: flatbuffers.Offset, producerVersionOffset: flatbuffers.Offset,\r\n domainOffset: flatbuffers.Offset, modelVersion: flatbuffers.Long, docStringOffset: flatbuffers.Offset,\r\n graphOffset: flatbuffers.Offset, graphDocStringOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n Model.startModel(builder);\r\n   Model.addIrVersion(builder, irVersion);\r\n   Model.addOpsetImport(builder, opsetImportOffset);\r\n   Model.addProducerName(builder, producerNameOffset);\r\n Model.addProducerVersion(builder, producerVersionOffset);\r\n   Model.addDomain(builder, domainOffset);\r\n   Model.addModelVersion(builder, modelVersion);\r\n   Model.addDocString(builder, docStringOffset);\r\n Model.addGraph(builder, graphOffset);\r\n   Model.addGraphDocString(builder, graphDocStringOffset);\r\n return Model.endModel(builder);\r\n   }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class KernelCreateInfos {\r\n   bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n   bb_pos = 0;\r\n   /**\r\n   * @param number i\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @returns KernelCreateInfos\r\n   */\r\n   __init(i: number, bb: flatbuffers.ByteBuffer): KernelCreateInfos {\r\n this.bb_pos = i;\r\n   this.bb = bb;\r\n   return this;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param KernelCreateInfos= obj\r\n   * @returns KernelCreateInfos\r\n   */\r\n   static getRootAsKernelCreateInfos(bb: flatbuffers.ByteBuffer, obj?: KernelCreateInfos): KernelCreateInfos {\r\n return (obj || new KernelCreateInfos()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param KernelCreateInfos= obj\r\n   * @returns KernelCreateInfos\r\n   */\r\n   static getSizePrefixedRootAsKernelCreateInfos(bb: flatbuffers.ByteBuffer, obj?: KernelCreateInfos):\r\n   KernelCreateInfos {\r\n   bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n   return (obj || new KernelCreateInfos()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n   /**\r\n   * @param number index\r\n   * @returns number\r\n   */\r\n   nodeIndices(index: number): number|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 4);\r\n   return offset ? this.bb!.readUint32(this.bb!.__vector(this.bb_pos + offset) + index * 4) : 0;\r\n   }\r\n\r\n   /**\r\n   * @returns number\r\n   */\r\n   nodeIndicesLength(): number {\r\n   let offset = this.bb!.__offset(this.bb_pos, 4);\r\n   return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n   /**\r\n   * @returns Uint32Array\r\n   */\r\n   nodeIndicesArray(): Uint32Array|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 4);\r\n   return offset ?\r\n   new Uint32Array(\r\n this.bb!.bytes().buffer, this.bb!.bytes().byteOffset + this.bb!.__vector(this.bb_pos + offset),\r\n this.bb!.__vector_len(this.bb_pos + offset)) :\r\n   null;\r\n   }\r\n\r\n   /**\r\n   * @param number index\r\n * @returns flatbuffers.Long\r\n   */\r\n   kernelDefHashes(index: number): flatbuffers.Long|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 6);\r\n   return offset ? this.bb!.readUint64(this.bb!.__vector(this.bb_pos + offset) + index * 8) :\r\n   this.bb!.createLong(0, 0);\r\n   }\r\n\r\n   /**\r\n   * @returns number\r\n   */\r\n kernelDefHashesLength(): number {\r\n   let offset = this.bb!.__offset(this.bb_pos, 6);\r\n   return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n */\r\n   static startKernelCreateInfos(builder: flatbuffers.Builder) {\r\n   builder.startObject(2);\r\n   }\r\n\r\n

/**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nodeIndicesOffset\r\n */\r\n static addNodeIndices(builder: flatbuffers.Builder, nodeIndicesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, nodeIndicesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<number> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createNodeIndicesVector(builder: flatbuffers.Builder, data: number[]|Uint8Array): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addInt32(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startNodeIndicesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset kernelDefHashesOffset\r\n */\r\n static addKernelDefHashes(builder: flatbuffers.Builder, kernelDefHashesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, kernelDefHashesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Long> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createKernelDefHashesVector(builder: flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n builder.startVector(8, data.length, 8);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addInt64(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startKernelDefHashesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(8, numElems, 8);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endKernelCreateInfos(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createKernelCreateInfos(\r\n builder: flatbuffers.Builder, nodeIndicesOffset: flatbuffers.Offset,\r\n kernelDefHashesOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n KernelCreateInfos.startKernelCreateInfos(builder);\r\n KernelCreateInfos.addNodeIndices(builder, nodeIndicesOffset);\r\n KernelCreateInfos.addKernelDefHashes(builder, kernelDefHashesOffset);\r\n return KernelCreateInfos.endKernelCreateInfos(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class SubGraphSessionState {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns SubGraphSessionState\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): SubGraphSessionState {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param SubGraphSessionState= obj\r\n * @returns SubGraphSessionState\r\n */\r\n static getRootAsSubGraphSessionState(bb: flatbuffers.ByteBuffer, obj?: SubGraphSessionState): SubGraphSessionState {\r\n return (obj || new SubGraphSessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param SubGraphSessionState= obj\r\n * @returns SubGraphSessionState\r\n */\r\n static getSizePrefixedRootAsSubGraphSessionState(bb: flatbuffers.ByteBuffer, obj?: SubGraphSessionState):\r\n SubGraphSessionState {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new SubGraphSessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n graphId(): string|null;\r\n graphId(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n graphId(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.SessionState= obj\r\n * @returns onnxruntime.experimental.fbs.SessionState|null\r\n */\r\n sessionState(obj?: onnxruntime.experimental.fbs.SessionState): onnxruntime.experimental.fbs.SessionState|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.SessionState())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n

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 * @param flatbuffers.Builder builder\r\n    */\r\n    static startSubGraphSessionState(builder: flatbuffers.Builder)
{\r\n      builder.startObject(2);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset graphIdOffset\r\n     */\r\n    static addGraphId(builder: flatbuffers.Builder, graphIdOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, graphIdOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset sessionStateOffset\r\n     */\r\n    static
addSessionState(builder: flatbuffers.Builder, sessionStateOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, sessionStateOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
 * @returns flatbuffers.Offset\r\n     */\r\n    static endSubGraphSessionState(builder: flatbuffers.Builder):
flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      builder.requiredField(offset, 4);  // graph_id\r\n
return offset;\r\n    }\r\n\r\n    static createSubGraphSessionState(\r\n        builder: flatbuffers.Builder, graphIdOffset:
flatbuffers.Offset,\r\n        sessionStateOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
SubGraphSessionState.startSubGraphSessionState(builder);\r\n      SubGraphSessionState.addGraphId(builder,
graphIdOffset);\r\n      SubGraphSessionState.addSessionState(builder, sessionStateOffset);\r\n      return
SubGraphSessionState.endSubGraphSessionState(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n
*/\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class SessionState {\r\n    bb:
flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @returns SessionState\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer):
SessionState {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param SessionState= obj\r\n     * @returns SessionState\r\n     */\r\n    static
getRootAsSessionState(bb: flatbuffers.ByteBuffer, obj?: SessionState): SessionState {\r\n      return (obj || new
SessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param SessionState= obj\r\n     * @returns SessionState\r\n     */\r\n    static
getSizePrefixedRootAsSessionState(bb: flatbuffers.ByteBuffer, obj?: SessionState): SessionState {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
SessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.KernelCreateInfos= obj\r\n     * @returns
onnxruntime.experimental.fbs.KernelCreateInfos|null\r\n     */\r\n    kernels(obj?:
onnxruntime.experimental.fbs.KernelCreateInfos): onnxruntime.experimental.fbs.KernelCreateInfos|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.KernelCreateInfos())\r\n                        .__init(this.bb!.__indirect(this.bb_pos +
offset), this.bb!) :\r\n                      null;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.SubGraphSessionState= obj\r\n     * @returns
onnxruntime.experimental.fbs.SubGraphSessionState\r\n     */\r\n    subGraphSessionStates(index: number, obj?:
onnxruntime.experimental.fbs.SubGraphSessionState):\r\n
onnxruntime.experimental.fbs.SubGraphSessionState|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
 return offset ? (obj || new onnxruntime.experimental.fbs.SubGraphSessionState())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                      null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    subGraphSessionStatesLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startSessionState(builder: flatbuffers.Builder)
{\r\n      builder.startObject(2);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset kernelsOffset\r\n     */\r\n    static addKernels(builder: flatbuffers.Builder, kernelsOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, kernelsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset subGraphSessionStatesOffset\r\n     */\r\n    static
addSubGraphSessionStates(builder: flatbuffers.Builder, subGraphSessionStatesOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, subGraphSessionStatesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createSubGraphSessionStatesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]):\r\n
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flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startSubGraphSessionStatesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endSessionState(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createSessionState(\r\n builder: flatbuffers.Builder, kernelsOffset: flatbuffers.Offset,\r\n subGraphSessionStatesOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n SessionState.startSessionState(builder);\r\n SessionState.addKernels(builder, kernelsOffset);\r\n SessionState.addSubGraphSessionStates(builder, subGraphSessionStatesOffset);\r\n return SessionState.endSessionState(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class InferenceSession {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns InferenceSession\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): InferenceSession {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param InferenceSession= obj\r\n * @returns InferenceSession\r\n */\r\n static getRootAsInferenceSession(bb: flatbuffers.ByteBuffer, obj?: InferenceSession): InferenceSession {\r\n return (obj || new InferenceSession()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param InferenceSession= obj\r\n * @returns InferenceSession\r\n */\r\n static getSizePrefixedRootAsInferenceSession(bb: flatbuffers.ByteBuffer, obj?: InferenceSession): InferenceSession {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new InferenceSession()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns boolean\r\n */\r\n static bufferHasIdentifier(bb: flatbuffers.ByteBuffer): boolean {\r\n return bb.__has_identifier('ORTM');\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n ortVersion(): string|null;\r\n ortVersion(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n ortVersion(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.Model= obj\r\n * @returns onnxruntime.experimental.fbs.Model|null\r\n */\r\n model(obj?: onnxruntime.experimental.fbs.Model): onnxruntime.experimental.fbs.Model|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Model())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.SessionState= obj\r\n * @returns onnxruntime.experimental.fbs.SessionState|null\r\n */\r\n sessionState(obj?: onnxruntime.experimental.fbs.SessionState): onnxruntime.experimental.fbs.SessionState|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.SessionState())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startInferenceSession(builder: flatbuffers.Builder) {\r\n builder.startObject(3);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset ortVersionOffset\r\n */\r\n static addOrtVersion(builder: flatbuffers.Builder, ortVersionOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, ortVersionOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset modelOffset\r\n */\r\n static addModel(builder: flatbuffers.Builder, modelOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, modelOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset sessionStateOffset\r\n */\r\n static addSessionState(builder: flatbuffers.Builder, sessionStateOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, sessionStateOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endInferenceSession(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset offset\r\n */\r\n static finishInferenceSessionBuffer(builder: flatbuffers.Builder, offset: flatbuffers.Offset) {\r\n builder.finish(offset, 'ORTM');\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset offset\r\n */\r\n static finishSizePrefixedInferenceSessionBuffer(builder: flatbuffers.Builder, offset: flatbuffers.Offset) {\r\n builder.finish(offset, 'ORTM', true);\r\n }\r\n\r\n static createInferenceSession(\r\n builder: flatbuffers.Builder, ortVersionOffset: flatbuffers.Offset, modelOffset: flatbuffers.Offset,\r\n sessionStateOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n InferenceSession.startInferenceSession(builder);\r\n InferenceSession.addOrtVersion(builder, ortVersionOffset);\r\n InferenceSession.addModel(builder, modelOffset);\r\n InferenceSession.addSessionState(builder, sessionStateOffset);\r\n return InferenceSession.endInferenceSession(builder);\r\n }\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceSession, SessionHandler, Tensor} from 'onnxruntime-common';\r\nimport {Session} from './session';\r\nimport {Tensor as OnnxjsTensor} from './tensor';\r\n\r\nexport class OnnxjsSessionHandler implements SessionHandler {\r\n constructor(private session: Session) {\r\n this.inputNames = this.session.inputNames;\r\n this.outputNames = this.session.outputNames;\r\n }\r\n\r\n async dispose(): Promise<void> {}\r\n inputNames: readonly string[];\r\n outputNames: readonly string[];\r\n async run(\r\n feeds: SessionHandler.FeedsType, _fetches: SessionHandler.FetchesType,\r\n _options: InferenceSession.RunOptions): Promise<SessionHandler.ReturnType> {\r\n const inputMap = new Map<string, OnnxjsTensor>();\r\n for (const name in feeds) {\r\n if (Object.hasOwnProperty.call(feeds, name)) {\r\n const feed = feeds[name];\r\n inputMap.set(\r\n name,\r\n new OnnxjsTensor(\r\n feed.dims, feed.type as OnnxjsTensor.DataType, undefined, undefined,\r\n feed.data as OnnxjsTensor.NumberType));\r\n }\r\n }\r\n const outputMap = await this.session.run(inputMap);\r\n const output: SessionHandler.ReturnType = {};\r\n outputMap.forEach((tensor, name) => {\r\n output[name] = new Tensor(tensor.type, tensor.data, tensor.dims);\r\n });\r\n return output;\r\n }\r\n startProfiling(): void {\r\n this.session.startProfiling();\r\n }\r\n endProfiling(): void {\r\n this.session.endProfiling();\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {readFile} from 'fs';\r\nimport {promisify} from 'util';\r\n\r\nimport {resolveBackend, SessionHandlerType} from './backend';\r\nimport {ExecutionPlan} from './execution-plan';\r\nimport {Graph} from './graph';\r\nimport {Profiler} from './instrument';\r\nimport {Model} from './model';\r\nimport {Operator} from './operators';\r\nimport {Tensor} from './tensor';\r\n\r\nexport declare namespace Session {\r\n export interface Config {\r\n backendHint?: string;\r\n profiler?: Profiler.Config;\r\n }\r\n\r\n export interface Context {\r\n profiler: Readonly<Profiler>;\r\n graphInputTypes?: Tensor.DataType[];\r\n graphInputDims?: Array<readonly number[]>;\r\n }\r\n}\r\n\r\nexport class Session {\r\n constructor(config: Session.Config = {}) {\r\n this._initialized = false;\r\n this.backendHint = config.backendHint;\r\n this.profiler = Profiler.create(config.profiler);\r\n this.context = {profiler: this.profiler, graphInputTypes: [], graphInputDims: []};\r\n }\r\n\r\n get inputNames(): readonly string[] {\r\n return this._model.graph.getInputNames();\r\n }\r\n get outputNames(): readonly string[] {\r\n return this._model.graph.getOutputNames();\r\n }\r\n\r\n startProfiling() {\r\n this.profiler.start();\r\n }\r\n\r\n endProfiling() {\r\n this.profiler.stop();\r\n }\r\n\r\n async loadModel(uri: string): Promise<void>;\r\n async loadModel(buffer: ArrayBuffer, byteOffset?: number, length?: number): Promise<void>;\r\n async loadModel(buffer: Uint8Array): Promise<void>;\r\n async loadModel(arg: string|ArrayBuffer|Uint8Array, byteOffset?: number, length?: number): Promise<void> {\r\n await this.profiler.event('session', 'Session.loadModel', async () => {\r\n // resolve backend and session handler\r\n const backend = await resolveBackend(this.backendHint);\r\n this.sessionHandler = backend.createSessionHandler(this.context);\r\n\r\n this._model = new Model();\r\n if (typeof arg === 'string') {\r\n const isOrtFormat = arg.endsWith('.ort');\r\n if (typeof fetch === 'undefined') {\r\n // node\r\n const buf = await promisify(readFile)(arg);\r\n this.initialize(Buffer.from(buf), isOrtFormat);\r\n } else {\r\n // browser\r\n const response = await fetch(arg);\r\n const buf = await response.arrayBuffer();\r\n this.initialize(new Uint8Array(buf), isOrtFormat);\r\n }\r\n } else if

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(!ArrayBuffer.isView(arg)) {\r\n        // load model from ArrayBuffer\r\n        const arr = new Uint8Array(arg,
byteOffset || 0, length || arg.byteLength);\r\n        this.initialize(arr);\r\n      } else {\r\n        // load model from
Uint8array\r\n        this.initialize(arg);\r\n      }\r\n    });\r\n  }\r\n\r\n  private initialize(modelProtoBlob: Uint8Array,
isOrtFormat?: boolean): void {\r\n    if (this._initialized) {\r\n      throw new Error('already initialized');\r\n
}\r\n\r\n    this.profiler.event('session', 'Session.initialize', () => {\r\n      // load graph\r\n      const graphInitializer
=\r\n          this.sessionHandler.transformGraph ? this.sessionHandler as Graph.Initializer : undefined;\r\n
this._model.load(modelProtoBlob, graphInitializer, isOrtFormat);\r\n\r\n      // graph is completely initialzied at this
stage , let the interested handlers know\r\n      if (this.sessionHandler.onGraphInitialized) {\r\n
this.sessionHandler.onGraphInitialized(this._model.graph);\r\n      }\r\n      // initialize each operator in the graph\r\n
   this.initializeOps(this._model.graph);\r\n\r\n      // instantiate an ExecutionPlan object to be used by the Session
object\r\n      this._executionPlan = new ExecutionPlan(this._model.graph, this._ops, this.profiler);\r\n    });\r\n\r\n
this._initialized = true;\r\n  }\r\n\r\n  async run(inputs: Map<string, Tensor>|Tensor[]): Promise<Map<string,
Tensor>> {\r\n    if (!this._initialized) {\r\n      throw new Error('session not initialized yet');\r\n    }\r\n\r\n    return
this.profiler.event('session', 'Session.run', async () => {\r\n      const inputTensors =
this.normalizeAndValidateInputs(inputs);\r\n\r\n      const outputTensors = await
this._executionPlan.execute(this.sessionHandler, inputTensors);\r\n\r\n      return
this.createOutput(outputTensors);\r\n    });\r\n  }\r\n\r\n  private normalizeAndValidateInputs(inputs: Map<string,
Tensor>|Tensor[]): Tensor[] {\r\n    const modelInputNames = this._model.graph.getInputNames();\r\n\r\n    //
normalize inputs\r\n    // inputs: Tensor[]\r\n    if (Array.isArray(inputs)) {\r\n      if (inputs.length !==
modelInputNames.length) {\r\n        throw new Error(`incorrect input array length: expected
${modelInputNames.length} but got ${inputs.length}`);\r\n      }\r\n    }\r\n    // convert map to array\r\n    // inputs:
Map<string, Tensor>\r\n    else {\r\n      if (inputs.size !== modelInputNames.length) {\r\n        throw new
Error(`incorrect input map size: expected ${modelInputNames.length} but got ${inputs.size}`);\r\n      }\r\n\r\n
const sortedInputs = new Array<Tensor>(inputs.size);\r\n      let sortedInputsIndex = 0;\r\n      for (let i = 0; i <
modelInputNames.length; ++i) {\r\n        const tensor = inputs.get(modelInputNames[i]);\r\n        if (!tensor) {\r\n
   throw new Error(`missing input tensor for: '${name}'`);\r\n        }\r\n        sortedInputs[sortedInputsIndex++] =
tensor;\r\n      }\r\n\r\n      inputs = sortedInputs;\r\n    }\r\n\r\n    // validate dims requirements\r\n    // First session
run - graph input data is not cached for the session\r\n    if (!this.context.graphInputTypes ||
this.context.graphInputTypes.length === 0 || !this.context.graphInputDims ||\r\n
this.context.graphInputDims.length === 0) {\r\n      const modelInputIndices =
this._model.graph.getInputIndices();\r\n      const modelValues = this._model.graph.getValues();\r\n\r\n      const
graphInputDims = new Array<readonly number[]>(modelInputIndices.length);\r\n\r\n      for (let i = 0; i <
modelInputIndices.length; ++i) {\r\n        const graphInput = modelValues[modelInputIndices[i]];\r\n
graphInputDims[i] = graphInput.type!.shape.dims;\r\n\r\n        // cached for second and subsequent runs.\r\n        //
Some parts of the framework works on the assumption that the graph and types and shapes are static\r\n
this.context.graphInputTypes!.push(graphInput.type!.tensorType);\r\n
this.context.graphInputDims!.push(inputs[i].dims);\r\n      }\r\n\r\n
this.validateInputTensorDims(graphInputDims, inputs, true);\r\n    }\r\n\r\n    // Second and subsequent session runs
- graph input data is cached for the session\r\n    else {\r\n
this.validateInputTensorDims(this.context.graphInputDims, inputs, false);\r\n    }\r\n\r\n    // validate types
requirement\r\n    this.validateInputTensorTypes(this.context.graphInputTypes!, inputs);\r\n\r\n    return inputs;\r\n
}\r\n\r\n  private validateInputTensorTypes(graphInputTypes: Tensor.DataType[], givenInputs: Tensor[]) {\r\n    for
(let i = 0; i < givenInputs.length; i++) {\r\n      const expectedType = graphInputTypes[i];\r\n      const actualType =
givenInputs[i].type;\r\n      if (expectedType !== actualType) {\r\n        throw new Error(`input tensor[${i}] check
failed: expected type '${expectedType}' but got ${actualType}`);\r\n      }\r\n    }\r\n  }\r\n\r\n  private
validateInputTensorDims(\r\n      graphInputDims: Array<readonly number[]>, givenInputs: Tensor[],
noneDimSupported: boolean) {\r\n    for (let i = 0; i < givenInputs.length; i++) {\r\n      const expectedDims =
graphInputDims[i];\r\n      const actualDims = givenInputs[i].dims;\r\n      if
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(!this.compareTensorDims(expectedDims, actualDims, noneDimSupported)) {\r\n   throw new Error(`input tensor[${i}] check failed: expected shape '[${expectedDims.join(',')}]' but got [${\r\n actualDims.join(',')}]`);\r\n   }\r\n   }\r\n }\r\n\r\n private compareTensorDims(expectedDims: readonly number[], actualDims: readonly number[], noneDimSupported: boolean):\r\n   boolean {\r\n   if (expectedDims.length !== actualDims.length) {\r\n   return false;\r\n   }\r\n\r\n   for (let i = 0; i < expectedDims.length; ++i) {\r\n   if (expectedDims[i] !== actualDims[i] && (!noneDimSupported || expectedDims[i] !== 0)) {\r\n   // data shape mis-match AND not a 'None' dimension.\r\n   return false;\r\n   }\r\n   }\r\n\r\n   return true;\r\n }\r\n\r\n private createOutput(outputTensors: Tensor[]): Map<string, Tensor> {\r\n   const modelOutputNames = this._model.graph.getOutputNames();\r\n   if (outputTensors.length !== modelOutputNames.length) {\r\n   throw new Error('expected number of outputs do not match number of generated outputs');\r\n   }\r\n\r\n   const output = new Map<string, Tensor>();\r\n   for (let i = 0; i < modelOutputNames.length; ++i) {\r\n   output.set(modelOutputNames[i], outputTensors[i]);\r\n   }\r\n\r\n   return output;\r\n }\r\n\r\n private initializeOps(graph: Graph): void {\r\n   const nodes = graph.getNodes();\r\n   this._ops = new Array(nodes.length);\r\n\r\n   for (let i = 0; i < nodes.length; i++) {\r\n   this._ops[i] = this.sessionHandler.resolve(nodes[i], this._model.opsets, graph);\r\n   }\r\n }\r\n\r\n private _model: Model;\r\n private _initialized: boolean;\r\n\r\n private _ops: Operator[];\r\n private _executionPlan: ExecutionPlan;\r\n\r\n private backendHint?: string;\r\n\r\n private sessionHandler: SessionHandlerType;\r\n private context: Session.Context;\r\n private profiler: Readonly<Profiler>;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Guid} from 'guid-typescript';\r\nimport Long from 'long';\r\nimport {onnx} from 'onnx-proto';\r\n\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\n\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\n\r\nimport {ProtoUtil, ShapeUtil} from './util';\r\n\r\nexport declare namespace Tensor {\r\n export interface DataTypeMap {\r\n   bool: Uint8Array;\r\n   float32: Float32Array;\r\n   float64: Float64Array;\r\n   string: string[];\r\n   int8: Int8Array;\r\n   uint8: Uint8Array;\r\n   int16: Int16Array;\r\n   uint16: Uint16Array;\r\n   int32: Int32Array;\r\n   uint32: Uint32Array;\r\n }\r\n\r\n export type DataType = keyof DataTypeMap;\r\n\r\n export type StringType = Tensor.DataTypeMap['string'];\r\n export type BooleanType = Tensor.DataTypeMap['bool'];\r\n export type IntegerType = Tensor.DataTypeMap['int8']|Tensor.DataTypeMap['uint8']|Tensor.DataTypeMap['int16']|\r\n   Tensor.DataTypeMap['uint16']|Tensor.DataTypeMap['int32']|Tensor.DataTypeMap['uint32'];\r\n export type FloatType = Tensor.DataTypeMap['float32']|Tensor.DataTypeMap['float64'];\r\n export type NumberType = BooleanType|IntegerType|FloatType;\r\n\r\n export type Id = Guid;\r\n}\r\n\r\ntype TensorData = Tensor.DataTypeMap[Tensor.DataType];\r\n\r\ntype DataProvider = (id: Tensor.Id) => TensorData;\r\ntype AsyncDataProvider = (id: Tensor.Id) => Promise<TensorData>;\r\n\r\nexport class Tensor {\r\n /**\r\n   * get the underlying tensor data\r\n   */\r\n get data(): TensorData {\r\n   if (this.cache === undefined) {\r\n   const data = this.dataProvider!(this.dataId);\r\n   if (data.length !== this.size) {\r\n   throw new Error('Length of data provided by the Data Provider is inconsistent with the dims of this Tensor.');\r\n   }\r\n   this.cache = data;\r\n   }\r\n   return this.cache;\r\n }\r\n\r\n /**\r\n   * get the underlying string tensor data. Should only use when type is STRING\r\n   */\r\n get stringData() {\r\n   if (this.type !== 'string') {\r\n   throw new TypeError('data type is not string');\r\n   }\r\n\r\n   return this.data as Tensor.StringType;\r\n }\r\n\r\n /**\r\n   * get the underlying integer tensor data. Should only use when type is one of the following: (UINT8, INT8, UINT16,\r\n   * INT16, INT32, UINT32, BOOL)\r\n   */\r\n get integerData() {\r\n   switch (this.type) {\r\n   case 'uint8':\r\n   case 'int8':\r\n   case 'uint16':\r\n   case 'int16':\r\n   case 'int32':\r\n   case 'uint32':\r\n   case 'bool':\r\n   return this.data as Tensor.IntegerType;\r\n\r\n   default:\r\n   throw new TypeError('data type is not integer (uint8, int8, uint16, int16, int32, uint32, bool)');\r\n   }\r\n }\r\n\r\n /**\r\n   * get the underlying float tensor data. Should only use when type is one of the following: (FLOAT, DOUBLE)\r\n   */\r\n get floatData() {\r\n   switch (this.type) {\r\n   case 'float32':\r\n   case 'float64':\r\n   return this.data as Tensor.FloatType;\r\n\r\n   default:\r\n   throw new TypeError('data type is not float (float32, float64)');\r\n   }\r\n }\r\n\r\n /**\r\n   * get the underlying number tensor data. Should only use when type is one of the following: (UINT8, INT8, UINT16,\r\n   * INT16, INT32, UINT32, BOOL, FLOAT, DOUBLE)\r\n   */\r\n get numberData() {\r\n   if (this.type !== 'string') {\r\n   return

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this.data as Tensor.NumberType;\r\n    }\r\n    throw new TypeError('type cannot be non-number (string)');\r\n
}\r\n\r\n  /**\r\n   * get value of an element at the given indices\r\n   */\r\n  get(indices: readonly number[]):
Tensor.DataTypeMap[Tensor.DataType][number] {\r\n    return this.data[ShapeUtil.indicesToOffset(indices,
this.strides)];\r\n  }\r\n\r\n  /**\r\n   * set value of an element at the given indices\r\n   */\r\n  set(indices: readonly
number[], value: Tensor.DataTypeMap[Tensor.DataType][number]) {\r\n
this.data[ShapeUtil.indicesToOffset(indices, this.strides)] = value;\r\n  }\r\n\r\n  /**\r\n   * get the underlying tensor
data asynchronously\r\n   */\r\n  async getData(): Promise<TensorData> {\r\n    if (this.cache === undefined) {\r\n
 this.cache = await this.asyncDataProvider!(this.dataId);\r\n    }\r\n    return this.cache;\r\n  }\r\n\r\n  /**\r\n   * get
the number of elements in the tensor\r\n   */\r\n  public readonly size: number;\r\n\r\n  private _strides: readonly
number[];\r\n  /**\r\n   * get the strides for each dimension\r\n   */\r\n  get strides(): readonly number[] {\r\n    if
(!this._strides) {\r\n      this._strides = ShapeUtil.computeStrides(this.dims);\r\n    }\r\n    return this._strides;\r\n
}\r\n\r\n  constructor(\r\n      /**\r\n       * get the dimensions of the tensor\r\n       */\r\n      public readonly dims:
readonly number[],\r\n      /**\r\n       * get the type of the tensor\r\n       */\r\n      public readonly type:
Tensor.DataType, private dataProvider?: DataProvider,\r\n      private asyncDataProvider?: AsyncDataProvider,
private cache?: TensorData,\r\n      /**\r\n       * get the data ID that used to map to a tensor data\r\n       */\r\n
public readonly dataId: Guid = Guid.create()) {\r\n    this.size = ShapeUtil.validateDimsAndCalcSize(dims);\r\n
const size = this.size;\r\n    const empty = (dataProvider === undefined && asyncDataProvider === undefined &&
cache === undefined);\r\n\r\n    if (cache !== undefined) {\r\n      if (cache.length !== size) {\r\n        throw new
RangeError('Input dims doesn\\'t match data length.');\r\n      }\r\n    }\r\n\r\n    if (type === 'string') {\r\n      if (cache
!== undefined && (!Array.isArray(cache) || !cache.every(i => typeof i === 'string'))) {\r\n        throw new
TypeError('cache should be a string array');\r\n      }\r\n\r\n      if (empty) {\r\n        this.cache = new
Array<string>(size);\r\n      }\r\n    } else {\r\n      if (cache !== undefined) {\r\n        const constructor =
dataviewConstructor(type);\r\n        if (!(cache instanceof constructor)) {\r\n          throw new TypeError(`cache
should be type ${constructor.name}`);\r\n        }\r\n      }\r\n\r\n      if (empty) {\r\n        const buf = new
ArrayBuffer(size * sizeof(type));\r\n        this.cache = createView(buf, type);\r\n      }\r\n    }\r\n  }\r\n\r\n  /**\r\n   *
Construct new Tensor from a ONNX Tensor object\r\n   * @param tensorProto the ONNX Tensor\r\n   */\r\n  static
fromProto(tensorProto: onnx.ITensorProto): Tensor {\r\n    if (!tensorProto) {\r\n      throw new Error('cannot
construct Value from an empty tensor');\r\n    }\r\n    const type =
ProtoUtil.tensorDataTypeFromProto(tensorProto.dataType!);\r\n    const dims =
ProtoUtil.tensorDimsFromProto(tensorProto.dims!);\r\n\r\n    const value = new Tensor(dims, type);\r\n\r\n    if
(type === 'string') {\r\n      // When it's STRING type, the value should always be stored in field\r\n      //
'stringData'\r\n      tensorProto.stringData!.forEach((str, i) => {\r\n        const buf = Buffer.from(str.buffer,
str.byteOffset, str.byteLength);\r\n        value.data[i] = buf.toString();\r\n      });\r\n\r\n    } else if (\r\n
tensorProto.rawData && typeof tensorProto.rawData.byteLength === 'number' &&\r\n
tensorProto.rawData.byteLength > 0) {\r\n      // NOT considering segment for now (IMPORTANT)\r\n\r\n      //
populate value from rawData\r\n      const dataDest = value.data;\r\n      const dataSource =\r\n          new
DataView(tensorProto.rawData.buffer, tensorProto.rawData.byteOffset, tensorProto.rawData.byteLength);\r\n
const elementSize = sizeofProto(tensorProto.dataType!);\r\n      const length = tensorProto.rawData.byteLength /
elementSize;\r\n\r\n      if (tensorProto.rawData.byteLength % elementSize !== 0) {\r\n        throw new Error('invalid
buffer length');\r\n      }\r\n      if (dataDest.length !== length) {\r\n        throw new Error('buffer length
mismatch');\r\n      }\r\n\r\n      for (let i = 0; i < length; i++) {\r\n        const n = readProto(dataSource,
tensorProto.dataType!, i * elementSize);\r\n        dataDest[i] = n;\r\n      }\r\n    } else {\r\n      // populate value from
array\r\n      let array: Array<number|Long>;\r\n      switch (tensorProto.dataType) {\r\n        case
onnx.TensorProto.DataType.FLOAT:\r\n          array = tensorProto.floatData!;\r\n          break;\r\n        case
onnx.TensorProto.DataType.INT32:\r\n        case onnx.TensorProto.DataType.INT16:\r\n        case
onnx.TensorProto.DataType.UINT16:\r\n        case onnx.TensorProto.DataType.INT8:\r\n        case
onnx.TensorProto.DataType.UINT8:\r\n        case onnx.TensorProto.DataType.BOOL:\r\n          array =
tensorProto.int32Data!;\r\n          break;\r\n        case onnx.TensorProto.DataType.INT64:\r\n          array =
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tensorProto.int64Data!;\r\n        break;\r\n      case onnx.TensorProto.DataType.DOUBLE:\r\n        array =
tensorProto.doubleData!;\r\n        break;\r\n      case onnx.TensorProto.DataType.UINT32:\r\n      case
onnx.TensorProto.DataType.UINT64:\r\n        array = tensorProto.uint64Data!;\r\n        break;\r\n      default:\r\n
    // should never run here\r\n        throw new Error('unspecific error');\r\n    }\r\n\r\n    if (array === null ||
array === undefined) {\r\n      throw new Error('failed to populate data from a tensorproto value');\r\n    }\r\n\r\n
const data = value.data;\r\n    if (data.length !== array.length) {\r\n      throw new Error('array length
mismatch');\r\n    }\r\n\r\n    for (let i = 0; i < array.length; i++) {\r\n      const element = array[i];\r\n      if
(Long.isLong(element)) {\r\n        data[i] = longToNumber(element, tensorProto.dataType);\r\n      } else {\r\n
  data[i] = element;\r\n      }\r\n    }\r\n  }\r\n\r\n  return value;\r\n  }\r\n\r\n  /**\r\n   * Construct new Tensor
from raw data\r\n   * @param data the raw data object. Should be a string array for 'string' tensor, and the
corresponding typed array\r\n   * for other types of tensor.\r\n   * @param dims the dimensions of the tensor\r\n   *
@param type the type of the tensor\r\n   */\r\n  static fromData(data: Tensor.DataTypeMap[Tensor.DataType], dims:
readonly number[], type: Tensor.DataType) {\r\n    return new Tensor(dims, type, undefined, undefined, data);\r\n
}\r\n\r\n  static fromOrtTensor(ortTensor: ortFbs.Tensor) {\r\n    if (!ortTensor) {\r\n      throw new Error('cannot
construct Value from an empty tensor');\r\n    }\r\n    const dims =
ProtoUtil.tensorDimsFromORTFormat(ortTensor);\r\n    const type =
ProtoUtil.tensorDataTypeFromProto(ortTensor.dataType());\r\n\r\n    const value = new Tensor(dims, type);\r\n\r\n
if (type === 'string') {\r\n      // When it's STRING type, the value should always be stored in field\r\n      //
'stringData'\r\n      for (let i = 0; i < ortTensor.stringDataLength(); i++) {\r\n        value.data[i] =
ortTensor.stringData(i);\r\n      }\r\n\r\n    } else if (\r\n        ortTensor.rawDataArray() && typeof
ortTensor.rawDataLength() === 'number' && ortTensor.rawDataLength() > 0) {\r\n      // NOT considering segment
for now (IMPORTANT)\r\n\r\n      // populate value from rawData\r\n      const dataDest = value.data;\r\n      const
dataSource = new DataView(\r\n          ortTensor.rawDataArray()!.buffer, ortTensor.rawDataArray()!.byteOffset,
ortTensor.rawDataLength());\r\n      const elementSize = sizeofProto(ortTensor.dataType());\r\n      const length =
ortTensor.rawDataLength() / elementSize;\r\n\r\n      if (ortTensor.rawDataLength() % elementSize !== 0) {\r\n
throw new Error('invalid buffer length');\r\n      }\r\n      if (dataDest.length !== length) {\r\n        throw new
Error('buffer length mismatch');\r\n      }\r\n\r\n      for (let i = 0; i < length; i++) {\r\n        const n =
readProto(dataSource, ortTensor.dataType(), i * elementSize);\r\n        dataDest[i] = n;\r\n      }\r\n    }\r\n    return
value;\r\n  }\r\n}\r\n\r\nfunction sizeof(type: Tensor.DataType): number {\r\n  switch (type) {\r\n    case 'bool':\r\n
case 'int8':\r\n    case 'uint8':\r\n      return 1;\r\n    case 'int16':\r\n    case 'uint16':\r\n      return 2;\r\n    case
'int32':\r\n    case 'uint32':\r\n    case 'float32':\r\n      return 4;\r\n    case 'float64':\r\n      return 8;\r\n    default:\r\n
throw new Error(`cannot calculate sizeof() on type ${type}`);\r\n  }\r\n}\r\n\r\nfunction sizeofProto(type:
onnx.TensorProto.DataType|ortFbs.TensorDataType): number {\r\n  switch (type) {\r\n    case
onnx.TensorProto.DataType.UINT8:\r\n    case onnx.TensorProto.DataType.INT8:\r\n    case
onnx.TensorProto.DataType.BOOL:\r\n      return 1;\r\n    case onnx.TensorProto.DataType.UINT16:\r\n    case
onnx.TensorProto.DataType.INT16:\r\n      return 2;\r\n    case onnx.TensorProto.DataType.FLOAT:\r\n    case
onnx.TensorProto.DataType.INT32:\r\n    case onnx.TensorProto.DataType.UINT32:\r\n      return 4;\r\n    case
onnx.TensorProto.DataType.INT64:\r\n    case onnx.TensorProto.DataType.DOUBLE:\r\n    case
onnx.TensorProto.DataType.UINT64:\r\n      return 8;\r\n    default:\r\n      throw new Error(`cannot calculate
sizeof() on type ${onnx.TensorProto.DataType[type]}`);\r\n  }\r\n}\r\n\r\nfunction createView(dataBuffer:
ArrayBuffer, type: Tensor.DataType) {\r\n  return new (dataviewConstructor(type))(dataBuffer);\r\n}\r\n\r\nfunction
dataviewConstructor(type: Tensor.DataType) {\r\n  switch (type) {\r\n    case 'bool':\r\n    case 'uint8':\r\n      return
Uint8Array;\r\n    case 'int8':\r\n      return Int8Array;\r\n    case 'int16':\r\n      return Int16Array;\r\n    case
'uint16':\r\n      return Uint16Array;\r\n    case 'int32':\r\n      return Int32Array;\r\n    case 'uint32':\r\n      return
Uint32Array;\r\n    case 'float32':\r\n      return Float32Array;\r\n    case 'float64':\r\n      return Float64Array;\r\n
default:\r\n      // should never run to here\r\n      throw new Error('unspecified error');\r\n  }\r\n}\r\n\r\n// convert a
long number to a 32-bit integer (cast-down)\r\nfunction longToNumber(i: Long, type:
onnx.TensorProto.DataType|ortFbs.TensorDataType): number {\r\n  // INT64, UINT32, UINT64\r\n  if (type ===
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onnx.TensorProto.DataType.INT64 || type === ortFbs.TensorDataType.INT64) {\r\n   if (i.greaterThanOrEqual(2147483648) || i.lessThan(-2147483648)) {\r\n   throw new TypeError('int64 is not supported');\r\n   }\r\n } else if (\r\n   type === onnx.TensorProto.DataType.UINT32 || type === ortFbs.TensorDataType.UINT32 ||\r\n   type === onnx.TensorProto.DataType.UINT64 || type === ortFbs.TensorDataType.UINT64) {\r\n   if (i.greaterThanOrEqual(4294967296) || i.lessThan(0)) {\r\n   throw new TypeError('uint64 is not supported');\r\n   }\r\n } else {\r\n   throw new TypeError(`not a LONG type: ${onnx.TensorProto.DataType[type]}`);\r\n }\r\n\r\n return i.toNumber();\r\n}\r\n\r\n// read one value from TensorProto\r\nfunction readProto(view: DataView, type: onnx.TensorProto.DataType|ortFbs.TensorDataType, byteOffset: number): number {\r\n switch (type) {\r\n   case onnx.TensorProto.DataType.BOOL:\r\n   case onnx.TensorProto.DataType.UINT8:\r\n   return view.getUint8(byteOffset);\r\n   case onnx.TensorProto.DataType.INT8:\r\n   return view.getInt8(byteOffset);\r\n   case onnx.TensorProto.DataType.UINT16:\r\n   return view.getUint16(byteOffset, true);\r\n   case onnx.TensorProto.DataType.INT16:\r\n   return view.getInt16(byteOffset, true);\r\n   case onnx.TensorProto.DataType.FLOAT:\r\n   return view.getFloat32(byteOffset, true);\r\n   case onnx.TensorProto.DataType.INT32:\r\n   return view.getInt32(byteOffset, true);\r\n   case onnx.TensorProto.DataType.UINT32:\r\n   return view.getUint32(byteOffset, true);\r\n   case onnx.TensorProto.DataType.INT64:\r\n   return longToNumber(\r\n Long.fromBits(view.getUint32(byteOffset, true), view.getUint32(byteOffset + 4, true), false), type);\r\n   case onnx.TensorProto.DataType.DOUBLE:\r\n   return view.getFloat64(byteOffset, true);\r\n   case onnx.TensorProto.DataType.UINT64:\r\n   return longToNumber(\r\n Long.fromBits(view.getUint32(byteOffset, true), view.getUint32(byteOffset + 4, true), true), type);\r\n   default:\r\n   throw new Error(`cannot read from DataView for type ${onnx.TensorProto.DataType[type]}`);\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {flatbuffers} from 'flatbuffers';\r\nimport Long from 'long';\r\nimport {onnx} from 'onnx-proto';\r\n\r\nimport {Graph} from './graph';\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\nimport {Tensor} from './tensor';\r\n\r\n// check the inputs shape before running an OP.\r\n// return true when the inputs pass the check\r\n// return false when the inputs do not fit the requirement\r\n// throw exception when fatal error or not implemented\r\nexport function checkInputsShape(inputs: Tensor[], ...expectedDimensions: number[]): boolean {\r\n if (!inputs || inputs.length !== expectedDimensions.length) {\r\n   return false;\r\n }\r\n for (let i = 0; i < inputs.length; i++) {\r\n   if (!inputs[i].dims || inputs[i].dims.length !== expectedDimensions[i]) {\r\n   return false;\r\n   }\r\n }\r\n return true;\r\n}\r\n\r\n// Evaluates the given expression and asserts error message if condition is unmet.\r\nexport function assert(expr: boolean, msg: () => string) {\r\n if (!expr) {\r\n   throw new Error(typeof msg === 'string' ? msg : msg());\r\n }\r\n}\r\n\r\nexport class ArrayUtil {\r\n /**\r\n   * Verifies if 2 input arrays contain the same elements.\r\n   * @param n1 Array 1\r\n   * @param n2 Array 2\r\n   * @returns Whether these 2 are equal\r\n   */\r\n static arraysEqual(\r\n   n1: readonly number[]|Int8Array|Uint8Array|Int16Array|Uint16Array|Int32Array|Uint32Array|Uint8ClampedArray|\r\n   Float32Array|Float64Array,\r\n   n2: readonly number[]|Int8Array|Uint8Array|Int16Array|Uint16Array|Int32Array|Uint32Array|Uint8ClampedArray|\r\n   Float32Array|Float64Array) {\r\n   if (n1.length !== n2.length) {\r\n   return false;\r\n   }\r\n   for (let i = 0; i < n1.length; i++) {\r\n   if (n1[i] !== n2[i]) {\r\n   return false;\r\n   }\r\n   }\r\n   return true;\r\n }\r\n}\r\n\r\nexport class MatMulUtil {\r\n /**\r\n   * Fix the input shapes for MatMul operation if they need fixing\r\n   * @param dimsA The shape of tensor A. Should be an array of positive integers\r\n   * @param dimsB The shape of tensor B. Should be an array of positive integers\r\n   * @returns A tuple containing the preprocessed input shapes as required by ONNX specifications\r\n   */\r\n static preprocessInputShapes(dimsA: readonly number[], dimsB: readonly number[]):\r\n   [readonly number[], readonly number[]] {\r\n   // If the first argument is 1-D, it is promoted to a matrix by prepending\r\n   // a 1 to its dimensions. After matrix multiplication the prepended 1 is\r\n   // removed.\r\n   const a = (dimsA.length === 1) ? [1, dimsA[0]] : dimsA;\r\n\r\n   // If the second argument is 1-D, it is promoted to a matrix by appending\r\n   // a 1 to its dimensions. After matrix

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multiplication the appended 1 is\r\n    // removed.\r\n    const b = (dimsB.length === 1) ? [dimsB[0], 1] :
dimsB;\r\n\r\n    return [a, b];\r\n  }\r\n\r\n  /**\r\n   * Fix the output shape computed for MatMul operation if it
needs fixing\r\n   * @param outputShape The computed outputShape. Should be an array (atleast of length 2) of
positive integers.\r\n   * This will be mutated.\r\n   * @param aRank The rank of tensor A.\r\n   * @param bRank
The rank of tensor B.\r\n   */\r\n  static postprocessOutputShape(outputShape: number[], aRank: number, bRank:
number) {\r\n    // Remove prepended dimension if first input is 1d\r\n    if (aRank === 1) {\r\n      // outputShape =
outputShape.slice(0, outputShape.length - 2).concat(outputShape.slice(outputShape.length - 1));\r\n
outputShape.splice(outputShape.length - 2, 1);\r\n    }\r\n    // Remove appended dimension if second input is 1d\r\n
if (bRank === 1) {\r\n      outputShape.pop();\r\n    }\r\n  }\r\n\r\n  /**\r\n   * Calculate the expected shape when
matrix multiplication\r\n   * @param a The shape of tensor A. Should be a tuple of 2 positive integers\r\n   *
@param b The shape of tensor B. Should be a tuple of 2 positive integers\r\n   * @returns The expected shape of the
result, or undefined if N/A\r\n   */\r\n  static calcMatMulShape(a: [number, number], b: [number, number]):
[number, number]|undefined {\r\n    return (a[1] !== b[0]) ? undefined : [a[0], b[1]];\r\n  }\r\n}\r\n\r\nexport class
BroadcastUtil {\r\n  /**\r\n   * Calculate the expected shape when broadcasting 2 tensors\r\n   * @param a The
shape of tensor A. Should be an array of positive integers\r\n   * @param b The shape of tensor B. Should be an
array of positive integers\r\n   * @param isMatMul Whether the operation is MatMul\r\n   * @returns The expected
shape of the result, or undefined if N/A\r\n   */\r\n  static calcShape(adims: readonly number[], bdims: readonly
number[], isMatMul = false): readonly number[]|undefined {\r\n    const arank = adims.length;\r\n    const brank =
bdims.length;\r\n    if (arank === 0) {\r\n      return bdims;\r\n    }\r\n    if (brank === 0) {\r\n      return adims;\r\n
}\r\n    const crank = Math.max(adims.length, bdims.length);\r\n    const cdims = new
Array<number>(crank);\r\n\r\n    // calculate the last 2 dimension if it is MatMul\r\n    if (isMatMul) {\r\n      if
(arank < 2 || brank < 2) {\r\n        return undefined;\r\n      }\r\n      const cShapeMatMul =\r\n
MatMulUtil.calcMatMulShape([adims[arank - 2], adims[arank - 1]], [bdims[brank - 2], bdims[brank - 1]]);\r\n      if
(cShapeMatMul === undefined) {\r\n        return undefined;\r\n      }\r\n      [cdims[crank - 2], cdims[crank - 1]] =
cShapeMatMul;\r\n    }\r\n\r\n    for (let i = isMatMul ? 3 : 1; i <= crank; i++) {\r\n      const aLen = arank - i < 0 ? 1
: adims[arank - i];\r\n      const bLen = brank - i < 0 ? 1 : bdims[brank - i];\r\n\r\n      if (aLen !== bLen && aLen > 1
&& bLen > 1) {\r\n        return undefined;\r\n      }\r\n      cdims[crank - i] = Math.max(aLen, bLen);\r\n    }\r\n\r\n
return cdims;\r\n  }\r\n\r\n  /**\r\n   * Given the indices of a broadcasted tensor, calculate the original indices\r\n   *
@param broadcastedIndices The given indices of the broadcasted tensor.\r\n   * @param originalShape The original
shape of the tensor before broadcas\r\n   * @returns The calculated indices that maps to the original tensor.\r\n
*/\r\n  static index(broadcastedIndices: readonly number[], originalShape: readonly number[]): number[] {\r\n    //
NOTE 1: we assume the parameter broadcastedIndices is valid. ie. it should have the same\r\n    // length as the
broadcasted shape, and for each dimension the index should\r\n    // not be out of range.\r\n    const originalIndices =
new Array(originalShape.length);\r\n    BroadcastUtil.fillIndex(broadcastedIndices, originalShape,
originalIndices);\r\n    return originalIndices;\r\n  }\r\n\r\n  /**\r\n   * Given the indices of a broadcasted tensor,
calculate the original indices\r\n   * @param broadcastedIndices The given indices of the broadcasted tensor.\r\n   *
@param originalShape The original shape of the tensor before broadcast\r\n   * @param originalIndices The
mapping of broadcastedIndices to the originalIndices (output parameter - will be\r\n   *     mutated).\r\n   */\r\n
static fillIndex(broadcastedIndices: readonly number[], originalShape: readonly number[], originalIndices:
number[]) {\r\n    // NOTE 1: we assume the parameter broadcastedIndices is valid. ie. it should have the same
length as the\r\n    // broadcasted shape, and for each dimension the index should not be out of range.\r\n    // NOTE
2: we assume the parameter originalIndices has the same length as the originalShape\r\n    const dimOffset =
broadcastedIndices.length - originalShape.length;\r\n    for (let i = 0; i < originalShape.length; i++) {\r\n
originalIndices[i] = broadcastedIndices[dimOffset + i] % originalShape[i];\r\n    }\r\n  }\r\n\r\n  /**\r\n   * Perform
the broadcasting operation on the specific operator\r\n   * @param a The input tensor A\r\n   * @param b The input
tensor B\r\n   * @param op The operator lambda function\r\n   * @param inplace Whether to write the result back to
A.\r\n   * @returns The result tensor, or undefined if input not broadcastable.\r\n   */\r\n  static calc(\r\n      a:
Tensor, b: Tensor, op: (a: string|number, b: string|number) => (string | number), inplace: boolean,\r\n
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resultType?: Tensor.DataType): Tensor|undefined {\r\n   const outputShape = BroadcastUtil.calcShape(a.dims, b.dims);\r\n\r\n   if (outputShape) {\r\n   if (inplace && !ShapeUtil.areEqual(outputShape, a.dims)) {\r\n   // B is not broadcastable to A, failed to calculate inplace.\r\n   return undefined;\r\n   }\r\n\r\n   const size = ShapeUtil.size(outputShape);\r\n   const c = inplace ? a : new Tensor(outputShape, resultType || a.type);\r\n\r\n   // both inputs are scalars\r\n   if (outputShape.length === 0) {\r\n   c.set([], op(a.get([]), b.get([])));\r\n   }\r\n\r\n   // atleast one input is a non-scalar\r\n   else {\r\n   const outputIndices = new Array<number>(outputShape.length);\r\n   const originalIndicesA = new Array(a.dims.length);\r\n   const originalIndicesB = new Array(b.dims.length);\r\n   let valA: string|number = 0;\r\n   let valB: string|number = 0;\r\n   let isAScalar = false;\r\n   let isBScalar = false;\r\n   if (a.dims.length === 0) {\r\n   valA = a.get([]);\r\n   isAScalar = true;\r\n   }\r\n   if (b.dims.length === 0) {\r\n   valB = b.get([]);\r\n   isBScalar = true;\r\n   }\r\n   let rest: number;\r\n   for (let i = 0; i < size; i++) {\r\n   // traversal indices\r\n   rest = i;\r\n   for (let j = outputShape.length - 1; j >= 0; j--) {\r\n   outputIndices[j] = rest % outputShape[j];\r\n   rest = Math.floor(rest / outputShape[j]);\r\n   }\r\n\r\n   if (!isAScalar) {\r\n   // map outputIndices (which is actually broadcasted) to the originalIndices\r\n   BroadcastUtil.fillIndex(outputIndices, a.dims, originalIndicesA);\r\n   valA = a.get(originalIndicesA);\r\n   }\r\n   if (!isBScalar) {\r\n   BroadcastUtil.fillIndex(outputIndices, b.dims, originalIndicesB);\r\n   valB = b.get(originalIndicesB);\r\n   }\r\n\r\n   c.set(outputIndices, op(valA, valB));\r\n   }\r\n   }\r\n\r\n   return c;\r\n   }\r\n\r\n   return undefined;\r\n }\r\n\r\n /**\r\n   * Determine if a shape is unidirectional broadcastable to another shape\r\n   * @param shape The input shape\r\n   * @param finalShape The desired shape after broadcasting\r\n   */\r\n static isValidBroadcast(shape: readonly number[], finalShape: readonly number[]): boolean {\r\n   // align shape to the right\r\n   const inputRank = shape.length;\r\n   const finalRank = finalShape.length;\r\n   if (inputRank > finalRank) {\r\n   return false;\r\n   }\r\n   for (let i = 1; i <= inputRank; i++) {\r\n   if (shape[inputRank - i] !== 1 && shape[inputRank - i] !== finalShape[finalRank - i]) {\r\n   return false;\r\n   }\r\n   }\r\n   return true;\r\n }\r\n\r\n /**\r\n   * Determine the broadcasted dims in input shape based on the given output shape.\r\n   * Note that this function only returns the broadcasted dims.\r\n   * @param inputShape The input shape\r\n   * @param outputShape The output shape\r\n   * @returns The broadcasted dims in input shape.\r\n   */\r\n static getBroadcastDims(inputShape: readonly number[], outputShape: readonly number[]): number[] {\r\n   const inRank = inputShape.length;\r\n   const dims: number[] = [];\r\n   for (let i = 0; i < inRank; i++) {\r\n   const dim = inRank - 1 - i;\r\n   const a = inputShape[dim] || 1;\r\n   const b = outputShape[outputShape.length - 1 - i] || 1;\r\n   if (b > 1 && a === 1) {\r\n   dims.unshift(dim);\r\n   }\r\n   }\r\n   return dims;\r\n }\r\n}\r\n\r\n// copy array helper\r\n// mimics memcpy as much as possible\r\nexport function arrayCopyHelper(\r\n   target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number, sourceIndex: number,\r\n   blockSize: number) {\r\n if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n   throw new Error('sourceIndex out of bounds');\r\n }\r\n if (targetIndex < 0 || targetIndex >= target.length) {\r\n   throw new Error('targetIndex out of bounds');\r\n }\r\n if (sourceIndex + blockSize > source.length) {\r\n   throw new Error('source indices to be copied are outside bounds');\r\n }\r\n if (targetIndex + blockSize > target.length) {\r\n   throw new Error('target array is too small to hold result');\r\n }\r\n\r\n for (let offset = 0; offset < blockSize; offset++) {\r\n   target[targetIndex + offset] = source[sourceIndex + offset];\r\n }\r\n}\r\n\r\nexport class GemmUtil {\r\n // will make sure input shapes are compatible for this op\r\n // and return back the shape of the output in the form of a tuple\r\n // will throw exception if the input shapes are not compatible\r\n static getShapeOfGemmResult(\r\n   leftShape: readonly number[], transLeft: boolean, rightShape: readonly number[], transRight: boolean,\r\n   biasShape?: readonly number[]): readonly number[] {\r\n   if (leftShape.length !== 2 || rightShape.length !== 2) {\r\n   throw new Error('shape need to be of size 2');\r\n   }\r\n\r\n   let M: number;\r\n   let K: number;\r\n   let N: number;\r\n\r\n   if (transLeft) {\r\n   M = leftShape[1];\r\n   K = leftShape[0];\r\n   } else {\r\n   M = leftShape[0];\r\n   K = leftShape[1];\r\n   }\r\n\r\n   let kDim = -1;\r\n\r\n   if (transRight) {\r\n   N = rightShape[0];\r\n   kDim = 1;\r\n   } else {\r\n   N = rightShape[1];\r\n   kDim = 0;\r\n   }\r\n\r\n   if (rightShape[kDim] !== K) {\r\n   throw new Error('dimension mismatch');\r\n   }\r\n\r\n   if (M <= 0 || N <= 0 || K <= 0) {\r\n   throw new Error('invalid shape specified');\r\n

}\r\n\r\n   if (biasShape && !BroadcastUtil.isValidBroadcast(biasShape, [M, N])) {\r\n   throw new Error('gemm: invalid bias shape for broadcast');\r\n   }\r\n\r\n   return [M, N, K];\r\n }\r\n}\r\n\r\nexport class ProtoUtil {\r\n static tensorDataTypeFromProto(typeProto: onnx.TensorProto.DataType|\r\n onnxruntime.experimental.fbs.TensorDataType): Tensor.DataType {\r\n   switch (typeProto) {\r\n   case onnx.TensorProto.DataType.INT8:\r\n   return 'int8';\r\n   case onnx.TensorProto.DataType.UINT8:\r\n   return 'uint8';\r\n   case onnx.TensorProto.DataType.BOOL:\r\n   return 'bool';\r\n   case onnx.TensorProto.DataType.INT16:\r\n   return 'int16';\r\n   case onnx.TensorProto.DataType.UINT16:\r\n   return 'uint16';\r\n   case onnx.TensorProto.DataType.INT32:\r\n   return 'int32';\r\n   case onnx.TensorProto.DataType.UINT32:\r\n   return 'uint32';\r\n   case onnx.TensorProto.DataType.FLOAT:\r\n   return 'float32';\r\n   case onnx.TensorProto.DataType.DOUBLE:\r\n   return 'float64';\r\n   case onnx.TensorProto.DataType.STRING:\r\n   return 'string';\r\n\r\n   // For INT64/UINT64, reduce their value to 32-bits.\r\n   // Should throw exception when overflow\r\n   case onnx.TensorProto.DataType.INT64:\r\n   return 'int32';\r\n   case onnx.TensorProto.DataType.UINT64:\r\n   return 'uint32';\r\n\r\n   default:\r\n   throw new Error(`unsupported data type: ${onnx.TensorProto.DataType[typeProto]}`);\r\n   }\r\n }\r\n\r\n static tensorDataTypeStringToEnum(type: string): onnx.TensorProto.DataType {\r\n   switch (type) {\r\n   case 'int8':\r\n   return onnx.TensorProto.DataType.INT8;\r\n   case 'uint8':\r\n   return onnx.TensorProto.DataType.UINT8;\r\n   case 'bool':\r\n   return onnx.TensorProto.DataType.BOOL;\r\n   case 'int16':\r\n   return onnx.TensorProto.DataType.INT16;\r\n   case 'uint16':\r\n   return onnx.TensorProto.DataType.UINT16;\r\n   case 'int32':\r\n   return onnx.TensorProto.DataType.INT32;\r\n   case 'uint32':\r\n   return onnx.TensorProto.DataType.UINT32;\r\n   case 'float32':\r\n   return onnx.TensorProto.DataType.FLOAT;\r\n   case 'float64':\r\n   return onnx.TensorProto.DataType.DOUBLE;\r\n   case 'string':\r\n   return onnx.TensorProto.DataType.STRING;\r\n   case 'int64':\r\n   return onnx.TensorProto.DataType.INT64;\r\n   case 'uint64':\r\n   return onnx.TensorProto.DataType.UINT64;\r\n\r\n   default:\r\n   throw new Error(`unsupported data type: ${type}`);\r\n   }\r\n }\r\n\r\n static tensorDimsFromProto(dims: Array<number|Long>): number[] {\r\n   // get rid of Long type for dims\r\n   return dims.map(d => Long.isLong(d) ? d.toNumber() : d);\r\n }\r\n\r\n static tensorValueTypeFromProto(valueType: onnx.TypeProto.ITensor): Graph.ValueType {\r\n   return {\r\n   tensorType: ProtoUtil.tensorDataTypeFromProto(valueType.elemType!),\r\n   shape: {dims: ProtoUtil.tensorDimsFromProto(valueType.shape!.dim!.map(d => d.dimValue!))}\r\n   };\r\n }\r\n\r\n static tensorDimsFromORTFormat(tensor: onnxruntime.experimental.fbs.Tensor) {\r\n   const dims = [];\r\n   for (let i = 0; i < tensor.dimsLength(); i++) {\r\n   dims.push(LongUtil.longToNumber(tensor.dims(i)!));\r\n   }\r\n   return dims;\r\n }\r\n\r\n static tensorAttributesFromORTFormat(node: onnxruntime.experimental.fbs.Node) {\r\n   const attributes = [];\r\n   for (let i = 0; i < node.attributesLength(); i++) {\r\n   attributes.push(node.attributes(i)!);\r\n   }\r\n   return attributes;\r\n }\r\n}\r\n\r\nexport class LongUtil {\r\n static longToNumber(n: Long|flatbuffers.Long|number) {\r\n   if (Long.isLong(n)) {\r\n   return n.toNumber();\r\n   } else if (n instanceof flatbuffers.Long) {\r\n   return Long.fromValue({low: n.low, high: n.high, unsigned: true}).toNumber();\r\n   }\r\n   return n;\r\n }\r\n static isLong(n: unknown) {\r\n   return Long.isLong(n) || n instanceof flatbuffers.Long;\r\n }\r\n}\r\n\r\nexport class ShapeUtil {\r\n static size(dims: readonly number[]): number {\r\n   return ShapeUtil.getSizeFromDimensionRange(dims, 0, dims.length);\r\n }\r\n\r\n // `axis` inclusive\r\n static sizeFromDimension(dims: readonly number[], axis: number): number {\r\n   if (axis < 0 || axis > dims.length) {\r\n   throw new Error(`invalid dimension of ${axis} for sizeFromDimension as Tensor has ${dims.length} dimensions.`);\r\n   }\r\n   return ShapeUtil.getSizeFromDimensionRange(dims, axis, dims.length);\r\n }\r\n\r\n // `axis` exclusive\r\n static sizeToDimension(dims: readonly number[], axis: number): number {\r\n   if (axis < 0 || axis > dims.length) {\r\n   throw new Error(`invalid dimension of ${axis} for sizeToDimension as Tensor has ${dims.length} dimensions.`);\r\n   }\r\n   return ShapeUtil.getSizeFromDimensionRange(dims, 0, axis);\r\n }\r\n\r\n static getSizeFromDimensionRange(dims: readonly number[], start: number, end: number): number {\r\n   let size = 1;\r\n   for (let i = start; i < end; i++) {\r\n   // safety check as this method is called by multiple other methods requiring size.\r\n   // size cannot be 0 or negative.\r\n   if (dims[i] <= 0) {\r\n   throw new Error(\r\n

// eslint-disable-next-line max-len\r\n 'cannot get valid size from specified dimension range. Most likely the range contains 0 or negative values in them.');\r\n }\r\n size *= dims[i];\r\n }\r\n return size;\r\n }\r\n\r\n static computeStrides(dims: readonly number[]): readonly number[] {\r\n const rank = dims.length;\r\n if (rank === 0) {\r\n return [];\r\n } else if (rank === 1) {\r\n return [1];\r\n }\r\n const strides = new Array(rank);\r\n strides[rank - 1] = 1;\r\n strides[rank - 2] = dims[rank - 1];\r\n for (let i = rank - 3; i >= 0; --i) {\r\n strides[i] = strides[i + 1] * dims[i + 1];\r\n }\r\n return strides;\r\n }\r\n\r\n static transpose(dims: readonly number[]): readonly number[] {\r\n const copy = dims.slice();\r\n return copy.reverse();\r\n }\r\n\r\n static indicesToOffset(indices: readonly number[], strides: readonly number[], axis?: number): number {\r\n if (axis === undefined) {\r\n axis = indices.length;\r\n }\r\n let offset = 0;\r\n for (let i = 0; i < axis; ++i) {\r\n offset += strides[i] * indices[i];\r\n }\r\n return offset;\r\n }\r\n\r\n static offsetToIndices(offset: number, strides: readonly number[]): readonly number[] {\r\n const rank = strides.length;\r\n if (rank === 0) {\r\n return [];\r\n } else if (rank === 1) {\r\n return [offset * strides[0]];\r\n }\r\n const indices: number[] = new Array(strides.length);\r\n for (let i = 0; i < indices.length - 1; ++i) {\r\n indices[i] = Math.floor(offset / strides[i]);\r\n offset -= indices[i] * strides[i];\r\n }\r\n indices[indices.length - 1] = offset;\r\n return indices;\r\n }\r\n\r\n /**\r\n * normailze axis of range [-r, r) into [0, r).\r\n */\r\n static normalizeAxis(axis: number, tensorRank: number): number {\r\n if (axis < -tensorRank && axis >= tensorRank) {\r\n throw new Error('unsupported axis for this operation.');\r\n }\r\n return axis < 0 ? axis + tensorRank : axis;\r\n }\r\n\r\n static normalizeAxes(axes: readonly number[], tensorRank: number): number[] {\r\n return axes.map(x => this.normalizeAxis(x, tensorRank));\r\n }\r\n\r\n // Increment an index into a tensor (in lexicographic\r\n // ordering), wrapping around the specified upper_bound.\r\n /**\r\n * Increment an index into a tensor (in lexicographic ordering), wrapping around the specified upper_bound.\r\n * @param index Given index to increment (Will be mutated)\r\n * @param dims The dimensions of the tensor for which the given index corresponds to\r\n * @param axisToIncrementOn The 1-indexed axis to increment on. If undefined, axisToIncrementOn == rank\r\n */\r\n static incrementIndex(index: number[], dims: readonly number[], axisToIncrementOn?: number) {\r\n if (dims.length === 0 || index.length === 0) {\r\n throw new Error('Index incrementing unsupported for scalar Tensor');\r\n }\r\n if (axisToIncrementOn === undefined) {\r\n axisToIncrementOn = dims.length;\r\n } else {\r\n if (axisToIncrementOn <= 0 || axisToIncrementOn > dims.length) {\r\n throw new Error('Incorrect axis to increment on');\r\n }\r\n }\r\n\r\n for (let k = axisToIncrementOn - 1; k >= 0; --k) {\r\n index[k]++;\r\n if (index[k] < dims[k]) {\r\n break;\r\n }\r\n index[k] = 0;\r\n }\r\n }\r\n\r\n /**\r\n * Produces a new dimensions array based on the values in the 'originalDimensions' and 'shape' array\r\n * Used in Reshape\r\n * @param originalDims Original Shape array\r\n * @param shapeHints array containing values to compute the new dimensions\r\n * For example:\r\n * originalDims = [2,2] and shapeHints = [0,-1] will return [2,2]\r\n * originalDims = [2,2] and shapeHints = [4] will return [4]\r\n * originalDims = [2,2] and shapeHints = [5] will throw an exception\r\n * https://github.com/onnx/onnx/blob/master/docs/Operators.md#Reshape\r\n */\r\n\r\n static calculateReshapedDims(originalDims: readonly number[], shapeHints: ArrayLike<number>): number[] {\r\n // reshape to a Scalar Tensor\r\n if (shapeHints.length === 0) {\r\n if (originalDims.length === 0 || ShapeUtil.size(originalDims) === 1) {\r\n return [];\r\n } else {\r\n throw new Error('cannot reshape to a scalar Tensor');\r\n }\r\n }\r\n\r\n const nDims = shapeHints.length;\r\n const reshapedDims = new Array<number>(nDims);\r\n let unknownDimension = -1;\r\n let newTensorSize = 1;\r\n for (let i = 0; i < nDims; i++) {\r\n if (shapeHints[i] < -1) {\r\n throw new Error('a dimension in shape hints cannot be less than -1');\r\n }\r\n if (shapeHints[i] === -1) {\r\n if (unknownDimension !== -1) {\r\n throw new Error('at most one dimension in shape hints can be -1');\r\n }\r\n unknownDimension = i;\r\n } else {\r\n if (shapeHints[i] === 0) {\r\n if (i >= originalDims.length) {\r\n throw new Error('the dimension with value zero exceeds the dimension size of the input tensor');\r\n }\r\n reshapedDims[i] = originalDims[i];\r\n } else {\r\n reshapedDims[i] = shapeHints[i];\r\n }\r\n newTensorSize *= reshapedDims[i];\r\n }\r\n }\r\n\r\n const oldTensorSize = ShapeUtil.size(originalDims);\r\n if (unknownDimension !== -1) {\r\n if (oldTensorSize % newTensorSize !== 0) {\r\n throw new Error(`the input tensor cannot be reshaped to the requested shape. Input shape: [${\r\n            originalDims}] Output shape: [${shapeHints}]`);\r\n   }\r\n   reshapedDims[unknownDimension] = oldTensorSize / newTensorSize;\r\n   }\r\n   // validate sizes from originalDims and reshapedDims match\r\n   else {\r\n   if (newTensorSize !== oldTensorSize) {\r\n   throw new Error('reshapedDims and originalDims don\\'t have matching sizes');\r\n   }\r\n   }\r\n   return reshapedDims;\r\n }\r\n\r\n /**\r\n   * Sorts a given array based on the indices in the Perm array\r\n   * Used in Transpose\r\n   * @param a Array to be sorted such as dims or strides\r\n   * @param perm Perm given; if null a will be reversed\r\n   */\r\n static sortBasedOnPerm(a: readonly number[], perm?: readonly number[]): readonly number[] {\r\n   if (perm) {\r\n   return perm.map((v) => a[v]);\r\n   } else {\r\n   return a.slice().reverse();\r\n   }\r\n }\r\n\r\n /**\r\n   * Pads a given shape according to the padding values\r\n   * @param dims shape of the Tensor to be padded\r\n   * @param pad pad values\r\n   */\r\n static padShape(dims: readonly number[], pad: readonly number[]): readonly number[] {\r\n   const rank = dims.length;\r\n   return dims.map((v, i) => v + pad[i] + pad[i + rank]);\r\n }\r\n\r\n /**\r\n   * Determines if the two shapes are identical\r\n   * @param shape1\r\n   * @param shape2\r\n   */\r\n static areEqual(shape1: readonly number[], shape2: readonly number[]): boolean {\r\n   if (shape1.length !== shape2.length) {\r\n   return false;\r\n   }\r\n   return shape1.every((v, i) => v === shape2[i]);\r\n }\r\n\r\n /**\r\n   * Validates if the given `dims` or `shape` is valid in ONNX.js context and returns data size\r\n   * @param dims - input `dims` that needs to be checked\r\n   */\r\n static validateDimsAndCalcSize(dims: readonly number[]): number {\r\n   if (dims.length > 6) {\r\n   throw new TypeError('Only rank 0 to 6 is supported for tensor shape.');\r\n   }\r\n   let size = 1;\r\n   for (const n of dims) {\r\n   if (!Number.isInteger(n)) {\r\n   throw new TypeError(`Invalid shape: ${n} is not an integer`);\r\n   }\r\n   if (n < 0 || n > 2147483647) {\r\n   throw new TypeError(`Invalid shape: length ${n} is not allowed`);\r\n   }\r\n   size *= n;\r\n   }\r\n   return size;\r\n }\r\n\r\n /**\r\n   * Determines the shape of output tensor y = flatten(x, axis)\r\n   * @param dims - shape of input tensor\r\n   * @param axis - flatten axis, in the range [-r, r]\r\n   */\r\n static flattenShape(dims: readonly number[], axis: number): readonly number[] {\r\n   if (axis < 0) {\r\n   axis += dims.length;\r\n   }\r\n   const total = dims.reduce((x, y) => x * y, 1);\r\n   const right = dims.slice(axis).reduce((x, y) => x * y, 1);\r\n   const outputDims = [total / right, right];\r\n\r\n   return outputDims;\r\n }\r\n\r\n /**\r\n   * Determines the shape of output tensor y = squeeze(x, axes)\r\n   * @param dims - shape of input tensor\r\n   * @param axes - squeeze axes\r\n   */\r\n static squeezeShape(dims: readonly number[], axes: readonly number[]): readonly number[] {\r\n   const outputDims = new Array<number>();\r\n\r\n   // sanity check\r\n   axes = ShapeUtil.normalizeAxes(axes, dims.length);\r\n\r\n   for (let i = 0; i < dims.length; i++) {\r\n   const inSqueezeList = axes.indexOf(i) >= 0;\r\n   if (inSqueezeList && dims[i] !== 1) {\r\n   throw new Error('squeeze an axis of size different than 1');\r\n   }\r\n\r\n   if ((axes.length === 0 && dims[i] > 1) || (axes.length > 0 && !inSqueezeList)) {\r\n   outputDims.push(dims[i]);\r\n   }\r\n   }\r\n\r\n   return outputDims;\r\n }\r\n\r\n /**\r\n   * Determines the shape of output tensor y = unsqueeze(x, axes)\r\n   * @param dims - shape of input tensor\r\n   * @param axes - unsqueeze axes\r\n   */\r\n static unsqueezeShape(dims: readonly number[], axes: readonly number[]): readonly number[] {\r\n   const outputDims = new Array<number>(dims.length + axes.length);\r\n\r\n   // initialize the array elements to 0\r\n   outputDims.fill(0);\r\n\r\n   // set all axes indices to 1 in outputDims and check for duplicates\r\n   for (let i = 0; i < axes.length; i++) {\r\n   const axis = ShapeUtil.normalizeAxis(axes[i], dims.length);\r\n   if (axis >= outputDims.length) {\r\n   throw new Error('\\'axes\\' has an out of range axis');\r\n   }\r\n   if (outputDims[axis] !== 0) {\r\n   throw new Error('\\'axes\\' has a duplicate axis');\r\n   }\r\n\r\n   outputDims[axis] = 1;\r\n   }\r\n\r\n   // fill in the zero entries of outputDims with the input tensor's shape\r\n   let inputDimsIterator = 0;\r\n   for (let i = 0; i < outputDims.length; i++) {\r\n   if (outputDims[i] === 0) {\r\n   outputDims[i] = dims[inputDimsIterator++];\r\n   }\r\n   }\r\n\r\n   // sanity check assertion. 'inputDimsIterator'\r\n   // should be equal to the length of 'dims'\r\n   if (inputDimsIterator !== dims.length) {\r\n   throw new Error('the unsqueezed dimension could not be established');\r\n   }\r\n\r\n   return outputDims;\r\n }\r\n}\r\n\r\n// bunch of helper methods that do a variety of math operations\r\nexport class MathUtil {\r\n // y = (x*x) + y\r\n static sqr(\r\n   target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number, sourceIndex: number,\r\n   blockSize: number) {\r\n   if (sourceIndex < 0 || sourceIndex >=

source.length) {\r\n   throw new Error('sourceIndex out of bounds');\r\n   }\r\n   if (targetIndex < 0 || targetIndex >= target.length) {\r\n   throw new Error('targetIndex out of bounds');\r\n   }\r\n   if (sourceIndex + blockSize > source.length) {\r\n   throw new Error('source indices to be copied are outside bounds');\r\n   }\r\n   if (targetIndex + blockSize > target.length) {\r\n   throw new Error('target array is too small to hold result');\r\n   }\r\n\r\n   for (let offset = 0; offset < blockSize; offset++) {\r\n   target[targetIndex + offset] += Math.pow(source[sourceIndex + offset], 2);\r\n   }\r\n }\r\n\r\n // y = ax + y\r\n static axpy(\r\n   target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number, sourceIndex: number,\r\n   blockSize: number, alpha: number) {\r\n   if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n   throw new Error('sourceIndex out of bounds');\r\n   }\r\n   if (targetIndex < 0 || targetIndex >= target.length) {\r\n   throw new Error('targetIndex out of bounds');\r\n   }\r\n   if (sourceIndex + blockSize > source.length) {\r\n   throw new Error('source indices to be copied are outside bounds');\r\n   }\r\n   if (targetIndex + blockSize > target.length) {\r\n   throw new Error('target array is too small to hold result');\r\n   }\r\n\r\n   for (let offset = 0; offset < blockSize; offset++) {\r\n   target[targetIndex + offset] += (alpha * source[sourceIndex + offset]);\r\n   }\r\n }\r\n\r\n // y = pow(x, b)\r\n static powx(\r\n   target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number, sourceIndex: number,\r\n   blockSize: number, b: number) {\r\n   if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n   throw new Error('sourceIndex out of bounds');\r\n   }\r\n   if (targetIndex < 0 || targetIndex >= target.length) {\r\n   throw new Error('targetIndex out of bounds');\r\n   }\r\n   if (sourceIndex + blockSize > source.length) {\r\n   throw new Error('source indices to be copied are outside bounds');\r\n   }\r\n   if (targetIndex + blockSize > target.length) {\r\n   throw new Error('target array is too small to hold result');\r\n   }\r\n\r\n   for (let offset = 0; offset < blockSize; offset++) {\r\n   target[targetIndex + offset] = Math.pow(source[sourceIndex + offset], b);\r\n   }\r\n }\r\n\r\n // y = x * y\r\n static mul(\r\n   target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number, sourceIndex: number,\r\n   blockSize: number) {\r\n   if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n   throw new Error('sourceIndex out of bounds');\r\n   }\r\n   if (targetIndex < 0 || targetIndex >= target.length) {\r\n   throw new Error('targetIndex out of bounds');\r\n   }\r\n   if (sourceIndex + blockSize > source.length) {\r\n   throw new Error('source indices to be copied are outside bounds');\r\n   }\r\n   if (targetIndex + blockSize > target.length) {\r\n   throw new Error('target array is too small to hold result');\r\n   }\r\n\r\n   for (let offset = 0; offset < blockSize; offset++) {\r\n   target[targetIndex + offset] = (source[sourceIndex + offset] * target[targetIndex + offset]);\r\n   }\r\n }\r\n}\r\n\r\nexport class SplitUtil {\r\n /**\r\n   * Calculates new Shapes from existing one and the splits given along the axis provides\r\n   * @param dims Shape of the Tensor to be splitted into two or more Shapes\r\n   * @param axis The dimension along which the Tensor will be split\r\n   * @param splits Offsets for the start of each split\r\n   */\r\n static splitShape(dims: readonly number[], axis: number, split: number[], numOutputs?: number):\r\n   [number[][], number[]] {\r\n   if (split.length === 0) {\r\n   if (!numOutputs) {\r\n   throw new Error('need to know number of outputs when the \\'split\\' attribute is not specified');\r\n   }\r\n   SplitUtil.determineSplit(dims[axis], numOutputs, split);\r\n   }\r\n\r\n   const shapes: number[][] = [];\r\n   const offsets = [0];\r\n   for (let i = 0; i < split.length; ++i) {\r\n   if (i !== 0) {\r\n   offsets.push(offsets[i - 1] + split[i - 1]);\r\n   }\r\n   const shape = dims.slice();\r\n   shape[axis] = split[i];\r\n   shapes.push(shape);\r\n   }\r\n   return [shapes, offsets];\r\n }\r\n\r\n static determineSplit(numElementsAlongAxis: number, numOutputs: number, split: number[]) {\r\n   // If 'split' is not specified by the user, we need to partition the number of elements equally among the outputs\r\n   if (numElementsAlongAxis % numOutputs !== 0) {\r\n   throw new Error('cannot split tensor to equal sized parts');\r\n   }\r\n   for (let i = 0; i < numOutputs; ++i) {\r\n   split.push(numElementsAlongAxis / numOutputs);\r\n   }\r\n }\r\n}\r\n\r\nexport class ReduceUtil {\r\n /**\r\n   * Perform reduce operations on the specific operator\r\n   * @param a Input tensor data\r\n   * @param axes The dimensions along which the Tensor will be reduced\r\n   * @param keepdims If set to true, the axes which are reduced are left in the\r\n   *   result as dimensions with size one.\r\n   * @param op1 The operation to be performed on each element in the tensor\r\n   * @param op2 The operation to be performed between elements in the tensor\r\n   */\r\n static calcReduce(\r\n   a: Tensor, axes: number[], keepdims: boolean, op1: (b: number) => number,\r\n   op2: (a: number, b: number) =>

number): Tensor {\r\n const dims = a.dims.slice(0);\r\n // if axes is not set, perform reduce on all axes\r\n if (axes.length === 0) {\r\n dims.forEach((d, ind) => axes.push(ind));\r\n }\r\n // get a temporary broadcastable output shape\r\n const outputDims = ReduceUtil.calcReduceShape(dims, axes, true);\r\n\r\n // loop through the output and calculate result one by one\r\n const size = ShapeUtil.size(outputDims);\r\n const y = new Tensor(outputDims, a.type);\r\n const strides = ShapeUtil.computeStrides(outputDims);\r\n const inputStrides = ShapeUtil.computeStrides(dims);\r\n const indicesY = new Array(dims.length);\r\n for (let i = 0; i < size; i++) {\r\n const indices = ShapeUtil.offsetToIndices(i, strides);\r\n // map index\r\n BroadcastUtil.fillIndex(indices, dims, indicesY);\r\n y.set(\r\n indices,\r\n ReduceUtil.calcReduceByAxis(\r\n a.numberData, axes, dims, 0, ShapeUtil.indicesToOffset(indicesY, inputStrides), op1, op2));\r\n }\r\n\r\n if (keepdims) {\r\n return y;\r\n } else {\r\n // keepdims == 0, calculate the expected shape\r\n return new Tensor(\r\n ReduceUtil.calcReduceShape(dims, axes, keepdims), y.type, undefined, undefined, y.data, y.dataId);\r\n }\r\n }\r\n\r\n /**\r\n * Perform reduce operations on the specific operator on specific axes\r\n * @param a Input tensor data\r\n * @param axes The dimensions along which the Tensor will be reduced\r\n * @param dims The input dimension.\r\n * @param curAxisInd Index in axes specifying the current dimension along\r\n * which the tensor will be reduced\r\n * @param pos The current index of element to perform operation\r\n * @param op1 The operation to be performed on each element in the tensor\r\n * @param op2 The operation to be performed between elements in the tensor\r\n */\r\n static calcReduceByAxis(\r\n input: Tensor.NumberType, axes: number[], dims: number[], curAxisInd: number, pos: number,\r\n op1: (b: number) => number, op2: (a: number, b: number) => number): number {\r\n let res = 0;\r\n if (curAxisInd >= axes.length) {\r\n return op1(input[pos]);\r\n }\r\n const axis = axes[curAxisInd];\r\n const step = axis >= dims.length ? 1 : ShapeUtil.size(dims.slice(axis + 1));\r\n for (let i = 0; i < dims[axis]; i++) {\r\n res = i === 0 ? ReduceUtil.calcReduceByAxis(input, axes, dims, curAxisInd + 1, pos, op1, op2) :\r\n op2(res, ReduceUtil.calcReduceByAxis(input, axes, dims, curAxisInd + 1, pos, op1, op2));\r\n pos += step;\r\n }\r\n return res;\r\n }\r\n\r\n /**\r\n * Calculate the expected shape of a reduce operation\r\n * @param dims The input tensor dimension\r\n * @param axes The dimensions along which the Tensor will be reduced\r\n * @param keepdims If set to true, the axes which are reduced are left in the\r\n * result as dimensions with size one.\r\n */\r\n static calcReduceShape(dims: readonly number[], axes: readonly number[], keepDims: boolean): number[] {\r\n const outputDims = dims.slice();\r\n for (let i = 0; i < axes.length; i++) {\r\n if (keepDims) {\r\n outputDims[axes[i]] = 1;\r\n } else {\r\n outputDims[axes[i]] = 0;\r\n }\r\n }\r\n return outputDims.filter(dim => dim !== 0);\r\n }\r\n}\r\n\r\nexport class PoolConvUtil {\r\n /**\r\n * Adjust the kernel, strides, pads to correct rank. Set to default value if not present\r\n * @param isGlobalOperator If true, perform global pooling.\r\n * @param inputDims The input tensor dimension.\r\n * @param kernelShape The size of the kernel along each axis.\r\n * @param strides Stride along each axis.\r\n * @param pads Padding for the beginning and ending along each axis.\r\n */\r\n static adjustPoolAttributes(\r\n isGlobalOperator: boolean, inputDims: readonly number[], kernelShape: number[], strides: number[],\r\n pads: number[]) {\r\n if (!isGlobalOperator && kernelShape.length !== inputDims.length - 2) {\r\n throw new Error('length of specified kernel shapes should be 2 less than length of input dimensions');\r\n }\r\n\r\n if (isGlobalOperator) {\r\n // adjust kernel shape to cover the input dims\r\n for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n if (dim >= kernelShape.length) {\r\n kernelShape.push(inputDims[dim + 2]);\r\n } else {\r\n kernelShape[dim] = inputDims[dim + 2];\r\n }\r\n }\r\n }\r\n\r\n // adjust strides length to match kernel shape length\r\n for (let dim = 0; dim < kernelShape.length; dim++) {\r\n if (dim < strides.length) {\r\n if (strides[dim] < 0) {\r\n throw new Error('strides should be greater than or equal to 1');\r\n }\r\n } else {\r\n strides.push(1);\r\n }\r\n }\r\n\r\n // adjust pads length to match 2 * kernel shape length\r\n for (let dim = 0; dim < kernelShape.length * 2; dim++) {\r\n if (dim < pads.length) {\r\n if (pads[dim] < 0) {\r\n throw new Error('pad should be greater than or equal to 1');\r\n }\r\n } else {\r\n pads.push(0);\r\n }\r\n }\r\n\r\n // sanity checks for values in kernel shapes and pads\r\n for (let dim = 0; dim < kernelShape.length; dim++) {\r\n if (kernelShape[dim] <= 0) {\r\n throw new Error('kernel shapes need to be greater than 0');\r\n }\r\n\r\n if (pads[dim] >= kernelShape[dim] || pads[dim + kernelShape.length] >=

kernelShape[dim]) {\r\n throw new Error('pads should be smaller than kernel');\r\n }\r\n }\r\n }\r\n\r\n // adjust pad values based on 'autoPad' attribute\r\n static adjustPadsBasedOnAutoPad(\r\n inputDims: readonly number[], strides: readonly number[], dilations: readonly number[],\r\n kernelShape: readonly number[], pads: number[], autoPad?: string) {\r\n if (!autoPad) {\r\n return;\r\n }\r\n\r\n if (pads.length !== 2 * (inputDims.length - 2)) {\r\n throw new Error('length of pads should be twice the length of data dimensions');\r\n }\r\n\r\n if (strides.length !== (inputDims.length - 2)) {\r\n throw new Error('length of strides should be the length of data dimensions');\r\n }\r\n\r\n if (kernelShape.length !== (inputDims.length - 2)) {\r\n throw new Error('length of kernel shapes should be the length of data dimensions');\r\n }\r\n\r\n for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n PoolConvUtil.adjustPadAndReturnShape(\r\n inputDims[dim + 2], strides[dim], dilations[dim], kernelShape[dim], pads, dim, dim + inputDims.length - 2,\r\n autoPad);\r\n }\r\n }\r\n\r\n /**\r\n * Calculate the output shape for Pool ops based on input attributes. (Should be used only for Pool ops)\r\n * @param isGlobalOperator If true, perform global pooling.\r\n * @param inputDims The input tensor dimension. (inputs[0].dims)\r\n * @param strides Stride along each axis.\r\n * @param kernelShape The size of the kernel along each axis.\r\n * @param pads Padding for the beginning and ending along each axis.\r\n * @param autoPad DEPRECATED attribute supported for legacy models. Specifies how to implicitly calculate pads in each\r\n * dimension. Can take values NOTSET, SAME_UPPER, SAME_LOWER, or VALID.\r\n */\r\n static computePoolOutputShape(\r\n isGlobalOperator: boolean, inputDims: readonly number[], strides: number[], kernelShape: number[], pads: number[],\r\n autoPad?: string): number[] {\r\n if (inputDims.length <= 0) {\r\n throw new Error('input shape must be of size greater than 0');\r\n }\r\n\r\n // Add batch size and number of channels of output\r\n const outputDims = [inputDims[0], inputDims[1]];\r\n\r\n // TODO: support dilations for pool operators\r\n const dilations = new Array<number>(kernelShape.length).fill(1);\r\n\r\n PoolConvUtil.computeShapeHelper(\r\n isGlobalOperator, inputDims, outputDims, strides, dilations, kernelShape, pads, autoPad);\r\n return outputDims;\r\n }\r\n\r\n /**\r\n * Calculate the output shape for Conv op based on input attributes. (Should be used only for Conv op)\r\n * @param inputDims The input tensor dimension. (inputs[0].dims)\r\n * @param filterDims The filter tensor dimension. (inputs[1].dims)\r\n * @param strides Stride along each axis.\r\n * @param kernelShape The size of the kernel along each axis.\r\n * @param pads Padding for the beginning and ending along each axis.\r\n * @param autoPad DEPRECATED attribute supported for legacy models. Specifies how to implicitly calculate pads in each\r\n * dimension. Can take values NOTSET, SAME_UPPER, SAME_LOWER, or VALID.\r\n */\r\n static computeConvOutputShape(\r\n inputDims: readonly number[], filterDims: readonly number[], strides: number[], dilations: number[],\r\n kernelShape: number[], pads: number[], autoPad?: string): number[] {\r\n if (inputDims.length <= 0 || filterDims.length <= 0) {\r\n throw new Error('invalid input tensor dims or invalid filter tensor dims');\r\n }\r\n\r\n // Add batch size and number of channels of output\r\n const outputDims = [inputDims[0], filterDims[0]];\r\n\r\n PoolConvUtil.computeShapeHelper(false, inputDims, outputDims, strides, dilations, kernelShape, pads, autoPad);\r\n return outputDims;\r\n }\r\n\r\n // will compute output shapes for data dimensions ONLY (i.e.) no batch size and channels\r\n // called by computePoolOutputShape() and computeConvOutputShape()\r\n // adjust pads based on 'autoPad' attribute prior to shape computation\r\n private static computeShapeHelper(\r\n isGlobalOperator: boolean, inputDims: readonly number[], outputDims: number[], strides: readonly number[],\r\n dilations: readonly number[], kernelShape: readonly number[], pads: number[], autoPad?: string) {\r\n if (isGlobalOperator) {\r\n for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n outputDims.push(1);\r\n }\r\n } else {\r\n for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n outputDims.push(PoolConvUtil.adjustPadAndReturnShape(\r\n inputDims[dim + 2], strides[dim], dilations[dim], kernelShape[dim], pads, dim, dim + inputDims.length - 2,\r\n autoPad));\r\n }\r\n }\r\n }\r\n\r\n // helper for computeShapeHelper() and adjustPadsBasedOnAutoPad()\r\n // adjusts pad value for given 'autoPad' string and computes output shape along a particular dimension\r\n private static adjustPadAndReturnShape(\r\n inSize: number, stride: number, dilation: number, kernel: number, pads: number[], padHeadIndex: number,\r\n padTailIndex: number, autoPad?: string): number {\r\n const dkernel = dilation * (kernel - 1) + 1;\r\n if (autoPad && autoPad !== 'NOTSET') {\r\n switch (autoPad) {\r\n case

'VALID':\r\n pads[padHeadIndex] = 0;\r\n pads[padTailIndex] = 0;\r\n return Math.floor(((inSize - dkernel) / stride) + 1);\r\n case 'SAME_LOWER':\r\n case 'SAME_UPPER':\r\n if (dilation !== 1) {\r\n throw new Error('Dilation not supported for SAME_UPPER or SAME_LOWER');\r\n } else {\r\n const legacyTargetSize = (inSize + stride - 1) / stride;\r\n const padNeeded = (legacyTargetSize - 1) * stride + kernel - inSize;\r\n pads[padHeadIndex] =\r\n (autoPad === 'SAME_LOWER') ? Math.floor((padNeeded + 1) / 2) : Math.floor(padNeeded / 2);\r\n pads[padTailIndex] = padNeeded - pads[padHeadIndex];\r\n return Math.floor(((inSize + padNeeded - kernel) / stride) + 1);\r\n }\r\n default:\r\n throw new Error('Unsupported AutoPad type');\r\n }\r\n } else {\r\n return Math.floor(((inSize + pads[padHeadIndex] + pads[padTailIndex] - dkernel) / stride) + 1);\r\n }\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\ninterface ExtraOptionsHandler {\r\n (name: string, value: string): void;\r\n}\r\n\r\nexport const iterateExtraOptions =\r\n (options: Record<string, unknown>, prefix: string, seen: WeakSet<Record<string, unknown>>,\r\n handler: ExtraOptionsHandler): void => {\r\n if (typeof options == 'object' && options !== null) {\r\n if (seen.has(options)) {\r\n throw new Error('Circular reference in options');\r\n } else {\r\n seen.add(options);\r\n }\r\n }\r\n\r\n Object.entries(options).forEach(([key, value]) => {\r\n const name = (prefix) ? prefix + key : key;\r\n if (typeof value === 'object') {\r\n iterateExtraOptions(value as Record<string, unknown>, name + '.', seen, handler);\r\n } else if (typeof value === 'string' || typeof value === 'number') {\r\n handler(name, value.toString());\r\n } else if (typeof value === 'boolean') {\r\n handler(name, (value) ? '1' : '0');\r\n } else {\r\n throw new Error(`Can't handle extra config type: ${typeof value}`);\r\n }\r\n });\r\n };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env, InferenceSession} from 'onnxruntime-common';\r\nimport {OrtWasmMessage, SerializableSessionMetadata, SerializableTensor} from './proxy-messages';\r\nimport * as core from './wasm-core-impl';\r\nimport {initializeWebAssembly} from './wasm-factory';\r\n\r\nconst isProxy = (): boolean => !!env.wasm.proxy && typeof document !== 'undefined';\r\nlet proxyWorker: Worker|undefined;\r\nlet initializing = false;\r\nlet initialized = false;\r\nlet aborted = false;\r\n\r\n// resolve; reject\r\ntype PromiseCallbacks<T = void> = [(result: T) => void, (reason: unknown) => void];\r\n\r\nlet initWasmCallbacks: PromiseCallbacks;\r\nlet initOrtCallbacks: PromiseCallbacks;\r\nconst createSessionCallbacks: Array<PromiseCallbacks<SerializableSessionMetadata>> = [];\r\nconst releaseSessionCallbacks: Array<PromiseCallbacks<void>> = [];\r\nconst runCallbacks: Array<PromiseCallbacks<SerializableTensor[]>> = [];\r\nconst endProfilingCallbacks: Array<PromiseCallbacks<void>> = [];\r\n\r\nconst ensureWorker = (): void => {\r\n if (initializing || !initialized || aborted || !proxyWorker) {\r\n throw new Error('worker not ready');\r\n }\r\n};\r\n\r\nconst onProxyWorkerMessage = (ev: MessageEvent<OrtWasmMessage>): void => {\r\n switch (ev.data.type) {\r\n case 'init-wasm':\r\n initializing = false;\r\n if (ev.data.err) {\r\n aborted = true;\r\n initWasmCallbacks[1](ev.data.err);\r\n } else {\r\n initialized = true;\r\n initWasmCallbacks[0]();\r\n }\r\n break;\r\n case 'init-ort':\r\n if (ev.data.err) {\r\n initOrtCallbacks[1](ev.data.err);\r\n } else {\r\n initOrtCallbacks[0]();\r\n }\r\n break;\r\n case 'create':\r\n if (ev.data.err) {\r\n createSessionCallbacks.shift()![1](ev.data.err);\r\n } else {\r\n createSessionCallbacks.shift()![0](ev.data.out!);\r\n }\r\n break;\r\n case 'release':\r\n if (ev.data.err) {\r\n releaseSessionCallbacks.shift()![1](ev.data.err);\r\n } else {\r\n releaseSessionCallbacks.shift()![0]();\r\n }\r\n break;\r\n case 'run':\r\n if (ev.data.err) {\r\n runCallbacks.shift()![1](ev.data.err);\r\n } else {\r\n runCallbacks.shift()![0](ev.data.out!);\r\n }\r\n break;\r\n case 'end-profiling':\r\n if (ev.data.err) {\r\n endProfilingCallbacks.shift()![1](ev.data.err);\r\n } else {\r\n endProfilingCallbacks.shift()![0]();\r\n }\r\n break;\r\n default:\r\n }\r\n};\r\n\r\nconst scriptSrc = typeof document !== 'undefined' ? (document?.currentScript as HTMLScriptElement)?.src : undefined;\r\n\r\nexport const initWasm = async(): Promise<void> => {\r\n if (isProxy()) {\r\n if (initialized) {\r\n return;\r\n }\r\n if (initializing) {\r\n throw new Error('multiple calls to \\'initWasm()\\' detected.');\r\n }\r\n if (aborted) {\r\n throw new Error('previous call to \\'initWasm()\\' failed.');\r\n }\r\n\r\n initializing = true;\r\n\r\n // overwrite wasm filepaths\r\n if (env.wasm.wasmPaths === undefined) {\r\n if (scriptSrc && scriptSrc.indexOf('blob:')

!== 0) {\r\n env.wasm.wasmPaths = scriptSrc.substr(0, (scriptSrc as string).lastIndexOf('/') + 1);\r\n }\r\n }\r\n\r\n return new Promise<void>((resolve, reject) => {\r\n proxyWorker?.terminate();\r\n // eslint-disable-next-line @typescript-eslint/no-var-requires, @typescript-eslint/no-require-imports\r\n proxyWorker = require('worker-loader?inline=no-fallback!./proxy-worker/main').default() as Worker;\r\n proxyWorker.onmessage = onProxyWorkerMessage;\r\n initWasmCallbacks = [resolve, reject];\r\n const message: OrtWasmMessage = {type: 'init-wasm', in : env.wasm};\r\n proxyWorker.postMessage(message);\r\n });\r\n\r\n } else {\r\n return initializeWebAssembly(env.wasm);\r\n }\r\n};\r\n\r\nexport const initOrt = async(numThreads: number, loggingLevel: number): Promise<void> => {\r\n if (isProxy()) {\r\n ensureWorker();\r\n return new Promise<void>((resolve, reject) => {\r\n initOrtCallbacks = [resolve, reject];\r\n const message: OrtWasmMessage = {type: 'init-ort', in : {numThreads, loggingLevel}};\r\n proxyWorker!.postMessage(message);\r\n });\r\n } else {\r\n core.initOrt(numThreads, loggingLevel);\r\n }\r\n};\r\n\r\nexport const createSession =\r\n async(model: Uint8Array, options?: InferenceSession.SessionOptions): Promise<SerializableSessionMetadata> => {\r\n if (isProxy()) {\r\n ensureWorker();\r\n return new Promise<SerializableSessionMetadata>((resolve, reject) => {\r\n createSessionCallbacks.push([resolve, reject]);\r\n const message: OrtWasmMessage = {type: 'create', in : {model, options}};\r\n proxyWorker!.postMessage(message, [model.buffer]);\r\n });\r\n } else {\r\n return core.createSession(model, options);\r\n }\r\n};\r\n\r\nexport const releaseSession = async(sessionId: number): Promise<void> => {\r\n if (isProxy()) {\r\n ensureWorker();\r\n return new Promise<void>((resolve, reject) => {\r\n releaseSessionCallbacks.push([resolve, reject]);\r\n const message: OrtWasmMessage = {type: 'release', in : sessionId};\r\n proxyWorker!.postMessage(message);\r\n });\r\n } else {\r\n core.releaseSession(sessionId);\r\n }\r\n};\r\n\r\nexport const run = async(\r\n sessionId: number, inputIndices: number[], inputs: SerializableTensor[], outputIndices: number[],\r\n options: InferenceSession.RunOptions): Promise<SerializableTensor[]> => {\r\n if (isProxy()) {\r\n ensureWorker();\r\n return new Promise<SerializableTensor[]>((resolve, reject) => {\r\n runCallbacks.push([resolve, reject]);\r\n const message: OrtWasmMessage = {type: 'run', in : {sessionId, inputIndices, inputs, outputIndices, options}};\r\n proxyWorker!.postMessage(message, core.extractTransferableBuffers(inputs));\r\n });\r\n } else {\r\n return core.run(sessionId, inputIndices, inputs, outputIndices, options);\r\n }\r\n};\r\n\r\nexport const endProfiling = async(sessionId: number): Promise<void> => {\r\n if (isProxy()) {\r\n ensureWorker();\r\n return new Promise<void>((resolve, reject) => {\r\n endProfilingCallbacks.push([resolve, reject]);\r\n const message: OrtWasmMessage = {type: 'end-profiling', in : sessionId};\r\n proxyWorker!.postMessage(message);\r\n });\r\n } else {\r\n core.endProfiling(sessionId);\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceSession} from 'onnxruntime-common';\r\n\r\nimport {iterateExtraOptions} from './options-utils';\r\nimport {allocWasmString} from './string-utils';\r\nimport {getInstance} from './wasm-factory';\r\n\r\nexport const setRunOptions = (options: InferenceSession.RunOptions): [number, number[]] => {\r\n const wasm = getInstance();\r\n let runOptionsHandle = 0;\r\n const allocs: number[] = [];\r\n\r\n const runOptions: InferenceSession.RunOptions = options || {};\r\n\r\n try {\r\n if (options?.logSeverityLevel === undefined) {\r\n runOptions.logSeverityLevel = 2; // Default to warning\r\n } else if (\r\n typeof options.logSeverityLevel !== 'number' || !Number.isInteger(options.logSeverityLevel) ||\r\n options.logSeverityLevel < 0 || options.logSeverityLevel > 4) {\r\n throw new Error(`log serverity level is not valid: ${options.logSeverityLevel}`);\r\n }\r\n\r\n if (options?.logVerbosityLevel === undefined) {\r\n runOptions.logVerbosityLevel = 0; // Default to 0\r\n } else if (typeof options.logVerbosityLevel !== 'number' || !Number.isInteger(options.logVerbosityLevel)) {\r\n throw new Error(`log verbosity level is not valid: ${options.logVerbosityLevel}`);\r\n }\r\n\r\n if (options?.terminate === undefined) {\r\n runOptions.terminate = false;\r\n }\r\n\r\n let tagDataOffset = 0;\r\n if (options?.tag !== undefined) {\r\n tagDataOffset = allocWasmString(options.tag, allocs);\r\n }\r\n\r\n runOptionsHandle = wasm._OrtCreateRunOptions(\r\n runOptions.logSeverityLevel!, runOptions.logVerbosityLevel!, !!runOptions.terminate!, tagDataOffset);\r\n if (runOptionsHandle === 0) {\r\n throw new Error('Can\\'t create run options');\r\n }\r\n\r\n if (options?.extra !== undefined) {\r\n iterateExtraOptions(options.extra, '', new

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WeakSet<Record<string, unknown>>(), (key, value) => {\r\n        const keyDataOffset = allocWasmString(key,
allocs);\r\n        const valueDataOffset = allocWasmString(value, allocs);\r\n\r\n        if
(wasm._OrtAddRunConfigEntry(runOptionsHandle, keyDataOffset, valueDataOffset) !== 0) {\r\n          throw new
Error(`Can't set a run config entry: ${key} - ${value}`);\r\n        }\r\n      });\r\n    }\r\n\r\n    return
[runOptionsHandle, allocs];\r\n  } catch (e) {\r\n    if (runOptionsHandle !== 0) {\r\n
wasm._OrtReleaseRunOptions(runOptionsHandle);\r\n    }\r\n    allocs.forEach(wasm._free);\r\n    throw e;\r\n
}\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {env, InferenceSession, SessionHandler, Tensor} from 'onnxruntime-common';\r\n\r\nimport
{createSession, endProfiling, initOrt, releaseSession, run} from './proxy-wrapper';\r\n\r\nlet ortInit:
boolean;\r\n\r\n\r\n\r\nconst getLogLevel = (logLevel: 'verbose'|'info'|'warning'|'error'|'fatal'): number => {\r\n  switch
(logLevel) {\r\n    case 'verbose':\r\n      return 0;\r\n    case 'info':\r\n      return 1;\r\n    case 'warning':\r\n      return
2;\r\n    case 'error':\r\n      return 3;\r\n    case 'fatal':\r\n      return 4;\r\n    default:\r\n      throw new
Error(`unsupported logging level: ${logLevel}`);\r\n  }\r\n};\r\n\r\nexport class
OnnxruntimeWebAssemblySessionHandler implements SessionHandler {\r\n  private sessionId: number;\r\n\r\n
inputNames: string[];\r\n  outputNames: string[];\r\n\r\n  async loadModel(model: Uint8Array, options?:
InferenceSession.SessionOptions): Promise<void> {\r\n    if (!ortInit) {\r\n      await initOrt(env.wasm.numThreads!,
getLogLevel(env.logLevel!));\r\n      ortInit = true;\r\n    }\r\n\r\n    [this.sessionId, this.inputNames,
this.outputNames] = await createSession(model, options);\r\n  }\r\n\r\n  async dispose(): Promise<void> {\r\n
return releaseSession(this.sessionId);\r\n  }\r\n\r\n  async run(feeds: SessionHandler.FeedsType, fetches:
SessionHandler.FetchesType, options: InferenceSession.RunOptions):\r\n      Promise<SessionHandler.ReturnType>
{\r\n    const inputArray: Tensor[] = [];\r\n    const inputIndices: number[] = [];\r\n
Object.entries(feeds).forEach(kvp => {\r\n      const name = kvp[0];\r\n      const tensor = kvp[1];\r\n      const index
= this.inputNames.indexOf(name);\r\n      if (index === -1) {\r\n        throw new Error(`invalid input '${name}'`);\r\n
    }\r\n      inputArray.push(tensor);\r\n      inputIndices.push(index);\r\n    });\r\n\r\n    const outputIndices: number[]
= [];\r\n    Object.entries(fetches).forEach(kvp => {\r\n      const name = kvp[0];\r\n      // TODO: support pre-
allocated output\r\n      const index = this.outputNames.indexOf(name);\r\n      if (index === -1) {\r\n        throw new
Error(`invalid output '${name}'`);\r\n      }\r\n      outputIndices.push(index);\r\n    });\r\n\r\n    const outputs =\r\n
 await run(this.sessionId, inputIndices, inputArray.map(t => [t.type, t.dims, t.data]), outputIndices, options);\r\n\r\n
const result: SessionHandler.ReturnType = {};\r\n    for (let i = 0; i < outputs.length; i++) {\r\n
result[this.outputNames[outputIndices[i]]] = new Tensor(outputs[i][0], outputs[i][2], outputs[i][1]);\r\n    }\r\n
return result;\r\n  }\r\n\r\n  startProfiling(): void {\r\n    // TODO: implement profiling\r\n  }\r\n\r\n  endProfiling():
void {\r\n    void endProfiling(this.sessionId);\r\n  }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights
reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceSession} from 'onnxruntime-
common';\r\n\r\nimport {iterateExtraOptions} from './options-utils';\r\nimport {allocWasmString} from './string-
utils';\r\nimport {getInstance} from './wasm-factory';\r\n\r\nconst getGraphOptimzationLevel =
(graphOptimizationLevel: string|unknown): number => {\r\n  switch (graphOptimizationLevel) {\r\n    case
'disabled':\r\n      return 0;\r\n    case 'basic':\r\n      return 1;\r\n    case 'extended':\r\n      return 2;\r\n    case 'all':\r\n
 return 99;\r\n    default:\r\n      throw new Error(`unsupported graph optimization level:
${graphOptimizationLevel}`);\r\n  }\r\n};\r\n\r\nconst getExecutionMode = (executionMode: 'sequential'|'parallel'):
number => {\r\n  switch (executionMode) {\r\n    case 'sequential':\r\n      return 0;\r\n    case 'parallel':\r\n      return
1;\r\n    default:\r\n      throw new Error(`unsupported execution mode: ${executionMode}`);\r\n  }\r\n};\r\n\r\nconst
appendDefaultOptions = (options: InferenceSession.SessionOptions): void => {\r\n  if (!options.extra) {\r\n
options.extra = {};\r\n  }\r\n  if (!options.extra.session) {\r\n    options.extra.session = {};\r\n  }\r\n  const session =
options.extra.session as Record<string, string>;\r\n  if (!session.use_ort_model_bytes_directly) {\r\n    // eslint-
disable-next-line camelcase\r\n    session.use_ort_model_bytes_directly = '1';\r\n  }\r\n};\r\n\r\nexport const
setSessionOptions = (options?: InferenceSession.SessionOptions): [number, number[]] => {\r\n  const wasm =
getInstance();\r\n  let sessionOptionsHandle = 0;\r\n  const allocs: number[] = [];\r\n\r\n  const sessionOptions:
InferenceSession.SessionOptions = options || {};\r\n  appendDefaultOptions(sessionOptions);\r\n\r\n  try {\r\n    if
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(options?.graphOptimizationLevel === undefined) {\r\n sessionOptions.graphOptimizationLevel = 'all';\r\n }\r\n const graphOptimizationLevel = getGraphOptimzationLevel(sessionOptions.graphOptimizationLevel!);\r\n\r\n if (options?.enableCpuMemArena === undefined) {\r\n sessionOptions.enableCpuMemArena = true;\r\n }\r\n\r\n if (options?.enableMemPattern === undefined) {\r\n sessionOptions.enableMemPattern = true;\r\n }\r\n\r\n if (options?.executionMode === undefined) {\r\n sessionOptions.executionMode = 'sequential';\r\n }\r\n const executionMode = getExecutionMode(sessionOptions.executionMode!);\r\n\r\n let logIdDataOffset = 0;\r\n if (options?.logId !== undefined) {\r\n logIdDataOffset = allocWasmString(options.logId, allocs);\r\n }\r\n\r\n if (options?.logSeverityLevel === undefined) {\r\n sessionOptions.logSeverityLevel = 2; // Default to warning\r\n } else if (\r\n typeof options.logSeverityLevel !== 'number' || !Number.isInteger(options.logSeverityLevel) ||\r\n options.logSeverityLevel < 0 || options.logSeverityLevel > 4) {\r\n throw new Error(`log serverity level is not valid: ${options.logSeverityLevel}`);\r\n }\r\n\r\n if (options?.logVerbosityLevel === undefined) {\r\n sessionOptions.logVerbosityLevel = 0; // Default to 0\r\n } else if (typeof options.logVerbosityLevel !== 'number' || !Number.isInteger(options.logVerbosityLevel)) {\r\n throw new Error(`log verbosity level is not valid: ${options.logVerbosityLevel}`);\r\n }\r\n\r\n if (options?.enableProfiling === undefined) {\r\n sessionOptions.enableProfiling = false;\r\n }\r\n\r\n sessionOptionsHandle = wasm._OrtCreateSessionOptions(\r\n graphOptimizationLevel, !!sessionOptions.enableCpuMemArena!, !!sessionOptions.enableMemPattern!, executionMode,\r\n !!sessionOptions.enableProfiling!, 0, logIdDataOffset, sessionOptions.logSeverityLevel!,\r\n sessionOptions.logVerbosityLevel!);\r\n if (sessionOptionsHandle === 0) {\r\n throw new Error('Can\\'t create session options');\r\n }\r\n\r\n if (options?.extra !== undefined) {\r\n iterateExtraOptions(options.extra, '', new WeakSet<Record<string, unknown>>(), (key, value) => {\r\n const keyDataOffset = allocWasmString(key, allocs);\r\n const valueDataOffset = allocWasmString(value, allocs);\r\n\r\n if (wasm._OrtAddSessionConfigEntry(sessionOptionsHandle, keyDataOffset, valueDataOffset) !== 0) {\r\n throw new Error(`Can't set a session config entry: ${key} - ${value}`);\r\n }\r\n });\r\n }\r\n\r\n return [sessionOptionsHandle, allocs];\r\n } catch (e) {\r\n if (sessionOptionsHandle !== 0) {\r\n wasm._OrtReleaseSessionOptions(sessionOptionsHandle);\r\n }\r\n allocs.forEach(wasm._free);\r\n throw e;\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {getInstance} from './wasm-factory';\r\n\r\nexport const allocWasmString = (data: string, allocs: number[]): number => {\r\n const wasm = getInstance();\r\n\r\n const dataLength = wasm.lengthBytesUTF8(data) + 1;\r\n const dataOffset = wasm._malloc(dataLength);\r\n wasm.stringToUTF8(data, dataOffset, dataLength);\r\n allocs.push(dataOffset);\r\n\r\n return dataOffset;\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceSession, Tensor} from 'onnxruntime-common';\r\nimport {SerializableSessionMetadata, SerializableTensor} from './proxy-messages';\r\nimport {setRunOptions} from './run-options';\r\nimport {setSessionOptions} from './session-options';\r\nimport {allocWasmString} from './string-utils';\r\nimport {getInstance} from './wasm-factory';\r\n\r\n/**\r\n * initialize ORT environment.\r\n * @param numThreads SetGlobalIntraOpNumThreads(numThreads)\r\n * @param loggingLevel CreateEnv(static_cast<OrtLoggingLevel>(logging_level))\r\n */\r\nexport const initOrt = (numThreads: number, loggingLevel: number): void => {\r\n const errorCode = getInstance()._OrtInit(numThreads, loggingLevel);\r\n if (errorCode !== 0) {\r\n throw new Error(`Can't initialize onnxruntime. error code = ${errorCode}`);\r\n }\r\n};\r\n\r\n/**\r\n * tuple elements are: InferenceSession ID; inputNamesUTF8Encoded; outputNamesUTF8Encoded\r\n */\r\ntype SessionMetadata = [number, number[], number[]];\r\n\r\nconst activeSessions: Array<SessionMetadata|undefined> = [];\r\n\r\n/**\r\n * create an instance of InferenceSession.\r\n * @returns the metadata of InferenceSession. 0-value handle for failure.\r\n */\r\nexport const createSession =\r\n (model: Uint8Array, options?: InferenceSession.SessionOptions): SerializableSessionMetadata => {\r\n const wasm = getInstance();\r\n const modelDataOffset = wasm._malloc(model.byteLength);\r\n let sessionHandle = 0;\r\n let sessionOptionsHandle = 0;\r\n let allocs: number[] = [];\r\n\r\n try {\r\n

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[sessionOptionsHandle, allocs] = setSessionOptions(options);\r\n\r\n        wasm.HEAPU8.set(model,
modelDataOffset);\r\n        sessionHandle = wasm._OrtCreateSession(modelDataOffset, model.byteLength,
sessionOptionsHandle);\r\n        if (sessionHandle === 0) {\r\n          throw new Error('Can\\'t create a session');\r\n
    }\r\n      } finally {\r\n        wasm._free(modelDataOffset);\r\n
wasm._OrtReleaseSessionOptions(sessionOptionsHandle);\r\n        allocs.forEach(wasm._free);\r\n      }\r\n\r\n
const inputCount = wasm._OrtGetInputCount(sessionHandle);\r\n      const outputCount =
wasm._OrtGetOutputCount(sessionHandle);\r\n\r\n      const inputNames = [];\r\n      const
inputNamesUTF8Encoded = [];\r\n      const outputNames = [];\r\n      const outputNamesUTF8Encoded = [];\r\n
for (let i = 0; i < inputCount; i++) {\r\n        const name = wasm._OrtGetInputName(sessionHandle, i);\r\n        if
(name === 0) {\r\n          throw new Error('Can\\'t get an input name');\r\n        }\r\n
inputNamesUTF8Encoded.push(name);\r\n        inputNames.push(wasm.UTF8ToString(name));\r\n      }\r\n      for
(let i = 0; i < outputCount; i++) {\r\n        const name = wasm._OrtGetOutputName(sessionHandle, i);\r\n        if
(name === 0) {\r\n          throw new Error('Can\\'t get an output name');\r\n        }\r\n
outputNamesUTF8Encoded.push(name);\r\n        outputNames.push(wasm.UTF8ToString(name));\r\n      }\r\n\r\n
activeSessions.push([sessionHandle, inputNamesUTF8Encoded, outputNamesUTF8Encoded]);\r\n      return
[activeSessions.length - 1, inputNames, outputNames];\r\n    };\r\n\r\nexport const releaseSession = (sessionId:
number): void => {\r\n  const wasm = getInstance();\r\n  const session = activeSessions[sessionId];\r\n  if (!session)
{\r\n    throw new Error('invalid session id');\r\n  }\r\n  const sessionHandle = session[0];\r\n  const
inputNamesUTF8Encoded = session[1];\r\n  const outputNamesUTF8Encoded = session[2];\r\n\r\n
inputNamesUTF8Encoded.forEach(wasm._OrtFree);\r\n  outputNamesUTF8Encoded.forEach(wasm._OrtFree);\r\n
wasm._OrtReleaseSession(sessionHandle);\r\n  activeSessions[sessionId] = undefined;\r\n};\r\n\r\n/**\r\n * Copied
from ONNX definition. Use this to drop dependency 'onnx_proto' to decrease compiled .js file size.\r\n */\r\nconst
enum DataType {\r\n  undefined = 0,\r\n  float = 1,\r\n  uint8 = 2,\r\n  int8 = 3,\r\n  uint16 = 4,\r\n  int16 = 5,\r\n
int32 = 6,\r\n  int64 = 7,\r\n  string = 8,\r\n  bool = 9,\r\n  float16 = 10,\r\n  double = 11,\r\n  uint32 = 12,\r\n  uint64
= 13,\r\n  complex64 = 14,\r\n  complex128 = 15,\r\n  bfloat16 = 16\r\n}\r\n\r\n\r\nconst
tensorDataTypeStringToEnum = (type: string): DataType => {\r\n  switch (type) {\r\n    case 'int8':\r\n      return
DataType.int8;\r\n    case 'uint8':\r\n      return DataType.uint8;\r\n    case 'bool':\r\n      return DataType.bool;\r\n
case 'int16':\r\n      return DataType.int16;\r\n    case 'uint16':\r\n      return DataType.uint16;\r\n    case 'int32':\r\n
return DataType.int32;\r\n    case 'uint32':\r\n      return DataType.uint32;\r\n    case 'float32':\r\n      return
DataType.float;\r\n    case 'float64':\r\n      return DataType.double;\r\n    case 'string':\r\n      return
DataType.string;\r\n    case 'int64':\r\n      return DataType.int64;\r\n    case 'uint64':\r\n      return
DataType.uint64;\r\n\r\n    default:\r\n      throw new Error(`unsupported data type: ${type}`);\r\n
}\r\n};\r\n\r\nconst tensorDataTypeEnumToString = (typeProto: DataType): Tensor.Type => {\r\n  switch
(typeProto) {\r\n    case DataType.int8:\r\n      return 'int8';\r\n    case DataType.uint8:\r\n      return 'uint8';\r\n    case
DataType.bool:\r\n      return 'bool';\r\n    case DataType.int16:\r\n      return 'int16';\r\n    case DataType.uint16:\r\n
  return 'uint16';\r\n    case DataType.int32:\r\n      return 'int32';\r\n    case DataType.uint32:\r\n      return
'uint32';\r\n    case DataType.float:\r\n      return 'float32';\r\n    case DataType.double:\r\n      return 'float64';\r\n
case DataType.string:\r\n      return 'string';\r\n    case DataType.int64:\r\n      return 'int32';\r\n    case
DataType.uint64:\r\n      return 'uint32';\r\n\r\n    default:\r\n      throw new Error(`unsupported data type:
${typeProto}`);\r\n  }\r\n};\r\n\r\nconst numericTensorTypeToTypedArray = (type: Tensor.Type):
Float32ArrayConstructor|Uint8ArrayConstructor|\r\n
Int8ArrayConstructor|Uint16ArrayConstructor|Int16ArrayConstructor|Int32ArrayConstructor|BigInt64ArrayConstru
ctor|\r\n    Uint8ArrayConstructor|Float64ArrayConstructor|Uint32ArrayConstructor|BigUint64ArrayConstructor =>
{\r\n      switch (type) {\r\n        case 'float32':\r\n          return Float32Array;\r\n        case 'uint8':\r\n          return
Uint8Array;\r\n        case 'int8':\r\n          return Int8Array;\r\n        case 'uint16':\r\n          return Uint16Array;\r\n
case 'int16':\r\n          return Int16Array;\r\n        case 'int32':\r\n          return Int32Array;\r\n        case 'bool':\r\n
return Uint8Array;\r\n        case 'float64':\r\n          return Float64Array;\r\n        case 'uint32':\r\n          return
Uint32Array;\r\n        case 'int64':\r\n          return BigInt64Array;\r\n        case 'uint64':\r\n          return
```

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BigUint64Array;\r\n      default:\r\n        throw new Error(`unsupported type: ${type}`);\r\n    }\r\n
};\r\n\r\n/**\r\n * perform inference run\r\n */\r\nexport const run =\r\n   (sessionId: number, inputIndices:
number[], inputs: SerializableTensor[], outputIndices: number[],\r\n    options: InferenceSession.RunOptions):
SerializableTensor[] => {\r\n      const wasm = getInstance();\r\n      const session = activeSessions[sessionId];\r\n
if (!session) {\r\n        throw new Error('invalid session id');\r\n      }\r\n      const sessionHandle = session[0];\r\n
const inputNamesUTF8Encoded = session[1];\r\n      const outputNamesUTF8Encoded = session[2];\r\n\r\n      const
inputCount = inputIndices.length;\r\n      const outputCount = outputIndices.length;\r\n\r\n      let runOptionsHandle
= 0;\r\n      let runOptionsAllocs: number[] = [];\r\n\r\n      const inputValues: number[] = [];\r\n      const
inputAllocs: number[] = [];\r\n\r\n      try {\r\n        [runOptionsHandle, runOptionsAllocs] =
setRunOptions(options);\r\n\r\n        // create input tensors\r\n        for (let i = 0; i < inputCount; i++) {\r\n          const
dataType = inputs[i][0];\r\n          const dims = inputs[i][1];\r\n          const data = inputs[i][2];\r\n\r\n          let
dataOffset: number;\r\n          let dataByteLength: number;\r\n\r\n          if (Array.isArray(data)) {\r\n            // string
tensor\r\n            dataByteLength = 4 * data.length;\r\n            dataOffset = wasm._malloc(dataByteLength);\r\n
  inputAllocs.push(dataOffset);\r\n            let dataIndex = dataOffset / 4;\r\n            for (let i = 0; i < data.length; i++)
{\r\n              if (typeof data[i] !== 'string') {\r\n                throw new TypeError(`tensor data at index ${i} is not a
string`);\r\n              }\r\n              wasm.HEAPU32[dataIndex++] = allocWasmString(data[i], inputAllocs);\r\n
}\r\n          } else {\r\n            dataByteLength = data.byteLength;\r\n            dataOffset =
wasm._malloc(dataByteLength);\r\n            inputAllocs.push(dataOffset);\r\n            wasm.HEAPU8.set(new
Uint8Array(data.buffer, data.byteOffset, dataByteLength), dataOffset);\r\n          }\r\n\r\n          const stack =
wasm.stackSave();\r\n          const dimsOffset = wasm.stackAlloc(4 * dims.length);\r\n          try {\r\n            let
dimIndex = dimsOffset / 4;\r\n            dims.forEach(d => wasm.HEAP32[dimIndex++] = d);\r\n            const tensor
= wasm._OrtCreateTensor(\r\n                tensorDataTypeStringToEnum(dataType), dataOffset, dataByteLength,
dimsOffset, dims.length);\r\n            if (tensor === 0) {\r\n              throw new Error('Can\\'t create a tensor');\r\n
   }\r\n            inputValues.push(tensor);\r\n          } finally {\r\n            wasm.stackRestore(stack);\r\n          }\r\n
}\r\n\r\n        const beforeRunStack = wasm.stackSave();\r\n        const inputValuesOffset =
wasm.stackAlloc(inputCount * 4);\r\n        const inputNamesOffset = wasm.stackAlloc(inputCount * 4);\r\n
const outputValuesOffset = wasm.stackAlloc(outputCount * 4);\r\n        const outputNamesOffset =
wasm.stackAlloc(outputCount * 4);\r\n\r\n        try {\r\n          let inputValuesIndex = inputValuesOffset / 4;\r\n
let inputNamesIndex = inputNamesOffset / 4;\r\n          let outputValuesIndex = outputValuesOffset / 4;\r\n          let
outputNamesIndex = outputNamesOffset / 4;\r\n          for (let i = 0; i < inputCount; i++) {\r\n
wasm.HEAPU32[inputValuesIndex++] = inputValues[i];\r\n            wasm.HEAPU32[inputNamesIndex++] =
inputNamesUTF8Encoded[inputIndices[i]];\r\n          }\r\n          for (let i = 0; i < outputCount; i++) {\r\n
wasm.HEAPU32[outputValuesIndex++] = 0;\r\n            wasm.HEAPU32[outputNamesIndex++] =
outputNamesUTF8Encoded[outputIndices[i]];\r\n          }\r\n\r\n          // support RunOptions\r\n          let errorCode
= wasm._OrtRun(\r\n              sessionHandle, inputNamesOffset, inputValuesOffset, inputCount,
outputNamesOffset, outputCount,\r\n              outputValuesOffset, runOptionsHandle);\r\n\r\n          const output:
SerializableTensor[] = [];\r\n\r\n          if (errorCode === 0) {\r\n            for (let i = 0; i < outputCount; i++) {\r\n
    const tensor = wasm.HEAPU32[outputValuesOffset / 4 + i];\r\n\r\n              const beforeGetTensorDataStack =
wasm.stackSave();\r\n              // stack allocate 4 pointer value\r\n              const tensorDataOffset =
wasm.stackAlloc(4 * 4);\r\n\r\n              let type: Tensor.Type|undefined, dataOffset = 0;\r\n              try {\r\n
 errorCode = wasm._OrtGetTensorData(\r\n                    tensor, tensorDataOffset, tensorDataOffset + 4,
tensorDataOffset + 8, tensorDataOffset + 12);\r\n                if (errorCode !== 0) {\r\n                  throw new
Error(`Can't get a tensor data. error code = ${errorCode}`);\r\n                }\r\n                let tensorDataIndex =
tensorDataOffset / 4;\r\n                const dataType = wasm.HEAPU32[tensorDataIndex++];\r\n                dataOffset
= wasm.HEAPU32[tensorDataIndex++];\r\n                const dimsOffset = wasm.HEAPU32[tensorDataIndex++];\r\n
            const dimsLength = wasm.HEAPU32[tensorDataIndex++];\r\n                const dims = [];\r\n                for
(let i = 0; i < dimsLength; i++) {\r\n                  dims.push(wasm.HEAPU32[dimsOffset / 4 + i]);\r\n                }\r\n
        wasm._OrtFree(dimsOffset);\r\n\r\n                const size = dims.length === 0 ? 1 : dims.reduce((a, b) => a *
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b);\r\n type = tensorDataTypeEnumToString(dataType);\r\n if (type === 'string') {\r\n const stringData: string[] = [];\r\n let dataIndex = dataOffset / 4;\r\n for (let i = 0; i < size; i++) {\r\n const offset = wasm.HEAPU32[dataIndex++];\r\n const maxBytesToRead = i === size - 1 ? undefined : wasm.HEAPU32[dataIndex] - offset;\r\n stringData.push(wasm.UTF8ToString(offset, maxBytesToRead));\r\n }\r\n output.push([type, dims, stringData]);\r\n } else {\r\n const typedArrayConstructor = numericTensorTypeToTypedArray(type);\r\n const data = new typedArrayConstructor(size);\r\n new Uint8Array(data.buffer, data.byteOffset, data.byteLength)\r\n .set(wasm.HEAPU8.subarray(dataOffset, dataOffset + data.byteLength));\r\n output.push([type, dims, data]);\r\n }\r\n } finally {\r\n wasm.stackRestore(beforeGetTensorDataStack);\r\n if (type === 'string' && dataOffset) {\r\n wasm._free(dataOffset);\r\n }\r\n wasm._OrtReleaseTensor(tensor);\r\n }\r\n }\r\n }\r\n\r\n if (errorCode === 0) {\r\n return output;\r\n } else {\r\n throw new Error(`failed to call OrtRun(). error code = ${errorCode}.`);\r\n }\r\n } finally {\r\n wasm.stackRestore(beforeRunStack);\r\n }\r\n } finally {\r\n inputValues.forEach(wasm._OrtReleaseTensor);\r\n inputAllocs.forEach(wasm._free);\r\n\r\n wasm._OrtReleaseRunOptions(runOptionsHandle);\r\n runOptionsAllocs.forEach(wasm._free);\r\n }\r\n };\r\n\r\n/**\r\n * end profiling\r\n */\r\nexport const endProfiling = (sessionId: number): void => {\r\n const wasm = getInstance();\r\n const session = activeSessions[sessionId];\r\n if (!session) {\r\n throw new Error('invalid session id');\r\n }\r\n const sessionHandle = session[0];\r\n\r\n // profile file name is not used yet, but it must be freed.\r\n const profileFileName = wasm._OrtEndProfiling(sessionHandle);\r\n if (profileFileName === 0) {\r\n throw new Error('Can\\'t get an profile file name');\r\n }\r\n wasm._OrtFree(profileFileName);\r\n};\r\n\r\nexport const extractTransferableBuffers = (tensors: readonly SerializableTensor[]): ArrayBufferLike[] => {\r\n const buffers: ArrayBufferLike[] = [];\r\n for (const tensor of tensors) {\r\n const data = tensor[2];\r\n if (!Array.isArray(data) && data.buffer) {\r\n buffers.push(data.buffer);\r\n }\r\n }\r\n return buffers;\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Env} from 'onnxruntime-common';\r\nimport * as path from 'path';\r\n\r\nimport {OrtWasmModule} from './binding/ort-wasm';\r\nimport {OrtWasmThreadedModule} from './binding/ort-wasm-threaded';\r\nimport ortWasmFactoryThreaded from './binding/ort-wasm-threaded.js';\r\nimport ortWasmFactory from './binding/ort-wasm.js';\r\n\r\nlet wasm: OrtWasmModule|undefined;\r\nlet initialized = false;\r\nlet initializing = false;\r\nlet aborted = false;\r\n\r\nconst isMultiThreadSupported = (): boolean => {\r\n try {\r\n // If 'SharedArrayBuffer' is not available, WebAssembly threads will not work.\r\n if (typeof SharedArrayBuffer === 'undefined') {\r\n return false;\r\n }\r\n\r\n // Test for transferability of SABs (for browsers. needed for Firefox)\r\n // https://groups.google.com/forum/#!msg/mozilla.dev.platform/IHkBZlHETpA/dwsMNchWEQAJ\r\n if (typeof MessageChannel !== 'undefined') {\r\n new MessageChannel().port1.postMessage(new SharedArrayBuffer(1));\r\n }\r\n\r\n // Test for WebAssembly threads capability (for both browsers and Node.js)\r\n // This typed array is a WebAssembly program containing threaded instructions.\r\n return WebAssembly.validate(new Uint8Array([\r\n 0, 97, 115, 109, 1, 0, 0, 0, 1, 4, 1, 96, 0, 0, 3, 2, 1, 0, 5,\r\n 4, 1, 3, 1, 1, 10, 11, 1, 9, 0, 65, 0, 254, 16, 2, 0, 26, 11\r\n]));\r\n } catch (e) {\r\n return false;\r\n }\r\n};\r\n\r\nconst isSimdSupported = (): boolean => {\r\n try {\r\n // Test for WebAssembly SIMD capability (for both browsers and Node.js)\r\n // This typed array is a WebAssembly program containing SIMD instructions.\r\n return WebAssembly.validate(new Uint8Array(\r\n [0, 97, 115, 109, 1, 0, 0, 0, 1, 4, 1, 96, 0, 0, 3, 2, 1, 0, 10, 9, 1, 7, 0, 65, 0, 253, 15, 26, 11]));\r\n } catch (e) {\r\n return false;\r\n }\r\n};\r\n\r\nconst getWasmFileName = (useSimd: boolean, useThreads: boolean) => {\r\n if (useThreads) {\r\n return useSimd ? 'ort-wasm-simd-threaded.wasm' : 'ort-wasm-threaded.wasm';\r\n } else {\r\n return useSimd ? 'ort-wasm-simd.wasm' : 'ort-wasm.wasm';\r\n }\r\n};\r\n\r\nexport const initializeWebAssembly = async(flags: Env.WebAssemblyFlags): Promise<void> => {\r\n if (initialized) {\r\n return Promise.resolve();\r\n }\r\n if (initializing) {\r\n throw new Error('multiple calls to \\'initializeWebAssembly()\\' detected.');\r\n }\r\n if (aborted) {\r\n throw new Error('previous call to \\'initializeWebAssembly()\\' failed.');\r\n }\r\n\r\n initializing =

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true;\r\n\r\n  // wasm flags are already initialized\r\n  const timeout = flags.initTimeout!;\r\n  const numThreads =
flags.numThreads!;\r\n  const simd = flags.simd!;\r\n\r\n  const useThreads = numThreads > 1 &&
isMultiThreadSupported();\r\n  const useSimd = simd && isSimdSupported();\r\n\r\n  const wasmPrefixOverride =
typeof flags.wasmPaths === 'string' ? flags.wasmPaths : undefined;\r\n  const wasmFileName =
getWasmFileName(false, useThreads);\r\n  const wasmOverrideFileName = getWasmFileName(useSimd,
useThreads);\r\n  const wasmPathOverride = typeof flags.wasmPaths === 'object' ?
flags.wasmPaths[wasmOverrideFileName] : undefined;\r\n\r\n  let isTimeout = false;\r\n\r\n  const tasks:
Array<Promise<void>> = [];\r\n\r\n  // promise for timeout\r\n  if (timeout > 0) {\r\n    tasks.push(new
Promise((resolve) => {\r\n      setTimeout(() => {\r\n        isTimeout = true;\r\n        resolve();\r\n      }, timeout);\r\n
}));\r\n  }\r\n\r\n  // promise for module initialization\r\n  tasks.push(new Promise((resolve, reject) => {\r\n    const
factory = useThreads ? ortWasmFactoryThreaded : ortWasmFactory;\r\n    const config: Partial<OrtWasmModule>
= {\r\n      locateFile: (fileName: string, scriptDirectory: string) => {\r\n        if (fileName.endsWith('.worker.js') &&
typeof Blob !== 'undefined') {\r\n          return URL.createObjectURL(new Blob(\r\n            [\r\n              // This
require() function is handled by webpack to load file content of the corresponding .worker.js\r\n              // eslint-
disable-next-line @typescript-eslint/no-require-imports\r\n              require('./binding/ort-wasm-
threaded.worker.js')\r\n            ],\r\n            {type: 'text/javascript'}));\r\n        }\r\n\r\n        if (fileName ===
wasmFileName) {\r\n          const prefix: string = wasmPrefixOverride ?? scriptDirectory;\r\n          return
wasmPathOverride ?? prefix + wasmOverrideFileName;\r\n        }\r\n\r\n        return scriptDirectory + fileName;\r\n
  }\r\n    };\r\n\r\n    if (useThreads) {\r\n      if (typeof Blob === 'undefined') {\r\n        config.mainScriptUrlOrBlob
= path.join(__dirname, 'ort-wasm-threaded.js');\r\n      } else {\r\n        const scriptSourceCode =\r\n          `var
ortWasmThreaded=(function(){var _scriptDir;return ${ortWasmFactoryThreaded.toString()}})();`;\r\n
config.mainScriptUrlOrBlob = new Blob([scriptSourceCode], {type: 'text/javascript'});\r\n      }\r\n    }\r\n\r\n
factory(config).then(\r\n        // wasm module initialized successfully\r\n        module => {\r\n          initializing =
false;\r\n          initialized = true;\r\n          wasm = module;\r\n          resolve();\r\n        },\r\n        // wasm module
failed to initialize\r\n        (what) => {\r\n          initializing = false;\r\n          aborted = true;\r\n          reject(what);\r\n
      });\r\n  }));\r\n\r\n  await Promise.race(tasks);\r\n\r\n  if (isTimeout) {\r\n    throw new Error(`WebAssembly
backend initializing failed due to timeout: ${timeout}ms`);\r\n  }\r\n};\r\n\r\nexport const getInstance = ():
OrtWasmModule => {\r\n  if (initialized && wasm) {\r\n    return wasm;\r\n  }\r\n\r\n  throw new
Error('WebAssembly is not initialized yet.');\r\n};\r\n\r\nexport const dispose = (): void => {\r\n  if (initialized &&
!initializing && !aborted) {\r\n    initializing = true;\r\n\r\n    (wasm as
OrtWasmThreadedModule).PThread?.terminateAllThreads();\r\n    wasm = undefined;\r\n\r\n    initializing =
false;\r\n    initialized = false;\r\n    aborted = true;\r\n  }\r\n};\r\n","\nimport worker from
\"!!../../../node_modules/worker-loader/dist/runtime/inline.js\";\n\nexport default function Worker_fn() {\n  return
worker(\"/*!\\n* ONNX Runtime Web v1.9.0\\n* Copyright (c) Microsoft Corporation. All rights reserved.\\n*
Licensed under the MIT License.\\n*/\\n(()=>{var e={474:(e,t,n)=>{var
_scriptDir,r=(_scriptDir=(_scriptDir=\\\"undefined\\\"!=typeof
document&&document.currentScript?document.currentScript.src:void 0)||\\\"/index.js\\\",function(e){function
t(){return R.buffer!=j&&J(R.buffer),L}function r(){return R.buffer!=j&&J(R.buffer),W}function a(){return
R.buffer!=j&&J(R.buffer),H}function o(){return R.buffer!=j&&J(R.buffer),Y}function i(){return
R.buffer!=j&&J(R.buffer),z}var u,s,c;e=e||{},u||(u=void 0!==e?e:{}),u.ready=new
Promise((function(e,t){s=e,c=t}));var l,f={};for(l in u)u.hasOwnProperty(l)&&(f[l]=u[l]);var
p=\\\"./this.program\\\";function d(e,t){throw t}var m,h,g,b,y,_=\\\"object\\\"==typeof
window,v=\\\"function\\\"==typeof importScripts,w=\\\"object\\\"==typeof process&&\\\"object\\\"==typeof
process.versions&&\\\"string\\\"==typeof
process.versions.node,O=u.ENVIRONMENT_IS_PTHREAD||!1,A=\\\"\\\";function E(e){return
u.locateFile?u.locateFile(e,A):A+e}if(w){var T;A=v?n(908).dirname(A)+\\\"/\\\":\\\"//\\\",m=function(e,t){return
b||(b=n(384)),y||(y=n(908)),e=y.normalize(e),b.readFileSync(e,t?null:\\\"utf8\\\")},g=function(e){return(e=m(e,!0)).b
uffer||(e=new
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Uint8Array(e)),F(e.buffer),e},h=function(e,t,r){b||(b=n(384)),y||(y=n(908)),e=y.normalize(e),b.readFile(e,(function(
e,n){e?r(e):t(n.buffer)}))},1<process.argv.length&&(p=process.argv[1].replace(/\\\\\\\/g,\\\"/\\\")),process.argv.slice(
2),process.on(\\\"uncaughtException\\\",(function(e){if(!(e instanceof Bt))throw
e})),process.on(\\\"unhandledRejection\\\",le),d=function(e,t){if(ae())throw
process.exitCode=e,t;process.exit(e)},u.inspect=function(){return\\\"[Emscripten Module
object]\\\"};try{T=n(925)}catch(e){throw console.error('The \\\"worker_threads\\\" module is not supported in this
node.js build - perhaps a newer version is
needed?'),e}n.g.Worker=T.Worker}else(_||v)&&(v?A=self.location.href:\\\"undefined\\\"!=typeof
document&&document.currentScript&&(A=document.currentScript.src),_scriptDir&&(A=_scriptDir),A=0!==A.in
dexOf(\\\"blob:\\\")?A.substr(0,A.lastIndexOf(\\\"/\\\")+1):\\\"\\\",w?(m=function(e,t){return
b||(b=n(384)),y||(y=n(908)),e=y.normalize(e),b.readFileSync(e,t?null:\\\"utf8\\\")},g=function(e){return(e=m(e,!0)).b
uffer||(e=new
Uint8Array(e)),F(e.buffer),e},h=function(e,t,r){b||(b=n(384)),y||(y=n(908)),e=y.normalize(e),b.readFile(e,(function(
e,n){e?r(e):t(n.buffer)}))}):(m=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.send(null),t.responseText},v&&(g=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.responseType=\\\"arraybuffer\\\",t.send(null),new
Uint8Array(t.response)}),h=function(e,t,n){var r=new
XMLHttpRequest;r.open(\\\"GET\\\",e,!0),r.responseType=\\\"arraybuffer\\\",r.onload=function(){200==r.status||0=
=r.status&&r.response?t(r.response):n()},r.onerror=n,r.send(null)}));w&&\\\"undefined\\\"==typeof
performance&&(n.g.performance=n(953).performance);var
S,M,k=u.print||console.log.bind(console),D=u.printErr||console.warn.bind(console);for(l in
f)f.hasOwnProperty(l)&&(u[l]=f[l]);f=null,u.thisProgram&&(p=u.thisProgram),u.quit&&(d=u.quit),u.wasmBinary
&&(M=u.wasmBinary);var x=u.noExitRuntime||!1;\\\"object\\\"!=typeof WebAssembly&&le(\\\"no native wasm
support detected\\\");var R,C,P,I=!1;function F(e,t){e||le(\\\"Assertion failed: \\\"+t)}function U(e){var t=new
TextDecoder(e);this.decode=function(e){return e.buffer instanceof SharedArrayBuffer&&(e=new
Uint8Array(e)),t.decode.call(t,e)}}var j,L,W,H,Y,z,B=\\\"undefined\\\"!=typeof TextDecoder?new
U(\\\"utf8\\\"):void 0;function G(e,t,n){var r=t+n;for(n=t;e[n]&&!(n>=r);)++n;if(16<n-t&&e.subarray&&B)return
B.decode(e.subarray(t,n));for(r=\\\"\\\";t<n;){var a=e[t++];if(128&a){var
o=63&e[t++];if(192==(224&a))r+=String.fromCharCode((31&a)<<6|o);else{var
i=63&e[t++];65536>(a=224==(240&a)?(15&a)<<12|o<<6|i:(7&a)<<18|o<<12|i<<6|63&e[t++])?r+=String.fromCh
arCode(a):(a-=65536,r+=String.fromCharCode(55296|a>>10,56320|1023&a))}}else
r+=String.fromCharCode(a)}return r}function N(e,t){return e?G(r(),e,t):\\\"\\\"}function q(e,t,n,r){if(!(0<r))return
0;var a=n;r=n+r-1;for(var o=0;o<e.length;++o){var
i=e.charCodeAt(o);if(55296<=i&&57343>=i&&(i=65536+((1023&i)<<10)|1023&e.charCodeAt(++o)),127>=i){if(
n>=r)break;t[n++]=i}else{if(2047>=i){if(n+1>=r)break;t[n++]=192|i>>6}else{if(65535>=i){if(n+2>=r)break;t[n++
]=224|i>>12}else{if(n+3>=r)break;t[n++]=240|i>>18,t[n++]=128|i>>12&63}t[n++]=128|i>>6&63}t[n++]=128|63
&i}}return t[n]=0,n-a}function V(e,t,n){return q(e,r(),t,n)}function $(e){for(var t=0,n=0;n<e.length;++n){var
r=e.charCodeAt(n);55296<=r&&57343>=r&&(r=65536+((1023&r)<<10)|1023&e.charCodeAt(++n)),127>=r?++t:t
=2047>=r?t+2:65535>=r?t+3:t+4}return t}function X(e){var n=$(e)+1,r=bt(n);return r&&q(e,t(),r,n),r}function
J(e){j=e,u.HEAP8=L=new Int8Array(e),u.HEAP16=new Int16Array(e),u.HEAP32=H=new
Int32Array(e),u.HEAPU8=W=new Uint8Array(e),u.HEAPU16=new Uint16Array(e),u.HEAPU32=Y=new
Uint32Array(e),u.HEAPF32=new Float32Array(e),u.HEAPF64=z=new Float64Array(e)}\\\"undefined\\\"!=typeof
TextDecoder&&new U(\\\"utf-16le\\\"),O&&(j=u.buffer);var
Q=u.INITIAL_MEMORY||16777216;if(O)R=u.wasmMemory,j=u.buffer;else
if(u.wasmMemory)R=u.wasmMemory;else if(!((R=new
WebAssembly.Memory({initial:Q/65536,maximum:32768,shared:!0})).buffer instanceof SharedArrayBuffer))throw
D(\\\"requested a shared WebAssembly.Memory but the returned buffer is not a SharedArrayBuffer, indicating that
while the browser has SharedArrayBuffer it does not have WebAssembly threads support - you may need to set a
```

```
flag\\\"),w&&console.log(\\\"(on node you may need: --experimental-wasm-threads --experimental-wasm-bulk-
memory and also use a recent version)\\\"),Error(\\\"bad memory\\\");R&&(j=R.buffer),Q=j.byteLength,J(j);var
Z,K=[],ee=[],te=[],ne=[],re=0;function ae(){return x||0<re}function oe(){var e=u.preRun.shift();K.unshift(e)}var
ie,ue=0,se=null,ce=null;function le(e){throw u.onAbort&&u.onAbort(e),F(!O),D(e),I=!0,P=1,e=new
WebAssembly.RuntimeError(\\\"abort(\\\"+e+\\\"). Build with -s ASSERTIONS=1 for more
info.\\\"),c(e),e}function fe(){return ie.startsWith(\\\"data:application/octet-stream;base64,\\\")}function pe(){var
e=ie;try{if(e==ie&&M)return new Uint8Array(M);if(g)return g(e);throw\\\"both async and sync fetching of the
wasm failed\\\"}catch(e){le(e)}}u.preloadedImages={},u.preloadedAudios={},ie=\\\"ort-wasm-
threaded.wasm\\\",fe()||(ie=E(ie));var de={973748:function(){throw\\\"Canceled!\\\"}};function
me(e){for(;0<e.length;){var t=e.shift();if(\\\"function\\\"==typeof t)t(u);else{var n=t.Nb;\\\"number\\\"==typeof
n?void 0===t.ib?Z.get(n)():Z.get(n)(t.ib):n(void 0===t.ib?null:t.ib)}}}function
he(e,n){if(0>=e||e>t().length||1&e||0>n)return-28;if(0==n)return 0;2147483647<=n&&(n=1/0);var
r=Atomics.load(a(),zt>>2),o=0;if(r==e&&Atomics.compareExchange(a(),zt>>2,r,0)==r&&(o=1,0>=--n))return
1;if(0<=(e=Atomics.notify(a(),e>>2,n)))return e+o;throw\\\"Atomics.notify returned an unexpected value
\\\"+e}function ge(e){if(O)throw\\\"Internal Error! cleanupThread() can only ever be called from main application
thread!\\\";if(!e)throw\\\"Internal Error! Null pthread_ptr in cleanupThread!\\\";var
t=ye.cb[e];t&&(a()[e+12>>2]=0,ye.sb(t.worker))}u._emscripten_futex_wake=he;var
be,ye={gb:[],fb:[],zb:[],xc:function(){},Rb:function(){for(var
e=bt(228),t=0;57>t;++t)o()[e/4+t]=0;a()[e+12>>2]=e,t=e+152,a()[t>>2]=t;var
n=bt(512);for(t=0;128>t;++t)o()[n/4+t]=0;Atomics.store(o(),e+100>>2,n),Atomics.store(o(),e+40>>2,e),xt(e,!v,1),O
t(e)},Sb:function(){ye.receiveObjectTransfer=ye.Xb,ye.threadInit=ye.hc,ye.threadCancel=ye.fc,ye.threadExit=ye.H
b,ye.setExitStatus=ye.Zb},cb:{},yb:[],Eb:function(){for(;0<ye.yb.length;)ye.yb.pop()();Ct()},Fb:function(e,t){Atom
ics.store(o(),e+56>>2,1),Atomics.store(o(),e+60>>2,0),ye.Eb(),Atomics.store(o(),e+4>>2,t),Atomics.store(o(),e+0>
>2,1),he(e+0,2147483647),xt(0,0,0)},Zb:function(e){P=e},Hb:function(e){var
t=vt();t&&(ye.Fb(t,e),O&&postMessage({cmd:\\\"exit\\\"}))},fc:function(){ye.Fb(vt(),-
1),postMessage({cmd:\\\"cancelDone\\\"})},Gb:function(){for(var e in ye.cb){var
t=ye.cb[e];t&&t.worker&&ye.sb(t.worker)}for(ye.cb={},e=0;e<ye.gb.length;++e){var
n=ye.gb[e];n.terminate()}for(ye.gb=[],e=0;e<ye.fb.length;++e)t=(n=ye.fb[e]).bb,ye.xb(t),n.terminate();ye.fb=[]},xb:
function(e){if(e){if(e.eb){var
t=a()[e.eb+100>>2];a()[e.eb+100>>2]=0,_t(t),_t(e.eb)}e.eb=0,e.wb&&e.hb&&_t(e.hb),e.hb=0,e.worker&&(e.work
er.bb=null)}},sb:function(e){ye.Yb((function(){delete
ye.cb[e.bb.eb],ye.gb.push(e),ye.fb.splice(ye.fb.indexOf(e),1),ye.xb(e.bb),e.bb=void
0}))},Yb:function(e){a()[Yt>>2]=0;try{e()}finally{a()[Yt>>2]=1}},Xb:function(){},hc:function(){for(var e in
ye.zb)ye.zb[e]()},Ub:function(e,t){e.onmessage=function(n){var
r=n.data,i=r.cmd;if(e.bb&&(ye.Lb=e.bb.eb),r.targetThread&&r.targetThread!=vt()){var
u=ye.cb[r.Dc];u?u.worker.postMessage(n.data,r.transferList):D('Internal error! Worker sent a message \\\"'+i+'\\\" to
target pthread '+r.targetThread+\\\", but that thread no longer exists!\\\")}else
if(\\\"processQueuedMainThreadWork\\\"===i)Tt();else if(\\\"spawnThread\\\"===i)Oe(n.data);else
if(\\\"cleanupThread\\\"===i)ge(r.thread);else if(\\\"killThread\\\"===i){if(n=r.thread,O)throw\\\"Internal Error!
killThread() can only ever be called from main application thread!\\\";if(!n)throw\\\"Internal Error! Null pthread_ptr
in killThread!\\\";a()[n+12>>2]=0,r=ye.cb[n],delete
ye.cb[n],r.worker.terminate(),ye.xb(r),ye.fb.splice(ye.fb.indexOf(r.worker),1),r.worker.bb=void 0}else
if(\\\"cancelThread\\\"===i){if(n=r.thread,O)throw\\\"Internal Error! cancelThread() can only ever be called from
main application thread!\\\";if(!n)throw\\\"Internal Error! Null pthread_ptr in
cancelThread!\\\";ye.cb[n].worker.postMessage({cmd:\\\"cancel\\\"})}else
if(\\\"loaded\\\"===i)e.loaded=!0,t&&t(e),e.mb&&(e.mb(),delete e.mb);else if(\\\"print\\\"===i)k(\\\"Thread
\\\"+r.threadId+\\\": \\\"+r.text);else if(\\\"printErr\\\"===i)D(\\\"Thread \\\"+r.threadId+\\\": \\\"+r.text);else
if(\\\"alert\\\"===i)alert(\\\"Thread \\\"+r.threadId+\\\": \\\"+r.text);else
```

```
if(\\\"exit\\\"===i)e.bb&&Atomics.load(o(),e.bb.eb+64>>2)&&ye.sb(e);else
if(\\\"exitProcess\\\"===i)try{Nt(r.returnCode)}catch(e){if(e instanceof Bt)return;throw
e}else\\\"cancelDone\\\"===i?ye.sb(e):\\\"objectTransfer\\\"!==i&&(\\\"setimmediate\\\"===n.data.target?e.postMes
sage(n.data):D(\\\"worker sent an unknown command \\\"+i));ye.Lb=void 0},e.onerror=function(e){D(\\\"pthread
sent an error! \\\"+e.filename+\\\":\\\"+e.lineno+\\\":
\\\"+e.message)},w&&(e.on(\\\"message\\\",(function(t){e.onmessage({data:t})})),e.on(\\\"error\\\",(function(t){e.on
error(t)})),e.on(\\\"exit\\\",(function(){}))),e.postMessage({cmd:\\\"load\\\",urlOrBlob:u.mainScriptUrlOrBlob||_scri
ptDir,wasmMemory:R,wasmModule:C})},Ib:function(){var e=E(\\\"ort-wasm-
threaded.worker.js\\\");ye.gb.push(new Worker(e))},Ob:function(){return
0==ye.gb.length&&(ye.Ib(),ye.Ub(ye.gb[0])),ye.gb.pop()},nc:function(e){for(e=performance.now()+e;performance.
now()<e;);}};function _e(e,t){if(0===e)e=Date.now();else{if(1!==e&&4!==e)return a()[yt()>>2]=28,-
1;e=be()}return a()[t>>2]=e/1e3|0,a()[t+4>>2]=e%1e3*1e6|0,0}function ve(e,t){if(O)return
Ne(1,1,e,t);te.unshift({Nb:e,ib:t})}function we(e){this.lb=e-
16,this.dc=function(e){a()[this.lb+4>>2]=e},this.ac=function(e){a()[this.lb+8>>2]=e},this.bc=function(){a()[this.lb
>>2]=0},this.$b=function(){t()[this.lb+12>>0]=0},this.cc=function(){t()[this.lb+13>>0]=0},this.Pb=function(e,t){t
his.dc(e),this.ac(t),this.bc(),this.$b(),this.cc()}}function Oe(e){if(O)throw\\\"Internal Error! spawnThread() can only
ever be called from main application thread!\\\";var t=ye.Ob();if(!t)return 6;if(void 0!==t.bb)throw\\\"Internal
error!\\\";if(!e.rb)throw\\\"Internal error, no pthread ptr!\\\";ye.fb.push(t);for(var
n=bt(512),r=0;128>r;++r)a()[n+4*r>>2]=0;var
i=e.hb+e.jb,u=(r=ye.cb[e.rb]={worker:t,hb:e.hb,jb:e.jb,wb:e.wb,eb:e.rb}).eb>>2;Atomics.store(o(),u+16,e.detached)
,Atomics.store(o(),u+25,n),Atomics.store(o(),u+10,r.eb),Atomics.store(o(),u+20,e.jb),Atomics.store(o(),u+19,i),Ato
mics.store(o(),u+26,e.jb),Atomics.store(o(),u+28,i),Atomics.store(o(),u+29,e.detached),n=Rt()+40,Atomics.store(o()
,u+43,n),t.bb=r;var
s={cmd:\\\"run\\\",start_routine:e.ec,arg:e.ib,threadInfoStruct:e.rb,stackBase:e.hb,stackSize:e.jb};return
t.mb=function(){s.time=performance.now(),t.postMessage(s,e.mc)},t.loaded&&(t.mb(),delete t.mb),0}function
Ae(e,n,r){if(0>=e||e>t().length||1&e)return-28;if(_){if(Atomics.load(a(),e>>2)!=n)return-6;var
o=performance.now();for(r=o+r,Atomics.exchange(a(),zt>>2,e);;){if((o=performance.now())>r)return
Atomics.exchange(a(),zt>>2,0),-
73;if(0==(o=Atomics.exchange(a(),zt>>2,0)))break;if(Tt(),Atomics.load(a(),e>>2)!=n)return-
6;Atomics.exchange(a(),zt>>2,e)}return 0}if(\\\"timed-out\\\"===(e=Atomics.wait(a(),e>>2,n,r)))return-
73;if(\\\"not-equal\\\"===e)return-6;if(\\\"ok\\\"===e)return 0;throw\\\"Atomics.wait returned an unexpected value
\\\"+e}function Ee(){w||v||(S||(S={}),S[\\\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-thread\\\"]||(S[\\\"Blocking on the
main thread is very dangerous, see https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-
browser-thread\\\"]=1,D(\\\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-
thread\\\")))}u.establishStackSpace=function(e,t){Wt(e,t),jt(e)},u.invokeEntryPoint=function(e,t){return
Z.get(e)(t)},be=w?function(){var e=process.hrtime();return 1e3*e[0]+e[1]/1e6}:O?function(){return
performance.now()-u.__performance_now_clock_drift}:function(){return performance.now()};var
Te={},Se=[null,[],[]];function Me(e,t){var n=Se[e];0===t||10===t?((1===e?k:D)(G(n,0)),n.length=0):n.push(t)}var
ke={};function De(e,t){return O?Ne(2,1,e,t):(e=N(e),ke.rc(e,t))}function xe(e,t,n){return O?Ne(3,1,e,t,n):0}function
Re(e,t){if(O)return Ne(4,1,e,t)}function Ce(e,t,n){if(O)return Ne(5,1,e,t,n)}function Pe(e,t,n){return
O?Ne(6,1,e,t,n):0}function Ie(e,t){if(O)return Ne(7,1,e,t)}function Fe(e,t){return
O?Ne(8,1,e,t):(e=N(e),ke.sc(e,t))}function Ue(e,t,n,a,o,i){if(O)t=Ne(9,1,e,t,n,a,o,i);else
if(i<<=12,0!=(16&a)&&0!=e%65536)t=-28;else if(0!=(32&a)){var
u=65536*Math.ceil(t/65536);(e=Ht(65536,u))?r().fill(0,e,e+u):e=0,e?(Te[e]={Wb:e,Tb:t,Jb:!0,fd:o,Ac:n,flags:a,offs
et:i},t=e):t=-48}else t=-52;return t}function je(e,t){if(O)e=Ne(10,1,e,t);else{var
n=Te[e];0!==t&&n?(t===n.Tb&&(Te[e]=null,n.Jb&&_t(n.Wb)),e=0):e=-28}return e}function Le(e,t,n){if(O)return
```

```
Ne(11,1,e,t,n)}function We(e,t,n){return O?Ne(12,1,e,t,n):(e=N(e),ke.tc(e,t,n))}function He(e){if(O)return
Ne(13,1,e)}function Ye(e,t){if(O)return Ne(14,1,e,t)}function ze(e){if(O)return Ne(15,1,e)}function
Be(){if(O)return Ne(16,1);le()}var Ge=[];function Ne(e,t){for(var n=arguments.length-
2,r=Ut(),a=Lt(8*n),o=a>>3,u=0;u<n;u++){var s=arguments[2+u];i()[o+u]=s}return n=St(e,n,a,t),jt(r),n}var
qe=[],Ve=[0,\\\"undefined\\\"!=typeof document?document:0,\\\"undefined\\\"!=typeof window?window:0];function
$e(e){return e=2<e?N(e):e,Ve[e]||(\\\"undefined\\\"!=typeof document?document.querySelector(e):void 0)}function
Xe(e,t,n){var r=$e(e);if(!r)return-
4;if(r.qb&&(a()[r.qb>>2]=t,a()[r.qb+4>>2]=n),!r.Db&&r.pc){if(r.qb){r=a()[r.qb+8>>2],e=e?N(e):\\\"\\\";var
o=Ut(),i=Lt(12),u=0;if(e){u=$(e)+1;var s=bt(u);V(e,s,u),u=s}return
a()[i>>2]=u,a()[i+4>>2]=t,a()[i+8>>2]=n,Mt(0,r,657457152,0,u,i),jt(o),1}return-4}return
r.Db&&(r=r.Db),e=!1,r.pb&&r.pb.ob&&(e=0===(e=r.pb.ob.getParameter(2978))[0]&&0===e[1]&&e[2]===r.widt
h&&e[3]===r.height),r.width=t,r.height=n,e&&r.pb.ob.viewport(0,0,t,n),0}function Je(e,t,n){return
O?Ne(17,1,e,t,n):Xe(e,t,n)}var Qe,Ze=[\\\"default\\\",\\\"low-power\\\",\\\"high-performance\\\"],Ke={};function
et(){if(!Qe){var
e,t={USER:\\\"web_user\\\",LOGNAME:\\\"web_user\\\",PATH:\\\"/\\\",PWD:\\\"/\\\",HOME:\\\"/home/web_user\\\
",LANG:(\\\"object\\\"==typeof navigator&&navigator.languages&&navigator.languages[0]||\\\"C\\\").replace(\\\"-
\\\",\\\"_\\\")+\\\".UTF-8\\\",_:p||\\\"./this.program\\\"};for(e in Ke)void 0===Ke[e]?delete t[e]:t[e]=Ke[e];var
n=[];for(e in t)n.push(e+\\\"=\\\"+t[e]);Qe=n}return Qe}function tt(e,n){if(O)return Ne(18,1,e,n);var r=0;return
et().forEach((function(o,i){var
u=n+r;for(i=a()[e+4*i>>2]=u,u=0;u<o.length;++u)t()[i++>>0]=o.charCodeAt(u);t()[i>>0]=0,r+=o.length+1})),0}fu
nction nt(e,t){if(O)return Ne(19,1,e,t);var n=et();a()[e>>2]=n.length;var r=0;return
n.forEach((function(e){r+=e.length+1})),a()[t>>2]=r,0}function rt(e){return O?Ne(20,1,e):0}function at(e,n){return
O?Ne(21,1,e,n):(e=1==e||2==e?2:le(),t()[n>>0]=e,0)}function ot(e,t,n,r){return
O?Ne(22,1,e,t,n,r):(e=ke.vc(e),t=ke.uc(e,t,n),a()[r>>2]=t,0)}function it(e,t,n,r,a){if(O)return
Ne(23,1,e,t,n,r,a)}function ut(e,t,n,o){if(O)return Ne(24,1,e,t,n,o);for(var i=0,u=0;u<n;u++){for(var
s=a()[t+8*u>>2],c=a()[t+(8*u+4)>>2],l=0;l<c;l++)Me(e,r()[s+l]);i+=c}return a()[o>>2]=i,0}function st(){function
e(e){return(e=e.toTimeString().match(/\\\\(([A-Za-z ]+)\\\\)$/))?e[1]:\\\"GMT\\\"}if(O)return
Ne(25,1);if(!st.Kb){st.Kb=!0;var t=(new Date).getFullYear(),n=new Date(t,0,1),r=new
Date(t,6,1);t=n.getTimezoneOffset();var
o=r.getTimezoneOffset(),i=Math.max(t,o);a()[Ft()>>2]=60*i,a()[It()>>2]=Number(t!=o),n=e(n),r=e(r),n=X(n),r=X(r
),o<t?(a()[Pt()>>2]=n,a()[Pt()+4>>2]=r):(a()[Pt()>>2]=r,a()[Pt()+4>>2]=n)}}function ct(e){return
0==e%4&&(0!=e%100||0==e%400)}function lt(e,t){for(var n=0,r=0;r<=t;n+=e[r++]);return n}var
ft=[31,29,31,30,31,30,31,31,30,31,30,31],pt=[31,28,31,30,31,30,31,31,30,31,30,31];function dt(e,t){for(e=new
Date(e.getTime());0<t;){var n=e.getMonth(),r=(ct(e.getFullYear())?ft:pt)[n];if(!(t>r-
e.getDate())){e.setDate(e.getDate()+t);break}t-=r-
e.getDate()+1,e.setDate(1),11>n?e.setMonth(n+1):(e.setMonth(0),e.setFullYear(e.getFullYear()+1))}return
e}function mt(e,n,r,o){function i(e,t,n){for(e=\\\"number\\\"==typeof
e?e.toString():e||\\\"\\\";e.length<t;)e=n[0]+e;return e}function u(e,t){return i(e,t,\\\"0\\\")}function s(e,t){function
n(e){return 0>e?-1:0<e?1:0}var r;return 0===(r=n(e.getFullYear()-t.getFullYear()))&&0===(r=n(e.getMonth()-
t.getMonth()))&&(r=n(e.getDate()-t.getDate())),r}function c(e){switch(e.getDay()){case 0:return new
Date(e.getFullYear()-1,11,29);case 1:return e;case 2:return new Date(e.getFullYear(),0,3);case 3:return new
Date(e.getFullYear(),0,2);case 4:return new Date(e.getFullYear(),0,1);case 5:return new Date(e.getFullYear()-
1,11,31);case 6:return new Date(e.getFullYear()-1,11,30)}}function l(e){e=dt(new Date(e.ab+1900,0,1),e.vb);var
t=new Date(e.getFullYear()+1,0,4),n=c(new Date(e.getFullYear(),0,4));return
t=c(t),0>=s(n,e)?0>=s(t,e)?e.getFullYear()+1:e.getFullYear():e.getFullYear()-1}var f=a()[o+40>>2];for(var p in
o={kc:a()[o>>2],jc:a()[o+4>>2],tb:a()[o+8>>2],nb:a()[o+12>>2],kb:a()[o+16>>2],ab:a()[o+20>>2],ub:a()[o+24>>2
],vb:a()[o+28>>2],Ec:a()[o+32>>2],ic:a()[o+36>>2],lc:f?N(f):\\\"\\\"},r=N(r),f={\\\"%c\\\":\\\"%a %b %d
%H:%M:%S %Y\\\",\\\"%D\\\":\\\"%m/%d/%y\\\",\\\"%F\\\":\\\"%Y-%m-
```

```
%d\\\",\\\"%h\\\":\\\"%b\\\",\\\"%r\\\":\\\"%I:%M:%S
%p\\\",\\\"%R\\\":\\\"%H:%M\\\",\\\"%T\\\":\\\"%H:%M:%S\\\",\\\"%x\\\":\\\"%m/%d/%y\\\",\\\"%X\\\":\\\"%H:%M:
%S\\\",\\\"%Ec\\\":\\\"%c\\\",\\\"%EC\\\":\\\"%C\\\",\\\"%Ex\\\":\\\"%m/%d/%y\\\",\\\"%EX\\\":\\\"%H:%M:%S\\\",\\\
"%Ey\\\":\\\"%y\\\",\\\"%EY\\\":\\\"%Y\\\",\\\"%Od\\\":\\\"%d\\\",\\\"%Oe\\\":\\\"%e\\\",\\\"%OH\\\":\\\"%H\\\",\\\"%
OI\\\":\\\"%I\\\",\\\"%Om\\\":\\\"%m\\\",\\\"%OM\\\":\\\"%M\\\",\\\"%OS\\\":\\\"%S\\\",\\\"%Ou\\\":\\\"%u\\\",\\\"%O
U\\\":\\\"%U\\\",\\\"%OV\\\":\\\"%V\\\",\\\"%Ow\\\":\\\"%w\\\",\\\"%OW\\\":\\\"%W\\\",\\\"%Oy\\\":\\\"%y\\\"})r=r.re
place(new RegExp(p,\\\"g\\\"),f[p]);var d=\\\"Sunday Monday Tuesday Wednesday Thursday Friday
Saturday\\\".split(\\\" \\\"),m=\\\"January February March April May June July August September October
November December\\\".split(\\\" \\\");for(p in f={\\\"%a\\\":function(e){return
d[e.ub].substring(0,3)},\\\"%A\\\":function(e){return d[e.ub]},\\\"%b\\\":function(e){return
m[e.kb].substring(0,3)},\\\"%B\\\":function(e){return m[e.kb]},\\\"%C\\\":function(e){return
u((e.ab+1900)/100|0,2)},\\\"%d\\\":function(e){return u(e.nb,2)},\\\"%e\\\":function(e){return i(e.nb,2,\\\"
\\\")},\\\"%g\\\":function(e){return l(e).toString().substring(2)},\\\"%G\\\":function(e){return
l(e)},\\\"%H\\\":function(e){return u(e.tb,2)},\\\"%I\\\":function(e){return 0==(e=e.tb)?e=12:12<e&&(e-
=12),u(e,2)},\\\"%j\\\":function(e){return u(e.nb+lt(ct(e.ab+1900)?ft:pt,e.kb-1),3)},\\\"%m\\\":function(e){return
u(e.kb+1,2)},\\\"%M\\\":function(e){return
u(e.jc,2)},\\\"%n\\\":function(){return\\\"\\\\n\\\"},\\\"%p\\\":function(e){return
0<=e.tb&&12>e.tb?\\\"AM\\\":\\\"PM\\\"},\\\"%S\\\":function(e){return
u(e.kc,2)},\\\"%t\\\":function(){return\\\"\\\\t\\\"},\\\"%u\\\":function(e){return e.ub||7},\\\"%U\\\":function(e){var
t=new Date(e.ab+1900,0,1),n=0===t.getDay()?t:dt(t,7-t.getDay());return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(lt(ct(e.getFullYear())?ft:pt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%V\\\":function(e){var t=new
Date(e.ab+1901,0,4),n=c(new Date(e.ab+1900,0,4));t=c(t);var r=dt(new Date(e.ab+1900,0,1),e.vb);return
0>s(r,n)?\\\"53\\\":0>=s(t,r)?\\\"01\\\":u(Math.ceil((n.getFullYear()<e.ab+1900?e.vb+32-n.getDate():e.vb+1-
n.getDate())/7),2)},\\\"%w\\\":function(e){return e.ub},\\\"%W\\\":function(e){var t=new
Date(e.ab,0,1),n=1===t.getDay()?t:dt(t,0===t.getDay()?1:7-t.getDay()+1);return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(lt(ct(e.getFullYear())?ft:pt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%y\\\":function(e){return(e.ab+1900).toString().substring(
2)},\\\"%Y\\\":function(e){return e.ab+1900},\\\"%z\\\":function(e){var t=0<=(e=e.ic);return
e=Math.abs(e)/60,(t?\\\"+\\\":\\\"-\\\")+String(\\\"0000\\\"+(e/60*100+e%60)).slice(-4)},\\\"%Z\\\":function(e){return
e.lc},\\\"%%\\\":function(){return\\\"%\\\"}})r.includes(p)&&(r=r.replace(new
RegExp(p,\\\"g\\\"),f[p](o)));return(p=function(e){var t=Array($(e)+1);return
q(e,t,0,t.length),t}(r)).length>n?0:(function(e,n){t().set(e,n)}(p,e),p.length-1)}var
ht=[null,ve,De,xe,Re,Ce,Pe,Ie,Fe,Ue,je,Le,We,He,Ye,ze,Be,Je,tt,nt,rt,at,ot,it,ut,st],gt={h:function(e,t,n,r){le(\\\"Asse
rtion failed: \\\"+N(e)+\\\", at: \\\"+[t?N(t):\\\"unknown filename\\\",n,r?N(r):\\\"unknown
function\\\"])},M:function(e,t){return _e(e,t)},b:function(e){return bt(e+16)+16},d:function(e,t){return
ve(e,t)},e:function(e,t){ye.yb.push((function(){Z.get(e)(t)}))},c:function(e,t,n){throw new
we(e).Pb(t,n),e},Z:function(e,t,n,r){if(\\\"undefined\\\"==typeof SharedArrayBuffer)return D(\\\"Current
environment does not support SharedArrayBuffer, pthreads are not available!\\\"),6;if(!e)return D(\\\"pthread_create
called with a null thread pointer!\\\"),28;var i=[];if(O&&0===i.length)return Et(687865856,e,t,n,r);var
u=0,s=0;if(t&&-1!=t){var c=a()[t>>2];c+=81920,u=a()[t+8>>2],s=0!==a()[t+12>>2]}else
c=2097152;(t=0==u)?u=Ht(16,c):F(0<(u-=c));for(var l=bt(228),f=0;57>f;++f)o()[(l>>2)+f]=0;return
a()[e>>2]=l,a()[l+12>>2]=l,e=l+152,a()[e>>2]=e,n={hb:u,jb:c,wb:t,detached:s,ec:n,rb:l,ib:r,mc:i},O?(n.oc=\\\"spaw
nThread\\\",postMessage(n,i),0):Oe(n)},X:function(e){throw
O?ye.Hb(e):(ye.Eb(),Nt(e)),\\\"unwind\\\"},Y:function(e,t){return function(e,t){if(!e)return D(\\\"pthread_join
attempted on a null thread pointer!\\\"),71;if(O&&vt()==e)return D(\\\"PThread \\\"+e+\\\" is attempting to join to
itself!\\\"),16;if(!O&&At()==e)return D(\\\"Main thread \\\"+e+\\\" is attempting to join to
itself!\\\"),16;if(a()[e+12>>2]!==e)return D(\\\"pthread_join attempted on thread \\\"+e+\\\", which does not point to
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a valid thread, or does not exist anymore!\\\"),71;if(Atomics.load(o(),e+64>>2))return D(\\\"Attempted to join
thread \\\"+e+\\\", which was already detached!\\\"),28;for(Ee();;){var n=Atomics.load(o(),e+0>>2);if(1==n)return
n=Atomics.load(o(),e+4>>2),t&&(a()[t>>2]=n),Atomics.store(o(),e+64>>2,1),O?postMessage({cmd:\\\"cleanupThr
ead\\\",thread:e}):ge(e),0;kt(),O||Tt(),Ae(e+0,n,O?100:1)}}(e,t)},L:De,s:xe,S:Re,V:Ce,u:function(){return
42},F:Pe,Q:Ie,P:Fe,U:Ue,T:je,q:Le,K:We,N:He,v:Ye,O:ze,da:function(e,t){if(e==t)postMessage({cmd:\\\"processQ
ueuedMainThreadWork\\\"});else
if(O)postMessage({targetThread:e,cmd:\\\"processThreadQueue\\\"});else{if(!(e=(e=ye.cb[e])&&e.worker))return;e.
postMessage({cmd:\\\"processThreadQueue\\\"})}return 1},f:Be,w:_e,ga:function(e,t){return e-
t},A:function(){le(\\\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},l:function(){le(\\\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},C:function(){le(\\\"To use dlopen, you need to use Emscripten's linking support,
see https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},z:function(){le(\\\"To use dlopen, you need to
use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},ea:function(e,t,n){var
o;for(Ge.length=0,n>>=2;o=r()[t++];)(o=105>o)&&1&n&&n++,Ge.push(o?i()[n++>>1]:a()[n]),++n;return
de[e].apply(null,Ge)},G:Ee,n:function(){},k:Ae,j:he,W:function(){return
2147483648},i:be,D:function(e,t,n){r().copyWithin(e,t,t+n)},o:function(){return
w?n(993).cpus().length:navigator.hardwareConcurrency},aa:function(e,t,n){qe.length=t,n>>=3;for(var
r=0;r<t;r++)qe[r]=i()[n+r];return(0>e?de[-e-1]:ht[e]).apply(null,qe)},E:function(e){var
t=r().length;if((e>>>=0)<=t||2147483648<e)return!1;for(var n=1;4>=n;n*=2){var
a=t*(1+.2/n);a=Math.min(a,e+100663296),0<(a=Math.max(e,a))%65536&&(a+=65536-
a%65536);e:{try{R.grow(Math.min(2147483648,a)-j.byteLength+65535>>>16),J(R.buffer);var o=1;break
e}catch(e){}o=void 0}if(o)return!0}return!1},ba:function(e,t,n){return
$e(e)?Xe(e,t,n):Je(e,t,n)},x:function(){},$:function(e,t,n){return re+=1,setTimeout((function(){--
re,function(e){if(!I){try{e()}catch(e){if(e instanceof Bt)return;if(\\\"unwind\\\"!==e)throw
e&&\\\"object\\\"==typeof e&&e.stack&&D(\\\"exception thrown:
\\\"+[e,e.stack]),e}if(!ae())try{O?Dt(P):Nt(P)}catch(e){if(!(e instanceof Bt))throw
e}}}((function(){Z.get(e)(n)}))}),t)},ca:function(e,t){t>>=2;var n=a()[t+6];return
t={alpha:!!a()[t],depth:!!a()[t+1],stencil:!!a()[t+2],antialias:!!a()[t+3],premultipliedAlpha:!!a()[t+4],preserveDrawin
gBuffer:!!a()[t+5],powerPreference:Ze[n],failIfMajorPerformanceCaveat:!!a()[t+7],Vb:a()[t+8],yc:a()[t+9],Bb:a()[t+
10],Mb:a()[t+11],Bc:a()[t+12],Cc:a()[t+13]},!(e=$e(e))||t.Mb?0:function(e,t){e.Cb||(e.Cb=e.getContext,e.getContext
=function(t,n){return\\\"webgl\\\"==t==(n=e.Cb(t,n))instanceof WebGLRenderingContext?n:null});var
n=e.getContext(\\\"webgl\\\",t);return n?function(e,t){var n=bt(8);a()[n+4>>2]=vt();var
r={wc:n,attributes:t,version:t.Vb,ob:e};return e.canvas&&(e.canvas.pb=r),(void
0===t.Bb||t.Bb)&&function(e){if(e||(e=void 0),!e.Qb){e.Qb=!0;var t=e.ob;!function(e){var
t=e.getExtension(\\\"ANGLE_instanced_arrays\\\");t&&(e.vertexAttribDivisor=function(e,n){t.vertexAttribDivisor
ANGLE(e,n)},e.drawArraysInstanced=function(e,n,r,a){t.drawArraysInstancedANGLE(e,n,r,a)},e.drawElementsIns
tanced=function(e,n,r,a,o){t.drawElementsInstancedANGLE(e,n,r,a,o)})}(t),function(e){var
t=e.getExtension(\\\"OES_vertex_array_object\\\");t&&(e.createVertexArray=function(){return
t.createVertexArrayOES()},e.deleteVertexArray=function(e){t.deleteVertexArrayOES(e)},e.bindVertexArray=funct
ion(e){t.bindVertexArrayOES(e)},e.isVertexArray=function(e){return t.isVertexArrayOES(e)})}(t),function(e){var
t=e.getExtension(\\\"WEBGL_draw_buffers\\\");t&&(e.drawBuffers=function(e,n){t.drawBuffersWEBGL(e,n)})}(t
),t.qc=t.getExtension(\\\"EXT_disjoint_timer_query\\\"),t.zc=t.getExtension(\\\"WEBGL_multi_draw\\\"),(t.getSupp
ortedExtensions()||[]).forEach((function(e){e.includes(\\\"lose_context\\\")||e.includes(\\\"debug\\\")||t.getExtension(e
)}))}}(r),n}(n,t):0}(e,t)},I:tt,J:nt,m:rt,H:at,t:ot,B:it,p:ut,R:function(e){var t=Date.now();return
a()[e>>2]=t/1e3|0,a()[e+4>>2]=t%1e3*1e3|0,0},ha:function e(t,n){return t=new
Date(1e3*a()[t>>2]),a()[n>>2]=t.getUTCSeconds(),a()[n+4>>2]=t.getUTCMinutes(),a()[n+8>>2]=t.getUTCHours()
```

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,a()[n+12>>2]=t.getUTCDate(),a()[n+16>>2]=t.getUTCMonth(),a()[n+20>>2]=t.getUTCFullYear()-
1900,a()[n+24>>2]=t.getUTCDay(),a()[n+36>>2]=0,a()[n+32>>2]=0,t=(t.getTime()-
Date.UTC(t.getUTCFullYear(),0,1,0,0,0,0))/864e5|0,a()[n+28>>2]=t,e.Ab||(e.Ab=X(\\\"GMT\\\")),a()[n+40>>2]=e.
Ab,n},_:function(){ye.Rb()},r:function(e,t){st(),e=new
Date(1e3*a()[e>>2]),a()[t>>2]=e.getSeconds(),a()[t+4>>2]=e.getMinutes(),a()[t+8>>2]=e.getHours(),a()[t+12>>2]
=e.getDate(),a()[t+16>>2]=e.getMonth(),a()[t+20>>2]=e.getFullYear()-1900,a()[t+24>>2]=e.getDay();var n=new
Date(e.getFullYear(),0,1),r=(e.getTime()-n.getTime())/864e5|0;return a()[t+28>>2]=r,a()[t+36>>2]=-
60*e.getTimezoneOffset(),r=new
Date(e.getFullYear(),6,1).getTimezoneOffset(),e=0|(r!=(n=n.getTimezoneOffset())&&e.getTimezoneOffset()==Mat
h.min(n,r)),a()[t+32>>2]=e,e=a()[Pt()+(e?4:0)>>2],a()[t+40>>2]=e,t},a:R||u.wasmMemory,y:function(e){st();var
t=new
Date(a()[e+20>>2]+1900,a()[e+16>>2],a()[e+12>>2],a()[e+8>>2],a()[e+4>>2],a()[e>>2],0),n=a()[e+32>>2],r=t.get
TimezoneOffset(),o=new Date(t.getFullYear(),0,1),i=new
Date(t.getFullYear(),6,1).getTimezoneOffset(),u=o.getTimezoneOffset(),s=Math.min(u,i);return
0>n?a()[e+32>>2]=Number(i!=u&&s==r):0<n!=(s==r)&&(i=Math.max(u,i),t.setTime(t.getTime()+6e4*((0<n?s:i)-
r))),a()[e+24>>2]=t.getDay(),n=(t.getTime()-
o.getTime())/864e5|0,a()[e+28>>2]=n,a()[e>>2]=t.getSeconds(),a()[e+4>>2]=t.getMinutes(),a()[e+8>>2]=t.getHour
s(),a()[e+12>>2]=t.getDate(),a()[e+16>>2]=t.getMonth(),t.getTime()/1e3|0},fa:mt,g:function(e,t,n,r){return
mt(e,t,n,r)}};!function(){function
e(e,t){u.asm=e.exports,Z=u.asm.Ca,ee.unshift(u.asm.ia),ye.zb.push(u.asm.Ha),C=t,O||(ue--
,u.monitorRunDependencies&&u.monitorRunDependencies(ue),0==ue&&(null!==se&&(clearInterval(se),se=null),
ce&&(e=ce,ce=null,e())))}function t(t){e(t.instance,t.module)}function n(e){return
function(){if(!M&&(_||v)){if(\\\"function\\\"==typeof fetch&&!ie.startsWith(\\\"file://\\\"))return
fetch(ie,{credentials:\\\"same-origin\\\"}).then((function(e){if(!e.ok)throw\\\"failed to load wasm binary file at
'\\\"+ie+\\\"'\\\";return e.arrayBuffer()})).catch((function(){return pe()}));if(h)return new
Promise((function(e,t){h(ie,(function(t){e(new Uint8Array(t))}),t)}))}return
Promise.resolve().then((function(){return pe()}))}().then((function(e){return
WebAssembly.instantiate(e,r)})).then(e,(function(e){D(\\\"failed to asynchronously prepare wasm:
\\\"+e),le(e)}))}var
r={a:gt};if(O||(ue++,u.monitorRunDependencies&&u.monitorRunDependencies(ue)),u.instantiateWasm)try{return
u.instantiateWasm(r,e)}catch(e){return D(\\\"Module.instantiateWasm callback failed with error:
\\\"+e),!1}(M||\\\"function\\\"!=typeof
WebAssembly.instantiateStreaming||fe()||ie.startsWith(\\\"file://\\\")||\\\"function\\\"!=typeof
fetch?n(t):fetch(ie,{credentials:\\\"same-origin\\\"}).then((function(e){return
WebAssembly.instantiateStreaming(e,r).then(t,(function(e){return D(\\\"wasm streaming compile failed:
\\\"+e),D(\\\"falling back to ArrayBuffer
instantiation\\\"),n(t)}))}))).catch(c)}(),u.___wasm_call_ctors=function(){return(u.___wasm_call_ctors=u.asm.ia).a
pply(null,arguments)},u._OrtInit=function(){return(u._OrtInit=u.asm.ja).apply(null,arguments)},u._OrtCreateSessio
nOptions=function(){return(u._OrtCreateSessionOptions=u.asm.ka).apply(null,arguments)},u._OrtAddSessionConfi
gEntry=function(){return(u._OrtAddSessionConfigEntry=u.asm.la).apply(null,arguments)},u._OrtReleaseSessionO
ptions=function(){return(u._OrtReleaseSessionOptions=u.asm.ma).apply(null,arguments)},u._OrtCreateSession=fu
nction(){return(u._OrtCreateSession=u.asm.na).apply(null,arguments)},u._OrtReleaseSession=function(){return(u._
OrtReleaseSession=u.asm.oa).apply(null,arguments)},u._OrtGetInputCount=function(){return(u._OrtGetInputCount
=u.asm.pa).apply(null,arguments)},u._OrtGetOutputCount=function(){return(u._OrtGetOutputCount=u.asm.qa).app
ly(null,arguments)},u._OrtGetInputName=function(){return(u._OrtGetInputName=u.asm.ra).apply(null,arguments)
},u._OrtGetOutputName=function(){return(u._OrtGetOutputName=u.asm.sa).apply(null,arguments)},u._OrtFree=f
unction(){return(u._OrtFree=u.asm.ta).apply(null,arguments)},u._OrtCreateTensor=function(){return(u._OrtCreate
Tensor=u.asm.ua).apply(null,arguments)},u._OrtGetTensorData=function(){return(u._OrtGetTensorData=u.asm.va)
```

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.apply(null,arguments)},u._OrtReleaseTensor=function(){return(u._OrtReleaseTensor=u.asm.wa).apply(null,arguments)},u._OrtCreateRunOptions=function(){return(u._OrtCreateRunOptions=u.asm.xa).apply(null,arguments)},u._OrtAddRunConfigEntry=function(){return(u._OrtAddRunConfigEntry=u.asm.ya).apply(null,arguments)},u._OrtReleaseRunOptions=function(){return(u._OrtReleaseRunOptions=u.asm.za).apply(null,arguments)},u._OrtRun=function(){return(u._OrtRun=u.asm.Aa).apply(null,arguments)},u._OrtEndProfiling=function(){return(u._OrtEndProfiling=u.asm.Ba).apply(null,arguments)};var
bt=u._malloc=function(){return(bt=u._malloc=u.asm.Da).apply(null,arguments)},yt=u.___errno_location=function(){return(yt=u.___errno_location=u.asm.Ea).apply(null,arguments)},_t=u._free=function(){return(_t=u._free=u.asm.Fa).apply(null,arguments)},vt=u._pthread_self=function(){return(vt=u._pthread_self=u.asm.Ga).apply(null,arguments)};u._emscripten_tls_init=function(){return(u._emscripten_tls_init=u.asm.Ha).apply(null,arguments)},u._emscripten_current_thread_process_queued_calls=function(){return(u._emscripten_current_thread_process_queued_calls=u.asm.Ia).apply(null,arguments)};var
wt,Ot=u._emscripten_register_main_browser_thread_id=function(){return(Ot=u._emscripten_register_main_browser_thread_id=u.asm.Ja).apply(null,arguments)},At=u._emscripten_main_browser_thread_id=function(){return(At=u._emscripten_main_browser_thread_id=u.asm.Ka).apply(null,arguments)},Et=u._emscripten_sync_run_in_main_thread_4=function(){return(Et=u._emscripten_sync_run_in_main_thread_4=u.asm.La).apply(null,arguments)},Tt=u._emscripten_main_thread_process_queued_calls=function(){return(Tt=u._emscripten_main_thread_process_queued_calls=u.asm.Ma).apply(null,arguments)},St=u._emscripten_run_in_main_runtime_thread_js=function(){return(St=u._emscripten_run_in_main_runtime_thread_js=u.asm.Na).apply(null,arguments)},Mt=u.__emscripten_call_on_thread=function(){return(Mt=u.__emscripten_call_on_thread=u.asm.Oa).apply(null,arguments)},kt=u._pthread_testcancel=function(){return(kt=u._pthread_testcancel=u.asm.Pa).apply(null,arguments)},Dt=u._pthread_exit=function(){return(Dt=u._pthread_exit=u.asm.Qa).apply(null,arguments)},xt=u.__emscripten_thread_init=function(){return(xt=u.__emscripten_thread_init=u.asm.Ra).apply(null,arguments)},Rt=u._emscripten_get_global_libc=function(){return(Rt=u._emscripten_get_global_libc=u.asm.Sa).apply(null,arguments)},Ct=u.___pthread_tsd_run_dtors=function(){return(Ct=u.___pthread_tsd_run_dtors=u.asm.Ta).apply(null,arguments)},Pt=u.__get_tzname=function(){return(Pt=u.__get_tzname=u.asm.Ua).apply(null,arguments)},It=u.__get_daylight=function(){return(It=u.__get_daylight=u.asm.Va).apply(null,arguments)},Ft=u.__get_timezone=function(){return(Ft=u.__get_timezone=u.asm.Wa).apply(null,arguments)},Ut=u.stackSave=function(){return(Ut=u.stackSave=u.asm.Xa).apply(null,arguments)},jt=u.stackRestore=function(){return(jt=u.stackRestore=u.asm.Ya).apply(null,arguments)},Lt=u.stackAlloc=function(){return(Lt=u.stackAlloc=u.asm.Za).apply(null,arguments)},Wt=u._emscripten_stack_set_limits=function(){return(Wt=u._emscripten_stack_set_limits=u.asm._a).apply(null,arguments)},Ht=u._memalign=function(){return(Ht=u._memalign=u.asm.$a).apply(null,arguments)},Yt=u.__emscripten_allow_main_runtime_queued_calls=973296,zt=u.__emscripten_main_thread_futex=977204;function Bt(e){this.name=\\\"ExitStatus\\\",this.message=\\\"Program terminated with exit(\\\"+e+\\\")\\\",this.status=e}function Gt(){function
e(){if(!wt&&(wt=!0,u.calledRun=!0,!I)&&(O||me(ee),s(u),u.onRuntimeInitialized&&u.onRuntimeInitialized(),!O)){if(u.postRun)for(\\\"function\\\"==typeof u.postRun&&(u.postRun=[u.postRun]);u.postRun.length;){var
e=u.postRun.shift();ne.unshift(e)}me(ne)}}if(!(0<ue))if(O)s(u),O||me(ee),postMessage({cmd:\\\"loaded\\\"});else{if(!O){if(u.preRun)for(\\\"function\\\"==typeof
u.preRun&&(u.preRun=[u.preRun]);u.preRun.length;)oe();me(K)}0<ue||(u.setStatus?(u.setStatus(\\\"Running...\\\"),setTimeout((function(){setTimeout((function(){u.setStatus(\\\"\\\")}),1),e()}),1)):e())}}function
Nt(e){if(P=e,O)throw postMessage({cmd:\\\"exitProcess\\\",returnCode:e}),new
Bt(e);ae()||(ye.Gb(),O||(me(te),\\\"undefined\\\"!=typeof
_fflush&&_fflush(0),Se[1].length&&Me(1,10),Se[2].length&&Me(2,10))),P=e,ae()||(ye.Gb(),u.onExit&&u.onExit(e),I=!0),d(e,new
Bt(e))}if(u.UTF8ToString=N,u.stringToUTF8=V,u.lengthBytesUTF8=$,u.keepRuntimeAlive=ae,u.PThread=ye,u.stackSave=Ut,u.stackRestore=jt,u.stackAlloc=Lt,u.PThread=ye,u.wasmMemory=R,u.ExitStatus=Bt,ce=function
e(){wt||Gt(),wt||(ce=e)},u.run=Gt,u.preInit)for(\\\"function\\\"==typeof
u.preInit&&(u.preInit=[u.preInit]);0<u.preInit.length;)u.preInit.pop()();return
```

```
O&&(x=!1,ye.Sb()),Gt(),e.ready});e.exports=r},118:e=>{\\\"use strict\\\";e.exports='\\\"use strict\\\";var
e={};if(\\\"object\\\"==typeof process&&\\\"object\\\"==typeof process.versions&&\\\"string\\\"==typeof
process.versions.node){var
a=require(\\\"worker_threads\\\"),t=a.parentPort;t.on(\\\"message\\\",(function(e){onmessage({data:e})}));var
r=require(\\\"fs\\\");Object.assign(global,{self:global,require:require,Module:e,location:{href:__filename},Worker:a.
Worker,importScripts:function(e){(0,eval)(r.readFileSync(e,\\\"utf8\\\"))},postMessage:function(e){t.postMessage(e
)},performance:global.performance||{now:function(){return Date.now()}}})}var s=function(){var
e=Array.prototype.slice.call(arguments).join(\\\" \\\");console.error(e)};self.alert=function(){var
a=Array.prototype.slice.call(arguments).join(\\\"
\\\");postMessage({cmd:\\\"alert\\\",text:a,threadId:e._pthread_self()})},e.instantiateWasm=function(a,t){var r=new
WebAssembly.Instance(e.wasmModule,a);return
t(r),e.wasmModule=null,r.exports},self.onmessage=function(a){try{if(\\\"load\\\"===a.data.cmd){if(e.wasmModule
=a.data.wasmModule,e.wasmMemory=a.data.wasmMemory,e.buffer=e.wasmMemory.buffer,e.ENVIRONMENT_I
S_PTHREAD=!0,\\\"string\\\"==typeof a.data.urlOrBlob)importScripts(a.data.urlOrBlob);else{var
t=URL.createObjectURL(a.data.urlOrBlob);importScripts(t),URL.revokeObjectURL(t)}ortWasmThreaded(e).then((
function(a){e=a}))}else if(\\\"objectTransfer\\\"===a.data.cmd)e.PThread.receiveObjectTransfer(a.data);else
if(\\\"run\\\"===a.data.cmd){e.__performance_now_clock_drift=performance.now()-
a.data.time,e.__emscripten_thread_init(a.data.threadInfoStruct,0,0);var
r=a.data.stackBase,o=a.data.stackBase+a.data.stackSize;e.establishStackSpace(o,r),e.PThread.receiveObjectTransfer
(a.data),e.PThread.threadInit();try{var
n=e.invokeEntryPoint(a.data.start_routine,a.data.arg);e.keepRuntimeAlive()?e.PThread.setExitStatus(n):e.PThread.t
hreadExit(n)}catch(a){if(\\\"Canceled!\\\"===a)e.PThread.threadCancel();else if(\\\"unwind\\\"!=a){if(!(a instanceof
e.ExitStatus))throw e.PThread.threadExit(-
2),a;e.keepRuntimeAlive()||e.PThread.threadExit(a.status)}}}else\\\"cancel\\\"===a.data.cmd?e._pthread_self()&&e
.PThread.threadCancel():\\\"setimmediate\\\"===a.data.target||(\\\"processThreadQueue\\\"===a.data.cmd?e._pthrea
d_self()&&e._emscripten_current_thread_process_queued_calls():(s(\\\"worker.js received unknown command
\\\"+a.data.cmd),s(a.data)))}catch(e){throw s(\\\"worker.js onmessage() captured an uncaught exception:
\\\"+e),e&&e.stack&&s(e.stack),e}};\\\\n'},932:(e,t,n)=>{var
_scriptDir,r=(_scriptDir=(_scriptDir=\\\"undefined\\\"!=typeof
document&&document.currentScript?document.currentScript.src:void 0)||\\\"/index.js\\\",function(e){var
t,r,a;e=e||{},t||(t=void 0!==e?e:{}),t.ready=new Promise((function(e,t){r=e,a=t}));var o,i={};for(o in
t)t.hasOwnProperty(o)&&(i[o]=t[o]);var u,s,c,l,f,p=\\\"./this.program\\\",d=\\\"object\\\"==typeof
window,m=\\\"function\\\"==typeof importScripts,h=\\\"object\\\"==typeof process&&\\\"object\\\"==typeof
process.versions&&\\\"string\\\"==typeof
process.versions.node,g=\\\"\\\";h?(g=m?n(908).dirname(g)+\\\"/\\\":\\\"//\\\",u=function(e,t){return
l||(l=n(384)),f||(f=n(908)),e=f.normalize(e),l.readFileSync(e,t?null:\\\"utf8\\\")},c=function(e){return(e=u(e,!0)).buff
er||(e=new Uint8Array(e)),e.buffer||B(\\\"Assertion failed:
undefined\\\"),e},s=function(e,t,r){l||(l=n(384)),f||(f=n(908)),e=f.normalize(e),l.readFile(e,(function(e,n){e?r(e):t(n.b
uffer)}))},1<process.argv.length&&(p=process.argv[1].replace(/\\\\\\\\/g,\\\"/\\\")),process.argv.slice(2),process.on(\\\
"uncaughtException\\\",(function(e){throw
e})),process.on(\\\"unhandledRejection\\\",B),t.inspect=function(){return\\\"[Emscripten Module
object]\\\"}):(d||m)&&(m?g=self.location.href:\\\"undefined\\\"!=typeof
document&&document.currentScript&&(g=document.currentScript.src),_scriptDir&&(g=_scriptDir),g=0!==g.inde
xOf(\\\"blob:\\\")?g.substr(0,g.lastIndexOf(\\\"/\\\")+1):\\\"\\\",u=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.send(null),t.responseText},m&&(c=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.responseType=\\\"arraybuffer\\\",t.send(null),new
Uint8Array(t.response)}),s=function(e,t,n){var r=new
XMLHttpRequest;r.open(\\\"GET\\\",e,!0),r.responseType=\\\"arraybuffer\\\",r.onload=function(){200==r.status||0=
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=r.status&&r.response?t(r.response):n()},r.onerror=n,r.send(null)});var
b,y=t.print||console.log.bind(console),_=t.printErr||console.warn.bind(console);for(o in
i)i.hasOwnProperty(o)&&(t[o]=i[o]);i=null,t.thisProgram&&(p=t.thisProgram),t.wasmBinary&&(b=t.wasmBinary),
t.noExitRuntime,\\\"object\\\"!=typeof WebAssembly&&B(\\\"no native wasm support detected\\\");var
v,w,O,A,E,T=!1,S=\\\"undefined\\\"!=typeof TextDecoder?new TextDecoder(\\\"utf8\\\"):void 0;function
M(e,t,n){var r=t+n;for(n=t;e[n]&&!(n>=r);)++n;if(16<n-t&&e.subarray&&S)return
S.decode(e.subarray(t,n));for(r=\\\"\\\";t<n;){var a=e[t++];if(128&a){var
o=63&e[t++];if(192==(224&a))r+=String.fromCharCode((31&a)<<6|o);else{var
i=63&e[t++];65536>(a=224==(240&a)?(15&a)<<12|o<<6|i:(7&a)<<18|o<<12|i<<6|63&e[t++])?r+=String.fromCh
arCode(a):(a-=65536,r+=String.fromCharCode(55296|a>>10,56320|1023&a))}}else
r+=String.fromCharCode(a)}return r}function k(e,t){return e?M(A,e,t):\\\"\\\"}function D(e,t,n,r){if(!(0<r))return
0;var a=n;r=n+r-1;for(var o=0;o<e.length;++o){var
i=e.charCodeAt(o);if(55296<=i&&57343>=i&&(i=65536+((1023&i)<<10)|1023&e.charCodeAt(++o)),127>=i){if(
n>=r)break;t[n++]=i}else{if(2047>=i){if(n+1>=r)break;t[n++]=192|i>>6}else{if(65535>=i){if(n+2>=r)break;t[n++
]=224|i>>12}else{if(n+3>=r)break;t[n++]=240|i>>18,t[n++]=128|i>>12&63}t[n++]=128|i>>6&63}t[n++]=128|63
&i}}return t[n]=0,n-a}function x(e){for(var t=0,n=0;n<e.length;++n){var
r=e.charCodeAt(n);55296<=r&&57343>=r&&(r=65536+((1023&r)<<10)|1023&e.charCodeAt(++n)),127>=r?++t:t
=2047>=r?t+2:65535>=r?t+3:t+4}return t}function R(e){var t=x(e)+1,n=pe(t);return n&&D(e,O,n,t),n}function
C(){var e=v.buffer;w=e,t.HEAP8=O=new Int8Array(e),t.HEAP16=new Int16Array(e),t.HEAP32=E=new
Int32Array(e),t.HEAPU8=A=new Uint8Array(e),t.HEAPU16=new Uint16Array(e),t.HEAPU32=new
Uint32Array(e),t.HEAPF32=new Float32Array(e),t.HEAPF64=new Float64Array(e)}var
P,I=[],F=[],U=[],j=[];function L(){var e=t.preRun.shift();I.unshift(e)}var W,H=0,Y=null,z=null;function B(e){throw
t.onAbort&&t.onAbort(e),_(e),T=!0,e=new WebAssembly.RuntimeError(\\\"abort(\\\"+e+\\\"). Build with -s
ASSERTIONS=1 for more info.\\\"),a(e),e}function G(){return W.startsWith(\\\"data:application/octet-
stream;base64,\\\")}if(t.preloadedImages={},t.preloadedAudios={},W=\\\"ort-wasm.wasm\\\",!G()){var
N=W;W=t.locateFile?t.locateFile(N,g):g+N}function q(){var e=W;try{if(e==W&&b)return new
Uint8Array(b);if(c)return c(e);throw\\\"both async and sync fetching of the wasm failed\\\"}catch(e){B(e)}}function
V(e){for(;0<e.length;){var n=e.shift();if(\\\"function\\\"==typeof n)n(t);else{var r=n.Ea;\\\"number\\\"==typeof
r?void 0===n.xa?P.get(r)():P.get(r)(n.xa):r(void 0===n.xa?null:n.xa)}}}function $(e){this.ya=e-
16,this.Na=function(e){E[this.ya+4>>2]=e},this.Ka=function(e){E[this.ya+8>>2]=e},this.La=function(){E[this.ya>
>2]=0},this.Ja=function(){O[this.ya+12>>0]=0},this.Ma=function(){O[this.ya+13>>0]=0},this.Ga=function(e,t){thi
s.Na(e),this.Ka(t),this.La(),this.Ja(),this.Ma()}}var X,J={},Q=[null,[],[]],Z={};X=h?function(){var
e=process.hrtime();return 1e3*e[0]+e[1]/1e6}:function(){return performance.now()};var K,ee,te={};function
ne(){if(!K){var
e,t={USER:\\\"web_user\\\",LOGNAME:\\\"web_user\\\",PATH:\\\"/\\\",PWD:\\\"/\\\",HOME:\\\"/home/web_user\\\
",LANG:(\\\"object\\\"==typeof navigator&&navigator.languages&&navigator.languages[0]||\\\"C\\\").replace(\\\"-
\\\",\\\"_\\\")+\\\".UTF-8\\\",_:p||\\\"./this.program\\\"};for(e in te)void 0===te[e]?delete t[e]:t[e]=te[e];var n=[];for(e
in t)n.push(e+\\\"=\\\"+t[e]);K=n}return K}function re(){function e(e){return(e=e.toTimeString().match(/\\\\(([A-Za-
z ]+)\\\\)$/))?e[1]:\\\"GMT\\\"}if(!ee){ee=!0;var t=(new Date).getFullYear(),n=new Date(t,0,1),r=new
Date(t,6,1);t=n.getTimezoneOffset();var
a=r.getTimezoneOffset(),o=Math.max(t,a);E[be()>>2]=60*o,E[ge()>>2]=Number(t!=a),n=e(n),r=e(r),n=R(n),r=R(r)
,a<t?(E[he()>>2]=n,E[he()+4>>2]=r):(E[he()>>2]=r,E[he()+4>>2]=n)}}function ae(e){return
0==e%4&&(0!=e%100||0==e%400)}function oe(e,t){for(var n=0,r=0;r<=t;n+=e[r++]);return n}var
ie=[31,29,31,30,31,30,31,31,30,31,30,31],ue=[31,28,31,30,31,30,31,31,30,31,30,31];function se(e,t){for(e=new
Date(e.getTime());0<t;){var n=e.getMonth(),r=(ae(e.getFullYear())?ie:ue)[n];if(!(t>r-
e.getDate())){e.setDate(e.getDate()+t);break}t-=r-
e.getDate()+1,e.setDate(1),11>n?e.setMonth(n+1):(e.setMonth(0),e.setFullYear(e.getFullYear()+1))}return
e}function ce(e,t,n,r){function a(e,t,n){for(e=\\\"number\\\"==typeof
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e?e.toString():e||\\\"\\\";e.length<t;)e=n[0]+e;return e}function o(e,t){return a(e,t,\\\"0\\\")}function i(e,t){function
n(e){return 0>e?-1:0<e?1:0}var r;return 0===(r=n(e.getFullYear()-t.getFullYear()))&&0===(r=n(e.getMonth()-
t.getMonth()))&&(r=n(e.getDate()-t.getDate())),r}function u(e){switch(e.getDay()){case 0:return new
Date(e.getFullYear()-1,11,29);case 1:return e;case 2:return new Date(e.getFullYear(),0,3);case 3:return new
Date(e.getFullYear(),0,2);case 4:return new Date(e.getFullYear(),0,1);case 5:return new Date(e.getFullYear()-
1,11,31);case 6:return new Date(e.getFullYear()-1,11,30)}}function s(e){e=se(new Date(e.va+1900,0,1),e.Ca);var
t=new Date(e.getFullYear()+1,0,4),n=u(new Date(e.getFullYear(),0,4));return
t=u(t),0>=i(n,e)?0>=i(t,e)?e.getFullYear()+1:e.getFullYear():e.getFullYear()-1}var c=E[r+40>>2];for(var l in
r={Qa:E[r>>2],Pa:E[r+4>>2],Aa:E[r+8>>2],za:E[r+12>>2],wa:E[r+16>>2],va:E[r+20>>2],Ba:E[r+24>>2],Ca:E[r+
28>>2],Ya:E[r+32>>2],Oa:E[r+36>>2],Ra:c?k(c):\\\"\\\"},n=k(n),c={\\\"%c\\\":\\\"%a %b %d %H:%M:%S
%Y\\\",\\\"%D\\\":\\\"%m/%d/%y\\\",\\\"%F\\\":\\\"%Y-%m-%d\\\",\\\"%h\\\":\\\"%b\\\",\\\"%r\\\":\\\"%I:%M:%S
%p\\\",\\\"%R\\\":\\\"%H:%M\\\",\\\"%T\\\":\\\"%H:%M:%S\\\",\\\"%x\\\":\\\"%m/%d/%y\\\",\\\"%X\\\":\\\"%H:%M:
%S\\\",\\\"%Ec\\\":\\\"%c\\\",\\\"%EC\\\":\\\"%C\\\",\\\"%Ex\\\":\\\"%m/%d/%y\\\",\\\"%EX\\\":\\\"%H:%M:%S\\\",\\\
"%Ey\\\":\\\"%y\\\",\\\"%EY\\\":\\\"%Y\\\",\\\"%Od\\\":\\\"%d\\\",\\\"%Oe\\\":\\\"%e\\\",\\\"%OH\\\":\\\"%H\\\",\\\"%
OI\\\":\\\"%I\\\",\\\"%Om\\\":\\\"%m\\\",\\\"%OM\\\":\\\"%M\\\",\\\"%OS\\\":\\\"%S\\\",\\\"%Ou\\\":\\\"%u\\\",\\\"%O
U\\\":\\\"%U\\\",\\\"%OV\\\":\\\"%V\\\",\\\"%Ow\\\":\\\"%w\\\",\\\"%OW\\\":\\\"%W\\\",\\\"%Oy\\\":\\\"%y\\\"})n=n.r
eplace(new RegExp(l,\\\"g\\\"),c[l]);var f=\\\"Sunday Monday Tuesday Wednesday Thursday Friday
Saturday\\\".split(\\\" \\\"),p=\\\"January February March April May June July August September October November
December\\\".split(\\\" \\\");for(l in c={\\\"%a\\\":function(e){return
f[e.Ba].substring(0,3)},\\\"%A\\\":function(e){return f[e.Ba]},\\\"%b\\\":function(e){return
p[e.wa].substring(0,3)},\\\"%B\\\":function(e){return p[e.wa]},\\\"%C\\\":function(e){return
o((e.va+1900)/100|0,2)},\\\"%d\\\":function(e){return o(e.za,2)},\\\"%e\\\":function(e){return a(e.za,2,\\\"
\\\")},\\\"%g\\\":function(e){return s(e).toString().substring(2)},\\\"%G\\\":function(e){return
s(e)},\\\"%H\\\":function(e){return o(e.Aa,2)},\\\"%I\\\":function(e){return 0==(e=e.Aa)?e=12:12<e&&(e-
=12),o(e,2)},\\\"%j\\\":function(e){return o(e.za+oe(ae(e.va+1900)?ie:ue,e.wa-1),3)},\\\"%m\\\":function(e){return
o(e.wa+1,2)},\\\"%M\\\":function(e){return
o(e.Pa,2)},\\\"%n\\\":function(){return\\\"\\\\n\\\"},\\\"%p\\\":function(e){return
0<=e.Aa&&12>e.Aa?\\\"AM\\\":\\\"PM\\\"},\\\"%S\\\":function(e){return
o(e.Qa,2)},\\\"%t\\\":function(){return\\\"\\\\t\\\"},\\\"%u\\\":function(e){return e.Ba||7},\\\"%U\\\":function(e){var
t=new Date(e.va+1900,0,1),n=0===t.getDay()?t:se(t,7-t.getDay());return 0>i(n,e=new
Date(e.va+1900,e.wa,e.za))?o(Math.ceil((31-n.getDate()+(oe(ae(e.getFullYear())?ie:ue,e.getMonth()-1)-
31)+e.getDate())/7),2):0===i(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%V\\\":function(e){var t=new
Date(e.va+1901,0,4),n=u(new Date(e.va+1900,0,4));t=u(t);var r=se(new Date(e.va+1900,0,1),e.Ca);return
0>i(r,n)?\\\"53\\\":0>=i(t,r)?\\\"01\\\":o(Math.ceil((n.getFullYear()<e.va+1900?e.Ca+32-n.getDate():e.Ca+1-
n.getDate())/7),2)},\\\"%w\\\":function(e){return e.Ba},\\\"%W\\\":function(e){var t=new
Date(e.va,0,1),n=1===t.getDay()?t:se(t,0===t.getDay()?1:7-t.getDay()+1);return 0>i(n,e=new
Date(e.va+1900,e.wa,e.za))?o(Math.ceil((31-n.getDate()+(oe(ae(e.getFullYear())?ie:ue,e.getMonth()-1)-
31)+e.getDate())/7),2):0===i(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%y\\\":function(e){return(e.va+1900).toString().substring(
2)},\\\"%Y\\\":function(e){return e.va+1900},\\\"%z\\\":function(e){var t=0<=(e=e.Oa);return
e=Math.abs(e)/60,(t?\\\"+\\\":\\\"-\\\")+String(\\\"0000\\\"+(e/60*100+e%60)).slice(-4)},\\\"%Z\\\":function(e){return
e.Ra},\\\"%%\\\":function(){return\\\"%\\\"}})n.includes(l)&&(n=n.replace(new
RegExp(l,\\\"g\\\"),c[l](r)));return(l=function(e){var t=Array(x(e)+1);return
D(e,t,0,t.length),t}(n)).length>t?0:(O.set(l,e),l.length-1)}var le={a:function(e){return
pe(e+16)+16},c:function(e,t){U.unshift({Ea:e,xa:t})},d:function(e,t){U.unshift({Ea:e,xa:t})},b:function(e,t,n){thro
w new $(e).Ga(t,n),e},D:function(e,t){return e=k(e),Z.Sa(e,t)},m:function(){return
0},I:function(){},L:function(){},o:function(){return 42},x:function(){return
0},H:function(){},G:function(e,t){return
e=k(e),Z.Ta(e,t)},K:function(e,t,n,r,a,o){if(o<<=12,0!=(16&r)&&0!=e%65536)t=-28;else
```

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if(0!=(32&r)){e=65536*Math.ceil(t/65536);var
i=we(65536,e);i?(A.fill(0,i,i+e),e=i):e=0,e?(J[e]={Ia:e,Ha:t,Fa:!0,fd:a,Xa:n,flags:r,offset:o},t=e):t=-48}else t=-
52;return t},J:function(e,t){var n=J[e];return 0!==t&&n?(t===n.Ha&&(J[e]=null,n.Fa&&me(n.Ia)),e=0):e=-
28,e},j:function(){},C:function(e,t,n){return
e=k(e),Z.Ua(e,t,n)},E:function(){},r:function(){},F:function(){},h:function(){B()},p:function(e,t){if(0===e)e=Date.
now();else{if(1!==e&&4!==e)return E[de()>>2]=28,-1;e=X()}return
E[t>>2]=e/1e3|0,E[t+4>>2]=e%1e3*1e6|0,0},s:function(e,t){return e-t},P:function(){B(\\\"To use dlopen, you need
to use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},g:function(){B(\\\"To use dlopen, you need to use Emscripten's linking support,
see https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},Q:function(){B(\\\"To use dlopen, you need to
use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},O:function(){B(\\\"To use dlopen, you need to use Emscripten's linking support,
see https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},M:function(){return
2147483648},v:function(e,t,n){A.copyWithin(e,t,t+n)},i:function(e){var
t=A.length;if(2147483648<(e>>>=0))return!1;for(var n=1;4>=n;n*=2){var
r=t*(1+.2/n);r=Math.min(r,e+100663296),0<(r=Math.max(e,r))%65536&&(r+=65536-
r%65536);e:{try{v.grow(Math.min(2147483648,r)-w.byteLength+65535>>>16),C();var a=1;break
e}catch(e){}a=void 0}if(a)return!0}return!1},B:function(e){for(var t=X();X()-t<e;);},z:function(e,t){var n=0;return
ne().forEach((function(r,a){var
o=t+n;for(a=E[e+4*a>>2]=o,o=0;o<r.length;++o)O[a++>>0]=r.charCodeAt(o);O[a>>0]=0,n+=r.length+1})),0},A:f
unction(e,t){var n=ne();E[e>>2]=n.length;var r=0;return
n.forEach((function(e){r+=e.length+1})),E[t>>2]=r,0},f:function(){return 0},y:function(e,t){return
e=1==e||2==e?2:B(),O[t>>0]=e,0},n:function(e,t,n,r){return
e=Z.Wa(e),t=Z.Va(e,t,n),E[r>>2]=t,0},u:function(){},q:function(e,t,n,r){for(var a=0,o=0;o<n;o++){for(var
i=E[t+8*o>>2],u=E[t+(8*o+4)>>2],s=0;s<u;s++){var
c=A[i+s],l=Q[e];0===c||10===c?((1===e?y:_)(M(l,0)),l.length=0):l.push(c)}a+=u}return
E[r>>2]=a,0},w:function(e){var t=Date.now();return E[e>>2]=t/1e3|0,E[e+4>>2]=t%1e3*1e3|0,0},t:function
e(t,n){return t=new
Date(1e3*E[t>>2]),E[n>>2]=t.getUTCSeconds(),E[n+4>>2]=t.getUTCMinutes(),E[n+8>>2]=t.getUTCHours(),E[n
+12>>2]=t.getUTCDate(),E[n+16>>2]=t.getUTCMonth(),E[n+20>>2]=t.getUTCFullYear()-
1900,E[n+24>>2]=t.getUTCDay(),E[n+36>>2]=0,E[n+32>>2]=0,E[n+28>>2]=(t.getTime()-
Date.UTC(t.getUTCFullYear(),0,1,0,0,0,0))/864e5|0,e.Da||(e.Da=R(\\\"GMT\\\")),E[n+40>>2]=e.Da,n},l:function(e,
t){re(),e=new
Date(1e3*E[e>>2]),E[t>>2]=e.getSeconds(),E[t+4>>2]=e.getMinutes(),E[t+8>>2]=e.getHours(),E[t+12>>2]=e.get
Date(),E[t+16>>2]=e.getMonth(),E[t+20>>2]=e.getFullYear()-1900,E[t+24>>2]=e.getDay();var n=new
Date(e.getFullYear(),0,1);E[t+28>>2]=(e.getTime()-n.getTime())/864e5|0,E[t+36>>2]=-
60*e.getTimezoneOffset();var r=new Date(e.getFullYear(),6,1).getTimezoneOffset();return
e=0|(r!=(n=n.getTimezoneOffset())&&e.getTimezoneOffset()==Math.min(n,r)),E[t+32>>2]=e,e=E[he()+(e?4:0)>>2
],E[t+40>>2]=e,t},k:function(e){re();var t=new
Date(E[e+20>>2]+1900,E[e+16>>2],E[e+12>>2],E[e+8>>2],E[e+4>>2],E[e>>2],0),n=E[e+32>>2],r=t.getTimezon
eOffset(),a=new Date(t.getFullYear(),0,1),o=new
Date(t.getFullYear(),6,1).getTimezoneOffset(),i=a.getTimezoneOffset(),u=Math.min(i,o);return
0>n?E[e+32>>2]=Number(o!=i&&u==r):0<n!=(u==r)&&(o=Math.max(i,o),t.setTime(t.getTime()+6e4*((0<n?u:o)-
r))),E[e+24>>2]=t.getDay(),E[e+28>>2]=(t.getTime()-
a.getTime())/864e5|0,E[e>>2]=t.getSeconds(),E[e+4>>2]=t.getMinutes(),E[e+8>>2]=t.getHours(),E[e+12>>2]=t.ge
tDate(),E[e+16>>2]=t.getMonth(),t.getTime()/1e3|0},N:ce,e:function(e,t,n,r){return
ce(e,t,n,r)}};!function(){function e(e){t.asm=e.exports,v=t.asm.R,C(),P=t.asm.ua,F.unshift(t.asm.S),H--
,t.monitorRunDependencies&&t.monitorRunDependencies(H),0==H&&(null!==Y&&(clearInterval(Y),Y=null),z&
```

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&(e=z,z=null,e()))}function n(t){e(t.instance)}function r(e){return
function(){if(!b&&(d||m)){if(\\\"function\\\"==typeof fetch&&!W.startsWith(\\\"file://\\\"))return
fetch(W,{credentials:\\\"same-origin\\\"}).then((function(e){if(!e.ok)throw\\\"failed to load wasm binary file at
'\\\"+W+\\\"'\\\";return e.arrayBuffer()})).catch((function(){return q()}));if(s)return new
Promise((function(e,t){s(W,(function(t){e(new Uint8Array(t))}),t)}))}return
Promise.resolve().then((function(){return q()}))}().then((function(e){return
WebAssembly.instantiate(e,o)})).then(e,(function(e){_(\\\"failed to asynchronously prepare wasm:
\\\"+e),B(e)}))}var
o={a:le};if(H++,t.monitorRunDependencies&&t.monitorRunDependencies(H),t.instantiateWasm)try{return
t.instantiateWasm(o,e)}catch(e){return _(\\\"Module.instantiateWasm callback failed with error:
\\\"+e),!1}(b||\\\"function\\\"!=typeof
WebAssembly.instantiateStreaming||G()||W.startsWith(\\\"file://\\\")||\\\"function\\\"!=typeof
fetch?r(n):fetch(W,{credentials:\\\"same-origin\\\"}).then((function(e){return
WebAssembly.instantiateStreaming(e,o).then(n,(function(e){return _(\\\"wasm streaming compile failed:
\\\"+e),_(\\\"falling back to ArrayBuffer
instantiation\\\"),r(n)}))}))).catch(a)}(),t.___wasm_call_ctors=function(){return(t.___wasm_call_ctors=t.asm.S).app
ly(null,arguments)},t._OrtInit=function(){return(t._OrtInit=t.asm.T).apply(null,arguments)},t._OrtCreateSessionOpt
ions=function(){return(t._OrtCreateSessionOptions=t.asm.U).apply(null,arguments)},t._OrtAddSessionConfigEntry
=function(){return(t._OrtAddSessionConfigEntry=t.asm.V).apply(null,arguments)},t._OrtReleaseSessionOptions=f
unction(){return(t._OrtReleaseSessionOptions=t.asm.W).apply(null,arguments)},t._OrtCreateSession=function(){ret
urn(t._OrtCreateSession=t.asm.X).apply(null,arguments)},t._OrtReleaseSession=function(){return(t._OrtReleaseSes
sion=t.asm.Y).apply(null,arguments)},t._OrtGetInputCount=function(){return(t._OrtGetInputCount=t.asm.Z).apply(
null,arguments)},t._OrtGetOutputCount=function(){return(t._OrtGetOutputCount=t.asm._).apply(null,arguments)},t
._OrtGetInputName=function(){return(t._OrtGetInputName=t.asm.$).apply(null,arguments)},t._OrtGetOutputName
=function(){return(t._OrtGetOutputName=t.asm.aa).apply(null,arguments)},t._OrtFree=function(){return(t._OrtFree
=t.asm.ba).apply(null,arguments)},t._OrtCreateTensor=function(){return(t._OrtCreateTensor=t.asm.ca).apply(null,a
rguments)},t._OrtGetTensorData=function(){return(t._OrtGetTensorData=t.asm.da).apply(null,arguments)},t._OrtR
eleaseTensor=function(){return(t._OrtReleaseTensor=t.asm.ea).apply(null,arguments)},t._OrtCreateRunOptions=fu
nction(){return(t._OrtCreateRunOptions=t.asm.fa).apply(null,arguments)},t._OrtAddRunConfigEntry=function(){re
turn(t._OrtAddRunConfigEntry=t.asm.ga).apply(null,arguments)},t._OrtReleaseRunOptions=function(){return(t._O
rtReleaseRunOptions=t.asm.ha).apply(null,arguments)},t._OrtRun=function(){return(t._OrtRun=t.asm.ia).apply(nul
l,arguments)},t._OrtEndProfiling=function(){return(t._OrtEndProfiling=t.asm.ja).apply(null,arguments)};var
fe,pe=t._malloc=function(){return(pe=t._malloc=t.asm.ka).apply(null,arguments)},de=t.___errno_location=function
(){return(de=t.___errno_location=t.asm.la).apply(null,arguments)},me=t._free=function(){return(me=t._free=t.asm.
ma).apply(null,arguments)},he=t.__get_tzname=function(){return(he=t.__get_tzname=t.asm.na).apply(null,argumen
ts)},ge=t.__get_daylight=function(){return(ge=t.__get_daylight=t.asm.oa).apply(null,arguments)},be=t.__get_timez
one=function(){return(be=t.__get_timezone=t.asm.pa).apply(null,arguments)},ye=t.stackSave=function(){return(ye
=t.stackSave=t.asm.qa).apply(null,arguments)},_e=t.stackRestore=function(){return(_e=t.stackRestore=t.asm.ra).ap
ply(null,arguments)},ve=t.stackAlloc=function(){return(ve=t.stackAlloc=t.asm.sa).apply(null,arguments)},we=t._m
emalign=function(){return(we=t._memalign=t.asm.ta).apply(null,arguments)};function Oe(){function
e(){if(!fe&&(fe=!0,t.calledRun=!0,!T)){if(V(F),r(t),t.onRuntimeInitialized&&t.onRuntimeInitialized(),t.postRun)fo
r(\\\"function\\\"==typeof t.postRun&&(t.postRun=[t.postRun]);t.postRun.length;){var
e=t.postRun.shift();j.unshift(e)}V(j)}}if(!(0<H)){if(t.preRun)for(\\\"function\\\"==typeof
t.preRun&&(t.preRun=[t.preRun]);t.preRun.length;)L();V(I),0<H||(t.setStatus?(t.setStatus(\\\"Running...\\\"),setTime
out((function(){setTimeout((function(){t.setStatus(\\\"\\\")}),1),e()}),1)):e())}}if(t.UTF8ToString=k,t.stringToUTF8
=function(e,t,n){return
D(e,A,t,n)},t.lengthBytesUTF8=x,t.stackSave=ye,t.stackRestore=_e,t.stackAlloc=ve,z=function
e(){fe||Oe(),fe||(z=e)},t.run=Oe,t.preInit)for(\\\"function\\\"==typeof
```

```
t.preInit&&(t.preInit=[t.preInit]);0<t.preInit.length;)t.preInit.pop()();return
Oe(),e.ready});e.exports=r},967:(e,t)=>{\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.iterateExtraOptions=void
0,t.iterateExtraOptions=(e,n,r,a)=>{if(\\\"object\\\"==typeof e&&null!==e){if(r.has(e))throw new Error(\\\"Circular
reference in options\\\");r.add(e)}Object.entries(e).forEach((([e,o])=>{const i=n?n+e:e;if(\\\"object\\\"==typeof
o)t.iterateExtraOptions(o,i+\\\".\\\",r,a);else if(\\\"string\\\"==typeof o||\\\"number\\\"==typeof
o)a(i,o.toString());else{if(\\\"boolean\\\"!=typeof o)throw new Error(\\\"Can't handle extra config type: \\\"+typeof
o);a(i,o?\\\"1\\\":\\\"0\\\")}}))}},586:(e,t,n)=>{\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.setRunOptions=void 0;const
r=n(967),a=n(983),o=n(361);t.setRunOptions=e=>{const t=o.getInstance();let n=0;const i=[],u=e||{};try{if(void
0===(null==e?void 0:e.logSeverityLevel))u.logSeverityLevel=2;else if(\\\"number\\\"!=typeof
e.logSeverityLevel||!Number.isInteger(e.logSeverityLevel)||e.logSeverityLevel<0||e.logSeverityLevel>4)throw new
Error(`log serverity level is not valid: ${e.logSeverityLevel}`);if(void 0===(null==e?void
0:e.logVerbosityLevel))u.logVerbosityLevel=0;else if(\\\"number\\\"!=typeof
e.logVerbosityLevel||!Number.isInteger(e.logVerbosityLevel))throw new Error(`log verbosity level is not valid:
${e.logVerbosityLevel}`);void 0===(null==e?void 0:e.terminate)&&(u.terminate=!1);let o=0;if(void
0!==(null==e?void
0:e.tag)&&(o=a.allocWasmString(e.tag,i)),n=t._OrtCreateRunOptions(u.logSeverityLevel,u.logVerbosityLevel,!!u.t
erminate,o),0===n)throw new Error(\\\"Can't create run options\\\");return void 0!==(null==e?void
0:e.extra)&&r.iterateExtraOptions(e.extra,\\\"\\\",new WeakSet,((e,r)=>{const
o=a.allocWasmString(e,i),u=a.allocWasmString(r,i);if(0!==t._OrtAddRunConfigEntry(n,o,u))throw new
Error(`Can't set a run config entry: ${e} - ${r}`)})),[n,i]}catch(e){throw
0!==n&&t._OrtReleaseRunOptions(n),i.forEach(t._free),e}}},919:(e,t,n)=>{\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.setSessionOptions=void 0;const
r=n(967),a=n(983),o=n(361);t.setSessionOptions=e=>{const t=o.getInstance();let n=0;const
i=[],u=e||{};(e=>{e.extra||(e.extra={}),e.extra.session||(e.extra.session={});const
t=e.extra.session;t.use_ort_model_bytes_directly||(t.use_ort_model_bytes_directly=\\\"1\\\")})(u);try{void
0===(null==e?void 0:e.graphOptimizationLevel)&&(u.graphOptimizationLevel=\\\"all\\\");const
o=(e=>{switch(e){case\\\"disabled\\\":return 0;case\\\"basic\\\":return 1;case\\\"extended\\\":return
2;case\\\"all\\\":return 99;default:throw new Error(`unsupported graph optimization level:
${e}`)}})(u.graphOptimizationLevel);void 0===(null==e?void
0:e.enableCpuMemArena)&&(u.enableCpuMemArena=!0),void 0===(null==e?void
0:e.enableMemPattern)&&(u.enableMemPattern=!0),void 0===(null==e?void
0:e.executionMode)&&(u.executionMode=\\\"sequential\\\");const s=(e=>{switch(e){case\\\"sequential\\\":return
0;case\\\"parallel\\\":return 1;default:throw new Error(`unsupported execution mode:
${e}`)}})(u.executionMode);let c=0;if(void 0!==(null==e?void 0:e.logId)&&(c=a.allocWasmString(e.logId,i)),void
0===(null==e?void 0:e.logSeverityLevel))u.logSeverityLevel=2;else if(\\\"number\\\"!=typeof
e.logSeverityLevel||!Number.isInteger(e.logSeverityLevel)||e.logSeverityLevel<0||e.logSeverityLevel>4)throw new
Error(`log serverity level is not valid: ${e.logSeverityLevel}`);if(void 0===(null==e?void
0:e.logVerbosityLevel))u.logVerbosityLevel=0;else if(\\\"number\\\"!=typeof
e.logVerbosityLevel||!Number.isInteger(e.logVerbosityLevel))throw new Error(`log verbosity level is not valid:
${e.logVerbosityLevel}`);if(void 0===(null==e?void
0:e.enableProfiling)&&(u.enableProfiling=!1),n=t._OrtCreateSessionOptions(o,!!u.enableCpuMemArena,!!u.enable
MemPattern,s,!!u.enableProfiling,0,c,u.logSeverityLevel,u.logVerbosityLevel),0===n)throw new Error(\\\"Can't
create session options\\\");return void 0!==(null==e?void 0:e.extra)&&r.iterateExtraOptions(e.extra,\\\"\\\",new
WeakSet,((e,r)=>{const
o=a.allocWasmString(e,i),u=a.allocWasmString(r,i);if(0!==t._OrtAddSessionConfigEntry(n,o,u))throw new
Error(`Can't set a session config entry: ${e} - ${r}`)})),[n,i]}catch(e){throw
```

```
0!==n&&t._OrtReleaseSessionOptions(n),i.forEach(t._free),e}}},983:(e,t,n)=>{\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.allocWasmString=void 0;const
r=n(361);t.allocWasmString=(e,t)=>{const n=r.getInstance(),a=n.lengthBytesUTF8(e)+1,o=n._malloc(a);return
n.stringToUTF8(e,o,a),t.push(o),o}},349:(e,t,n)=>{\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.extractTransferableBuffers=t.endProfiling=t.run=t.
releaseSession=t.createSession=t.initOrt=void 0;const r=n(586),a=n(919),o=n(983),i=n(361);t.initOrt=(e,t)=>{const
n=i.getInstance()._OrtInit(e,t);if(0!==n)throw new Error(`Can't initialize onnxruntime. error code = ${n}`)};const
u=[];t.createSession=(e,t)=>{const n=i.getInstance(),r=n._malloc(e.byteLength);let
o=0,s=0,c=[];try{if([s,c]=a.setSessionOptions(t),n.HEAPU8.set(e,r),o=n._OrtCreateSession(r,e.byteLength,s),0===
o)throw new Error(\\\"Can't create a
session\\\")}finally{n._free(r),n._OrtReleaseSessionOptions(s),c.forEach(n._free)}const
l=n._OrtGetInputCount(o),f=n._OrtGetOutputCount(o),p=[],d=[],m=[],h=[];for(let e=0;e<l;e++){const
t=n._OrtGetInputName(o,e);if(0===t)throw new Error(\\\"Can't get an input
name\\\");d.push(t),p.push(n.UTF8ToString(t))}for(let e=0;e<f;e++){const
t=n._OrtGetOutputName(o,e);if(0===t)throw new Error(\\\"Can't get an output
name\\\");h.push(t),m.push(n.UTF8ToString(t))}return u.push([o,d,h]),[u.length-1,p,m]},t.releaseSession=e=>{const
t=i.getInstance(),n=u[e];if(!n)throw new Error(\\\"invalid session id\\\");const
r=n[0],a=n[1],o=n[2];a.forEach(t._OrtFree),o.forEach(t._OrtFree),t._OrtReleaseSession(r),u[e]=void 0};const
s=e=>{switch(e){case\\\"int8\\\":return 3;case\\\"uint8\\\":return 2;case\\\"bool\\\":return 9;case\\\"int16\\\":return
5;case\\\"uint16\\\":return 4;case\\\"int32\\\":return 6;case\\\"uint32\\\":return 12;case\\\"float32\\\":return
1;case\\\"float64\\\":return 11;case\\\"string\\\":return 8;case\\\"int64\\\":return 7;case\\\"uint64\\\":return
13;default:throw new Error(`unsupported data type: ${e}`)}},c=e=>{switch(e){case 3:return\\\"int8\\\";case
2:return\\\"uint8\\\";case 9:return\\\"bool\\\";case 5:return\\\"int16\\\";case 4:return\\\"uint16\\\";case
6:return\\\"int32\\\";case 12:return\\\"uint32\\\";case 1:return\\\"float32\\\";case 11:return\\\"float64\\\";case
8:return\\\"string\\\";case 7:return\\\"int32\\\";case 13:return\\\"uint32\\\";default:throw new Error(`unsupported data
type: ${e}`)}},l=e=>{switch(e){case\\\"float32\\\":return Float32Array;case\\\"uint8\\\":return
Uint8Array;case\\\"int8\\\":return Int8Array;case\\\"uint16\\\":return Uint16Array;case\\\"int16\\\":return
Int16Array;case\\\"int32\\\":return Int32Array;case\\\"bool\\\":return Uint8Array;case\\\"float64\\\":return
Float64Array;case\\\"uint32\\\":return Uint32Array;case\\\"int64\\\":return BigInt64Array;case\\\"uint64\\\":return
BigUint64Array;default:throw new Error(`unsupported type: ${e}`)}};t.run=(e,t,n,a,f)=>{const
p=i.getInstance(),d=u[e];if(!d)throw new Error(\\\"invalid session id\\\");const
m=d[0],h=d[1],g=d[2],b=t.length,y=a.length;let _=0,v=[];const w=[],O=[];try{[_,v]=r.setRunOptions(f);for(let
e=0;e<b;e++){const t=n[e][0],r=n[e][1],a=n[e][2];let
i,u;if(Array.isArray(a)){u=4*a.length,i=p._malloc(u),O.push(i);let e=i/4;for(let
t=0;t<a.length;t++){if(\\\"string\\\"!=typeof a[t])throw new TypeError(`tensor data at index ${t} is not a
string`);p.HEAPU32[e++]=o.allocWasmString(a[t],O)}}else
u=a.byteLength,i=p._malloc(u),O.push(i),p.HEAPU8.set(new Uint8Array(a.buffer,a.byteOffset,u),i);const
c=p.stackSave(),l=p.stackAlloc(4*r.length);try{let e=l/4;r.forEach((t=>p.HEAP32[e++]=t));const
n=p._OrtCreateTensor(s(t),i,u,l,r.length);if(0===n)throw new Error(\\\"Can't create a
tensor\\\");w.push(n)}finally{p.stackRestore(c)}}const
e=p.stackSave(),i=p.stackAlloc(4*b),u=p.stackAlloc(4*b),d=p.stackAlloc(4*y),A=p.stackAlloc(4*y);try{let
n=i/4,r=u/4,o=d/4,s=A/4;for(let e=0;e<b;e++)p.HEAPU32[n++]=w[e],p.HEAPU32[r++]=h[t[e]];for(let
e=0;e<y;e++)p.HEAPU32[o++]=0,p.HEAPU32[s++]=g[a[e]];let f=p._OrtRun(m,u,i,b,A,y,d,_);const
v=[];if(0===f)for(let e=0;e<y;e++){const t=p.HEAPU32[d/4+e],n=p.stackSave(),r=p.stackAlloc(16);let
a,o=0;try{if(f=p._OrtGetTensorData(t,r,r+4,r+8,r+12),0!==f)throw new Error(`Can't get a tensor data. error code =
${f}`);let e=r/4;const i=p.HEAPU32[e++];o=p.HEAPU32[e++];const
u=p.HEAPU32[e++],s=p.HEAPU32[e++],d=[];for(let
e=0;e<s;e++)d.push(p.HEAPU32[u/4+e]);p._OrtFree(u);const
```

```
m=0===d.length?1:d.reduce(((e,t)=>e*t));if(a=c(i),\\\"string\\\"===a){const e=[];let t=o/4;for(let
n=0;n<m;n++){const r=p.HEAPU32[t++],a=n===m-1?void 0:p.HEAPU32[t]-
r;e.push(p.UTF8ToString(r,a))}v.push([a,d,e])}else{const e=new(l(a))(m);new
Uint8Array(e.buffer,e.byteOffset,e.byteLength).set(p.HEAPU8.subarray(o,o+e.byteLength)),v.push([a,d,e])}}finally
{p.stackRestore(n),\\\"string\\\"===a&&o&&p._free(o),p._OrtReleaseTensor(t)}}if(0===f)return v;throw new
Error(`failed to call OrtRun(). error code =
${f}.`)}finally{p.stackRestore(e)}}finally{w.forEach(p._OrtReleaseTensor),O.forEach(p._free),p._OrtReleaseRunO
ptions(_),v.forEach(p._free)}},t.endProfiling=e=>{const t=i.getInstance(),n=u[e];if(!n)throw new Error(\\\"invalid
session id\\\");const r=n[0],a=t._OrtEndProfiling(r);if(0===a)throw new Error(\\\"Can't get an profile file
name\\\");t._OrtFree(a)},t.extractTransferableBuffers=e=>{const t=[];for(const n of e){const
e=n[2];!Array.isArray(e)&&e.buffer&&t.push(e.buffer)}return t}},361:function(e,t,n){\\\"use strict\\\";var
r=this&&this.__createBinding||(Object.create?function(e,t,n,r){void
0===r&&(r=n),Object.defineProperty(e,r,{enumerable:!0,get:function(){return t[n]}})}:function(e,t,n,r){void
0===r&&(r=n),e[r]=t[n]}),a=this&&this.__setModuleDefault||(Object.create?function(e,t){Object.defineProperty(e,
\\\"default\\\",{enumerable:!0,value:t})}:function(e,t){e.default=t}),o=this&&this.__importStar||function(e){if(e&&
e.__esModule)return e;var t={};if(null!=e)for(var n in
e)\\\"default\\\"!==n&&Object.prototype.hasOwnProperty.call(e,n)&&r(t,e,n);return
a(t,e),t},i=this&&this.__awaiter||function(e,t,n,r){return new(n||(n=Promise))((function(a,o){function
i(e){try{s(r.next(e))}catch(e){o(e)}}function u(e){try{s(r.throw(e))}catch(e){o(e)}}function s(e){var
t;e.done?a(e.value):(t=e.value,t instanceof n?t:new
n((function(e){e(t)}))).then(i,u)}s((r=r.apply(e,t||[])).next())}))},u=this&&this.__importDefault||function(e){return
e&&e.__esModule?e:{default:e}};Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.dispose=t.getInstance=t.i
nitializeWebAssembly=void 0;const s=o(n(449)),c=u(n(474)),l=u(n(932));let f,p=!1,d=!1,m=!1;const
h=(e,t)=>t?e?\\\"ort-wasm-simd-threaded.wasm\\\":\\\"ort-wasm-threaded.wasm\\\":e?\\\"ort-wasm-
simd.wasm\\\":\\\"ort-wasm.wasm\\\";t.initializeWebAssembly=e=>i(void 0,void 0,void 0,(function*(){if(p)return
Promise.resolve();if(d)throw new Error(\\\"multiple calls to 'initializeWebAssembly()' detected.\\\");if(m)throw new
Error(\\\"previous call to 'initializeWebAssembly()' failed.\\\");d=!0;const
t=e.initTimeout,r=e.numThreads,a=e.simd,o=r>1&&(()=>{try{return\\\"undefined\\\"!=typeof
SharedArrayBuffer&&(\\\"undefined\\\"!=typeof MessageChannel&&(new
MessageChannel).port1.postMessage(new SharedArrayBuffer(1)),WebAssembly.validate(new
Uint8Array([0,97,115,109,1,0,0,0,1,4,1,96,0,0,3,2,1,0,5,4,1,3,1,1,10,11,1,9,0,65,0,254,16,2,0,26,11])))}catch(e){ret
urn!1}})(),i=a&&(()=>{try{return WebAssembly.validate(new
Uint8Array([0,97,115,109,1,0,0,0,1,4,1,96,0,0,3,2,1,0,10,9,1,7,0,65,0,253,15,26,11]))}catch(e){return!1}})(),u=\\\"s
tring\\\"==typeof e.wasmPaths?e.wasmPaths:void 0,g=h(!1,o),b=h(i,o),y=\\\"object\\\"==typeof
e.wasmPaths?e.wasmPaths[b]:void 0;let _=!1;const v=[];if(t>0&&v.push(new
Promise((e=>{setTimeout((()=>{_=!0,e()}),t)}))),v.push(new Promise(((e,t)=>{const
r=o?c.default:l.default,a={locateFile:(e,t)=>{if(e.endsWith(\\\".worker.js\\\")&&\\\"undefined\\\"!=typeof
Blob)return URL.createObjectURL(new Blob([n(118)],{type:\\\"text/javascript\\\"}));if(e===g){const
e=null!=u?u:t;return null!=y?y:e+b}return t+e}};if(o)if(\\\"undefined\\\"==typeof
Blob)a.mainScriptUrlOrBlob=s.join(\\\"/\\\",\\\"ort-wasm-threaded.js\\\");else{const e=`var
ortWasmThreaded=(function(){var _scriptDir;return ${c.default.toString()}})();`;a.mainScriptUrlOrBlob=new
Blob([e],{type:\\\"text/javascript\\\"})}r(a).then((t=>{d=!1,p=!0,f=t,e()}),(e=>{d=!1,m=!0,t(e)}))}))),yield
Promise.race(v),_)throw new Error(`WebAssembly backend initializing failed due to timeout:
${t}ms`)})),t.getInstance=()=>{if(p&&f)return f;throw new Error(\\\"WebAssembly is not initialized
yet.\\\")},t.dispose=()=>{var e;!p||d||m||(d=!0,null===(e=f.PThread)||void 0===e||e.terminateAllThreads(),f=void
0,d=!1,p=!1,m=!0)}},384:()=>{},993:()=>{},908:()=>{},953:()=>{},925:()=>{},449:()=>{}},t={};function
n(r){var a=t[r];if(void 0!==a)return a.exports;var o=t[r]={exports:{}};return
e[r].call(o.exports,o.exports,n),o.exports}n.g=function(){if(\\\"object\\\"==typeof globalThis)return
```

globalThis;try{return this||new Function(\\\"return this\\\")()}catch(e){if(\\\"object\\\"==typeof window)return window}}(),(()=>{\\\"use strict\\\";const e=n(349),t=n(361);self.onmessage=n=>{switch(n.data.type){case\\\"init-wasm\\\":t.initializeWebAssembly(n.data.in).then((()=>postMessage({type:\\\"init-wasm\\\"})),(e=>postMessage({type:\\\"init-wasm\\\",err:e})));break;case\\\"init-ort\\\":try{const{numThreads:t,loggingLevel:r}=n.data.in;e.initOrt(t,r),postMessage({type:\\\"init-ort\\\"})}catch(e){postMessage({type:\\\"init-ort\\\",err:e})}break;case\\\"create\\\":try{const{model:t,options:r}=n.data.in,a=e.createSession(t,r);postMessage({type:\\\"create\\\",out:a})}catch(e){postMessage({type:\\\"create\\\",err:e})}break;case\\\"release\\\":try{const t=n.data.in;e.releaseSession(t),postMessage({type:\\\"release\\\"})}catch(e){postMessage({type:\\\"release\\\",err:e})}break;case\\\"run\\\":try{const{sessionId:t,inputIndices:r,inputs:a,outputIndices:o,options:i}=n.data.in,u=e.run(t,r,a,o,i);postMessage({type:\\\"run\\\",out:u},e.extractTransferableBuffers(u))}catch(e){postMessage({type:\\\"run\\\",err:e})}break;case\\\"end-profiling\\\":try{const t=n.data.in;e.endProfiling(t),postMessage({type:\\\"end-profiling\\\"})}catch(e){postMessage({type:\\\"end-profiling\\\",err:e})}}}})()})();\\n\", \"Worker\", undefined, undefined);\n}\n","\"use strict\";\n\n/* eslint-env browser */\n\n/* eslint-disable no-undef, no-use-before-define, new-cap */\nmodule.exports = function (content, workerConstructor, workerOptions, url) {\n var globalScope = self || window;\n\n try {\n   try {\n   var blob;\n\n   try {\n   // New API\n   blob = new globalScope.Blob([content]);\n   } catch (e) {\n   // BlobBuilder = Deprecated, but widely implemented\n   var BlobBuilder = globalScope.BlobBuilder || globalScope.WebKitBlobBuilder || globalScope.MozBlobBuilder || globalScope.MSBlobBuilder;\n   blob = new BlobBuilder();\n   blob.append(content);\n   blob = blob.getBlob();\n   }\n\n   var URL = globalScope.URL || globalScope.webkitURL;\n   var objectURL = URL.createObjectURL(blob);\n   var worker = new globalScope[workerConstructor](objectURL, workerOptions);\n   URL.revokeObjectURL(objectURL);\n   return worker;\n   } catch (e) {\n   return new globalScope[workerConstructor](\"data:application/javascript,\".concat(encodeURIComponent(content)), workerOptions);\n   }\n } catch (e) {\n   if (!url) {\n   throw Error(\"Inline worker is not supported\");\n   }\n\n   return new globalScope[workerConstructor](url, workerOptions);\n }\n};","// The module cache\nvar __webpack_module_cache__ = {};\n\n// The require function\nfunction __webpack_require__(moduleId) {\n\t// Check if module is in cache\n\tvar cachedModule = __webpack_module_cache__[moduleId];\n\tif (cachedModule !== undefined) {\n\t\treturn cachedModule.exports;\n\t}\n\t// Create a new module (and put it into the cache)\n\tvar module = __webpack_module_cache__[moduleId] = {\n\t\t// no module.id needed\n\t\t// no module.loaded needed\n\t\texports: {}\n\t};\n\n\t// Execute the module function\n\t__webpack_modules__[moduleId].call(module.exports, module, module.exports, __webpack_require__);\n\n\t// Return the exports of the module\n\treturn module.exports;\n}\n\n","// getDefaultExport function for compatibility with non-harmony modules\n__webpack_require__.n = (module) => {\n\tvar getter = module && module.__esModule ?\n\t\t() => (module['default']) :\n\t\t() => (module);\n\t__webpack_require__.d(getter, { a: getter });\n\treturn getter;\n};","// define getter functions for harmony exports\n__webpack_require__.d = (exports, definition) => {\n\tfor(var key in definition) {\n\t\tif(__webpack_require__.o(definition, key) && !__webpack_require__.o(exports, key)) {\n\t\t\tObject.defineProperty(exports, key, { enumerable: true, get: definition[key] });\n\t\t}\n\t}\n};","__webpack_require__.g = (function() {\n\tif (typeof globalThis === 'object') return globalThis;\n\ttry {\n\t\treturn this || new Function('return this')();\n\t} catch (e) {\n\t\tif (typeof window === 'object') return window;\n\t}\n})();","__webpack_require__.o = (obj, prop) => (Object.prototype.hasOwnProperty.call(obj, prop))","// define __esModule on exports\n__webpack_require__.r = (exports) => {\n\tif(typeof Symbol !== 'undefined' && Symbol.toStringTag) {\n\t\tObject.defineProperty(exports, Symbol.toStringTag, { value: 'Module' });\n\t}\n\tObject.defineProperty(exports, '__esModule', { value: true });\n};","// startup\n// Load entry module and return exports\n// This entry module is referenced by other modules so it can't be inlined\nvar __webpack_exports__ = __webpack_require__(6018);\n"],"sourceRoot":""}

Found in path(s):

* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/dist/ort.es6.min.js.map
No license file was found, but licenses were detected in source scan.

{"version":3,"sources":["webpack://onnxruntime-web/webpack/universalModuleDefinition","webpack://onnxruntime-web/./lib/wasm/binding/ort-wasm-threaded.min.js","webpack://onnxruntime-web/./lib/wasm/binding/ort-wasm.js","webpack://onnxruntime-web/./node_modules/@protobufjs/aspromise/index.js","webpack://onnxruntime-web/./node_modules/@protobufjs/base64/index.js","webpack://onnxruntime-web/./node_modules/@protobufjs/eventemitter/index.js","webpack://onnxruntime-web/./node_modules/@protobufjs/float/index.js","webpack://onnxruntime-web/./node_modules/@protobufjs/inquire/index.js","webpack://onnxruntime-web/./node_modules/@protobufjs/pool/index.js","webpack://onnxruntime-web/./node_modules/@protobufjs/utf8/index.js","webpack://onnxruntime-web/./node_modules/flatbuffers/js/flatbuffers.mjs","webpack://onnxruntime-web/./node_modules/guid-typescript/dist/guid.js","webpack://onnxruntime-web/./node_modules/long/src/long.js","webpack://onnxruntime-web/./node_modules/onnx-proto/dist/onnx.js","webpack://onnxruntime-web/./node_modules/protobufjs/minimal.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/index-minimal.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/reader.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/reader_buffer.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/roots.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/rpc.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/rpc/service.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/util/longbits.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/util/minimal.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/writer.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/writer_buffer.js","webpack://onnxruntime-web/./lib/backend-onnxjs.ts","webpack://onnxruntime-web/./lib/backend-wasm.ts","webpack://onnxruntime-web/./lib/index.ts","webpack://onnxruntime-web/./lib/onnxjs/attribute-with-cache-key.ts","webpack://onnxruntime-web/./lib/onnxjs/attribute.ts","webpack://onnxruntime-web/./lib/onnxjs/backend.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/backend-webgl.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-coordinate-lib.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-definitions.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-encoding-lib.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-fragcolor-lib.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-function-inliner.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-preprocessor.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-registered-libs.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-shape-utils-lib.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-source.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-vec-lib.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/inference-handler.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/op-resolve-rules.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/batch-normalization.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/binary-op.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/concat-packed.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/concat.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/conv-grouped.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/conv-pack.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/conv.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/depth-to-space.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/dot-product.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/flatten.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/fuse-utils.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/gather.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/gemm.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/im2col-pack.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/im2col.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/image-scaler.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/instance-normalization.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/matmul-pack.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/matmul.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/pack.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/packing-utils.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/pad.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/pool.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/reduce.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/reshape-packed.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/reshape.ts","webpack:/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object","webpack://onnxruntime-web/webpack/startup"],"names":["root","factory","exports","module","require","define","amd","a","i","self","__WEBPACK_EXTERNAL_MODULE__2174__","_scriptDir","e","document","currentScript","src","t","S","buffer","Y","Q","P","n","W","r","q","U","B","o","u","s","ready","Promise","c","f","hasOwnProperty","l","p","d","m","b","h","g","_","window","y","importScripts","w","process","versions","node","v","ENVIRONMENT_IS_PTHREAD","A","T","locateFile","O","__dirname","normalize","readFileSync","Uint8Array","F","readFile","argv","length","replace","slice","on","Gt","ce","re","exitCode","exit","inspect","console","error","Worker","location","href","indexOf","substr","lastIndexOf","XMLHttpRequest","open","send","responseText","responseType","response","onload","status","onerror","performance","k","E","x","print","log","bind","M","printErr","warn","thisProgram","quit","wasmBinary","D","noExitRuntime","WebAssembly","C","R","I","j","TextDecoder","this","decode","SharedArrayBuffer","call","G","H","subarray","String","fromCharCode","z","L","charCodeAt","N","V","X","ht","HEAP8","Int8Array","HEAP16","Int16Array","HEAP32","Int32Array","HEAPU8","HEAPU16","Uint16Array","HEAPU32","Uint32Array","HEAPF32","Float32Array","HEAPF64","Float64Array","J","INITIAL_MEMORY","wasmMemory","Memory","initial","maximum","shared","Error","byteLength","Z","$","K","ee","te","ne","ae","preRun","shift","unshift","ie","oe","ue","se","onAbort","RuntimeError","fe","startsWith","le","preloadedImages","preloadedAudios","pe","973748","de","Nb","ib","get","me","Atomics","load","Bt","compareExchange","notify","be","ge","cb","sb","worker","_emscripten_futex_wake","he","gb","fb","zb","xc","Rb","store","Dt","vt","Sb","receiveObjectTransfer","Xb","threadInit","hc","threadCancel","fc","threadExit","Hb","setExitStatus","Zb","yb","Eb","pop","Ct","Fb","yt","postMessage","cmd","Gb","terminate","bb","xb","eb","_t","wb","hb","Yb","push","splice","Ut","Ub","onmessage","data","Lb","targetThread","Dc","transferList","Ot","ve","thread","loaded","mb","threadId","text","alert","zt","returnCode","target","filename","lineno","message","urlOrBlob","mainScriptUrlOrBlob","wasmModule","Ib","Ob","nc","now","_e","Date","gt","ye","ze","we","lb","dc","ac","bc","$b","cc","Pb","rb","jb","detached","St","start_routine","ec","arg","threadInfoStruct","stackBase","stackSize","time","mc","Ae","exchange","wait","Te","establishStackSpace","Wt","Yt","invokeEntryPoint","hrtime","__performance_now_clock_drift","Oe","ke","Ee","xe","Me","rc","De","Se","Ce","Re","Ie","Fe","sc","je","Math","ceil","qt","fill","Wb","Tb","Jb","fd","Ac","flags","offset","Ye","Pe","We","tc","qe","Ue","Be","Ge","He","arguments","jt","Pt","kt","Le","Ne","Ve","querySelector","Xe","qb","Db","pc","Et","pb","ob","getParameter","width","height","viewport","Qe","Je","Ze","$e","Ke","USER","LOGNAME","PATH","PWD","HOME","LANG","navigator","languages","et","forEach","tt","nt","rt","at","vc","uc","it","ot","ut","toTimeString","match","Kb","getFullYear","getTimezoneOffset","max","Ft","It","Number","Rt","st","ct","ft","lt","pt","getTime","getMonth","getDate","setDate","setMonth","setFullYear","dt","toString","getDay","ab","vb","kc","jc","tb","nb","kb","ub","Ec","ic","lc","RegExp","split","substring","abs","includes","Array","set","mt","bt","Tt","oc","At","xt","da","ga","ea","apply","copyWithin","hardwareConcurrency","aa","min","grow","ba","setTimeout","stack","Mt","ca","alpha","depth","stencil","antialias","premultipliedAlpha","preserveDrawingBuffer","powerPreference","failIfMajorPerformanceCaveat","Vb","yc","Bb","Mb","Bc","Cc","Cb","getContext","WebGLRenderingContext","wc","attributes","version","canvas","Qb","getExtension","vertexAttribDivisor","vertexAttribDivisorANGLE","drawArraysInstanced","drawArraysInstancedANGLE","drawElementsInstanced","drawElementsInstancedANGLE","createVertexArray","createVertexArrayOES","deleteVertexArray","deleteVertexArrayOES","bindVertexArray","bindVertexArrayOES","isVertexArray","isVertexArrayOES","drawBuffers","drawBuffersWEBGL","qc","zc","getSupportedExtensions","ha","getUTCSeconds","getUTCMinutes","getUTCHours","getUTCDate","getUTCMonth","getUTCFullYear","getUTCDay","UTC","Ab","getSeconds","getMinutes","getHours","setTime","fa","asm","Ca","ia","Ha","monitorRunDependen cies","clearInterval","instance","fetch","credentials","then","ok","arrayBuffer","catch","resolve","instantiate","instantiateWasm","instantiateStreaming","___wasm_call_ctors","_OrtInit","ja","_OrtCreateSessionOptions","ka","_OrtAddSessionConfigEntry","la","_OrtReleaseSessionOptions","ma","_OrtCreateSession","na","_OrtReleaseSession","oa","_OrtGetInputCount","pa","_OrtGetOutputCount","qa","_OrtGetInputName","ra","_OrtGetOutputName","sa","_OrtFree","ta","_OrtCreateTensor","ua","_OrtGetTensorData","va","_OrtReleaseTensor","wa","_OrtCreateRunOptions","xa","_OrtAddRunConfigEntry","ya","_OrtReleaseRunOptions","za","_OrtRun","Aa","_OrtEndProfiling","Ba","_malloc","Da","___errno_location","Ea","_free","Fa","_pthread_self","Ga","_emscripten_tls_init","_emscripten_current_thread_process_queued_calls","Ia","wt","_emscripten_register_main_browser_thread_id","Ja","_emscripten_main_browser_thread_id","Ka","_emscripten_sync_run_in_main_thread_4","La","_emscripten_main_thread_process_queued_calls","Ma","_emscripten_run_in_main_runtime_thread_js","Na","__emscripten_call_on_thread","Oa","_pthread_testcancel","Pa","_pthread_exit","Qa","__emscripten_thread_init","Ra","_emscripten_get_global_libc","Sa","___pthread_tsd_run_dtors","Ta","__get_tzname","Ua","__get_daylight","Va","__get_timezone","Wa","stackSave","Xa","stackRestore","Ya","stackAlloc","Za","_emscripten_stack_set_limits","_a","_memalign","$a","__emscripten_allow_main_runtime_queued_calls","__emscripten_main_thread_futex","name","Ht","calledRun","onRuntimeInitialized","postRun","setStatus","_fflush","onExit","UTF8ToString","stringToUTF8","lengthBytesUTF8","keepRuntimeAlive","PThread","ExitStatus","run","preInit","ortWasm","undefined","fn","ctx","params","index","pending","reject","err","base64","string","charAt","b64","s64","encode","start","end","parts","chunk","join","invalidEncoding","test","EventEmitter","_listeners","prototype","evt","off","listeners","emit","args","f32","f8b","writeFloat_f32_cpy","val","buf","pos","writeFloat_f32_rev","readFloat_f32_cpy","readFloat_f32_rev","writeFloatLE","writeFloatBE","readFloatLE","readFloatBE","writeFloat_ieee754","writeUint","sign","isNaN","round","exponent","floor","LN2","pow","readFloat_ieee754","readUint","uint","mantissa","NaN","Infinity","writeUintLE","writeUintBE","readUintLE","readUintBE","f64","writeDouble_f64_cpy","writeDouble_f64_rev","readDouble_f64_cpy","readDouble_f64_rev","writeDoubleLE","writeDoubleBE","readDoubleLE","readDoubleBE","writeDouble_ieee754","off0","off1","readDouble_ieee754","lo","hi","inquire","moduleName","mod","eval","Object","keys","alloc","size","SIZE","MAX","slab","utf8","len","read","write","c1","c2","flatbuffers","Offset","Table","SIZEOF_SHORT","SIZEOF_INT","FILE_IDENTIFIER_LENGTH","SIZE_PREFIX_LENGTH","Encoding","UTF8_BYTES","UTF16_STRING","int32","float32","float64","isLittleEndian","Long","low","high","create","ZERO","toFloat64","equals","other","Builder","opt_initial_size","initial_size","ByteBuffer","allocate","space","minalign","vtable","vtable_in_use","isNested","object_start","vtables","vector_num_elems","force_defaults","clear","capacity","forceDefaults","dataBuffer","asUint8Array","bytes","position","prep","additional_bytes","align_size","old_buf_size","growByteBuffer","pad","byte_size","writeInt8","value","writeInt16","writeInt32","writeInt64","writeFloat32","writeFloat64","addInt8","addInt16","addInt32","addInt64","addFloat32","addFloat64","addFieldInt8","voffset","defaultValue","slot","addFieldInt16","addFieldInt32","addFieldInt64","addFieldFloat32","addFieldFloat64","addFieldOffset","addOffset","addFieldStruct","nested","obj","notNested","new_buf_size","nbb","setPosition","startObject","numfields","endObject","vtableloc","trimmed_size","existing_vtable","vt1","outer_loop","vt2","readInt16","finish","root_table","opt_file_identifier","opt_size_prefix","size_prefix","file_identifier","finishSizePrefixed","requiredField","table","field","table_start","vtable_start","readInt32","startVector","elem_size","num_elems","alignment","endVector","createString","codePoint","createLong","bytes_","position_","readInt8","readUint8","readUint16","readUint32","readInt64","readUint64","readFloat32","readFloat64","writeUint8","writeUint16","writeUint32","writeUint64","getBufferIdentifier","result","__offset","bb_pos","vtable_offset","__union","__string","opt_encoding","__indirect","__vector","__vector_len","__has_identifier","ident","__esModule","Guid","guid","TypeError","EMPTY","isGuid","validator","gen","createEmpty","parse","raw","count","out","random","isEmpty","toJSON","wasm","Instance","Module","unsigned","isLong","__isLong__","defineProperty","INT_CACHE","UINT_CACHE","fromInt","cachedObj","cache","fromBits","fromNumber","UZERO","TWO_PWR_64_DBL","MAX_UNSIGNED_VALUE","TWO_PWR_63_DBL","MIN_VALUE","MAX_VALUE","neg","TWO_PWR_32_DBL","lowBits","highBits","pow_dbl","fromString","str","radix","RangeError","radixToPower","parseInt","power","mul","add","fromValue","TWO_PWR_16_DBL","TWO_PWR_24","ONE","UONE","NEG_ONE","LongPrototype","toInt","toNumber","isZero","isNegative","eq","radixLong","div","rem1","sub","rem","remDiv","digits","getHighBits","getHighBitsUnsigned","getLowBits","getLowBitsUnsigned","ge

tNumBitsAbs","bit","eqz","isPositive","isOdd","isEven","notEquals","neq","lessThan","comp","lessThanOrEqual",
"lte","greaterThan","greaterThanOrEqual","gte","compare","thisNeg","otherNeg","negate","not","addend","a48","a
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Res","approxRem","modulo","rem_u","rem_s","and","or","xor","shiftLeft","numBits","shiftRight","shiftRightUnsig
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ById","values","onnx","$protobuf","$Reader","Reader","$Writer","Writer","$util","util","$root","roots","Version","
AttributeProto","properties","floats","ints","strings","tensors","graphs","refAttrName","docString","type","newBuff
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AAQ,IAAIogG,SAAS,cAAAb,GACd,MAAOxmG,GACR,GAAAsB,iBAAAXgC,OAAAqB,OAAAOA,QALjB,GCAxBgk
G,oBAAoBhlG,EAAI,SAASovB,EAAKqY,GAAAQ,OAAO9d,OAAOzD,UAAU3lB,eAAegF,KAAK6pB,EAAKqY,

ICC/Fu9D,oBAAoBplG,EAAI,SAAStB,GACX,oBAAXmnG,QAA0BA,OAAOC,aAC1C/7E,OAAO8K,eAAen2B,
EAASmnG,OAAOC,YAAa,CAAE/3E,MAAO,WAE7DhE,OAAO8K,eAAen2B,EAAS,aAAc,CAAAEqvB,OAAO,K
CFvD,IAAIg4E,oBAAsBX,oBAAoB,M","file":"ort-web.min.js","sourcesContent":["(function
webpackUniversalModuleDefinition(root, factory) {\n\tif(typeof exports === 'object' && typeof module ===
'object')\n\t\tmodule.exports = factory(require(\"onnxruntime-common\"));\n\telse if(typeof define === 'function'
&& define.amd)\n\t\tdefine([], factory);\n\telse {\n\t\tvar a = typeof exports === 'object' ?
factory(require(\"onnxruntime-common\")) : factory(root[\"ort\"]);\n\t\tfor(var i in a) (typeof exports === 'object' ?
exports : root)[i] = a[i];\n\t}\n})(self, function(__WEBPACK_EXTERNAL_MODULE__2174__) {\nreturn ","var
_scriptDir,e=(_scriptDir=\"undefined\"!=typeof
document&&document.currentScript?document.currentScript.src:void 0,\"undefined\"!=typeof
__filename&&(_scriptDir=_scriptDir||__filename),function(e){function t(){return
S.buffer!=Y&&Q(S.buffer),P}function n(){return S.buffer!=Y&&Q(S.buffer),W}function r(){return
S.buffer!=Y&&Q(S.buffer),q}function a(){return S.buffer!=Y&&Q(S.buffer),U}function i(){return
S.buffer!=Y&&Q(S.buffer),B}var o,u,s;e=e||{},o||(o=void 0!==e?e:{}),o.ready=new
Promise((function(e,t){u=e,s=t}));var c,f={};for(c in o)o.hasOwnProperty(c)&&(f[c]=o[c]);var
l=\"./this.program\";function p(e,t){throw t}var d,m,b,h,g,_=\"object\"==typeof window,y=\"function\"==typeof
importScripts,w=\"object\"==typeof process&&\"object\"==typeof process.versions&&\"string\"==typeof
process.versions.node,v=o.ENVIRONMENT_IS_PTHREAD||!1,A=\"\";function T(e){return
o.locateFile?o.locateFile(e,A):A+e}if(w){var
O;A=y?require(\"path\").dirname(A)+\"/\":__dirname+\"/\",d=function(e,t){return
h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.readFileSync(e,t?null:\"utf8\")},b=function(e){retur
n(e=d(e,!0)).buffer||(e=new
Uint8Array(e)),F(e.buffer),e},m=function(e,t,n){h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.rea
dFile(e,(function(e,r){e?n(e):t(r.buffer)}))},1<process.argv.length&&(l=process.argv[1].replace(/\\\\/g,\"/\")),process
.argv.slice(2),process.on(\"uncaughtException\",(function(e){if(!(e instanceof Gt))throw
e})),process.on(\"unhandledRejection\",ce),p=function(e,t){if(re())throw
process.exitCode=e,t;process.exit(e)},o.inspect=function(){return\"[Emscripten Module
object]\"};try{O=require(\"worker_threads\")}catch(e){throw console.error('The \"worker_threads\" module is not
supported in this node.js build - perhaps a newer version is
needed?'),e}global.Worker=O.Worker}else(_||y)&&(y?A=self.location.href:\"undefined\"!=typeof
document&&document.currentScript&&(A=document.currentScript.src),_scriptDir&&(A=_scriptDir),A=0!==A.in
dexOf(\"blob:\")?A.substr(0,A.lastIndexOf(\"/\")+1):\"\",w?(d=function(e,t){return
h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.readFileSync(e,t?null:\"utf8\")},b=function(e){retur
n(e=d(e,!0)).buffer||(e=new
Uint8Array(e)),F(e.buffer),e},m=function(e,t,n){h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.rea
dFile(e,(function(e,r){e?n(e):t(r.buffer)}))}):(d=function(e){var t=new XMLHttpRequest;return
t.open(\"GET\",e,!1),t.send(null),t.responseText},y&&(b=function(e){var t=new XMLHttpRequest;return
t.open(\"GET\",e,!1),t.responseType=\"arraybuffer\",t.send(null),new
Uint8Array(t.response)}),m=function(e,t,n){var r=new
XMLHttpRequest;r.open(\"GET\",e,!0),r.responseType=\"arraybuffer\",r.onload=function(){200==r.status||0==r.stat
us&&r.response?t(r.response):n()},r.onerror=n,r.send(null)}));w&&\"undefined\"==typeof
performance&&(global.performance=require(\"perf_hooks\").performance);var
k,E,x=o.print||console.log.bind(console),M=o.printErr||console.warn.bind(console);for(c in
f)f.hasOwnProperty(c)&&(o[c]=f[c]);f=null,o.thisProgram&&(l=o.thisProgram),o.quit&&(p=o.quit),o.wasmBinary
&&(E=o.wasmBinary);var D=o.noExitRuntime||!1;\"object\"!=typeof WebAssembly&&ce(\"no native wasm
support detected\");var S,C,R,I=!1;function F(e,t){e||ce(\"Assertion failed: \"+t)}function j(e){var t=new
TextDecoder(e);this.decode=function(e){return e.buffer instanceof SharedArrayBuffer&&(e=new
Uint8Array(e)),t.decode.call(t,e)}}var Y,P,W,q,U,B,G=\"undefined\"!=typeof TextDecoder?new j(\"utf8\"):void

```
0;function H(e,t,n){var r=t+n;for(n=t;e[n]&&!(n>=r);)++n;if(16<n-t&&e.subarray&&G)return
G.decode(e.subarray(t,n));for(r=\"\";t<n;){var a=e[t++];if(128&a){var
i=63&e[t++];if(192==(224&a))r+=String.fromCharCode((31&a)<<6|i);else{var
o=63&e[t++];65536>(a=224==(240&a)?(15&a)<<12|i<<6|o:(7&a)<<18|i<<12|o<<6|63&e[t++])?r+=String.fromCh
arCode(a):(a-=65536,r+=String.fromCharCode(55296|a>>10,56320|1023&a))}}else
r+=String.fromCharCode(a)}return r}function z(e,t){return e?H(n(),e,t):\"\"}function L(e,t,n,r){if(!(0<r))return 0;var
a=n;r=n+r-1;for(var i=0;i<e.length;++i){var
o=e.charCodeAt(i);if(55296<=o&&57343>=o&&(o=65536+((1023&o)<<10)|1023&e.charCodeAt(++i)),127>=o){i
f(n>=r)break;t[n++]=o}else{if(2047>=o){if(n+1>=r)break;t[n++]=192|o>>6}else{if(65535>=o){if(n+2>=r)break;t[
n++]=224|o>>12}else{if(n+3>=r)break;t[n++]=240|o>>18,t[n++]=128|o>>12&63}t[n++]=128|o>>6&63}t[n++]=1
28|63&o}}return t[n]=0,n-a}function N(e,t,r){return L(e,n(),t,r)}function V(e){for(var t=0,n=0;n<e.length;++n){var
r=e.charCodeAt(n);55296<=r&&57343>=r&&(r=65536+((1023&r)<<10)|1023&e.charCodeAt(++n)),127>=r?++t:t
=2047>=r?t+2:65535>=r?t+3:t+4}return t}function X(e){var n=V(e)+1,r=ht(n);return r&&L(e,t(),r,n),r}function
Q(e){Y=e,o.HEAP8=P=new Int8Array(e),o.HEAP16=new Int16Array(e),o.HEAP32=q=new
Int32Array(e),o.HEAPU8=W=new Uint8Array(e),o.HEAPU16=new Uint16Array(e),o.HEAPU32=U=new
Uint32Array(e),o.HEAPF32=new Float32Array(e),o.HEAPF64=B=new Float64Array(e)}\"undefined\"!=typeof
TextDecoder&&new j(\"utf-16le\"),v&&(Y=o.buffer);var
J=o.INITIAL_MEMORY||16777216;if(v)S=o.wasmMemory,Y=o.buffer;else
if(o.wasmMemory)S=o.wasmMemory;else if(!((S=new
WebAssembly.Memory({initial:J/65536,maximum:32768,shared:!0})).buffer instanceof SharedArrayBuffer))throw
M(\"requested a shared WebAssembly.Memory but the returned buffer is not a SharedArrayBuffer, indicating that
while the browser has SharedArrayBuffer it does not have WebAssembly threads support - you may need to set a
flag\"),w&&console.log(\"(on node you may need: --experimental-wasm-threads --experimental-wasm-bulk-
memory and also use a recent version)\"),Error(\"bad memory\");S&&(Y=S.buffer),J=Y.byteLength,Q(Y);var
Z,$=[],K=[],ee=[],te=[],ne=0;function re(){return D||0<ne}function ae(){var e=o.preRun.shift();$.unshift(e)}var
ie,oe=0,ue=null,se=null;function ce(e){throw o.onAbort&&o.onAbort(e),F(!v),M(e),I=!0,R=1,e=new
WebAssembly.RuntimeError(\"abort(\"+e+\"). Build with -s ASSERTIONS=1 for more info.\"),s(e),e}function
fe(){return ie.startsWith(\"data:application/octet-stream;base64,\")}function le(){var e=ie;try{if(e==ie&&E)return
new Uint8Array(E);if(b)return b(e);throw\"both async and sync fetching of the wasm
failed\"}catch(e){ce(e)}}o.preloadedImages={},o.preloadedAudios={},ie=\"ort-wasm-
threaded.wasm\",fe()||(ie=T(ie));var pe={973748:function(){throw\"Canceled!\"}};function
de(e){for(;0<e.length;){var t=e.shift();if(\"function\"==typeof t)t(o);else{var n=t.Nb;\"number\"==typeof n?void
0===t.ib?Z.get(n)():Z.get(n)(t.ib):n(void 0===t.ib?null:t.ib)}}}function
me(e,n){if(0>=e||e>t().length||1&e||0>n)return-28;if(0==n)return 0;2147483647<=n&&(n=1/0);var
a=Atomics.load(r(),Bt>>2),i=0;if(a==e&&Atomics.compareExchange(r(),Bt>>2,a,0)==a&&(i=1,0>=--n))return
1;if(0<=(e=Atomics.notify(r(),e>>2,n)))return e+i;throw\"Atomics.notify returned an unexpected value
\"+e}function be(e){if(v)throw\"Internal Error! cleanupThread() can only ever be called from main application
thread!\";if(!e)throw\"Internal Error! Null pthread_ptr in cleanupThread!\";var
t=ge.cb[e];t&&(r()[e+12>>2]=0,ge.sb(t.worker))}o._emscripten_futex_wake=me;var
he,ge={gb:[],fb:[],zb:[],xc:function(){},Rb:function(){for(var
e=ht(228),t=0;57>t;++t)a()[e/4+t]=0;r()[e+12>>2]=e,t=e+152,r()[t>>2]=t;var
n=ht(512);for(t=0;128>t;++t)a()[n/4+t]=0;Atomics.store(a(),e+100>>2,n),Atomics.store(a(),e+40>>2,e),Dt(e,!y,1),v
t(e)},Sb:function(){ge.receiveObjectTransfer=ge.Xb,ge.threadInit=ge.hc,ge.threadCancel=ge.fc,ge.threadExit=ge.H
b,ge.setExitStatus=ge.Zb},cb:{},yb:[],Eb:function(){for(;0<ge.yb.length;)ge.yb.pop()();Ct()},Fb:function(e,t){Atom
ics.store(a(),e+56>>2,1),Atomics.store(a(),e+60>>2,0),ge.Eb(),Atomics.store(a(),e+4>>2,t),Atomics.store(a(),e+0>
>2,1),me(e+0,2147483647),Dt(0,0,0)},Zb:function(e){R=e},Hb:function(e){var
t=yt();t&&(ge.Fb(t,e),v&&postMessage({cmd:\"exit\"}))},fc:function(){ge.Fb(yt(),-
1),postMessage({cmd:\"cancelDone\"})},Gb:function(){for(var e in ge.cb){var
```

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t=ge.cb[e];t&&t.worker&&ge.sb(t.worker)}for(ge.cb={},e=0;e<ge.gb.length;++e){var
n=ge.gb[e];n.terminate()}for(ge.gb=[],e=0;e<ge.fb.length;++e)t=(n=ge.fb[e]).bb,ge.xb(t),n.terminate();ge.fb=[]},xb:
function(e){if(e){if(e.eb){var
t=r()[e.eb+100>>2];r()[e.eb+100>>2]=0,_t(t),_t(e.eb)}e.eb=0,e.wb&&e.hb&&_t(e.hb),e.hb=0,e.worker&&(e.worke
r.bb=null)}},sb:function(e){ge.Yb((function(){delete
ge.cb[e.bb.eb],ge.gb.push(e),ge.fb.splice(ge.fb.indexOf(e),1),ge.xb(e.bb),e.bb=void
0}))},Yb:function(e){r()[Ut>>2]=0;try{e()}finally{r()[Ut>>2]=1}},Xb:function(){},hc:function(){for(var e in
ge.zb)ge.zb[e]()},Ub:function(e,t){e.onmessage=function(n){var
i=n.data,o=i.cmd;if(e.bb&&(ge.Lb=e.bb.eb),i.targetThread&&i.targetThread!=yt()){var
u=ge.cb[i.Dc];u?u.worker.postMessage(n.data,i.transferList):M('Internal error! Worker sent a message \"'+o+'\" to
target pthread '+i.targetThread+\", but that thread no longer exists!\")}else
if(\"processQueuedMainThreadWork\"===o)Ot();else if(\"spawnThread\"===o)ve(n.data);else
if(\"cleanupThread\"===o)be(i.thread);else if(\"killThread\"===o){if(n=i.thread,v)throw\"Internal Error!
killThread() can only ever be called from main application thread!\";if(!n)throw\"Internal Error! Null pthread_ptr in
killThread!\";r()[n+12>>2]=0,i=ge.cb[n],delete
ge.cb[n],i.worker.terminate(),ge.xb(i),ge.fb.splice(ge.fb.indexOf(i.worker),1),i.worker.bb=void 0}else
if(\"cancelThread\"===o){if(n=i.thread,v)throw\"Internal Error! cancelThread() can only ever be called from main
application thread!\";if(!n)throw\"Internal Error! Null pthread_ptr in
cancelThread!\";ge.cb[n].worker.postMessage({cmd:\"cancel\"})}else
if(\"loaded\"===o)e.loaded=!0,t&&t(e),e.mb&&(e.mb(),delete e.mb);else if(\"print\"===o)x(\"Thread
\"+i.threadId+\": \"+i.text);else if(\"printErr\"===o)M(\"Thread \"+i.threadId+\": \"+i.text);else
if(\"alert\"===o)alert(\"Thread \"+i.threadId+\": \"+i.text);else
if(\"exit\"===o)e.bb&&Atomics.load(a(),e.bb.eb+64>>2)&&ge.sb(e);else
if(\"exitProcess\"===o)try{zt(i.returnCode)}catch(e){if(e instanceof Gt)return;throw
e}else\"cancelDone\"===o?ge.sb(e):\"objectTransfer\"!==o&&(\"setimmediate\"===n.data.target?e.postMessage(n.
data):M(\"worker sent an unknown command \"+o));ge.Lb=void 0},e.onerror=function(e){M(\"pthread sent an
error! \"+e.filename+\":\"+e.lineno+\":
\"+e.message)},w&&(e.on(\"message\",(function(t){e.onmessage({data:t})})),e.on(\"error\",(function(t){e.onerror(t)
})),e.on(\"exit\",(function(){}))),e.postMessage({cmd:\"load\",urlOrBlob:o.mainScriptUrlOrBlob||_scriptDir,wasm
Memory:S,wasmModule:C})},Ib:function(){var e=T(\"ort-wasm-threaded.worker.js\");ge.gb.push(new
Worker(e))},Ob:function(){return
0==ge.gb.length&&(ge.Ib(),ge.Ub(ge.gb[0])),ge.gb.pop()},nc:function(e){for(e=performance.now()+e;performance.
now()<e;);}};function _e(e,t){if(0===e)e=Date.now();else{if(1!==e&&4!==e)return r()[gt()>>2]=28,-
1;e=he()}return r()[t>>2]=e/1e3|0,r()[t+4>>2]=e%1e3*1e6|0,0}function ye(e,t){if(v)return
ze(1,1,e,t);ee.unshift({Nb:e,ib:t})}function we(e){this.lb=e-
16,this.dc=function(e){r()[this.lb+4>>2]=e},this.ac=function(e){r()[this.lb+8>>2]=e},this.bc=function(){r()[this.lb>
>2]=0},this.$b=function(){t()[this.lb+12>>0]=0},this.cc=function(){t()[this.lb+13>>0]=0},this.Pb=function(e,t){thi
s.dc(e),this.ac(t),this.bc(),this.$b(),this.cc()}}function ve(e){if(v)throw\"Internal Error! spawnThread() can only ever
be called from main application thread!\";var t=ge.Ob();if(!t)return 6;if(void 0!==t.bb)throw\"Internal
error!\";if(!e.rb)throw\"Internal error, no pthread ptr!\";ge.fb.push(t);for(var
n=ht(512),i=0;128>i;++i)r()[n+4*i>>2]=0;var
o=e.hb+e.jb,u=(i=ge.cb[e.rb]={worker:t,hb:e.hb,jb:e.jb,wb:e.wb,eb:e.rb}).eb>>2;Atomics.store(a(),u+16,e.detached)
,Atomics.store(a(),u+25,n),Atomics.store(a(),u+10,i.eb),Atomics.store(a(),u+20,e.jb),Atomics.store(a(),u+19,o),Ato
mics.store(a(),u+26,e.jb),Atomics.store(a(),u+28,o),Atomics.store(a(),u+29,e.detached),n=St()+40,Atomics.store(a()
,u+43,n),t.bb=i;var
s={cmd:\"run\",start_routine:e.ec,arg:e.ib,threadInfoStruct:e.rb,stackBase:e.hb,stackSize:e.jb};return
t.mb=function(){s.time=performance.now(),t.postMessage(s,e.mc)},t.loaded&&(t.mb(),delete t.mb),0}function
Ae(e,n,a){if(0>=e||e>t().length||1&e)return-28;if(_){if(Atomics.load(r(),e>>2)!=n)return-6;var
```

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i=performance.now();for(a=i+a,Atomics.exchange(r(),Bt>>2,e);;){if((i=performance.now())>a)return
Atomics.exchange(r(),Bt>>2,0),-
73;if(0==(i=Atomics.exchange(r(),Bt>>2,0)))break;if(Ot(),Atomics.load(r(),e>>2)!=n)return-
6;Atomics.exchange(r(),Bt>>2,e)}return 0}if(\"timed-out\"===(e=Atomics.wait(r(),e>>2,n,a)))return-73;if(\"not-
equal\"===e)return-6;if(\"ok\"===e)return 0;throw\"Atomics.wait returned an unexpected value \"+e}function
Te(){w||y||(k||(k={}),k[\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-thread\"]||(k[\"Blocking on the
main thread is very dangerous, see https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-
browser-thread\"]=1,M(\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-
thread\")))}o.establishStackSpace=function(e,t){Wt(e,t),Yt(e)},o.invokeEntryPoint=function(e,t){return
Z.get(e)(t)},he=w?function(){var e=process.hrtime();return 1e3*e[0]+e[1]/1e6}:v?function(){return
performance.now()-o.__performance_now_clock_drift}:function(){return performance.now()};var
Oe={},ke=[null,[],[]];function Ee(e,t){var n=ke[e];0===t||10===t?((1===e?x:M)(H(n,0)),n.length=0):n.push(t)}var
xe={};function Me(e,t){return v?ze(2,1,e,t):(e=z(e),xe.rc(e,t))}function De(e,t,n){return v?ze(3,1,e,t,n):0}function
Se(e,t){if(v)return ze(4,1,e,t)}function Ce(e,t,n){if(v)return ze(5,1,e,t,n)}function Re(e,t,n){return
v?ze(6,1,e,t,n):0}function Ie(e,t){if(v)return ze(7,1,e,t)}function Fe(e,t){return
v?ze(8,1,e,t):(e=z(e),xe.sc(e,t))}function je(e,t,r,a,i,o){if(v)t=ze(9,1,e,t,r,a,i,o);else
if(o<<=12,0!=(16&a)&&0!=e%65536)t=-28;else if(0!=(32&a)){var
u=65536*Math.ceil(t/65536);(e=qt(65536,u))?n().fill(0,e,e+u):e=0,e?(Oe[e]={Wb:e,Tb:t,Jb:!0,fd:i,Ac:r,flags:a,offse
t:o},t=e):t=-48}else t=-52;return t}function Ye(e,t){if(v)e=ze(10,1,e,t);else{var
n=Oe[e];0!==t&&n?(t===n.Tb&&(Oe[e]=null,n.Jb&&_t(n.Wb)),e=0):e=-28}return e}function Pe(e,t,n){if(v)return
ze(11,1,e,t,n)}function We(e,t,n){return v?ze(12,1,e,t,n):(e=z(e),xe.tc(e,t,n))}function qe(e){if(v)return
ze(13,1,e)}function Ue(e,t){if(v)return ze(14,1,e,t)}function Be(e){if(v)return ze(15,1,e)}function Ge(){if(v)return
ze(16,1);ce()}var He=[];function ze(e,t){for(var n=arguments.length-2,r=jt(),a=Pt(8*n),o=a>>3,u=0;u<n;u++){var
s=arguments[2+u];i()[o+u]=s}return n=kt(e,n,a,t),Yt(r),n}var Le=[],Ne=[0,\"undefined\"!=typeof
document?document:0,\"undefined\"!=typeof window?window:0];function Ve(e){return
e=2<e?z(e):e,Ne[e]||(\"undefined\"!=typeof document?document.querySelector(e):void 0)}function Xe(e,t,n){var
a=Ve(e);if(!a)return-
4;if(a.qb&&(r()[a.qb>>2]=t,r()[a.qb+4>>2]=n),!a.Db&&a.pc){if(a.qb){a=r()[a.qb+8>>2],e=e?z(e):\"\";var
i=jt(),o=Pt(12),u=0;if(e){u=V(e)+1;var s=ht(u);N(e,s,u),u=s}return
r()[o>>2]=u,r()[o+4>>2]=t,r()[o+8>>2]=n,Et(0,a,657457152,0,u,o),Yt(i),1}return-4}return
a.Db&&(a=a.Db),e=!1,a.pb&&a.pb.ob&&(e=0===(e=a.pb.ob.getParameter(2978))[0]&&0===e[1]&&e[2]===a.wi
dth&&e[3]===a.height),a.width=t,a.height=n,e&&a.pb.ob.viewport(0,0,t,n),0}function Qe(e,t,n){return
v?ze(17,1,e,t,n):Xe(e,t,n)}var Je,Ze=[\"default\",\"low-power\",\"high-performance\"],$e={};function
Ke(){if(!Je){var
e,t={USER:\"web_user\",LOGNAME:\"web_user\",PATH:\"/\",PWD:\"/\",HOME:\"/home/web_user\",LANG:(\"ob
ject\"==typeof navigator&&navigator.languages&&navigator.languages[0]||\"C\").replace(\"-\",\"_\")+\".UTF-
8\",_:l||\"./this.program\"};for(e in $e)void 0===$e[e]?delete t[e]:t[e]=$e[e];var n=[];for(e in
t)n.push(e+\"=\"+t[e]);Je=n}return Je}function et(e,n){if(v)return ze(18,1,e,n);var a=0;return
Ke().forEach((function(i,o){var
u=n+a;for(o=r()[e+4*o>>2]=u,u=0;u<i.length;++u)t()[o++>>0]=i.charCodeAt(u);t()[o>>0]=0,a+=i.length+1})),0}f
unction tt(e,t){if(v)return ze(19,1,e,t);var n=Ke();r()[e>>2]=n.length;var a=0;return
n.forEach((function(e){a+=e.length+1})),r()[t>>2]=a,0}function nt(e){return v?ze(20,1,e):0}function rt(e,n){return
v?ze(21,1,e,n):(e=1==e||2==e?2:ce(),t()[n>>0]=e,0)}function at(e,t,n,a){return
v?ze(22,1,e,t,n,a):(e=xe.vc(e),t=xe.uc(e,t,n),r()[a>>2]=t,0)}function it(e,t,n,r,a){if(v)return
ze(23,1,e,t,n,r,a)}function ot(e,t,a,i){if(v)return ze(24,1,e,t,a,i);for(var o=0,u=0;u<a;u++){for(var
s=r()[t+8*u>>2],c=r()[t+(8*u+4)>>2],f=0;f<c;f++)Ee(e,n()[s+f]);o+=c}return r()[i>>2]=o,0}function ut(){function
```

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e(e){return(e=e.toTimeString().match(/\\(([A-Za-z ]+)\\)$/))?e[1]:\"GMT\"}if(v)return
ze(25,1);if(!ut.Kb){ut.Kb=!0;var t=(new Date).getFullYear(),n=new Date(t,0,1),a=new
Date(t,6,1);t=n.getTimezoneOffset();var
i=a.getTimezoneOffset(),o=Math.max(t,i);r()[Ft()>>2]=60*o,r()[It()>>2]=Number(t!=i),n=e(n),a=e(a),n=X(n),a=X(
a),i<t?(r()[Rt()>>2]=n,r()[Rt()+4>>2]=a):(r()[Rt()>>2]=a,r()[Rt()+4>>2]=n)}}function st(e){return
0==e%4&&(0!=e%100||0==e%400)}function ct(e,t){for(var n=0,r=0;r<=t;n+=e[r++]);return n}var
ft=[31,29,31,30,31,30,31,31,30,31,30,31],lt=[31,28,31,30,31,30,31,31,30,31,30,31];function pt(e,t){for(e=new
Date(e.getTime());0<t;){var n=e.getMonth(),r=(st(e.getFullYear())?ft:lt)[n];if(!(t>r-
e.getDate())){e.setDate(e.getDate()+t);break}t-=r-
e.getDate()+1,e.setDate(1),11>n?e.setMonth(n+1):(e.setMonth(0),e.setFullYear(e.getFullYear()+1))}return
e}function dt(e,n,a,i){function o(e,t,n){for(e=\"number\"==typeof e?e.toString():e||\"\";e.length<t;)e=n[0]+e;return
e}function u(e,t){return o(e,t,\"0\")}function s(e,t){function n(e){return 0>e?-1:0<e?1:0}var r;return
0===(r=n(e.getFullYear()-t.getFullYear()))&&0===(r=n(e.getMonth()-t.getMonth()))&&(r=n(e.getDate()-
t.getDate())),r}function c(e){switch(e.getDay()){case 0:return new Date(e.getFullYear()-1,11,29);case 1:return
e;case 2:return new Date(e.getFullYear(),0,3);case 3:return new Date(e.getFullYear(),0,2);case 4:return new
Date(e.getFullYear(),0,1);case 5:return new Date(e.getFullYear()-1,11,31);case 6:return new Date(e.getFullYear()-
1,11,30)}}function f(e){e=pt(new Date(e.ab+1900,0,1),e.vb);var t=new Date(e.getFullYear()+1,0,4),n=c(new
Date(e.getFullYear(),0,4));return t=c(t),0>=s(n,e)?0>=s(t,e)?e.getFullYear()+1:e.getFullYear():e.getFullYear()-
1}var l=r()[i+40>>2];for(var p in
i={kc:r()[i>>2],jc:r()[i+4>>2],tb:r()[i+8>>2],nb:r()[i+12>>2],kb:r()[i+16>>2],ab:r()[i+20>>2],ub:r()[i+24>>2],vb:r(
)[i+28>>2],Ec:r()[i+32>>2],ic:r()[i+36>>2],lc:l?z(l):\"\"},a=z(a),l={\"%c\":\"%a %b %d %H:%M:%S
%Y\",\"%D\":\"%m/%d/%y\",\"%F\":\"%Y-%m-%d\",\"%h\":\"%b\",\"%r\":\"%I:%M:%S
%p\",\"%R\":\"%H:%M\",\"%T\":\"%H:%M:%S\",\"%x\":\"%m/%d/%y\",\"%X\":\"%H:%M:%S\",\"%Ec\":\"%c\",\
"%EC\":\"%C\",\"%Ex\":\"%m/%d/%y\",\"%EX\":\"%H:%M:%S\",\"%Ey\":\"%y\",\"%EY\":\"%Y\",\"%Od\":\"%d
\",\"%Oe\":\"%e\",\"%OH\":\"%H\",\"%OI\":\"%I\",\"%Om\":\"%m\",\"%OM\":\"%M\",\"%OS\":\"%S\",\"%Ou\":\"
%u\",\"%OU\":\"%U\",\"%OV\":\"%V\",\"%Ow\":\"%w\",\"%OW\":\"%W\",\"%Oy\":\"%y\"})a=a.replace(new
RegExp(p,\"g\"),l[p]);var d=\"Sunday Monday Tuesday Wednesday Thursday Friday Saturday\".split(\"
\"),m=\"January February March April May June July August September October November December\".split(\"
\");for(p in l={\"%a\":function(e){return d[e.ub].substring(0,3)},\"%A\":function(e){return
d[e.ub]},\"%b\":function(e){return m[e.kb].substring(0,3)},\"%B\":function(e){return
m[e.kb]},\"%C\":function(e){return u((e.ab+1900)/100|0,2)},\"%d\":function(e){return
u(e.nb,2)},\"%e\":function(e){return o(e.nb,2,\" \")},\"%g\":function(e){return
f(e).toString().substring(2)},\"%G\":function(e){return f(e)},\"%H\":function(e){return
u(e.tb,2)},\"%I\":function(e){return 0==(e=e.tb)?e=12:12<e&&(e-=12),u(e,2)},\"%j\":function(e){return
u(e.nb+ct(st(e.ab+1900)?ft:lt,e.kb-1),3)},\"%m\":function(e){return u(e.kb+1,2)},\"%M\":function(e){return
u(e.jc,2)},\"%n\":function(){return\"\\n\"},\"%p\":function(e){return
0<=e.tb&&12>e.tb?\"AM\":\"PM\"},\"%S\":function(e){return
u(e.kc,2)},\"%t\":function(){return\"\\t\"},\"%u\":function(e){return e.ub||7},\"%U\":function(e){var t=new
Date(e.ab+1900,0,1),n=0===t.getDay()?t:pt(t,7-t.getDay());return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(ct(st(e.getFullYear())?ft:lt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\"01\":\"00\"},\"%V\":function(e){var t=new Date(e.ab+1901,0,4),n=c(new
Date(e.ab+1900,0,4));t=c(t);var r=pt(new Date(e.ab+1900,0,1),e.vb);return
0>s(r,n)?\"53\":0>=s(t,r)?\"01\":u(Math.ceil((n.getFullYear()<e.ab+1900?e.vb+32-n.getDate():e.vb+1-
n.getDate())/7),2)},\"%w\":function(e){return e.ub},\"%W\":function(e){var t=new
Date(e.ab,0,1),n=1===t.getDay()?t:pt(t,0===t.getDay()?1:7-t.getDay()+1);return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(ct(st(e.getFullYear())?ft:lt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\"01\":\"00\"},\"%y\":function(e){return(e.ab+1900).toString().substring(2)},\"%
Y\":function(e){return e.ab+1900},\"%z\":function(e){var t=0<=(e=e.ic);return e=Math.abs(e)/60,(t?\"+\":\"-
```

```
\")+String(\"0000\"+(e/60*100+e%60)).slice(-4)},\"%Z\":function(e){return
e.lc},\"%%\":function(){return\"%\"}})a.includes(p)&&(a=a.replace(new
RegExp(p,\"g\"),l[p](i)));return(p=function(e){var t=Array(V(e)+1);return
L(e,t,0,t.length),t}(a)).length>n?0:(function(e,n){t().set(e,n)}(p,e),p.length-1)}var
mt=[null,ye,Me,De,Se,Ce,Re,Ie,Fe,je,Ye,Pe,We,qe,Ue,Be,Ge,Qe,et,tt,nt,rt,at,it,ot,ut],bt={h:function(e,t,n,r){ce(\"As
sertion failed: \"+z(e)+\", at: \"+[t?z(t):\"unknown filename\",n,r?z(r):\"unknown
function\"])},M:function(e,t){return _e(e,t)},b:function(e){return ht(e+16)+16},d:function(e,t){return
ye(e,t)},e:function(e,t){ge.yb.push((function(){Z.get(e)(t)}))},c:function(e,t,n){throw new
we(e).Pb(t,n),e},Z:function(e,t,n,i){if(\"undefined\"==typeof SharedArrayBuffer)return M(\"Current environment
does not support SharedArrayBuffer, pthreads are not available!\"),6;if(!e)return M(\"pthread_create called with a
null thread pointer!\"),28;var o=[];if(v&&0===o.length)return Tt(687865856,e,t,n,i);var u=0,s=0;if(t&&-1!=t){var
c=r()[t>>2];c+=81920,u=r()[t+8>>2],s=0!==r()[t+12>>2]}else c=2097152;(t=0==u)?u=qt(16,c):F(0<(u-=c));for(var
f=ht(228),l=0;57>l;++l)a()[(f>>2)+l]=0;return
r()[e>>2]=f,r()[f+12>>2]=f,e=f+152,r()[e>>2]=e,n={hb:u,jb:c,wb:t,detached:s,ec:n,rb:f,ib:i,mc:o},v?(n.oc=\"spawn
Thread\",postMessage(n,o),0):ve(n)},X:function(e){throw
v?ge.Hb(e):(ge.Eb(),zt(e)),\"unwind\"},Y:function(e,t){return function(e,t){if(!e)return M(\"pthread_join attempted
on a null thread pointer!\"),71;if(v&&yt()==e)return M(\"PThread \"+e+\" is attempting to join to
itself!\"),16;if(!v&&At()==e)return M(\"Main thread \"+e+\" is attempting to join to
itself!\"),16;if(r()[e+12>>2]!==e)return M(\"pthread_join attempted on thread \"+e+\", which does not point to a
valid thread, or does not exist anymore!\"),71;if(Atomics.load(a(),e+64>>2))return M(\"Attempted to join thread
\"+e+\", which was already detached!\"),28;for(Te();;){var n=Atomics.load(a(),e+0>>2);if(1==n)return
n=Atomics.load(a(),e+4>>2),t&&(r()[t>>2]=n),Atomics.store(a(),e+64>>2,1),v?postMessage({cmd:\"cleanupThrea
d\",thread:e}):be(e),0;xt(),v||Ot(),Ae(e+0,n,v?100:1)}}(e,t)},L:Me,s:De,S:Se,V:Ce,u:function(){return
42},F:Re,Q:Ie,P:Fe,U:je,T:Ye,q:Pe,K:We,N:qe,v:Ue,O:Be,da:function(e,t){if(e==t)postMessage({cmd:\"processQu
euedMainThreadWork\"});else
if(v)postMessage({targetThread:e,cmd:\"processThreadQueue\"});else{if(!(e=(e=ge.cb[e])&&e.worker))return;e.po
stMessage({cmd:\"processThreadQueue\"})}return 1},f:Ge,w:_e,ga:function(e,t){return e-t},A:function(){ce(\"To
use dlopen, you need to use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},l:function(){ce(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},C:function(){ce(\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},z:function(){ce(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},ea:function(e,t,a){var
o;for(He.length=0,a>>=2;o=n()[t++];)(o=105>o)&&1&a&&a++,He.push(o?i()[a++>>1]:r()[a]),++a;return
pe[e].apply(null,He)},G:Te,n:function(){},k:Ae,j:me,W:function(){return
2147483648},i:he,D:function(e,t,r){n().copyWithin(e,t,t+r)},o:function(){return
w?require(\"os\").cpus().length:navigator.hardwareConcurrency},aa:function(e,t,n){Le.length=t,n>>=3;for(var
r=0;r<t;r++)Le[r]=i()[n+r];return(0>e?pe[-e-1]:mt[e]).apply(null,Le)},E:function(e){var
t=n().length;if((e>>>=0)<=t||2147483648<e)return!1;for(var r=1;4>=r;r*=2){var
a=t*(1+.2/r);a=Math.min(a,e+100663296),0<(a=Math.max(e,a))%65536&&(a+=65536-
a%65536);e:{try{S.grow(Math.min(2147483648,a)-Y.byteLength+65535>>>16),Q(S.buffer);var i=1;break
e}catch(e){}i=void 0}if(i)return!0}return!1},ba:function(e,t,n){return
Ve(e)?Xe(e,t,n):Qe(e,t,n)},x:function(){},$:function(e,t,n){return ne+=1,setTimeout((function(){--
ne,function(e){if(!I){try{e()}catch(e){if(e instanceof Gt)return;if(\"unwind\"!==e)throw e&&\"object\"==typeof
e&&e.stack&&M(\"exception thrown: \"+[e,e.stack]),e}if(!re())try{v?Mt(R):zt(R)}catch(e){if(!(e instanceof
Gt))throw e}}}((function(){Z.get(e)(n)}))}),t)},ca:function(e,t){t>>=2;var n=r()[t+6];return
t={alpha:!!r()[t],depth:!!r()[t+1],stencil:!!r()[t+2],antialias:!!r()[t+3],premultipliedAlpha:!!r()[t+4],preserveDrawing
Buffer:!!r()[t+5],powerPreference:Ze[n],failIfMajorPerformanceCaveat:!!r()[t+7],Vb:r()[t+8],yc:r()[t+9],Bb:r()[t+10
```

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],Mb:r()[t+11],Bc:r()[t+12],Cc:r()[t+13]},!(e=Ve(e))||t.Mb?0:function(e,t){e.Cb||(e.Cb=e.getContext,e.getContext=f
unction(t,n){return\"webgl\"==t==(n=e.Cb(t,n))instanceof WebGLRenderingContext?n:null});var
n=e.getContext(\"webgl\",t);return n?function(e,t){var n=ht(8);r()[n+4>>2]=yt();var
a={wc:n,attributes:t,version:t.Vb,ob:e};return e.canvas&&(e.canvas.pb=a),(void
0===t.Bb||t.Bb)&&function(e){if(e||(e=void 0),!e.Qb){e.Qb=!0;var t=e.ob;!function(e){var
t=e.getExtension(\"ANGLE_instanced_arrays\");t&&(e.vertexAttribDivisor=function(e,n){t.vertexAttribDivisorAN
GLE(e,n)},e.drawArraysInstanced=function(e,n,r,a){t.drawArraysInstancedANGLE(e,n,r,a)},e.drawElementsInstan
ced=function(e,n,r,a,i){t.drawElementsInstancedANGLE(e,n,r,a,i)})}(t),function(e){var
t=e.getExtension(\"OES_vertex_array_object\");t&&(e.createVertexArray=function(){return
t.createVertexArrayOES()},e.deleteVertexArray=function(e){t.deleteVertexArrayOES(e)},e.bindVertexArray=funct
ion(e){t.bindVertexArrayOES(e)},e.isVertexArray=function(e){return t.isVertexArrayOES(e)})}(t),function(e){var
t=e.getExtension(\"WEBGL_draw_buffers\");t&&(e.drawBuffers=function(e,n){t.drawBuffersWEBGL(e,n)})}(t),t.
qc=t.getExtension(\"EXT_disjoint_timer_query\"),t.zc=t.getExtension(\"WEBGL_multi_draw\"),(t.getSupportedExt
ensions()||[]).forEach((function(e){e.includes(\"lose_context\")||e.includes(\"debug\")||t.getExtension(e)}))}}(a),n}(n
,t):0}(e,t)},I:et,J:tt,m:nt,H:rt,t:at,B:it,p:ot,R:function(e){var t=Date.now();return
r()[e>>2]=t/1e3|0,r()[e+4>>2]=t%1e3*1e3|0,0},ha:function e(t,n){return t=new
Date(1e3*r()[t>>2]),r()[n>>2]=t.getUTCSeconds(),r()[n+4>>2]=t.getUTCMinutes(),r()[n+8>>2]=t.getUTCHours(),
r()[n+12>>2]=t.getUTCDate(),r()[n+16>>2]=t.getUTCMonth(),r()[n+20>>2]=t.getUTCFullYear()-
1900,r()[n+24>>2]=t.getUTCDay(),r()[n+36>>2]=0,r()[n+32>>2]=0,t=(t.getTime()-
Date.UTC(t.getUTCFullYear(),0,1,0,0,0,0))/864e5|0,r()[n+28>>2]=t,e.Ab||(e.Ab=X(\"GMT\")),r()[n+40>>2]=e.Ab,
n},_:function(){ge.Rb()},r:function(e,t){ut(),e=new
Date(1e3*r()[e>>2]),r()[t>>2]=e.getSeconds(),r()[t+4>>2]=e.getMinutes(),r()[t+8>>2]=e.getHours(),r()[t+12>>2]=e
.getDate(),r()[t+16>>2]=e.getMonth(),r()[t+20>>2]=e.getFullYear()-1900,r()[t+24>>2]=e.getDay();var n=new
Date(e.getFullYear(),0,1),a=(e.getTime()-n.getTime())/864e5|0;return r()[t+28>>2]=a,r()[t+36>>2]=-
60*e.getTimezoneOffset(),a=new
Date(e.getFullYear(),6,1).getTimezoneOffset(),e=0|(a!=(n=n.getTimezoneOffset())&&e.getTimezoneOffset()==Mat
h.min(n,a)),r()[t+32>>2]=e,e=r()[Rt()+(e?4:0)>>2],r()[t+40>>2]=e,t},a:S||o.wasmMemory,y:function(e){ut();var
t=new
Date(r()[e+20>>2]+1900,r()[e+16>>2],r()[e+12>>2],r()[e+8>>2],r()[e+4>>2],r()[e>>2],0),n=r()[e+32>>2],a=t.getT
imezoneOffset(),i=new Date(t.getFullYear(),0,1),o=new
Date(t.getFullYear(),6,1).getTimezoneOffset(),u=i.getTimezoneOffset(),s=Math.min(u,o);return
0>n?r()[e+32>>2]=Number(o!=u&&s==a):0<n!=(s==a)&&(o=Math.max(u,o),t.setTime(t.getTime()+6e4*((0<n?s:o
)-a))),r()[e+24>>2]=t.getDay(),n=(t.getTime()-
i.getTime())/864e5|0,r()[e+28>>2]=n,r()[e>>2]=t.getSeconds(),r()[e+4>>2]=t.getMinutes(),r()[e+8>>2]=t.getHours(
),r()[e+12>>2]=t.getDate(),r()[e+16>>2]=t.getMonth(),t.getTime()/1e3|0},fa:dt,g:function(e,t,n,r){return
dt(e,t,n,r)}};!function(){function
e(e,t){o.asm=e.exports,Z=o.asm.Ca,K.unshift(o.asm.ia),ge.zb.push(o.asm.Ha),C=t,v||(oe--
,o.monitorRunDependencies&&o.monitorRunDependencies(oe),0==oe&&(null!==ue&&(clearInterval(ue),ue=null)
,se&&(e=se,se=null,e())))}function t(t){e(t.instance,t.module)}function n(e){return
function(){if(!E&&(_||y)){if(\"function\"==typeof fetch&&!ie.startsWith(\"file://\"))return
fetch(ie,{credentials:\"same-origin\"}).then((function(e){if(!e.ok)throw\"failed to load wasm binary file at
'\"+ie+\"'\";return e.arrayBuffer()})).catch((function(){return le()}));if(m)return new
Promise((function(e,t){m(ie,(function(t){e(new Uint8Array(t))}),t)}))}return
Promise.resolve().then((function(){return le()}))}().then((function(e){return
WebAssembly.instantiate(e,r)})).then(e,(function(e){M(\"failed to asynchronously prepare wasm: \"+e),ce(e)}))}var
r={a:bt};if(v||(oe++,o.monitorRunDependencies&&o.monitorRunDependencies(oe)),o.instantiateWasm)try{return
o.instantiateWasm(r,e)}catch(e){return M(\"Module.instantiateWasm callback failed with error:
\"+e),!1}(E||\"function\"!=typeof
```

```
WebAssembly.instantiateStreaming||fe()||ie.startsWith(\"file://\")||\"function\"!=typeof
fetch?n(t):fetch(ie,{credentials:\"same-origin\"}).then((function(e){return
WebAssembly.instantiateStreaming(e,r).then(t,(function(e){return M(\"wasm streaming compile failed:
\"+e),M(\"falling back to ArrayBuffer
instantiation\"),n(t)}))}))).catch(s)}(),o.___wasm_call_ctors=function(){return(o.___wasm_call_ctors=o.asm.ia).app
ly(null,arguments)},o._OrtInit=function(){return(o._OrtInit=o.asm.ja).apply(null,arguments)},o._OrtCreateSession
Options=function(){return(o._OrtCreateSessionOptions=o.asm.ka).apply(null,arguments)},o._OrtAddSessionConfig
Entry=function(){return(o._OrtAddSessionConfigEntry=o.asm.la).apply(null,arguments)},o._OrtReleaseSessionOpt
ions=function(){return(o._OrtReleaseSessionOptions=o.asm.ma).apply(null,arguments)},o._OrtCreateSession=funct
ion(){return(o._OrtCreateSession=o.asm.na).apply(null,arguments)},o._OrtReleaseSession=function(){return(o._Ort
ReleaseSession=o.asm.oa).apply(null,arguments)},o._OrtGetInputCount=function(){return(o._OrtGetInputCount=o.
asm.pa).apply(null,arguments)},o._OrtGetOutputCount=function(){return(o._OrtGetOutputCount=o.asm.qa).apply(
null,arguments)},o._OrtGetInputName=function(){return(o._OrtGetInputName=o.asm.ra).apply(null,arguments)},o.
_OrtGetOutputName=function(){return(o._OrtGetOutputName=o.asm.sa).apply(null,arguments)},o._OrtFree=funct
ion(){return(o._OrtFree=o.asm.ta).apply(null,arguments)},o._OrtCreateTensor=function(){return(o._OrtCreateTens
or=o.asm.ua).apply(null,arguments)},o._OrtGetTensorData=function(){return(o._OrtGetTensorData=o.asm.va).appl
y(null,arguments)},o._OrtReleaseTensor=function(){return(o._OrtReleaseTensor=o.asm.wa).apply(null,arguments)
},o._OrtCreateRunOptions=function(){return(o._OrtCreateRunOptions=o.asm.xa).apply(null,arguments)},o._OrtAd
dRunConfigEntry=function(){return(o._OrtAddRunConfigEntry=o.asm.ya).apply(null,arguments)},o._OrtReleaseR
unOptions=function(){return(o._OrtReleaseRunOptions=o.asm.za).apply(null,arguments)},o._OrtRun=function(){re
turn(o._OrtRun=o.asm.Aa).apply(null,arguments)},o._OrtEndProfiling=function(){return(o._OrtEndProfiling=o.as
m.Ba).apply(null,arguments)};var
ht=o._malloc=function(){return(ht=o._malloc=o.asm.Da).apply(null,arguments)},gt=o.___errno_location=function(
){return(gt=o.___errno_location=o.asm.Ea).apply(null,arguments)},_t=o._free=function(){return(_t=o._free=o.asm.
Fa).apply(null,arguments)},yt=o._pthread_self=function(){return(yt=o._pthread_self=o.asm.Ga).apply(null,argumen
ts)};o._emscripten_tls_init=function(){return(o._emscripten_tls_init=o.asm.Ha).apply(null,arguments)},o._emscript
en_current_thread_process_queued_calls=function(){return(o._emscripten_current_thread_process_queued_calls=o.
asm.Ia).apply(null,arguments)};var
wt,vt=o._emscripten_register_main_browser_thread_id=function(){return(vt=o._emscripten_register_main_browser
_thread_id=o.asm.Ja).apply(null,arguments)},At=o._emscripten_main_browser_thread_id=function(){return(At=o._
emscripten_main_browser_thread_id=o.asm.Ka).apply(null,arguments)},Tt=o._emscripten_sync_run_in_main_thre
ad_4=function(){return(Tt=o._emscripten_sync_run_in_main_thread_4=o.asm.La).apply(null,arguments)},Ot=o._e
mscripten_main_thread_process_queued_calls=function(){return(Ot=o._emscripten_main_thread_process_queued_
calls=o.asm.Ma).apply(null,arguments)},kt=o._emscripten_run_in_main_runtime_thread_js=function(){return(kt=o.
_emscripten_run_in_main_runtime_thread_js=o.asm.Na).apply(null,arguments)},Et=o.__emscripten_call_on_threa
d=function(){return(Et=o.__emscripten_call_on_thread=o.asm.Oa).apply(null,arguments)},xt=o._pthread_testcance
l=function(){return(xt=o._pthread_testcancel=o.asm.Pa).apply(null,arguments)},Mt=o._pthread_exit=function(){ret
urn(Mt=o._pthread_exit=o.asm.Qa).apply(null,arguments)},Dt=o.__emscripten_thread_init=function(){return(Dt=o.
__emscripten_thread_init=o.asm.Ra).apply(null,arguments)},St=o._emscripten_get_global_libc=function(){return(S
t=o._emscripten_get_global_libc=o.asm.Sa).apply(null,arguments)},Ct=o.___pthread_tsd_run_dtors=function(){ret
urn(Ct=o.___pthread_tsd_run_dtors=o.asm.Ta).apply(null,arguments)},Rt=o.__get_tzname=function(){return(Rt=o.
__get_tzname=o.asm.Ua).apply(null,arguments)},It=o.__get_daylight=function(){return(It=o.__get_daylight=o.asm
.Va).apply(null,arguments)},Ft=o.__get_timezone=function(){return(Ft=o.__get_timezone=o.asm.Wa).apply(null,ar
guments)},jt=o.stackSave=function(){return(jt=o.stackSave=o.asm.Xa).apply(null,arguments)},Yt=o.stackRestore=f
unction(){return(Yt=o.stackRestore=o.asm.Ya).apply(null,arguments)},Pt=o.stackAlloc=function(){return(Pt=o.stac
kAlloc=o.asm.Za).apply(null,arguments)},Wt=o._emscripten_stack_set_limits=function(){return(Wt=o._emscripten
_stack_set_limits=o.asm._a).apply(null,arguments)},qt=o._memalign=function(){return(qt=o._memalign=o.asm.$a)
.apply(null,arguments)},Ut=o.__emscripten_allow_main_runtime_queued_calls=973296,Bt=o.__emscripten_main_
```

```
thread_futex=977204;function Gt(e){this.name=\"ExitStatus\",this.message=\"Program terminated with
exit(\"+e+\")\",this.status=e}function Ht(){function
e(){if(!wt&&(wt=!0,o.calledRun=!0,!I)&&(v||de(K),u(o),o.onRuntimeInitialized&&o.onRuntimeInitialized(),!v)){if
(o.postRun)for(\"function\"==typeof o.postRun&&(o.postRun=[o.postRun]);o.postRun.length;){var
e=o.postRun.shift();te.unshift(e)}de(te)}}if(!(0<oe))if(v)u(o),v||de(K),postMessage({cmd:\"loaded\"});else{if(!v){if
(o.preRun)for(\"function\"==typeof
o.preRun&&(o.preRun=[o.preRun]);o.preRun.length;)ae();de($)}0<oe||(o.setStatus?(o.setStatus(\"Running...\"),setT
imeout((function(){setTimeout((function(){o.setStatus(\"\")}),1),e()}),1)):e())}}function zt(e){if(R=e,v)throw
postMessage({cmd:\"exitProcess\",returnCode:e}),new Gt(e);re()||(ge.Gb(),v||(de(ee),\"undefined\"!=typeof
_fflush&&_fflush(0),ke[1].length&&Ee(1,10),ke[2].length&&Ee(2,10))),R=e,re()||(ge.Gb(),o.onExit&&o.onExit(e),
I=!0),p(e,new
Gt(e))}if(o.UTF8ToString=z,o.stringToUTF8=N,o.lengthBytesUTF8=V,o.keepRuntimeAlive=re,o.PThread=ge,o.st
ackSave=jt,o.stackRestore=Yt,o.stackAlloc=Pt,o.PThread=ge,o.wasmMemory=S,o.ExitStatus=Gt,se=function
e(){wt||Ht(),wt||(se=e)},o.run=Ht,o.preInit)for(\"function\"==typeof
o.preInit&&(o.preInit=[o.preInit]);0<o.preInit.length;)o.preInit.pop()();return
v&&(D=!1,ge.Sb()),Ht(),e.ready});\"object\"==typeof exports&&\"object\"==typeof
module?module.exports=e:\"function\"==typeof define&&define.amd?define([],(function(){return
e})):\"object\"==typeof exports&&(exports.ortWasmThreaded=e);\n","\r\nvar ortWasm = (function() {\r\n  var
_scriptDir = typeof document !== 'undefined' && document.currentScript ? document.currentScript.src :
undefined;\r\n  if (typeof __filename !== 'undefined') _scriptDir = _scriptDir || __filename;\r\n  return
(\r\nfunction(ortWasm) {\r\n  ortWasm = ortWasm || {};\r\n\r\n\r\nvar c;c||(c=typeof ortWasm !== 'undefined' ?
ortWasm : {});var aa,g;c.ready=new Promise(function(a,b){aa=a;g=b});var r={},t;for(t in
c)c.hasOwnProperty(t)&&(r[t]=c[t]);var v=\"./this.program\",ba=\"object\"===typeof
window,w=\"function\"===typeof importScripts,ca=\"object\"===typeof process&&\"object\"===typeof
process.versions&&\"string\"===typeof
process.versions.node,x=\"\",y,z,B,C,D;\r\nif(ca)x=w?require(\"path\").dirname(x)+\"/\":__dirname+\"/\",y=function
(a,b){C||(C=require(\"fs\"));D||(D=require(\"path\"));a=D.normalize(a);return
C.readFileSync(a,b?null:\"utf8\")},B=function(a){a=y(a,!0);a.buffer||(a=new Uint8Array(a));a.buffer||E(\"Assertion
failed: undefined\");return
a},z=function(a,b,e){C||(C=require(\"fs\"));D||(D=require(\"path\"));a=D.normalize(a);C.readFile(a,function(f,h){f?e
(f):b(h.buffer)})},1<process.argv.length&&(v=process.argv[1].replace(/\\\\/g,\"/\")),process.argv.slice(2),process.on(
\"uncaughtException\",\r\nfunction(a){throw
a;}),process.on(\"unhandledRejection\",E),c.inspect=function(){return\"[Emscripten Module object]\"};else
if(ba||w)w?x=self.location.href:\"undefined\"!==typeof
document&&document.currentScript&&(x=document.currentScript.src),_scriptDir&&(x=_scriptDir),0!==x.indexO
f(\"blob:\")?x=x.substr(0,x.lastIndexOf(\"/\")+1):x=\"\",y=function(a){var b=new
XMLHttpRequest;b.open(\"GET\",a,!1);b.send(null);return b.responseText},w&&(B=function(a){var b=new
XMLHttpRequest;b.open(\"GET\",a,!1);b.responseType=\"arraybuffer\";\r\nb.send(null);return new
Uint8Array(b.response)}),z=function(a,b,e){var f=new
XMLHttpRequest;f.open(\"GET\",a,!0);f.responseType=\"arraybuffer\";f.onload=function(){200==f.status||0==f.stat
us&&f.response?b(f.response):e()};f.onerror=e;f.send(null)};var
da=c.print||console.log.bind(console),F=c.printErr||console.warn.bind(console);for(t in
r)r.hasOwnProperty(t)&&(c[t]=r[t]);r=null;c.thisProgram&&(v=c.thisProgram);var
H;c.wasmBinary&&(H=c.wasmBinary);var noExitRuntime=c.noExitRuntime||!1;\r\n\"object\"!==typeof
WebAssembly&&E(\"no native wasm support detected\");var I,ea=!1,fa=\"undefined\"!==typeof TextDecoder?new
TextDecoder(\"utf8\"):void 0;\r\nfunction ha(a,b,e){var f=b+e;for(e=b;a[e]&&!(e>=f);)++e;if(16<e-
b&&a.subarray&&fa)return fa.decode(a.subarray(b,e));for(f=\"\";b<e;){var h=a[b++];if(h&128){var
k=a[b++]&63;if(192==(h&224))f+=String.fromCharCode((h&31)<<6|k);else{var
```

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l=a[b++]&63;h=224==(h&240)?(h&15)<<12|k<<6|l:(h&7)<<18|k<<12|l<<6|a[b++]&63;65536>h?f+=String.fromC
harCode(h):(h-=65536,f+=String.fromCharCode(55296|h>>10,56320|h&1023))}}else
f+=String.fromCharCode(h)}return f}function J(a,b){return a?ha(K,a,b):\"\"}\r\nfunction L(a,b,e,f){if(!(0<f))return
0;var h=e;f=e+f-1;for(var k=0;k<a.length;++k){var l=a.charCodeAt(k);if(55296<=l&&57343>=l){var
q=a.charCodeAt(++k);l=65536+((l&1023)<<10)|q&1023}if(127>=l){if(e>=f)break;b[e++]=l}else{if(2047>=l){if(e
+1>=f)break;b[e++]=192|l>>6}else{if(65535>=l){if(e+2>=f)break;b[e++]=224|l>>12}else{if(e+3>=f)break;b[e++]
=240|l>>18;b[e++]=128|l>>12&63}b[e++]=128|l>>6&63}b[e++]=128|l&63}}b[e]=0;return e-h}\r\nfunction
ia(a){for(var b=0,e=0;e<a.length;++e){var
f=a.charCodeAt(e);55296<=f&&57343>=f&&(f=65536+((f&1023)<<10)|a.charCodeAt(++e)&1023);127>=f?++b:
b=2047>=f?b+2:65535>=f?b+3:b+4}return b}function ja(a){var b=ia(a)+1,e=ka(b);e&&L(a,M,e,b);return e}var
la,M,K,N;\r\nfunction ma(){var a=I.buffer;la=a;c.HEAP8=M=new Int8Array(a);c.HEAP16=new
Int16Array(a);c.HEAP32=N=new Int32Array(a);c.HEAPU8=K=new Uint8Array(a);c.HEAPU16=new
Uint16Array(a);c.HEAPU32=new Uint32Array(a);c.HEAPF32=new Float32Array(a);c.HEAPF64=new
Float64Array(a)}var na,oa=[],pa=[],qa=[],ra=[];function sa(){var a=c.preRun.shift();oa.unshift(a)}var
O=0,ta=null,P=null;c.preloadedImages={};c.preloadedAudios={};\r\nfunction
E(a){if(c.onAbort)c.onAbort(a);F(a);ea=!0;a=new WebAssembly.RuntimeError(\"abort(\"+a+\"). Build with -s
ASSERTIONS=1 for more info.\");g(a);throw a;}function ua(){return Q.startsWith(\"data:application/octet-
stream;base64,\")}var Q;Q=\"ort-wasm.wasm\";if(!ua()){var va=Q;Q=c.locateFile?c.locateFile(va,x):x+va}function
wa(){var a=Q;try{if(a==Q&&H)return new Uint8Array(H);if(B)return B(a);throw\"both async and sync fetching of
the wasm failed\";}catch(b){E(b)}}\r\nfunction xa(){if(!H&&(ba||w)){if(\"function\"===typeof
fetch&&!Q.startsWith(\"file://\"))return fetch(Q,{credentials:\"same-
origin\"}).then(function(a){if(!a.ok)throw\"failed to load wasm binary file at '\"+Q+\"'\";return
a.arrayBuffer()}).catch(function(){return wa()});if(z)return new Promise(function(a,b){z(Q,function(e){a(new
Uint8Array(e))},b)})}return Promise.resolve().then(function(){return wa()})}\r\nfunction
ya(a){for(;0<a.length;){var b=a.shift();if(\"function\"==typeof b)b(c);else{var e=b.Ea;\"number\"===typeof e?void
0===b.xa?na.get(e)():na.get(e)(b.xa):e(void 0===b.xa?null:b.xa)}}}function za(a){this.ya=a-
16;this.Na=function(b){N[this.ya+4>>2]=b};this.Ka=function(b){N[this.ya+8>>2]=b};this.La=function(){N[this.ya
>>2]=0};this.Ja=function(){M[this.ya+12>>0]=0};this.Ma=function(){M[this.ya+13>>0]=0};this.Ga=function(b,e)
{this.Na(b);this.Ka(e);this.La();this.Ja();this.Ma()}}\r\nvar Aa=0,Ba={},Ca=[null,[],[]],R={},S;S=ca?function(){var
a=process.hrtime();return 1E3*a[0]+a[1]/1E6}:function(){return performance.now()};var Da={};function
Ea(){if(!Fa){var
a={USER:\"web_user\",LOGNAME:\"web_user\",PATH:\"/\",PWD:\"/\",HOME:\"/home/web_user\",LANG:(\"obj
ect\"===typeof navigator&&navigator.languages&&navigator.languages[0]||\"C\").replace(\"-\",\"_\")+\".UTF-
8\",_:v||\"./this.program\"},b;for(b in Da)void 0===Da[b]?delete a[b]:a[b]=Da[b];var e=[];for(b in
a)e.push(b+\"=\"+a[b]);Fa=e}return Fa}var Fa;\r\nfunction T(a,b){a=new
Date(1E3*N[a>>2]);N[b>>2]=a.getUTCSeconds();N[b+4>>2]=a.getUTCMinutes();N[b+8>>2]=a.getUTCHours();
N[b+12>>2]=a.getUTCDate();N[b+16>>2]=a.getUTCMonth();N[b+20>>2]=a.getUTCFullYear()-
1900;N[b+24>>2]=a.getUTCDay();N[b+36>>2]=0;N[b+32>>2]=0;N[b+28>>2]=(a.getTime()-
Date.UTC(a.getUTCFullYear(),0,1,0,0,0,0))/864E5|0;T.Da||(T.Da=ja(\"GMT\"));N[b+40>>2]=T.Da;return
b}\r\nfunction Ga(){function a(l){return(l=l.toTimeString().match(/\\(([A-Za-z
]+)\\)$/))?l[1]:\"GMT\"}if(!Ka){Ka=!0;var b=(new Date).getFullYear(),e=new Date(b,0,1),f=new
Date(b,6,1);b=e.getTimezoneOffset();var
h=f.getTimezoneOffset(),k=Math.max(b,h);N[La()>>2]=60*k;N[Ma()>>2]=Number(b!=h);e=a(e);f=a(f);e=ja(e);f=j
a(f);h<b?(N[U()>>2]=e,N[U()+4>>2]=f):(N[U()>>2]=f,N[U()+4>>2]=e)}}var Ka;function V(a){return
0===a%4&&(0!==a%100||0===a%400)}function Na(a,b){for(var e=0,f=0;f<=b;e+=a[f++]);return e}\r\nvar
W=[31,29,31,30,31,30,31,31,30,31,30,31],X=[31,28,31,30,31,30,31,31,30,31,30,31];function Y(a,b){for(a=new
Date(a.getTime());0<b;){var e=a.getMonth(),f=(V(a.getFullYear())?W:X)[e];if(b>f-a.getDate())b-=f-
a.getDate()+1,a.setDate(1),11>e?a.setMonth(e+1):(a.setMonth(0),a.setFullYear(a.getFullYear()+1));else{a.setDate(
```

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a.getDate()+b);break}}return a}\r\nfunction Oa(a,b,e,f){function h(d,m,n){for(d=\"number\"===typeof
d?d.toString():d||\"\";d.length<m;)d=n[0]+d;return d}function k(d,m){return h(d,m,\"0\")}function l(d,m){function
n(Ha){return 0>Ha?-1:0<Ha?1:0}var A;0===(A=n(d.getFullYear()-m.getFullYear()))&&0===(A=n(d.getMonth()-
m.getMonth()))&&(A=n(d.getDate()-m.getDate()));return A}function q(d){switch(d.getDay()){case 0:return new
Date(d.getFullYear()-1,11,29);case 1:return d;case 2:return new Date(d.getFullYear(),0,3);case 3:return new
Date(d.getFullYear(),\r\n0,2);case 4:return new Date(d.getFullYear(),0,1);case 5:return new Date(d.getFullYear()-
1,11,31);case 6:return new Date(d.getFullYear()-1,11,30)}}function G(d){d=Y(new Date(d.va+1900,0,1),d.Ca);var
m=new Date(d.getFullYear()+1,0,4),n=q(new Date(d.getFullYear(),0,4));m=q(m);return
0>=l(n,d)?0>=l(m,d)?d.getFullYear()+1:d.getFullYear():d.getFullYear()-1}var
u=N[f+40>>2];f={Qa:N[f>>2],Pa:N[f+4>>2],Aa:N[f+8>>2],za:N[f+12>>2],wa:N[f+16>>2],va:N[f+20>>2],Ba:N[
f+24>>2],Ca:N[f+28>>2],Ya:N[f+32>>2],Oa:N[f+\r\n36>>2],Ra:u?J(u):\"\"};e=J(e);u={\"%c\":\"%a %b %d
%H:%M:%S %Y\",\"%D\":\"%m/%d/%y\",\"%F\":\"%Y-%m-%d\",\"%h\":\"%b\",\"%r\":\"%I:%M:%S
%p\",\"%R\":\"%H:%M\",\"%T\":\"%H:%M:%S\",\"%x\":\"%m/%d/%y\",\"%X\":\"%H:%M:%S\",\"%Ec\":\"%c\",\
"%EC\":\"%C\",\"%Ex\":\"%m/%d/%y\",\"%EX\":\"%H:%M:%S\",\"%Ey\":\"%y\",\"%EY\":\"%Y\",\"%Od\":\"%d
\",\"%Oe\":\"%e\",\"%OH\":\"%H\",\"%OI\":\"%I\",\"%Om\":\"%m\",\"%OM\":\"%M\",\"%OS\":\"%S\",\"%Ou\":\"
%u\",\"%OU\":\"%U\",\"%OV\":\"%V\",\"%Ow\":\"%w\",\"%OW\":\"%W\",\"%Oy\":\"%y\"};for(var p in
u)e=e.replace(new RegExp(p,\"g\"),u[p]);var Ia=\"Sunday Monday Tuesday Wednesday Thursday Friday
Saturday\".split(\" \"),\r\nJa=\"January February March April May June July August September October November
December\".split(\" \");u={\"%a\":function(d){return Ia[d.Ba].substring(0,3)},\"%A\":function(d){return
Ia[d.Ba]},\"%b\":function(d){return Ja[d.wa].substring(0,3)},\"%B\":function(d){return
Ja[d.wa]},\"%C\":function(d){return k((d.va+1900)/100|0,2)},\"%d\":function(d){return
k(d.za,2)},\"%e\":function(d){return h(d.za,2,\" \")},\"%g\":function(d){return
G(d).toString().substring(2)},\"%G\":function(d){return G(d)},\"%H\":function(d){return
k(d.Aa,\r\n2)},\"%I\":function(d){d=d.Aa;0==d?d=12:12<d&&(d-=12);return k(d,2)},\"%j\":function(d){return
k(d.za+Na(V(d.va+1900)?W:X,d.wa-1),3)},\"%m\":function(d){return k(d.wa+1,2)},\"%M\":function(d){return
k(d.Pa,2)},\"%n\":function(){return\"\\n\"},\"%p\":function(d){return
0<=d.Aa&&12>d.Aa?\"AM\":\"PM\"},\"%S\":function(d){return
k(d.Qa,2)},\"%t\":function(){return\"\\t\"},\"%u\":function(d){return d.Ba||7},\"%U\":function(d){var m=new
Date(d.va+1900,0,1),n=0===m.getDay()?m:Y(m,7-m.getDay());d=new Date(d.va+1900,d.wa,d.za);return
0>\r\nl(n,d)?k(Math.ceil((31-n.getDate()+(Na(V(d.getFullYear())?W:X,d.getMonth()-1)-
31)+d.getDate())/7),2):0===l(n,m)?\"01\":\"00\"},\"%V\":function(d){var m=new Date(d.va+1901,0,4),n=q(new
Date(d.va+1900,0,4));m=q(m);var A=Y(new Date(d.va+1900,0,1),d.Ca);return
0>l(A,n)?\"53\":0>=l(m,A)?\"01\":k(Math.ceil((n.getFullYear()<d.va+1900?d.Ca+32-n.getDate():d.Ca+1-
n.getDate())/7),2)},\"%w\":function(d){return d.Ba},\"%W\":function(d){var m=new
Date(d.va,0,1),n=1===m.getDay()?m:Y(m,0===m.getDay()?1:7-m.getDay()+1);d=new
Date(d.va+\r\n1900,d.wa,d.za);return 0>l(n,d)?k(Math.ceil((31-
n.getDate()+(Na(V(d.getFullYear())?W:X,d.getMonth()-1)-
31)+d.getDate())/7),2):0===l(n,m)?\"01\":\"00\"},\"%y\":function(d){return(d.va+1900).toString().substring(2)},\"
%Y\":function(d){return d.va+1900},\"%z\":function(d){d=d.Oa;var m=0<=d;d=Math.abs(d)/60;return(m?\"+\":\"-
\")+String(\"0000\"+(d/60*100+d%60)).slice(-4)},\"%Z\":function(d){return
d.Ra},\"%%\":function(){return\"%\"}};for(p in u)e.includes(p)&&(e=e.replace(new
RegExp(p,\"g\"),u[p](f)));p=Pa(e);if(p.length>b)return 0;\r\nM.set(p,a);return p.length-1}function Pa(a){var
b=Array(ia(a)+1);L(a,b,0,b.length);return b}\r\nvar Ta={a:function(a){return
ka(a+16)+16},c:function(a,b){qa.unshift({Ea:a,xa:b})},d:function(a,b){qa.unshift({Ea:a,xa:b})},b:function(a,b,e){(
new za(a)).Ga(b,e);Aa++;throw a;},D:function(a,b){a=J(a);return R.Sa(a,b)},m:function(){return
0},I:function(){},L:function(){},o:function(){return 42},x:function(){return
0},H:function(){},G:function(a,b){a=J(a);return
R.Ta(a,b)},K:function(a,b,e,f,h,k){k<<=12;if(0!==(f&16)&&0!==a%65536)b=-28;else
```

```
if(0!==(f&32)){a=65536*Math.ceil(b/65536);var
l=Qa(65536,a);\r\nl?(K.fill(0,l,l+a),a=l):a=0;a?(Ba[a]={Ia:a,Ha:b,Fa:!0,fd:h,Xa:e,flags:f,offset:k},b=a):b=-48}else
b=-52;return b},J:function(a,b){var e=Ba[a];0!==b&&e?(b===e.Ha&&(Ba[a]=null,e.Fa&&Ra(e.Ia)),a=0):a=-
28;return a},j:function(){},C:function(a,b,e){a=J(a);return
R.Ua(a,b,e)},E:function(){},r:function(){},F:function(){},h:function(){E()},p:function(a,b){if(0===a)a=Date.now();
else if(1===a||4===a)a=S();else return N[Sa()>>2]=28,-1;N[b>>2]=a/1E3|0;N[b+4>>2]=a%1E3*1E6|0;return
0},s:function(a,b){return a-\r\nb},P:function(){E(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},g:function(){E(\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},Q:function(){E(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},O:function(){E(\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},\r\nM:function(){return
2147483648},v:function(a,b,e){K.copyWithin(a,b,b+e)},i:function(a){var
b=K.length;a>>>=0;if(2147483648<a)return!1;for(var e=1;4>=e;e*=2){var
f=b*(1+.2/e);f=Math.min(f,a+100663296);f=Math.max(a,f);0<f%65536&&(f+=65536-
f%65536);a:{try{I.grow(Math.min(2147483648,f)-la.byteLength+65535>>>16);ma();var h=1;break
a}catch(k){}h=void 0}if(h)return!0}return!1},B:function(a){for(var b=S();S()-b<a;);},z:function(a,b){var
e=0;Ea().forEach(function(f,h){var
k=b+e;h=N[a+4*h>>2]=k;for(k=0;k<f.length;++k)M[h++>>\r\n0]=f.charCodeAt(k);M[h>>0]=0;e+=f.length+1});re
turn 0},A:function(a,b){var e=Ea();N[a>>2]=e.length;var
f=0;e.forEach(function(h){f+=h.length+1});N[b>>2]=f;return 0},f:function(){return
0},y:function(a,b){a=1==a||2==a?2:E();M[b>>0]=a;return
0},n:function(a,b,e,f){a=R.Wa(a);b=R.Va(a,b,e);N[f>>2]=b;return 0},u:function(){},q:function(a,b,e,f){for(var
h=0,k=0;k<e;k++){for(var l=N[b+8*k>>2],q=N[b+(8*k+4)>>2],G=0;G<q;G++){var
u=K[l+G],p=Ca[a];0===u||10===u?((1===a?da:F)(ha(p,0)),p.length=0):p.push(u)}h+=\r\nq}N[f>>2]=h;return
0},w:function(a){var b=Date.now();N[a>>2]=b/1E3|0;N[a+4>>2]=b%1E3*1E3|0;return
0},t:T,l:function(a,b){Ga();a=new
Date(1E3*N[a>>2]);N[b>>2]=a.getSeconds();N[b+4>>2]=a.getMinutes();N[b+8>>2]=a.getHours();N[b+12>>2]=a.
getDate();N[b+16>>2]=a.getMonth();N[b+20>>2]=a.getFullYear()-1900;N[b+24>>2]=a.getDay();var e=new
Date(a.getFullYear(),0,1);N[b+28>>2]=(a.getTime()-e.getTime())/864E5|0;N[b+36>>2]=-
(60*a.getTimezoneOffset());var f=(new
Date(a.getFullYear(),6,1)).getTimezoneOffset();e=\r\ne.getTimezoneOffset();a=(f!=e&&a.getTimezoneOffset()==
Math.min(e,f))|0;N[b+32>>2]=a;a=N[U()+(a?4:0)>>2];N[b+40>>2]=a;return b},k:function(a){Ga();var b=new
Date(N[a+20>>2]+1900,N[a+16>>2],N[a+12>>2],N[a+8>>2],N[a+4>>2],N[a>>2],0),e=N[a+32>>2],f=b.getTimez
oneOffset(),h=new Date(b.getFullYear(),0,1),k=(new
Date(b.getFullYear(),6,1)).getTimezoneOffset(),l=h.getTimezoneOffset(),q=Math.min(l,k);0>e?N[a+32>>2]=Numb
er(k!=l&&q==f):0<e!=(q==f)&&(k=Math.max(l,k),b.setTime(b.getTime()+6E4*((0<e?q:k)-
f)));N[a+\r\n24>>2]=b.getDay();N[a+28>>2]=(b.getTime()-
h.getTime())/864E5|0;N[a>>2]=b.getSeconds();N[a+4>>2]=b.getMinutes();N[a+8>>2]=b.getHours();N[a+12>>2]=
b.getDate();N[a+16>>2]=b.getMonth();return b.getTime()/1E3|0},N:Oa,e:function(a,b,e,f){return
Oa(a,b,e,f)}};\r\n(function(){function a(h){c.asm=h.exports;I=c.asm.R;ma();na=c.asm.ua;pa.unshift(c.asm.S);O--
;c.monitorRunDependencies&&c.monitorRunDependencies(O);0==O&&(null!==ta&&(clearInterval(ta),ta=null),P
&&(h=P,P=null,h()))}function b(h){a(h.instance)}function e(h){return xa().then(function(k){return
WebAssembly.instantiate(k,f)}).then(h,function(k){F(\"failed to asynchronously prepare wasm: \"+k);E(k)})}var
f={a:Ta};O++;c.monitorRunDependencies&&c.monitorRunDependencies(O);if(c.instantiateWasm)try{return
c.instantiateWasm(f,\r\na)}catch(h){return F(\"Module.instantiateWasm callback failed with error:
\"+h),!1}(function(){return H||\"function\"!==typeof
```

```
WebAssembly.instantiateStreaming||ua()||Q.startsWith(\"file://\")||\"function\"!==typeof
fetch?e(b):fetch(Q,{credentials:\"same-origin\"}).then(function(h){return
WebAssembly.instantiateStreaming(h,f).then(b,function(k){F(\"wasm streaming compile failed: \"+k);F(\"falling
back to ArrayBuffer instantiation\");return
e(b)})})})().catch(g);return{}})();\r\nc.___wasm_call_ctors=function(){return(c.___wasm_call_ctors=c.asm.S).appl
y(null,arguments)};c._OrtInit=function(){return(c._OrtInit=c.asm.T).apply(null,arguments)};c._OrtCreateSessionO
ptions=function(){return(c._OrtCreateSessionOptions=c.asm.U).apply(null,arguments)};c._OrtAddSessionConfigE
ntry=function(){return(c._OrtAddSessionConfigEntry=c.asm.V).apply(null,arguments)};c._OrtReleaseSessionOptio
ns=function(){return(c._OrtReleaseSessionOptions=c.asm.W).apply(null,arguments)};\r\nc._OrtCreateSession=func
tion(){return(c._OrtCreateSession=c.asm.X).apply(null,arguments)};c._OrtReleaseSession=function(){return(c._Ort
ReleaseSession=c.asm.Y).apply(null,arguments)};c._OrtGetInputCount=function(){return(c._OrtGetInputCount=c.a
sm.Z).apply(null,arguments)};c._OrtGetOutputCount=function(){return(c._OrtGetOutputCount=c.asm._).apply(null
,arguments)};c._OrtGetInputName=function(){return(c._OrtGetInputName=c.asm.$).apply(null,arguments)};\r\nc._
OrtGetOutputName=function(){return(c._OrtGetOutputName=c.asm.aa).apply(null,arguments)};c._OrtFree=functio
n(){return(c._OrtFree=c.asm.ba).apply(null,arguments)};c._OrtCreateTensor=function(){return(c._OrtCreateTensor
=c.asm.ca).apply(null,arguments)};c._OrtGetTensorData=function(){return(c._OrtGetTensorData=c.asm.da).apply(
null,arguments)};c._OrtReleaseTensor=function(){return(c._OrtReleaseTensor=c.asm.ea).apply(null,arguments)};\r\
nc._OrtCreateRunOptions=function(){return(c._OrtCreateRunOptions=c.asm.fa).apply(null,arguments)};c._OrtAdd
RunConfigEntry=function(){return(c._OrtAddRunConfigEntry=c.asm.ga).apply(null,arguments)};c._OrtReleaseRu
nOptions=function(){return(c._OrtReleaseRunOptions=c.asm.ha).apply(null,arguments)};c._OrtRun=function(){ret
urn(c._OrtRun=c.asm.ia).apply(null,arguments)};c._OrtEndProfiling=function(){return(c._OrtEndProfiling=c.asm.j
a).apply(null,arguments)};\r\nvar
ka=c._malloc=function(){return(ka=c._malloc=c.asm.ka).apply(null,arguments)},Sa=c.___errno_location=function(
){return(Sa=c.___errno_location=c.asm.la).apply(null,arguments)},Ra=c._free=function(){return(Ra=c._free=c.asm
.ma).apply(null,arguments)},U=c.__get_tzname=function(){return(U=c.__get_tzname=c.asm.na).apply(null,argume
nts)},Ma=c.__get_daylight=function(){return(Ma=c.__get_daylight=c.asm.oa).apply(null,arguments)},La=c.__get_t
imezone=function(){return(La=c.__get_timezone=c.asm.pa).apply(null,\r\narguments)},Ua=c.stackSave=function()
{return(Ua=c.stackSave=c.asm.qa).apply(null,arguments)},Va=c.stackRestore=function(){return(Va=c.stackRestore
=c.asm.ra).apply(null,arguments)},Wa=c.stackAlloc=function(){return(Wa=c.stackAlloc=c.asm.sa).apply(null,argu
ments)},Qa=c._memalign=function(){return(Qa=c._memalign=c.asm.ta).apply(null,arguments)};c.UTF8ToString=J
;c.stringToUTF8=function(a,b,e){return
L(a,K,b,e)};c.lengthBytesUTF8=ia;c.stackSave=Ua;c.stackRestore=Va;c.stackAlloc=Wa;var Z;\r\nP=function
Xa(){Z||Ya();Z||(P=Xa)};\r\nfunction Ya(){function
a(){if(!Z&&(Z=!0,c.calledRun=!0,!ea)){ya(pa);aa(c);if(c.onRuntimeInitialized)c.onRuntimeInitialized();if(c.postRu
n)for(\"function\"==typeof c.postRun&&(c.postRun=[c.postRun]);c.postRun.length;){var
b=c.postRun.shift();ra.unshift(b)}ya(ra)}}if(!(0<O)){if(c.preRun)for(\"function\"==typeof
c.preRun&&(c.preRun=[c.preRun]);c.preRun.length;)sa();ya(oa);0<O||(c.setStatus?(c.setStatus(\"Running...\"),setTi
meout(function(){setTimeout(function(){c.setStatus(\"\")},1);a()},1)):a())}}c.run=Ya;\r\nif(c.preInit)for(\"function\"
==typeof c.preInit&&(c.preInit=[c.preInit]);0<c.preInit.length;)c.preInit.pop()();Ya();\r\n\r\n\r\n  return
ortWasm.ready\r\n}\r\n);\r\n})();\r\nif (typeof exports === 'object' && typeof module === 'object')\r\n
module.exports = ortWasm;\r\nelse if (typeof define === 'function' && define['amd'])\r\n  define([], function() {
return ortWasm; });\r\nelse if (typeof exports === 'object')\r\n  exports[\"ortWasm\"] = ortWasm;\r\n","\"use
strict\";\r\nmodule.exports = asPromise;\r\n\r\n/**\r\n * Callback as used by {@link util.asPromise}.\r\n * @typedef
asPromiseCallback\r\n * @type {function}\r\n * @param {Error|null} error Error, if any\r\n * @param {...*}
params Additional arguments\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n * Returns a promise from a node-style
callback function.\r\n * @memberof util\r\n * @param {asPromiseCallback} fn Function to call\r\n * @param {*}
ctx Function context\r\n * @param {...*} params Function arguments\r\n * @returns {Promise<*>} Promisified
function\r\n */\r\nfunction asPromise(fn, ctx/*, varargs */) {\r\n    var params  = new Array(arguments.length -
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1),\r\n offset = 0,\r\n index = 2,\r\n pending = true;\r\n while (index < arguments.length)\r\n params[offset++] = arguments[index++];\r\n return new Promise(function executor(resolve, reject) {\r\n params[offset] = function callback(err/*, varargs */) {\r\n if (pending) {\r\n pending = false;\r\n if (err)\r\n reject(err);\r\n else {\r\n var params = new Array(arguments.length - 1),\r\n offset = 0;\r\n while (offset < params.length)\r\n params[offset++] = arguments[offset];\r\n resolve.apply(null, params);\r\n }\r\n }\r\n };\r\n try {\r\n fn.apply(ctx || null, params);\r\n } catch (err) {\r\n if (pending) {\r\n pending = false;\r\n reject(err);\r\n }\r\n }\r\n });\r\n}\r\n","\"use strict\";\r\n\r\n/**\r\n * A minimal base64 implementation for number arrays.\r\n * @memberof util\r\n * @namespace\r\n */\r\nvar base64 = exports;\r\n\r\n/**\r\n * Calculates the byte length of a base64 encoded string.\r\n * @param {string} string Base64 encoded string\r\n * @returns {number} Byte length\r\n */\r\nbase64.length = function length(string) {\r\n var p = string.length;\r\n if (!p)\r\n return 0;\r\n var n = 0;\r\n while (--p % 4 > 1 && string.charAt(p) === \"=\")\r\n ++n;\r\n return Math.ceil(string.length * 3) / 4 - n;\r\n};\r\n\r\n// Base64 encoding table\r\nvar b64 = new Array(64);\r\n\r\n// Base64 decoding table\r\nvar s64 = new Array(123);\r\n\r\n// 65..90, 97..122, 48..57, 43, 47\r\nfor (var i = 0; i < 64;)\r\n s64[b64[i] = i < 26 ? i + 65 : i < 52 ? i + 71 : i < 62 ? i - 4 : i - 59 | 43] = i++;\r\n\r\n/**\r\n * Encodes a buffer to a base64 encoded string.\r\n * @param {Uint8Array} buffer Source buffer\r\n * @param {number} start Source start\r\n * @param {number} end Source end\r\n * @returns {string} Base64 encoded string\r\n */\r\nbase64.encode = function encode(buffer, start, end) {\r\n var parts = null,\r\n chunk = [];\r\n var i = 0, // output index\r\n j = 0, // goto index\r\n t; // temporary\r\n while (start < end) {\r\n var b = buffer[start++];\r\n switch (j) {\r\n case 0:\r\n chunk[i++] = b64[b >> 2];\r\n t = (b & 3) << 4;\r\n j = 1;\r\n break;\r\n case 1:\r\n chunk[i++] = b64[t | b >> 4];\r\n t = (b & 15) << 2;\r\n j = 2;\r\n break;\r\n case 2:\r\n chunk[i++] = b64[t | b >> 6];\r\n chunk[i++] = b64[b & 63];\r\n j = 0;\r\n break;\r\n }\r\n if (i > 8191) {\r\n (parts || (parts = [])).push(String.fromCharCode.apply(String, chunk));\r\n i = 0;\r\n }\r\n }\r\n if (j) {\r\n chunk[i++] = b64[t];\r\n chunk[i++] = 61;\r\n if (j === 1)\r\n chunk[i++] = 61;\r\n }\r\n if (parts) {\r\n if (i)\r\n parts.push(String.fromCharCode.apply(String, chunk.slice(0, i)));\r\n return parts.join(\"\");\r\n }\r\n return String.fromCharCode.apply(String, chunk.slice(0, i));\r\n};\r\n\r\nvar invalidEncoding = \"invalid encoding\";\r\n\r\n/**\r\n * Decodes a base64 encoded string to a buffer.\r\n * @param {string} string Source string\r\n * @param {Uint8Array} buffer Destination buffer\r\n * @param {number} offset Destination offset\r\n * @returns {number} Number of bytes written\r\n * @throws {Error} If encoding is invalid\r\n */\r\nbase64.decode = function decode(string, buffer, offset) {\r\n var start = offset;\r\n var j = 0, // goto index\r\n t; // temporary\r\n for (var i = 0; i < string.length;) {\r\n var c = string.charCodeAt(i++);\r\n if (c === 61 && j > 1)\r\n break;\r\n if ((c = s64[c]) === undefined)\r\n throw Error(invalidEncoding);\r\n switch (j) {\r\n case 0:\r\n t = c;\r\n j = 1;\r\n break;\r\n case 1:\r\n buffer[offset++] = t << 2 | (c & 48) >> 4;\r\n t = c;\r\n j = 2;\r\n break;\r\n case 2:\r\n buffer[offset++] = (t & 15) << 4 | (c & 60) >> 2;\r\n t = c;\r\n j = 3;\r\n break;\r\n case 3:\r\n buffer[offset++] = (t & 3) << 6 | c;\r\n j = 0;\r\n break;\r\n }\r\n }\r\n if (j === 1)\r\n throw Error(invalidEncoding);\r\n return offset - start;\r\n};\r\n\r\n/**\r\n * Tests if the specified string appears to be base64 encoded.\r\n * @param {string} string String to test\r\n * @returns {boolean} `true` if probably base64 encoded, otherwise false\r\n */\r\nbase64.test = function test(string) {\r\n return /^(?:[A-Za-z0-9+/]{4})*(?:[A-Za-z0-9+/]{2}==|[A-Za-z0-9+/]{3}=)?$/.test(string);\r\n};\r\n","\"use strict\";\r\nmodule.exports = EventEmitter;\r\n\r\n/**\r\n * Constructs a new event emitter instance.\r\n * @classdesc A minimal event emitter.\r\n * @memberof util\r\n * @constructor\r\n */\r\nfunction EventEmitter() {\r\n\r\n /**\r\n * Registered listeners.\r\n * @type {Object.<string,*>}\r\n * @private\r\n */\r\n this._listeners = {};\r\n}\r\n\r\n/**\r\n * Registers an event listener.\r\n * @param {string} evt Event name\r\n * @param {function} fn Listener\r\n * @param {*} [ctx] Listener context\r\n * @returns {util.EventEmitter} `this`\r\n */\r\nEventEmitter.prototype.on = function on(evt, fn, ctx) {\r\n (this._listeners[evt] || (this._listeners[evt] = [])).push({\r\n fn : fn,\r\n ctx :

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ctx || this\r\n    });\r\n    return this;\r\n};\r\n\r\n/**\r\n * Removes an event listener or any matching listeners if
arguments are omitted.\r\n * @param {string} [evt] Event name. Removes all listeners if omitted.\r\n * @param
{function} [fn] Listener to remove. Removes all listeners of `evt` if omitted.\r\n * @returns {util.EventEmitter}
`this`\r\n */\r\nEventEmitter.prototype.off = function off(evt, fn) {\r\n    if (evt === undefined)\r\n        this._listeners
= {};\r\n    else {\r\n        if (fn === undefined)\r\n            this._listeners[evt] = [];\r\n        else {\r\n            var
listeners = this._listeners[evt];\r\n            for (var i = 0; i < listeners.length;)\r\n                if (listeners[i].fn ===
fn)\r\n                    listeners.splice(i, 1);\r\n                else\r\n                    ++i;\r\n        }\r\n    }\r\n    return
this;\r\n};\r\n\r\n/**\r\n * Emits an event by calling its listeners with the specified arguments.\r\n * @param {string}
evt Event name\r\n * @param {...*} args Arguments\r\n * @returns {util.EventEmitter} `this`\r\n
*/\r\nEventEmitter.prototype.emit = function emit(evt) {\r\n    var listeners = this._listeners[evt];\r\n    if (listeners)
{\r\n        var args = [],\r\n            i = 1;\r\n        for (; i < arguments.length;)\r\n
args.push(arguments[i++]);\r\n        for (i = 0; i < listeners.length;)\r\n            listeners[i].fn.apply(listeners[i++].ctx,
args);\r\n    }\r\n    return this;\r\n};\r\n","\"use strict\";\r\n\r\nmodule.exports = factory(factory);\r\n\r\n/**\r\n *
Reads / writes floats / doubles from / to buffers.\r\n * @name util.float\r\n * @namespace\r\n */\r\n\r\n/**\r\n *
Writes a 32 bit float to a buffer using little endian byte order.\r\n * @name util.float.writeFloatLE\r\n *
@function\r\n * @param {number} val Value to write\r\n * @param {Uint8Array} buf Target buffer\r\n * @param
{number} pos Target buffer offset\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n * Writes a 32 bit float to a buffer
using big endian byte order.\r\n * @name util.float.writeFloatBE\r\n * @function\r\n * @param {number} val
Value to write\r\n * @param {Uint8Array} buf Target buffer\r\n * @param {number} pos Target buffer offset\r\n *
@returns {undefined}\r\n */\r\n\r\n/**\r\n * Reads a 32 bit float from a buffer using little endian byte order.\r\n *
@name util.float.readFloatLE\r\n * @function\r\n * @param {Uint8Array} buf Source buffer\r\n * @param
{number} pos Source buffer offset\r\n * @returns {number} Value read\r\n */\r\n\r\n/**\r\n * Reads a 32 bit float
from a buffer using big endian byte order.\r\n * @name util.float.readFloatBE\r\n * @function\r\n * @param
{Uint8Array} buf Source buffer\r\n * @param {number} pos Source buffer offset\r\n * @returns {number} Value
read\r\n */\r\n\r\n/**\r\n * Writes a 64 bit double to a buffer using little endian byte order.\r\n * @name
util.float.writeDoubleLE\r\n * @function\r\n * @param {number} val Value to write\r\n * @param {Uint8Array}
buf Target buffer\r\n * @param {number} pos Target buffer offset\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n *
Writes a 64 bit double to a buffer using big endian byte order.\r\n * @name util.float.writeDoubleBE\r\n *
@function\r\n * @param {number} val Value to write\r\n * @param {Uint8Array} buf Target buffer\r\n * @param
{number} pos Target buffer offset\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n * Reads a 64 bit double from a
buffer using little endian byte order.\r\n * @name util.float.readDoubleLE\r\n * @function\r\n * @param
{Uint8Array} buf Source buffer\r\n * @param {number} pos Source buffer offset\r\n * @returns {number} Value
read\r\n */\r\n\r\n/**\r\n * Reads a 64 bit double from a buffer using big endian byte order.\r\n * @name
util.float.readDoubleBE\r\n * @function\r\n * @param {Uint8Array} buf Source buffer\r\n * @param {number}
pos Source buffer offset\r\n * @returns {number} Value read\r\n */\r\n\r\n// Factory function for the purpose of
node-based testing in modified global environments\r\nfunction factory(exports) {\r\n\r\n    // float: typed array\r\n
if (typeof Float32Array !== \"undefined\") (function() {\r\n\r\n        var f32 = new Float32Array([ -0 ]),\r\n
f8b = new Uint8Array(f32.buffer),\r\n            le  = f8b[3] === 128;\r\n\r\n        function writeFloat_f32_cpy(val, buf,
pos) {\r\n            f32[0] = val;\r\n            buf[pos    ] = f8b[0];\r\n            buf[pos + 1] = f8b[1];\r\n            buf[pos +
2] = f8b[2];\r\n            buf[pos + 3] = f8b[3];\r\n        }\r\n\r\n        function writeFloat_f32_rev(val, buf, pos) {\r\n
    f32[0] = val;\r\n            buf[pos    ] = f8b[3];\r\n            buf[pos + 1] = f8b[2];\r\n            buf[pos + 2] = f8b[1];\r\n
        buf[pos + 3] = f8b[0];\r\n        }\r\n\r\n        /* istanbul ignore next */\r\n        exports.writeFloatLE = le ?
writeFloat_f32_cpy : writeFloat_f32_rev;\r\n        /* istanbul ignore next */\r\n        exports.writeFloatBE = le ?
writeFloat_f32_rev : writeFloat_f32_cpy;\r\n\r\n        function readFloat_f32_cpy(buf, pos) {\r\n            f8b[0] =
buf[pos    ];\r\n            f8b[1] = buf[pos + 1];\r\n            f8b[2] = buf[pos + 2];\r\n            f8b[3] = buf[pos + 3];\r\n
      return f32[0];\r\n        }\r\n\r\n        function readFloat_f32_rev(buf, pos) {\r\n            f8b[3] = buf[pos    ];\r\n
   f8b[2] = buf[pos + 1];\r\n            f8b[1] = buf[pos + 2];\r\n            f8b[0] = buf[pos + 3];\r\n            return
f32[0];\r\n        }\r\n\r\n        /* istanbul ignore next */\r\n        exports.readFloatLE = le ? readFloat_f32_cpy :
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readFloat_f32_rev;\r\n        /* istanbul ignore next */\r\n        exports.readFloatBE = le ? readFloat_f32_rev :
readFloat_f32_cpy;\r\n\r\n    // float: ieee754\r\n    })(); else (function() {\r\n\r\n        function
writeFloat_ieee754(writeUint, val, buf, pos) {\r\n            var sign = val < 0 ? 1 : 0;\r\n            if (sign)\r\n
val = -val;\r\n            if (val === 0)\r\n                writeUint(1 / val > 0 ? /* positive */ 0 : /* negative 0 */
2147483648, buf, pos);\r\n            else if (isNaN(val))\r\n                writeUint(2143289344, buf, pos);\r\n            else
if (val > 3.4028234663852886e+38) // +-Infinity\r\n                writeUint((sign << 31 | 2139095040) >>> 0, buf,
pos);\r\n            else if (val < 1.1754943508222875e-38) // denormal\r\n                writeUint((sign << 31 |
Math.round(val / 1.401298464324817e-45)) >>> 0, buf, pos);\r\n            else {\r\n                var exponent =
Math.floor(Math.log(val) / Math.LN2),\r\n                    mantissa = Math.round(val * Math.pow(2, -exponent) *
8388608) & 8388607;\r\n                writeUint((sign << 31 | exponent + 127 << 23 | mantissa) >>> 0, buf, pos);\r\n
      }\r\n        }\r\n\r\n        exports.writeFloatLE = writeFloat_ieee754.bind(null, writeUintLE);\r\n
exports.writeFloatBE = writeFloat_ieee754.bind(null, writeUintBE);\r\n\r\n        function
readFloat_ieee754(readUint, buf, pos) {\r\n            var uint = readUint(buf, pos),\r\n                sign = (uint >> 31) * 2
+ 1,\r\n                exponent = uint >>> 23 & 255,\r\n                mantissa = uint & 8388607;\r\n            return exponent
=== 255\r\n                ? mantissa\r\n                ? NaN\r\n                : sign * Infinity\r\n                : exponent === 0 //
denormal\r\n                ? sign * 1.401298464324817e-45 * mantissa\r\n                : sign * Math.pow(2, exponent -
150) * (mantissa + 8388608);\r\n        }\r\n\r\n        exports.readFloatLE = readFloat_ieee754.bind(null,
readUintLE);\r\n        exports.readFloatBE = readFloat_ieee754.bind(null, readUintBE);\r\n\r\n    })();\r\n\r\n    //
double: typed array\r\n    if (typeof Float64Array !== \"undefined\") (function() {\r\n\r\n        var f64 = new
Float64Array([-0]),\r\n            f8b = new Uint8Array(f64.buffer),\r\n            le  = f8b[7] === 128;\r\n\r\n
function writeDouble_f64_cpy(val, buf, pos) {\r\n            f64[0] = val;\r\n            buf[pos    ] = f8b[0];\r\n
buf[pos + 1] = f8b[1];\r\n            buf[pos + 2] = f8b[2];\r\n            buf[pos + 3] = f8b[3];\r\n            buf[pos + 4] =
f8b[4];\r\n            buf[pos + 5] = f8b[5];\r\n            buf[pos + 6] = f8b[6];\r\n            buf[pos + 7] = f8b[7];\r\n
}\r\n\r\n        function writeDouble_f64_rev(val, buf, pos) {\r\n            f64[0] = val;\r\n            buf[pos    ] =
f8b[7];\r\n            buf[pos + 1] = f8b[6];\r\n            buf[pos + 2] = f8b[5];\r\n            buf[pos + 3] = f8b[4];\r\n
buf[pos + 4] = f8b[3];\r\n            buf[pos + 5] = f8b[2];\r\n            buf[pos + 6] = f8b[1];\r\n            buf[pos + 7] =
f8b[0];\r\n        }\r\n\r\n        /* istanbul ignore next */\r\n        exports.writeDoubleLE = le ? writeDouble_f64_cpy :
writeDouble_f64_rev;\r\n        /* istanbul ignore next */\r\n        exports.writeDoubleBE = le ? writeDouble_f64_rev
: writeDouble_f64_cpy;\r\n\r\n        function readDouble_f64_cpy(buf, pos) {\r\n            f8b[0] = buf[pos    ];\r\n
  f8b[1] = buf[pos + 1];\r\n            f8b[2] = buf[pos + 2];\r\n            f8b[3] = buf[pos + 3];\r\n            f8b[4] =
buf[pos + 4];\r\n            f8b[5] = buf[pos + 5];\r\n            f8b[6] = buf[pos + 6];\r\n            f8b[7] = buf[pos + 7];\r\n
     return f64[0];\r\n        }\r\n\r\n        function readDouble_f64_rev(buf, pos) {\r\n            f8b[7] = buf[pos    ];\r\n
      f8b[6] = buf[pos + 1];\r\n            f8b[5] = buf[pos + 2];\r\n            f8b[4] = buf[pos + 3];\r\n            f8b[3] =
buf[pos + 4];\r\n            f8b[2] = buf[pos + 5];\r\n            f8b[1] = buf[pos + 6];\r\n            f8b[0] = buf[pos + 7];\r\n
     return f64[0];\r\n        }\r\n\r\n        /* istanbul ignore next */\r\n        exports.readDoubleLE = le ?
readDouble_f64_cpy : readDouble_f64_rev;\r\n        /* istanbul ignore next */\r\n        exports.readDoubleBE = le ?
readDouble_f64_rev : readDouble_f64_cpy;\r\n\r\n    // double: ieee754\r\n    })(); else (function() {\r\n\r\n
function writeDouble_ieee754(writeUint, off0, off1, val, buf, pos) {\r\n            var sign = val < 0 ? 1 : 0;\r\n            if
(sign)\r\n                val = -val;\r\n            if (val === 0) {\r\n                writeUint(0, buf, pos + off0);\r\n
writeUint(1 / val > 0 ? /* positive */ 0 : /* negative 0 */ 2147483648, buf, pos + off1);\r\n            } else if
(isNaN(val)) {\r\n                writeUint(0, buf, pos + off0);\r\n                writeUint(2146959360, buf, pos + off1);\r\n
     } else if (val > 1.7976931348623157e+308) { // +-Infinity\r\n                writeUint(0, buf, pos + off0);\r\n
 writeUint((sign << 31 | 2146435072) >>> 0, buf, pos + off1);\r\n            } else {\r\n                var mantissa;\r\n
    if (val < 2.2250738585072014e-308) { // denormal\r\n                    mantissa = val / 5e-324;\r\n
writeUint(mantissa >>> 0, buf, pos + off0);\r\n                    writeUint((sign << 31 | mantissa / 4294967296) >>> 0,
buf, pos + off1);\r\n                } else {\r\n                    var exponent = Math.floor(Math.log(val) / Math.LN2);\r\n
        if (exponent === 1024)\r\n                        exponent = 1023;\r\n                    mantissa = val * Math.pow(2, -
exponent);\r\n                    writeUint(mantissa * 4503599627370496 >>> 0, buf, pos + off0);\r\n
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writeUint((sign << 31 | exponent + 1023 << 20 | mantissa * 1048576 & 1048575) >>> 0, buf, pos + off1);\r\n }\r\n }\r\n }\r\n\r\n exports.writeDoubleLE = writeDouble_ieee754.bind(null, writeUintLE, 0, 4);\r\n exports.writeDoubleBE = writeDouble_ieee754.bind(null, writeUintBE, 4, 0);\r\n\r\n function readDouble_ieee754(readUint, off0, off1, buf, pos) {\r\n var lo = readUint(buf, pos + off0),\r\n hi = readUint(buf, pos + off1);\r\n var sign = (hi >> 31) * 2 + 1,\r\n exponent = hi >>> 20 & 2047,\r\n mantissa = 4294967296 * (hi & 1048575) + lo;\r\n return exponent === 2047\r\n ? mantissa\r\n ? NaN\r\n : sign * Infinity\r\n : exponent === 0 // denormal\r\n ? sign * 5e-324 * mantissa\r\n : sign * Math.pow(2, exponent - 1075) * (mantissa + 4503599627370496);\r\n }\r\n\r\n exports.readDoubleLE = readDouble_ieee754.bind(null, readUintLE, 0, 4);\r\n exports.readDoubleBE = readDouble_ieee754.bind(null, readUintBE, 4, 0);\r\n\r\n })();\r\n\r\n return exports;\r\n}\r\n\r\n// uint helpers\r\n\r\nfunction writeUintLE(val, buf, pos) {\r\n buf[pos] = val & 255;\r\n buf[pos + 1] = val >>> 8 & 255;\r\n buf[pos + 2] = val >>> 16 & 255;\r\n buf[pos + 3] = val >>> 24;\r\n}\r\n\r\nfunction writeUintBE(val, buf, pos) {\r\n buf[pos] = val >>> 24;\r\n buf[pos + 1] = val >>> 16 & 255;\r\n buf[pos + 2] = val >>> 8 & 255;\r\n buf[pos + 3] = val & 255;\r\n}\r\n\r\nfunction readUintLE(buf, pos) {\r\n return (buf[pos]\r\n | buf[pos + 1] << 8\r\n | buf[pos + 2] << 16\r\n | buf[pos + 3] << 24) >>> 0;\r\n}\r\n\r\nfunction readUintBE(buf, pos) {\r\n return (buf[pos] << 24\r\n | buf[pos + 1] << 16\r\n | buf[pos + 2] << 8\r\n | buf[pos + 3]) >>> 0;\r\n}\r\n","\"use strict\";\r\nmodule.exports = inquire;\r\n\r\n/**\r\n * Requires a module only if available.\r\n * @memberof util\r\n * @param {string} moduleName Module to require\r\n * @returns {?Object} Required module if available and not empty, otherwise `null`\r\n */\r\nfunction inquire(moduleName) {\r\n try {\r\n var mod = eval(\"quire\".replace(/^/,\"re\"))(moduleName); // eslint-disable-line no-eval\r\n if (mod && (mod.length || Object.keys(mod).length))\r\n return mod;\r\n } catch (e) {} // eslint-disable-line no-empty\r\n return null;\r\n}\r\n","\"use strict\";\r\nmodule.exports = pool;\r\n\r\n/**\r\n * An allocator as used by {@link util.pool}.\r\n * @typedef PoolAllocator\r\n * @type {function}\r\n * @param {number} size Buffer size\r\n * @returns {Uint8Array} Buffer\r\n */\r\n\r\n/**\r\n * A slicer as used by {@link util.pool}.\r\n * @typedef PoolSlicer\r\n * @type {function}\r\n * @param {number} start Start offset\r\n * @param {number} end End offset\r\n * @returns {Uint8Array} Buffer slice\r\n * @this {Uint8Array}\r\n */\r\n\r\n/**\r\n * A general purpose buffer pool.\r\n * @memberof util\r\n * @function\r\n * @param {PoolAllocator} alloc Allocator\r\n * @param {PoolSlicer} slice Slicer\r\n * @param {number} [size=8192] Slab size\r\n * @returns {PoolAllocator} Pooled allocator\r\n */\r\nfunction pool(alloc, slice, size) {\r\n var SIZE = size || 8192;\r\n var MAX = SIZE >>> 1;\r\n var slab = null;\r\n var offset = SIZE;\r\n return function pool_alloc(size) {\r\n if (size < 1 || size > MAX)\r\n return alloc(size);\r\n if (offset + size > SIZE) {\r\n slab = alloc(SIZE);\r\n offset = 0;\r\n }\r\n var buf = slice.call(slab, offset, offset += size);\r\n if (offset & 7) // align to 32 bit\r\n offset = (offset | 7) + 1;\r\n return buf;\r\n };\r\n}\r\n","\"use strict\";\r\n\r\n/**\r\n * A minimal UTF8 implementation for number arrays.\r\n * @memberof util\r\n * @namespace\r\n */\r\nvar utf8 = exports;\r\n\r\n/**\r\n * Calculates the UTF8 byte length of a string.\r\n * @param {string} string String\r\n * @returns {number} Byte length\r\n */\r\nutf8.length = function utf8_length(string) {\r\n var len = 0,\r\n c = 0;\r\n for (var i = 0; i < string.length; ++i) {\r\n c = string.charCodeAt(i);\r\n if (c < 128)\r\n len += 1;\r\n else if (c < 2048)\r\n len += 2;\r\n else if ((c & 0xFC00) === 0xD800 && (string.charCodeAt(i + 1) & 0xFC00) === 0xDC00) {\r\n ++i;\r\n len += 4;\r\n } else\r\n len += 3;\r\n }\r\n return len;\r\n};\r\n\r\n/**\r\n * Reads UTF8 bytes as a string.\r\n * @param {Uint8Array} buffer Source buffer\r\n * @param {number} start Source start\r\n * @param {number} end Source end\r\n * @returns {string} String read\r\n */\r\nutf8.read = function utf8_read(buffer, start, end) {\r\n var len = end - start;\r\n if (len < 1)\r\n return \"\";\r\n var parts = null,\r\n chunk = [],\r\n i = 0, // char offset\r\n t; // temporary\r\n while (start < end) {\r\n t = buffer[start++];\r\n if (t < 128)\r\n chunk[i++] = t;\r\n else if (t > 191 && t < 224)\r\n chunk[i++] = (t & 31) << 6 | buffer[start++] & 63;\r\n else if (t > 239 && t < 365) {\r\n t = ((t & 7) << 18 | (buffer[start++] & 63) << 12 | (buffer[start++] & 63) << 6 | buffer[start++] & 63) - 0x10000;\r\n chunk[i++] = 0xD800 + (t >> 10);\r\n chunk[i++] = 0xDC00 + (t & 1023);\r\n } else\r\n

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chunk[i++] = (t & 15) << 12 | (buffer[start++] & 63) << 6 | buffer[start++] & 63;\r\n        if (i > 8191) {\r\n
(parts || (parts = [])).push(String.fromCharCode.apply(String, chunk));\r\n            i = 0;\r\n        }\r\n    }\r\n    if
(parts) {\r\n        if (i)\r\n            parts.push(String.fromCharCode.apply(String, chunk.slice(0, i)));\r\n        return
parts.join(\"\");\r\n    }\r\n    return String.fromCharCode.apply(String, chunk.slice(0, i));\r\n};\r\n\r\n/**\r\n * Writes
a string as UTF8 bytes.\r\n * @param {string} string Source string\r\n * @param {Uint8Array} buffer Destination
buffer\r\n * @param {number} offset Destination offset\r\n * @returns {number} Bytes written\r\n */\r\nutf8.write
= function utf8_write(string, buffer, offset) {\r\n    var start = offset,\r\n        c1, // character 1\r\n        c2; // character
2\r\n    for (var i = 0; i < string.length; ++i) {\r\n        c1 = string.charCodeAt(i);\r\n        if (c1 < 128) {\r\n
buffer[offset++] = c1;\r\n        } else if (c1 < 2048) {\r\n            buffer[offset++] = c1 >> 6       | 192;\r\n
buffer[offset++] = c1       & 63 | 128;\r\n        } else if ((c1 & 0xFC00) === 0xD800 && ((c2 = string.charCodeAt(i
+ 1)) & 0xFC00) === 0xDC00) {\r\n            c1 = 0x10000 + ((c1 & 0x03FF) << 10) + (c2 & 0x03FF);\r\n
++i;\r\n            buffer[offset++] = c1 >> 18      | 240;\r\n            buffer[offset++] = c1 >> 12 & 63 | 128;\r\n
buffer[offset++] = c1 >> 6  & 63 | 128;\r\n            buffer[offset++] = c1       & 63 | 128;\r\n        } else {\r\n
buffer[offset++] = c1 >> 12      | 224;\r\n            buffer[offset++] = c1 >> 6  & 63 | 128;\r\n            buffer[offset++] =
c1       & 63 | 128;\r\n        }\r\n    }\r\n    return offset - start;\r\n};\r\n","/// @file\n/// @addtogroup
flatbuffers_javascript_api\n/// @{\n/// @cond FLATBUFFERS_INTERNAL\n\n/**\n * @fileoverview\n *\n *
Need to suppress 'global this' error so the Node.js export line doesn't cause\n * closure compile to error out.\n *
@suppress {globalThis}\n */\n\n/**\n * @const\n * @namespace\n */\nvar flatbuffers = {};\n\n/**\n * @typedef
{number}\n */\nflatbuffers.Offset;\n\n/**\n * @typedef {{\n *   bb: flatbuffers.ByteBuffer,\n *   bb_pos: number\n *
}}\n */\nflatbuffers.Table;\n\n/**\n * @type {number}\n * @const\n */\nflatbuffers.SIZEOF_SHORT = 2;\n\n/**\n
* @type {number}\n * @const\n */\nflatbuffers.SIZEOF_INT = 4;\n\n/**\n * @type {number}\n * @const\n
*/\nflatbuffers.FILE_IDENTIFIER_LENGTH = 4;\n\n/**\n * @type {number}\n * @const\n
*/\nflatbuffers.SIZE_PREFIX_LENGTH = 4;\n\n/**\n * @enum {number}\n */\nflatbuffers.Encoding = {\n
UTF8_BYTES: 1,\n  UTF16_STRING: 2\n};\n\n/**\n * @type {Int32Array}\n * @const\n */\nflatbuffers.int32 =
new Int32Array(2);\n\n/**\n * @type {Float32Array}\n * @const\n */\nflatbuffers.float32 = new
Float32Array(flatbuffers.int32.buffer);\n\n/**\n * @type {Float64Array}\n * @const\n */\nflatbuffers.float64 = new
Float64Array(flatbuffers.int32.buffer);\n\n/**\n * @type {boolean}\n * @const\n */\nflatbuffers.isLittleEndian =
new Uint16Array(new Uint8Array([1, 0]).buffer)[0] ===
1;\n\n////////////////////////////////////////////////////////////////////////////////\n\n/**\n * @constructor\n * @param {number} low\n
* @param {number} high\n */\nflatbuffers.Long = function(low, high) {\n  /**\n   * @type {number}\n   *
@const\n   */\n  this.low = low | 0;\n\n  /**\n   * @type {number}\n   * @const\n   */\n  this.high = high |
0;\n};\n\n/**\n * @param {number} low\n * @param {number} high\n * @returns {!flatbuffers.Long}\n
*/\nflatbuffers.Long.create = function(low, high) {\n  // Special-case zero to avoid GC overhead for default values\n
return low == 0 && high == 0 ? flatbuffers.Long.ZERO : new flatbuffers.Long(low, high);\n};\n\n/**\n * @returns
{number}\n */\nflatbuffers.Long.prototype.toFloat64 = function() {\n  return (this.low >>> 0) + this.high *
0x100000000;\n};\n\n/**\n * @param {flatbuffers.Long} other\n * @returns {boolean}\n
*/\nflatbuffers.Long.prototype.equals = function(other) {\n  return this.low == other.low && this.high ==
other.high;\n};\n\n/**\n * @type {!flatbuffers.Long}\n * @const\n */\nflatbuffers.Long.ZERO = new
flatbuffers.Long(0, 0);\n\n/// @endcond\n////////////////////////////////////////////////////////////////////////////////\n/**\n * Create a
FlatBufferBuilder.\n *\n * @constructor\n * @param {number=} opt_initial_size\n */\nflatbuffers.Builder =
function(opt_initial_size) {\n  if (!opt_initial_size) {\n    var initial_size = 1024;\n  } else {\n    var initial_size =
opt_initial_size;\n  }\n\n  /**\n   * @type {flatbuffers.ByteBuffer}\n   * @private\n   */\n  this.bb =
flatbuffers.ByteBuffer.allocate(initial_size);\n\n  /**\n   * Remaining space in the ByteBuffer.\n   *\n   * @type
{number}\n   * @private\n   */\n  this.space = initial_size;\n\n  /**\n   * Minimum alignment encountered so far.\n
*\n   * @type {number}\n   * @private\n   */\n  this.minalign = 1;\n\n  /**\n   * The vtable for the current table.\n
*\n   * @type {Array.<number>}\n   * @private\n   */\n  this.vtable = null;\n\n  /**\n   * The amount of fields we're
actually using.\n   *\n   * @type {number}\n   * @private\n   */\n  this.vtable_in_use = 0;\n\n  /**\n   * Whether we
are currently serializing a table.\n   *\n   * @type {boolean}\n   * @private\n   */\n  this.isNested = false;\n\n  /**\n
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* Starting offset of the current struct/table.\n   *\n   * @type {number}\n   * @private\n   */\n this.object_start = 0;\n\n /**\n   * List of offsets of all vtables.\n   *\n   * @type {Array.<number>}\n   * @private\n   */\n this.vtables = [];\n\n /**\n   * For the current vector being built.\n   *\n   * @type {number}\n   * @private\n   */\n this.vector_num_elems = 0;\n\n /**\n   * False omits default values from the serialized data\n   *\n   * @type {boolean}\n   * @private\n   */\n this.force_defaults = false;\n};\n\nflatbuffers.Builder.prototype.clear = function() {\n this.bb.clear();\n this.space = this.bb.capacity();\n this.minalign = 1;\n this.vtable = null;\n this.vtable_in_use = 0;\n this.isNested = false;\n this.object_start = 0;\n this.vtables = [];\n this.vector_num_elems = 0;\n this.force_defaults = false;\n};\n\n/**\n * In order to save space, fields that are set to their default value\n * don't get serialized into the buffer. Forcing defaults provides a\n * way to manually disable this optimization.\n *\n * @param {boolean} forceDefaults true always serializes default values\n */\nflatbuffers.Builder.prototype.forceDefaults = function(forceDefaults) {\n this.force_defaults = forceDefaults;\n};\n\n/**\n * Get the ByteBuffer representing the FlatBuffer. Only call this after you've\n * called finish(). The actual data starts at the ByteBuffer's current position,\n * not necessarily at 0.\n *\n * @returns {flatbuffers.ByteBuffer}\n */\nflatbuffers.Builder.prototype.dataBuffer = function() {\n return this.bb;\n};\n\n/**\n * Get the bytes representing the FlatBuffer. Only call this after you've\n * called finish().\n *\n * @returns {!Uint8Array}\n */\nflatbuffers.Builder.prototype.asUint8Array = function() {\n return this.bb.bytes().subarray(this.bb.position(), this.bb.position() + this.offset());\n};\n\n/// @cond FLATBUFFERS_INTERNAL\n/**\n * Prepare to write an element of `size` after `additional_bytes` have been\n * written, e.g. if you write a string, you need to align such the int length\n * field is aligned to 4 bytes, and the string data follows it directly. If all\n * you need to do is alignment, `additional_bytes` will be 0.\n *\n * @param {number} size This is the of the new element to write\n * @param {number} additional_bytes The padding size\n */\nflatbuffers.Builder.prototype.prep = function(size, additional_bytes) {\n // Track the biggest thing we've ever aligned to.\n if (size > this.minalign) {\n   this.minalign = size;\n }\n\n // Find the amount of alignment needed such that `size` is properly\n // aligned after `additional_bytes`\n var align_size = ((~(this.bb.capacity() - this.space + additional_bytes)) + 1) & (size - 1);\n\n // Reallocate the buffer if needed.\n while (this.space < align_size + size + additional_bytes) {\n   var old_buf_size = this.bb.capacity();\n   this.bb = flatbuffers.Builder.growByteBuffer(this.bb);\n   this.space += this.bb.capacity() - old_buf_size;\n }\n\n this.pad(align_size);\n};\n\n/**\n * @param {number} byte_size\n */\nflatbuffers.Builder.prototype.pad = function(byte_size) {\n for (var i = 0; i < byte_size; i++) {\n   this.bb.writeInt8(--this.space, 0);\n }\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeInt8 = function(value) {\n this.bb.writeInt8(this.space -= 1, value);\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeInt16 = function(value) {\n this.bb.writeInt16(this.space -= 2, value);\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeInt32 = function(value) {\n this.bb.writeInt32(this.space -= 4, value);\n};\n\n/**\n * @param {flatbuffers.Long} value\n */\nflatbuffers.Builder.prototype.writeInt64 = function(value) {\n this.bb.writeInt64(this.space -= 8, value);\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeFloat32 = function(value) {\n this.bb.writeFloat32(this.space -= 4, value);\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeFloat64 = function(value) {\n this.bb.writeFloat64(this.space -= 8, value);\n};\n/// @endcond\n\n/**\n * Add an `int8` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `int8` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addInt8 = function(value) {\n this.prep(1, 0);\n this.writeInt8(value);\n};\n\n/**\n * Add an `int16` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `int16` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addInt16 = function(value) {\n this.prep(2, 0);\n this.writeInt16(value);\n};\n\n/**\n * Add an `int32` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `int32` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addInt32 = function(value) {\n this.prep(4, 0);\n this.writeInt32(value);\n};\n\n/**\n * Add an `int64` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {flatbuffers.Long} value The `int64` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addInt64 = function(value) {\n this.prep(8, 0);\n

this.writeInt64(value);\n};\n\n/**\n * Add a `float32` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `float32` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addFloat32 = function(value) {\n this.prep(4, 0);\n this.writeFloat32(value);\n};\n\n/**\n * Add a `float64` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `float64` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addFloat64 = function(value) {\n this.prep(8, 0);\n this.writeFloat64(value);\n};\n\n/// @cond FLATBUFFERS_INTERNAL\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt8 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n this.addInt8(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt16 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addInt16(value);\n this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt32 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addInt32(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {flatbuffers.Long} value\n * @param {flatbuffers.Long} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt64 = function(voffset, value, defaultValue) {\n if (this.force_defaults || !value.equals(defaultValue)) {\n   this.addInt64(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldFloat32 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addFloat32(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldFloat64 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addFloat64(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {flatbuffers.Offset} value\n * @param {flatbuffers.Offset} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldOffset = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addOffset(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * Structs are stored inline, so nothing additional is being added. `d` is always 0.\n *\n * @param {number} voffset\n * @param {flatbuffers.Offset} value\n * @param {flatbuffers.Offset} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldStruct = function(voffset, value, defaultValue) {\n if (value != defaultValue) {\n   this.nested(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * Structures are always stored inline, they need to be created right\n * where they're used. You'll get this assertion failure if you\n * created it elsewhere.\n *\n * @param {flatbuffers.Offset} obj The offset of the created object\n */\nflatbuffers.Builder.prototype.nested = function(obj) {\n if (obj != this.offset()) {\n   throw new Error('FlatBuffers: struct must be serialized inline.');\n }\n};\n\n/**\n * Should not be creating any other object, string or vector\n * while an object is being constructed\n */\nflatbuffers.Builder.prototype.notNested = function() {\n if (this.isNested) {\n   throw new Error('FlatBuffers: object serialization must not be nested.');\n }\n};\n\n/**\n * Set the current vtable at `voffset` to the current location in the buffer.\n *\n * @param {number} voffset\n */\nflatbuffers.Builder.prototype.slot = function(voffset) {\n this.vtable[voffset] = this.offset();\n};\n\n/**\n * @returns {flatbuffers.Offset} Offset relative to the end of the buffer.\n */\nflatbuffers.Builder.prototype.offset = function() {\n return this.bb.capacity() - this.space;\n};\n\n/**\n * Doubles the size of the backing ByteBuffer and copies the old data towards\n * the end of the new buffer (since we build the buffer backwards).\n *\n * @param {flatbuffers.ByteBuffer} bb The current buffer with the existing data\n * @returns {!flatbuffers.ByteBuffer} A new byte buffer with the old data copied\n * to it. The data is located at the end of the buffer.\n *\n * uint8Array.set() formally takes {Array<number>|ArrayBufferView}, so to pass\n * it a uint8Array we need to suppress the type check:\n * @suppress {checkTypes}\n */\nflatbuffers.Builder.growByteBuffer = function(bb) {\n var old_buf_size = bb.capacity();\n\n // Ensure we don't grow beyond what fits in an int.\n if (old_buf_size & 0xC0000000) {\n throw new Error('FlatBuffers: cannot grow buffer beyond 2 gigabytes.');\n }\n\n var new_buf_size = old_buf_size

<< 1;\n var nbb = flatbuffers.ByteBuffer.allocate(new_buf_size);\n nbb.setPosition(new_buf_size - old_buf_size);\n nbb.bytes().set(bb.bytes(), new_buf_size - old_buf_size);\n return nbb;\n};\n/// @endcond\n\n/**\n * Adds on offset, relative to where it will be written.\n *\n * @param {flatbuffers.Offset} offset The offset to add.\n */\nflatbuffers.Builder.prototype.addOffset = function(offset) {\n this.prep(flatbuffers.SIZEOF_INT, 0); // Ensure alignment is already done.\n this.writeInt32(this.offset() - offset + flatbuffers.SIZEOF_INT);\n};\n\n/// @cond FLATBUFFERS_INTERNAL\n/**\n * Start encoding a new object in the buffer. Users will not usually need to\n * call this directly. The FlatBuffers compiler will generate helper methods\n * that call this method internally.\n *\n * @param {number} numfields\n */\nflatbuffers.Builder.prototype.startObject = function(numfields) {\n this.notNested();\n if (this.vtable == null) {\n   this.vtable = [];\n }\n this.vtable_in_use = numfields;\n for (var i = 0; i < numfields; i++) {\n   this.vtable[i] = 0; // This will push additional elements as needed\n }\n this.isNested = true;\n this.object_start = this.offset();\n};\n\n/**\n * Finish off writing the object that is under construction.\n *\n * @returns {flatbuffers.Offset} The offset to the object inside `dataBuffer`\n */\nflatbuffers.Builder.prototype.endObject = function() {\n if (this.vtable == null || !this.isNested) {\n   throw new Error('FlatBuffers: endObject called without startObject');\n }\n\n this.addInt32(0);\n var vtableloc = this.offset();\n\n // Trim trailing zeroes.\n var i = this.vtable_in_use - 1;\n for (; i >= 0 && this.vtable[i] == 0; i--) {}\n var trimmed_size = i + 1;\n\n // Write out the current vtable.\n for (; i >= 0; i--) {\n   // Offset relative to the start of the table.\n   this.addInt16(this.vtable[i] != 0 ? vtableloc - this.vtable[i] : 0);\n }\n\n var standard_fields = 2; // The fields below:\n this.addInt16(vtableloc - this.object_start);\n var len = (trimmed_size + standard_fields) * flatbuffers.SIZEOF_SHORT;\n this.addInt16(len);\n\n // Search for an existing vtable that matches the current one.\n var existing_vtable = 0;\n var vt1 = this.space;\nouter_loop:\n for (i = 0; i < this.vtables.length; i++) {\n   var vt2 = this.bb.capacity() - this.vtables[i];\n   if (len == this.bb.readInt16(vt2)) {\n   for (var j = flatbuffers.SIZEOF_SHORT; j < len; j += flatbuffers.SIZEOF_SHORT) {\n   if (this.bb.readInt16(vt1 + j) != this.bb.readInt16(vt2 + j)) {\n   continue outer_loop;\n   }\n   }\n   existing_vtable = this.vtables[i];\n   break;\n   }\n }\n\n if (existing_vtable) {\n   // Found a match:\n   // Remove the current vtable.\n   this.space = this.bb.capacity() - vtableloc;\n\n   // Point table to existing vtable.\n   this.bb.writeInt32(this.space, existing_vtable - vtableloc);\n } else {\n   // No match:\n   // Add the location of the current vtable to the list of vtables.\n   this.vtables.push(this.offset());\n\n   // Point table to current vtable.\n   this.bb.writeInt32(this.bb.capacity() - vtableloc, this.offset() - vtableloc);\n }\n\n this.isNested = false;\n return vtableloc;\n};\n/// @endcond\n\n/**\n * Finalize a buffer, poiting to the given `root_table`.\n *\n * @param {flatbuffers.Offset} root_table\n * @param {string=} opt_file_identifier\n * @param {boolean=} opt_size_prefix\n */\nflatbuffers.Builder.prototype.finish = function(root_table, opt_file_identifier, opt_size_prefix) {\n var size_prefix = opt_size_prefix ? flatbuffers.SIZE_PREFIX_LENGTH : 0;\n if (opt_file_identifier) {\n   var file_identifier = opt_file_identifier;\n   this.prep(this.minalign, flatbuffers.SIZEOF_INT +\n   flatbuffers.FILE_IDENTIFIER_LENGTH + size_prefix);\n   if (file_identifier.length != flatbuffers.FILE_IDENTIFIER_LENGTH) {\n   throw new Error('FlatBuffers: file identifier must be length ' +\n   flatbuffers.FILE_IDENTIFIER_LENGTH);\n   }\n   for (var i = flatbuffers.FILE_IDENTIFIER_LENGTH - 1; i >= 0; i--) {\n   this.writeInt8(file_identifier.charCodeAt(i));\n   }\n }\n this.prep(this.minalign, flatbuffers.SIZEOF_INT + size_prefix);\n this.addOffset(root_table);\n if (size_prefix) {\n   this.addInt32(this.bb.capacity() - this.space);\n }\n this.bb.setPosition(this.space);\n};\n\n/**\n * Finalize a size prefixed buffer, pointing to the given `root_table`.\n *\n * @param {flatbuffers.Offset} root_table\n * @param {string=} opt_file_identifier\n */\nflatbuffers.Builder.prototype.finishSizePrefixed = function (root_table, opt_file_identifier) {\n this.finish(root_table, opt_file_identifier, true);\n};\n\n/// @cond FLATBUFFERS_INTERNAL\n/**\n * This checks a required field has been set in a given table that has\n * just been constructed.\n *\n * @param {flatbuffers.Offset} table\n * @param {number} field\n */\nflatbuffers.Builder.prototype.requiredField = function(table, field) {\n var table_start = this.bb.capacity() - table;\n var vtable_start = table_start - this.bb.readInt32(table_start);\n var ok = this.bb.readInt16(vtable_start + field) != 0;\n\n // If this fails, the caller will show what field needs to be set.\n if (!ok) {\n   throw new Error('FlatBuffers: field ' + field + ' must be set');\n }\n};\n\n/**\n * Start a new array/vector of objects. Users

usually will not call\n * this directly. The FlatBuffers compiler will create a start/end\n * method for vector types in generated code.\n *\n * @param {number} elem_size The size of each element in the array\n * @param {number} num_elems The number of elements in the array\n * @param {number} alignment The alignment of the array\n */\nflatbuffers.Builder.prototype.startVector = function(elem_size, num_elems, alignment) {\n this.notNested();\n this.vector_num_elems = num_elems;\n this.prep(flatbuffers.SIZEOF_INT, elem_size * num_elems);\n this.prep(alignment, elem_size * num_elems); // Just in case alignment > int.\n};\n\n/**\n * Finish off the creation of an array and all its elements. The array must be\n * created with `startVector`.\n *\n * @returns {flatbuffers.Offset} The offset at which the newly created array\n * starts.\n */\nflatbuffers.Builder.prototype.endVector = function() {\n this.writeInt32(this.vector_num_elems);\n return this.offset();\n};\n/// @endcond\n\n/**\n * Encode the string `s` in the buffer using UTF-8. If a Uint8Array is passed\n * instead of a string, it is assumed to contain valid UTF-8 encoded data.\n *\n * @param {string|Uint8Array} s The string to encode\n * @return {flatbuffers.Offset} The offset in the buffer where the encoded string starts\n */\nflatbuffers.Builder.prototype.createString = function(s) {\n if (s instanceof Uint8Array) {\n   var utf8 = s;\n } else {\n   var utf8 = [];\n   var i = 0;\n\n   while (i < s.length) {\n   var codePoint;\n\n   // Decode UTF-16\n   var a = s.charCodeAt(i++);\n   if (a < 0xD800 || a >= 0xDC00) {\n   codePoint = a;\n   } else {\n   var b = s.charCodeAt(i++);\n   codePoint = (a << 10) + b + (0x10000 - (0xD800 << 10) - 0xDC00);\n   }\n\n   // Encode UTF-8\n   if (codePoint < 0x80) {\n   utf8.push(codePoint);\n   } else {\n   if (codePoint < 0x800) {\n   utf8.push(((codePoint >> 6) & 0x1F) | 0xC0);\n   } else {\n   if (codePoint < 0x10000) {\n   utf8.push(((codePoint >> 12) & 0x0F) | 0xE0);\n   } else {\n   utf8.push(\n   ((codePoint >> 18) & 0x07) | 0xF0,\n   ((codePoint >> 12) & 0x3F) | 0x80);\n   }\n   utf8.push(((codePoint >> 6) & 0x3F) | 0x80);\n   }\n   utf8.push((codePoint & 0x3F) | 0x80);\n   }\n   }\n }\n\n this.addInt8(0);\n this.startVector(1, utf8.length, 1);\n this.bb.setPosition(this.space -= utf8.length);\n for (var i = 0, offset = this.space, bytes = this.bb.bytes(); i < utf8.length; i++) {\n   bytes[offset++] = utf8[i];\n }\n return this.endVector();\n};\n\n/**\n * A helper function to avoid generated code depending on this file directly.\n *\n * @param {number} low\n * @param {number} high\n * @returns {!flatbuffers.Long}\n */\nflatbuffers.Builder.prototype.createLong = function(low, high) {\n return flatbuffers.Long.create(low, high);\n};\n//\n/// @cond FLATBUFFERS_INTERNAL\n/**\n * Create a new ByteBuffer with a given array of bytes (`Uint8Array`).\n *\n * @constructor\n * @param {Uint8Array} bytes\n */\nflatbuffers.ByteBuffer = function(bytes) {\n /**\n   * @type {Uint8Array}\n   * @private\n   */\n this.bytes_ = bytes;\n\n /**\n   * @type {number}\n   * @private\n   */\n this.position_ = 0;\n};\n\n/**\n * Create and allocate a new ByteBuffer with a given size.\n *\n * @param {number} byte_size\n * @returns {!flatbuffers.ByteBuffer}\n */\nflatbuffers.ByteBuffer.allocate = function(byte_size) {\n return new flatbuffers.ByteBuffer(new Uint8Array(byte_size));\n};\n\nflatbuffers.ByteBuffer.prototype.clear = function() {\n this.position_ = 0;\n};\n\n/**\n * Get the underlying `Uint8Array`.\n *\n * @returns {Uint8Array}\n */\nflatbuffers.ByteBuffer.prototype.bytes = function() {\n return this.bytes_;\n};\n\n/**\n * Get the buffer's position.\n *\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.position = function() {\n return this.position_;\n};\n\n/**\n * Set the buffer's position.\n *\n * @param {number} position\n */\nflatbuffers.ByteBuffer.prototype.setPosition = function(position) {\n this.position_ = position;\n};\n\n/**\n * Get the buffer's capacity.\n *\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.capacity = function() {\n return this.bytes_.length;\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readInt8 = function(offset) {\n return this.readUint8(offset) << 24 >> 24;\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readUint8 = function(offset) {\n return this.bytes_[offset];\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readInt16 = function(offset) {\n return this.readUint16(offset) << 16 >> 16;\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readUint16 = function(offset) {\n return this.bytes_[offset] | this.bytes_[offset + 1] << 8;\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readInt32 = function(offset) {\n return this.bytes_[offset] | this.bytes_[offset +

1] << 8 | this.bytes_[offset + 2] << 16 | this.bytes_[offset + 3] << 24;\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readUint32 = function(offset) {\n return this.readInt32(offset) >>> 0;\n};\n\n/**\n * @param {number} offset\n * @returns {!flatbuffers.Long}\n */\nflatbuffers.ByteBuffer.prototype.readInt64 = function(offset) {\n return new flatbuffers.Long(this.readInt32(offset), this.readInt32(offset + 4));\n};\n\n/**\n * @param {number} offset\n * @returns {!flatbuffers.Long}\n */\nflatbuffers.ByteBuffer.prototype.readUint64 = function(offset) {\n return new flatbuffers.Long(this.readUint32(offset), this.readUint32(offset + 4));\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readFloat32 = function(offset) {\n flatbuffers.int32[0] = this.readInt32(offset);\n return flatbuffers.float32[0];\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readFloat64 = function(offset) {\n flatbuffers.int32[flatbuffers.isLittleEndian ? 0 : 1] = this.readInt32(offset);\n flatbuffers.int32[flatbuffers.isLittleEndian ? 1 : 0] = this.readInt32(offset + 4);\n return flatbuffers.float64[0];\n};\n\n/**\n * @param {number} offset\n * @param {number|boolean} value\n */\nflatbuffers.ByteBuffer.prototype.writeInt8 = function(offset, value) {\n this.bytes_[offset] = /** @type {number} */(value);\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeUint8 = function(offset, value) {\n this.bytes_[offset] = value;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeInt16 = function(offset, value) {\n this.bytes_[offset] = value;\n this.bytes_[offset + 1] = value >> 8;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeUint16 = function(offset, value) {\n   this.bytes_[offset] = value;\n   this.bytes_[offset + 1] = value >> 8;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeInt32 = function(offset, value) {\n this.bytes_[offset] = value;\n this.bytes_[offset + 1] = value >> 8;\n this.bytes_[offset + 2] = value >> 16;\n this.bytes_[offset + 3] = value >> 24;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeUint32 = function(offset, value) {\n   this.bytes_[offset] = value;\n   this.bytes_[offset + 1] = value >> 8;\n   this.bytes_[offset + 2] = value >> 16;\n   this.bytes_[offset + 3] = value >> 24;\n};\n\n/**\n * @param {number} offset\n * @param {flatbuffers.Long} value\n */\nflatbuffers.ByteBuffer.prototype.writeInt64 = function(offset, value) {\n this.writeInt32(offset, value.low);\n this.writeInt32(offset + 4, value.high);\n};\n\n/**\n * @param {number} offset\n * @param {flatbuffers.Long} value\n */\nflatbuffers.ByteBuffer.prototype.writeUint64 = function(offset, value) {\n   this.writeUint32(offset, value.low);\n   this.writeUint32(offset + 4, value.high);\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeFloat32 = function(offset, value) {\n flatbuffers.float32[0] = value;\n this.writeInt32(offset, flatbuffers.int32[0]);\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeFloat64 = function(offset, value) {\n flatbuffers.float64[0] = value;\n this.writeInt32(offset, flatbuffers.int32[flatbuffers.isLittleEndian ? 0 : 1]);\n this.writeInt32(offset + 4, flatbuffers.int32[flatbuffers.isLittleEndian ? 1 : 0]);\n};\n\n/**\n * Return the file identifier.   Behavior is undefined for FlatBuffers whose\n * schema does not include a file_identifier (likely points at padding or the\n * start of a the root vtable).\n * @returns {string}\n */\nflatbuffers.ByteBuffer.prototype.getBufferIdentifier = function() {\n if (this.bytes_.length < this.position_ + flatbuffers.SIZEOF_INT +\n   flatbuffers.FILE_IDENTIFIER_LENGTH) {\n   throw new Error(\n 'FlatBuffers: ByteBuffer is too short to contain an identifier.');\n }\n var result = \"\";\n for (var i = 0; i < flatbuffers.FILE_IDENTIFIER_LENGTH; i++) {\n   result += String.fromCharCode(\n this.readInt8(this.position_ + flatbuffers.SIZEOF_INT + i));\n }\n return result;\n};\n\n/**\n * Look up a field in the vtable, return an offset into the object, or 0 if the\n * field is not present.\n *\n * @param {number} bb_pos\n * @param {number} vtable_offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__offset = function(bb_pos, vtable_offset) {\n var vtable = bb_pos - this.readInt32(bb_pos);\n return vtable_offset < this.readInt16(vtable) ? this.readInt16(vtable + vtable_offset) : 0;\n};\n\n/**\n * Initialize any Table-derived type to point to the union at the given offset.\n *\n * @param {flatbuffers.Table} t\n * @param {number} offset\n *

@returns {flatbuffers.Table}\n */\nflatbuffers.ByteBuffer.prototype.__union = function(t, offset) {\n t.bb_pos = offset + this.readInt32(offset);\n t.bb = this;\n return t;\n};\n\n/**\n * Create a JavaScript string from UTF-8 data stored inside the FlatBuffer.\n * This allocates a new string and converts to wide chars upon each access.\n *\n * To avoid the conversion to UTF-16, pass flatbuffers.Encoding.UTF8_BYTES as\n * the \"optionalEncoding\" argument. This is useful for avoiding conversion to\n * and from UTF-16 when the data will just be packaged back up in another\n * FlatBuffer later on.\n *\n * @param {number} offset\n * @param {flatbuffers.Encoding=} opt_encoding Defaults to UTF16_STRING\n * @returns {string|!Uint8Array}\n */\nflatbuffers.ByteBuffer.prototype.__string = function(offset, opt_encoding) {\n offset += this.readInt32(offset);\n\n var length = this.readInt32(offset);\n var result = '';\n var i = 0;\n\n offset += flatbuffers.SIZEOF_INT;\n\n if (opt_encoding === flatbuffers.Encoding.UTF8_BYTES) {\n   return this.bytes_.subarray(offset, offset + length);\n }\n\n while (i < length) {\n   var codePoint;\n\n   // Decode UTF-8\n   var a = this.readUint8(offset + i++);\n   if (a < 0xC0) {\n   codePoint = a;\n   } else {\n   var b = this.readUint8(offset + i++);\n   if (a < 0xE0) {\n   codePoint =\n   ((a & 0x1F) << 6) |\n   (b & 0x3F);\n   } else {\n   var c = this.readUint8(offset + i++);\n   if (a < 0xF0) {\n   codePoint =\n   ((a & 0x0F) << 12) |\n   ((b & 0x3F) << 6) |\n   (c & 0x3F);\n   } else {\n   var d = this.readUint8(offset + i++);\n   codePoint =\n   ((a & 0x07) << 18) |\n   ((b & 0x3F) << 12) |\n   ((c & 0x3F) << 6) |\n   (d & 0x3F);\n   }\n   }\n   }\n\n   // Encode UTF-16\n   if (codePoint < 0x10000) {\n   result += String.fromCharCode(codePoint);\n   } else {\n   codePoint -= 0x10000;\n   result += String.fromCharCode(\n   (codePoint >> 10) + 0xD800,\n   (codePoint & ((1 << 10) - 1)) + 0xDC00);\n   }\n }\n\n return result;\n};\n\n/**\n * Retrieve the relative offset stored at \"offset\"\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__indirect = function(offset) {\n return offset + this.readInt32(offset);\n};\n\n/**\n * Get the start of data of a vector whose offset is stored at \"offset\" in this object.\n *\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__vector = function(offset) {\n return offset + this.readInt32(offset) + flatbuffers.SIZEOF_INT; // data starts after the length\n};\n\n/**\n * Get the length of a vector whose offset is stored at \"offset\" in this object.\n *\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__vector_len = function(offset) {\n return this.readInt32(offset + this.readInt32(offset));\n};\n\n/**\n * @param {string} ident\n * @returns {boolean}\n */\nflatbuffers.ByteBuffer.prototype.__has_identifier = function(ident) {\n if (ident.length != flatbuffers.FILE_IDENTIFIER_LENGTH) {\n   throw new Error('FlatBuffers: file identifier must be length ' +\n   flatbuffers.FILE_IDENTIFIER_LENGTH);\n }\n for (var i = 0; i < flatbuffers.FILE_IDENTIFIER_LENGTH; i++) {\n   if (ident.charCodeAt(i) != this.readInt8(this.position_ + flatbuffers.SIZEOF_INT + i)) {\n   return false;\n   }\n }\n return true;\n};\n\n/**\n * A helper function to avoid generated code depending on this file directly.\n *\n * @param {number} low\n * @param {number} high\n * @returns {!flatbuffers.Long}\n */\nflatbuffers.ByteBuffer.prototype.createLong = function(low, high) {\n return flatbuffers.Long.create(low, high);\n};\n\n// Exports for Node.js and RequireJS\nexport { flatbuffers };\n\n/// @endcond\n/// @}\n","\"use strict\";\r\nexports.__esModule = true;\r\nvar Guid = /** @class */ (function () {\r\n   function Guid(guid) {\r\n   if (!guid) {\r\n   throw new TypeError(\"Invalid argument; `value` has no value.\");\r\n   }\r\n   this.value = Guid.EMPTY;\r\n   if (guid && Guid.isGuid(guid)) {\r\n   this.value = guid;\r\n   }\r\n   }\r\n   Guid.isGuid = function (guid) {\r\n   var value = guid.toString();\r\n   return guid && (guid instanceof Guid || Guid.validator.test(value));\r\n   };\r\n   Guid.create = function () {\r\n   return new Guid([Guid.gen(2), Guid.gen(1), Guid.gen(1), Guid.gen(1), Guid.gen(3)].join(\"-\"));\r\n   };\r\n   Guid.createEmpty = function () {\r\n   return new Guid(\"emptyguid\");\r\n   };\r\n   Guid.parse = function (guid) {\r\n   return new Guid(guid);\r\n   };\r\n   Guid.raw = function () {\r\n   return [Guid.gen(2), Guid.gen(1), Guid.gen(1), Guid.gen(1), Guid.gen(3)].join(\"-\");\r\n   };\r\n   Guid.gen = function (count) {\r\n   var out = \"\";\r\n   for (var i = 0; i < count; i++) {\r\n   // tslint:disable-next-line:no-bitwise\r\n   out += (((1 + Math.random()) * 0x10000) | 0).toString(16).substring(1);\r\n   }\r\n   return out;\r\n   };\r\n   Guid.prototype.equals = function (other) {\r\n   // Comparing string `value` against provided `guid` will auto-call\r\n   // toString on `guid` for comparison\r\n   return Guid.isGuid(other) && this.value ===

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other.toString();\r\n    };\r\n    Guid.prototype.isEmpty = function () {\r\n        return this.value ===
Guid.EMPTY;\r\n    };\r\n    Guid.prototype.toString = function () {\r\n        return this.value;\r\n    };\r\n
Guid.prototype.toJSON = function () {\r\n        return {\r\n            value: this.value\r\n        };\r\n    };\r\n
Guid.validator = new RegExp(\"^[a-z0-9]{8}-[a-z0-9]{4}-[a-z0-9]{4}-[a-z0-9]{4}-[a-z0-9]{12}$\", \"i\");\r\n
Guid.EMPTY = \"00000000-0000-0000-0000-000000000000\";\r\n    return Guid;\r\n}());\r\nexports.Guid =
Guid;\r\n","module.exports = Long;\r\n\r\n/**\r\n * wasm optimizations, to do native i64 multiplication and
divide\r\n */\r\nvar wasm = null;\r\n\r\ntry {\r\n  wasm = new WebAssembly.Instance(new
WebAssembly.Module(new Uint8Array([\r\n    0, 97, 115, 109, 1, 0, 0, 0, 1, 13, 2, 96, 0, 1, 127, 96, 4, 127, 127,
127, 127, 1, 127, 3, 7, 6, 0, 1, 1, 1, 1, 1, 6, 6, 1, 127, 1, 65, 0, 11, 7, 50, 6, 3, 109, 117, 108, 0, 1, 5, 100, 105, 118, 95,
115, 0, 2, 5, 100, 105, 118, 95, 117, 0, 3, 5, 114, 101, 109, 95, 115, 0, 4, 5, 114, 101, 109, 95, 117, 0, 5, 8, 103, 101,
116, 95, 104, 105, 103, 104, 0, 0, 10, 191, 1, 6, 4, 0, 35, 0, 11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132,
32, 2, 173, 32, 3, 173, 66, 32, 134, 132, 126, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167, 11, 36, 1, 1, 126, 32, 0, 173,
32, 1, 173, 66, 32, 134, 132, 32, 2, 173, 32, 3, 173, 66, 32, 134, 132, 127, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167,
11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132, 32, 2, 173, 32, 3, 173, 66, 32, 134, 132, 128, 34, 4, 66, 32,
135, 167, 36, 0, 32, 4, 167, 11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132, 32, 2, 173, 32, 3, 173, 66, 32,
134, 132, 129, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167, 11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132, 32,
2, 173, 32, 3, 173, 66, 32, 134, 132, 130, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167, 11\r\n  ])), {}).exports;\r\n} catch
(e) {\r\n  // no wasm support :(\r\n}\r\n\r\n/**\r\n * Constructs a 64 bit two's-complement integer, given its low and
high 32 bit values as *signed* integers.\r\n *  See the from* functions below for more convenient ways of
constructing Longs.\r\n * @exports Long\r\n * @class A Long class for representing a 64 bit two's-complement
integer value.\r\n * @param {number} low The low (signed) 32 bits of the long\r\n * @param {number} high The
high (signed) 32 bits of the long\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n
 * @constructor\r\n */\r\nfunction Long(low, high, unsigned) {\r\n\r\n    /**\r\n     * The low 32 bits as a signed
value.\r\n     * @type {number}\r\n     */\r\n    this.low = low | 0;\r\n\r\n    /**\r\n     * The high 32 bits as a signed
value.\r\n     * @type {number}\r\n     */\r\n    this.high = high | 0;\r\n\r\n    /**\r\n     * Whether unsigned or not.\r\n
  * @type {boolean}\r\n     */\r\n    this.unsigned = !!unsigned;\r\n}\r\n\r\n// The internal representation of a long is
the two given signed, 32-bit values.\r\n// We use 32-bit pieces because these are the size of integers on which\r\n//
Javascript performs bit-operations.  For operations like addition and\r\n// multiplication, we split each number into
16 bit pieces, which can easily be\r\n// multiplied within Javascript's floating-point representation without
overflow\r\n// or change in sign.\r\n//\r\n// In the algorithms below, we frequently reduce the negative case to
the\r\n// positive case by negating the input(s) and then post-processing the result.\r\n// Note that we must ALWAYS
check specially whether those values are MIN_VALUE\r\n// (-2^63) because -MIN_VALUE == MIN_VALUE
(since 2^63 cannot be represented as\r\n// a positive number, it overflows back into a negative).  Not handling
this\r\n// case would often result in infinite recursion.\r\n//\r\n// Common constant values ZERO, ONE, NEG_ONE,
etc. are defined below the from*\r\n// methods on which they depend.\r\n\r\n/**\r\n * An indicator used to reliably
determine if an object is a Long or not.\r\n * @type {boolean}\r\n * @const\r\n * @private\r\n
 */\r\nLong.prototype.__isLong__;\r\n\r\nObject.defineProperty(Long.prototype, \"__isLong__\", { value: true
});\r\n\r\n/**\r\n * @function\r\n * @param {*} obj Object\r\n * @returns {boolean}\r\n * @inner\r\n */\r\nfunction
isLong(obj) {\r\n    return (obj && obj[\"__isLong__\"]) === true;\r\n}\r\n\r\n/**\r\n * Tests if the specified object
is a Long.\r\n * @function\r\n * @param {*} obj Object\r\n * @returns {boolean}\r\n */\r\nLong.isLong =
isLong;\r\n\r\n/**\r\n * A cache of the Long representations of small integer values.\r\n * @type {!Object}\r\n *
@inner\r\n */\r\nvar INT_CACHE = {};\r\n\r\n/**\r\n * A cache of the Long representations of small unsigned
integer values.\r\n * @type {!Object}\r\n * @inner\r\n */\r\nvar UINT_CACHE = {};\r\n\r\n/**\r\n * @param
{number} value\r\n * @param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction
fromInt(value, unsigned) {\r\n    var obj, cachedObj, cache;\r\n    if (unsigned) {\r\n        value >>>= 0;\r\n        if
(cache = (0 <= value && value < 256)) {\r\n            cachedObj = UINT_CACHE[value];\r\n            if
(cachedObj)\r\n                return cachedObj;\r\n        }\r\n        obj = fromBits(value, (value | 0) < 0 ? -1 : 0, true);\r\n
    if (cache)\r\n            UINT_CACHE[value] = obj;\r\n        return obj;\r\n    } else {\r\n        value |= 0;\r\n        if
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(cache = (-128 <= value && value < 128)) {\r\n            cachedObj = INT_CACHE[value];\r\n            if
(cachedObj)\r\n                return cachedObj;\r\n        }\r\n        obj = fromBits(value, value < 0 ? -1 : 0, false);\r\n
if (cache)\r\n            INT_CACHE[value] = obj;\r\n        return obj;\r\n    }\r\n}\r\n\r\n/**\r\n * Returns a Long
representing the given 32 bit integer value.\r\n * @function\r\n * @param {number} value The 32 bit integer in
question\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long}
The corresponding Long value\r\n */\r\nLong.fromInt = fromInt;\r\n\r\n/**\r\n * @param {number} value\r\n *
@param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromNumber(value,
unsigned) {\r\n    if (isNaN(value))\r\n        return unsigned ? UZERO : ZERO;\r\n    if (unsigned) {\r\n        if (value
< 0)\r\n            return UZERO;\r\n        if (value >= TWO_PWR_64_DBL)\r\n            return
MAX_UNSIGNED_VALUE;\r\n    } else {\r\n        if (value <= -TWO_PWR_63_DBL)\r\n            return
MIN_VALUE;\r\n        if (value + 1 >= TWO_PWR_63_DBL)\r\n            return MAX_VALUE;\r\n    }\r\n    if
(value < 0)\r\n        return fromNumber(-value, unsigned).neg();\r\n    return fromBits((value %
TWO_PWR_32_DBL) | 0, (value / TWO_PWR_32_DBL) | 0, unsigned);\r\n}\r\n\r\n/**\r\n * Returns a Long
representing the given value, provided that it is a finite number. Otherwise, zero is returned.\r\n * @function\r\n *
@param {number} value The number in question\r\n * @param {boolean=} unsigned Whether unsigned or not,
defaults to signed\r\n * @returns {!Long} The corresponding Long value\r\n */\r\nLong.fromNumber =
fromNumber;\r\n\r\n/**\r\n * @param {number} lowBits\r\n * @param {number} highBits\r\n * @param
{boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromBits(lowBits, highBits, unsigned)
{\r\n    return new Long(lowBits, highBits, unsigned);\r\n}\r\n\r\n/**\r\n * Returns a Long representing the 64 bit
integer that comes by concatenating the given low and high bits. Each is\r\n *  assumed to use 32 bits.\r\n *
@function\r\n * @param {number} lowBits The low 32 bits\r\n * @param {number} highBits The high 32 bits\r\n
* @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long} The
corresponding Long value\r\n */\r\nLong.fromBits = fromBits;\r\n\r\n/**\r\n * @function\r\n * @param {number}
base\r\n * @param {number} exponent\r\n * @returns {number}\r\n * @inner\r\n */\r\nvar pow_dbl = Math.pow; //
Used 4 times (4*8 to 15+4)\r\n\r\n/**\r\n * @param {string} str\r\n * @param {(boolean|number)=} unsigned\r\n *
@param {number=} radix\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromString(str, unsigned, radix)
{\r\n    if (str.length === 0)\r\n        throw Error('empty string');\r\n    if (str === \"NaN\" || str === \"Infinity\" || str
=== \"+Infinity\" || str === \"-Infinity\")\r\n        return ZERO;\r\n    if (typeof unsigned === 'number') {\r\n        //
For goog.math.long compatibility\r\n        radix = unsigned,\r\n        unsigned = false;\r\n    } else {\r\n        unsigned
= !! unsigned;\r\n    }\r\n    radix = radix || 10;\r\n    if (radix < 2 || 36 < radix)\r\n        throw
RangeError('radix');\r\n\r\n    var p;\r\n    if ((p = str.indexOf('-')) > 0)\r\n        throw Error('interior hyphen');\r\n
else if (p === 0) {\r\n        return fromString(str.substring(1), unsigned, radix).neg();\r\n    }\r\n\r\n    // Do several
(8) digits each time through the loop, so as to\r\n    // minimize the calls to the very expensive emulated div.\r\n    var
radixToPower = fromNumber(pow_dbl(radix, 8));\r\n\r\n    var result = ZERO;\r\n    for (var i = 0; i < str.length; i
+= 8) {\r\n        var size = Math.min(8, str.length - i),\r\n            value = parseInt(str.substring(i, i + size), radix);\r\n
    if (size < 8) {\r\n            var power = fromNumber(pow_dbl(radix, size));\r\n            result =
result.mul(power).add(fromNumber(value));\r\n        } else {\r\n            result = result.mul(radixToPower);\r\n
result = result.add(fromNumber(value));\r\n        }\r\n    }\r\n    result.unsigned = unsigned;\r\n    return
result;\r\n}\r\n\r\n/**\r\n * Returns a Long representation of the given string, written using the specified radix.\r\n *
@function\r\n * @param {string} str The textual representation of the Long\r\n * @param {(boolean|number)=}
unsigned Whether unsigned or not, defaults to signed\r\n * @param {number=} radix The radix in which the text is
written (2-36), defaults to 10\r\n * @returns {!Long} The corresponding Long value\r\n */\r\nLong.fromString =
fromString;\r\n\r\n/**\r\n * @function\r\n * @param {!Long|number|string|!{low: number, high: number, unsigned:
boolean}} val\r\n * @param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction
fromValue(val, unsigned) {\r\n    if (typeof val === 'number')\r\n        return fromNumber(val, unsigned);\r\n    if
(typeof val === 'string')\r\n        return fromString(val, unsigned);\r\n    // Throws for non-objects, converts non-
instanceof Long:\r\n    return fromBits(val.low, val.high, typeof unsigned === 'boolean' ? unsigned :
val.unsigned);\r\n}\r\n\r\n/**\r\n * Converts the specified value to a Long using the appropriate from* function for
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its type.\r\n * @function\r\n * @param {!Long|number|string|!{low: number, high: number, unsigned: boolean}} val
Value\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long}\r\n
*/\r\nLong.fromValue = fromValue;\r\n\r\n// NOTE: the compiler should inline these constant values below and
then remove these variables, so there should be\r\n// no runtime penalty for these.\r\n\r\n/**\r\n * @type
{number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_16_DBL = 1 << 16;\r\n\r\n/**\r\n * @type
{number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_24_DBL = 1 << 24;\r\n\r\n/**\r\n * @type
{number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_32_DBL = TWO_PWR_16_DBL *
TWO_PWR_16_DBL;\r\n\r\n/**\r\n * @type {number}\r\n * @const\r\n * @inner\r\n */\r\nvar
TWO_PWR_64_DBL = TWO_PWR_32_DBL * TWO_PWR_32_DBL;\r\n\r\n/**\r\n * @type {number}\r\n *
@const\r\n * @inner\r\n */\r\nvar TWO_PWR_63_DBL = TWO_PWR_64_DBL / 2;\r\n\r\n/**\r\n * @type
{!Long}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_24 = fromInt(TWO_PWR_24_DBL);\r\n\r\n/**\r\n *
@type {!Long}\r\n * @inner\r\n */\r\nvar ZERO = fromInt(0);\r\n\r\n/**\r\n * Signed zero.\r\n * @type {!Long}\r\n
*/\r\nLong.ZERO = ZERO;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar UZERO = fromInt(0,
true);\r\n\r\n/**\r\n * Unsigned zero.\r\n * @type {!Long}\r\n */\r\nLong.UZERO = UZERO;\r\n\r\n/**\r\n * @type
{!Long}\r\n * @inner\r\n */\r\nvar ONE = fromInt(1);\r\n\r\n/**\r\n * Signed one.\r\n * @type {!Long}\r\n
*/\r\nLong.ONE = ONE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar UONE = fromInt(1,
true);\r\n\r\n/**\r\n * Unsigned one.\r\n * @type {!Long}\r\n */\r\nLong.UONE = UONE;\r\n\r\n/**\r\n * @type
{!Long}\r\n * @inner\r\n */\r\nvar NEG_ONE = fromInt(-1);\r\n\r\n/**\r\n * Signed negative one.\r\n * @type
{!Long}\r\n */\r\nLong.NEG_ONE = NEG_ONE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar
MAX_VALUE = fromBits(0xFFFFFFFF|0, 0x7FFFFFFF|0, false);\r\n\r\n/**\r\n * Maximum signed value.\r\n *
@type {!Long}\r\n */\r\nLong.MAX_VALUE = MAX_VALUE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n
*/\r\nvar MAX_UNSIGNED_VALUE = fromBits(0xFFFFFFFF|0, 0xFFFFFFFF|0, true);\r\n\r\n/**\r\n * Maximum
unsigned value.\r\n * @type {!Long}\r\n */\r\nLong.MAX_UNSIGNED_VALUE =
MAX_UNSIGNED_VALUE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar MIN_VALUE =
fromBits(0, 0x80000000|0, false);\r\n\r\n/**\r\n * Minimum signed value.\r\n * @type {!Long}\r\n
*/\r\nLong.MIN_VALUE = MIN_VALUE;\r\n\r\n/**\r\n * @alias Long.prototype\r\n * @inner\r\n */\r\nvar
LongPrototype = Long.prototype;\r\n\r\n/**\r\n * Converts the Long to a 32 bit integer, assuming it is a 32 bit
integer.\r\n * @returns {number}\r\n */\r\nLongPrototype.toInt = function toInt() {\r\n    return this.unsigned ?
this.low >>> 0 : this.low;\r\n};\r\n\r\n/**\r\n * Converts the Long to a the nearest floating-point representation of
this value (double, 53 bit mantissa).\r\n * @returns {number}\r\n */\r\nLongPrototype.toNumber = function
toNumber() {\r\n    if (this.unsigned)\r\n        return ((this.high >>> 0) * TWO_PWR_32_DBL) + (this.low >>>
0);\r\n    return this.high * TWO_PWR_32_DBL + (this.low >>> 0);\r\n};\r\n\r\n/**\r\n * Converts the Long to a
string written in the specified radix.\r\n * @param {number=} radix Radix (2-36), defaults to 10\r\n * @returns
{string}\r\n * @override\r\n * @throws {RangeError} If `radix` is out of range\r\n */\r\nLongPrototype.toString =
function toString(radix) {\r\n    radix = radix || 10;\r\n    if (radix < 2 || 36 < radix)\r\n        throw
RangeError('radix');\r\n    if (this.isZero())\r\n        return '0';\r\n    if (this.isNegative()) { // Unsigned Longs are
never negative\r\n        if (this.eq(MIN_VALUE)) {\r\n            // We need to change the Long value before it can be
negated, so we remove\r\n            // the bottom-most digit in this base and then recurse to do the rest.\r\n            var
radixLong = fromNumber(radix),\r\n                div = this.div(radixLong),\r\n                rem1 =
div.mul(radixLong).sub(this);\r\n            return div.toString(radix) + rem1.toInt().toString(radix);\r\n        } else\r\n
        return '-' + this.neg().toString(radix);\r\n    }\r\n\r\n    // Do several (6) digits each time through the loop, so as
to\r\n    // minimize the calls to the very expensive emulated div.\r\n    var radixToPower =
fromNumber(pow_dbl(radix, 6), this.unsigned),\r\n        rem = this;\r\n    var result = '';\r\n    while (true) {\r\n
var remDiv = rem.div(radixToPower),\r\n            intval = rem.sub(remDiv.mul(radixToPower)).toInt() >>> 0,\r\n
      digits = intval.toString(radix);\r\n        rem = remDiv;\r\n        if (rem.isZero())\r\n            return digits + result;\r\n
       else {\r\n            while (digits.length < 6)\r\n                digits = '0' + digits;\r\n            result = '' + digits +
result;\r\n        }\r\n    }\r\n};\r\n\r\n/**\r\n * Gets the high 32 bits as a signed integer.\r\n * @returns {number}
Signed high bits\r\n */\r\nLongPrototype.getHighBits = function getHighBits() {\r\n    return
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this.high;\r\n};\r\n\r\n/**\r\n * Gets the high 32 bits as an unsigned integer.\r\n * @returns {number} Unsigned high bits\r\n */\r\nLongPrototype.getHighBitsUnsigned = function getHighBitsUnsigned() {\r\n   return this.high >>> 0;\r\n};\r\n\r\n/**\r\n * Gets the low 32 bits as a signed integer.\r\n * @returns {number} Signed low bits\r\n */\r\nLongPrototype.getLowBits = function getLowBits() {\r\n   return this.low;\r\n};\r\n\r\n/**\r\n * Gets the low 32 bits as an unsigned integer.\r\n * @returns {number} Unsigned low bits\r\n */\r\nLongPrototype.getLowBitsUnsigned = function getLowBitsUnsigned() {\r\n   return this.low >>> 0;\r\n};\r\n\r\n/**\r\n * Gets the number of bits needed to represent the absolute value of this Long.\r\n * @returns {number}\r\n */\r\nLongPrototype.getNumBitsAbs = function getNumBitsAbs() {\r\n   if (this.isNegative()) // Unsigned Longs are never negative\r\n   return this.eq(MIN_VALUE) ? 64 : this.neg().getNumBitsAbs();\r\n   var val = this.high != 0 ? this.high : this.low;\r\n   for (var bit = 31; bit > 0; bit--)\r\n   if ((val & (1 << bit)) != 0)\r\n   break;\r\n   return this.high != 0 ? bit + 33 : bit + 1;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value equals zero.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isZero = function isZero() {\r\n   return this.high === 0 && this.low === 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value equals zero. This is an alias of {@link Long#isZero}.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.eqz = LongPrototype.isZero;\r\n\r\n/**\r\n * Tests if this Long's value is negative.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isNegative = function isNegative() {\r\n   return !this.unsigned && this.high < 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is positive.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isPositive = function isPositive() {\r\n   return this.unsigned || this.high >= 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is odd.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isOdd = function isOdd() {\r\n   return (this.low & 1) === 1;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is even.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isEven = function isEven() {\r\n   return (this.low & 1) === 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value equals the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.equals = function equals(other) {\r\n   if (!isLong(other))\r\n   other = fromValue(other);\r\n   if (this.unsigned !== other.unsigned && (this.high >>> 31) === 1 && (other.high >>> 31) === 1)\r\n   return false;\r\n   return this.high === other.high && this.low === other.low;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value equals the specified's. This is an alias of {@link Long#equals}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.eq = LongPrototype.equals;\r\n\r\n/**\r\n * Tests if this Long's value differs from the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.notEquals = function notEquals(other) {\r\n   return !this.eq(/* validates */ other);\r\n};\r\n\r\n/**\r\n * Tests if this Long's value differs from the specified's. This is an alias of {@link Long#notEquals}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.neq = LongPrototype.notEquals;\r\n\r\n/**\r\n * Tests if this Long's value differs from the specified's. This is an alias of {@link Long#notEquals}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.ne = LongPrototype.notEquals;\r\n\r\n/**\r\n * Tests if this Long's value is less than the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.lessThan = function lessThan(other) {\r\n   return this.comp(/* validates */ other) < 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is less than the specified's. This is an alias of {@link Long#lessThan}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.lt = LongPrototype.lessThan;\r\n\r\n/**\r\n * Tests if this Long's value is less than or equal the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.lessThanOrEqual = function lessThanOrEqual(other) {\r\n   return this.comp(/* validates */ other) <= 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is less than or equal the specified's. This is an alias of {@link Long#lessThanOrEqual}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.lte = LongPrototype.lessThanOrEqual;\r\n\r\n/**\r\n * Tests if this Long's value is less than or equal the specified's. This is an alias of {@link Long#lessThanOrEqual}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.le = LongPrototype.lessThanOrEqual;\r\n\r\n/**\r\n * Tests if this Long's value is greater than the specified's.\r\n *

@param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.greaterThan = function greaterThan(other) {\r\n   return this.comp(/* validates */ other) > 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is greater than the specified's. This is an alias of {@link Long#greaterThan}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.gt = LongPrototype.greaterThan;\r\n\r\n/**\r\n * Tests if this Long's value is greater than or equal the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.greaterThanOrEqual = function greaterThanOrEqual(other) {\r\n   return this.comp(/* validates */ other) >= 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is greater than or equal the specified's. This is an alias of {@link Long#greaterThanOrEqual}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.gte = LongPrototype.greaterThanOrEqual;\r\n\r\n/**\r\n * Tests if this Long's value is greater than or equal the specified's. This is an alias of {@link Long#greaterThanOrEqual}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.ge = LongPrototype.greaterThanOrEqual;\r\n\r\n/**\r\n * Compares this Long's value with the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {number} 0 if they are the same, 1 if the this is greater and -1\r\n * if the given one is greater\r\n */\r\nLongPrototype.compare = function compare(other) {\r\n   if (!isLong(other))\r\n   other = fromValue(other);\r\n   if (this.eq(other))\r\n return 0;\r\n   var thisNeg = this.isNegative(),\r\n   otherNeg = other.isNegative();\r\n   if (thisNeg && !otherNeg)\r\n   return -1;\r\n   if (!thisNeg && otherNeg)\r\n   return 1;\r\n   // At this point the sign bits are the same\r\n   if (!this.unsigned)\r\n   return this.sub(other).isNegative() ? -1 : 1;\r\n   // Both are positive if at least one is unsigned\r\n   return (other.high >>> 0) > (this.high >>> 0) || (other.high === this.high && (other.low >>> 0) > (this.low >>> 0)) ? -1 : 1;\r\n};\r\n\r\n/**\r\n * Compares this Long's value with the specified's. This is an alias of {@link Long#compare}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {number} 0 if they are the same, 1 if the this is greater and -1\r\n * if the given one is greater\r\n */\r\nLongPrototype.comp = LongPrototype.compare;\r\n\r\n/**\r\n * Negates this Long's value.\r\n * @returns {!Long} Negated Long\r\n */\r\nLongPrototype.negate = function negate() {\r\n   if (!this.unsigned && this.eq(MIN_VALUE))\r\n   return MIN_VALUE;\r\n   return this.not().add(ONE);\r\n};\r\n\r\n/**\r\n * Negates this Long's value. This is an alias of {@link Long#negate}.\r\n * @function\r\n * @returns {!Long} Negated Long\r\n */\r\nLongPrototype.neg = LongPrototype.negate;\r\n\r\n/**\r\n * Returns the sum of this and the specified Long.\r\n * @param {!Long|number|string} addend Addend\r\n * @returns {!Long} Sum\r\n */\r\nLongPrototype.add = function add(addend) {\r\n   if (!isLong(addend))\r\n   addend = fromValue(addend);\r\n\r\n   // Divide each number into 4 chunks of 16 bits, and then sum the chunks.\r\n\r\n   var a48 = this.high >>> 16;\r\n   var a32 = this.high & 0xFFFF;\r\n   var a16 = this.low >>> 16;\r\n   var a00 = this.low & 0xFFFF;\r\n\r\n   var b48 = addend.high >>> 16;\r\n   var b32 = addend.high & 0xFFFF;\r\n   var b16 = addend.low >>> 16;\r\n   var b00 = addend.low & 0xFFFF;\r\n\r\n   var c48 = 0, c32 = 0, c16 = 0, c00 = 0;\r\n c00 += a00 + b00;\r\n   c16 += c00 >>> 16;\r\n   c00 &= 0xFFFF;\r\n   c16 += a16 + b16;\r\n   c32 += c16 >>> 16;\r\n   c16 &= 0xFFFF;\r\n   c32 += a32 + b32;\r\n   c48 += c32 >>> 16;\r\n   c32 &= 0xFFFF;\r\n   c48 += a48 + b48;\r\n   c48 &= 0xFFFF;\r\n   return fromBits((c16 << 16) | c00, (c48 << 16) | c32, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the difference of this and the specified Long.\r\n * @param {!Long|number|string} subtrahend Subtrahend\r\n * @returns {!Long} Difference\r\n */\r\nLongPrototype.subtract = function subtract(subtrahend) {\r\n   if (!isLong(subtrahend))\r\n   subtrahend = fromValue(subtrahend);\r\n return this.add(subtrahend.neg());\r\n};\r\n\r\n/**\r\n * Returns the difference of this and the specified Long. This is an alias of {@link Long#subtract}.\r\n * @function\r\n * @param {!Long|number|string} subtrahend Subtrahend\r\n * @returns {!Long} Difference\r\n */\r\nLongPrototype.sub = LongPrototype.subtract;\r\n\r\n/**\r\n * Returns the product of this and the specified Long.\r\n * @param {!Long|number|string} multiplier Multiplier\r\n * @returns {!Long} Product\r\n */\r\nLongPrototype.multiply = function multiply(multiplier) {\r\n   if (this.isZero())\r\n return ZERO;\r\n   if (!isLong(multiplier))\r\n   multiplier = fromValue(multiplier);\r\n\r\n   // use wasm support if present\r\n   if (wasm) {\r\n   var low = wasm.mul(this.low,\r\n   this.high,\r\n multiplier.low,\r\n   multiplier.high);\r\n   return fromBits(low, wasm.get_high(), this.unsigned);\r\n }\r\n\r\n if (multiplier.isZero())\r\n return ZERO;\r\n if (this.eq(MIN_VALUE))\r\n return multiplier.isOdd() ? MIN_VALUE : ZERO;\r\n if (multiplier.eq(MIN_VALUE))\r\n return this.isOdd() ? MIN_VALUE : ZERO;\r\n\r\n if (this.isNegative()) {\r\n if (multiplier.isNegative())\r\n return this.neg().mul(multiplier.neg());\r\n else\r\n return this.neg().mul(multiplier).neg();\r\n } else if (multiplier.isNegative())\r\n return this.mul(multiplier.neg()).neg();\r\n\r\n // If both longs are small, use float multiplication\r\n if (this.lt(TWO_PWR_24) && multiplier.lt(TWO_PWR_24))\r\n return fromNumber(this.toNumber() * multiplier.toNumber(), this.unsigned);\r\n\r\n // Divide each long into 4 chunks of 16 bits, and then add up 4x4 products.\r\n // We can skip products that would overflow.\r\n\r\n var a48 = this.high >>> 16;\r\n var a32 = this.high & 0xFFFF;\r\n var a16 = this.low >>> 16;\r\n var a00 = this.low & 0xFFFF;\r\n\r\n var b48 = multiplier.high >>> 16;\r\n var b32 = multiplier.high & 0xFFFF;\r\n var b16 = multiplier.low >>> 16;\r\n var b00 = multiplier.low & 0xFFFF;\r\n\r\n var c48 = 0, c32 = 0, c16 = 0, c00 = 0;\r\n c00 += a00 * b00;\r\n c16 += c00 >>> 16;\r\n c00 &= 0xFFFF;\r\n c16 += a16 * b00;\r\n c32 += c16 >>> 16;\r\n c16 &= 0xFFFF;\r\n c16 += a00 * b16;\r\n c32 += c16 >>> 16;\r\n c16 &= 0xFFFF;\r\n c32 += a32 * b00;\r\n c48 += c32 >>> 16;\r\n c32 &= 0xFFFF;\r\n c32 += a16 * b16;\r\n c48 += c32 >>> 16;\r\n c32 &= 0xFFFF;\r\n c32 += a00 * b32;\r\n c48 += c32 >>> 16;\r\n c32 &= 0xFFFF;\r\n c48 += a48 * b00 + a32 * b16 + a16 * b32 + a00 * b48;\r\n c48 &= 0xFFFF;\r\n return fromBits((c16 << 16) | c00, (c48 << 16) | c32, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the product of this and the specified Long. This is an alias of {@link Long#multiply}.\r\n * @function\r\n * @param {!Long|number|string} multiplier Multiplier\r\n * @returns {!Long} Product\r\n */\r\nLongPrototype.mul = LongPrototype.multiply;\r\n\r\n/**\r\n * Returns this Long divided by the specified. The result is signed if this Long is signed or\r\n * unsigned if this Long is unsigned.\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Quotient\r\n */\r\nLongPrototype.divide = function divide(divisor) {\r\n if (!isLong(divisor))\r\n divisor = fromValue(divisor);\r\n if (divisor.isZero())\r\n throw Error('division by zero');\r\n\r\n // use wasm support if present\r\n if (wasm) {\r\n // guard against signed division overflow: the largest\r\n // negative number / -1 would be 1 larger than the largest\r\n // positive number, due to two's complement.\r\n if (!this.unsigned &&\r\n this.high === -0x80000000 &&\r\n divisor.low === -1 && divisor.high === -1) {\r\n // be consistent with non-wasm code path\r\n return this;\r\n }\r\n var low = (this.unsigned ? wasm.div_u : wasm.div_s)(\r\n this.low,\r\n this.high,\r\n divisor.low,\r\n divisor.high\r\n);\r\n return fromBits(low, wasm.get_high(), this.unsigned);\r\n }\r\n\r\n if (this.isZero())\r\n return this.unsigned ? UZERO : ZERO;\r\n var approx, rem, res;\r\n if (!this.unsigned) {\r\n // This section is only relevant for signed longs and is derived from the\r\n // closure library as a whole.\r\n if (this.eq(MIN_VALUE)) {\r\n if (divisor.eq(ONE) || divisor.eq(NEG_ONE))\r\n return MIN_VALUE; // recall that -MIN_VALUE == MIN_VALUE\r\n else if (divisor.eq(MIN_VALUE))\r\n return ONE;\r\n else {\r\n // At this point, we have |other| >= 2, so |this/other| < |MIN_VALUE|.\r\n var halfThis = this.shr(1);\r\n approx = halfThis.div(divisor).shl(1);\r\n if (approx.eq(ZERO)) {\r\n return divisor.isNegative() ? ONE : NEG_ONE;\r\n } else {\r\n rem = this.sub(divisor.mul(approx));\r\n res = approx.add(rem.div(divisor));\r\n return res;\r\n }\r\n }\r\n } else if (divisor.eq(MIN_VALUE))\r\n return this.unsigned ? UZERO : ZERO;\r\n if (this.isNegative()) {\r\n if (divisor.isNegative())\r\n return this.neg().div(divisor.neg());\r\n return this.neg().div(divisor).neg();\r\n } else if (divisor.isNegative())\r\n return this.div(divisor.neg()).neg();\r\n res = ZERO;\r\n } else {\r\n // The algorithm below has not been made for unsigned longs. It's therefore\r\n // required to take special care of the MSB prior to running it.\r\n if (!divisor.unsigned)\r\n divisor = divisor.toUnsigned();\r\n if (divisor.gt(this))\r\n return UZERO;\r\n if (divisor.gt(this.shru(1))) // 15 >>> 1 = 7 ; with divisor = 8 ; true\r\n return UONE;\r\n res = UZERO;\r\n }\r\n\r\n // Repeat the following until the remainder is less than other: find a\r\n // floating-point that approximates remainder / other *from below*, add this\r\n // into the result, and subtract it from the remainder. It is critical that\r\n // the approximate value is less than or equal to the real value so that the\r\n // remainder never becomes negative.\r\n rem = this;\r\n while (rem.gte(divisor)) {\r\n // Approximate the result of division.

This may be a little greater or\r\n   // smaller than the actual value.\r\n   approx = Math.max(1, Math.floor(rem.toNumber() / divisor.toNumber()));\r\n\r\n   // We will tweak the approximate result by changing it in the 48-th digit or\r\n   // the smallest non-fractional digit, whichever is larger.\r\n   var log2 = Math.ceil(Math.log(approx) / Math.LN2),\r\n   delta = (log2 <= 48) ? 1 : pow_dbl(2, log2 - 48),\r\n\r\n   // Decrease the approximation until it is smaller than the remainder. Note\r\n   // that if it is too large, the product overflows and is negative.\r\n   approxRes = fromNumber(approx),\r\n   approxRem = approxRes.mul(divisor);\r\n   while (approxRem.isNegative() || approxRem.gt(rem)) {\r\n   approx -= delta;\r\n   approxRes = fromNumber(approx, this.unsigned);\r\n   approxRem = approxRes.mul(divisor);\r\n   }\r\n\r\n   // We know the answer can't be zero... and actually, zero would cause\r\n   // infinite recursion since we would make no progress.\r\n   if (approxRes.isZero())\r\n   approxRes = ONE;\r\n\r\n   res = res.add(approxRes);\r\n   rem = rem.sub(approxRem);\r\n   }\r\n   return res;\r\n};\r\n\r\n/**\r\n * Returns this Long divided by the specified. This is an alias of {@link Long#divide}.\r\n * @function\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Quotient\r\n */\r\nLongPrototype.div = LongPrototype.divide;\r\n\r\n/**\r\n * Returns this Long modulo the specified.\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Remainder\r\n */\r\nLongPrototype.modulo = function modulo(divisor) {\r\n   if (!isLong(divisor))\r\n   divisor = fromValue(divisor);\r\n\r\n   // use wasm support if present\r\n   if (wasm) {\r\n   var low = (this.unsigned ? wasm.rem_u : wasm.rem_s)(\r\n   this.low,\r\n   this.high,\r\n   divisor.low,\r\n   divisor.high\r\n   );\r\n   return fromBits(low, wasm.get_high(), this.unsigned);\r\n   }\r\n\r\n   return this.sub(this.div(divisor).mul(divisor));\r\n};\r\n\r\n/**\r\n * Returns this Long modulo the specified. This is an alias of {@link Long#modulo}.\r\n * @function\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Remainder\r\n */\r\nLongPrototype.mod = LongPrototype.modulo;\r\n\r\n/**\r\n * Returns this Long modulo the specified. This is an alias of {@link Long#modulo}.\r\n * @function\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Remainder\r\n */\r\nLongPrototype.rem = LongPrototype.modulo;\r\n\r\n/**\r\n * Returns the bitwise NOT of this Long.\r\n * @returns {!Long}\r\n */\r\nLongPrototype.not = function not() {\r\n   return fromBits(~this.low, ~this.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the bitwise AND of this Long and the specified.\r\n * @param {!Long|number|string} other Other Long\r\n * @returns {!Long}\r\n */\r\nLongPrototype.and = function and(other) {\r\n   if (!isLong(other))\r\n   other = fromValue(other);\r\n   return fromBits(this.low & other.low, this.high & other.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the bitwise OR of this Long and the specified.\r\n * @param {!Long|number|string} other Other Long\r\n * @returns {!Long}\r\n */\r\nLongPrototype.or = function or(other) {\r\n   if (!isLong(other))\r\n   other = fromValue(other);\r\n   return fromBits(this.low | other.low, this.high | other.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the bitwise XOR of this Long and the given one.\r\n * @param {!Long|number|string} other Other Long\r\n * @returns {!Long}\r\n */\r\nLongPrototype.xor = function xor(other) {\r\n   if (!isLong(other))\r\n   other = fromValue(other);\r\n   return fromBits(this.low ^ other.low, this.high ^ other.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns this Long with bits shifted to the left by the given amount.\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shiftLeft = function shiftLeft(numBits) {\r\n   if (isLong(numBits))\r\n   numBits = numBits.toInt();\r\n   if ((numBits &= 63) === 0)\r\n   return this;\r\n   else if (numBits < 32)\r\n   return fromBits(this.low << numBits, (this.high << numBits) | (this.low >>> (32 - numBits)), this.unsigned);\r\n   else\r\n   return fromBits(0, this.low << (numBits - 32), this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns this Long with bits shifted to the left by the given amount. This is an alias of {@link Long#shiftLeft}.\r\n * @function\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shl = LongPrototype.shiftLeft;\r\n\r\n/**\r\n * Returns this Long with bits arithmetically shifted to the right by the given amount.\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shiftRight = function shiftRight(numBits) {\r\n   if (isLong(numBits))\r\n   numBits = numBits.toInt();\r\n   if ((numBits &= 63) === 0)\r\n   return this;\r\n   else if (numBits < 32)\r\n   return fromBits((this.low >>> numBits) | (this.high << (32 - numBits)), this.high >> numBits, this.unsigned);\r\n   else\r\n   return fromBits(this.high >> (numBits - 32),

this.high >= 0 ? 0 : -1, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns this Long with bits arithmetically shifted to the right by the given amount. This is an alias of {@link Long#shiftRight}.\r\n * @function\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shr = LongPrototype.shiftRight;\r\n\r\n/**\r\n * Returns this Long with bits logically shifted to the right by the given amount.\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shiftRightUnsigned = function shiftRightUnsigned(numBits) {\r\n   if (isLong(numBits))\r\n   numBits = numBits.toInt();\r\n   numBits &= 63;\r\n   if (numBits === 0)\r\n   return this;\r\n   else {\r\n   var high = this.high;\r\n   if (numBits < 32) {\r\n   var low = this.low;\r\n   return fromBits((low >>> numBits) | (high << (32 - numBits)), high >>> numBits, this.unsigned);\r\n   } else if (numBits === 32)\r\n   return fromBits(high, 0, this.unsigned);\r\n   else\r\n   return fromBits(high >>> (numBits - 32), 0, this.unsigned);\r\n   }\r\n};\r\n\r\n/**\r\n * Returns this Long with bits logically shifted to the right by the given amount. This is an alias of {@link Long#shiftRightUnsigned}.\r\n * @function\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shru = LongPrototype.shiftRightUnsigned;\r\n\r\n/**\r\n * Returns this Long with bits logically shifted to the right by the given amount. This is an alias of {@link Long#shiftRightUnsigned}.\r\n * @function\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shr_u = LongPrototype.shiftRightUnsigned;\r\n\r\n/**\r\n * Converts this Long to signed.\r\n * @returns {!Long} Signed long\r\n */\r\nLongPrototype.toSigned = function toSigned() {\r\n   if (!this.unsigned)\r\n   return this;\r\n   return fromBits(this.low, this.high, false);\r\n};\r\n\r\n/**\r\n * Converts this Long to unsigned.\r\n * @returns {!Long} Unsigned long\r\n */\r\nLongPrototype.toUnsigned = function toUnsigned() {\r\n   if (this.unsigned)\r\n   return this;\r\n   return fromBits(this.low, this.high, true);\r\n};\r\n\r\n/**\r\n * Converts this Long to its byte representation.\r\n * @param {boolean=} le Whether little or big endian, defaults to big endian\r\n * @returns {!Array.<number>} Byte representation\r\n */\r\nLongPrototype.toBytes = function toBytes(le) {\r\n   return le ? this.toBytesLE() : this.toBytesBE();\r\n};\r\n\r\n/**\r\n * Converts this Long to its little endian byte representation.\r\n * @returns {!Array.<number>} Little endian byte representation\r\n */\r\nLongPrototype.toBytesLE = function toBytesLE() {\r\n   var hi = this.high,\r\n   lo = this.low;\r\n   return [\r\n   lo   & 0xff,\r\n   lo >>> 8 & 0xff,\r\n   lo >>> 16 & 0xff,\r\n   lo >>> 24   ,\r\n   hi   & 0xff,\r\n   hi >>> 8 & 0xff,\r\n   hi >>> 16 & 0xff,\r\n   hi >>> 24\r\n   ];\r\n};\r\n\r\n/**\r\n * Converts this Long to its big endian byte representation.\r\n * @returns {!Array.<number>} Big endian byte representation\r\n */\r\nLongPrototype.toBytesBE = function toBytesBE() {\r\n   var hi = this.high,\r\n   lo = this.low;\r\n   return [\r\n   hi >>> 24   ,\r\n   hi >>> 16 & 0xff,\r\n   hi >>> 8 & 0xff,\r\n   hi   & 0xff,\r\n   lo >>> 24   ,\r\n   lo >>> 16 & 0xff,\r\n   lo >>> 8 & 0xff,\r\n   lo   & 0xff\r\n   ];\r\n};\r\n\r\n/**\r\n * Creates a Long from its byte representation.\r\n * @param {!Array.<number>} bytes Byte representation\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @param {boolean=} le Whether little or big endian, defaults to big endian\r\n * @returns {Long} The corresponding Long value\r\n */\r\nLong.fromBytes = function fromBytes(bytes, unsigned, le) {\r\n   return le ? Long.fromBytesLE(bytes, unsigned) : Long.fromBytesBE(bytes, unsigned);\r\n};\r\n\r\n/**\r\n * Creates a Long from its little endian byte representation.\r\n * @param {!Array.<number>} bytes Little endian byte representation\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {Long} The corresponding Long value\r\n */\r\nLong.fromBytesLE = function fromBytesLE(bytes, unsigned) {\r\n   return new Long(\r\n   bytes[0] |\r\n   bytes[1] << 8 |\r\n   bytes[2] << 16 |\r\n   bytes[3] << 24,\r\n   bytes[4] |\r\n   bytes[5] << 8 |\r\n   bytes[6] << 16 |\r\n   bytes[7] << 24,\r\n   unsigned\r\n   );\r\n};\r\n\r\n/**\r\n * Creates a Long from its big endian byte representation.\r\n * @param {!Array.<number>} bytes Big endian byte representation\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {Long} The corresponding Long value\r\n */\r\nLong.fromBytesBE = function fromBytesBE(bytes, unsigned) {\r\n   return new Long(\r\n   bytes[4] << 24 |\r\n   bytes[5] << 16 |\r\n   bytes[6] << 8 |\r\n   bytes[7],\r\n   bytes[0] << 24 |\r\n   bytes[1] << 16 |\r\n   bytes[2] << 8 |\r\n   bytes[3],\r\n   unsigned\r\n   );\r\n};\r\n","/*eslint-disable block-scoped-var, id-length, no-control-regex, no-

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magic-numbers, no-prototype-builtins, no-redeclare, no-shadow, no-var, sort-vars*/\n\"use strict\";\n\nvar $protobuf
= require(\"protobufjs/minimal\");\n\n// Common aliases\nvar $Reader = $protobuf.Reader, $Writer =
$protobuf.Writer, $util = $protobuf.util;\n\n// Exported root namespace\nvar $root = $protobuf.roots[\"default\"] ||
($protobuf.roots[\"default\"] = {});\n\n$root.onnx = (function() {\n\n    /**\n     * Namespace onnx.\n     * @exports
onnx\n     * @namespace\n     */\n    var onnx = {};\n\n    /**\n     * Version enum.\n     * @name onnx.Version\n
* @enum {string}\n     * @property {number} _START_VERSION=0 _START_VERSION value\n     * @property
{number} IR_VERSION_2017_10_10=1 IR_VERSION_2017_10_10 value\n     * @property {number}
IR_VERSION_2017_10_30=2 IR_VERSION_2017_10_30 value\n     * @property {number}
IR_VERSION_2017_11_3=3 IR_VERSION_2017_11_3 value\n     * @property {number}
IR_VERSION_2019_1_22=4 IR_VERSION_2019_1_22 value\n     * @property {number} IR_VERSION=5
IR_VERSION value\n     */\n    onnx.Version = (function() {\n        var valuesById = {}, values =
Object.create(valuesById);\n        values[valuesById[0] = \"_START_VERSION\"] = 0;\n        values[valuesById[1]
= \"IR_VERSION_2017_10_10\"] = 1;\n        values[valuesById[2] = \"IR_VERSION_2017_10_30\"] = 2;\n
values[valuesById[3] = \"IR_VERSION_2017_11_3\"] = 3;\n        values[valuesById[4] =
\"IR_VERSION_2019_1_22\"] = 4;\n        values[valuesById[5] = \"IR_VERSION\"] = 5;\n        return values;\n
})();\n\n    onnx.AttributeProto = (function() {\n\n        /**\n         * Properties of an AttributeProto.\n         *
@memberof onnx\n         * @interface IAttributeProto\n         * @property {string|null} [name] AttributeProto
name\n         * @property {string|null} [refAttrName] AttributeProto refAttrName\n         * @property {string|null}
[docString] AttributeProto docString\n         * @property {onnx.AttributeProto.AttributeType|null} [type]
AttributeProto type\n         * @property {number|null} [f] AttributeProto f\n         * @property {number|Long|null}
[i] AttributeProto i\n         * @property {Uint8Array|null} [s] AttributeProto s\n         * @property
{onnx.ITensorProto|null} [t] AttributeProto t\n         * @property {onnx.IGraphProto|null} [g] AttributeProto g\n
 * @property {Array.<number>|null} [floats] AttributeProto floats\n         * @property
{Array.<number|Long>|null} [ints] AttributeProto ints\n         * @property {Array.<Uint8Array>|null} [strings]
AttributeProto strings\n         * @property {Array.<onnx.ITensorProto>|null} [tensors] AttributeProto tensors\n
* @property {Array.<onnx.IGraphProto>|null} [graphs] AttributeProto graphs\n         */\n\n        /**\n         *
Constructs a new AttributeProto.\n         * @memberof onnx\n         * @classdesc Represents an AttributeProto.\n
  * @implements IAttributeProto\n         * @constructor\n         * @param {onnx.IAttributeProto=} [properties]
Properties to set\n         */\n        function AttributeProto(properties) {\n            this.floats = [];\n            this.ints =
[];\n            this.strings = [];\n            this.tensors = [];\n            this.graphs = [];\n            if (properties)\n
for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n                    if (properties[keys[i]] != null)\n
            this[keys[i]] = properties[keys[i]];\n        }\n\n        /**\n         * AttributeProto name.\n         * @member
{string} name\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.name = \"\";\n\n        /**\n         * AttributeProto refAttrName.\n         * @member {string}
refAttrName\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.refAttrName = \"\";\n\n        /**\n         * AttributeProto docString.\n         * @member
{string} docString\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.docString = \"\";\n\n        /**\n         * AttributeProto type.\n         * @member
{onnx.AttributeProto.AttributeType} type\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
    AttributeProto.prototype.type = 0;\n\n        /**\n         * AttributeProto f.\n         * @member {number} f\n         *
@memberof onnx.AttributeProto\n         * @instance\n         */\n        AttributeProto.prototype.f = 0;\n\n        /**\n
   * AttributeProto i.\n         * @member {number|Long} i\n         * @memberof onnx.AttributeProto\n         *
@instance\n         */\n        AttributeProto.prototype.i = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n        /**\n
      * AttributeProto s.\n         * @member {Uint8Array} s\n         * @memberof onnx.AttributeProto\n         *
@instance\n         */\n        AttributeProto.prototype.s = $util.newBuffer([]);\n\n        /**\n         * AttributeProto t.\n
    * @member {onnx.ITensorProto|null|undefined} t\n         * @memberof onnx.AttributeProto\n         *
@instance\n         */\n        AttributeProto.prototype.t = null;\n\n        /**\n         * AttributeProto g.\n         *
@member {onnx.IGraphProto|null|undefined} g\n         * @memberof onnx.AttributeProto\n         * @instance\n
```

*/\n AttributeProto.prototype.g = null;\n\n /**\n * AttributeProto floats.\n * @member {Array.<number>} floats\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.floats = $util.emptyArray;\n\n /**\n * AttributeProto ints.\n * @member {Array.<number|Long>} ints\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.ints = $util.emptyArray;\n\n /**\n * AttributeProto strings.\n * @member {Array.<Uint8Array>} strings\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.strings = $util.emptyArray;\n\n /**\n * AttributeProto tensors.\n * @member {Array.<onnx.ITensorProto>} tensors\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.tensors = $util.emptyArray;\n\n /**\n * AttributeProto graphs.\n * @member {Array.<onnx.IGraphProto>} graphs\n * @memberof onnx.AttributeProto\n * @instance\n */\n AttributeProto.prototype.graphs = $util.emptyArray;\n\n /**\n * Creates a new AttributeProto instance using the specified properties.\n * @function create\n * @memberof onnx.AttributeProto\n * @static\n * @param {onnx.IAttributeProto=} [properties] Properties to set\n * @returns {onnx.AttributeProto} AttributeProto instance\n */\n AttributeProto.create = function create(properties) {\n return new AttributeProto(properties);\n };\n\n /**\n * Encodes the specified AttributeProto message. Does not implicitly {@link onnx.AttributeProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.AttributeProto\n * @static\n * @param {onnx.IAttributeProto} message AttributeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n AttributeProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.name != null && message.hasOwnProperty(\"name\"))\n writer.uint32(/* id 1, wireType 2 =*/10).string(message.name);\n if (message.f != null && message.hasOwnProperty(\"f\"))\n writer.uint32(/* id 2, wireType 5 =*/21).float(message.f);\n if (message.i != null && message.hasOwnProperty(\"i\"))\n writer.uint32(/* id 3, wireType 0 =*/24).int64(message.i);\n if (message.s != null && message.hasOwnProperty(\"s\"))\n writer.uint32(/* id 4, wireType 2 =*/34).bytes(message.s);\n if (message.t != null && message.hasOwnProperty(\"t\"))\n $root.onnx.TensorProto.encode(message.t, writer.uint32(/* id 5, wireType 2 =*/42).fork()).ldelim();\n if (message.g != null && message.hasOwnProperty(\"g\"))\n $root.onnx.GraphProto.encode(message.g, writer.uint32(/* id 6, wireType 2 =*/50).fork()).ldelim();\n if (message.floats != null && message.floats.length) {\n writer.uint32(/* id 7, wireType 2 =*/58).fork();\n for (var i = 0; i < message.floats.length; ++i)\n writer.float(message.floats[i]);\n writer.ldelim();\n }\n if (message.ints != null && message.ints.length) {\n writer.uint32(/* id 8, wireType 2 =*/66).fork();\n for (var i = 0; i < message.ints.length; ++i)\n writer.int64(message.ints[i]);\n writer.ldelim();\n }\n if (message.strings != null && message.strings.length)\n for (var i = 0; i < message.strings.length; ++i)\n writer.uint32(/* id 9, wireType 2 =*/74).bytes(message.strings[i]);\n if (message.tensors != null && message.tensors.length)\n for (var i = 0; i < message.tensors.length; ++i)\n $root.onnx.TensorProto.encode(message.tensors[i], writer.uint32(/* id 10, wireType 2 =*/82).fork()).ldelim();\n if (message.graphs != null && message.graphs.length)\n for (var i = 0; i < message.graphs.length; ++i)\n $root.onnx.GraphProto.encode(message.graphs[i], writer.uint32(/* id 11, wireType 2 =*/90).fork()).ldelim();\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n writer.uint32(/* id 13, wireType 2 =*/106).string(message.docString);\n if (message.type != null && message.hasOwnProperty(\"type\"))\n writer.uint32(/* id 20, wireType 0 =*/160).int32(message.type);\n if (message.refAttrName != null && message.hasOwnProperty(\"refAttrName\"))\n writer.uint32(/* id 21, wireType 2 =*/170).string(message.refAttrName);\n return writer;\n };\n\n /**\n * Encodes the specified AttributeProto message, length delimited. Does not implicitly {@link onnx.AttributeProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.AttributeProto\n * @static\n * @param {onnx.IAttributeProto} message AttributeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns

{$protobuf.Writer} Writer\n */\n AttributeProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes an AttributeProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.AttributeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.AttributeProto} AttributeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n AttributeProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.AttributeProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.name = reader.string();\n break;\n case 21:\n message.refAttrName = reader.string();\n break;\n case 13:\n message.docString = reader.string();\n break;\n case 20:\n message.type = reader.int32();\n break;\n case 2:\n message.f = reader.float();\n break;\n case 3:\n message.i = reader.int64();\n break;\n case 4:\n message.s = reader.bytes();\n break;\n case 5:\n message.t = $root.onnx.TensorProto.decode(reader, reader.uint32());\n break;\n case 6:\n message.g = $root.onnx.GraphProto.decode(reader, reader.uint32());\n break;\n case 7:\n if (!(message.floats && message.floats.length))\n message.floats = [];\n if ((tag & 7) === 2) {\n var end2 = reader.uint32() + reader.pos;\n while (reader.pos < end2)\n message.floats.push(reader.float());\n } else\n message.floats.push(reader.float());\n break;\n case 8:\n if (!(message.ints && message.ints.length))\n message.ints = [];\n if ((tag & 7) === 2) {\n var end2 = reader.uint32() + reader.pos;\n while (reader.pos < end2)\n message.ints.push(reader.int64());\n } else\n message.ints.push(reader.int64());\n break;\n case 9:\n if (!(message.strings && message.strings.length))\n message.strings = [];\n message.strings.push(reader.bytes());\n break;\n case 10:\n if (!(message.tensors && message.tensors.length))\n message.tensors = [];\n message.tensors.push($root.onnx.TensorProto.decode(reader, reader.uint32()));\n break;\n case 11:\n if (!(message.graphs && message.graphs.length))\n message.graphs = [];\n message.graphs.push($root.onnx.GraphProto.decode(reader, reader.uint32()));\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes an AttributeProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.AttributeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.AttributeProto} AttributeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n AttributeProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies an AttributeProto message.\n * @function verify\n * @memberof onnx.AttributeProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n AttributeProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.name != null && message.hasOwnProperty(\"name\"))\n if (!$util.isString(message.name))\n return \"name: string expected\";\n if (message.refAttrName != null && message.hasOwnProperty(\"refAttrName\"))\n if (!$util.isString(message.refAttrName))\n return \"refAttrName: string expected\";\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n if (!$util.isString(message.docString))\n return

\"docString: string expected\";\n if (message.type != null && message.hasOwnProperty(\"type\"))\n switch (message.type) {\n default:\n return \"type: enum value expected\";\n case 0:\n case 1:\n case 2:\n case 3:\n case 4:\n case 5:\n case 6:\n case 7:\n case 8:\n case 9:\n case 10:\n break;\n }\n if (message.f != null && message.hasOwnProperty(\"f\"))\n if (typeof message.f !== \"number\")\n return \"f: number expected\";\n if (message.i != null && message.hasOwnProperty(\"i\"))\n if (!$util.isInteger(message.i) && !(message.i && $util.isInteger(message.i.low) && $util.isInteger(message.i.high)))\n return \"i: integer|Long expected\";\n if (message.s != null && message.hasOwnProperty(\"s\"))\n if (!(message.s && typeof message.s.length === \"number\" || $util.isString(message.s)))\n return \"s: buffer expected\";\n if (message.t != null && message.hasOwnProperty(\"t\")) {\n var error = $root.onnx.TensorProto.verify(message.t);\n if (error)\n return \"t.\" + error;\n }\n if (message.g != null && message.hasOwnProperty(\"g\")) {\n var error = $root.onnx.GraphProto.verify(message.g);\n if (error)\n return \"g.\" + error;\n }\n if (message.floats != null && message.hasOwnProperty(\"floats\")) {\n if (!Array.isArray(message.floats))\n return \"floats: array expected\";\n for (var i = 0; i < message.floats.length; ++i)\n if (typeof message.floats[i] !== \"number\")\n return \"floats: number[] expected\";\n }\n if (message.ints != null && message.hasOwnProperty(\"ints\")) {\n if (!Array.isArray(message.ints))\n return \"ints: array expected\";\n for (var i = 0; i < message.ints.length; ++i)\n if (!$util.isInteger(message.ints[i]) && !(message.ints[i] && $util.isInteger(message.ints[i].low) && $util.isInteger(message.ints[i].high)))\n return \"ints: integer|Long[] expected\";\n }\n if (message.strings != null && message.hasOwnProperty(\"strings\")) {\n if (!Array.isArray(message.strings))\n return \"strings: array expected\";\n for (var i = 0; i < message.strings.length; ++i)\n if (!(message.strings[i] && typeof message.strings[i].length === \"number\" || $util.isString(message.strings[i])))\n return \"strings: buffer[] expected\";\n }\n if (message.tensors != null && message.hasOwnProperty(\"tensors\")) {\n if (!Array.isArray(message.tensors))\n return \"tensors: array expected\";\n for (var i = 0; i < message.tensors.length; ++i) {\n var error = $root.onnx.TensorProto.verify(message.tensors[i]);\n if (error)\n return \"tensors.\" + error;\n }\n }\n if (message.graphs != null && message.hasOwnProperty(\"graphs\")) {\n if (!Array.isArray(message.graphs))\n return \"graphs: array expected\";\n for (var i = 0; i < message.graphs.length; ++i) {\n var error = $root.onnx.GraphProto.verify(message.graphs[i]);\n if (error)\n return \"graphs.\" + error;\n }\n }\n return null;\n };\n\n /**\n * Creates an AttributeProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.AttributeProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.AttributeProto} AttributeProto\n */\n AttributeProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.AttributeProto)\n return object;\n var message = new $root.onnx.AttributeProto();\n if (object.name != null)\n message.name = String(object.name);\n if (object.refAttrName != null)\n message.refAttrName = String(object.refAttrName);\n if (object.docString != null)\n message.docString = String(object.docString);\n switch (object.type) {\n case \"UNDEFINED\":\n case 0:\n message.type = 0;\n break;\n case \"FLOAT\":\n case 1:\n message.type = 1;\n break;\n case \"INT\":\n case 2:\n message.type = 2;\n break;\n case \"STRING\":\n case 3:\n message.type = 3;\n break;\n case \"TENSOR\":\n case 4:\n message.type = 4;\n break;\n case \"GRAPH\":\n case 5:\n message.type = 5;\n break;\n case \"FLOATS\":\n case 6:\n message.type = 6;\n break;\n case \"INTS\":\n case 7:\n message.type = 7;\n break;\n case \"STRINGS\":\n case 8:\n message.type = 8;\n break;\n case \"TENSORS\":\n

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case 9:\n                message.type = 9;\n                break;\n            case \"GRAPHS\":\n            case 10:\n
message.type = 10;\n                break;\n            }\n            if (object.f != null)\n                message.f =
Number(object.f);\n            if (object.i != null)\n                if ($util.Long)\n                    (message.i =
$util.Long.fromValue(object.i)).unsigned = false;\n                else if (typeof object.i === \"string\")\n
message.i = parseInt(object.i, 10);\n                else if (typeof object.i === \"number\")\n                    message.i =
object.i;\n                else if (typeof object.i === \"object\")\n                    message.i = new $util.LongBits(object.i.low
>>> 0, object.i.high >>> 0).toNumber();\n            if (object.s != null)\n                if (typeof object.s === \"string\")\n
                $util.base64.decode(object.s, message.s = $util.newBuffer($util.base64.length(object.s)), 0);\n
else if (object.s.length)\n                    message.s = object.s;\n            if (object.t != null) {\n                if (typeof
object.t !== \"object\")\n                    throw TypeError(\".onnx.AttributeProto.t: object expected\");\n
message.t = $root.onnx.TensorProto.fromObject(object.t);\n            }\n            if (object.g != null) {\n                if
(typeof object.g !== \"object\")\n                    throw TypeError(\".onnx.AttributeProto.g: object expected\");\n
   message.g = $root.onnx.GraphProto.fromObject(object.g);\n            }\n            if (object.floats) {\n                if
(!Array.isArray(object.floats))\n                    throw TypeError(\".onnx.AttributeProto.floats: array expected\");\n
      message.floats = [];\n                for (var i = 0; i < object.floats.length; ++i)\n                    message.floats[i] =
Number(object.floats[i]);\n            }\n            if (object.ints) {\n                if (!Array.isArray(object.ints))\n
 throw TypeError(\".onnx.AttributeProto.ints: array expected\");\n                message.ints = [];\n                for (var i =
0; i < object.ints.length; ++i)\n                    if ($util.Long)\n                        (message.ints[i] =
$util.Long.fromValue(object.ints[i])).unsigned = false;\n                    else if (typeof object.ints[i] === \"string\")\n
                  message.ints[i] = parseInt(object.ints[i], 10);\n                    else if (typeof object.ints[i] === \"number\")\n
                      message.ints[i] = object.ints[i];\n                    else if (typeof object.ints[i] === \"object\")\n
  message.ints[i] = new $util.LongBits(object.ints[i].low >>> 0, object.ints[i].high >>> 0).toNumber();\n            }\n
        if (object.strings) {\n                if (!Array.isArray(object.strings))\n                    throw
TypeError(\".onnx.AttributeProto.strings: array expected\");\n                message.strings = [];\n                for (var i =
0; i < object.strings.length; ++i)\n                    if (typeof object.strings[i] === \"string\")\n
$util.base64.decode(object.strings[i], message.strings[i] = $util.newBuffer($util.base64.length(object.strings[i])),
0);\n                    else if (object.strings[i].length)\n                        message.strings[i] = object.strings[i];\n            }\n
       if (object.tensors) {\n                if (!Array.isArray(object.tensors))\n                    throw
TypeError(\".onnx.AttributeProto.tensors: array expected\");\n                message.tensors = [];\n                for (var i =
0; i < object.tensors.length; ++i) {\n                    if (typeof object.tensors[i] !== \"object\")\n                        throw
TypeError(\".onnx.AttributeProto.tensors: object expected\");\n                    message.tensors[i] =
$root.onnx.TensorProto.fromObject(object.tensors[i]);\n                }\n            }\n            if (object.graphs) {\n
 if (!Array.isArray(object.graphs))\n                    throw TypeError(\".onnx.AttributeProto.graphs: array
expected\");\n                message.graphs = [];\n                for (var i = 0; i < object.graphs.length; ++i) {\n
if (typeof object.graphs[i] !== \"object\")\n                        throw TypeError(\".onnx.AttributeProto.graphs: object
expected\");\n                    message.graphs[i] = $root.onnx.GraphProto.fromObject(object.graphs[i]);\n                }\n
         }\n            return message;\n        };\n\n        /**\n         * Creates a plain object from an AttributeProto
message. Also converts values to other types if specified.\n         * @function toObject\n         * @memberof
onnx.AttributeProto\n         * @static\n         * @param {onnx.AttributeProto} message AttributeProto\n         *
@param {$protobuf.IConversionOptions} [options] Conversion options\n         * @returns {Object.<string,*>}
Plain object\n         */\n        AttributeProto.toObject = function toObject(message, options) {\n            if (!options)\n
            options = {};\n            var object = {};\n            if (options.arrays || options.defaults) {\n
object.floats = [];\n                object.ints = [];\n                object.strings = [];\n                object.tensors = [];\n
object.graphs = [];\n            }\n            if (options.defaults) {\n                object.name = \"\";\n                object.f = 0;\n
            if ($util.Long) {\n                    var long = new $util.Long(0, 0, false);\n                    object.i = options.longs
=== String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n                } else\n
object.i = options.longs === String ? \"0\" : 0;\n                if (options.bytes === String)\n                    object.s =
\"\";\n                else {\n                    object.s = [];\n                    if (options.bytes !== Array)\n                        object.s
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= $util.newBuffer(object.s);\n            }\n            object.t = null;\n            object.g = null;\n
object.docString = \"\";\n            object.type = options.enums === String ? \"UNDEFINED\" : 0;\n
object.refAttrName = \"\";\n        }\n        if (message.name != null && message.hasOwnProperty(\"name\"))\n
        object.name = message.name;\n        if (message.f != null && message.hasOwnProperty(\"f\"))\n
object.f = options.json && !isFinite(message.f) ? String(message.f) : message.f;\n        if (message.i != null &&
message.hasOwnProperty(\"i\"))\n            if (typeof message.i === \"number\")\n                object.i =
options.longs === String ? String(message.i) : message.i;\n            else\n                object.i = options.longs ===
String ? $util.Long.prototype.toString.call(message.i) : options.longs === Number ? new
$util.LongBits(message.i.low >>> 0, message.i.high >>> 0).toNumber() : message.i;\n        if (message.s != null
&& message.hasOwnProperty(\"s\"))\n            object.s = options.bytes === String ?
$util.base64.encode(message.s, 0, message.s.length) : options.bytes === Array ?
Array.prototype.slice.call(message.s) : message.s;\n        if (message.t != null &&
message.hasOwnProperty(\"t\"))\n            object.t = $root.onnx.TensorProto.toObject(message.t, options);\n
if (message.g != null && message.hasOwnProperty(\"g\"))\n            object.g =
$root.onnx.GraphProto.toObject(message.g, options);\n        if (message.floats && message.floats.length) {\n
     object.floats = [];\n            for (var j = 0; j < message.floats.length; ++j)\n                object.floats[j] =
options.json && !isFinite(message.floats[j]) ? String(message.floats[j]) : message.floats[j];\n        }\n        if
(message.ints && message.ints.length) {\n            object.ints = [];\n            for (var j = 0; j <
message.ints.length; ++j)\n                if (typeof message.ints[j] === \"number\")\n                    object.ints[j] =
options.longs === String ? String(message.ints[j]) : message.ints[j];\n                else\n                    object.ints[j]
= options.longs === String ? $util.Long.prototype.toString.call(message.ints[j]) : options.longs === Number ? new
$util.LongBits(message.ints[j].low >>> 0, message.ints[j].high >>> 0).toNumber() : message.ints[j];\n        }\n
  if (message.strings && message.strings.length) {\n            object.strings = [];\n            for (var j = 0; j <
message.strings.length; ++j)\n                object.strings[j] = options.bytes === String ?
$util.base64.encode(message.strings[j], 0, message.strings[j].length) : options.bytes === Array ?
Array.prototype.slice.call(message.strings[j]) : message.strings[j];\n        }\n        if (message.tensors &&
message.tensors.length) {\n            object.tensors = [];\n            for (var j = 0; j < message.tensors.length; ++j)\n
                object.tensors[j] = $root.onnx.TensorProto.toObject(message.tensors[j], options);\n        }\n        if
(message.graphs && message.graphs.length) {\n            object.graphs = [];\n            for (var j = 0; j <
message.graphs.length; ++j)\n                object.graphs[j] = $root.onnx.GraphProto.toObject(message.graphs[j],
options);\n        }\n        if (message.docString != null && message.hasOwnProperty(\"docString\"))\n
object.docString = message.docString;\n        if (message.type != null && message.hasOwnProperty(\"type\"))\n
        object.type = options.enums === String ? $root.onnx.AttributeProto.AttributeType[message.type] :
message.type;\n        if (message.refAttrName != null && message.hasOwnProperty(\"refAttrName\"))\n
object.refAttrName = message.refAttrName;\n        return object;\n    };\n\n    /**\n     * Converts this
AttributeProto to JSON.\n     * @function toJSON\n     * @memberof onnx.AttributeProto\n     *
@instance\n     * @returns {Object.<string,*>} JSON object\n     */\n    AttributeProto.prototype.toJSON =
function toJSON() {\n        return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n    };\n\n
/**\n     * AttributeType enum.\n     * @name onnx.AttributeProto.AttributeType\n     * @enum {string}\n
  * @property {number} UNDEFINED=0 UNDEFINED value\n     * @property {number} FLOAT=1 FLOAT
value\n     * @property {number} INT=2 INT value\n     * @property {number} STRING=3 STRING value\n
   * @property {number} TENSOR=4 TENSOR value\n     * @property {number} GRAPH=5 GRAPH value\n
   * @property {number} FLOATS=6 FLOATS value\n     * @property {number} INTS=7 INTS value\n     *
@property {number} STRINGS=8 STRINGS value\n     * @property {number} TENSORS=9 TENSORS
value\n     * @property {number} GRAPHS=10 GRAPHS value\n     */\n    AttributeProto.AttributeType =
(function() {\n        var valuesById = {}, values = Object.create(valuesById);\n        values[valuesById[0] =
\"UNDEFINED\"] = 0;\n        values[valuesById[1] = \"FLOAT\"] = 1;\n        values[valuesById[2] = \"INT\"]
= 2;\n        values[valuesById[3] = \"STRING\"] = 3;\n        values[valuesById[4] = \"TENSOR\"] = 4;\n
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values[valuesById[5] = \"GRAPH\"] = 5;\n values[valuesById[6] = \"FLOATS\"] = 6;\n values[valuesById[7] = \"INTS\"] = 7;\n values[valuesById[8] = \"STRINGS\"] = 8;\n values[valuesById[9] = \"TENSORS\"] = 9;\n values[valuesById[10] = \"GRAPHS\"] = 10;\n return values;\n })();\n\n return AttributeProto;\n })();\n\n onnx.ValueInfoProto = (function() {\n\n /**\n * Properties of a ValueInfoProto.\n * @memberof onnx\n * @interface IValueInfoProto\n * @property {string|null} [name] ValueInfoProto name\n * @property {onnx.ITypeProto|null} [type] ValueInfoProto type\n * @property {string|null} [docString] ValueInfoProto docString\n */\n\n /**\n * Constructs a new ValueInfoProto.\n * @memberof onnx\n * @classdesc Represents a ValueInfoProto.\n * @implements IValueInfoProto\n * @constructor\n * @param {onnx.IValueInfoProto=} [properties] Properties to set\n */\n function ValueInfoProto(properties) {\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * ValueInfoProto name.\n * @member {string} name\n * @memberof onnx.ValueInfoProto\n * @instance\n */\n ValueInfoProto.prototype.name = \"\";\n\n /**\n * ValueInfoProto type.\n * @member {onnx.ITypeProto|null|undefined} type\n * @memberof onnx.ValueInfoProto\n * @instance\n */\n ValueInfoProto.prototype.type = null;\n\n /**\n * ValueInfoProto docString.\n * @member {string} docString\n * @memberof onnx.ValueInfoProto\n * @instance\n */\n ValueInfoProto.prototype.docString = \"\";\n\n /**\n * Creates a new ValueInfoProto instance using the specified properties.\n * @function create\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {onnx.IValueInfoProto=} [properties] Properties to set\n * @returns {onnx.ValueInfoProto} ValueInfoProto instance\n */\n ValueInfoProto.create = function create(properties) {\n return new ValueInfoProto(properties);\n };\n\n /**\n * Encodes the specified ValueInfoProto message. Does not implicitly {@link onnx.ValueInfoProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {onnx.IValueInfoProto} message ValueInfoProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n ValueInfoProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.name != null && message.hasOwnProperty(\"name\"))\n writer.uint32(/* id 1, wireType 2 =*/10).string(message.name);\n if (message.type != null && message.hasOwnProperty(\"type\"))\n $root.onnx.TypeProto.encode(message.type, writer.uint32(/* id 2, wireType 2 =*/18).fork()).ldelim();\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n writer.uint32(/* id 3, wireType 2 =*/26).string(message.docString);\n return writer;\n };\n\n /**\n * Encodes the specified ValueInfoProto message, length delimited. Does not implicitly {@link onnx.ValueInfoProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {onnx.IValueInfoProto} message ValueInfoProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n ValueInfoProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a ValueInfoProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.ValueInfoProto} ValueInfoProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n ValueInfoProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.ValueInfoProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.name = reader.string();\n break;\n case 2:\n message.type = $root.onnx.TypeProto.decode(reader, reader.uint32());\n break;\n case 3:\n message.docString = reader.string();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a ValueInfoProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.ValueInfoProto} ValueInfoProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n ValueInfoProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a ValueInfoProto message.\n * @function verify\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n ValueInfoProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.name != null && message.hasOwnProperty(\"name\"))\n if (!$util.isString(message.name))\n return \"name: string expected\";\n if (message.type != null && message.hasOwnProperty(\"type\")) {\n var error = $root.onnx.TypeProto.verify(message.type);\n if (error)\n return \"type.\" + error;\n }\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n if (!$util.isString(message.docString))\n return \"docString: string expected\";\n return null;\n };\n\n /**\n * Creates a ValueInfoProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.ValueInfoProto} ValueInfoProto\n */\n ValueInfoProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.ValueInfoProto)\n return object;\n var message = new $root.onnx.ValueInfoProto();\n if (object.name != null)\n message.name = String(object.name);\n if (object.type != null) {\n if (typeof object.type !== \"object\")\n throw TypeError(\".onnx.ValueInfoProto.type: object expected\");\n message.type = $root.onnx.TypeProto.fromObject(object.type);\n }\n if (object.docString != null)\n message.docString = String(object.docString);\n return message;\n };\n\n /**\n * Creates a plain object from a ValueInfoProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {onnx.ValueInfoProto} message ValueInfoProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n ValueInfoProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.defaults) {\n object.name = \"\";\n object.type = null;\n object.docString = \"\";\n }\n if (message.name != null && message.hasOwnProperty(\"name\"))\n object.name = message.name;\n if (message.type != null && message.hasOwnProperty(\"type\"))\n object.type = $root.onnx.TypeProto.toObject(message.type, options);\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n object.docString = message.docString;\n return object;\n };\n\n /**\n * Converts this ValueInfoProto to JSON.\n * @function toJSON\n * @memberof onnx.ValueInfoProto\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n ValueInfoProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return ValueInfoProto;\n })();\n\n onnx.NodeProto = (function() {\n\n /**\n * Properties of a NodeProto.\n * @memberof onnx\n * @interface INodeProto\n * @property {Array.<string>|null} [input] NodeProto input\n * @property {Array.<string>|null} [output] NodeProto output\n * @property {string|null} [name] NodeProto name\n * @property {string|null} [opType] NodeProto opType\n * @property {string|null} [domain] NodeProto domain\n * @property {Array.<onnx.IAttributeProto>|null} [attribute] NodeProto attribute\n * @property {string|null} [docString] NodeProto docString\n */\n\n /**\n * Constructs a new NodeProto.\n *

@memberof onnx\n * @classdesc Represents a NodeProto.\n * @implements INodeProto\n * @constructor\n * @param {onnx.INodeProto=} [properties] Properties to set\n */\n function NodeProto(properties) {\n this.input = [];\n this.output = [];\n this.attribute = [];\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * NodeProto input.\n * @member {Array.<string>} input\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.input = $util.emptyArray;\n\n /**\n * NodeProto output.\n * @member {Array.<string>} output\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.output = $util.emptyArray;\n\n /**\n * NodeProto name.\n * @member {string} name\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.name = \"\";\n\n /**\n * NodeProto opType.\n * @member {string} opType\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.opType = \"\";\n\n /**\n * NodeProto domain.\n * @member {string} domain\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.domain = \"\";\n\n /**\n * NodeProto attribute.\n * @member {Array.<onnx.IAttributeProto>} attribute\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.attribute = $util.emptyArray;\n\n /**\n * NodeProto docString.\n * @member {string} docString\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.docString = \"\";\n\n /**\n * Creates a new NodeProto instance using the specified properties.\n * @function create\n * @memberof onnx.NodeProto\n * @static\n * @param {onnx.INodeProto=} [properties] Properties to set\n * @returns {onnx.NodeProto} NodeProto instance\n */\n NodeProto.create = function create(properties) {\n return new NodeProto(properties);\n };\n\n /**\n * Encodes the specified NodeProto message. Does not implicitly {@link onnx.NodeProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.NodeProto\n * @static\n * @param {onnx.INodeProto} message NodeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n NodeProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.input != null && message.input.length)\n for (var i = 0; i < message.input.length; ++i)\n writer.uint32(/* id 1, wireType 2 =*/10).string(message.input[i]);\n if (message.output != null && message.output.length)\n for (var i = 0; i < message.output.length; ++i)\n writer.uint32(/* id 2, wireType 2 =*/18).string(message.output[i]);\n if (message.name != null && message.hasOwnProperty(\"name\"))\n writer.uint32(/* id 3, wireType 2 =*/26).string(message.name);\n if (message.opType != null && message.hasOwnProperty(\"opType\"))\n writer.uint32(/* id 4, wireType 2 =*/34).string(message.opType);\n if (message.attribute != null && message.attribute.length)\n for (var i = 0; i < message.attribute.length; ++i)\n $root.onnx.AttributeProto.encode(message.attribute[i], writer.uint32(/* id 5, wireType 2 =*/42).fork()).ldelim();\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n writer.uint32(/* id 6, wireType 2 =*/50).string(message.docString);\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n writer.uint32(/* id 7, wireType 2 =*/58).string(message.domain);\n return writer;\n };\n\n /**\n * Encodes the specified NodeProto message, length delimited. Does not implicitly {@link onnx.NodeProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.NodeProto\n * @static\n * @param {onnx.INodeProto} message NodeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n NodeProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a NodeProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.NodeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.NodeProto} NodeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n NodeProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.NodeProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n if (!(message.input && message.input.length))\n message.input = [];\n message.input.push(reader.string());\n break;\n case 2:\n if (!(message.output && message.output.length))\n message.output = [];\n message.output.push(reader.string());\n break;\n case 3:\n message.name = reader.string();\n break;\n case 4:\n message.opType = reader.string();\n break;\n case 7:\n message.domain = reader.string();\n break;\n case 5:\n if (!(message.attribute && message.attribute.length))\n message.attribute = [];\n message.attribute.push($root.onnx.AttributeProto.decode(reader, reader.uint32()));\n break;\n case 6:\n message.docString = reader.string();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a NodeProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.NodeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.NodeProto} NodeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n NodeProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a NodeProto message.\n * @function verify\n * @memberof onnx.NodeProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n NodeProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.input != null && message.hasOwnProperty(\"input\")) {\n if (!Array.isArray(message.input))\n return \"input: array expected\";\n for (var i = 0; i < message.input.length; ++i)\n if (!$util.isString(message.input[i]))\n return \"input: string[] expected\";\n }\n if (message.output != null && message.hasOwnProperty(\"output\")) {\n if (!Array.isArray(message.output))\n return \"output: array expected\";\n for (var i = 0; i < message.output.length; ++i)\n if (!$util.isString(message.output[i]))\n return \"output: string[] expected\";\n }\n if (message.name != null && message.hasOwnProperty(\"name\"))\n if (!$util.isString(message.name))\n return \"name: string expected\";\n if (message.opType != null && message.hasOwnProperty(\"opType\"))\n if (!$util.isString(message.opType))\n return \"opType: string expected\";\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n if (!$util.isString(message.domain))\n return \"domain: string expected\";\n if (message.attribute != null && message.hasOwnProperty(\"attribute\")) {\n if (!Array.isArray(message.attribute))\n return \"attribute: array expected\";\n for (var i = 0; i < message.attribute.length; ++i) {\n var error = $root.onnx.AttributeProto.verify(message.attribute[i]);\n if (error)\n return \"attribute.\" + error;\n }\n }\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n if (!$util.isString(message.docString))\n return \"docString: string expected\";\n return null;\n };\n\n /**\n * Creates a NodeProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.NodeProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.NodeProto} NodeProto\n */\n NodeProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.NodeProto)\n return object;\n var message = new $root.onnx.NodeProto();\n if (object.input) {\n if (!Array.isArray(object.input))\n throw TypeError(\".onnx.NodeProto.input: array expected\");\n message.input = [];\n for

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(var i = 0; i < object.input.length; ++i)\n                    message.input[i] = String(object.input[i]);\n            }\n            if
(object.output) {\n                if (!Array.isArray(object.output))\n                    throw
TypeError(\".onnx.NodeProto.output: array expected\");\n                message.output = [];\n                for (var i = 0; i
< object.output.length; ++i)\n                    message.output[i] = String(object.output[i]);\n            }\n            if
(object.name != null)\n                message.name = String(object.name);\n            if (object.opType != null)\n
message.opType = String(object.opType);\n            if (object.domain != null)\n                message.domain =
String(object.domain);\n            if (object.attribute) {\n                if (!Array.isArray(object.attribute))\n
throw TypeError(\".onnx.NodeProto.attribute: array expected\");\n                message.attribute = [];\n                for
(var i = 0; i < object.attribute.length; ++i) {\n                    if (typeof object.attribute[i] !== \"object\")\n
throw TypeError(\".onnx.NodeProto.attribute: object expected\");\n                    message.attribute[i] =
$root.onnx.AttributeProto.fromObject(object.attribute[i]);\n                }\n            }\n            if (object.docString !=
null)\n                message.docString = String(object.docString);\n            return message;\n        };\n\n        /**\n
* Creates a plain object from a NodeProto message. Also converts values to other types if specified.\n         *
@function toObject\n         * @memberof onnx.NodeProto\n         * @static\n         * @param {onnx.NodeProto}
message NodeProto\n         * @param {$protobuf.IConversionOptions} [options] Conversion options\n         *
@returns {Object.<string,*>} Plain object\n         */\n        NodeProto.toObject = function toObject(message,
options) {\n            if (!options)\n                options = {};\n            var object = {};\n            if (options.arrays ||
options.defaults) {\n                object.input = [];\n                object.output = [];\n                object.attribute = [];\n
  }\n            if (options.defaults) {\n                object.name = \"\";\n                object.opType = \"\";\n
object.docString = \"\";\n                object.domain = \"\";\n            }\n            if (message.input &&
message.input.length) {\n                object.input = [];\n                for (var j = 0; j < message.input.length; ++j)\n
        object.input[j] = message.input[j];\n            }\n            if (message.output && message.output.length) {\n
   object.output = [];\n                for (var j = 0; j < message.output.length; ++j)\n                    object.output[j] =
message.output[j];\n            }\n            if (message.name != null && message.hasOwnProperty(\"name\"))\n
object.name = message.name;\n            if (message.opType != null && message.hasOwnProperty(\"opType\"))\n
        object.opType = message.opType;\n            if (message.attribute && message.attribute.length) {\n
object.attribute = [];\n                for (var j = 0; j < message.attribute.length; ++j)\n                    object.attribute[j] =
$root.onnx.AttributeProto.toObject(message.attribute[j], options);\n            }\n            if (message.docString != null
&& message.hasOwnProperty(\"docString\"))\n                object.docString = message.docString;\n            if
(message.domain != null && message.hasOwnProperty(\"domain\"))\n                object.domain =
message.domain;\n            return object;\n        };\n\n        /**\n         * Converts this NodeProto to JSON.\n         *
@function toJSON\n         * @memberof onnx.NodeProto\n         * @instance\n         * @returns
{Object.<string,*>} JSON object\n         */\n        NodeProto.prototype.toJSON = function toJSON() {\n
return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n        };\n\n        return NodeProto;\n
})();\n\n    onnx.ModelProto = (function() {\n\n        /**\n         * Properties of a ModelProto.\n         * @memberof
onnx\n         * @interface IModelProto\n         * @property {number|Long|null} [irVersion] ModelProto irVersion\n
     * @property {Array.<onnx.IOperatorSetIdProto>|null} [opsetImport] ModelProto opsetImport\n         *
@property {string|null} [producerName] ModelProto producerName\n         * @property {string|null}
[producerVersion] ModelProto producerVersion\n         * @property {string|null} [domain] ModelProto domain\n
   * @property {number|Long|null} [modelVersion] ModelProto modelVersion\n         * @property {string|null}
[docString] ModelProto docString\n         * @property {onnx.IGraphProto|null} [graph] ModelProto graph\n         *
@property {Array.<onnx.IStringStringEntryProto>|null} [metadataProps] ModelProto metadataProps\n         */\n\n
    /**\n         * Constructs a new ModelProto.\n         * @memberof onnx\n         * @classdesc Represents a
ModelProto.\n         * @implements IModelProto\n         * @constructor\n         * @param {onnx.IModelProto=}
[properties] Properties to set\n         */\n        function ModelProto(properties) {\n            this.opsetImport = [];\n
  this.metadataProps = [];\n            if (properties)\n                for (var keys = Object.keys(properties), i = 0; i <
keys.length; ++i)\n                    if (properties[keys[i]] != null)\n                        this[keys[i]] = properties[keys[i]];\n
  }\n\n        /**\n         * ModelProto irVersion.\n         * @member {number|Long} irVersion\n         * @memberof
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onnx.ModelProto\n        * @instance\n        */\n        ModelProto.prototype.irVersion = $util.Long ?
$util.Long.fromBits(0,0,false) : 0;\n\n        /**\n        * ModelProto opsetImport.\n        * @member
{Array.<onnx.IOperatorSetIdProto>} opsetImport\n        * @memberof onnx.ModelProto\n        * @instance\n
*/\n        ModelProto.prototype.opsetImport = $util.emptyArray;\n\n        /**\n        * ModelProto producerName.\n
     * @member {string} producerName\n        * @memberof onnx.ModelProto\n        * @instance\n        */\n
ModelProto.prototype.producerName = \"\";\n\n        /**\n        * ModelProto producerVersion.\n        * @member
{string} producerVersion\n        * @memberof onnx.ModelProto\n        * @instance\n        */\n
ModelProto.prototype.producerVersion = \"\";\n\n        /**\n        * ModelProto domain.\n        * @member
{string} domain\n        * @memberof onnx.ModelProto\n        * @instance\n        */\n
ModelProto.prototype.domain = \"\";\n\n        /**\n        * ModelProto modelVersion.\n        * @member
{number|Long} modelVersion\n        * @memberof onnx.ModelProto\n        * @instance\n        */\n
ModelProto.prototype.modelVersion = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n        /**\n        *
ModelProto docString.\n        * @member {string} docString\n        * @memberof onnx.ModelProto\n        *
@instance\n        */\n        ModelProto.prototype.docString = \"\";\n\n        /**\n        * ModelProto graph.\n        *
@member {onnx.IGraphProto|null|undefined} graph\n        * @memberof onnx.ModelProto\n        * @instance\n
   */\n        ModelProto.prototype.graph = null;\n\n        /**\n        * ModelProto metadataProps.\n        * @member
{Array.<onnx.IStringStringEntryProto>} metadataProps\n        * @memberof onnx.ModelProto\n        *
@instance\n        */\n        ModelProto.prototype.metadataProps = $util.emptyArray;\n\n        /**\n        * Creates a
new ModelProto instance using the specified properties.\n        * @function create\n        * @memberof
onnx.ModelProto\n        * @static\n        * @param {onnx.IModelProto=} [properties] Properties to set\n        *
@returns {onnx.ModelProto} ModelProto instance\n        */\n        ModelProto.create = function create(properties)
{\n            return new ModelProto(properties);\n        };\n\n        /**\n        * Encodes the specified ModelProto
message. Does not implicitly {@link onnx.ModelProto.verify|verify} messages.\n        * @function encode\n        *
@memberof onnx.ModelProto\n        * @static\n        * @param {onnx.IModelProto} message ModelProto
message or plain object to encode\n        * @param {$protobuf.Writer} [writer] Writer to encode to\n        *
@returns {$protobuf.Writer} Writer\n        */\n        ModelProto.encode = function encode(message, writer) {\n
  if (!writer)\n                writer = $Writer.create();\n            if (message.irVersion != null &&
message.hasOwnProperty(\"irVersion\"))\n                writer.uint32(/* id 1, wireType 0
=*/8).int64(message.irVersion);\n            if (message.producerName != null &&
message.hasOwnProperty(\"producerName\"))\n                writer.uint32(/* id 2, wireType 2
=*/18).string(message.producerName);\n            if (message.producerVersion != null &&
message.hasOwnProperty(\"producerVersion\"))\n                writer.uint32(/* id 3, wireType 2
=*/26).string(message.producerVersion);\n            if (message.domain != null &&
message.hasOwnProperty(\"domain\"))\n                writer.uint32(/* id 4, wireType 2
=*/34).string(message.domain);\n            if (message.modelVersion != null &&
message.hasOwnProperty(\"modelVersion\"))\n                writer.uint32(/* id 5, wireType 0
=*/40).int64(message.modelVersion);\n            if (message.docString != null &&
message.hasOwnProperty(\"docString\"))\n                writer.uint32(/* id 6, wireType 2
=*/50).string(message.docString);\n            if (message.graph != null && message.hasOwnProperty(\"graph\"))\n
      $root.onnx.GraphProto.encode(message.graph, writer.uint32(/* id 7, wireType 2 =*/58).fork()).ldelim();\n
  if (message.opsetImport != null && message.opsetImport.length)\n                for (var i = 0; i <
message.opsetImport.length; ++i)\n                    $root.onnx.OperatorSetIdProto.encode(message.opsetImport[i],
writer.uint32(/* id 8, wireType 2 =*/66).fork()).ldelim();\n            if (message.metadataProps != null &&
message.metadataProps.length)\n                for (var i = 0; i < message.metadataProps.length; ++i)\n
$root.onnx.StringStringEntryProto.encode(message.metadataProps[i], writer.uint32(/* id 14, wireType 2
=*/114).fork()).ldelim();\n            return writer;\n        };\n\n        /**\n        * Encodes the specified ModelProto
message, length delimited. Does not implicitly {@link onnx.ModelProto.verify|verify} messages.\n        *
@function encodeDelimited\n        * @memberof onnx.ModelProto\n        * @static\n        * @param
```

{onnx.IModelProto} message ModelProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n ModelProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a ModelProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.ModelProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.ModelProto} ModelProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n ModelProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.ModelProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.irVersion = reader.int64();\n break;\n case 8:\n if (!(message.opsetImport && message.opsetImport.length))\n message.opsetImport = [];\n message.opsetImport.push($root.onnx.OperatorSetIdProto.decode(reader, reader.uint32()));\n break;\n case 2:\n message.producerName = reader.string();\n break;\n case 3:\n message.producerVersion = reader.string();\n break;\n case 4:\n message.domain = reader.string();\n break;\n case 5:\n message.modelVersion = reader.int64();\n break;\n case 6:\n message.docString = reader.string();\n break;\n case 7:\n message.graph = $root.onnx.GraphProto.decode(reader, reader.uint32());\n break;\n case 14:\n if (!(message.metadataProps && message.metadataProps.length))\n message.metadataProps = [];\n message.metadataProps.push($root.onnx.StringStringEntryProto.decode(reader, reader.uint32()));\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a ModelProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.ModelProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.ModelProto} ModelProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n ModelProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a ModelProto message.\n * @function verify\n * @memberof onnx.ModelProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n ModelProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.irVersion != null && message.hasOwnProperty(\"irVersion\"))\n if (!$util.isInteger(message.irVersion) && !(message.irVersion && $util.isInteger(message.irVersion.low) && $util.isInteger(message.irVersion.high)))\n return \"irVersion: integer|Long expected\";\n if (message.opsetImport != null && message.hasOwnProperty(\"opsetImport\")) {\n if (!Array.isArray(message.opsetImport))\n return \"opsetImport: array expected\";\n for (var i = 0; i < message.opsetImport.length; ++i) {\n var error = $root.onnx.OperatorSetIdProto.verify(message.opsetImport[i]);\n if (error)\n return \"opsetImport.\" + error;\n }\n }\n if (message.producerName != null && message.hasOwnProperty(\"producerName\"))\n if (!$util.isString(message.producerName))\n return \"producerName: string expected\";\n if (message.producerVersion != null && message.hasOwnProperty(\"producerVersion\"))\n if (!$util.isString(message.producerVersion))\n return \"producerVersion: string expected\";\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n if (!$util.isString(message.domain))\n return \"domain: string expected\";\n if (message.modelVersion != null &&

message.hasOwnProperty(\"modelVersion\"))\n if (!$util.isInteger(message.modelVersion) && !(message.modelVersion && $util.isInteger(message.modelVersion.low) && $util.isInteger(message.modelVersion.high)))\n return \"modelVersion: integer|Long expected\";\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n if (!$util.isString(message.docString))\n return \"docString: string expected\";\n if (message.graph != null && message.hasOwnProperty(\"graph\")) {\n var error = $root.onnx.GraphProto.verify(message.graph);\n if (error)\n return \"graph.\" + error;\n }\n if (message.metadataProps != null && message.hasOwnProperty(\"metadataProps\")) {\n if (!Array.isArray(message.metadataProps))\n return \"metadataProps: array expected\";\n for (var i = 0; i < message.metadataProps.length; ++i) {\n var error = $root.onnx.StringStringEntryProto.verify(message.metadataProps[i]);\n if (error)\n return \"metadataProps.\" + error;\n }\n }\n return null;\n };\n\n /**\n * Creates a ModelProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.ModelProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.ModelProto} ModelProto\n */\n ModelProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.ModelProto)\n return object;\n var message = new $root.onnx.ModelProto();\n if (object.irVersion != null)\n if ($util.Long)\n (message.irVersion = $util.Long.fromValue(object.irVersion)).unsigned = false;\n else if (typeof object.irVersion === \"string\")\n message.irVersion = parseInt(object.irVersion, 10);\n else if (typeof object.irVersion === \"number\")\n message.irVersion = object.irVersion;\n else if (typeof object.irVersion === \"object\")\n message.irVersion = new $util.LongBits(object.irVersion.low >>> 0, object.irVersion.high >>> 0).toNumber();\n if (object.opsetImport) {\n if (!Array.isArray(object.opsetImport))\n throw TypeError(\".onnx.ModelProto.opsetImport: array expected\");\n message.opsetImport = [];\n for (var i = 0; i < object.opsetImport.length; ++i) {\n if (typeof object.opsetImport[i] !== \"object\")\n throw TypeError(\".onnx.ModelProto.opsetImport: object expected\");\n message.opsetImport[i] = $root.onnx.OperatorSetIdProto.fromObject(object.opsetImport[i]);\n }\n }\n if (object.producerName != null)\n message.producerName = String(object.producerName);\n if (object.producerVersion != null)\n message.producerVersion = String(object.producerVersion);\n if (object.domain != null)\n message.domain = String(object.domain);\n if (object.modelVersion != null)\n if ($util.Long)\n (message.modelVersion = $util.Long.fromValue(object.modelVersion)).unsigned = false;\n else if (typeof object.modelVersion === \"string\")\n message.modelVersion = parseInt(object.modelVersion, 10);\n else if (typeof object.modelVersion === \"number\")\n message.modelVersion = object.modelVersion;\n else if (typeof object.modelVersion === \"object\")\n message.modelVersion = new $util.LongBits(object.modelVersion.low >>> 0, object.modelVersion.high >>> 0).toNumber();\n if (object.docString != null)\n message.docString = String(object.docString);\n if (object.graph != null) {\n if (typeof object.graph !== \"object\")\n throw TypeError(\".onnx.ModelProto.graph: object expected\");\n message.graph = $root.onnx.GraphProto.fromObject(object.graph);\n }\n if (object.metadataProps) {\n if (!Array.isArray(object.metadataProps))\n throw TypeError(\".onnx.ModelProto.metadataProps: array expected\");\n message.metadataProps = [];\n for (var i = 0; i < object.metadataProps.length; ++i) {\n if (typeof object.metadataProps[i] !== \"object\")\n throw TypeError(\".onnx.ModelProto.metadataProps: object expected\");\n message.metadataProps[i] = $root.onnx.StringStringEntryProto.fromObject(object.metadataProps[i]);\n }\n }\n return message;\n };\n\n /**\n * Creates a plain object from a ModelProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.ModelProto\n * @static\n * @param {onnx.ModelProto} message ModelProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n

```
    */\n        ModelProto.toObject = function toObject(message, options) {\n            if (!options)\n                options
= {};\n            var object = {};\n            if (options.arrays || options.defaults) {\n                object.opsetImport = [];\n
        object.metadataProps = [];\n            }\n            if (options.defaults) {\n                if ($util.Long) {\n
var long = new $util.Long(0, 0, false);\n                    object.irVersion = options.longs === String ? long.toString() :
options.longs === Number ? long.toNumber() : long;\n                } else\n                    object.irVersion =
options.longs === String ? \"0\" : 0;\n                object.producerName = \"\";\n                object.producerVersion =
\"\";\n                object.domain = \"\";\n                if ($util.Long) {\n                    var long = new $util.Long(0, 0,
false);\n                    object.modelVersion = options.longs === String ? long.toString() : options.longs === Number
? long.toNumber() : long;\n                } else\n                    object.modelVersion = options.longs === String ? \"0\" :
0;\n                object.docString = \"\";\n                object.graph = null;\n            }\n            if (message.irVersion !=
null && message.hasOwnProperty(\"irVersion\"))\n                if (typeof message.irVersion === \"number\")\n
    object.irVersion = options.longs === String ? String(message.irVersion) : message.irVersion;\n                else\n
          object.irVersion = options.longs === String ? $util.Long.prototype.toString.call(message.irVersion) :
options.longs === Number ? new $util.LongBits(message.irVersion.low >>> 0, message.irVersion.high >>>
0).toNumber() : message.irVersion;\n            if (message.producerName != null &&
message.hasOwnProperty(\"producerName\"))\n                object.producerName = message.producerName;\n
if (message.producerVersion != null && message.hasOwnProperty(\"producerVersion\"))\n
object.producerVersion = message.producerVersion;\n            if (message.domain != null &&
message.hasOwnProperty(\"domain\"))\n                object.domain = message.domain;\n            if
(message.modelVersion != null && message.hasOwnProperty(\"modelVersion\"))\n                if (typeof
message.modelVersion === \"number\")\n                    object.modelVersion = options.longs === String ?
String(message.modelVersion) : message.modelVersion;\n                else\n                    object.modelVersion =
options.longs === String ? $util.Long.prototype.toString.call(message.modelVersion) : options.longs === Number ?
new $util.LongBits(message.modelVersion.low >>> 0, message.modelVersion.high >>> 0).toNumber() :
message.modelVersion;\n            if (message.docString != null && message.hasOwnProperty(\"docString\"))\n
   object.docString = message.docString;\n            if (message.graph != null &&
message.hasOwnProperty(\"graph\"))\n                object.graph = $root.onnx.GraphProto.toObject(message.graph,
options);\n            if (message.opsetImport && message.opsetImport.length) {\n                object.opsetImport = [];\n
          for (var j = 0; j < message.opsetImport.length; ++j)\n                    object.opsetImport[j] =
$root.onnx.OperatorSetIdProto.toObject(message.opsetImport[j], options);\n            }\n            if
(message.metadataProps && message.metadataProps.length) {\n                object.metadataProps = [];\n                for
(var j = 0; j < message.metadataProps.length; ++j)\n                    object.metadataProps[j] =
$root.onnx.StringStringEntryProto.toObject(message.metadataProps[j], options);\n            }\n            return object;\n
     };\n\n        /**\n         * Converts this ModelProto to JSON.\n         * @function toJSON\n         * @memberof
onnx.ModelProto\n         * @instance\n         * @returns {Object.<string,*>} JSON object\n         */\n
ModelProto.prototype.toJSON = function toJSON() {\n            return this.constructor.toObject(this,
$protobuf.util.toJSONOptions);\n        };\n\n        return ModelProto;\n    })();\n\n    onnx.StringStringEntryProto =
(function() {\n\n        /**\n         * Properties of a StringStringEntryProto.\n         * @memberof onnx\n         *
@interface IStringStringEntryProto\n         * @property {string|null} [key] StringStringEntryProto key\n         *
@property {string|null} [value] StringStringEntryProto value\n         */\n\n        /**\n         * Constructs a new
StringStringEntryProto.\n         * @memberof onnx\n         * @classdesc Represents a StringStringEntryProto.\n
* @implements IStringStringEntryProto\n         * @constructor\n         * @param {onnx.IStringStringEntryProto=}
[properties] Properties to set\n         */\n        function StringStringEntryProto(properties) {\n            if (properties)\n
        for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n                    if (properties[keys[i]] !=
null)\n                        this[keys[i]] = properties[keys[i]];\n        }\n\n        /**\n         * StringStringEntryProto key.\n
   * @member {string} key\n         * @memberof onnx.StringStringEntryProto\n         * @instance\n         */\n
StringStringEntryProto.prototype.key = \"\";\n\n        /**\n         * StringStringEntryProto value.\n         * @member
{string} value\n         * @memberof onnx.StringStringEntryProto\n         * @instance\n         */\n
```

StringStringEntryProto.prototype.value = \"\";\n\n /**\n * Creates a new StringStringEntryProto instance using the specified properties.\n * @function create\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {onnx.IStringStringEntryProto=} [properties] Properties to set\n * @returns {onnx.StringStringEntryProto} StringStringEntryProto instance\n */\n StringStringEntryProto.create = function create(properties) {\n return new StringStringEntryProto(properties);\n };\n\n /**\n * Encodes the specified StringStringEntryProto message. Does not implicitly {@link onnx.StringStringEntryProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {onnx.IStringStringEntryProto} message StringStringEntryProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n StringStringEntryProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.key != null && message.hasOwnProperty(\"key\"))\n writer.uint32(/* id 1, wireType 2 =*/10).string(message.key);\n if (message.value != null && message.hasOwnProperty(\"value\"))\n writer.uint32(/* id 2, wireType 2 =*/18).string(message.value);\n return writer;\n };\n\n /**\n * Encodes the specified StringStringEntryProto message, length delimited. Does not implicitly {@link onnx.StringStringEntryProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {onnx.IStringStringEntryProto} message StringStringEntryProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n StringStringEntryProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a StringStringEntryProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.StringStringEntryProto} StringStringEntryProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n StringStringEntryProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.StringStringEntryProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.key = reader.string();\n break;\n case 2:\n message.value = reader.string();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a StringStringEntryProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.StringStringEntryProto} StringStringEntryProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n StringStringEntryProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a StringStringEntryProto message.\n * @function verify\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n StringStringEntryProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.key != null && message.hasOwnProperty(\"key\"))\n if (!$util.isString(message.key))\n return \"key: string expected\";\n if (message.value != null && message.hasOwnProperty(\"value\"))\n if (!$util.isString(message.value))\n return \"value: string expected\";\n return null;\n };\n\n /**\n * Creates a StringStringEntryProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.StringStringEntryProto} StringStringEntryProto\n */\n StringStringEntryProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.StringStringEntryProto)\n return object;\n var message = new $root.onnx.StringStringEntryProto();\n if (object.key != null)\n message.key = String(object.key);\n if (object.value != null)\n message.value = String(object.value);\n return message;\n };\n\n /**\n * Creates a plain object from a StringStringEntryProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {onnx.StringStringEntryProto} message StringStringEntryProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n StringStringEntryProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.defaults) {\n object.key = \"\";\n object.value = \"\";\n }\n if (message.key != null && message.hasOwnProperty(\"key\"))\n object.key = message.key;\n if (message.value != null && message.hasOwnProperty(\"value\"))\n object.value = message.value;\n return object;\n };\n\n /**\n * Converts this StringStringEntryProto to JSON.\n * @function toJSON\n * @memberof onnx.StringStringEntryProto\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n StringStringEntryProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return StringStringEntryProto;\n })();\n\n onnx.TensorAnnotation = (function() {\n\n /**\n * Properties of a TensorAnnotation.\n * @memberof onnx\n * @interface ITensorAnnotation\n * @property {string|null} [tensorName] TensorAnnotation tensorName\n * @property {Array.<onnx.IStringStringEntryProto>|null} [quantParameterTensorNames] TensorAnnotation quantParameterTensorNames\n */\n\n /**\n * Constructs a new TensorAnnotation.\n * @memberof onnx\n * @classdesc Represents a TensorAnnotation.\n * @implements ITensorAnnotation\n * @constructor\n * @param {onnx.ITensorAnnotation=} [properties] Properties to set\n */\n function TensorAnnotation(properties) {\n this.quantParameterTensorNames = [];\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * TensorAnnotation tensorName.\n * @member {string} tensorName\n * @memberof onnx.TensorAnnotation\n * @instance\n */\n TensorAnnotation.prototype.tensorName = \"\";\n\n /**\n * TensorAnnotation quantParameterTensorNames.\n * @member {Array.<onnx.IStringStringEntryProto>} quantParameterTensorNames\n * @memberof onnx.TensorAnnotation\n * @instance\n */\n TensorAnnotation.prototype.quantParameterTensorNames = $util.emptyArray;\n\n /**\n * Creates a new TensorAnnotation instance using the specified properties.\n * @function create\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {onnx.ITensorAnnotation=} [properties] Properties to set\n * @returns {onnx.TensorAnnotation} TensorAnnotation instance\n */\n TensorAnnotation.create = function create(properties) {\n return new TensorAnnotation(properties);\n };\n\n /**\n * Encodes the specified TensorAnnotation message. Does not implicitly {@link onnx.TensorAnnotation.verify|verify} messages.\n * @function encode\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {onnx.ITensorAnnotation} message TensorAnnotation message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n TensorAnnotation.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.tensorName != null && message.hasOwnProperty(\"tensorName\"))\n writer.uint32(/* id 1, wireType 2 =*/10).string(message.tensorName);\n if (message.quantParameterTensorNames != null && message.quantParameterTensorNames.length)\n for (var i = 0; i < message.quantParameterTensorNames.length; ++i)\n

$root.onnx.StringStringEntryProto.encode(message.quantParameterTensorNames[i], writer.uint32(/* id 2, wireType 2 =*/18).fork()).ldelim();\n return writer;\n };\n\n /**\n * Encodes the specified TensorAnnotation message, length delimited. Does not implicitly {@link onnx.TensorAnnotation.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {onnx.ITensorAnnotation} message TensorAnnotation message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n TensorAnnotation.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a TensorAnnotation message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.TensorAnnotation} TensorAnnotation\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n TensorAnnotation.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.TensorAnnotation();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.tensorName = reader.string();\n break;\n case 2:\n if (!(message.quantParameterTensorNames && message.quantParameterTensorNames.length))\n message.quantParameterTensorNames = [];\n message.quantParameterTensorNames.push($root.onnx.StringStringEntryProto.decode(reader, reader.uint32()));\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a TensorAnnotation message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TensorAnnotation} TensorAnnotation\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n TensorAnnotation.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a TensorAnnotation message.\n * @function verify\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n TensorAnnotation.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.tensorName != null && message.hasOwnProperty(\"tensorName\"))\n if (!$util.isString(message.tensorName))\n return \"tensorName: string expected\";\n if (message.quantParameterTensorNames != null && message.hasOwnProperty(\"quantParameterTensorNames\")) {\n if (!Array.isArray(message.quantParameterTensorNames))\n return \"quantParameterTensorNames: array expected\";\n for (var i = 0; i < message.quantParameterTensorNames.length; ++i) {\n var error = $root.onnx.StringStringEntryProto.verify(message.quantParameterTensorNames[i]);\n if (error)\n return \"quantParameterTensorNames.\" + error;\n }\n }\n return null;\n };\n\n /**\n * Creates a TensorAnnotation message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.TensorAnnotation} TensorAnnotation\n */\n TensorAnnotation.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.TensorAnnotation)\n return object;\n var message = new $root.onnx.TensorAnnotation();\n if (object.tensorName != null)\n message.tensorName = String(object.tensorName);\n if (object.quantParameterTensorNames) {\n if (!Array.isArray(object.quantParameterTensorNames))\n throw

```
TypeError(\".onnx.TensorAnnotation.quantParameterTensorNames: array expected\");\n
message.quantParameterTensorNames = [];\n        for (var i = 0; i < object.quantParameterTensorNames.length;
++i) {\n          if (typeof object.quantParameterTensorNames[i] !== \"object\")\n            throw
TypeError(\".onnx.TensorAnnotation.quantParameterTensorNames: object expected\");\n
message.quantParameterTensorNames[i] =
$root.onnx.StringStringEntryProto.fromObject(object.quantParameterTensorNames[i]);\n        }\n      }\n
    return message;\n    };\n\n    /**\n     * Creates a plain object from a TensorAnnotation message. Also
converts values to other types if specified.\n     * @function toObject\n     * @memberof
onnx.TensorAnnotation\n     * @static\n     * @param {onnx.TensorAnnotation} message TensorAnnotation\n
     * @param {$protobuf.IConversionOptions} [options] Conversion options\n     * @returns {Object.<string,*>}
Plain object\n     */\n    TensorAnnotation.toObject = function toObject(message, options) {\n      if
(!options)\n        options = {};\n      var object = {};\n      if (options.arrays || options.defaults)\n
object.quantParameterTensorNames = [];\n      if (options.defaults)\n        object.tensorName = \"\";\n
if (message.tensorName != null && message.hasOwnProperty(\"tensorName\"))\n        object.tensorName =
message.tensorName;\n      if (message.quantParameterTensorNames &&
message.quantParameterTensorNames.length) {\n        object.quantParameterTensorNames = [];\n        for
(var j = 0; j < message.quantParameterTensorNames.length; ++j)\n
object.quantParameterTensorNames[j] =
$root.onnx.StringStringEntryProto.toObject(message.quantParameterTensorNames[j], options);\n      }\n
return object;\n    };\n\n    /**\n     * Converts this TensorAnnotation to JSON.\n     * @function toJSON\n
     * @memberof onnx.TensorAnnotation\n     * @instance\n     * @returns {Object.<string,*>} JSON
object\n     */\n    TensorAnnotation.prototype.toJSON = function toJSON() {\n      return
this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n    };\n\n    return TensorAnnotation;\n
})();\n\n  onnx.GraphProto = (function() {\n\n    /**\n     * Properties of a GraphProto.\n     * @memberof
onnx\n     * @interface IGraphProto\n     * @property {Array.<onnx.INodeProto>|null} [node] GraphProto
node\n     * @property {string|null} [name] GraphProto name\n     * @property
{Array.<onnx.ITensorProto>|null} [initializer] GraphProto initializer\n     * @property {string|null} [docString]
GraphProto docString\n     * @property {Array.<onnx.IValueInfoProto>|null} [input] GraphProto input\n     *
@property {Array.<onnx.IValueInfoProto>|null} [output] GraphProto output\n     * @property
{Array.<onnx.IValueInfoProto>|null} [valueInfo] GraphProto valueInfo\n     * @property
{Array.<onnx.ITensorAnnotation>|null} [quantizationAnnotation] GraphProto quantizationAnnotation\n     */\n\n
     /**\n     * Constructs a new GraphProto.\n     * @memberof onnx\n     * @classdesc Represents a
GraphProto.\n     * @implements IGraphProto\n     * @constructor\n     * @param {onnx.IGraphProto=}
[properties] Properties to set\n     */\n    function GraphProto(properties) {\n      this.node = [];\n
this.initializer = [];\n      this.input = [];\n      this.output = [];\n      this.valueInfo = [];\n
this.quantizationAnnotation = [];\n      if (properties)\n        for (var keys = Object.keys(properties), i = 0; i <
keys.length; ++i)\n          if (properties[keys[i]] != null)\n            this[keys[i]] = properties[keys[i]];\n
  }\n\n    /**\n     * GraphProto node.\n     * @member {Array.<onnx.INodeProto>} node\n     *
@memberof onnx.GraphProto\n     * @instance\n     */\n    GraphProto.prototype.node =
$util.emptyArray;\n\n    /**\n     * GraphProto name.\n     * @member {string} name\n     * @memberof
onnx.GraphProto\n     * @instance\n     */\n    GraphProto.prototype.name = \"\";\n\n    /**\n     *
GraphProto initializer.\n     * @member {Array.<onnx.ITensorProto>} initializer\n     * @memberof
onnx.GraphProto\n     * @instance\n     */\n    GraphProto.prototype.initializer = $util.emptyArray;\n\n
/**\n     * GraphProto docString.\n     * @member {string} docString\n     * @memberof onnx.GraphProto\n
     * @instance\n     */\n    GraphProto.prototype.docString = \"\";\n\n    /**\n     * GraphProto input.\n
 * @member {Array.<onnx.IValueInfoProto>} input\n     * @memberof onnx.GraphProto\n     * @instance\n
    */\n    GraphProto.prototype.input = $util.emptyArray;\n\n    /**\n     * GraphProto output.\n     *
@member {Array.<onnx.IValueInfoProto>} output\n     * @memberof onnx.GraphProto\n     * @instance\n
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*/\n GraphProto.prototype.output = $util.emptyArray;\n\n /**\n * GraphProto valueInfo.\n * @member {Array.<onnx.IValueInfoProto>} valueInfo\n * @memberof onnx.GraphProto\n * @instance\n */\n GraphProto.prototype.valueInfo = $util.emptyArray;\n\n /**\n * GraphProto quantizationAnnotation.\n * @member {Array.<onnx.ITensorAnnotation>} quantizationAnnotation\n * @memberof onnx.GraphProto\n * @instance\n */\n GraphProto.prototype.quantizationAnnotation = $util.emptyArray;\n\n /**\n * Creates a new GraphProto instance using the specified properties.\n * @function create\n * @memberof onnx.GraphProto\n * @static\n * @param {onnx.IGraphProto=} [properties] Properties to set\n * @returns {onnx.GraphProto} GraphProto instance\n */\n GraphProto.create = function create(properties) {\n return new GraphProto(properties);\n };\n\n /**\n * Encodes the specified GraphProto message. Does not implicitly {@link onnx.GraphProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.GraphProto\n * @static\n * @param {onnx.IGraphProto} message GraphProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n GraphProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.node != null && message.node.length)\n for (var i = 0; i < message.node.length; ++i)\n $root.onnx.NodeProto.encode(message.node[i], writer.uint32(/* id 1, wireType 2 =*/10).fork()).ldelim();\n if (message.name != null && message.hasOwnProperty(\"name\"))\n writer.uint32(/* id 2, wireType 2 =*/18).string(message.name);\n if (message.initializer != null && message.initializer.length)\n for (var i = 0; i < message.initializer.length; ++i)\n $root.onnx.TensorProto.encode(message.initializer[i], writer.uint32(/* id 5, wireType 2 =*/42).fork()).ldelim();\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n writer.uint32(/* id 10, wireType 2 =*/82).string(message.docString);\n if (message.input != null && message.input.length)\n for (var i = 0; i < message.input.length; ++i)\n $root.onnx.ValueInfoProto.encode(message.input[i], writer.uint32(/* id 11, wireType 2 =*/90).fork()).ldelim();\n if (message.output != null && message.output.length)\n for (var i = 0; i < message.output.length; ++i)\n $root.onnx.ValueInfoProto.encode(message.output[i], writer.uint32(/* id 12, wireType 2 =*/98).fork()).ldelim();\n if (message.valueInfo != null && message.valueInfo.length)\n for (var i = 0; i < message.valueInfo.length; ++i)\n $root.onnx.ValueInfoProto.encode(message.valueInfo[i], writer.uint32(/* id 13, wireType 2 =*/106).fork()).ldelim();\n if (message.quantizationAnnotation != null && message.quantizationAnnotation.length)\n for (var i = 0; i < message.quantizationAnnotation.length; ++i)\n $root.onnx.TensorAnnotation.encode(message.quantizationAnnotation[i], writer.uint32(/* id 14, wireType 2 =*/114).fork()).ldelim();\n return writer;\n };\n\n /**\n * Encodes the specified GraphProto message, length delimited. Does not implicitly {@link onnx.GraphProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.GraphProto\n * @static\n * @param {onnx.IGraphProto} message GraphProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n GraphProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a GraphProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.GraphProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.GraphProto} GraphProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n GraphProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.GraphProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n if (!(message.node && message.node.length))\n message.node = [];\n message.node.push($root.onnx.NodeProto.decode(reader, reader.uint32()));\n break;\n case

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2:\n                    message.name = reader.string();\n                    break;\n                case 5:\n                    if
(!(message.initializer && message.initializer.length))\n                        message.initializer = [];\n
message.initializer.push($root.onnx.TensorProto.decode(reader, reader.uint32()));\n                    break;\n
case 10:\n                    message.docString = reader.string();\n                    break;\n                case 11:\n                    if
(!(message.input && message.input.length))\n                        message.input = [];\n
message.input.push($root.onnx.ValueInfoProto.decode(reader, reader.uint32()));\n                    break;\n
case 12:\n                    if (!(message.output && message.output.length))\n                        message.output = [];\n
        message.output.push($root.onnx.ValueInfoProto.decode(reader, reader.uint32()));\n                    break;\n
    case 13:\n                    if (!(message.valueInfo && message.valueInfo.length))\n                        message.valueInfo
= [];\n                    message.valueInfo.push($root.onnx.ValueInfoProto.decode(reader, reader.uint32()));\n
 break;\n                case 14:\n                    if (!(message.quantizationAnnotation &&
message.quantizationAnnotation.length))\n                        message.quantizationAnnotation = [];\n
message.quantizationAnnotation.push($root.onnx.TensorAnnotation.decode(reader, reader.uint32()));\n
break;\n                default:\n                    reader.skipType(tag & 7);\n                    break;\n                }\n            }\n
    return message;\n        };\n\n        /**\n         * Decodes a GraphProto message from the specified reader or buffer,
length delimited.\n         * @function decodeDelimited\n         * @memberof onnx.GraphProto\n         * @static\n
  * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @returns
{onnx.GraphProto} GraphProto\n         * @throws {Error} If the payload is not a reader or valid buffer\n         *
@throws {$protobuf.util.ProtocolError} If required fields are missing\n         */\n        GraphProto.decodeDelimited
= function decodeDelimited(reader) {\n            if (!(reader instanceof $Reader))\n                reader = new
$Reader(reader);\n            return this.decode(reader, reader.uint32());\n        };\n\n        /**\n         * Verifies a
GraphProto message.\n         * @function verify\n         * @memberof onnx.GraphProto\n         * @static\n         *
@param {Object.<string,*>} message Plain object to verify\n         * @returns {string|null} `null` if valid, otherwise
the reason why it is not\n         */\n        GraphProto.verify = function verify(message) {\n            if (typeof message
!== \"object\" || message === null)\n                return \"object expected\";\n            if (message.node != null &&
message.hasOwnProperty(\"node\")) {\n                if (!Array.isArray(message.node))\n                    return \"node:
array expected\";\n                for (var i = 0; i < message.node.length; ++i) {\n                    var error =
$root.onnx.NodeProto.verify(message.node[i]);\n                    if (error)\n                        return \"node.\" + error;\n
        }\n            }\n            if (message.name != null && message.hasOwnProperty(\"name\"))\n                if
(!$util.isString(message.name))\n                    return \"name: string expected\";\n            if (message.initializer !=
null && message.hasOwnProperty(\"initializer\")) {\n                if (!Array.isArray(message.initializer))\n
return \"initializer: array expected\";\n                for (var i = 0; i < message.initializer.length; ++i) {\n                    var
error = $root.onnx.TensorProto.verify(message.initializer[i]);\n                    if (error)\n                        return
\"initializer.\" + error;\n                }\n            }\n            if (message.docString != null &&
message.hasOwnProperty(\"docString\"))\n                if (!$util.isString(message.docString))\n                    return
\"docString: string expected\";\n            if (message.input != null && message.hasOwnProperty(\"input\")) {\n
    if (!Array.isArray(message.input))\n                    return \"input: array expected\";\n                for (var i = 0; i <
message.input.length; ++i) {\n                    var error = $root.onnx.ValueInfoProto.verify(message.input[i]);\n
      if (error)\n                        return \"input.\" + error;\n                }\n            }\n            if (message.output != null &&
message.hasOwnProperty(\"output\")) {\n                if (!Array.isArray(message.output))\n                    return
\"output: array expected\";\n                for (var i = 0; i < message.output.length; ++i) {\n                    var error =
$root.onnx.ValueInfoProto.verify(message.output[i]);\n                    if (error)\n                        return \"output.\" +
error;\n                }\n            }\n            if (message.valueInfo != null && message.hasOwnProperty(\"valueInfo\"))
{\n                if (!Array.isArray(message.valueInfo))\n                    return \"valueInfo: array expected\";\n
for (var i = 0; i < message.valueInfo.length; ++i) {\n                    var error =
$root.onnx.ValueInfoProto.verify(message.valueInfo[i]);\n                    if (error)\n                        return
\"valueInfo.\" + error;\n                }\n            }\n            if (message.quantizationAnnotation != null &&
message.hasOwnProperty(\"quantizationAnnotation\")) {\n                if
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(!Array.isArray(message.quantizationAnnotation))\n return \"quantizationAnnotation: array expected\";\n for (var i = 0; i < message.quantizationAnnotation.length; ++i) {\n var error = $root.onnx.TensorAnnotation.verify(message.quantizationAnnotation[i]);\n if (error)\n return \"quantizationAnnotation.\" + error;\n }\n }\n return null;\n };\n\n /**\n * Creates a GraphProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.GraphProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.GraphProto} GraphProto\n */\n GraphProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.GraphProto)\n return object;\n var message = new $root.onnx.GraphProto();\n if (object.node) {\n if (!Array.isArray(object.node))\n throw TypeError(\".onnx.GraphProto.node: array expected\");\n message.node = [];\n for (var i = 0; i < object.node.length; ++i) {\n if (typeof object.node[i] !== \"object\")\n throw TypeError(\".onnx.GraphProto.node: object expected\");\n message.node[i] = $root.onnx.NodeProto.fromObject(object.node[i]);\n }\n }\n if (object.name != null)\n message.name = String(object.name);\n if (object.initializer) {\n if (!Array.isArray(object.initializer))\n throw TypeError(\".onnx.GraphProto.initializer: array expected\");\n message.initializer = [];\n for (var i = 0; i < object.initializer.length; ++i) {\n if (typeof object.initializer[i] !== \"object\")\n throw TypeError(\".onnx.GraphProto.initializer: object expected\");\n message.initializer[i] = $root.onnx.TensorProto.fromObject(object.initializer[i]);\n }\n }\n if (object.docString != null)\n message.docString = String(object.docString);\n if (object.input) {\n if (!Array.isArray(object.input))\n throw TypeError(\".onnx.GraphProto.input: array expected\");\n message.input = [];\n for (var i = 0; i < object.input.length; ++i) {\n if (typeof object.input[i] !== \"object\")\n throw TypeError(\".onnx.GraphProto.input: object expected\");\n message.input[i] = $root.onnx.ValueInfoProto.fromObject(object.input[i]);\n }\n }\n if (object.output) {\n if (!Array.isArray(object.output))\n throw TypeError(\".onnx.GraphProto.output: array expected\");\n message.output = [];\n for (var i = 0; i < object.output.length; ++i) {\n if (typeof object.output[i] !== \"object\")\n throw TypeError(\".onnx.GraphProto.output: object expected\");\n message.output[i] = $root.onnx.ValueInfoProto.fromObject(object.output[i]);\n }\n }\n if (object.valueInfo) {\n if (!Array.isArray(object.valueInfo))\n throw TypeError(\".onnx.GraphProto.valueInfo: array expected\");\n message.valueInfo = [];\n for (var i = 0; i < object.valueInfo.length; ++i) {\n if (typeof object.valueInfo[i] !== \"object\")\n throw TypeError(\".onnx.GraphProto.valueInfo: object expected\");\n message.valueInfo[i] = $root.onnx.ValueInfoProto.fromObject(object.valueInfo[i]);\n }\n }\n if (object.quantizationAnnotation) {\n if (!Array.isArray(object.quantizationAnnotation))\n throw TypeError(\".onnx.GraphProto.quantizationAnnotation: array expected\");\n message.quantizationAnnotation = [];\n for (var i = 0; i < object.quantizationAnnotation.length; ++i) {\n if (typeof object.quantizationAnnotation[i] !== \"object\")\n throw TypeError(\".onnx.GraphProto.quantizationAnnotation: object expected\");\n message.quantizationAnnotation[i] = $root.onnx.TensorAnnotation.fromObject(object.quantizationAnnotation[i]);\n }\n }\n return message;\n };\n\n /**\n * Creates a plain object from a GraphProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.GraphProto\n * @static\n * @param {onnx.GraphProto} message GraphProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n GraphProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.arrays || options.defaults) {\n object.node = [];\n object.initializer = [];\n object.input = [];\n object.output = [];\n object.valueInfo = [];\n object.quantizationAnnotation = [];\n }\n if (options.defaults) {\n object.name = \"\";\n object.docString = \"\";\n }\n if (message.node &&

message.node.length) {\n object.node = [];\n for (var j = 0; j < message.node.length; ++j)\n object.node[j] = $root.onnx.NodeProto.toObject(message.node[j], options);\n }\n if (message.name != null && message.hasOwnProperty(\"name\"))\n object.name = message.name;\n if (message.initializer && message.initializer.length) {\n object.initializer = [];\n for (var j = 0; j < message.initializer.length; ++j)\n object.initializer[j] = $root.onnx.TensorProto.toObject(message.initializer[j], options);\n }\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n object.docString = message.docString;\n if (message.input && message.input.length) {\n object.input = [];\n for (var j = 0; j < message.input.length; ++j)\n object.input[j] = $root.onnx.ValueInfoProto.toObject(message.input[j], options);\n }\n if (message.output && message.output.length) {\n object.output = [];\n for (var j = 0; j < message.output.length; ++j)\n object.output[j] = $root.onnx.ValueInfoProto.toObject(message.output[j], options);\n }\n if (message.valueInfo && message.valueInfo.length) {\n object.valueInfo = [];\n for (var j = 0; j < message.valueInfo.length; ++j)\n object.valueInfo[j] = $root.onnx.ValueInfoProto.toObject(message.valueInfo[j], options);\n }\n if (message.quantizationAnnotation && message.quantizationAnnotation.length) {\n object.quantizationAnnotation = [];\n for (var j = 0; j < message.quantizationAnnotation.length; ++j)\n object.quantizationAnnotation[j] = $root.onnx.TensorAnnotation.toObject(message.quantizationAnnotation[j], options);\n }\n return object;\n };\n\n /**\n * Converts this GraphProto to JSON.\n * @function toJSON\n * @memberof onnx.GraphProto\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n GraphProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return GraphProto;\n })();\n\n onnx.TensorProto = (function() {\n\n /**\n * Properties of a TensorProto.\n * @memberof onnx\n * @interface ITensorProto\n * @property {Array.<number|Long>|null} [dims] TensorProto dims\n * @property {number|null} [dataType] TensorProto dataType\n * @property {onnx.TensorProto.ISegment|null} [segment] TensorProto segment\n * @property {Array.<number>|null} [floatData] TensorProto floatData\n * @property {Array.<number>|null} [int32Data] TensorProto int32Data\n * @property {Array.<Uint8Array>|null} [stringData] TensorProto stringData\n * @property {Array.<number|Long>|null} [int64Data] TensorProto int64Data\n * @property {string|null} [name] TensorProto name\n * @property {string|null} [docString] TensorProto docString\n * @property {Uint8Array|null} [rawData] TensorProto rawData\n * @property {Array.<onnx.IStringStringEntryProto>|null} [externalData] TensorProto externalData\n * @property {onnx.TensorProto.DataLocation|null} [dataLocation] TensorProto dataLocation\n * @property {Array.<number>|null} [doubleData] TensorProto doubleData\n * @property {Array.<number|Long>|null} [uint64Data] TensorProto uint64Data\n */\n\n /**\n * Constructs a new TensorProto.\n * @memberof onnx\n * @classdesc Represents a TensorProto.\n * @implements ITensorProto\n * @constructor\n * @param {onnx.ITensorProto=} [properties] Properties to set\n */\n function TensorProto(properties) {\n this.dims = [];\n this.floatData = [];\n this.int32Data = [];\n this.stringData = [];\n this.int64Data = [];\n this.externalData = [];\n this.doubleData = [];\n this.uint64Data = [];\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * TensorProto dims.\n * @member {Array.<number|Long>} dims\n * @memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.dims = $util.emptyArray;\n\n /**\n * TensorProto dataType.\n * @member {number} dataType\n * @memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.dataType = 0;\n\n /**\n * TensorProto segment.\n * @member {onnx.TensorProto.ISegment|null|undefined} segment\n * @memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.segment = null;\n\n /**\n * TensorProto floatData.\n * @member {Array.<number>} floatData\n * @memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.floatData = $util.emptyArray;\n\n /**\n * TensorProto int32Data.\n * @member {Array.<number>} int32Data\n * @memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.int32Data = $util.emptyArray;\n\n /**\n * TensorProto stringData.\n * @member {Array.<Uint8Array>} stringData\n * @memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.stringData = $util.emptyArray;\n\n /**\n * TensorProto int64Data.\n * @member {Array.<number|Long>} int64Data\n * @memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.int64Data = $util.emptyArray;\n\n /**\n * TensorProto name.\n * @member {string} name\n * @memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.name = \"\";\n\n /**\n * TensorProto docString.\n * @member {string} docString\n * @memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.docString = \"\";\n\n /**\n * TensorProto rawData.\n * @member {Uint8Array} rawData\n * @memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.rawData = $util.newBuffer([]);\n\n /**\n * TensorProto externalData.\n * @member {Array.<onnx.IStringStringEntryProto>} externalData\n * @memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.externalData = $util.emptyArray;\n\n /**\n * TensorProto dataLocation.\n * @member {onnx.TensorProto.DataLocation} dataLocation\n * @memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.dataLocation = 0;\n\n /**\n * TensorProto doubleData.\n * @member {Array.<number>} doubleData\n * @memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.doubleData = $util.emptyArray;\n\n /**\n * TensorProto uint64Data.\n * @member {Array.<number|Long>} uint64Data\n * @memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.uint64Data = $util.emptyArray;\n\n /**\n * Creates a new TensorProto instance using the specified properties.\n * @function create\n * @memberof onnx.TensorProto\n * @static\n * @param {onnx.ITensorProto=} [properties] Properties to set\n * @returns {onnx.TensorProto} TensorProto instance\n */\n TensorProto.create = function create(properties) {\n return new TensorProto(properties);\n };\n\n /**\n * Encodes the specified TensorProto message. Does not implicitly {@link onnx.TensorProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.TensorProto\n * @static\n * @param {onnx.ITensorProto} message TensorProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n TensorProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.dims != null && message.dims.length) {\n writer.uint32(/* id 1, wireType 2 =*/10).fork();\n for (var i = 0; i < message.dims.length; ++i)\n writer.int64(message.dims[i]);\n writer.ldelim();\n }\n if (message.dataType != null && message.hasOwnProperty(\"dataType\"))\n writer.uint32(/* id 2, wireType 0 =*/16).int32(message.dataType);\n if (message.segment != null && message.hasOwnProperty(\"segment\"))\n $root.onnx.TensorProto.Segment.encode(message.segment, writer.uint32(/* id 3, wireType 2 =*/26).fork()).ldelim();\n if (message.floatData != null && message.floatData.length) {\n writer.uint32(/* id 4, wireType 2 =*/34).fork();\n for (var i = 0; i < message.floatData.length; ++i)\n writer.float(message.floatData[i]);\n writer.ldelim();\n }\n if (message.int32Data != null && message.int32Data.length) {\n writer.uint32(/* id 5, wireType 2 =*/42).fork();\n for (var i = 0; i < message.int32Data.length; ++i)\n writer.int32(message.int32Data[i]);\n writer.ldelim();\n }\n if (message.stringData != null && message.stringData.length)\n for (var i = 0; i < message.stringData.length; ++i)\n writer.uint32(/* id 6, wireType 2 =*/50).bytes(message.stringData[i]);\n if (message.int64Data != null && message.int64Data.length) {\n writer.uint32(/* id 7, wireType 2 =*/58).fork();\n for (var i = 0; i < message.int64Data.length; ++i)\n writer.int64(message.int64Data[i]);\n writer.ldelim();\n }\n if (message.name != null && message.hasOwnProperty(\"name\"))\n writer.uint32(/* id 8, wireType 2 =*/66).string(message.name);\n if (message.rawData != null &&

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message.hasOwnProperty(\"rawData\"))\n                writer.uint32(/* id 9, wireType 2
=*/74).bytes(message.rawData);\n            if (message.doubleData != null && message.doubleData.length) {\n
    writer.uint32(/* id 10, wireType 2 =*/82).fork();\n                for (var i = 0; i < message.doubleData.length; ++i)\n
                writer.double(message.doubleData[i]);\n                writer.ldelim();\n            }\n            if
(message.uint64Data != null && message.uint64Data.length) {\n                writer.uint32(/* id 11, wireType 2
=*/90).fork();\n                for (var i = 0; i < message.uint64Data.length; ++i)\n
writer.uint64(message.uint64Data[i]);\n                writer.ldelim();\n            }\n            if (message.docString != null
&& message.hasOwnProperty(\"docString\"))\n                writer.uint32(/* id 12, wireType 2
=*/98).string(message.docString);\n            if (message.externalData != null && message.externalData.length)\n
       for (var i = 0; i < message.externalData.length; ++i)\n
$root.onnx.StringStringEntryProto.encode(message.externalData[i], writer.uint32(/* id 13, wireType 2
=*/106).fork()).ldelim();\n            if (message.dataLocation != null &&
message.hasOwnProperty(\"dataLocation\"))\n                writer.uint32(/* id 14, wireType 0
=*/112).int32(message.dataLocation);\n            return writer;\n        };\n\n        /**\n         * Encodes the specified
TensorProto message, length delimited. Does not implicitly {@link onnx.TensorProto.verify|verify} messages.\n
 * @function encodeDelimited\n         * @memberof onnx.TensorProto\n         * @static\n         * @param
{onnx.ITensorProto} message TensorProto message or plain object to encode\n         * @param {$protobuf.Writer}
[writer] Writer to encode to\n         * @returns {$protobuf.Writer} Writer\n         */\n
TensorProto.encodeDelimited = function encodeDelimited(message, writer) {\n            return this.encode(message,
writer).ldelim();\n        };\n\n        /**\n         * Decodes a TensorProto message from the specified reader or buffer.\n
       * @function decode\n         * @memberof onnx.TensorProto\n         * @static\n         * @param
{$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @param {number} [length]
Message length if known beforehand\n         * @returns {onnx.TensorProto} TensorProto\n         * @throws {Error}
If the payload is not a reader or valid buffer\n         * @throws {$protobuf.util.ProtocolError} If required fields are
missing\n         */\n        TensorProto.decode = function decode(reader, length) {\n            if (!(reader instanceof
$Reader))\n                reader = $Reader.create(reader);\n            var end = length === undefined ? reader.len :
reader.pos + length, message = new $root.onnx.TensorProto();\n            while (reader.pos < end) {\n                var
tag = reader.uint32();\n                switch (tag >>> 3) {\n                case 1:\n                    if (!(message.dims &&
message.dims.length))\n                        message.dims = [];\n                    if ((tag & 7) === 2) {\n                        var
end2 = reader.uint32() + reader.pos;\n                        while (reader.pos < end2)\n
message.dims.push(reader.int64());\n                    } else\n                        message.dims.push(reader.int64());\n
       break;\n                case 2:\n                    message.dataType = reader.int32();\n                    break;\n                case
3:\n                    message.segment = $root.onnx.TensorProto.Segment.decode(reader, reader.uint32());\n
break;\n                case 4:\n                    if (!(message.floatData && message.floatData.length))\n
message.floatData = [];\n                    if ((tag & 7) === 2) {\n                        var end2 = reader.uint32() +
reader.pos;\n                        while (reader.pos < end2)\n                            message.floatData.push(reader.float());\n
             } else\n                        message.floatData.push(reader.float());\n                    break;\n                case 5:\n
          if (!(message.int32Data && message.int32Data.length))\n                        message.int32Data = [];\n
 if ((tag & 7) === 2) {\n                        var end2 = reader.uint32() + reader.pos;\n                        while (reader.pos <
end2)\n                            message.int32Data.push(reader.int32());\n                    } else\n
message.int32Data.push(reader.int32());\n                    break;\n                case 6:\n                    if
(!(message.stringData && message.stringData.length))\n                        message.stringData = [];\n
message.stringData.push(reader.bytes());\n                    break;\n                case 7:\n                    if
(!(message.int64Data && message.int64Data.length))\n                        message.int64Data = [];\n                    if ((tag
& 7) === 2) {\n                        var end2 = reader.uint32() + reader.pos;\n                        while (reader.pos < end2)\n
                        message.int64Data.push(reader.int64());\n                    } else\n
message.int64Data.push(reader.int64());\n                    break;\n                case 8:\n                    message.name =
reader.string();\n                    break;\n                case 12:\n                    message.docString = reader.string();\n
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break;\n case 9:\n message.rawData = reader.bytes();\n break;\n case 13:\n if (!(message.externalData && message.externalData.length))\n message.externalData = [];\n message.externalData.push($root.onnx.StringStringEntryProto.decode(reader, reader.uint32()));\n break;\n case 14:\n message.dataLocation = reader.int32();\n break;\n case 10:\n if (!(message.doubleData && message.doubleData.length))\n message.doubleData = [];\n if ((tag & 7) === 2) {\n var end2 = reader.uint32() + reader.pos;\n while (reader.pos < end2)\n message.doubleData.push(reader.double());\n } else\n message.doubleData.push(reader.double());\n break;\n case 11:\n if (!(message.uint64Data && message.uint64Data.length))\n message.uint64Data = [];\n if ((tag & 7) === 2) {\n var end2 = reader.uint32() + reader.pos;\n while (reader.pos < end2)\n message.uint64Data.push(reader.uint64());\n } else\n message.uint64Data.push(reader.uint64());\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a TensorProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TensorProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TensorProto} TensorProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n TensorProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a TensorProto message.\n * @function verify\n * @memberof onnx.TensorProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n TensorProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.dims != null && message.hasOwnProperty(\"dims\")) {\n if (!Array.isArray(message.dims))\n return \"dims: array expected\";\n for (var i = 0; i < message.dims.length; ++i)\n if (!$util.isInteger(message.dims[i]) && !(message.dims[i] && $util.isInteger(message.dims[i].low) && $util.isInteger(message.dims[i].high)))\n return \"dims: integer|Long[] expected\";\n }\n if (message.dataType != null && message.hasOwnProperty(\"dataType\"))\n if (!$util.isInteger(message.dataType))\n return \"dataType: integer expected\";\n if (message.segment != null && message.hasOwnProperty(\"segment\")) {\n var error = $root.onnx.TensorProto.Segment.verify(message.segment);\n if (error)\n return \"segment.\" + error;\n }\n if (message.floatData != null && message.hasOwnProperty(\"floatData\")) {\n if (!Array.isArray(message.floatData))\n return \"floatData: array expected\";\n for (var i = 0; i < message.floatData.length; ++i)\n if (typeof message.floatData[i] !== \"number\")\n return \"floatData: number[] expected\";\n }\n if (message.int32Data != null && message.hasOwnProperty(\"int32Data\")) {\n if (!Array.isArray(message.int32Data))\n return \"int32Data: array expected\";\n for (var i = 0; i < message.int32Data.length; ++i)\n if (!$util.isInteger(message.int32Data[i]))\n return \"int32Data: integer[] expected\";\n }\n if (message.stringData != null && message.hasOwnProperty(\"stringData\")) {\n if (!Array.isArray(message.stringData))\n return \"stringData: array expected\";\n for (var i = 0; i < message.stringData.length; ++i)\n if (!(message.stringData[i] && typeof message.stringData[i].length === \"number\" || $util.isString(message.stringData[i])))\n return \"stringData: buffer[] expected\";\n }\n if (message.int64Data != null && message.hasOwnProperty(\"int64Data\")) {\n if (!Array.isArray(message.int64Data))\n return \"int64Data: array expected\";\n for (var i = 0; i < message.int64Data.length; ++i)\n if (!$util.isInteger(message.int64Data[i]) && !(message.int64Data[i] && $util.isInteger(message.int64Data[i].low) && $util.isInteger(message.int64Data[i].high)))\n

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return \"int64Data: integer|Long[] expected\";\n            }\n            if (message.name != null &&
message.hasOwnProperty(\"name\"))\n                if (!$util.isString(message.name))\n                    return \"name:
string expected\";\n            if (message.docString != null && message.hasOwnProperty(\"docString\"))\n                if
(!$util.isString(message.docString))\n                    return \"docString: string expected\";\n            if
(message.rawData != null && message.hasOwnProperty(\"rawData\"))\n                if (!(message.rawData && typeof
message.rawData.length === \"number\" || $util.isString(message.rawData)))\n                    return \"rawData: buffer
expected\";\n            if (message.externalData != null && message.hasOwnProperty(\"externalData\")) {\n
if (!Array.isArray(message.externalData))\n                    return \"externalData: array expected\";\n                for (var i
= 0; i < message.externalData.length; ++i) {\n                    var error =
$root.onnx.StringStringEntryProto.verify(message.externalData[i]);\n                    if (error)\n                        return
\"externalData.\" + error;\n                }\n            }\n            if (message.dataLocation != null &&
message.hasOwnProperty(\"dataLocation\"))\n                switch (message.dataLocation) {\n                default:\n
        return \"dataLocation: enum value expected\";\n                case 0:\n                case 1:\n                    break;\n
       }\n            if (message.doubleData != null && message.hasOwnProperty(\"doubleData\")) {\n                if
(!Array.isArray(message.doubleData))\n                    return \"doubleData: array expected\";\n                for (var i = 0;
i < message.doubleData.length; ++i)\n                    if (typeof message.doubleData[i] !== \"number\")\n
return \"doubleData: number[] expected\";\n            }\n            if (message.uint64Data != null &&
message.hasOwnProperty(\"uint64Data\")) {\n                if (!Array.isArray(message.uint64Data))\n
return \"uint64Data: array expected\";\n                for (var i = 0; i < message.uint64Data.length; ++i)\n                    if
(!$util.isInteger(message.uint64Data[i]) && !(message.uint64Data[i] && $util.isInteger(message.uint64Data[i].low)
&& $util.isInteger(message.uint64Data[i].high)))\n                        return \"uint64Data: integer|Long[] expected\";\n
        }\n            return null;\n        };\n\n        /**\n         * Creates a TensorProto message from a plain object. Also
converts values to their respective internal types.\n         * @function fromObject\n         * @memberof
onnx.TensorProto\n         * @static\n         * @param {Object.<string,*>} object Plain object\n         * @returns
{onnx.TensorProto} TensorProto\n         */\n        TensorProto.fromObject = function fromObject(object) {\n
if (object instanceof $root.onnx.TensorProto)\n                return object;\n            var message = new
$root.onnx.TensorProto();\n            if (object.dims) {\n                if (!Array.isArray(object.dims))\n
throw TypeError(\".onnx.TensorProto.dims: array expected\");\n                message.dims = [];\n                for (var i =
0; i < object.dims.length; ++i)\n                    if ($util.Long)\n                        (message.dims[i] =
$util.Long.fromValue(object.dims[i])).unsigned = false;\n                    else if (typeof object.dims[i] === \"string\")\n
                   message.dims[i] = parseInt(object.dims[i], 10);\n                    else if (typeof object.dims[i] ===
\"number\")\n                        message.dims[i] = object.dims[i];\n                    else if (typeof object.dims[i] ===
\"object\")\n                        message.dims[i] = new $util.LongBits(object.dims[i].low >>> 0, object.dims[i].high >>>
0).toNumber();\n            }\n            if (object.dataType != null)\n                message.dataType = object.dataType |
0;\n            if (object.segment != null) {\n                if (typeof object.segment !== \"object\")\n                    throw
TypeError(\".onnx.TensorProto.segment: object expected\");\n                message.segment =
$root.onnx.TensorProto.Segment.fromObject(object.segment);\n            }\n            if (object.floatData) {\n
if (!Array.isArray(object.floatData))\n                    throw TypeError(\".onnx.TensorProto.floatData: array
expected\");\n                message.floatData = [];\n                for (var i = 0; i < object.floatData.length; ++i)\n
   message.floatData[i] = Number(object.floatData[i]);\n            }\n            if (object.int32Data) {\n                if
(!Array.isArray(object.int32Data))\n                    throw TypeError(\".onnx.TensorProto.int32Data: array
expected\");\n                message.int32Data = [];\n                for (var i = 0; i < object.int32Data.length; ++i)\n
     message.int32Data[i] = object.int32Data[i] | 0;\n            }\n            if (object.stringData) {\n                if
(!Array.isArray(object.stringData))\n                    throw TypeError(\".onnx.TensorProto.stringData: array
expected\");\n                message.stringData = [];\n                for (var i = 0; i < object.stringData.length; ++i)\n
       if (typeof object.stringData[i] === \"string\")\n                        $util.base64.decode(object.stringData[i],
message.stringData[i] = $util.newBuffer($util.base64.length(object.stringData[i])), 0);\n                    else if
(object.stringData[i].length)\n                        message.stringData[i] = object.stringData[i];\n            }\n            if
```

(object.int64Data) {\n if (!Array.isArray(object.int64Data))\n throw TypeError(\".onnx.TensorProto.int64Data: array expected\");\n message.int64Data = [];\n for (var i = 0; i < object.int64Data.length; ++i)\n if ($util.Long)\n (message.int64Data[i] = $util.Long.fromValue(object.int64Data[i])).unsigned = false;\n else if (typeof object.int64Data[i] === \"string\")\n message.int64Data[i] = parseInt(object.int64Data[i], 10);\n else if (typeof object.int64Data[i] === \"number\")\n message.int64Data[i] = object.int64Data[i];\n else if (typeof object.int64Data[i] === \"object\")\n message.int64Data[i] = new $util.LongBits(object.int64Data[i].low >>> 0, object.int64Data[i].high >>> 0).toNumber();\n }\n if (object.name != null)\n message.name = String(object.name);\n if (object.docString != null)\n message.docString = String(object.docString);\n if (object.rawData != null)\n if (typeof object.rawData === \"string\")\n $util.base64.decode(object.rawData, message.rawData = $util.newBuffer($util.base64.length(object.rawData)), 0);\n else if (object.rawData.length)\n message.rawData = object.rawData;\n if (object.externalData) {\n if (!Array.isArray(object.externalData))\n throw TypeError(\".onnx.TensorProto.externalData: array expected\");\n message.externalData = [];\n for (var i = 0; i < object.externalData.length; ++i) {\n if (typeof object.externalData[i] !== \"object\")\n throw TypeError(\".onnx.TensorProto.externalData: object expected\");\n message.externalData[i] = $root.onnx.StringStringEntryProto.fromObject(object.externalData[i]);\n }\n }\n switch (object.dataLocation) {\n case \"DEFAULT\":\n case 0:\n message.dataLocation = 0;\n break;\n case \"EXTERNAL\":\n case 1:\n message.dataLocation = 1;\n break;\n }\n if (object.doubleData) {\n if (!Array.isArray(object.doubleData))\n throw TypeError(\".onnx.TensorProto.doubleData: array expected\");\n message.doubleData = [];\n for (var i = 0; i < object.doubleData.length; ++i)\n message.doubleData[i] = Number(object.doubleData[i]);\n }\n if (object.uint64Data) {\n if (!Array.isArray(object.uint64Data))\n throw TypeError(\".onnx.TensorProto.uint64Data: array expected\");\n message.uint64Data = [];\n for (var i = 0; i < object.uint64Data.length; ++i)\n if ($util.Long)\n (message.uint64Data[i] = $util.Long.fromValue(object.uint64Data[i])).unsigned = true;\n else if (typeof object.uint64Data[i] === \"string\")\n message.uint64Data[i] = parseInt(object.uint64Data[i], 10);\n else if (typeof object.uint64Data[i] === \"number\")\n message.uint64Data[i] = object.uint64Data[i];\n else if (typeof object.uint64Data[i] === \"object\")\n message.uint64Data[i] = new $util.LongBits(object.uint64Data[i].low >>> 0, object.uint64Data[i].high >>> 0).toNumber(true);\n }\n return message;\n };\n\n /**\n * Creates a plain object from a TensorProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.TensorProto\n * @static\n * @param {onnx.TensorProto} message TensorProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n TensorProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.arrays || options.defaults) {\n object.dims = [];\n object.floatData = [];\n object.int32Data = [];\n object.stringData = [];\n object.int64Data = [];\n object.doubleData = [];\n object.uint64Data = [];\n object.externalData = [];\n }\n if (options.defaults) {\n object.dataType = 0;\n object.segment = null;\n object.name = \"\";\n if (options.bytes === String)\n object.rawData = \"\";\n else {\n object.rawData = [];\n if (options.bytes !== Array)\n object.rawData = $util.newBuffer(object.rawData);\n }\n object.docString = \"\";\n object.dataLocation = options.enums === String ? \"DEFAULT\" : 0;\n }\n if (message.dims && message.dims.length) {\n object.dims = [];\n for (var j = 0; j < message.dims.length; ++j)\n if (typeof message.dims[j] === \"number\")\n object.dims[j] = options.longs === String ? String(message.dims[j]) : message.dims[j];\n else\n

```
object.dims[j] = options.longs === String ? $util.Long.prototype.toString.call(message.dims[j]) : options.longs ===
Number ? new $util.LongBits(message.dims[j].low >>> 0, message.dims[j].high >>> 0).toNumber() :
message.dims[j];\n            }\n            if (message.dataType != null && message.hasOwnProperty(\"dataType\"))\n
          object.dataType = message.dataType;\n            if (message.segment != null &&
message.hasOwnProperty(\"segment\"))\n                object.segment =
$root.onnx.TensorProto.Segment.toObject(message.segment, options);\n            if (message.floatData &&
message.floatData.length) {\n                object.floatData = [];\n                for (var j = 0; j < message.floatData.length;
++j)\n                    object.floatData[j] = options.json && !isFinite(message.floatData[j]) ?
String(message.floatData[j]) : message.floatData[j];\n            }\n            if (message.int32Data &&
message.int32Data.length) {\n                object.int32Data = [];\n                for (var j = 0; j <
message.int32Data.length; ++j)\n                    object.int32Data[j] = message.int32Data[j];\n            }\n            if
(message.stringData && message.stringData.length) {\n                object.stringData = [];\n                for (var j = 0; j
< message.stringData.length; ++j)\n                    object.stringData[j] = options.bytes === String ?
$util.base64.encode(message.stringData[j], 0, message.stringData[j].length) : options.bytes === Array ?
Array.prototype.slice.call(message.stringData[j]) : message.stringData[j];\n            }\n            if (message.int64Data
&& message.int64Data.length) {\n                object.int64Data = [];\n                for (var j = 0; j <
message.int64Data.length; ++j)\n                    if (typeof message.int64Data[j] === \"number\")\n
object.int64Data[j] = options.longs === String ? String(message.int64Data[j]) : message.int64Data[j];\n
else\n                        object.int64Data[j] = options.longs === String ?
$util.Long.prototype.toString.call(message.int64Data[j]) : options.longs === Number ? new
$util.LongBits(message.int64Data[j].low >>> 0, message.int64Data[j].high >>> 0).toNumber() :
message.int64Data[j];\n            }\n            if (message.name != null && message.hasOwnProperty(\"name\"))\n
     object.name = message.name;\n            if (message.rawData != null &&
message.hasOwnProperty(\"rawData\"))\n                object.rawData = options.bytes === String ?
$util.base64.encode(message.rawData, 0, message.rawData.length) : options.bytes === Array ?
Array.prototype.slice.call(message.rawData) : message.rawData;\n            if (message.doubleData &&
message.doubleData.length) {\n                object.doubleData = [];\n                for (var j = 0; j <
message.doubleData.length; ++j)\n                    object.doubleData[j] = options.json &&
!isFinite(message.doubleData[j]) ? String(message.doubleData[j]) : message.doubleData[j];\n            }\n            if
(message.uint64Data && message.uint64Data.length) {\n                object.uint64Data = [];\n                for (var j = 0;
j < message.uint64Data.length; ++j)\n                    if (typeof message.uint64Data[j] === \"number\")\n
object.uint64Data[j] = options.longs === String ? String(message.uint64Data[j]) : message.uint64Data[j];\n
    else\n                        object.uint64Data[j] = options.longs === String ?
$util.Long.prototype.toString.call(message.uint64Data[j]) : options.longs === Number ? new
$util.LongBits(message.uint64Data[j].low >>> 0, message.uint64Data[j].high >>> 0).toNumber(true) :
message.uint64Data[j];\n            }\n            if (message.docString != null &&
message.hasOwnProperty(\"docString\"))\n                object.docString = message.docString;\n            if
(message.externalData && message.externalData.length) {\n                object.externalData = [];\n                for (var j
= 0; j < message.externalData.length; ++j)\n                    object.externalData[j] =
$root.onnx.StringStringEntryProto.toObject(message.externalData[j], options);\n            }\n            if
(message.dataLocation != null && message.hasOwnProperty(\"dataLocation\"))\n                object.dataLocation =
options.enums === String ? $root.onnx.TensorProto.DataLocation[message.dataLocation] :
message.dataLocation;\n            return object;\n        };\n\n        /**\n         * Converts this TensorProto to JSON.\n
   * @function toJSON\n         * @memberof onnx.TensorProto\n         * @instance\n         * @returns
{Object.<string,*>} JSON object\n         */\n        TensorProto.prototype.toJSON = function toJSON() {\n
return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n        };\n\n        /**\n         * DataType
enum.\n         * @name onnx.TensorProto.DataType\n         * @enum {string}\n         * @property {number}
UNDEFINED=0 UNDEFINED value\n         * @property {number} FLOAT=1 FLOAT value\n         * @property
```

```
{number} UINT8=2 UINT8 value\n        * @property {number} INT8=3 INT8 value\n        * @property {number}
UINT16=4 UINT16 value\n        * @property {number} INT16=5 INT16 value\n        * @property {number}
INT32=6 INT32 value\n        * @property {number} INT64=7 INT64 value\n        * @property {number}
STRING=8 STRING value\n        * @property {number} BOOL=9 BOOL value\n        * @property {number}
FLOAT16=10 FLOAT16 value\n        * @property {number} DOUBLE=11 DOUBLE value\n        * @property
{number} UINT32=12 UINT32 value\n        * @property {number} UINT64=13 UINT64 value\n        *
@property {number} COMPLEX64=14 COMPLEX64 value\n        * @property {number} COMPLEX128=15
COMPLEX128 value\n        * @property {number} BFLOAT16=16 BFLOAT16 value\n        */\n
TensorProto.DataType = (function() {\n          var valuesById = {}, values = Object.create(valuesById);\n
values[valuesById[0] = \"UNDEFINED\"] = 0;\n          values[valuesById[1] = \"FLOAT\"] = 1;\n
values[valuesById[2] = \"UINT8\"] = 2;\n          values[valuesById[3] = \"INT8\"] = 3;\n
values[valuesById[4] = \"UINT16\"] = 4;\n          values[valuesById[5] = \"INT16\"] = 5;\n
values[valuesById[6] = \"INT32\"] = 6;\n          values[valuesById[7] = \"INT64\"] = 7;\n
values[valuesById[8] = \"STRING\"] = 8;\n          values[valuesById[9] = \"BOOL\"] = 9;\n
values[valuesById[10] = \"FLOAT16\"] = 10;\n          values[valuesById[11] = \"DOUBLE\"] = 11;\n
values[valuesById[12] = \"UINT32\"] = 12;\n          values[valuesById[13] = \"UINT64\"] = 13;\n
values[valuesById[14] = \"COMPLEX64\"] = 14;\n          values[valuesById[15] = \"COMPLEX128\"] = 15;\n
   values[valuesById[16] = \"BFLOAT16\"] = 16;\n          return values;\n       })();\n\n       TensorProto.Segment
= (function() {\n\n          /**\n          * Properties of a Segment.\n          * @memberof onnx.TensorProto\n
  * @interface ISegment\n          * @property {number|Long|null} [begin] Segment begin\n          * @property
{number|Long|null} [end] Segment end\n          */\n\n          /**\n          * Constructs a new Segment.\n          *
@memberof onnx.TensorProto\n          * @classdesc Represents a Segment.\n          * @implements ISegment\n
        * @constructor\n          * @param {onnx.TensorProto.ISegment=} [properties] Properties to set\n
*/\n          function Segment(properties) {\n              if (properties)\n                  for (var keys =
Object.keys(properties), i = 0; i < keys.length; ++i)\n                      if (properties[keys[i]] != null)\n
this[keys[i]] = properties[keys[i]];\n          }\n\n          /**\n          * Segment begin.\n          * @member
{number|Long} begin\n          * @memberof onnx.TensorProto.Segment\n          * @instance\n          */\n
 Segment.prototype.begin = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n          /**\n          * Segment
end.\n          * @member {number|Long} end\n          * @memberof onnx.TensorProto.Segment\n          *
@instance\n          */\n          Segment.prototype.end = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n
/**\n          * Creates a new Segment instance using the specified properties.\n          * @function create\n
* @memberof onnx.TensorProto.Segment\n          * @static\n          * @param {onnx.TensorProto.ISegment=}
[properties] Properties to set\n          * @returns {onnx.TensorProto.Segment} Segment instance\n          */\n
   Segment.create = function create(properties) {\n              return new Segment(properties);\n          };\n\n
/**\n          * Encodes the specified Segment message. Does not implicitly {@link
onnx.TensorProto.Segment.verify|verify} messages.\n          * @function encode\n          * @memberof
onnx.TensorProto.Segment\n          * @static\n          * @param {onnx.TensorProto.ISegment} message
Segment message or plain object to encode\n          * @param {$protobuf.Writer} [writer] Writer to encode to\n
      * @returns {$protobuf.Writer} Writer\n          */\n          Segment.encode = function encode(message, writer)
{\n              if (!writer)\n                  writer = $Writer.create();\n              if (message.begin != null &&
message.hasOwnProperty(\"begin\"))\n                  writer.uint32(/* id 1, wireType 0 =*/8).int64(message.begin);\n
          if (message.end != null && message.hasOwnProperty(\"end\"))\n                  writer.uint32(/* id 2, wireType
0 =*/16).int64(message.end);\n              return writer;\n          };\n\n          /**\n          * Encodes the specified
Segment message, length delimited. Does not implicitly {@link onnx.TensorProto.Segment.verify|verify}
messages.\n          * @function encodeDelimited\n          * @memberof onnx.TensorProto.Segment\n          *
@static\n          * @param {onnx.TensorProto.ISegment} message Segment message or plain object to encode\n
      * @param {$protobuf.Writer} [writer] Writer to encode to\n          * @returns {$protobuf.Writer} Writer\n
     */\n          Segment.encodeDelimited = function encodeDelimited(message, writer) {\n              return
```

this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a Segment message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.TensorProto.Segment} Segment\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Segment.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.TensorProto.Segment();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.begin = reader.int64();\n break;\n case 2:\n message.end = reader.int64();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a Segment message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TensorProto.Segment} Segment\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Segment.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a Segment message.\n * @function verify\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n Segment.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.begin != null && message.hasOwnProperty(\"begin\"))\n if (!$util.isInteger(message.begin) && !(message.begin && $util.isInteger(message.begin.low) && $util.isInteger(message.begin.high)))\n return \"begin: integer|Long expected\";\n if (message.end != null && message.hasOwnProperty(\"end\"))\n if (!$util.isInteger(message.end) && !(message.end && $util.isInteger(message.end.low) && $util.isInteger(message.end.high)))\n return \"end: integer|Long expected\";\n return null;\n };\n\n /**\n * Creates a Segment message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.TensorProto.Segment} Segment\n */\n Segment.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.TensorProto.Segment)\n return object;\n var message = new $root.onnx.TensorProto.Segment();\n if (object.begin != null)\n if ($util.Long)\n (message.begin = $util.Long.fromValue(object.begin)).unsigned = false;\n else if (typeof object.begin === \"string\")\n message.begin = parseInt(object.begin, 10);\n else if (typeof object.begin === \"number\")\n message.begin = object.begin;\n else if (typeof object.begin === \"object\")\n message.begin = new $util.LongBits(object.begin.low >>> 0, object.begin.high >>> 0).toNumber();\n if (object.end != null)\n if ($util.Long)\n (message.end = $util.Long.fromValue(object.end)).unsigned = false;\n else if (typeof object.end === \"string\")\n message.end = parseInt(object.end, 10);\n else if (typeof object.end === \"number\")\n message.end = object.end;\n else if (typeof object.end === \"object\")\n message.end = new $util.LongBits(object.end.low >>> 0, object.end.high >>> 0).toNumber();\n return message;\n };\n\n /**\n * Creates a plain object from a Segment message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {onnx.TensorProto.Segment} message Segment\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns

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{Object.<string,*>} Plain object\n             */\n             Segment.toObject = function toObject(message, options) {\n
          if (!options)\n                    options = {};\n               var object = {};\n               if (options.defaults) {\n
       if ($util.Long) {\n                      var long = new $util.Long(0, 0, false);\n                      object.begin =
options.longs === String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n                    }
else\n                      object.begin = options.longs === String ? \"0\" : 0;\n                   if ($util.Long) {\n
  var long = new $util.Long(0, 0, false);\n                      object.end = options.longs === String ? long.toString() :
options.longs === Number ? long.toNumber() : long;\n                   } else\n                      object.end = options.longs
=== String ? \"0\" : 0;\n                }\n               if (message.begin != null && message.hasOwnProperty(\"begin\"))\n
                if (typeof message.begin === \"number\")\n                     object.begin = options.longs === String ?
String(message.begin) : message.begin;\n                   else\n                      object.begin = options.longs === String ?
$util.Long.prototype.toString.call(message.begin) : options.longs === Number ? new
$util.LongBits(message.begin.low >>> 0, message.begin.high >>> 0).toNumber() : message.begin;\n                if
(message.end != null && message.hasOwnProperty(\"end\"))\n                   if (typeof message.end ===
\"number\")\n                      object.end = options.longs === String ? String(message.end) : message.end;\n
  else\n                      object.end = options.longs === String ? $util.Long.prototype.toString.call(message.end) :
options.longs === Number ? new $util.LongBits(message.end.low >>> 0, message.end.high >>> 0).toNumber() :
message.end;\n                return object;\n             };\n\n             /**\n             * Converts this Segment to JSON.\n
  * @function toJSON\n             * @memberof onnx.TensorProto.Segment\n             * @instance\n             *
@returns {Object.<string,*>} JSON object\n             */\n             Segment.prototype.toJSON = function toJSON()
{\n                return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n             };\n\n             return
Segment;\n         })();\n\n         /**\n         * DataLocation enum.\n         * @name onnx.TensorProto.DataLocation\n
   * @enum {string}\n         * @property {number} DEFAULT=0 DEFAULT value\n         * @property {number}
EXTERNAL=1 EXTERNAL value\n         */\n         TensorProto.DataLocation = (function() {\n             var
valuesById = {}, values = Object.create(valuesById);\n             values[valuesById[0] = \"DEFAULT\"] = 0;\n
values[valuesById[1] = \"EXTERNAL\"] = 1;\n             return values;\n         })();\n\n         return TensorProto;\n
})();\n\n    onnx.TensorShapeProto = (function() {\n\n         /**\n         * Properties of a TensorShapeProto.\n         *
@memberof onnx\n         * @interface ITensorShapeProto\n         * @property
{Array.<onnx.TensorShapeProto.IDimension>|null} [dim] TensorShapeProto dim\n         */\n\n         /**\n         *
Constructs a new TensorShapeProto.\n         * @memberof onnx\n         * @classdesc Represents a
TensorShapeProto.\n         * @implements ITensorShapeProto\n         * @constructor\n         * @param
{onnx.ITensorShapeProto=} [properties] Properties to set\n         */\n         function TensorShapeProto(properties)
{\n             this.dim = [];\n             if (properties)\n                 for (var keys = Object.keys(properties), i = 0; i <
keys.length; ++i)\n                    if (properties[keys[i]] != null)\n                       this[keys[i]] = properties[keys[i]];\n
  }\n\n         /**\n         * TensorShapeProto dim.\n         * @member {Array.<onnx.TensorShapeProto.IDimension>}
dim\n         * @memberof onnx.TensorShapeProto\n         * @instance\n         */\n
TensorShapeProto.prototype.dim = $util.emptyArray;\n\n         /**\n         * Creates a new TensorShapeProto
instance using the specified properties.\n         * @function create\n         * @memberof onnx.TensorShapeProto\n
   * @static\n         * @param {onnx.ITensorShapeProto=} [properties] Properties to set\n         * @returns
{onnx.TensorShapeProto} TensorShapeProto instance\n         */\n         TensorShapeProto.create = function
create(properties) {\n             return new TensorShapeProto(properties);\n         };\n\n         /**\n         * Encodes the
specified TensorShapeProto message. Does not implicitly {@link onnx.TensorShapeProto.verify|verify}
messages.\n         * @function encode\n         * @memberof onnx.TensorShapeProto\n         * @static\n         *
@param {onnx.ITensorShapeProto} message TensorShapeProto message or plain object to encode\n         *
@param {$protobuf.Writer} [writer] Writer to encode to\n         * @returns {$protobuf.Writer} Writer\n         */\n
  TensorShapeProto.encode = function encode(message, writer) {\n             if (!writer)\n                 writer =
$Writer.create();\n             if (message.dim != null && message.dim.length)\n                 for (var i = 0; i <
message.dim.length; ++i)\n                    $root.onnx.TensorShapeProto.Dimension.encode(message.dim[i],
writer.uint32(/* id 1, wireType 2 =*/10).fork()).ldelim();\n             return writer;\n         };\n\n         /**\n         *
```

Encodes the specified TensorShapeProto message, length delimited. Does not implicitly {@link onnx.TensorShapeProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {onnx.ITensorShapeProto} message TensorShapeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n TensorShapeProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a TensorShapeProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.TensorShapeProto} TensorShapeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n TensorShapeProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.TensorShapeProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n if (!(message.dim && message.dim.length))\n message.dim = [];\n message.dim.push($root.onnx.TensorShapeProto.Dimension.decode(reader, reader.uint32()));\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a TensorShapeProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TensorShapeProto} TensorShapeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n TensorShapeProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a TensorShapeProto message.\n * @function verify\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n TensorShapeProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.dim != null && message.hasOwnProperty(\"dim\")) {\n if (!Array.isArray(message.dim))\n return \"dim: array expected\";\n for (var i = 0; i < message.dim.length; ++i) {\n var error = $root.onnx.TensorShapeProto.Dimension.verify(message.dim[i]);\n if (error)\n return \"dim.\" + error;\n }\n }\n return null;\n };\n\n /**\n * Creates a TensorShapeProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.TensorShapeProto} TensorShapeProto\n */\n TensorShapeProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.TensorShapeProto)\n return object;\n var message = new $root.onnx.TensorShapeProto();\n if (object.dim) {\n if (!Array.isArray(object.dim))\n throw TypeError(\".onnx.TensorShapeProto.dim: array expected\");\n message.dim = [];\n for (var i = 0; i < object.dim.length; ++i) {\n if (typeof object.dim[i] !== \"object\")\n throw TypeError(\".onnx.TensorShapeProto.dim: object expected\");\n message.dim[i] = $root.onnx.TensorShapeProto.Dimension.fromObject(object.dim[i]);\n }\n }\n return message;\n };\n\n /**\n * Creates a plain object from a TensorShapeProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {onnx.TensorShapeProto} message TensorShapeProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n TensorShapeProto.toObject = function toObject(message, options) {\n if (!options)\n

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options = {};\n            var object = {};\n            if (options.arrays || options.defaults)\n                object.dim = [];\n
    if (message.dim && message.dim.length) {\n                object.dim = [];\n                for (var j = 0; j <
message.dim.length; ++j)\n                    object.dim[j] =
$root.onnx.TensorShapeProto.Dimension.toObject(message.dim[j], options);\n            }\n            return object;\n
};\n\n        /**\n         * Converts this TensorShapeProto to JSON.\n         * @function toJSON\n         * @memberof
onnx.TensorShapeProto\n         * @instance\n         * @returns {Object.<string,*>} JSON object\n         */\n
TensorShapeProto.prototype.toJSON = function toJSON() {\n            return this.constructor.toObject(this,
$protobuf.util.toJSONOptions);\n        };\n\n        TensorShapeProto.Dimension = (function() {\n\n            /**\n
  * Properties of a Dimension.\n             * @memberof onnx.TensorShapeProto\n             * @interface
IDimension\n             * @property {number|Long|null} [dimValue] Dimension dimValue\n             * @property
{string|null} [dimParam] Dimension dimParam\n             * @property {string|null} [denotation] Dimension
denotation\n             */\n\n            /**\n             * Constructs a new Dimension.\n             * @memberof
onnx.TensorShapeProto\n             * @classdesc Represents a Dimension.\n             * @implements IDimension\n
    * @constructor\n             * @param {onnx.TensorShapeProto.IDimension=} [properties] Properties to set\n
  */\n             function Dimension(properties) {\n                if (properties)\n                    for (var keys =
Object.keys(properties), i = 0; i < keys.length; ++i)\n                        if (properties[keys[i]] != null)\n
this[keys[i]] = properties[keys[i]];\n            }\n\n            /**\n             * Dimension dimValue.\n             * @member
{number|Long} dimValue\n             * @memberof onnx.TensorShapeProto.Dimension\n             * @instance\n
  */\n             Dimension.prototype.dimValue = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n            /**\n
 * Dimension dimParam.\n             * @member {string} dimParam\n             * @memberof
onnx.TensorShapeProto.Dimension\n             * @instance\n             */\n            Dimension.prototype.dimParam =
\"\";\n\n            /**\n             * Dimension denotation.\n             * @member {string} denotation\n             *
@memberof onnx.TensorShapeProto.Dimension\n             * @instance\n             */\n
Dimension.prototype.denotation = \"\";\n\n            // OneOf field names bound to virtual getters and setters\n
var $oneOfFields;\n\n            /**\n             * Dimension value.\n             * @member
{\"dimValue\"|\"dimParam\"|undefined} value\n             * @memberof onnx.TensorShapeProto.Dimension\n
* @instance\n             */\n            Object.defineProperty(Dimension.prototype, \"value\", {\n                get:
$util.oneOfGetter($oneOfFields = [\"dimValue\", \"dimParam\"]),\n                set: $util.oneOfSetter($oneOfFields)\n
         });\n\n            /**\n             * Creates a new Dimension instance using the specified properties.\n             *
@function create\n             * @memberof onnx.TensorShapeProto.Dimension\n             * @static\n             *
@param {onnx.TensorShapeProto.IDimension=} [properties] Properties to set\n             * @returns
{onnx.TensorShapeProto.Dimension} Dimension instance\n             */\n            Dimension.create = function
create(properties) {\n                return new Dimension(properties);\n            };\n\n            /**\n             * Encodes the
specified Dimension message. Does not implicitly {@link onnx.TensorShapeProto.Dimension.verify|verify}
messages.\n             * @function encode\n             * @memberof onnx.TensorShapeProto.Dimension\n             *
@static\n             * @param {onnx.TensorShapeProto.IDimension} message Dimension message or plain object to
encode\n             * @param {$protobuf.Writer} [writer] Writer to encode to\n             * @returns
{$protobuf.Writer} Writer\n             */\n            Dimension.encode = function encode(message, writer) {\n
if (!writer)\n                    writer = $Writer.create();\n                if (message.dimValue != null &&
message.hasOwnProperty(\"dimValue\"))\n                    writer.uint32(/* id 1, wireType 0
=*/8).int64(message.dimValue);\n                if (message.dimParam != null &&
message.hasOwnProperty(\"dimParam\"))\n                    writer.uint32(/* id 2, wireType 2
=*/18).string(message.dimParam);\n                if (message.denotation != null &&
message.hasOwnProperty(\"denotation\"))\n                    writer.uint32(/* id 3, wireType 2
=*/26).string(message.denotation);\n                return writer;\n            };\n\n            /**\n             * Encodes the
specified Dimension message, length delimited. Does not implicitly {@link
onnx.TensorShapeProto.Dimension.verify|verify} messages.\n             * @function encodeDelimited\n             *
@memberof onnx.TensorShapeProto.Dimension\n             * @static\n             * @param
```

{onnx.TensorShapeProto.IDimension} message Dimension message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n Dimension.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a Dimension message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.TensorShapeProto.Dimension} Dimension\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Dimension.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.TensorShapeProto.Dimension();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.dimValue = reader.int64();\n break;\n case 2:\n message.dimParam = reader.string();\n break;\n case 3:\n message.denotation = reader.string();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a Dimension message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TensorShapeProto.Dimension} Dimension\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Dimension.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a Dimension message.\n * @function verify\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n Dimension.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n var properties = {};\n if (message.dimValue != null && message.hasOwnProperty(\"dimValue\")) {\n properties.value = 1;\n if (!$util.isInteger(message.dimValue) && !(message.dimValue && $util.isInteger(message.dimValue.low) && $util.isInteger(message.dimValue.high)))\n return \"dimValue: integer|Long expected\";\n }\n if (message.dimParam != null && message.hasOwnProperty(\"dimParam\")) {\n if (properties.value === 1)\n return \"value: multiple values\";\n properties.value = 1;\n if (!$util.isString(message.dimParam))\n return \"dimParam: string expected\";\n }\n if (message.denotation != null && message.hasOwnProperty(\"denotation\"))\n if (!$util.isString(message.denotation))\n return \"denotation: string expected\";\n return null;\n };\n\n /**\n * Creates a Dimension message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.TensorShapeProto.Dimension} Dimension\n */\n Dimension.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.TensorShapeProto.Dimension)\n return object;\n var message = new $root.onnx.TensorShapeProto.Dimension();\n if (object.dimValue != null)\n if ($util.Long)\n (message.dimValue = $util.Long.fromValue(object.dimValue)).unsigned = false;\n else if (typeof object.dimValue === \"string\")\n message.dimValue = parseInt(object.dimValue, 10);\n else if (typeof object.dimValue === \"number\")\n message.dimValue = object.dimValue;\n else if (typeof object.dimValue === \"object\")\n message.dimValue = new $util.LongBits(object.dimValue.low >>> 0, object.dimValue.high >>> 0).toNumber();\n if

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(object.dimParam != null)\n                    message.dimParam = String(object.dimParam);\n                if
(object.denotation != null)\n                    message.denotation = String(object.denotation);\n                return
message;\n            };\n\n            /**\n             * Creates a plain object from a Dimension message. Also converts
values to other types if specified.\n             * @function toObject\n             * @memberof
onnx.TensorShapeProto.Dimension\n             * @static\n             * @param {onnx.TensorShapeProto.Dimension}
message Dimension\n             * @param {$protobuf.IConversionOptions} [options] Conversion options\n             *
@returns {Object.<string,*>} Plain object\n             */\n            Dimension.toObject = function toObject(message,
options) {\n                if (!options)\n                    options = {};\n                var object = {};\n                if
(options.defaults)\n                    object.denotation = \"\";\n                if (message.dimValue != null &&
message.hasOwnProperty(\"dimValue\")) {\n                    if (typeof message.dimValue === \"number\")\n
    object.dimValue = options.longs === String ? String(message.dimValue) : message.dimValue;\n
else\n                        object.dimValue = options.longs === String ?
$util.Long.prototype.toString.call(message.dimValue) : options.longs === Number ? new
$util.LongBits(message.dimValue.low >>> 0, message.dimValue.high >>> 0).toNumber() : message.dimValue;\n
             if (options.oneofs)\n                        object.value = \"dimValue\";\n                }\n                if
(message.dimParam != null && message.hasOwnProperty(\"dimParam\")) {\n                    object.dimParam =
message.dimParam;\n                    if (options.oneofs)\n                        object.value = \"dimParam\";\n                }\n
         if (message.denotation != null && message.hasOwnProperty(\"denotation\"))\n                    object.denotation
= message.denotation;\n                return object;\n            };\n\n            /**\n             * Converts this Dimension to
JSON.\n             * @function toJSON\n             * @memberof onnx.TensorShapeProto.Dimension\n             *
@instance\n             * @returns {Object.<string,*>} JSON object\n             */\n            Dimension.prototype.toJSON
= function toJSON() {\n                return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n
};\n\n            return Dimension;\n        })();\n\n        return TensorShapeProto;\n    })();\n\n    onnx.TypeProto =
(function() {\n\n        /**\n         * Properties of a TypeProto.\n         * @memberof onnx\n         * @interface
ITypeProto\n         * @property {onnx.TypeProto.ITensor|null} [tensorType] TypeProto tensorType\n         *
@property {string|null} [denotation] TypeProto denotation\n         */\n\n        /**\n         * Constructs a new
TypeProto.\n         * @memberof onnx\n         * @classdesc Represents a TypeProto.\n         * @implements
ITypeProto\n         * @constructor\n         * @param {onnx.ITypeProto=} [properties] Properties to set\n         */\n
  function TypeProto(properties) {\n            if (properties)\n                for (var keys = Object.keys(properties), i = 0; i
< keys.length; ++i)\n                    if (properties[keys[i]] != null)\n                        this[keys[i]] = properties[keys[i]];\n
      }\n\n        /**\n         * TypeProto tensorType.\n         * @member {onnx.TypeProto.ITensor|null|undefined}
tensorType\n         * @memberof onnx.TypeProto\n         * @instance\n         */\n
TypeProto.prototype.tensorType = null;\n\n        /**\n         * TypeProto denotation.\n         * @member {string}
denotation\n         * @memberof onnx.TypeProto\n         * @instance\n         */\n
TypeProto.prototype.denotation = \"\";\n\n        // OneOf field names bound to virtual getters and setters\n        var
$oneOfFields;\n\n        /**\n         * TypeProto value.\n         * @member {\"tensorType\"|undefined} value\n         *
@memberof onnx.TypeProto\n         * @instance\n         */\n        Object.defineProperty(TypeProto.prototype,
\"value\", {\n            get: $util.oneOfGetter($oneOfFields = [\"tensorType\"]),\n            set:
$util.oneOfSetter($oneOfFields)\n        });\n\n        /**\n         * Creates a new TypeProto instance using the
specified properties.\n         * @function create\n         * @memberof onnx.TypeProto\n         * @static\n         *
@param {onnx.ITypeProto=} [properties] Properties to set\n         * @returns {onnx.TypeProto} TypeProto
instance\n         */\n        TypeProto.create = function create(properties) {\n            return new
TypeProto(properties);\n        };\n\n        /**\n         * Encodes the specified TypeProto message. Does not implicitly
{@link onnx.TypeProto.verify|verify} messages.\n         * @function encode\n         * @memberof
onnx.TypeProto\n         * @static\n         * @param {onnx.ITypeProto} message TypeProto message or plain object
to encode\n         * @param {$protobuf.Writer} [writer] Writer to encode to\n         * @returns {$protobuf.Writer}
Writer\n         */\n        TypeProto.encode = function encode(message, writer) {\n            if (!writer)\n
writer = $Writer.create();\n            if (message.tensorType != null && message.hasOwnProperty(\"tensorType\"))\n
```

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        $root.onnx.TypeProto.Tensor.encode(message.tensorType, writer.uint32(/* id 1, wireType 2
=*/10).fork()).ldelim();\n        if (message.denotation != null && message.hasOwnProperty(\"denotation\"))\n
    writer.uint32(/* id 6, wireType 2 =*/50).string(message.denotation);\n        return writer;\n    };\n\n
/**\n     * Encodes the specified TypeProto message, length delimited. Does not implicitly {@link
onnx.TypeProto.verify|verify} messages.\n     * @function encodeDelimited\n     * @memberof
onnx.TypeProto\n     * @static\n     * @param {onnx.ITypeProto} message TypeProto message or plain object
to encode\n     * @param {$protobuf.Writer} [writer] Writer to encode to\n     * @returns {$protobuf.Writer}
Writer\n     */\n    TypeProto.encodeDelimited = function encodeDelimited(message, writer) {\n        return
this.encode(message, writer).ldelim();\n    };\n\n    /**\n     * Decodes a TypeProto message from the
specified reader or buffer.\n     * @function decode\n     * @memberof onnx.TypeProto\n     * @static\n
* @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n     * @param {number}
[length] Message length if known beforehand\n     * @returns {onnx.TypeProto} TypeProto\n     * @throws
{Error} If the payload is not a reader or valid buffer\n     * @throws {$protobuf.util.ProtocolError} If required
fields are missing\n     */\n    TypeProto.decode = function decode(reader, length) {\n        if (!(reader
instanceof $Reader))\n            reader = $Reader.create(reader);\n        var end = length === undefined ?
reader.len : reader.pos + length, message = new $root.onnx.TypeProto();\n        while (reader.pos < end) {\n
   var tag = reader.uint32();\n            switch (tag >>> 3) {\n            case 1:\n                message.tensorType =
$root.onnx.TypeProto.Tensor.decode(reader, reader.uint32());\n                break;\n            case 6:\n
message.denotation = reader.string();\n                break;\n            default:\n                reader.skipType(tag &
7);\n                break;\n            }\n        }\n        return message;\n    };\n\n    /**\n     * Decodes a
TypeProto message from the specified reader or buffer, length delimited.\n     * @function decodeDelimited\n
 * @memberof onnx.TypeProto\n     * @static\n     * @param {$protobuf.Reader|Uint8Array} reader Reader or
buffer to decode from\n     * @returns {onnx.TypeProto} TypeProto\n     * @throws {Error} If the payload is
not a reader or valid buffer\n     * @throws {$protobuf.util.ProtocolError} If required fields are missing\n
*/\n    TypeProto.decodeDelimited = function decodeDelimited(reader) {\n        if (!(reader instanceof
$Reader))\n            reader = new $Reader(reader);\n        return this.decode(reader, reader.uint32());\n
};\n\n    /**\n     * Verifies a TypeProto message.\n     * @function verify\n     * @memberof
onnx.TypeProto\n     * @static\n     * @param {Object.<string,*>} message Plain object to verify\n     *
@returns {string|null} `null` if valid, otherwise the reason why it is not\n     */\n    TypeProto.verify = function
verify(message) {\n        if (typeof message !== \"object\" || message === null)\n            return \"object
expected\";\n        var properties = {};\n        if (message.tensorType != null &&
message.hasOwnProperty(\"tensorType\")) {\n            properties.value = 1;\n            {\n                var error =
$root.onnx.TypeProto.Tensor.verify(message.tensorType);\n                if (error)\n                    return
\"tensorType.\" + error;\n            }\n        }\n        if (message.denotation != null &&
message.hasOwnProperty(\"denotation\"))\n            if (!$util.isString(message.denotation))\n                return
\"denotation: string expected\";\n        return null;\n    };\n\n    /**\n     * Creates a TypeProto message
from a plain object. Also converts values to their respective internal types.\n     * @function fromObject\n     *
@memberof onnx.TypeProto\n     * @static\n     * @param {Object.<string,*>} object Plain object\n     *
@returns {onnx.TypeProto} TypeProto\n     */\n    TypeProto.fromObject = function fromObject(object) {\n
    if (object instanceof $root.onnx.TypeProto)\n            return object;\n        var message = new
$root.onnx.TypeProto();\n        if (object.tensorType != null) {\n            if (typeof object.tensorType !==
\"object\")\n                throw TypeError(\".onnx.TypeProto.tensorType: object expected\");\n
message.tensorType = $root.onnx.TypeProto.Tensor.fromObject(object.tensorType);\n        }\n        if
(object.denotation != null)\n            message.denotation = String(object.denotation);\n        return message;\n
 };\n\n    /**\n     * Creates a plain object from a TypeProto message. Also converts values to other types if
specified.\n     * @function toObject\n     * @memberof onnx.TypeProto\n     * @static\n     * @param
{onnx.TypeProto} message TypeProto\n     * @param {$protobuf.IConversionOptions} [options] Conversion
options\n     * @returns {Object.<string,*>} Plain object\n     */\n    TypeProto.toObject = function
```

```
toObject(message, options) {\n        if (!options)\n            options = {};\n        var object = {};\n        if
(options.defaults)\n            object.denotation = \"\";\n        if (message.tensorType != null &&
message.hasOwnProperty(\"tensorType\")) {\n            object.tensorType =
$root.onnx.TypeProto.Tensor.toObject(message.tensorType, options);\n            if (options.oneofs)\n
object.value = \"tensorType\";\n        }\n        if (message.denotation != null &&
message.hasOwnProperty(\"denotation\"))\n            object.denotation = message.denotation;\n        return
object;\n    };\n\n    /**\n     * Converts this TypeProto to JSON.\n     * @function toJSON\n     *
@memberof onnx.TypeProto\n     * @instance\n     * @returns {Object.<string,*>} JSON object\n     */\n
 TypeProto.prototype.toJSON = function toJSON() {\n        return this.constructor.toObject(this,
$protobuf.util.toJSONOptions);\n    };\n\n    TypeProto.Tensor = (function() {\n\n        /**\n         *
Properties of a Tensor.\n         * @memberof onnx.TypeProto\n         * @interface ITensor\n         *
@property {number|null} [elemType] Tensor elemType\n         * @property {onnx.ITensorShapeProto|null}
[shape] Tensor shape\n         */\n\n        /**\n         * Constructs a new Tensor.\n         * @memberof
onnx.TypeProto\n         * @classdesc Represents a Tensor.\n         * @implements ITensor\n         *
@constructor\n         * @param {onnx.TypeProto.ITensor=} [properties] Properties to set\n         */\n
function Tensor(properties) {\n            if (properties)\n                for (var keys = Object.keys(properties), i = 0; i
< keys.length; ++i)\n                    if (properties[keys[i]] != null)\n                        this[keys[i]] =
properties[keys[i]];\n        }\n\n        /**\n         * Tensor elemType.\n         * @member {number}
elemType\n         * @memberof onnx.TypeProto.Tensor\n         * @instance\n         */\n
Tensor.prototype.elemType = 0;\n\n        /**\n         * Tensor shape.\n         * @member
{onnx.ITensorShapeProto|null|undefined} shape\n         * @memberof onnx.TypeProto.Tensor\n         *
@instance\n         */\n        Tensor.prototype.shape = null;\n\n        /**\n         * Creates a new Tensor
instance using the specified properties.\n         * @function create\n         * @memberof
onnx.TypeProto.Tensor\n         * @static\n         * @param {onnx.TypeProto.ITensor=} [properties] Properties
to set\n         * @returns {onnx.TypeProto.Tensor} Tensor instance\n         */\n        Tensor.create = function
create(properties) {\n            return new Tensor(properties);\n        };\n\n        /**\n         * Encodes the
specified Tensor message. Does not implicitly {@link onnx.TypeProto.Tensor.verify|verify} messages.\n         *
@function encode\n         * @memberof onnx.TypeProto.Tensor\n         * @static\n         * @param
{onnx.TypeProto.ITensor} message Tensor message or plain object to encode\n         * @param
{$protobuf.Writer} [writer] Writer to encode to\n         * @returns {$protobuf.Writer} Writer\n         */\n
Tensor.encode = function encode(message, writer) {\n            if (!writer)\n                writer = $Writer.create();\n
            if (message.elemType != null && message.hasOwnProperty(\"elemType\"))\n                writer.uint32(/*
id 1, wireType 0 =*/8).int32(message.elemType);\n            if (message.shape != null &&
message.hasOwnProperty(\"shape\"))\n                $root.onnx.TensorShapeProto.encode(message.shape,
writer.uint32(/* id 2, wireType 2 =*/18).fork()).ldelim();\n            return writer;\n        };\n\n        /**\n
* Encodes the specified Tensor message, length delimited. Does not implicitly {@link
onnx.TypeProto.Tensor.verify|verify} messages.\n         * @function encodeDelimited\n         * @memberof
onnx.TypeProto.Tensor\n         * @static\n         * @param {onnx.TypeProto.ITensor} message Tensor
message or plain object to encode\n         * @param {$protobuf.Writer} [writer] Writer to encode to\n         *
@returns {$protobuf.Writer} Writer\n         */\n        Tensor.encodeDelimited = function
encodeDelimited(message, writer) {\n            return this.encode(message, writer).ldelim();\n        };\n\n
/**\n         * Decodes a Tensor message from the specified reader or buffer.\n         * @function decode\n
* @memberof onnx.TypeProto.Tensor\n         * @static\n         * @param {$protobuf.Reader|Uint8Array}
reader Reader or buffer to decode from\n         * @param {number} [length] Message length if known
beforehand\n         * @returns {onnx.TypeProto.Tensor} Tensor\n         * @throws {Error} If the payload is not
a reader or valid buffer\n         * @throws {$protobuf.util.ProtocolError} If required fields are missing\n
*/\n        Tensor.decode = function decode(reader, length) {\n            if (!(reader instanceof $Reader))\n
    reader = $Reader.create(reader);\n            var end = length === undefined ? reader.len : reader.pos + length,
```

message = new $root.onnx.TypeProto.Tensor();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.elemType = reader.int32();\n break;\n case 2:\n message.shape = $root.onnx.TensorShapeProto.decode(reader, reader.uint32());\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a Tensor message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TypeProto.Tensor} Tensor\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Tensor.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a Tensor message.\n * @function verify\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n Tensor.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.elemType != null && message.hasOwnProperty(\"elemType\"))\n if (!$util.isInteger(message.elemType))\n return \"elemType: integer expected\";\n if (message.shape != null && message.hasOwnProperty(\"shape\")) {\n var error = $root.onnx.TensorShapeProto.verify(message.shape);\n if (error)\n return \"shape.\" + error;\n }\n return null;\n };\n\n /**\n * Creates a Tensor message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.TypeProto.Tensor} Tensor\n */\n Tensor.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.TypeProto.Tensor)\n return object;\n var message = new $root.onnx.TypeProto.Tensor();\n if (object.elemType != null)\n message.elemType = object.elemType | 0;\n if (object.shape != null) {\n if (typeof object.shape !== \"object\")\n throw TypeError(\".onnx.TypeProto.Tensor.shape: object expected\");\n message.shape = $root.onnx.TensorShapeProto.fromObject(object.shape);\n }\n return message;\n };\n\n /**\n * Creates a plain object from a Tensor message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.TypeProto.Tensor\n * @static\n * @param {onnx.TypeProto.Tensor} message Tensor\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n Tensor.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.defaults) {\n object.elemType = 0;\n object.shape = null;\n }\n if (message.elemType != null && message.hasOwnProperty(\"elemType\"))\n object.elemType = message.elemType;\n if (message.shape != null && message.hasOwnProperty(\"shape\"))\n object.shape = $root.onnx.TensorShapeProto.toObject(message.shape, options);\n return object;\n };\n\n /**\n * Converts this Tensor to JSON.\n * @function toJSON\n * @memberof onnx.TypeProto.Tensor\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n Tensor.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return Tensor;\n })();\n\n return TypeProto;\n })();\n\n onnx.OperatorSetIdProto = (function() {\n\n /**\n * Properties of an OperatorSetIdProto.\n * @memberof onnx\n * @interface IOperatorSetIdProto\n * @property {string|null} [domain] OperatorSetIdProto domain\n * @property {number|Long|null} [version] OperatorSetIdProto version\n */\n\n /**\n * Constructs a new OperatorSetIdProto.\n * @memberof onnx\n * @classdesc Represents an OperatorSetIdProto.\n * @implements IOperatorSetIdProto\n * @constructor\n *

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@param {onnx.IOperatorSetIdProto=} [properties] Properties to set\n         */\n        function
OperatorSetIdProto(properties) {\n            if (properties)\n                for (var keys = Object.keys(properties), i = 0; i
< keys.length; ++i)\n                    if (properties[keys[i]] != null)\n                        this[keys[i]] = properties[keys[i]];\n
      }\n\n        /**\n         * OperatorSetIdProto domain.\n         * @member {string} domain\n         * @memberof
onnx.OperatorSetIdProto\n         * @instance\n         */\n        OperatorSetIdProto.prototype.domain = \"\";\n\n
/**\n         * OperatorSetIdProto version.\n         * @member {number|Long} version\n         * @memberof
onnx.OperatorSetIdProto\n         * @instance\n         */\n        OperatorSetIdProto.prototype.version = $util.Long ?
$util.Long.fromBits(0,0,false) : 0;\n\n        /**\n         * Creates a new OperatorSetIdProto instance using the
specified properties.\n         * @function create\n         * @memberof onnx.OperatorSetIdProto\n         * @static\n
  * @param {onnx.IOperatorSetIdProto=} [properties] Properties to set\n         * @returns
{onnx.OperatorSetIdProto} OperatorSetIdProto instance\n         */\n        OperatorSetIdProto.create = function
create(properties) {\n            return new OperatorSetIdProto(properties);\n        };\n\n        /**\n         * Encodes the
specified OperatorSetIdProto message. Does not implicitly {@link onnx.OperatorSetIdProto.verify|verify}
messages.\n         * @function encode\n         * @memberof onnx.OperatorSetIdProto\n         * @static\n         *
@param {onnx.IOperatorSetIdProto} message OperatorSetIdProto message or plain object to encode\n         *
@param {$protobuf.Writer} [writer] Writer to encode to\n         * @returns {$protobuf.Writer} Writer\n         */\n
  OperatorSetIdProto.encode = function encode(message, writer) {\n            if (!writer)\n                writer =
$Writer.create();\n            if (message.domain != null && message.hasOwnProperty(\"domain\"))\n
writer.uint32(/* id 1, wireType 2 =*/10).string(message.domain);\n            if (message.version != null &&
message.hasOwnProperty(\"version\"))\n                writer.uint32(/* id 2, wireType 0
=*/16).int64(message.version);\n            return writer;\n        };\n\n        /**\n         * Encodes the specified
OperatorSetIdProto message, length delimited. Does not implicitly {@link onnx.OperatorSetIdProto.verify|verify}
messages.\n         * @function encodeDelimited\n         * @memberof onnx.OperatorSetIdProto\n         * @static\n
   * @param {onnx.IOperatorSetIdProto} message OperatorSetIdProto message or plain object to encode\n         *
@param {$protobuf.Writer} [writer] Writer to encode to\n         * @returns {$protobuf.Writer} Writer\n         */\n
  OperatorSetIdProto.encodeDelimited = function encodeDelimited(message, writer) {\n            return
this.encode(message, writer).ldelim();\n        };\n\n        /**\n         * Decodes an OperatorSetIdProto message from
the specified reader or buffer.\n         * @function decode\n         * @memberof onnx.OperatorSetIdProto\n         *
@static\n         * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @param
{number} [length] Message length if known beforehand\n         * @returns {onnx.OperatorSetIdProto}
OperatorSetIdProto\n         * @throws {Error} If the payload is not a reader or valid buffer\n         * @throws
{$protobuf.util.ProtocolError} If required fields are missing\n         */\n        OperatorSetIdProto.decode = function
decode(reader, length) {\n            if (!(reader instanceof $Reader))\n                reader = $Reader.create(reader);\n
   var end = length === undefined ? reader.len : reader.pos + length, message = new
$root.onnx.OperatorSetIdProto();\n            while (reader.pos < end) {\n                var tag = reader.uint32();\n
switch (tag >>> 3) {\n                case 1:\n                    message.domain = reader.string();\n                    break;\n
    case 2:\n                    message.version = reader.int64();\n                    break;\n                default:\n
reader.skipType(tag & 7);\n                    break;\n                }\n            }\n            return message;\n        };\n\n
/**\n         * Decodes an OperatorSetIdProto message from the specified reader or buffer, length delimited.\n         *
@function decodeDelimited\n         * @memberof onnx.OperatorSetIdProto\n         * @static\n         * @param
{$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @returns
{onnx.OperatorSetIdProto} OperatorSetIdProto\n         * @throws {Error} If the payload is not a reader or valid
buffer\n         * @throws {$protobuf.util.ProtocolError} If required fields are missing\n         */\n
OperatorSetIdProto.decodeDelimited = function decodeDelimited(reader) {\n            if (!(reader instanceof
$Reader))\n                reader = new $Reader(reader);\n            return this.decode(reader, reader.uint32());\n
};\n\n        /**\n         * Verifies an OperatorSetIdProto message.\n         * @function verify\n         * @memberof
onnx.OperatorSetIdProto\n         * @static\n         * @param {Object.<string,*>} message Plain object to verify\n
  * @returns {string|null} `null` if valid, otherwise the reason why it is not\n         */\n        OperatorSetIdProto.verify
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= function verify(message) {\n        if (typeof message !== \"object\" || message === null)\n            return
\"object expected\";\n        if (message.domain != null && message.hasOwnProperty(\"domain\"))\n            if
(!$util.isString(message.domain))\n                return \"domain: string expected\";\n        if (message.version !=
null && message.hasOwnProperty(\"version\"))\n            if (!$util.isInteger(message.version) &&
!(message.version && $util.isInteger(message.version.low) && $util.isInteger(message.version.high)))\n
return \"version: integer|Long expected\";\n        return null;\n    };\n\n    /**\n     * Creates an
OperatorSetIdProto message from a plain object. Also converts values to their respective internal types.\n     *
@function fromObject\n     * @memberof onnx.OperatorSetIdProto\n     * @static\n     * @param
{Object.<string,*>} object Plain object\n     * @returns {onnx.OperatorSetIdProto} OperatorSetIdProto\n
*/\n    OperatorSetIdProto.fromObject = function fromObject(object) {\n        if (object instanceof
$root.onnx.OperatorSetIdProto)\n            return object;\n        var message = new
$root.onnx.OperatorSetIdProto();\n        if (object.domain != null)\n            message.domain =
String(object.domain);\n        if (object.version != null)\n            if ($util.Long)\n                (message.version
= $util.Long.fromValue(object.version)).unsigned = false;\n            else if (typeof object.version === \"string\")\n
                message.version = parseInt(object.version, 10);\n            else if (typeof object.version ===
\"number\")\n                message.version = object.version;\n            else if (typeof object.version ===
\"object\")\n                message.version = new $util.LongBits(object.version.low >>> 0, object.version.high >>>
0).toNumber();\n        return message;\n    };\n\n    /**\n     * Creates a plain object from an
OperatorSetIdProto message. Also converts values to other types if specified.\n     * @function toObject\n     *
@memberof onnx.OperatorSetIdProto\n     * @static\n     * @param {onnx.OperatorSetIdProto} message
OperatorSetIdProto\n     * @param {$protobuf.IConversionOptions} [options] Conversion options\n     *
@returns {Object.<string,*>} Plain object\n     */\n    OperatorSetIdProto.toObject = function
toObject(message, options) {\n        if (!options)\n            options = {};\n        var object = {};\n        if
(options.defaults) {\n            object.domain = \"\";\n            if ($util.Long) {\n                var long = new
$util.Long(0, 0, false);\n                object.version = options.longs === String ? long.toString() : options.longs ===
Number ? long.toNumber() : long;\n            } else\n                object.version = options.longs === String ? \"0\" :
0;\n        }\n        if (message.domain != null && message.hasOwnProperty(\"domain\"))\n
object.domain = message.domain;\n        if (message.version != null && message.hasOwnProperty(\"version\"))\n
            if (typeof message.version === \"number\")\n                object.version = options.longs === String ?
String(message.version) : message.version;\n            else\n                object.version = options.longs === String
? $util.Long.prototype.toString.call(message.version) : options.longs === Number ? new
$util.LongBits(message.version.low >>> 0, message.version.high >>> 0).toNumber() : message.version;\n
return object;\n    };\n\n    /**\n     * Converts this OperatorSetIdProto to JSON.\n     * @function
toJSON\n     * @memberof onnx.OperatorSetIdProto\n     * @instance\n     * @returns {Object.<string,*>}
JSON object\n     */\n    OperatorSetIdProto.prototype.toJSON = function toJSON() {\n        return
this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n    };\n\n    return OperatorSetIdProto;\n
})();\n\n    return onnx;\n})();\n\nmodule.exports = $root;\n","// minimal library entry point.\n\n\"use
strict\";\nmodule.exports = require(\"./src/index-minimal\");\n","\"use strict\";\nvar protobuf = exports;\n\n/**\n *
Build type, one of `\"full\"`, `\"light\"` or `\"minimal\"`.\n * @name build\n * @type {string}\n * @const\n
*/\nprotobuf.build = \"minimal\";\n\n// Serialization\nprotobuf.Writer       =
require(\"./writer\");\nprotobuf.BufferWriter = require(\"./writer_buffer\");\nprotobuf.Reader       =
require(\"./reader\");\nprotobuf.BufferReader = require(\"./reader_buffer\");\n\n// Utility\nprotobuf.util         =
require(\"./util/minimal\");\nprotobuf.rpc          = require(\"./rpc\");\nprotobuf.roots        =
require(\"./roots\");\nprotobuf.configure    = configure;\n\n/* istanbul ignore next */\n/**\n * Reconfigures the
library according to the environment.\n * @returns {undefined}\n */\nfunction configure() {\n
protobuf.util._configure();\n    protobuf.Writer._configure(protobuf.BufferWriter);\n
protobuf.Reader._configure(protobuf.BufferReader);\n}\n\n// Set up buffer utility according to the
environment\nconfigure();\n","\"use strict\";\nmodule.exports = Reader;\n\nvar util      =
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require(\"./util/minimal\");\n\nvar BufferReader; // cyclic\n\nvar LongBits = util.LongBits,\n   utf8   = util.utf8;\n\n/* istanbul ignore next */\nfunction indexOutOfRange(reader, writeLength) {\n   return RangeError(\"index out of range: \" + reader.pos + \" + \" + (writeLength || 1) + \" > \" + reader.len);\n}\n\n/**\n * Constructs a new reader instance using the specified buffer.\n * @classdesc Wire format reader using `Uint8Array` if available, otherwise `Array`.\n * @constructor\n * @param {Uint8Array} buffer Buffer to read from\n */\nfunction Reader(buffer) {\n\n   /**\n   * Read buffer.\n   * @type {Uint8Array}\n   */\n   this.buf = buffer;\n\n   /**\n   * Read buffer position.\n   * @type {number}\n   */\n   this.pos = 0;\n\n   /**\n   * Read buffer length.\n   * @type {number}\n   */\n   this.len = buffer.length;\n}\n\nvar create_array = typeof Uint8Array !== \"undefined\"\n   ? function create_typed_array(buffer) {\n   if (buffer instanceof Uint8Array || Array.isArray(buffer))\n   return new Reader(buffer);\n   throw Error(\"illegal buffer\");\n   }\n   /* istanbul ignore next */\n   : function create_array(buffer) {\n   if (Array.isArray(buffer))\n   return new Reader(buffer);\n   throw Error(\"illegal buffer\");\n   };\n\nvar create = function create() {\n   return util.Buffer\n   ? function create_buffer_setup(buffer) {\n   return (Reader.create = function create_buffer(buffer) {\n   return util.Buffer.isBuffer(buffer)\n   ? new BufferReader(buffer)\n   /* istanbul ignore next */\n   : create_array(buffer);\n   })(buffer);\n   }\n   /* istanbul ignore next */\n   : create_array;\n};\n\n/**\n * Creates a new reader using the specified buffer.\n * @function\n * @param {Uint8Array|Buffer} buffer Buffer to read from\n * @returns {Reader|BufferReader} A {@link BufferReader} if `buffer` is a Buffer, otherwise a {@link Reader}\n * @throws {Error} If `buffer` is not a valid buffer\n */\nReader.create = create();\n\nReader.prototype._slice = util.Array.prototype.subarray || /* istanbul ignore next */ util.Array.prototype.slice;\n\n/**\n * Reads a varint as an unsigned 32 bit value.\n * @function\n * @returns {number} Value read\n */\nReader.prototype.uint32 = (function read_uint32_setup() {\n   var value = 4294967295; // optimizer type-hint, tends to deopt otherwise (?!)\n   return function read_uint32() {\n   value = (this.buf[this.pos] & 127   ) >>> 0; if (this.buf[this.pos++] < 128) return value;\n   value = (value | (this.buf[this.pos] & 127) << 7) >>> 0; if (this.buf[this.pos++] < 128) return value;\n   value = (value | (this.buf[this.pos] & 127) << 14) >>> 0; if (this.buf[this.pos++] < 128) return value;\n   value = (value | (this.buf[this.pos] & 127) << 21) >>> 0; if (this.buf[this.pos++] < 128) return value;\n   value = (value | (this.buf[this.pos] & 15) << 28) >>> 0; if (this.buf[this.pos++] < 128) return value;\n\n   /* istanbul ignore if */\n   if ((this.pos += 5) > this.len) {\n   this.pos = this.len;\n   throw indexOutOfRange(this, 10);\n   }\n   return value;\n   };\n})();\n\n/**\n * Reads a varint as a signed 32 bit value.\n * @returns {number} Value read\n */\nReader.prototype.int32 = function read_int32() {\n   return this.uint32() | 0;\n};\n\n/**\n * Reads a zig-zag encoded varint as a signed 32 bit value.\n * @returns {number} Value read\n */\nReader.prototype.sint32 = function read_sint32() {\n   var value = this.uint32();\n   return value >>> 1 ^ -(value & 1) | 0;\n};\n\n/* eslint-disable no-invalid-this */\n\nfunction readLongVarint() {\n   // tends to deopt with local vars for octet etc.\n   var bits = new LongBits(0, 0);\n   var i = 0;\n   if (this.len - this.pos > 4) { // fast route (lo)\n   for (; i < 4; ++i) {\n   // 1st..4th\n   bits.lo = (bits.lo | (this.buf[this.pos] & 127) << i * 7) >>> 0;\n   if (this.buf[this.pos++] < 128)\n   return bits;\n   }\n   // 5th\n   bits.lo = (bits.lo | (this.buf[this.pos] & 127) << 28) >>> 0;\n   bits.hi = (bits.hi | (this.buf[this.pos] & 127) >> 4) >>> 0;\n   if (this.buf[this.pos++] < 128)\n   return bits;\n   i = 0;\n   } else {\n   for (; i < 3; ++i) {\n   /* istanbul ignore if */\n   if (this.pos >= this.len)\n   throw indexOutOfRange(this);\n   // 1st..3th\n   bits.lo = (bits.lo | (this.buf[this.pos] & 127) << i * 7) >>> 0;\n   if (this.buf[this.pos++] < 128)\n   return bits;\n   }\n   // 4th\n   bits.lo = (bits.lo | (this.buf[this.pos++] & 127) << i * 7) >>> 0;\n   return bits;\n   }\n   if (this.len - this.pos > 4) { // fast route (hi)\n   for (; i < 5; ++i) {\n   // 6th..10th\n   bits.hi = (bits.hi | (this.buf[this.pos] & 127) << i * 7 + 3) >>> 0;\n   if (this.buf[this.pos++] < 128)\n   return bits;\n   }\n   } else {\n   for (; i < 5; ++i) {\n   /* istanbul ignore if */\n   if (this.pos >= this.len)\n   throw indexOutOfRange(this);\n   // 6th..10th\n   bits.hi = (bits.hi | (this.buf[this.pos] & 127) << i * 7 + 3) >>> 0;\n   if (this.buf[this.pos++] < 128)\n   return bits;\n   }\n   }\n   /* istanbul ignore next */\n   throw Error(\"invalid varint encoding\");\n}\n\n/* eslint-enable no-invalid-this */\n\n/**\n * Reads a varint as a signed 64 bit value.\n * @name Reader#int64\n * @function\n * @returns {Long} Value read\n */\n\n/**\n * Reads

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a varint as an unsigned 64 bit value.\n * @name Reader#uint64\n * @function\n * @returns {Long} Value read\n
*/\n\n/**\n * Reads a zig-zag encoded varint as a signed 64 bit value.\n * @name Reader#sint64\n * @function\n *
@returns {Long} Value read\n */\n\n/**\n * Reads a varint as a boolean.\n * @returns {boolean} Value read\n
*/\nReader.prototype.bool = function read_bool() {\n    return this.uint32() !== 0;\n};\n\nfunction
readFixed32_end(buf, end) { // note that this uses `end`, not `pos`\n    return (buf[end - 4]\n          | buf[end - 3] <<
8\n          | buf[end - 2] << 16\n          | buf[end - 1] << 24) >>> 0;\n}\n\n/**\n * Reads fixed 32 bits as an unsigned
32 bit integer.\n * @returns {number} Value read\n */\nReader.prototype.fixed32 = function read_fixed32() {\n\n
/* istanbul ignore if */\n    if (this.pos + 4 > this.len)\n        throw indexOutOfRange(this, 4);\n\n    return
readFixed32_end(this.buf, this.pos += 4);\n};\n\n/**\n * Reads fixed 32 bits as a signed 32 bit integer.\n * @returns
{number} Value read\n */\nReader.prototype.sfixed32 = function read_sfixed32() {\n\n    /* istanbul ignore if */\n
if (this.pos + 4 > this.len)\n        throw indexOutOfRange(this, 4);\n\n    return readFixed32_end(this.buf, this.pos +=
4) | 0;\n};\n\n/* eslint-disable no-invalid-this */\n\nfunction readFixed64(/* this: Reader */) {\n\n    /* istanbul
ignore if */\n    if (this.pos + 8 > this.len)\n        throw indexOutOfRange(this, 8);\n\n    return new
LongBits(readFixed32_end(this.buf, this.pos += 4), readFixed32_end(this.buf, this.pos += 4));\n}\n\n/* eslint-
enable no-invalid-this */\n\n/**\n * Reads fixed 64 bits.\n * @name Reader#fixed64\n * @function\n * @returns
{Long} Value read\n */\n\n/**\n * Reads zig-zag encoded fixed 64 bits.\n * @name Reader#sfixed64\n *
@function\n * @returns {Long} Value read\n */\n\n/**\n * Reads a float (32 bit) as a number.\n * @function\n *
@returns {number} Value read\n */\nReader.prototype.float = function read_float() {\n\n    /* istanbul ignore if */\n
 if (this.pos + 4 > this.len)\n        throw indexOutOfRange(this, 4);\n\n    var value = util.float.readFloatLE(this.buf,
this.pos);\n    this.pos += 4;\n    return value;\n};\n\n/**\n * Reads a double (64 bit float) as a number.\n *
@function\n * @returns {number} Value read\n */\nReader.prototype.double = function read_double() {\n\n    /*
istanbul ignore if */\n    if (this.pos + 8 > this.len)\n        throw indexOutOfRange(this, 4);\n\n    var value =
util.float.readDoubleLE(this.buf, this.pos);\n    this.pos += 8;\n    return value;\n};\n\n/**\n * Reads a sequence of
bytes preceeded by its length as a varint.\n * @returns {Uint8Array} Value read\n */\nReader.prototype.bytes =
function read_bytes() {\n    var length = this.uint32(),\n        start  = this.pos,\n        end    = this.pos + length;\n\n    /*
istanbul ignore if */\n    if (end > this.len)\n        throw indexOutOfRange(this, length);\n\n    this.pos += length;\n
if (Array.isArray(this.buf)) // plain array\n        return this.buf.slice(start, end);\n    return start === end // fix for IE
10/Win8 and others' subarray returning array of size 1\n        ? new this.buf.constructor(0)\n        :
this._slice.call(this.buf, start, end);\n};\n\n/**\n * Reads a string preceeded by its byte length as a varint.\n *
@returns {string} Value read\n */\nReader.prototype.string = function read_string() {\n    var bytes = this.bytes();\n
 return utf8.read(bytes, 0, bytes.length);\n};\n\n/**\n * Skips the specified number of bytes if specified, otherwise
skips a varint.\n * @param {number} [length] Length if known, otherwise a varint is assumed\n * @returns
{Reader} `this`\n */\nReader.prototype.skip = function skip(length) {\n    if (typeof length === \"number\") {\n
/* istanbul ignore if */\n        if (this.pos + length > this.len)\n            throw indexOutOfRange(this, length);\n
this.pos += length;\n    } else {\n        do {\n            /* istanbul ignore if */\n            if (this.pos >= this.len)\n
throw indexOutOfRange(this);\n        } while (this.buf[this.pos++] & 128);\n    }\n    return this;\n};\n\n/**\n * Skips
the next element of the specified wire type.\n * @param {number} wireType Wire type received\n * @returns
{Reader} `this`\n */\nReader.prototype.skipType = function(wireType) {\n    switch (wireType) {\n        case 0:\n
     this.skip();\n            break;\n        case 1:\n            this.skip(8);\n            break;\n        case 2:\n
this.skip(this.uint32());\n            break;\n        case 3:\n            while ((wireType = this.uint32() & 7) !== 4) {\n
    this.skipType(wireType);\n            }\n            break;\n        case 5:\n            this.skip(4);\n            break;\n\n        /*
istanbul ignore next */\n        default:\n            throw Error(\"invalid wire type \" + wireType + \" at offset \" +
this.pos);\n    }\n    return this;\n};\n\nReader._configure = function(BufferReader_) {\n    BufferReader =
BufferReader_;\n    Reader.create = create();\n    BufferReader._configure();\n\n    var fn = util.Long ? \"toLong\" :
/* istanbul ignore next */ \"toNumber\";\n    util.merge(Reader.prototype, {\n\n        int64: function read_int64() {\n
        return readLongVarint.call(this)[fn](false);\n        },\n\n        uint64: function read_uint64() {\n            return
readLongVarint.call(this)[fn](true);\n        },\n\n        sint64: function read_sint64() {\n            return
readLongVarint.call(this).zzDecode()[fn](false);\n        },\n\n        fixed64: function read_fixed64() {\n            return
```

readFixed64.call(this)[fn](true);\n },\n\n sfixed64: function read_sfixed64() {\n return readFixed64.call(this)[fn](false);\n }\n\n });\n};\n","\"use strict\";\nmodule.exports = BufferReader;\n\n// extends Reader\nvar Reader = require(\"./reader\");\n(BufferReader.prototype = Object.create(Reader.prototype)).constructor = BufferReader;\n\nvar util = require(\"./util/minimal\");\n\n/**\n * Constructs a new buffer reader instance.\n * @classdesc Wire format reader using node buffers.\n * @extends Reader\n * @constructor\n * @param {Buffer} buffer Buffer to read from\n */\nfunction BufferReader(buffer) {\n Reader.call(this, buffer);\n\n /**\n * Read buffer.\n * @name BufferReader#buf\n * @type {Buffer}\n */\n}\n\nBufferReader._configure = function () {\n /* istanbul ignore else */\n if (util.Buffer)\n BufferReader.prototype._slice = util.Buffer.prototype.slice;\n};\n\n\n/**\n * @override\n */\nBufferReader.prototype.string = function read_string_buffer() {\n var len = this.uint32(); // modifies pos\n return this.buf.utf8Slice\n ? this.buf.utf8Slice(this.pos, this.pos = Math.min(this.pos + len, this.len))\n : this.buf.toString(\"utf-8\", this.pos, this.pos = Math.min(this.pos + len, this.len));\n};\n\n/**\n * Reads a sequence of bytes preceeded by its length as a varint.\n * @name BufferReader#bytes\n * @function\n * @returns {Buffer} Value read\n */\n\nBufferReader._configure();\n","\"use strict\";\nmodule.exports = {};\n\n/**\n * Named roots.\n * This is where pbjs stores generated structures (the option `-r, --root` specifies a name).\n * Can also be used manually to make roots available accross modules.\n * @name roots\n * @type {Object.<string,Root>}\n * @example\n * // pbjs -r myroot -o compiled.js ...\n *\n * // in another module:\n * require(\"./compiled.js\");\n *\n * // in any subsequent module:\n * var root = protobuf.roots[\"myroot\"];\n */\n","\"use strict\";\n\n/**\n * Streaming RPC helpers.\n * @namespace\n */\nvar rpc = exports;\n\n/**\n * RPC implementation passed to {@link Service#create} performing a service request on network level, i.e. by utilizing http requests or websockets.\n * @typedef RPCImpl\n * @type {function}\n * @param {Method|rpc.ServiceMethod<Message<{}>,Message<{}>>} method Reflected or static method being called\n * @param {Uint8Array} requestData Request data\n * @param {RPCImplCallback} callback Callback function\n * @returns {undefined}\n * @example\n * function rpcImpl(method, requestData, callback) {\n * if (protobuf.util.lcFirst(method.name) !== \"myMethod\") // compatible with static code\n * throw Error(\"no such method\");\n * asynchronouslyObtainAResponse(requestData, function(err, responseData) {\n * callback(err, responseData);\n * });\n * }\n */\n\n/**\n * Node-style callback as used by {@link RPCImpl}.\n * @typedef RPCImplCallback\n * @type {function}\n * @param {Error|null} error Error, if any, otherwise `null`\n * @param {Uint8Array|null} [response] Response data or `null` to signal end of stream, if there hasn't been an error\n * @returns {undefined}\n */\n\nrpc.Service = require(\"./rpc/service\");\n","\"use strict\";\nmodule.exports = Service;\n\nvar util = require(\"../util/minimal\");\n\n// Extends EventEmitter\n(Service.prototype = Object.create(util.EventEmitter.prototype)).constructor = Service;\n\n/**\n * A service method callback as used by {@link rpc.ServiceMethod|ServiceMethod}.\n *\n * Differs from {@link RPCImplCallback} in that it is an actual callback of a service method which may not return `response = null`.\n * @typedef rpc.ServiceMethodCallback\n * @template TRes extends Message<TRes>\n * @type {function}\n * @param {Error|null} error Error, if any\n * @param {TRes} [response] Response message\n * @returns {undefined}\n */\n\n/**\n * A service method part of a {@link rpc.Service} as created by {@link Service.create}.\n * @typedef rpc.ServiceMethod\n * @template TReq extends Message<TReq>\n * @template TRes extends Message<TRes>\n * @type {function}\n * @param {TReq|Properties<TReq>} request Request message or plain object\n * @param {rpc.ServiceMethodCallback<TRes>} [callback] Node-style callback called with the error, if any, and the response message\n * @returns {Promise<Message<TRes>>} Promise if `callback` has been omitted, otherwise `undefined`\n */\n\n/**\n * Constructs a new RPC service instance.\n * @classdesc An RPC service as returned by {@link Service#create}.\n * @exports rpc.Service\n * @extends util.EventEmitter\n * @constructor\n * @param {RPCImpl} rpcImpl RPC implementation\n * @param {boolean} [requestDelimited=false] Whether requests are length-delimited\n * @param {boolean} [responseDelimited=false] Whether responses are length-delimited\n */\nfunction Service(rpcImpl, requestDelimited, responseDelimited) {\n\n if (typeof rpcImpl !== \"function\")\n throw TypeError(\"rpcImpl must be a function\");\n\n util.EventEmitter.call(this);\n\n /**\n * RPC implementation. Becomes `null` once the service is ended.\n * @type {RPCImpl|null}\n */\n this.rpcImpl =

rpcImpl;\n\n   /**\n   * Whether requests are length-delimited.\n   * @type {boolean}\n   */\n   this.requestDelimited = Boolean(requestDelimited);\n\n   /**\n   * Whether responses are length-delimited.\n   * @type {boolean}\n   */\n   this.responseDelimited = Boolean(responseDelimited);\n}\n\n/**\n * Calls a service method through {@link rpc.Service#rpcImpl|rpcImpl}.\n * @param {Method|rpc.ServiceMethod<TReq,TRes>} method Reflected or static method\n * @param {Constructor<TReq>} requestCtor Request constructor\n * @param {Constructor<TRes>} responseCtor Response constructor\n * @param {TReq|Properties<TReq>} request Request message or plain object\n * @param {rpc.ServiceMethodCallback<TRes>} callback Service callback\n * @returns {undefined}\n * @template TReq extends Message<TReq>\n * @template TRes extends Message<TRes>\n */\nService.prototype.rpcCall = function rpcCall(method, requestCtor, responseCtor, request, callback) {\n\n   if (!request)\n   throw TypeError(\"request must be specified\");\n\n   var self = this;\n   if (!callback)\n   return util.asPromise(rpcCall, self, method, requestCtor, responseCtor, request);\n\n   if (!self.rpcImpl) {\n   setTimeout(function() { callback(Error(\"already ended\")); }, 0);\n   return undefined;\n   }\n\n   try {\n   return self.rpcImpl(\n   method,\n   requestCtor[self.requestDelimited ? \"encodeDelimited\" : \"encode\"](request).finish(),\n   function rpcCallback(err, response) {\n\n   if (err) {\n   self.emit(\"error\", err, method);\n   return callback(err);\n   }\n\n   if (response === null) {\n   self.end(/* endedByRPC */ true);\n   return undefined;\n   }\n\n   if (!(response instanceof responseCtor)) {\n   try {\n   response = responseCtor[self.responseDelimited ? \"decodeDelimited\" : \"decode\"](response);\n   } catch (err) {\n   self.emit(\"error\", err, method);\n   return callback(err);\n   }\n   }\n\n   self.emit(\"data\", response, method);\n   return callback(null, response);\n   }\n   );\n   } catch (err) {\n   self.emit(\"error\", err, method);\n   setTimeout(function() { callback(err); }, 0);\n   return undefined;\n   }\n};\n\n/**\n * Ends this service and emits the `end` event.\n * @param {boolean} [endedByRPC=false] Whether the service has been ended by the RPC implementation.\n * @returns {rpc.Service} `this`\n */\nService.prototype.end = function end(endedByRPC) {\n   if (this.rpcImpl) {\n   if (!endedByRPC) // signal end to rpcImpl\n   this.rpcImpl(null, null, null);\n   this.rpcImpl = null;\n   this.emit(\"end\").off();\n   }\n   return this;\n};\n","\"use strict\";\nmodule.exports = LongBits;\n\nvar util = require(\"../util/minimal\");\n\n/**\n * Constructs new long bits.\n * @classdesc Helper class for working with the low and high bits of a 64 bit value.\n * @memberof util\n * @constructor\n * @param {number} lo Low 32 bits, unsigned\n * @param {number} hi High 32 bits, unsigned\n */\nfunction LongBits(lo, hi) {\n\n   // note that the casts below are theoretically unnecessary as of today, but older statically\n   // generated converter code might still call the ctor with signed 32bits. kept for compat.\n\n   /**\n   * Low bits.\n   * @type {number}\n   */\n   this.lo = lo >>> 0;\n\n   /**\n   * High bits.\n   * @type {number}\n   */\n   this.hi = hi >>> 0;\n}\n\n/**\n * Zero bits.\n * @memberof util.LongBits\n * @type {util.LongBits}\n */\nvar zero = LongBits.zero = new LongBits(0, 0);\n\nzero.toNumber = function() { return 0; };\nzero.zzEncode = zero.zzDecode = function() { return this; };\nzero.length = function() { return 1; };\n\n/**\n * Zero hash.\n * @memberof util.LongBits\n * @type {string}\n */\nvar zeroHash = LongBits.zeroHash = \"\\0\\0\\0\\0\\0\\0\\0\\0\";\n\n/**\n * Constructs new long bits from the specified number.\n * @param {number} value Value\n * @returns {util.LongBits} Instance\n */\nLongBits.fromNumber = function fromNumber(value) {\n   if (value === 0)\n   return zero;\n   var sign = value < 0;\n   if (sign)\n   value = -value;\n   var lo = value >>> 0,\n   hi = (value - lo) / 4294967296 >>> 0;\n   if (sign) {\n   hi = ~hi >>> 0;\n   lo = ~lo >>> 0;\n   if (++lo > 4294967295) {\n   lo = 0;\n   if (++hi > 4294967295)\n   hi = 0;\n   }\n   }\n   return new LongBits(lo, hi);\n};\n\n/**\n * Constructs new long bits from a number, long or string.\n * @param {Long|number|string} value Value\n * @returns {util.LongBits} Instance\n */\nLongBits.from = function from(value) {\n   if (typeof value === \"number\")\n   return LongBits.fromNumber(value);\n   if (util.isString(value)) {\n   /* istanbul ignore else */\n   if (util.Long)\n   value = util.Long.fromString(value);\n   else\n   return LongBits.fromNumber(parseInt(value, 10));\n   }\n   return value.low || value.high ? new LongBits(value.low >>> 0, value.high >>> 0) : zero;\n};\n\n/**\n * Converts this long bits to a possibly unsafe JavaScript number.\n * @param {boolean} [unsigned=false] Whether unsigned or not\n * @returns {number} Possibly unsafe number\n

*/\nLongBits.prototype.toNumber = function toNumber(unsigned) {\n   if (!unsigned && this.hi >>> 31) {\n   var lo = ~this.lo + 1 >>> 0,\n   hi = ~this.hi   >>> 0;\n   if (!lo)\n   hi = hi + 1 >>> 0;\n   return -(lo + hi * 4294967296);\n   }\n   return this.lo + this.hi * 4294967296;\n};\n\n/**\n * Converts this long bits to a long.\n * @param {boolean} [unsigned=false] Whether unsigned or not\n * @returns {Long} Long\n */\nLongBits.prototype.toLong = function toLong(unsigned) {\n   return util.Long\n   ? new util.Long(this.lo | 0, this.hi | 0, Boolean(unsigned))\n   /* istanbul ignore next */\n   : { low: this.lo | 0, high: this.hi | 0, unsigned: Boolean(unsigned) };\n};\n\nvar charCodeAt = String.prototype.charCodeAt;\n\n/**\n * Constructs new long bits from the specified 8 characters long hash.\n * @param {string} hash Hash\n * @returns {util.LongBits} Bits\n */\nLongBits.fromHash = function fromHash(hash) {\n   if (hash === zeroHash)\n   return zero;\n   return new LongBits(\n   (charCodeAt.call(hash, 0)\n | charCodeAt.call(hash, 1) << 8\n | charCodeAt.call(hash, 2) << 16\n | charCodeAt.call(hash, 3) << 24) >>> 0\n   ,\n   (charCodeAt.call(hash, 4)\n | charCodeAt.call(hash, 5) << 8\n | charCodeAt.call(hash, 6) << 16\n | charCodeAt.call(hash, 7) << 24) >>> 0\n   );\n};\n\n/**\n * Converts this long bits to a 8 characters long hash.\n * @returns {string} Hash\n */\nLongBits.prototype.toHash = function toHash() {\n   return String.fromCharCode(\n   this.lo   & 255,\n   this.lo >>> 8 & 255,\n   this.lo >>> 16 & 255,\n   this.lo >>> 24   ,\n   this.hi   & 255,\n   this.hi >>> 8 & 255,\n   this.hi >>> 16 & 255,\n   this.hi >>> 24\n   );\n};\n\n/**\n * Zig-zag encodes this long bits.\n * @returns {util.LongBits} `this`\n */\nLongBits.prototype.zzEncode = function zzEncode() {\n   var mask =   this.hi >> 31;\n   this.hi = ((this.hi << 1 | this.lo >>> 31) ^ mask) >>> 0;\n   this.lo = (this.lo << 1   ^ mask) >>> 0;\n   return this;\n};\n\n/**\n * Zig-zag decodes this long bits.\n * @returns {util.LongBits} `this`\n */\nLongBits.prototype.zzDecode = function zzDecode() {\n   var mask = -(this.lo & 1);\n   this.lo = ((this.lo >>> 1 | this.hi << 31) ^ mask) >>> 0;\n   this.hi = (this.hi >>> 1   ^ mask) >>> 0;\n   return this;\n};\n\n/**\n * Calculates the length of this longbits when encoded as a varint.\n * @returns {number} Length\n */\nLongBits.prototype.length = function length() {\n   var part0 = this.lo,\n   part1 = (this.lo >>> 28 | this.hi << 4) >>> 0,\n   part2 = this.hi >>> 24;\n   return part2 === 0\n   ? part1 === 0\n   ? part0 < 16384\n   ? part0 < 128 ? 1 : 2\n   : part0 < 2097152 ? 3 : 4\n   : part1 < 16384\n   ? part1 < 128 ? 5 : 6\n   : part1 < 2097152 ? 7 : 8\n   : part2 < 128 ? 9 : 10;\n};\n","\"use strict\";\nvar util = exports;\n\n// used to return a Promise where callback is omitted\nutil.asPromise = require(\"@protobufjs/aspromise\");\n\n// converts to / from base64 encoded strings\nutil.base64 = require(\"@protobufjs/base64\");\n\n// base class of rpc.Service\nutil.EventEmitter = require(\"@protobufjs/eventemitter\");\n\n// float handling accross browsers\nutil.float = require(\"@protobufjs/float\");\n\n// requires modules optionally and hides the call from bundlers\nutil.inquire = require(\"@protobufjs/inquire\");\n\n// converts to / from utf8 encoded strings\nutil.utf8 = require(\"@protobufjs/utf8\");\n\n// provides a node-like buffer pool in the browser\nutil.pool = require(\"@protobufjs/pool\");\n\n// utility to work with the low and high bits of a 64 bit value\nutil.LongBits = require(\"./longbits\");\n\n/**\n * Whether running within node or not.\n * @memberof util\n * @type {boolean}\n */\nutil.isNode = Boolean(typeof global !== \"undefined\"\n   && global\n   && global.process\n   && global.process.versions\n   && global.process.versions.node);\n\n/**\n * Global object reference.\n * @memberof util\n * @type {Object}\n */\nutil.global = util.isNode && global\n || typeof window !== \"undefined\" && window\n || typeof self   !== \"undefined\" && self\n || this; // eslint-disable-line no-invalid-this\n\n/**\n * An immuable empty array.\n * @memberof util\n * @type {Array.<*>}\n * @const\n */\nutil.emptyArray = Object.freeze ? Object.freeze([]) : /* istanbul ignore next */ []; // used on prototypes\n\n/**\n * An immutable empty object.\n * @type {Object}\n * @const\n */\nutil.emptyObject = Object.freeze ? Object.freeze({}) : /* istanbul ignore next */ {}; // used on prototypes\n\n/**\n * Tests if the specified value is an integer.\n * @function\n * @param {*} value Value to test\n * @returns {boolean} `true` if the value is an integer\n */\nutil.isInteger = Number.isInteger || /* istanbul ignore next */ function isInteger(value) {\n   return typeof value === \"number\" && isFinite(value) && Math.floor(value) === value;\n};\n\n/**\n * Tests if the specified value is a string.\n * @param {*} value Value to test\n * @returns {boolean} `true` if the value is a string\n */\nutil.isString = function isString(value) {\n   return typeof value === \"string\" || value instanceof String;\n};\n\n/**\n * Tests if the specified value is a non-null object.\n * @param {*} value Value to test\n *

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@returns {boolean} `true` if the value is a non-null object\n */\nutil.isObject = function isObject(value) {\n    return
value && typeof value === \"object\";\n};\n\n/**\n * Checks if a property on a message is considered to be
present.\n * This is an alias of {@link util.isSet}.\n * @function\n * @param {Object} obj Plain object or message
instance\n * @param {string} prop Property name\n * @returns {boolean} `true` if considered to be present,
otherwise `false`\n */\nutil.isset =\n\n/**\n * Checks if a property on a message is considered to be present.\n *
@param {Object} obj Plain object or message instance\n * @param {string} prop Property name\n * @returns
{boolean} `true` if considered to be present, otherwise `false`\n */\nutil.isSet = function isSet(obj, prop) {\n    var
value = obj[prop];\n    if (value != null && obj.hasOwnProperty(prop)) // eslint-disable-line eqeqeq, no-prototype-
builtins\n        return typeof value !== \"object\" || (Array.isArray(value) ? value.length : Object.keys(value).length)
> 0;\n    return false;\n};\n\n/**\n * Any compatible Buffer instance.\n * This is a minimal stand-alone definition of
a Buffer instance. The actual type is that exported by node's typings.\n * @interface Buffer\n * @extends
Uint8Array\n */\n\n/**\n * Node's Buffer class if available.\n * @type {Constructor<Buffer>}\n */\nutil.Buffer =
(function() {\n    try {\n        var Buffer = util.inquire(\"buffer\").Buffer;\n        // refuse to use non-node buffers if
not explicitly assigned (perf reasons):\n        return Buffer.prototype.utf8Write ? Buffer : /* istanbul ignore next */
null;\n    } catch (e) {\n        /* istanbul ignore next */\n        return null;\n    }\n})();\n\n// Internal alias of or polyfull
for Buffer.from.\nutil._Buffer_from = null;\n\n// Internal alias of or polyfill for
Buffer.allocUnsafe.\nutil._Buffer_allocUnsafe = null;\n\n/**\n * Creates a new buffer of whatever type supported
by the environment.\n * @param {number|number[]} [sizeOrArray=0] Buffer size or number array\n * @returns
{Uint8Array|Buffer} Buffer\n */\nutil.newBuffer = function newBuffer(sizeOrArray) {\n    /* istanbul ignore next
*/\n    return typeof sizeOrArray === \"number\"\n        ? util.Buffer\n            ?
util._Buffer_allocUnsafe(sizeOrArray)\n            : new util.Array(sizeOrArray)\n        : util.Buffer\n            ?
util._Buffer_from(sizeOrArray)\n            : typeof Uint8Array === \"undefined\"\n                ? sizeOrArray\n
: new Uint8Array(sizeOrArray);\n};\n\n/**\n * Array implementation used in the browser. `Uint8Array` if
supported, otherwise `Array`.\n * @type {Constructor<Uint8Array>}\n */\nutil.Array = typeof Uint8Array !==
\"undefined\" ? Uint8Array /* istanbul ignore next */ : Array;\n\n/**\n * Any compatible Long instance.\n * This is
a minimal stand-alone definition of a Long instance. The actual type is that exported by long.js.\n * @interface
Long\n * @property {number} low Low bits\n * @property {number} high High bits\n * @property {boolean}
unsigned Whether unsigned or not\n */\n\n/**\n * Long.js's Long class if available.\n * @type
{Constructor<Long>}\n */\nutil.Long = /* istanbul ignore next */ util.global.dcodeIO && /* istanbul ignore next */
util.global.dcodeIO.Long\n         || /* istanbul ignore next */ util.global.Long\n         || util.inquire(\"long\");\n\n/**\n
* Regular expression used to verify 2 bit (`bool`) map keys.\n * @type {RegExp}\n * @const\n */\nutil.key2Re =
/^true|false|0|1$/;\n\n/**\n * Regular expression used to verify 32 bit (`int32` etc.) map keys.\n * @type {RegExp}\n
* @const\n */\nutil.key32Re = /^-?(?:0|[1-9][0-9]*)$/;\n\n/**\n * Regular expression used to verify 64 bit (`int64`
etc.) map keys.\n * @type {RegExp}\n * @const\n */\nutil.key64Re = /^(?:[\\\\x00-\\\\xff]{8}|-?(?:0|[1-9][0-
9]*))$/;\n\n/**\n * Converts a number or long to an 8 characters long hash string.\n * @param {Long|number} value
Value to convert\n * @returns {string} Hash\n */\nutil.longToHash = function longToHash(value) {\n    return
value\n        ? util.LongBits.from(value).toHash()\n        : util.LongBits.zeroHash;\n};\n\n/**\n * Converts an 8
characters long hash string to a long or number.\n * @param {string} hash Hash\n * @param {boolean}
[unsigned=false] Whether unsigned or not\n * @returns {Long|number} Original value\n */\nutil.longFromHash =
function longFromHash(hash, unsigned) {\n    var bits = util.LongBits.fromHash(hash);\n    if (util.Long)\n
return util.Long.fromBits(bits.lo, bits.hi, unsigned);\n    return bits.toNumber(Boolean(unsigned));\n};\n\n/**\n *
Merges the properties of the source object into the destination object.\n * @memberof util\n * @param
{Object.<string,*>} dst Destination object\n * @param {Object.<string,*>} src Source object\n * @param
{boolean} [ifNotSet=false] Merges only if the key is not already set\n * @returns {Object.<string,*>} Destination
object\n */\nfunction merge(dst, src, ifNotSet) { // used by converters\n    for (var keys = Object.keys(src), i = 0; i <
keys.length; ++i)\n        if (dst[keys[i]] === undefined || !ifNotSet)\n            dst[keys[i]] = src[keys[i]];\n    return
dst;\n}\n\nutil.merge = merge;\n\n/**\n * Converts the first character of a string to lower case.\n * @param {string}
str String to convert\n * @returns {string} Converted string\n */\nutil.lcFirst = function lcFirst(str) {\n    return
```

str.charAt(0).toLowerCase() + str.substring(1);\n};\n\n/**\n * Creates a custom error constructor.\n * @memberof util\n * @param {string} name Error name\n * @returns {Constructor<Error>} Custom error constructor\n */\nfunction newError(name) {\n\n   function CustomError(message, properties) {\n\n   if (!(this instanceof CustomError))\n   return new CustomError(message, properties);\n\n   // Error.call(this, message);\n   // ^ just returns a new error instance because the ctor can be called as a function\n\n   Object.defineProperty(this, \"message\", { get: function() { return message; } });\n\n   /* istanbul ignore next */\n   if (Error.captureStackTrace) // node\n   Error.captureStackTrace(this, CustomError);\n   else\n   Object.defineProperty(this, \"stack\", { value: new Error().stack || \"\" });\n\n   if (properties)\n   merge(this, properties);\n   }\n\n   (CustomError.prototype = Object.create(Error.prototype)).constructor = CustomError;\n\n   Object.defineProperty(CustomError.prototype, \"name\", { get: function() { return name; } });\n\n   CustomError.prototype.toString = function toString() {\n   return this.name + \": \" + this.message;\n   };\n\n   return CustomError;\n}\n\nutil.newError = newError;\n\n/**\n * Constructs a new protocol error.\n * @classdesc Error subclass indicating a protocol specifc error.\n * @memberof util\n * @extends Error\n * @template T extends Message<T>\n * @constructor\n * @param {string} message Error message\n * @param {Object.<string,*>} [properties] Additional properties\n * @example\n * try {\n *   MyMessage.decode(someBuffer); // throws if required fields are missing\n * } catch (e) {\n *   if (e instanceof ProtocolError && e.instance)\n *   console.log(\"decoded so far: \" + JSON.stringify(e.instance));\n * }\n */\nutil.ProtocolError = newError(\"ProtocolError\");\n\n/**\n * So far decoded message instance.\n * @name util.ProtocolError#instance\n * @type {Message<T>}\n */\n\n/**\n * A OneOf getter as returned by {@link util.oneOfGetter}.\n * @typedef OneOfGetter\n * @type {function}\n * @returns {string|undefined} Set field name, if any\n */\n\n/**\n * Builds a getter for a oneof's present field name.\n * @param {string[]} fieldNames Field names\n * @returns {OneOfGetter} Unbound getter\n */\nutil.oneOfGetter = function getOneOf(fieldNames) {\n   var fieldMap = {};\n   for (var i = 0; i < fieldNames.length; ++i)\n   fieldMap[fieldNames[i]] = 1;\n\n   /**\n   * @returns {string|undefined} Set field name, if any\n   * @this Object\n   * @ignore\n   */\n   return function() { // eslint-disable-line consistent-return\n   for (var keys = Object.keys(this), i = keys.length - 1; i > -1; --i)\n   if (fieldMap[keys[i]] === 1 && this[keys[i]] !== undefined && this[keys[i]] !== null)\n   return keys[i];\n   };\n};\n\n/**\n * A OneOf setter as returned by {@link util.oneOfSetter}.\n * @typedef OneOfSetter\n * @type {function}\n * @param {string|undefined} value Field name\n * @returns {undefined}\n */\n\n/**\n * Builds a setter for a oneof's present field name.\n * @param {string[]} fieldNames Field names\n * @returns {OneOfSetter} Unbound setter\n */\nutil.oneOfSetter = function setOneOf(fieldNames) {\n\n   /**\n   * @param {string} name Field name\n   * @returns {undefined}\n   * @this Object\n   * @ignore\n   */\n   return function(name) {\n   for (var i = 0; i < fieldNames.length; ++i)\n   if (fieldNames[i] !== name)\n   delete this[fieldNames[i]];\n   };\n};\n\n/**\n * Default conversion options used for {@link Message#toJSON} implementations.\n *\n * These options are close to proto3's JSON mapping with the exception that internal types like Any are handled just like messages. More precisely:\n *\n * - Longs become strings\n * - Enums become string keys\n * - Bytes become base64 encoded strings\n * - (Sub-)Messages become plain objects\n * - Maps become plain objects with all string keys\n * - Repeated fields become arrays\n * - NaN and Infinity for float and double fields become strings\n *\n * @type {IConversionOptions}\n * @see https://developers.google.com/protocol-buffers/docs/proto3?hl=en#json\n */\nutil.toJSONOptions = {\n   longs: String,\n   enums: String,\n   bytes: String,\n   json: true\n};\n\n// Sets up buffer utility according to the environment (called in index-minimal)\nutil._configure = function() {\n   var Buffer = util.Buffer;\n   /* istanbul ignore if */\n   if (!Buffer) {\n   util._Buffer_from = util._Buffer_allocUnsafe = null;\n   return;\n   }\n   // because node 4.x buffers are incompatible & immutable\n   // see: https://github.com/dcodeIO/protobuf.js/pull/665\n   util._Buffer_from = Buffer.from !== Uint8Array.from && Buffer.from ||\n   /* istanbul ignore next */\n   function Buffer_from(value, encoding) {\n   return new Buffer(value, encoding);\n   };\n   util._Buffer_allocUnsafe = Buffer.allocUnsafe ||\n   /* istanbul ignore next */\n   function Buffer_allocUnsafe(size) {\n   return new Buffer(size);\n   };\n};\n","\"use strict\";\nmodule.exports = Writer;\n\nvar util   = require(\"./util/minimal\");\n\nvar BufferWriter; // cyclic\n\nvar LongBits = util.LongBits,\n   base64   = util.base64,\n   utf8   = util.utf8;\n\n/**\n * Constructs a new writer

operation instance.\n * @classdesc Scheduled writer operation.\n * @constructor\n * @param {function(*, Uint8Array, number)} fn Function to call\n * @param {number} len Value byte length\n * @param {*} val Value to write\n * @ignore\n */\nfunction Op(fn, len, val) {\n\n /**\n * Function to call.\n * @type {function(Uint8Array, number, *)}\n */\n this.fn = fn;\n\n /**\n * Value byte length.\n * @type {number}\n */\n this.len = len;\n\n /**\n * Next operation.\n * @type {Writer.Op|undefined}\n */\n this.next = undefined;\n\n /**\n * Value to write.\n * @type {*}\n */\n this.val = val; // type varies\n}\n\n/* istanbul ignore next */\nfunction noop() {} // eslint-disable-line no-empty-function\n\n/**\n * Constructs a new writer state instance.\n * @classdesc Copied writer state.\n * @memberof Writer\n * @constructor\n * @param {Writer} writer Writer to copy state from\n * @ignore\n */\nfunction State(writer) {\n\n /**\n * Current head.\n * @type {Writer.Op}\n */\n this.head = writer.head;\n\n /**\n * Current tail.\n * @type {Writer.Op}\n */\n this.tail = writer.tail;\n\n /**\n * Current buffer length.\n * @type {number}\n */\n this.len = writer.len;\n\n /**\n * Next state.\n * @type {State|null}\n */\n this.next = writer.states;\n}\n\n/**\n * Constructs a new writer instance.\n * @classdesc Wire format writer using `Uint8Array` if available, otherwise `Array`.\n * @constructor\n */\nfunction Writer() {\n\n /**\n * Current length.\n * @type {number}\n */\n this.len = 0;\n\n /**\n * Operations head.\n * @type {Object}\n */\n this.head = new Op(noop, 0, 0);\n\n /**\n * Operations tail\n * @type {Object}\n */\n this.tail = this.head;\n\n /**\n * Linked forked states.\n * @type {Object|null}\n */\n this.states = null;\n\n // When a value is written, the writer calculates its byte length and puts it into a linked\n // list of operations to perform when finish() is called. This both allows us to allocate\n // buffers of the exact required size and reduces the amount of work we have to do compared\n // to first calculating over objects and then encoding over objects. In our case, the encoding\n // part is just a linked list walk calling operations with already prepared values.\n}\n\nvar create = function create() {\n return util.Buffer\n ? function create_buffer_setup() {\n return (Writer.create = function create_buffer() {\n return new BufferWriter();\n })();\n }\n /* istanbul ignore next */\n : function create_array() {\n return new Writer();\n };\n};\n\n/**\n * Creates a new writer.\n * @function\n * @returns {BufferWriter|Writer} A {@link BufferWriter} when Buffers are supported, otherwise a {@link Writer}\n */\nWriter.create = create();\n\n/**\n * Allocates a buffer of the specified size.\n * @param {number} size Buffer size\n * @returns {Uint8Array} Buffer\n */\nWriter.alloc = function alloc(size) {\n return new util.Array(size);\n};\n\n// Use Uint8Array buffer pool in the browser, just like node does with buffers\n/* istanbul ignore else */\nif (util.Array !== Array)\n Writer.alloc = util.pool(Writer.alloc, util.Array.prototype.subarray);\n\n/**\n * Pushes a new operation to the queue.\n * @param {function(Uint8Array, number, *)} fn Function to call\n * @param {number} len Value byte length\n * @param {number} val Value to write\n * @returns {Writer} `this`\n * @private\n */\nWriter.prototype._push = function push(fn, len, val) {\n this.tail = this.tail.next = new Op(fn, len, val);\n this.len += len;\n return this;\n};\n\nfunction writeByte(val, buf, pos) {\n buf[pos] = val & 255;\n}\n\nfunction writeVarint32(val, buf, pos) {\n while (val > 127) {\n buf[pos++] = val & 127 | 128;\n val >>>= 7;\n }\n buf[pos] = val;\n}\n\n/**\n * Constructs a new varint writer operation instance.\n * @classdesc Scheduled varint writer operation.\n * @extends Op\n * @constructor\n * @param {number} len Value byte length\n * @param {number} val Value to write\n * @ignore\n */\nfunction VarintOp(len, val) {\n this.len = len;\n this.next = undefined;\n this.val = val;\n}\n\nVarintOp.prototype = Object.create(Op.prototype);\nVarintOp.prototype.fn = writeVarint32;\n\n/**\n * Writes an unsigned 32 bit value as a varint.\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.uint32 = function write_uint32(value) {\n // here, the call to this.push has been inlined and a varint specific Op subclass is used.\n // uint32 is by far the most frequently used operation and benefits significantly from this.\n this.len += (this.tail = this.tail.next = new VarintOp(\n (value = value >>> 0)\n < 128 ? 1\n : value < 16384 ? 2\n : value < 2097152 ? 3\n : value < 268435456 ? 4\n : 5,\n value)).len;\n return this;\n};\n\n/**\n * Writes a signed 32 bit value as a varint.\n * @function\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.int32 = function write_int32(value) {\n return value < 0\n ? this._push(writeVarint64, 10, LongBits.fromNumber(value)) // 10 bytes per spec\n : this.uint32(value);\n};\n\n/**\n * Writes a 32 bit value as a varint, zig-zag encoded.\n * @param {number} value

Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.sint32 = function write_sint32(value) {\n   return this.uint32((value << 1 ^ value >> 31) >>> 0);\n};\n\nfunction writeVarint64(val, buf, pos) {\n   while (val.hi) {\n   buf[pos++] = val.lo & 127 | 128;\n   val.lo = (val.lo >>> 7 | val.hi << 25) >>> 0;\n   val.hi >>>= 7;\n   }\n   while (val.lo > 127) {\n   buf[pos++] = val.lo & 127 | 128;\n   val.lo = val.lo >>> 7;\n   }\n   buf[pos++] = val.lo;\n}\n\n/**\n * Writes an unsigned 64 bit value as a varint.\n * @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n */\nWriter.prototype.uint64 = function write_uint64(value) {\n   var bits = LongBits.from(value);\n   return this._push(writeVarint64, bits.length(), bits);\n};\n\n/**\n * Writes a signed 64 bit value as a varint.\n * @function\n * @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n */\nWriter.prototype.int64 = Writer.prototype.uint64;\n\n/**\n * Writes a signed 64 bit value as a varint, zig-zag encoded.\n * @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n */\nWriter.prototype.sint64 = function write_sint64(value) {\n   var bits = LongBits.from(value).zzEncode();\n   return this._push(writeVarint64, bits.length(), bits);\n};\n\n/**\n * Writes a boolish value as a varint.\n * @param {boolean} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.bool = function write_bool(value) {\n   return this._push(writeByte, 1, value ? 1 : 0);\n};\n\nfunction writeFixed32(val, buf, pos) {\n   buf[pos   ] = val   & 255;\n   buf[pos + 1] = val >>> 8   & 255;\n   buf[pos + 2] = val >>> 16 & 255;\n   buf[pos + 3] = val >>> 24;\n}\n\n/**\n * Writes an unsigned 32 bit value as fixed 32 bits.\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.fixed32 = function write_fixed32(value) {\n   return this._push(writeFixed32, 4, value >>> 0);\n};\n\n/**\n * Writes a signed 32 bit value as fixed 32 bits.\n * @function\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.sfixed32 = Writer.prototype.fixed32;\n\n/**\n * Writes an unsigned 64 bit value as fixed 64 bits.\n * @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n */\nWriter.prototype.fixed64 = function write_fixed64(value) {\n   var bits = LongBits.from(value);\n   return this._push(writeFixed32, 4, bits.lo)._push(writeFixed32, 4, bits.hi);\n};\n\n/**\n * Writes a signed 64 bit value as fixed 64 bits.\n * @function\n * @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n */\nWriter.prototype.sfixed64 = Writer.prototype.fixed64;\n\n/**\n * Writes a float (32 bit).\n * @function\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.float = function write_float(value) {\n   return this._push(util.float.writeFloatLE, 4, value);\n};\n\n/**\n * Writes a double (64 bit float).\n * @function\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.double = function write_double(value) {\n   return this._push(util.float.writeDoubleLE, 8, value);\n};\n\nvar writeBytes = util.Array.prototype.set\n   ? function writeBytes_set(val, buf, pos) {\n   buf.set(val, pos); // also works for plain array values\n   }\n   /* istanbul ignore next */\n   : function writeBytes_for(val, buf, pos) {\n   for (var i = 0; i < val.length; ++i)\n   buf[pos + i] = val[i];\n   };\n\n/**\n * Writes a sequence of bytes.\n * @param {Uint8Array|string} value Buffer or base64 encoded string to write\n * @returns {Writer} `this`\n */\nWriter.prototype.bytes = function write_bytes(value) {\n   var len = value.length >>> 0;\n   if (!len)\n   return this._push(writeByte, 1, 0);\n   if (util.isString(value)) {\n   var buf = Writer.alloc(len = base64.length(value));\n   base64.decode(value, buf, 0);\n   value = buf;\n   }\n   return this.uint32(len)._push(writeBytes, len, value);\n};\n\n/**\n * Writes a string.\n * @param {string} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.string = function write_string(value) {\n   var len = utf8.length(value);\n   return len\n   ? this.uint32(len)._push(utf8.write, len, value)\n   : this._push(writeByte, 1, 0);\n};\n\n/**\n * Forks this writer's state by pushing it to a stack.\n * Calling {@link Writer#reset|reset} or {@link Writer#ldelim|ldelim} resets the writer to the previous state.\n * @returns {Writer} `this`\n */\nWriter.prototype.fork = function fork() {\n   this.states = new State(this);\n   this.head = this.tail = new Op(noop, 0, 0);\n   this.len = 0;\n   return this;\n};\n\n/**\n * Resets this instance to the last state.\n * @returns {Writer} `this`\n */\nWriter.prototype.reset = function reset() {\n   if (this.states) {\n   this.head   = this.states.head;\n   this.tail   = this.states.tail;\n   this.len   = this.states.len;\n   this.states =

this.states.next;\n   } else {\n   this.head = this.tail = new Op(noop, 0, 0);\n   this.len = 0;\n   }\n   return
this;\n};\n\n/**\n * Resets to the last state and appends the fork state's current write length as a varint followed by its
operations.\n * @returns {Writer} `this`\n */\nWriter.prototype.ldelim = function ldelim() {\n   var head =
this.head,\n   tail = this.tail,\n   len = this.len;\n   this.reset().uint32(len);\n   if (len) {\n   this.tail.next =
head.next; // skip noop\n   this.tail = tail;\n   this.len += len;\n   }\n   return this;\n};\n\n/**\n * Finishes the
write operation.\n * @returns {Uint8Array} Finished buffer\n */\nWriter.prototype.finish = function finish() {\n
var head = this.head.next, // skip noop\n   buf = this.constructor.alloc(this.len),\n   pos = 0;\n   while (head)
{\n   head.fn(head.val, buf, pos);\n   pos += head.len;\n   head = head.next;\n   }\n   // this.head = this.tail
= null;\n   return buf;\n};\n\nWriter._configure = function(BufferWriter_) {\n   BufferWriter = BufferWriter_;\n
Writer.create = create();\n   BufferWriter._configure();\n};\n","\"use strict\";\nmodule.exports = BufferWriter;\n\n//
extends Writer\nvar Writer = require(\"./writer\");\n(BufferWriter.prototype =
Object.create(Writer.prototype)).constructor = BufferWriter;\n\nvar util = require(\"./util/minimal\");\n\n/**\n *
Constructs a new buffer writer instance.\n * @classdesc Wire format writer using node buffers.\n * @extends
Writer\n * @constructor\n */\nfunction BufferWriter() {\n   Writer.call(this);\n}\n\nBufferWriter._configure =
function () {\n   /**\n   * Allocates a buffer of the specified size.\n   * @function\n   * @param {number} size
Buffer size\n   * @returns {Buffer} Buffer\n   */\n   BufferWriter.alloc = util._Buffer_allocUnsafe;\n\n
BufferWriter.writeBytesBuffer = util.Buffer && util.Buffer.prototype instanceof Uint8Array &&
util.Buffer.prototype.set.name === \"set\"\n   ? function writeBytesBuffer_set(val, buf, pos) {\n   buf.set(val,
pos); // faster than copy (requires node >= 4 where Buffers extend Uint8Array and set is properly inherited)\n
// also works for plain array values\n   }\n   /* istanbul ignore next */\n   : function
writeBytesBuffer_copy(val, buf, pos) {\n   if (val.copy) // Buffer values\n   val.copy(buf, pos, 0,
val.length);\n   else for (var i = 0; i < val.length;) // plain array values\n   buf[pos++] = val[i++];\n
};\n};\n\n\n/**\n * @override\n */\nBufferWriter.prototype.bytes = function write_bytes_buffer(value) {\n   if
(util.isString(value))\n   value = util._Buffer_from(value, \"base64\");\n   var len = value.length >>> 0;\n
this.uint32(len);\n   if (len)\n   this._push(BufferWriter.writeBytesBuffer, len, value);\n   return
this;\n};\n\nfunction writeStringBuffer(val, buf, pos) {\n   if (val.length < 40) // plain js is faster for short strings
(probably due to redundant assertions)\n   util.utf8.write(val, buf, pos);\n   else if (buf.utf8Write)\n
buf.utf8Write(val, pos);\n   else\n   buf.write(val, pos);\n}\n\n/**\n * @override\n
*/\nBufferWriter.prototype.string = function write_string_buffer(value) {\n   var len =
util.Buffer.byteLength(value);\n   this.uint32(len);\n   if (len)\n   this._push(writeStringBuffer, len, value);\n
return this;\n};\n\n\n/**\n * Finishes the write operation.\n * @name BufferWriter#finish\n * @function\n *
@returns {Buffer} Finished buffer\n */\n\nBufferWriter._configure();\n","// Copyright (c) Microsoft Corporation.
All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\n/* eslint-disable import/no-internal-modules
*/\r\nimport {Backend, InferenceSession, SessionHandler} from 'onnxruntime-common';\r\nimport {Session} from
'./onnxjs/session';\r\nimport {OnnxjsSessionHandler} from './onnxjs/session-handler';\r\n\r\nclass OnnxjsBackend
implements Backend {\r\n // eslint-disable-next-line @typescript-eslint/no-empty-function\r\n async init():
Promise<void> {}\r\n\r\n async createSessionHandler(pathOrBuffer: string|Uint8Array, options?:
InferenceSession.SessionOptions):\r\n   Promise<SessionHandler> {\r\n   // NOTE: Session.Config(from onnx.js)
is not compatible with InferenceSession.SessionOptions(from\r\n   // onnxruntime-common).\r\n   //   In future
we should remove Session.Config and use InferenceSession.SessionOptions.\r\n   //   Currently we allow this to
happen to make test runner work.\r\n   const session = new Session(options as unknown as Session.Config);\r\n\r\n
// typescript cannot merge method override correctly (so far in 4.2.3). need if-else to call the method.\r\n   if (typeof
pathOrBuffer === 'string') {\r\n   await session.loadModel(pathOrBuffer);\r\n   } else {\r\n   await
session.loadModel(pathOrBuffer);\r\n   }\r\n\r\n   return new OnnxjsSessionHandler(session);\r\n
}\r\n}\r\n\r\nexport const onnxjsBackend = new OnnxjsBackend();\r\n","// Copyright (c) Microsoft Corporation. All
rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {readFile} from 'fs';\r\nimport {Backend, env,
InferenceSession, SessionHandler} from 'onnxruntime-common';\r\nimport {cpus} from 'os';\r\nimport {promisify}
from 'util';\r\nimport {initWasm} from './wasm/proxy-wrapper';\r\n\r\nimport

{OnnxruntimeWebAssemblySessionHandler} from './wasm/session-handler';\r\n\r\n/**\r\n * This function initializes all flags for WebAssembly.\r\n *\r\n * Those flags are accessible from `ort.env.wasm`. Users are allow to set those flags before the first inference session\r\n * being created, to override default value.\r\n */\r\nexport const initializeFlags = (): void => {\r\n if (typeof env.wasm.initTimeout !== 'number' || env.wasm.initTimeout < 0) {\r\n   env.wasm.initTimeout = 0;\r\n }\r\n\r\n if (typeof env.wasm.simd !== 'boolean') {\r\n   env.wasm.simd = true;\r\n }\r\n\r\n if (typeof env.wasm.proxy !== 'boolean') {\r\n   env.wasm.proxy = false;\r\n }\r\n\r\n if (typeof env.wasm.numThreads !== 'number' || !Number.isInteger(env.wasm.numThreads) || env.wasm.numThreads <= 0) {\r\n   const numCpuLogicalCores = typeof navigator === 'undefined' ? cpus().length : navigator.hardwareConcurrency;\r\n   env.wasm.numThreads = Math.min(4, Math.ceil((numCpuLogicalCores || 1) / 2));\r\n }\r\n};\r\n\r\nclass OnnxruntimeWebAssemblyBackend implements Backend {\r\n async init(): Promise<void> {\r\n   // populate wasm flags\r\n   initializeFlags();\r\n\r\n   // init wasm\r\n   await initWasm();\r\n }\r\n createSessionHandler(path: string, options?: InferenceSession.SessionOptions): Promise<SessionHandler>;\r\n createSessionHandler(buffer: Uint8Array, options?: InferenceSession.SessionOptions): Promise<SessionHandler>;\r\n async createSessionHandler(pathOrBuffer: string|Uint8Array, options?: InferenceSession.SessionOptions):\r\n   Promise<SessionHandler> {\r\n   let buffer: Uint8Array;\r\n   if (typeof pathOrBuffer === 'string') {\r\n   if (typeof fetch === 'undefined') {\r\n   // node\r\n   buffer = await promisify(readFile)(pathOrBuffer);\r\n   } else {\r\n   // browser\r\n   const response = await fetch(pathOrBuffer);\r\n   const arrayBuffer = await response.arrayBuffer();\r\n   buffer = new Uint8Array(arrayBuffer);\r\n   }\r\n   } else {\r\n   buffer = pathOrBuffer;\r\n   }\r\n\r\n   const handler = new OnnxruntimeWebAssemblySessionHandler();\r\n   await handler.loadModel(buffer, options);\r\n   return Promise.resolve(handler);\r\n }\r\n}\r\n\r\nexport const wasmBackend = new OnnxruntimeWebAssemblyBackend();\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nexport * from 'onnxruntime-common';\r\nimport {registerBackend} from 'onnxruntime-common';\r\nimport {onnxjsBackend} from './backend-onnxjs';\r\nimport {wasmBackend} from './backend-wasm';\r\n\r\nregisterBackend('webgl', onnxjsBackend, 1);\r\nregisterBackend('wasm', wasmBackend, 2);\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nclass AttributeWithCacheKeyImpl {\r\n constructor(attribute: Record<string, unknown>) {\r\n   Object.assign(this, attribute);\r\n }\r\n\r\n private _cacheKey: string;\r\n public get cacheKey(): string {\r\n   if (!this._cacheKey) {\r\n   this._cacheKey =\r\n   Object.getOwnPropertyNames(this).sort().map(name => `${(this as Record<string, unknown>)[name]}`).join(';');\r\n   }\r\n   return this._cacheKey;\r\n }\r\n}\r\n\r\nexport interface AttributeWithCacheKey {\r\n readonly cacheKey: string;\r\n}\r\n\r\nexport const createAttributeWithCacheKey = <T extends Record<string, unknown>>(attribute: T): T&AttributeWithCacheKey =>\r\n   new AttributeWithCacheKeyImpl(attribute) as unknown as T & AttributeWithCacheKey;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport Long from 'long';\r\nimport {onnx} from 'onnx-proto';\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\n\r\nimport {Tensor} from './tensor';\r\nimport {LongUtil} from './util';\r\n\r\nexport declare namespace Attribute {\r\n export interface DataTypeMap {\r\n   float: number;\r\n   int: number;\r\n   string: string;\r\n   tensor: Tensor;\r\n   floats: number[];\r\n   ints: number[];\r\n   strings: string[];\r\n   tensors: Tensor[];\r\n }\r\n\r\n export type DataType = keyof DataTypeMap;\r\n}\r\n\r\ntype ValueTypes = Attribute.DataTypeMap[Attribute.DataType];\r\n\r\ntype Value = [ValueTypes, Attribute.DataType];\r\n\r\nexport class Attribute {\r\n constructor(attributes: onnx.IAttributeProto[]|ortFbs.Attribute[]|null|undefined) {\r\n   this._attributes = new Map();\r\n   if (attributes !== null && attributes !== undefined) {\r\n   for (const attr of attributes) {\r\n   if (attr instanceof onnx.AttributeProto) {\r\n   this._attributes.set(attr.name, [Attribute.getValue(attr), Attribute.getType(attr)]);\r\n   } else if (attr instanceof ortFbs.Attribute) {\r\n   this._attributes.set(attr.name()!, [Attribute.getValue(attr), Attribute.getType(attr)]);\r\n   }\r\n   }\r\n   if (this._attributes.size < attributes.length) {\r\n   throw new Error('duplicated attribute names');\r\n   }\r\n   }\r\n }\r\n\r\n set(key: string, type: Attribute.DataType, value: ValueTypes): void {\r\n   this._attributes.set(key, [value, type]);\r\n }\r\n delete(key: string): void {\r\n

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this._attributes.delete(key);\r\n  }\r\n  getFloat(key: string, defaultValue?: Attribute.DataTypeMap['float']) {\r\n
return this.get(key, 'float', defaultValue);\r\n  }\r\n\r\n  getInt(key: string, defaultValue?:
Attribute.DataTypeMap['int']) {\r\n    return this.get(key, 'int', defaultValue);\r\n  }\r\n\r\n  getString(key: string,
defaultValue?: Attribute.DataTypeMap['string']) {\r\n    return this.get(key, 'string', defaultValue);\r\n  }\r\n\r\n
getTensor(key: string, defaultValue?: Attribute.DataTypeMap['tensor']) {\r\n    return this.get(key, 'tensor',
defaultValue);\r\n  }\r\n\r\n  getFloats(key: string, defaultValue?: Attribute.DataTypeMap['floats']) {\r\n    return
this.get(key, 'floats', defaultValue);\r\n  }\r\n\r\n  getInts(key: string, defaultValue?: Attribute.DataTypeMap['ints'])
{\r\n    return this.get(key, 'ints', defaultValue);\r\n  }\r\n\r\n  getStrings(key: string, defaultValue?:
Attribute.DataTypeMap['strings']) {\r\n    return this.get(key, 'strings', defaultValue);\r\n  }\r\n\r\n  getTensors(key:
string, defaultValue?: Attribute.DataTypeMap['tensors']) {\r\n    return this.get(key, 'tensors', defaultValue);\r\n
}\r\n\r\n  private get<V extends Attribute.DataTypeMap[Attribute.DataType]>(\r\n      key: string, type:
Attribute.DataType, defaultValue?: V): V {\r\n    const valueAndType = this._attributes.get(key);\r\n    if
(valueAndType === undefined) {\r\n      if (defaultValue !== undefined) {\r\n        return defaultValue;\r\n      }\r\n
 throw new Error(`required attribute not found: ${key}`);\r\n    }\r\n    if (valueAndType[1] !== type) {\r\n      throw
new Error(`type mismatch: expected ${type} but got ${valueAndType[1]}`);\r\n    }\r\n    return valueAndType[0]
as V;\r\n  }\r\n\r\n  private static getType(attr: onnx.IAttributeProto|ortFbs.Attribute): Attribute.DataType {\r\n
const type = attr instanceof onnx.AttributeProto ? (attr).type : (attr as ortFbs.Attribute).type();\r\n    switch (type)
{\r\n      case onnx.AttributeProto.AttributeType.FLOAT:\r\n        return 'float';\r\n      case
onnx.AttributeProto.AttributeType.INT:\r\n        return 'int';\r\n      case
onnx.AttributeProto.AttributeType.STRING:\r\n        return 'string';\r\n      case
onnx.AttributeProto.AttributeType.TENSOR:\r\n        return 'tensor';\r\n      case
onnx.AttributeProto.AttributeType.FLOATS:\r\n        return 'floats';\r\n      case
onnx.AttributeProto.AttributeType.INTS:\r\n        return 'ints';\r\n      case
onnx.AttributeProto.AttributeType.STRINGS:\r\n        return 'strings';\r\n      case
onnx.AttributeProto.AttributeType.TENSORS:\r\n        return 'tensors';\r\n      default:\r\n        throw new
Error(`attribute type is not supported yet: ${onnx.AttributeProto.AttributeType[type]}`);\r\n    }\r\n  }\r\n\r\n  private
static getValue(attr: onnx.IAttributeProto|ortFbs.Attribute) {\r\n    const attrType = attr instanceof
onnx.AttributeProto ? attr.type : (attr as ortFbs.Attribute).type();\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.GRAPH || attrType === onnx.AttributeProto.AttributeType.GRAPHS) {\r\n
throw new Error('graph attribute is not supported yet');\r\n    }\r\n\r\n    const value =
this.getValueNoCheck(attr);\r\n\r\n    // cast LONG to number\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.INT && LongUtil.isLong(value)) {\r\n      return LongUtil.longToNumber(value
as Long | flatbuffers.Long);\r\n    }\r\n\r\n    // cast LONG[] to number[]\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.INTS) {\r\n      const arr = (value as Array<number|Long|flatbuffers.Long>);\r\n
  const numberValue: number[] = new Array<number>(arr.length);\r\n\r\n      for (let i = 0; i < arr.length; i++) {\r\n
    const maybeLong = arr[i];\r\n        numberValue[i] = LongUtil.longToNumber(maybeLong);\r\n      }\r\n\r\n
return numberValue;\r\n    }\r\n\r\n    // cast onnx.TensorProto to onnxjs.Tensor\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.TENSOR) {\r\n      return attr instanceof onnx.AttributeProto ?
Tensor.fromProto(value as onnx.ITensorProto) :\r\n                                                  Tensor.fromOrtTensor(value as
ortFbs.Tensor);\r\n    }\r\n\r\n    // cast onnx.TensorProto[] to onnxjs.Tensor[]\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.TENSORS) {\r\n      if (attr instanceof onnx.AttributeProto) {\r\n        const
tensorProtos = value as onnx.ITensorProto[];\r\n        return tensorProtos.map(value =>
Tensor.fromProto(value));\r\n      } else if (attr instanceof ortFbs.Attribute) {\r\n        const tensorProtos = value as
ortFbs.Tensor[];\r\n        return tensorProtos.map(value => Tensor.fromOrtTensor(value));\r\n      }\r\n    }\r\n\r\n    //
cast Uint8Array to string\r\n    if (attrType === onnx.AttributeProto.AttributeType.STRING) {\r\n      // string in
onnx attribute is of uint8array type, so we need to convert it to string below. While in ort format,\r\n      // string
attributes are returned as string, so no conversion is needed.\r\n      if (attr instanceof onnx.AttributeProto) {\r\n
const utf8String = value as Uint8Array;\r\n        return Buffer.from(utf8String.buffer, utf8String.byteOffset,
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utf8String.byteLength).toString();\r\n   }\r\n   }\r\n\r\n   // cast Uint8Array[] to string[]\r\n   if (attrType === onnx.AttributeProto.AttributeType.STRINGS) {\r\n   // strings in onnx attribute is returned as uint8array[], so we need to convert it to string[] below. While in ort\r\n   // format strings attributes are returned as string[], so no conversion is needed.\r\n   if (attr instanceof onnx.AttributeProto) {\r\n   const utf8Strings = value as Uint8Array[];\r\n   return utf8Strings.map(\r\n   utf8String => Buffer.from(utf8String.buffer, utf8String.byteOffset, utf8String.byteLength).toString());\r\n   }\r\n   }\r\n\r\n   return value as ValueTypes;\r\n }\r\n\r\n private static getValueNoCheck(attr: onnx.IAttributeProto|ortFbs.Attribute) {\r\n   return attr instanceof (onnx.AttributeProto) ? this.getValueNoCheckFromOnnxFormat(attr) :\r\n this.getValueNoCheckFromOrtFormat(attr as ortFbs.Attribute);\r\n }\r\n\r\n private static getValueNoCheckFromOnnxFormat(attr: onnx.IAttributeProto) {\r\n   switch (attr.type!) {\r\n   case onnx.AttributeProto.AttributeType.FLOAT:\r\n   return attr.f;\r\n   case onnx.AttributeProto.AttributeType.INT:\r\n   return attr.i;\r\n   case onnx.AttributeProto.AttributeType.STRING:\r\n   return attr.s;\r\n   case onnx.AttributeProto.AttributeType.TENSOR:\r\n   return attr.t;\r\n   case onnx.AttributeProto.AttributeType.GRAPH:\r\n   return attr.g;\r\n   case onnx.AttributeProto.AttributeType.FLOATS:\r\n   return attr.floats;\r\n   case onnx.AttributeProto.AttributeType.INTS:\r\n   return attr.ints;\r\n   case onnx.AttributeProto.AttributeType.STRINGS:\r\n   return attr.strings;\r\n   case onnx.AttributeProto.AttributeType.TENSORS:\r\n   return attr.tensors;\r\n   case onnx.AttributeProto.AttributeType.GRAPHS:\r\n   return attr.graphs;\r\n   default:\r\n   throw new Error(`unsupported attribute type: ${onnx.AttributeProto.AttributeType[attr.type!]}`);\r\n   }\r\n }\r\n\r\n private static getValueNoCheckFromOrtFormat(attr: ortFbs.Attribute) {\r\n   switch (attr.type()) {\r\n   case ortFbs.AttributeType.FLOAT:\r\n   return attr.f();\r\n   case ortFbs.AttributeType.INT:\r\n   return attr.i();\r\n   case ortFbs.AttributeType.STRING:\r\n   return attr.s();\r\n   case ortFbs.AttributeType.TENSOR:\r\n   return attr.t();\r\n   case ortFbs.AttributeType.GRAPH:\r\n   return attr.g();\r\n   case ortFbs.AttributeType.FLOATS:\r\n   return attr.floatsArray();\r\n   case ortFbs.AttributeType.INTS: {\r\n   const ints = [];\r\n   for (let i = 0; i < attr.intsLength(); i++) {\r\n ints.push(attr.ints(i)!);\r\n   }\r\n   return ints;\r\n   }\r\n   case ortFbs.AttributeType.STRINGS: {\r\n const strings = [];\r\n   for (let i = 0; i < attr.stringsLength(); i++) {\r\n   strings.push(attr.strings(i));\r\n }\r\n   return strings;\r\n   }\r\n   case ortFbs.AttributeType.TENSORS: {\r\n   const tensors = [];\r\n for (let i = 0; i < attr.tensorsLength(); i++) {\r\n   tensors.push(attr.tensors(i)!);\r\n   }\r\n   return tensors;\r\n   }\r\n   // case ortFbs.AttributeType.GRAPHS:\r\n   // TODO: Subgraph not supported yet.\r\n // const graphs = [];\r\n   // for (let i = 0; i < attr.graphsLength(); i++) {\r\n   //   graphs.push(attr.graphs(i)!);\r\n // }\r\n   // return graphs;\r\n   default:\r\n   throw new Error(`unsupported attribute type: ${ortFbs.AttributeType[attr.type()]}`);\r\n   }\r\n }\r\n\r\n protected _attributes: Map<string, Value>;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {WebGLBackend} from './backends/backend-webgl';\r\nimport {Graph} from './graph';\r\nimport {Operator} from './operators';\r\nimport {OpSet} from './opset';\r\nimport {Session} from './session';\r\n\r\nexport interface InferenceHandler {\r\n /**\r\n   * dispose the inference handler. it will be called as the last step in Session.run()\r\n */\r\n dispose(): void;\r\n}\r\n\r\nexport interface SessionHandler {\r\n /**\r\n   * transform the graph at initialization time\r\n   * @param graphTransformer the graph transformer to manipulate the model graph\r\n   */\r\n transformGraph?(graphTransformer: Graph.Transformer): void;\r\n\r\n /**\r\n   * create an instance of InferenceHandler to use in a Session.run() call\r\n   */\r\n createInferenceHandler(): InferenceHandler;\r\n\r\n /**\r\n   * dispose the session handler. it will be called when a session is being disposed explicitly\r\n   */\r\n dispose(): void;\r\n\r\n /**\r\n   * Resolves the operator from the name and opset version; backend specific\r\n   * @param node the node to resolve\r\n   * @param opsets a list of opsets that exported from the model\r\n   * @param graph the completely initialized graph\r\n   */\r\n resolve(node: Graph.Node, opsets: readonly OpSet[], graph: Graph): Operator;\r\n\r\n /**\r\n   * This method let's the sessionHandler know that the graph initialization is complete\r\n   * @param graph the completely initialized graph\r\n   */\r\n onGraphInitialized?(graph: Graph): void;\r\n\r\n /**\r\n   * a reference to the corresponding backend\r\n   */\r\n readonly backend: Backend;\r\n\r\n /**\r\n   * a reference to the session context\r\n   */\r\n readonly context: Session.Context;\r\n}\r\n\r\nexport interface Backend {\r\n /**\r\n   * initialize the backend. will be called only once, when the first time the\r\n   * backend it to be used\r\n   */\r\n initialize(): boolean|Promise<boolean>;\r\n\r\n /**\r\n   * create an instance of SessionHandler to use in a Session object's lifecycle\r\n   */\r\n createSessionHandler(context: Session.Context): SessionHandler;\r\n\r\n /**\r\n   * dispose the backend. currently this will not be called\r\n   */\r\n dispose(): void;\r\n}\r\n\r\n// caches all initialized backend instances\r\nconst backendsCache: Map<string, Backend> = new Map();\r\n\r\nexport const backend: {[name: string]: Backend} = {\r\n webgl: new WebGLBackend(),\r\n};\r\n\r\n/**\r\n * Resolve a reference to the backend. If a hint is specified, the corresponding\r\n * backend will be used.\r\n */\r\nexport async function resolveBackend(hint?: string|readonly string[]): Promise<Backend> {\r\n if (!hint) {\r\n   return resolveBackend(['webgl']);\r\n } else {\r\n   const hints = typeof hint === 'string' ? [hint] : hint;\r\n\r\n   for (const backendHint of hints) {\r\n   const cache = backendsCache.get(backendHint);\r\n   if (cache) {\r\n   return cache;\r\n   }\r\n\r\n   const backend = await tryLoadBackend(backendHint);\r\n   if (backend) {\r\n   return backend;\r\n   }\r\n   }\r\n }\r\n\r\n throw new Error('no available backend to use');\r\n}\r\n\r\nasync function tryLoadBackend(backendHint: string): Promise<Backend|undefined> {\r\n const backendObj = backend;\r\n\r\n if (typeof backendObj[backendHint] !== 'undefined' && isBackend(backendObj[backendHint])) {\r\n   const backend = backendObj[backendHint];\r\n   let init = backend.initialize();\r\n   if (typeof init === 'object' && 'then' in init) {\r\n   init = await init;\r\n   }\r\n   if (init) {\r\n   backendsCache.set(backendHint, backend);\r\n   return backend;\r\n   }\r\n }\r\n\r\n return undefined;\r\n}\r\n\r\nfunction isBackend(obj: unknown) {\r\n // eslint-disable-next-line @typescript-eslint/no-explicit-any\r\n const o = obj as any;\r\n\r\n // check if an object is a Backend instance\r\n if (\r\n   'initialize' in o && typeof o.initialize === 'function' &&   // initialize()\r\n   'createSessionHandler' in o && typeof o.createSessionHandler === 'function' && // createSessionHandler()\r\n   'dispose' in o && typeof o.dispose === 'function'   // dispose()\r\n) {\r\n   return true;\r\n }\r\n\r\n return false;\r\n}\r\n\r\nexport type BackendType = Backend;\r\nexport type SessionHandlerType = ReturnType<BackendType['createSessionHandler']>;\r\nexport type InferenceHandlerType = ReturnType<SessionHandlerType['createInferenceHandler']>;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env} from 'onnxruntime-common';\r\nimport {Backend, SessionHandler} from '../backend';\r\nimport {Logger} from '../instrument';\r\nimport {Session} from '../session';\r\n\r\nimport {WebGLSessionHandler} from './webgl/session-handler';\r\nimport {WebGLContext} from './webgl/webgl-context';\r\nimport {createWebGLContext} from './webgl/webgl-context-factory';\r\n\r\n/**\r\n * WebGLBackend is the entry point for all WebGL opeartions\r\n * When it starts it created the WebGLRenderingContext\r\n * and other main framework components such as Program and Texture Managers\r\n */\r\nexport class WebGLBackend implements Backend {\r\n glContext: WebGLContext;\r\n\r\n get contextId(): 'webgl'|'webgl2'|undefined {\r\n   return env.webgl.contextId;\r\n }\r\n set contextId(value: 'webgl'|'webgl2'|undefined) {\r\n   env.webgl.contextId = value;\r\n }\r\n\r\n get matmulMaxBatchSize(): number|undefined {\r\n   return env.webgl.matmulMaxBatchSize;\r\n }\r\n set matmulMaxBatchSize(value: number|undefined) {\r\n   env.webgl.matmulMaxBatchSize = value;\r\n }\r\n\r\n get textureCacheMode(): 'initializerOnly'|'full'|undefined {\r\n   return env.webgl.textureCacheMode;\r\n }\r\n set textureCacheMode(value: 'initializerOnly'|'full'|undefined) {\r\n   env.webgl.textureCacheMode = value;\r\n }\r\n\r\n get pack(): boolean|undefined {\r\n   return env.webgl.pack;\r\n }\r\n set pack(value: boolean|undefined) {\r\n   env.webgl.pack = value;\r\n }\r\n\r\n get async(): boolean|undefined {\r\n   return env.webgl.async;\r\n }\r\n set async(value: boolean|undefined) {\r\n   env.webgl.async = value;\r\n }\r\n\r\n initialize(): boolean {\r\n   try {\r\n   this.glContext = createWebGLContext(this.contextId);\r\n   if (typeof this.matmulMaxBatchSize !== 'number') {\r\n   this.matmulMaxBatchSize = 16;\r\n   }\r\n   if (typeof this.textureCacheMode !== 'string') {\r\n   this.textureCacheMode = 'full';\r\n   }\r\n   if (typeof this.pack !== 'boolean') {\r\n   this.pack = false;\r\n   }\r\n   if (typeof this.async !== 'boolean') {\r\n   this.async = false;\r\n   }\r\n\r\n

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Logger.setWithEnv(env);\r\n\r\n      Logger.verbose(\r\n          'WebGLBackend',\r\n          `Created WebGLContext:
${typeof this.glContext} with matmulMaxBatchSize: ${\r\n              this.matmulMaxBatchSize};
textureCacheMode: ${this.textureCacheMode}; pack: ${this.pack}; async: ${\r\n              this.async}.`);\r\n
return true;\r\n    } catch (e) {\r\n      Logger.warning('WebGLBackend', `Unable to initialize WebGLBackend.
${e}`);\r\n      return false;\r\n    }\r\n  }\r\n  createSessionHandler(context: Session.Context): SessionHandler {\r\n
return new WebGLSessionHandler(this, context);\r\n  }\r\n  dispose(): void {\r\n    this.glContext.dispose();\r\n
}\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\n\r\nimport {ArrayUtil, BroadcastUtil, ShapeUtil} from '../../util';\r\n\r\nimport {GlslContext, GlslLib,
GlslLibRoutine} from './glsl-definitions';\r\nimport {getGlsl} from './glsl-source';\r\nimport {squeezeShape} from
'./texture-layout-strategy';\r\nimport {TextureLayout} from './types';\r\nimport
{generateShaderFuncNameFromInputSamplerName,
generateShaderFuncNameFromInputSamplerNameAtOutCoords, getCoordsDataType, getGlChannels,
getSqueezedParams, squeezeInputShape} from './utils';\r\n\r\n\r\n/**\r\n * GLSL Library responsible for data types and
routines for manipulating\r\n * coordinates and mapping to/from tensor indices\r\n */\r\nexport class CoordsGlslLib
extends GlslLib {\r\n  returnType: string;\r\n\r\n  constructor(context: GlslContext) {\r\n    super(context);\r\n  }\r\n
getFunctions(): {[name: string]: GlslLibRoutine} {\r\n    return {\r\n      ...this.offsetToCoords(),\r\n
...this.coordsToOffset(),\r\n      ...this.toVec(),\r\n      ...this.valueFrom(),\r\n      // TODO return these only when
packing is enabled.\r\n      ...this.getCommonUtilFuncs(),\r\n      ...this.getInputsSamplingSnippets(),\r\n
...this.getOutputSamplingSnippet()\r\n    };\r\n  }\r\n  getCustomTypes() {\r\n    return {};\r\n  }\r\n  /**\r\n   *
Produces a function that can map from\r\n   * 2D normalzied coordinates (s,t) to a flat offset\r\n   */\r\n  protected
offsetToCoords(): {[name: string]: GlslLibRoutine} {\r\n    const funcName = 'offsetToCoords';\r\n    return {\r\n
offsetToCoords: new GlslLibRoutine(`\r\n      vec2 ${funcName}(int offset, int width, int height) {\r\n        int t =
offset / width;\r\n        int s = offset - t*width;\r\n        vec2 coords = (vec2(s,t) + vec2(0.5,0.5)) / vec2(width,
height);\r\n        return coords;\r\n      }\r\n      `)\r\n    };\r\n  }\r\n\r\n  /**\r\n   * Produces a function that can map
from\r\n   * 2D normalzied coordinates (s,t) to a flat offset\r\n   */\r\n  protected coordsToOffset(): {[name: string]:
GlslLibRoutine} {\r\n    const funcName = 'coordsToOffset';\r\n    return {\r\n      coordsToOffset: new
GlslLibRoutine(`\r\n      int ${funcName}(vec2 coords, int width, int height) {\r\n        float s = coords.s *
float(width);\r\n        float t = coords.t * float(height);\r\n        int offset = int(t) * width + int(s);\r\n        return
offset;\r\n      }\r\n      `)\r\n    };\r\n  }\r\n\r\n  /**\r\n   * Generates code for output sampler.\r\n   */\r\n\r\n  protected
getOutputSamplingSnippet(): {[name: string]: GlslLibRoutine} {\r\n    const outputLayout =
this.context.outputTextureLayout;\r\n    if (outputLayout.isPacked) {\r\n      return
this.getPackedOutputSamplingSnippet(outputLayout);\r\n    } else {\r\n      return
this.getUnpackedOutputSamplingSnippet(outputLayout);\r\n    }\r\n  }\r\n\r\n  /**\r\n   * Generates code for packed
output sampler.\r\n   */\r\n  protected getPackedOutputSamplingSnippet(outputLayout: TextureLayout): {[name:
string]: GlslLibRoutine} {\r\n    const outShape = outputLayout.unpackedShape;\r\n    const outTexShape =
[outputLayout.width, outputLayout.height];\r\n    const result: {[name: string]: GlslLibRoutine} = {};\r\n    const
funcName = 'getOutputCoords';\r\n    switch (outShape.length) {\r\n      case 0:\r\n        result[funcName] =
this.getOutputScalarCoords();\r\n        break;\r\n      case 1:\r\n        result[funcName] =
this.getOutputPacked1DCoords(outShape as [number], outTexShape as [number, number]);\r\n        break;\r\n
case 2:\r\n        result[funcName] = this.getOutputPacked2DCoords(outShape as [number, number], outTexShape as
[number, number]);\r\n        break;\r\n      case 3:\r\n        result[funcName] =\r\n
this.getOutputPacked3DCoords(outShape as [number, number, number], outTexShape as [number, number]);\r\n
break;\r\n      default:\r\n        result[funcName] = this.getOutputPackedNDCoords(outShape, outTexShape as
[number, number]);\r\n    }\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n    // TODO we need this to
properly return a packed vec4 from kernels.\r\n    // Replace all '{glsl.output} = result' with 'setOutput(result)' in all
kernels.\r\n    const floatTextureSetRGBASource = `\r\n      void setOutput(vec4 val) {\r\n        ${glsl.output} =
val;\r\n      }\r\n    `;\r\n    const floatTextureSetRGBAFuncName = 'floatTextureSetRGBA';\r\n
result[floatTextureSetRGBAFuncName] = new GlslLibRoutine(floatTextureSetRGBASource);\r\n    return
```

```
result;\r\n  }\r\n\r\n  /**\r\n   * Generates code for unpacked output sampler.\r\n   */\r\n  protected
getUnpackedOutputSamplingSnippet(outputLayout: TextureLayout): {[name: string]: GlslLibRoutine} {\r\n    const
outShape = outputLayout.unpackedShape;\r\n    const outTexShape = [outputLayout.width,
outputLayout.height];\r\n    const result: {[name: string]: GlslLibRoutine} = {};\r\n    const funcName =
'getOutputCoords';\r\n    switch (outShape.length) {\r\n      case 0:\r\n        result[funcName] =
this.getOutputScalarCoords();\r\n        break;\r\n      case 1:\r\n        result[funcName] =
this.getOutputUnpacked1DCoords(outShape as [number], outTexShape as [number, number]);\r\n        break;\r\n
case 2:\r\n        result[funcName] =\r\n            this.getOutputUnpacked2DCoords(outShape as [number, number],
outTexShape as [number, number]);\r\n        break;\r\n      case 3:\r\n        result[funcName] =\r\n
this.getOutputUnpacked3DCoords(outShape as [number, number, number], outTexShape as [number, number]);\r\n
     break;\r\n      case 4:\r\n        result[funcName] = this.getOutputUnpacked4DCoords(\r\n            outShape as
[number, number, number, number], outTexShape as [number, number]);\r\n        break;\r\n      case 5:\r\n
result[funcName] = this.getOutputUnpacked5DCoords(\r\n            outShape as [number, number, number, number,
number], outTexShape as [number, number]);\r\n        break;\r\n      case 6:\r\n        result[funcName] =
this.getOutputUnpacked6DCoords(\r\n            outShape as [number, number, number, number, number, number],
outTexShape as [number, number]);\r\n        break;\r\n      default:\r\n        throw new Error(`Unsupported output
dimensionality: ${outShape.length}`);\r\n    }\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n    //
TODO we need this to properly return a packed vec4 from kernels.\r\n    // Replace all '{glsl.output} = result' with
'setOutput(result)' in all kernels.\r\n    const floatTextureSetRSource = `\r\n        void setOutput(float val) {\r\n
${glsl.output} = vec4(val, 0, 0, 0);\r\n        }\r\n    `;\r\n    const floatTextureSetRFuncName = 'floatTextureSetR';\r\n
  result[floatTextureSetRFuncName] = new GlslLibRoutine(floatTextureSetRSource);\r\n    return result;\r\n
}\r\n\r\n  /**\r\n   * Scalar output coordinates.\r\n   */\r\n  protected getOutputScalarCoords(): GlslLibRoutine {\r\n
return new GlslLibRoutine(`\r\n      int getOutputCoords() {\r\n        return 0;\r\n      }\r\n    `);\r\n  }\r\n\r\n  /**\r\n
* 1D packed output coordinates.\r\n   */\r\n  protected getOutputPacked1DCoords(shape: [number], texShape:
[number, number]): GlslLibRoutine {\r\n    const packedTexShape = texShape;\r\n    let source = '';\r\n    if
(packedTexShape[0] === 1) {\r\n      source = `\r\n          int getOutputCoords() {\r\n            return 2 *
int(TexCoords.y * ${packedTexShape[1]}.0);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source);\r\n
}\r\n\r\n    if (packedTexShape[1] === 1) {\r\n      source = `\r\n          int getOutputCoords() {\r\n            return 2 *
int(TexCoords.x * ${packedTexShape[0]}.0);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source);\r\n
}\r\n\r\n    source = `\r\n        int getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
              vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n          return 2 * (resTexRC.y *
${packedTexShape[0]} + resTexRC.x);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n
/**\r\n   * 2D packed output coordinates.\r\n   */\r\n  protected getOutputPacked2DCoords(shape: [number,
number], texShape: [number, number]): GlslLibRoutine {\r\n    let source = '';\r\n    if (ArrayUtil.arraysEqual(shape,
texShape)) {\r\n      source = `\r\n        ivec2 getOutputCoords() {\r\n          return 2 * ivec2(TexCoords.xy *
vec2(${texShape[0]}, ${texShape[1]}));\r\n        }\r\n      `;\r\n      return new GlslLibRoutine(source);\r\n    }\r\n\r\n
 const packedTexShape = texShape;\r\n    // texels needed to accommodate a logical row\r\n    const
texelsInLogicalRow = Math.ceil(shape[1] / 2);\r\n\r\n    /**\r\n     * getOutputCoords\r\n     *\r\n     * resTexRC: The
rows and columns of the texels. If you move over one\r\n     * texel to the right in the packed texture, you are
moving over one column\r\n     * (not two).\r\n     *\r\n     * index: The texel index\r\n     */\r\n    source = `\r\n
ivec2 getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n\r\n          int index = resTexRC.y *
${packedTexShape[0]} + resTexRC.x;\r\n\r\n          // reverse r and c order for packed texture\r\n          int r =
imod(index, ${texelsInLogicalRow}) * 2;\r\n          int c = 2 * (index / ${texelsInLogicalRow});\r\n\r\n          return
ivec2(r, c);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * 3D packed output
coordinates.\r\n   */\r\n  protected getOutputPacked3DCoords(shape: [number, number, number], texShape:
[number, number]): GlslLibRoutine {\r\n    const packedTexShape = [texShape[0], texShape[1]];\r\n    const
texelsInLogicalRow = Math.ceil(shape[2] / 2);\r\n    const texelsInBatch = texelsInLogicalRow * Math.ceil(shape[1]
```

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/ 2);\r\n    const source = `\r\n        ivec3 getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                            vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n          int index = resTexRC.y *
${packedTexShape[0]} + resTexRC.x;\r\n\r\n          int b = index / ${texelsInBatch};\r\n          index -= b *
${texelsInBatch};\r\n\r\n          // reverse r and c order for packed texture\r\n          int r = imod(index,
${texelsInLogicalRow}) * 2;\r\n          int c = 2 * (index / ${texelsInLogicalRow});\r\n\r\n          return ivec3(b, r,
c);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * ND packed output
coordinates.\r\n   */\r\n  protected getOutputPackedNDCoords(shape: readonly number[], texShape: [number,
number]): GlslLibRoutine {\r\n    const packedTexShape = [texShape[0], texShape[1]];\r\n\r\n    const
texelsInLogicalRow = Math.ceil(shape[shape.length - 1] / 2);\r\n    const texelsInBatch = texelsInLogicalRow *
Math.ceil(shape[shape.length - 2] / 2);\r\n    let texelsInBatchN = texelsInBatch;\r\n    let batches = '';\r\n    let coords
= 'b, r, c';\r\n\r\n    for (let b = 2; b < shape.length - 1; b++) {\r\n      texelsInBatchN *= shape[shape.length - b -
1];\r\n      batches = `\r\n      int b${b} = index / ${texelsInBatchN};\r\n      index -= b${b} * ${texelsInBatchN};\r\n
 ` + batches;\r\n      coords = `b${b}, ` + coords;\r\n    }\r\n    const source = `\r\n      ivec${shape.length}
getOutputCoords() {\r\n        ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n        int index = resTexRC.y * ${packedTexShape[0]} +
resTexRC.x;\r\n\r\n        ${batches}\r\n\r\n        int b = index / ${texelsInBatch};\r\n        index -= b *
${texelsInBatch};\r\n\r\n        // reverse r and c order for packed texture\r\n        int r = imod(index,
${texelsInLogicalRow}) * 2;\r\n        int c = 2 * (index / ${texelsInLogicalRow});\r\n\r\n        return
ivec${shape.length}(${coords});\r\n      }\r\n    `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   *
Unpacked 1D output coordinates.\r\n   */\r\n  protected getOutputUnpacked1DCoords(shape: [number], texShape:
[number, number]): GlslLibRoutine {\r\n    const source = `\r\n        int getOutputCoords() {\r\n          ivec2
resTexRC = ivec2(TexCoords.xy *\r\n                              vec2(${texShape[0]}, ${texShape[1]}));\r\n          return
resTexRC.y * ${texShape[0]} + resTexRC.x;\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n
}\r\n\r\n  /**\r\n   * Unpacked 2D output coordinates.\r\n   */\r\n  protected getOutputUnpacked2DCoords(shape:
[number, number], texShape: [number, number]): GlslLibRoutine {\r\n    const source = `\r\n        ivec2
getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
vec2(${texShape[0]}, ${texShape[1]}));\r\n          int index = resTexRC.y * ${texShape[0]} + resTexRC.x;\r\n
int r = index / ${shape[1]};\r\n          int c = index - r * ${shape[1]};\r\n          return ivec2(r, c);\r\n        }\r\n
`;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 3D output coordinates.\r\n   */\r\n
protected getOutputUnpacked3DCoords(shape: [number, number, number], texShape: [number, number]):
GlslLibRoutine {\r\n    let source = '';\r\n    const rank = shape.length;\r\n\r\n    let strides = null;\r\n    if (rank < 2)
{\r\n      strides = [];\r\n    }\r\n\r\n    strides = new Array(rank - 1);\r\n    strides[rank - 2] = shape[rank - 1];\r\n    for
(let i = rank - 3; i >= 0; --i) {\r\n      strides[i] = strides[i + 1] * shape[i + 1];\r\n    }\r\n    const coordsToCompute =
['r', 'c', 'd'];\r\n    const coordsFromIndexSnippet =\r\n        strides\r\n            .map((stride, i) => {\r\n              const
line1 = `int ${coordsToCompute[i]} = index / ${stride}`;\r\n              const line2 = i === strides.length - 1 ?\r\n
       `int ${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} * ${stride}` :\r\n                  `index -=
${coordsToCompute[i]} * ${stride}`;\r\n              return `${line1}; ${line2};`;\r\n            })\r\n
.join('');\r\n\r\n    source = `\r\n        ivec3 getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                          vec2(${texShape[0]}, ${texShape[1]}));\r\n          int index = resTexRC.y * ${texShape[0]} +
resTexRC.x;\r\n          ${coordsFromIndexSnippet}\r\n          return ivec3(r, c, d);\r\n        }\r\n      `;\r\n    return new
GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 4D output coordinates.\r\n   */\r\n  protected
getOutputUnpacked4DCoords(shape: [number, number, number, number], texShape: [number, number]):\r\n
GlslLibRoutine {\r\n    let source = '';\r\n    const rank = shape.length;\r\n\r\n    let strides = null;\r\n    if (rank < 2)
{\r\n      strides = [];\r\n    }\r\n\r\n    strides = new Array(rank - 1);\r\n    strides[rank - 2] = shape[rank - 1];\r\n    for
(let i = rank - 3; i >= 0; --i) {\r\n      strides[i] = strides[i + 1] * shape[i + 1];\r\n    }\r\n    const coordsToCompute =
['r', 'c', 'd', 'd2'];\r\n    const coordsFromIndexSnippet =\r\n        strides\r\n            .map((stride, i) => {\r\n
const line1 = `int ${coordsToCompute[i]} = index / ${stride}`;\r\n              const line2 = i === strides.length - 1
?\r\n                  `int ${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} * ${stride}` :\r\n
```

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`index -= ${coordsToCompute[i]} * ${stride}`;\r\n            return `${line1}; ${line2};`;\r\n          })\r\n
.join('');\r\n\r\n    source = `\r\n      ivec4 getOutputCoords() {\r\n        ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                              vec2(${texShape[0]}, ${texShape[1]}));\r\n        int index = resTexRC.y * ${texShape[0]} +
resTexRC.x;\r\n        ${coordsFromIndexSnippet}\r\n        return ivec4(r, c, d, d2);\r\n      }\r\n    `;\r\n    return
new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 5D output coordinates.\r\n   */\r\n  protected
getOutputUnpacked5DCoords(shape: [number, number, number, number, number], texShape: [number,
number]):\r\n      GlslLibRoutine {\r\n    let source = '';\r\n    const rank = shape.length;\r\n\r\n    let strides = null;\r\n
  if (rank < 2) {\r\n      strides = [];\r\n    }\r\n\r\n    strides = new Array(rank - 1);\r\n    strides[rank - 2] = shape[rank
- 1];\r\n    for (let i = rank - 3; i >= 0; --i) {\r\n      strides[i] = strides[i + 1] * shape[i + 1];\r\n    }\r\n    const
coordsToCompute = ['r', 'c', 'd', 'd2', 'd3'];\r\n    const coordsFromIndexSnippet =\r\n        strides\r\n
.map((stride, i) => {\r\n            const line1 = `int ${coordsToCompute[i]} = index / ${stride}`;\r\n            const
line2 = i === strides.length - 1 ?\r\n                `int ${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} *
${stride}` :\r\n                `index -= ${coordsToCompute[i]} * ${stride}`;\r\n            return `${line1};
${line2};`;\r\n          })\r\n          .join('');\r\n\r\n    source = `\r\n      ivec5 getOutputCoords() {\r\n        ivec2
resTexRC = ivec2(TexCoords.xy *\r\n                              vec2(${texShape[0]}, ${texShape[1]}));\r\n        int
index = resTexRC.y * ${texShape[0]} + resTexRC.x;\r\n        ${coordsFromIndexSnippet}\r\n        return ivec5(r,
c, d, d2, d3);\r\n      }\r\n    `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 6D
output coordinates.\r\n   */\r\n  protected getOutputUnpacked6DCoords(shape: [number, number, number, number,
number, number], texShape: [\r\n    number, number\r\n  ]): GlslLibRoutine {\r\n    let source = '';\r\n    const rank =
shape.length;\r\n\r\n    let strides = null;\r\n    if (rank < 2) {\r\n      strides = [];\r\n    }\r\n\r\n    strides = new
Array(rank - 1);\r\n    strides[rank - 2] = shape[rank - 1];\r\n    for (let i = rank - 3; i >= 0; --i) {\r\n      strides[i] =
strides[i + 1] * shape[i + 1];\r\n    }\r\n    const coordsToCompute = ['r', 'c', 'd', 'd2', 'd3', 'd4'];\r\n    const
coordsFromIndexSnippet =\r\n        strides\r\n          .map((stride, i) => {\r\n            const line1 = `int
${coordsToCompute[i]} = index / ${stride}`;\r\n            const line2 = i === strides.length - 1 ?\r\n                `int
${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} * ${stride}` :\r\n                `index -=
${coordsToCompute[i]} * ${stride}`;\r\n            return `${line1}; ${line2};`;\r\n          })\r\n
.join('');\r\n\r\n    source = `\r\n     ivec6 getOutputCoords() {\r\n         ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                      vec2(${texShape[0]}, ${texShape[1]}));\r\n         int index = resTexRC.y * ${texShape[0]} +
resTexRC.x;\r\n         ${coordsFromIndexSnippet}\r\n         return ivec6(r, c, d, d2, d3, d4);\r\n       }\r\n     `;\r\n
return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Generates code for common UV coords computation
utility functions.\r\n   */\r\n  protected getCommonUtilFuncs(): {[name: string]: GlslLibRoutine} {\r\n    const
result: {[name: string]: GlslLibRoutine} = {};\r\n    let funcName = 'uvFromFlat';\r\n    result[funcName] = new
GlslLibRoutine(`\r\n    vec2 uvFromFlat(int texNumR, int texNumC, int index) {\r\n      int texC = index /
texNumR;\r\n      int texR = index - texC * texNumR;\r\n      // TODO: swap texR, texC order in following function
so row is corresponding to u and column is corresponding to\r\n      //       v.\r\n      return (vec2(texR, texC) +
halfCR) / vec2(texNumR, texNumC);\r\n    }\r\n    `);\r\n    funcName = 'packedUVfrom1D';\r\n    result[funcName]
= new GlslLibRoutine(`\r\n      vec2 packedUVfrom1D(int texNumR, int texNumC, int index) {\r\n        int
texelIndex = index / 2;\r\n        int texR = texelIndex / texNumC;\r\n        int texC = texelIndex - texR *
texNumC;\r\n        return (vec2(texC, texR) + halfCR) / vec2(texNumC, texNumR);\r\n      }\r\n      `);\r\n
funcName = 'packedUVfrom2D';\r\n    result[funcName] = new GlslLibRoutine(`\r\n      vec2 packedUVfrom2D(int
texNumR, int texNumC, int texelsInLogicalRow, int row, int col) {\r\n        int texelIndex = (row / 2) *
texelsInLogicalRow + (col / 2);\r\n        int texR = texelIndex / texNumC;\r\n        int texC = texelIndex - texR *
texNumC;\r\n        return (vec2(texC, texR) + halfCR) / vec2(texNumC, texNumR);\r\n      }\r\n      `);\r\n
funcName = 'packedUVfrom3D';\r\n    result[funcName] = new GlslLibRoutine(`\r\n      vec2 packedUVfrom3D(int
texNumR, int texNumC,\r\n          int texelsInBatch, int texelsInLogicalRow, int b,\r\n          int row, int col) {\r\n
int index = b * texelsInBatch + (row / 2) * texelsInLogicalRow + (col / 2);\r\n        int texR = index / texNumC;\r\n
   int texC = index - texR * texNumC;\r\n        return (vec2(texC, texR) + halfCR) / vec2(texNumC, texNumR);\r\n
  }\r\n      `);\r\n    funcName = 'sampleTexture';\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n
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result[funcName] = new GlslLibRoutine(`\r\n        float sampleTexture(sampler2D textureSampler, vec2 uv) {\r\n
     return ${glsl.texture2D}(textureSampler, uv).r;\r\n        }`);\r\n    return result;\r\n  }\r\n\r\n  /**\r\n   *
Constructing snippets for inputs\r\n   */\r\n  protected getInputsSamplingSnippets(): {[name: string]:
GlslLibRoutine} {\r\n    const result: {[name: string]: GlslLibRoutine} = {};\r\n    const outputLayout =
this.context.outputTextureLayout;\r\n    this.context.programInfo.inputNames.forEach((samplerName, i) => {\r\n
const inputLayout = this.context.inputTextureLayouts[i];\r\n      const funcName =
generateShaderFuncNameFromInputSamplerName(samplerName);\r\n      if (inputLayout.isPacked) {\r\n
result[funcName] = this.getPackedSamplerFromInput(funcName, samplerName, inputLayout);\r\n      } else {\r\n
 result[funcName] = this.getUnpackedSamplerFromInput(funcName, samplerName, inputLayout);\r\n      }\r\n\r\n
const outCoordFuncName = generateShaderFuncNameFromInputSamplerNameAtOutCoords(samplerName);\r\n
if (inputLayout.unpackedShape.length <= outputLayout.unpackedShape.length) {\r\n        if (inputLayout.isPacked)
{\r\n          result[outCoordFuncName] =\r\n              this.getPackedSamplerAtOutputCoords(outCoordFuncName,
inputLayout, outputLayout, samplerName);\r\n        } else {\r\n          result[outCoordFuncName] =\r\n
this.getUnpackedSamplerAtOutputCoords(outCoordFuncName, inputLayout, outputLayout, samplerName);\r\n
}\r\n      }\r\n    });\r\n\r\n    return result;\r\n  }\r\n\r\n  /**\r\n   * Constructing snippets for output coordinates of
samplers\r\n   */\r\n  protected getPackedSamplerAtOutputCoords(\r\n      funcName: string, inputLayout:
TextureLayout, outputLayout: TextureLayout, name: string): GlslLibRoutine {\r\n    const inShape =
inputLayout.unpackedShape;\r\n    const outShape = outputLayout.unpackedShape;\r\n    const texName = name;\r\n
  const texFuncSnippet = generateShaderFuncNameFromInputSamplerName(texName);\r\n\r\n    const inRank =
inShape.length;\r\n    const outRank = outShape.length;\r\n\r\n    const broadcastDims =
BroadcastUtil.getBroadcastDims(inShape, outShape);\r\n\r\n    const type = getCoordsDataType(outRank);\r\n
const rankDiff = outRank - inRank;\r\n    let coordsSnippet: string;\r\n    const fields = getGlChannels();\r\n\r\n    if
(inRank === 0) {\r\n      coordsSnippet = '';\r\n    } else if (outRank < 2 && broadcastDims.length >= 1) {\r\n
coordsSnippet = 'coords = 0;';\r\n    } else {\r\n      coordsSnippet = broadcastDims.map(d => `coords.${fields[d +
rankDiff]} = 0;`).join('\\n');\r\n    }\r\n    let unpackedCoordsSnippet = '';\r\n    if (outRank < 2 && inRank > 0) {\r\n
   unpackedCoordsSnippet = 'coords';\r\n    } else {\r\n      unpackedCoordsSnippet = inShape.map((s, i) =>
`coords.${fields[i + rankDiff]}`).join(', ');\r\n    }\r\n\r\n    let output = 'return outputValue;';\r\n    const inSize =
ShapeUtil.size(inShape);\r\n    const isInputScalar = inSize === 1;\r\n    const outSize =
ShapeUtil.size(outShape);\r\n    const isOutputScalar = outSize === 1;\r\n\r\n    if (inRank === 1 && !isInputScalar
&& !isOutputScalar) {\r\n      output = `\r\n        return vec4(outputValue.xy, outputValue.xy);\r\n      `;\r\n    } else if
(isInputScalar && !isOutputScalar) {\r\n      if (outRank === 1) {\r\n        output = `\r\n          return
vec4(outputValue.x, outputValue.x, 0., 0.);\r\n        `;\r\n      } else {\r\n        output = `\r\n          return
vec4(outputValue.x);\r\n        `;\r\n      }\r\n    } else if (broadcastDims.length) {\r\n      const rows = inRank - 2;\r\n
 const cols = inRank - 1;\r\n\r\n      if (broadcastDims.indexOf(rows) > -1 && broadcastDims.indexOf(cols) > -1)
{\r\n        output = 'return vec4(outputValue.x);';\r\n      } else if (broadcastDims.indexOf(rows) > -1) {\r\n
output = 'return vec4(outputValue.x, outputValue.y, ' +\r\n            'outputValue.x, outputValue.y);';\r\n      } else if
(broadcastDims.indexOf(cols) > -1) {\r\n        output = 'return vec4(outputValue.xx, outputValue.zz);';\r\n      }\r\n
}\r\n\r\n    const swapLastDimsSnippet = `\r\n        int lastDim = coords.${fields[outRank - 1]};\r\n
coords.${fields[outRank - 1]} = coords.${fields[outRank - 2]};\r\n        coords.${fields[outRank - 2]} = lastDim;\r\n
    `;\r\n    const source = `\r\n      vec4 ${funcName}() {\r\n        ${type} coords = getOutputCoords();\r\n
${swapLastDimsSnippet}\r\n        ${coordsSnippet}\r\n        vec4 outputValue =
${texFuncSnippet}(${unpackedCoordsSnippet});\r\n        ${output}\r\n      }\r\n    `;\r\n    return new
GlslLibRoutine(source, ['coordinates.getOutputCoords']);\r\n  }\r\n\r\n  /**\r\n   * Constructing snippets for
unpacked output coordinates of samplers\r\n   */\r\n  protected getUnpackedSamplerAtOutputCoords(\r\n
funcName: string, inputLayout: TextureLayout, outputLayout: TextureLayout, name: string): GlslLibRoutine {\r\n
const outTexShape = [outputLayout.width, outputLayout.height];\r\n    const inTexShape = [inputLayout.width,
inputLayout.height];\r\n    const inRank = inputLayout.unpackedShape.length;\r\n    const outRank =
outputLayout.unpackedShape.length;\r\n    const inShape = inputLayout.unpackedShape;\r\n    const outShape =
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outputLayout.unpackedShape;\r\n    const texFuncSnippet =
generateShaderFuncNameFromInputSamplerName(name);\r\n\r\n    if (inRank === outRank &&
ArrayUtil.arraysEqual(inTexShape, outTexShape)) {\r\n      const source = `\r\n          float ${funcName}() {\r\n
   return sampleTexture(${name}, TexCoords);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source,
['coordinates.sampleTexture']);\r\n    }\r\n\r\n    const type = getCoordsDataType(outRank);\r\n    const
broadcastDims = BroadcastUtil.getBroadcastDims(inShape, outShape);\r\n    const rankDiff = outRank - inRank;\r\n
  let coordsSnippet: string;\r\n    const fields = getGlChannels();\r\n\r\n    if (inRank === 0) {\r\n      coordsSnippet =
'';\r\n    } else if (outRank < 2 && broadcastDims.length >= 1) {\r\n      coordsSnippet = 'coords = 0;';\r\n    } else
{\r\n      coordsSnippet = broadcastDims.map(d => `coords.${fields[d + rankDiff]} = 0;`).join('\\n');\r\n    }\r\n    let
unpackedCoordsSnippet = '';\r\n    if (outRank < 2 && inRank > 0) {\r\n      unpackedCoordsSnippet = 'coords';\r\n
} else {\r\n      unpackedCoordsSnippet = inputLayout.unpackedShape.map((s, i) => `coords.${fields[i +
rankDiff]}`).join(', ');\r\n    }\r\n    const source = `\r\n        float ${funcName}() {\r\n          ${type} coords =
getOutputCoords();\r\n          ${coordsSnippet}\r\n          return ${texFuncSnippet}(${unpackedCoordsSnippet});\r\n
      }\r\n      `;\r\n    return new GlslLibRoutine(source, ['coordinates.getOutputCoords']);\r\n  }\r\n\r\n  /**\r\n   *
Constructing snippets for packed operations.\r\n   */\r\n  protected getPackedSamplerFromInput(funcName: string,
name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    switch (inputLayout.unpackedShape.length)
{\r\n      case 0:\r\n        return this.getPackedSamplerScalar(funcName, name);\r\n      case 1:\r\n        return
this.getPackedSampler1D(funcName, name, inputLayout);\r\n      case 2:\r\n        return
this.getPackedSampler2D(funcName, name, inputLayout);\r\n      case 3:\r\n        return
this.getPackedSampler3D(funcName, name, inputLayout);\r\n      default:\r\n        return
this.getPackedSamplerND(funcName, name, inputLayout);\r\n    }\r\n  }\r\n\r\n  /**\r\n   * Constructing snippets for
unpacked operations.\r\n   */\r\n  protected getUnpackedSamplerFromInput(funcName: string, name: string,
inputLayout: TextureLayout): GlslLibRoutine {\r\n    const shape = inputLayout.unpackedShape;\r\n    switch
(shape.length) {\r\n      case 0:\r\n        return this.getUnpackedSamplerScalar(funcName, name, inputLayout);\r\n
case 1:\r\n        return this.getUnpackedSampler1D(funcName, name, inputLayout);\r\n      case 2:\r\n        return
this.getUnpackedSampler2D(funcName, name, inputLayout);\r\n      case 3:\r\n        return
this.getUnpackedSampler3D(funcName, name, inputLayout);\r\n      case 4:\r\n        return
this.getUnpackedSampler4D(funcName, name, inputLayout);\r\n      case 5:\r\n        return
this.getUnpackedSampler5D(funcName, name, inputLayout);\r\n      case 6:\r\n        return
this.getUnpackedSampler6D(funcName, name, inputLayout);\r\n      default:\r\n        // TODO support more
dimensionalities\r\n        throw new Error(`Unsupported dimension ${shape.length}-D`);\r\n    }\r\n  }\r\n\r\n  /**\r\n
 * Packed scalar snippet.\r\n   */\r\n  protected getPackedSamplerScalar(funcName: string, name: string):
GlslLibRoutine {\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n    const source = `\r\n          vec4
${funcName}() {\r\n            return ${glsl.texture2D}(${name}, halfCR);\r\n          }\r\n        `;\r\n    return new
GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Packed 1D snippet.\r\n   */\r\n  protected
getPackedSampler1D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    const
texShape = [inputLayout.width, inputLayout.height];\r\n    const packedTexShape = [texShape[1], texShape[0]];\r\n
 const glsl = getGlsl(this.context.glContext.version);\r\n\r\n    const packedSampler = `vec4 ${funcName}(int index)
{\r\n      vec2 uv = packedUVfrom1D(\r\n      ${packedTexShape[0]}, ${packedTexShape[1]}, index);\r\n      return
${glsl.texture2D}(${name}, uv);\r\n    }`;\r\n    const source = packedSampler;\r\n    return new
GlslLibRoutine(source, ['coordinates.packedUVfrom1D']);\r\n  }\r\n\r\n  /**\r\n   * Packed 2D snippet.\r\n   */\r\n
protected getPackedSampler2D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n
 const shape = inputLayout.unpackedShape;\r\n    const texShape = [inputLayout.width, inputLayout.height];\r\n
const glsl = getGlsl(this.context.glContext.version);\r\n    const texNumR = texShape[0];\r\n    const texNumC =
texShape[1];\r\n\r\n    if (texShape != null && ArrayUtil.arraysEqual(shape, texShape)) {\r\n      const
packedSampler = `vec4 ${funcName}(int row, int col) {\r\n        vec2 uv = (vec2(col, row) + halfCR) /
vec2(${texNumC}.0, ${texNumR}.0);\r\n        return ${glsl.texture2D}(${name}, uv);\r\n      }`;\r\n\r\n      return
new GlslLibRoutine(packedSampler);\r\n    }\r\n    const packedTexShape = texShape;\r\n    const valuesPerRow =
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Math.ceil(shape[1] / 2);\r\n    const packedSampler = `vec4 ${funcName}(int row, int col) {\r\n      vec2 uv =
packedUVfrom2D(${packedTexShape[1]}, ${packedTexShape[0]}, ${valuesPerRow}, row, col);\r\n      return
${glsl.texture2D}(${name}, uv);\r\n    }`;\r\n    const source = packedSampler;\r\n    return new
GlslLibRoutine(source, ['coordinates.packedUVfrom2D']);\r\n  }\r\n\r\n  /**\r\n   * Packed 3D snippet.\r\n   */\r\n
protected getPackedSampler3D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n
 const shape = inputLayout.unpackedShape;\r\n    const texShape = [inputLayout.width, inputLayout.height];\r\n
const packedTexShape = [texShape[0], texShape[1]];\r\n    const glsl =
getGlsl(this.context.glContext.version);\r\n\r\n    if (shape[0] === 1) {\r\n      const squeezedShape =
shape.slice(1);\r\n      const keptDims = [1, 2];\r\n      const newInputShape = squeezeInputShape(shape,
squeezedShape);\r\n      const params = ['b', 'row', 'col'];\r\n      // Deep copy of input texture layout.\r\n      const
newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
newInputLayout.unpackedShape = newInputShape;\r\n      const samplerRoutine =
this.getPackedSamplerFromInput(funcName, name, newInputLayout);\r\n      const packedSampler =
`${samplerRoutine.routineBody}\r\n      vec4 ${funcName}(int b, int row, int col) {\r\n        return
${funcName}(${getSqueezedParams(params, keptDims)});\r\n      } `;\r\n      const source = packedSampler;\r\n
return new GlslLibRoutine(source, samplerRoutine.dependencies);\r\n    }\r\n    const texNumR =
packedTexShape[0];\r\n    const texNumC = packedTexShape[1];\r\n\r\n    const valuesPerRow =
Math.ceil(shape[2] / 2);\r\n    const texelsInBatch = valuesPerRow * Math.ceil(shape[1] / 2);\r\n\r\n    const
packedSampler = `vec4 ${funcName}(int b, int row, int col) {\r\n      vec2 uv = packedUVfrom3D(\r\n
${texNumC}, ${texNumR}, ${texelsInBatch}, ${valuesPerRow}, b, row, col);\r\n      return
${glsl.texture2D}(${name}, uv);}`;\r\n    const source = packedSampler;\r\n    return new GlslLibRoutine(source,
['coordinates.packedUVfrom3D']);\r\n  }\r\n  /*\r\n   * Packed ND snippet.\r\n   */\r\n  protected
getPackedSamplerND(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    const
shape = inputLayout.unpackedShape;\r\n    const rank = shape.length;\r\n    const texShape = [inputLayout.width,
inputLayout.height];\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n\r\n    const packedTexShape =
[texShape[0], texShape[1]];\r\n    const texNumR = packedTexShape[1];\r\n    const texNumC =
packedTexShape[0];\r\n    const valuesPerRow = Math.ceil(shape[rank - 1] / 2);\r\n    let texelsInBatch =
valuesPerRow * Math.ceil(shape[rank - 2] / 2);\r\n    let params = 'int b, int row, int col';\r\n    let index = `b *
${texelsInBatch} + (row / 2) * ${valuesPerRow} + (col / 2)`;\r\n    for (let b = 2; b < rank - 1; b++) {\r\n      params
= `int b${b}, ` + params;\r\n      texelsInBatch *= shape[rank - b - 1];\r\n      index = `b${b} * ${texelsInBatch} + ` +
index;\r\n    }\r\n    const packedSampler = `vec4 ${funcName}(${params}) {\r\n      int index = ${index};\r\n      int
texR = index / ${texNumC};\r\n      int texC = index - texR * ${texNumC};\r\n      vec2 uv = (vec2(texC, texR) +
halfCR) / vec2(${texNumC}, ${texNumR});\r\n      return ${glsl.texture2D}(${name}, uv);\r\n    }`;\r\n    const
source = packedSampler;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked scalar
snippet.\r\n   */\r\n  protected getUnpackedSamplerScalar(funcName: string, name: string, inputLayout:
TextureLayout): GlslLibRoutine {\r\n    const [texNumR, texNumC] = [inputLayout.width, inputLayout.height];\r\n
 if (texNumR === 1 && texNumC === 1) {\r\n      const source = `\r\n          float ${funcName}() {\r\n            return
sampleTexture(${name}, halfCR);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source,
['coordinates.sampleTexture']);\r\n    }\r\n\r\n    const source = `\r\n        float ${funcName}() {\r\n          int
offset_${name} = coordsToOffset(TexCoords, ${texNumR}, ${texNumC});\r\n          vec2 uv =
uvFromFlat(${texNumR}, ${texNumC}, offset_${name});\r\n          return sampleTexture(${name}, uv);\r\n
}\r\n      `;\r\n    return new GlslLibRoutine(\r\n        source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture',
'coordinates.coordsToOffset']);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 1D snippet.\r\n   */\r\n  protected
getUnpackedSampler1D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    const
tNumR = inputLayout.width;\r\n    const tNumC = inputLayout.height;\r\n\r\n    if (tNumC === 1 && tNumR ===
1) {\r\n      const source = `\r\n        float ${funcName}(int index) {\r\n          return sampleTexture(${name},
halfCR);\r\n        }\r\n      `;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n\r\n
if (tNumC === 1) {\r\n      const source = `\r\n          float ${funcName}(int index) {\r\n            vec2 uv =
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vec2((float(index) + 0.5) / ${tNumR}.0, 0.5);\r\n          return sampleTexture(${name}, uv);\r\n        }\r\n
`;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n    if (tNumR === 1) {\r\n
const source = `\r\n        float ${funcName}(int index) {\r\n          vec2 uv = vec2(0.5, (float(index) + 0.5) /
${tNumC}.0);\r\n          return sampleTexture(${name}, uv);\r\n        }\r\n        `;\r\n      return new
GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n    const source = `\r\n        float ${funcName}(int
index) {\r\n          vec2 uv = uvFromFlat(${tNumR}, ${tNumC}, index);\r\n          return sampleTexture(${name},
uv);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source, ['coordinates.uvFromFlat',
'coordinates.sampleTexture']);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 2D snippet.\r\n   */\r\n\r\n  protected
getUnpackedSampler2D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    const
shape = inputLayout.unpackedShape;\r\n\r\n    // TODO: modify row/col order for other dimensions.\r\n    const
texShape = [inputLayout.height, inputLayout.width];\r\n\r\n    if (texShape != null && ArrayUtil.arraysEqual(shape,
texShape)) {\r\n      const texNumR = texShape[1];\r\n      const texNumC = texShape[0];\r\n      const source = `\r\n
      float ${funcName}(int row, int col) {\r\n          vec2 uv = (vec2(row, col) + halfCR) / vec2(${texNumR}.0,
${texNumC}.0);\r\n          return sampleTexture(${name}, uv);\r\n        }\r\n        `;\r\n      return new
GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n\r\n    const {newShape, keptDims} =
squeezeShape(shape as number[]);\r\n    const squeezedShape = newShape;\r\n    if (squeezedShape.length <
shape.length) {\r\n      const newInputShape = squeezeInputShape(shape, squeezedShape);\r\n      // Deep copy of
input texture layout.\r\n      const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
  newInputLayout.unpackedShape = newInputShape;\r\n\r\n      const params = ['col', 'row'];\r\n      const source =
`\r\n          ${this.getUnpackedSamplerFromInput(funcName, name, newInputLayout).routineBody}\r\n          float
${funcName}(int row, int col) {\r\n            return ${funcName}(${getSqueezedParams(params, keptDims)});\r\n
  }\r\n        `;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n\r\n    const
texNumR = texShape[1];\r\n    const texNumC = texShape[0];\r\n    if (texNumC === 1) {\r\n      const source = `\r\n
       float ${funcName}(int row, int col) {\r\n          int offset_${name} = coordsToOffset(TexCoords,
${texNumR}, ${texNumC});\r\n          float index = dot(vec3(row, col, offset_${name}), vec3(${shape[1]}, 1,
1));\r\n          vec2 uv = vec2(0.5, (index + 0.5) / ${texNumR}.0);\r\n          return sampleTexture(${name},
uv);\r\n        }\r\n      `;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture',
'coordinates.coordsToOffset']);\r\n    }\r\n\r\n    if (texNumR === 1) {\r\n      const source = `\r\n        float
${funcName}(int row, int col) {\r\n          int offset_${name} = coordsToOffset(TexCoords, ${texNumR},
${texNumC});\r\n          float index = dot(vec3(row, col, offset_${name}), vec3(${shape[1]}, 1, 1));\r\n
vec2 uv = vec2((index + 0.5) / ${texNumC}.0, 0.5);\r\n          return sampleTexture(${name}, uv);\r\n        }\r\n
  `;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n
}\r\n\r\n    const source = `\r\n        float ${funcName}(int row, int col) {\r\n          int index = col * ${shape[1]} +
row;\r\n          vec2 uv = uvFromFlat(${texNumR}, ${texNumC}, index);\r\n          return sampleTexture(${name},
uv);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(\r\n        source, ['coordinates.uvFromFlat',
'coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 3D snippet.\r\n
*/\r\n\r\n  protected getUnpackedSampler3D(funcName: string, name: string, inputLayout: TextureLayout):
GlslLibRoutine {\r\n    const shape = inputLayout.unpackedShape;\r\n    const stride0 = shape[1] * shape[2];\r\n
const stride1 = shape[2];\r\n\r\n    const {newShape, keptDims} = squeezeShape(shape as number[]);\r\n    const
squeezedShape = newShape;\r\n    if (squeezedShape.length < shape.length) {\r\n      const newInputShape =
squeezeInputShape(shape, squeezedShape);\r\n      const params = ['batch', 'col', 'row'];\r\n      // Deep copy of input
texture layout.\r\n      const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
newInputLayout.unpackedShape = newInputShape;\r\n      const routine =
this.getUnpackedSamplerFromInput(funcName, name, newInputLayout);\r\n      // TODO: revisit the logic here to
make it simpler\r\n      const revDims = keptDims.reverse();\r\n      const source = `\r\n
${routine.routineBody}\r\n          float ${funcName}(int batch, int row, int col) {\r\n            return
${funcName}(${getSqueezedParams(params, revDims)});\r\n          }\r\n        `;\r\n      return new
GlslLibRoutine(source, routine.dependencies);\r\n    }\r\n\r\n    const texNumR = inputLayout.width;\r\n    const
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texNumC = inputLayout.height;\r\n    const source = `\r\n          float ${funcName}(int depth, int row, int col) {\r\n
      // Explicitly use integer operations as dot() only works on floats.\r\n           int index = depth * ${stride0} + col
* ${stride1} + row;\r\n           vec2 uv = uvFromFlat(${texNumR}, ${texNumC}, index);\r\n           return
sampleTexture(${name}, uv);\r\n         }\r\n      `;\r\n    return new GlslLibRoutine(\r\n        source,
['coordinates.uvFromFlat', 'coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n  }\r\n\r\n  /**\r\n   *
Unpacked 4D snippet.\r\n   */\r\n\r\n  protected getUnpackedSampler4D(funcName: string, name: string,
inputLayout: TextureLayout): GlslLibRoutine {\r\n    const shape = inputLayout.unpackedShape;\r\n    const stride2
= shape[3];\r\n    const stride1 = shape[2] * stride2;\r\n    const stride0 = shape[1] * stride1;\r\n\r\n    //\r\n    //
TODO: re-enable this shortcut once the index calculation bug is fixed.\r\n    //\r\n    // const {newShape, keptDims}
= squeezeShape(shape as number[]);\r\n    // if (newShape.length < shape.length) {\r\n    //   const newInputShape =
squeezeInputShape(shape, newShape);\r\n    //   const params = ['row', 'col', 'depth', 'depth2'];\r\n    //   // Deep copy
of input texture layout.\r\n    //   const newInputLayout: TextureLayout =
JSON.parse(JSON.stringify(inputLayout));\r\n    //   newInputLayout.unpackedShape = newInputShape;\r\n    //
const source = `\r\n    //       ${this.getUnpackedSamplerFromInput(funcName, name,
newInputLayout).routineBody}\r\n    //       float ${funcName}(int row, int col, int depth, int depth2) {\r\n    //
return ${funcName}(${getSqueezedParams(params, keptDims)});\r\n    //       }\r\n    //     `;\r\n    //   return new
GlslLibRoutine(\r\n    //       source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture',
'coordinates.coordsToOffset']);\r\n    // }\r\n\r\n    const texNumR = inputLayout.width;\r\n    const texNumC =
inputLayout.height;\r\n    const source = `\r\n        float ${funcName}(int row, int col, int depth, int depth2) {\r\n
 int index = row * ${stride0} + col * ${stride1} +\r\n              depth2 * ${stride2} + depth;\r\n          vec2 uv =
uvFromFlat(${texNumR}, ${texNumC}, index);\r\n          return sampleTexture(${name}, uv);\r\n        }\r\n
`;\r\n    return new GlslLibRoutine(source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture']);\r\n  }\r\n\r\n
/**\r\n   * Unpacked 5D snippet.\r\n   */\r\n  protected getUnpackedSampler5D(funcName: string, name: string,
inputLayout: TextureLayout): GlslLibRoutine {\r\n    const shape = inputLayout.unpackedShape;\r\n    const stride3
= shape[4];\r\n    const stride2 = shape[3] * stride3;\r\n    const stride1 = shape[2] * stride2;\r\n    const stride0 =
shape[1] * stride1;\r\n\r\n    const {newShape, keptDims} = squeezeShape(shape as number[]);\r\n    if
(newShape.length < shape.length) {\r\n      const newInputShape = squeezeInputShape(shape, newShape);\r\n
const params = ['row', 'col', 'depth', 'depth2', 'depth3'];\r\n      // Deep copy of input texture layout.\r\n      const
newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
newInputLayout.unpackedShape = newInputShape;\r\n\r\n      const source = `\r\n
${this.getUnpackedSamplerFromInput(funcName, name, newInputLayout).routineBody}\r\n          float
${funcName}(int row, int col, int depth, int depth2, int depth3) {\r\n            return
${funcName}(${getSqueezedParams(params, keptDims)});\r\n          }\r\n        `;\r\n      return new
GlslLibRoutine(source, ['coordinates.sampleTexture', 'coordinates.uvFromFlat']);\r\n    }\r\n\r\n    const texNumR =
inputLayout.width;\r\n    const texNumC = inputLayout.height;\r\n    const source = `\r\n        float ${funcName}(int
row, int col, int depth, int depth2, int depth3) {\r\n          int index = row * ${stride0} + col * ${stride1} + depth *
${stride2} +\r\n          depth3 * ${stride3} + depth2;\r\n          vec2 uv = uvFromFlat(${texNumR}, ${texNumC},
index);\r\n          return sampleTexture(${name}, uv);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source,
['coordinates.sampleTexture', 'coordinates.uvFromFlat']);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 6D snippet.\r\n   */\r\n
protected getUnpackedSampler6D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine
{\r\n    const shape = inputLayout.unpackedShape;\r\n    const stride4 = shape[5];\r\n    const stride3 = shape[4] *
stride4;\r\n    const stride2 = shape[3] * stride3;\r\n    const stride1 = shape[2] * stride2;\r\n    const stride0 =
shape[1] * stride1;\r\n\r\n    const {newShape, keptDims} = squeezeShape(shape as number[]);\r\n    if
(newShape.length < shape.length) {\r\n      const newInputShape = squeezeInputShape(shape, newShape);\r\n
const params = ['row', 'col', 'depth', 'depth2', 'depth3', 'depth4'];\r\n      // Deep copy of input texture layout.\r\n
const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
newInputLayout.unpackedShape = newInputShape;\r\n\r\n      const source = `\r\n
${this.getUnpackedSamplerFromInput(funcName, name, newInputLayout).routineBody}\r\n          float
```

${funcName}(int row, int col, int depth,\r\n int depth2, int depth3, int depth4) {\r\n return ${funcName}(${getSqueezedParams(params, keptDims)});\r\n }\r\n `;\r\n return new GlslLibRoutine(source, ['coordinates.sampleTexture', 'coordinates.uvFromFlat']);\r\n }\r\n\r\n const texNumR = inputLayout.width;\r\n const texNumC = inputLayout.height;\r\n const source = `\r\n float ${funcName}(int row, int col, int depth,\r\n int depth2, int depth3, int depth4) {\r\n int index = row * ${stride0} + col * ${stride1} + depth * ${stride2} +\r\n depth2 * ${stride3} + depth3 * ${stride4} + depth4;\r\n vec2 uv = uvFromFlat(${texNumR}, ${texNumC}, index);\r\n return sampleTexture(${name}, uv);\r\n }\r\n `;\r\n return new GlslLibRoutine(\r\n source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n }\r\n\r\n /**\r\n * This is the main function to map from the given texture coordiantes (s,t)\r\n * to logical indices for the output\r\n * There will only be one single variation of this\r\n * Also see coordsToOffset and offsetToIndices for input-specific versions\r\n */\r\n protected toVec(): {[name: string]: GlslLibRoutine} {\r\n const output = this.context.outputTextureLayout;\r\n const rank = output.shape.length;\r\n const strides = output.strides;\r\n const xScale = output.width;\r\n const yScale = output.height;\r\n\r\n const stridesBlock = [];\r\n for (let i = 0; i < rank - 1; ++i) {\r\n stridesBlock.push(`\r\n c[${i}] = offset / ${strides[i]};`);\r\n stridesBlock.push(`\r\n offset -= c[${i}] * ${strides[i]};`);\r\n }\r\n stridesBlock.push(`\r\n c[${rank - 1}] = offset;`);\r\n const body = `\r\n void toVec(vec2 texCoords, out int c[${rank}]) {\r\n int offset = coordsToOffset(texCoords, ${xScale}, ${yScale});\r\n ${stridesBlock.join('')}\r\n }\r\n void toVec(int offset, out int c[${rank}]) {\r\n ${stridesBlock.join('')}\r\n }\r\n `;\r\n return {toVec: new GlslLibRoutine(body, ['coordinates.coordsToOffset'])};\r\n }\r\n /**\r\n * These are value getter functions generated for each input\r\n * Each function is hardwired to the name and dimensions of the input\r\n * An '_T' variation is also produced which accesses values as if the\r\n * input was transposed\r\n */\r\n protected valueFrom(): {[name: string]: GlslLibRoutine} {\r\n const result: {[name: string]: GlslLibRoutine} = {};\r\n this.context.programInfo.inputNames.forEach((name, i) => {\r\n const layout = this.context.inputTextureLayouts[i];\r\n const shape = layout.unpackedShape.length > 0 ? layout.unpackedShape : layout.shape;\r\n const rank = shape.length;\r\n let funcName = `_${name}`;\r\n result[funcName] = new GlslLibRoutine(\r\n this.getValueFromSingle(name, rank, layout.width, layout.height, false),\r\n [`shapeUtils.indicesToOffset${funcName}`, 'coordinates.offsetToCoords', 'fragcolor.getColorAsFloat']);\r\n funcName = funcName + '_T';\r\n result[funcName] = new GlslLibRoutine(\r\n this.getValueFromSingle(name, rank, layout.width, layout.height, true),\r\n [`shapeUtils.indicesToOffset${funcName}`, 'coordinates.offsetToCoords', 'fragcolor.getColorAsFloat']);\r\n });\r\n return result;\r\n }\r\n /**\r\n * Produces one value getter function for the name and rank given\r\n * If a transpose is set proper offsetToCoords mapping will be used\r\n * @param name name of the function\r\n * @param rank rank of the input\r\n * @param transpose whether or not should generate a transpose variation\r\n */\r\n protected getValueFromSingle(varName: string, rank: number, width: number, height: number, transpose: boolean):\r\n string {\r\n let name = `_${varName}`;\r\n if (transpose) {\r\n name = name + '_T';\r\n }\r\n const glsl = getGlsl(this.context.glContext.version);\r\n return `\r\n float ${name}(int m[${rank}]) {\r\n int offset = indicesToOffset${name}(m);\r\n vec2 coords = offsetToCoords(offset, ${width}, ${height});\r\n float value = getColorAsFloat(${glsl.texture2D}(${varName}, coords));\r\n return value;\r\n }\r\n `;\r\n }\r\n\r\n /**\r\n * Produces a packed value getter function for the name and rank given\r\n * If a transpose is set proper offsetToCoords mapping will be used\r\n * @param name name of the function\r\n * @param rank rank of the input\r\n * @param transpose whether or not should generate a transpose variation\r\n */\r\n protected getPackedValueFrom(varName: string, rank: number, width: number, height: number, transpose: boolean):\r\n string {\r\n let name = `_${varName}_Pack`;\r\n if (transpose) {\r\n name = name + '_T';\r\n }\r\n const glsl = getGlsl(this.context.glContext.version);\r\n return `\r\n vec4 ${name}(int m[${rank}]) {\r\n int offset = indicesToOffset_${varName}(m);\r\n vec2 coords = offsetToCoords(offset, ${width}, ${height});\r\n return ${glsl.texture2D}(${varName}, coords);\r\n }\r\n `;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT

License.\r\n\r\nimport {ProgramInfo, TextureLayout} from './types';\r\nimport {WebGLContext} from './webgl-context';\r\n\r\n/* eslint-disable @typescript-eslint/naming-convention */\r\nexport enum FunctionType {\r\n ValueBased,\r\n Positional\r\n}\r\nexport interface GlslFunction<T extends FunctionType> {\r\n body: string;\r\n name: string;\r\n type: T;\r\n}\r\nexport type GlslValueFunction = GlslFunction<FunctionType.ValueBased>;\r\nexport interface GlslPositionalFunction extends GlslFunction<FunctionType.Positional> {\r\n inputShape: readonly number[];\r\n outputShape: readonly number[];\r\n}\r\n\r\nexport class GlslContext {\r\n constructor(\r\n public glContext: WebGLContext, public programInfo: ProgramInfo, public inputTextureLayouts: TextureLayout[],\r\n public outputTextureLayout: TextureLayout) {}\r\n}\r\nexport abstract class GlslLib {\r\n constructor(public context: GlslContext) {}\r\n abstract getFunctions(): {[name: string]: GlslLibRoutine};\r\n abstract getCustomTypes(): {[name: string]: string};\r\n}\r\n\r\n// abstraction to represent a GLSL library routine and it's dependencies\r\nexport class GlslLibRoutine {\r\n constructor(public routineBody: string, public dependencies?: string[]) {}\r\n}\r\n\r\n// abstraction to represent a GLSL library routine and it's dependencies AS GRAPH Nodes\r\n// this level of abstraction is used to topologically sort routines before fragment shade inclusion\r\nexport class GlslLibRoutineNode {\r\n dependencies: GlslLibRoutineNode[];\r\n routineBody: string;\r\n constructor(public name: string, routineBody?: string, dependencies?: GlslLibRoutineNode[]) {\r\n if (dependencies) {\r\n this.dependencies = dependencies;\r\n } else {\r\n this.dependencies = [];\r\n }\r\n\r\n if (routineBody) {\r\n this.routineBody = routineBody;\r\n }\r\n }\r\n addDependency(node: GlslLibRoutineNode) {\r\n if (node) {\r\n this.dependencies.push(node);\r\n }\r\n }\r\n}\r\n\r\n// topologically sort GLSL library routines (graph nodes abstraction) before shader script inclusion\r\nexport class TopologicalSortGlslRoutines {\r\n static returnOrderedNodes(nodes: GlslLibRoutineNode[]): GlslLibRoutineNode[] {\r\n if (!nodes || nodes.length === 0) {\r\n return [];\r\n }\r\n\r\n if (nodes.length === 1) {\r\n return nodes;\r\n }\r\n\r\n const cycleCheck = new Set<string>();\r\n const alreadyTraversed = new Set<string>();\r\n const result = new Array<GlslLibRoutineNode>();\r\n\r\n this.createOrderedNodes(nodes, cycleCheck, alreadyTraversed, result);\r\n return result;\r\n }\r\n\r\n private static createOrderedNodes(\r\n graphNodes: GlslLibRoutineNode[], cycleCheck: Set<string>, alreadyTraversed: Set<string>,\r\n result: GlslLibRoutineNode[]) {\r\n for (let i = 0; i < graphNodes.length; ++i) {\r\n this.dfsTraverse(graphNodes[i], cycleCheck, alreadyTraversed, result);\r\n }\r\n }\r\n\r\n private static dfsTraverse(\r\n root: GlslLibRoutineNode, cycleCheck: Set<string>, alreadyTraversed: Set<string>, result: GlslLibRoutineNode[]) {\r\n // if this root has already been traversed return\r\n if (!root || alreadyTraversed.has(root.name)) {\r\n return;\r\n }\r\n\r\n // cyclic dependency has been detected\r\n if (cycleCheck.has(root.name)) {\r\n throw new Error('Cyclic dependency detected. Can\\'t topologically sort routines needed for shader.');\r\n }\r\n\r\n // hold this node to detect cycles if any\r\n cycleCheck.add(root.name);\r\n\r\n // traverse children in a dfs fashion\r\n const dependencies = root.dependencies;\r\n if (dependencies && dependencies.length > 0) {\r\n for (let i = 0; i < dependencies.length; ++i) {\r\n this.dfsTraverse(dependencies[i], cycleCheck, alreadyTraversed, result);\r\n }\r\n }\r\n\r\n // add to result holder\r\n result.push(root);\r\n\r\n // mark this node as traversed so that we don't traverse from this again\r\n alreadyTraversed.add(root.name);\r\n\r\n // release the hold\r\n cycleCheck.delete(root.name);\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\n\r\n/**\r\n * This GLSL library handles routines converting\r\n * float32 to/from Unsigned byte or float 16\r\n */\r\nexport class EncodingGlslLib extends GlslLib {\r\n constructor(context: GlslContext) {\r\n super(context);\r\n }\r\n getFunctions(): {[name: string]: GlslLibRoutine} {\r\n return {...this.encodeFloat32(), ...this.decodeFloat32()};\r\n }\r\n getCustomTypes(): {[name: string]: string} {\r\n return {};\r\n }\r\n protected encodeFloat32(): {[name: string]: GlslLibRoutine} {\r\n return {\r\n encode: new GlslLibRoutine(`highp vec4 encode(highp float f) {\r\n return vec4(f, 0.0, 0.0, 0.0);\r\n }\r\n `)\r\n };\r\n }\r\n protected decodeFloat32(): {[name: string]: GlslLibRoutine} {\r\n return {\r\n decode: new GlslLibRoutine(`highp float decode(highp vec4 rgba) {\r\n return rgba.r;\r\n }\r\n `)\r\n };\r\n }\r\n /**\r\n * returns the routine to encode encode a 32bit float to a vec4 (of unsigned bytes)\r\n * @credit:

https://stackoverflow.com/questions/7059962/how-do-i-convert-a-vec4-rgba-value-to-a-float\r\n   */\r\n protected encodeUint8(): {[name: string]: GlslLibRoutine} {\r\n   const endianness = EncodingGlslLib.isLittleEndian() ? 'rgba.rgba=rgba.abgr;' : '';\r\n   return {\r\n   encode: new GlslLibRoutine(`\r\n   highp vec4 encode(highp float f) {\r\n   highp float F = abs(f);\r\n   highp float Sign = step(0.0,-f);\r\n   highp float Exponent = floor(log2(F));\r\n   highp float Mantissa = (exp2(- Exponent) * F);\r\n   Exponent = floor(log2(F) + 127.0) + floor(log2(Mantissa));\r\n   highp vec4 rgba;\r\n   rgba[0] = 128.0 * Sign + floor(Exponent*exp2(-1.0));\r\n   rgba[1] = 128.0 * mod(Exponent,2.0) + mod(floor(Mantissa*128.0),128.0);\r\n   rgba[2] = floor(mod(floor(Mantissa*exp2(23.0 -8.0)),exp2(8.0)));\r\n   rgba[3] = floor(exp2(23.0)*mod(Mantissa,exp2(-15.0)));\r\n ${endianness}\r\n   rgba = rgba / 255.0; // values need to be normalized to [0,1]\r\n   return rgba;\r\n   }\r\n   `)\r\n   };\r\n }\r\n /**\r\n   * returns the routine to encode a vec4 of unsigned bytes to float32\r\n   * @credit: https://stackoverflow.com/questions/7059962/how-do-i-convert-a-vec4-rgba-value-to-a-float\r\n   */\r\n protected decodeUint8(): {[name: string]: GlslLibRoutine} {\r\n   const endianness = EncodingGlslLib.isLittleEndian() ? 'rgba.rgba=rgba.abgr;' : '';\r\n   return {\r\n   decode: new GlslLibRoutine(`\r\n   highp float decode(highp vec4 rgba) {\r\n   rgba = rgba * 255.0; // values need to be de-normalized from [0,1] to [0,255]\r\n ${endianness}\r\n   highp float Sign = 1.0 - step(128.0,rgba[0])*2.0;\r\n   highp float Exponent = 2.0 * mod(rgba[0],128.0) + step(128.0,rgba[1]) - 127.0;\r\n   highp float Mantissa = mod(rgba[1],128.0)*65536.0 + rgba[2]*256.0 +rgba[3] + float(0x800000);\r\n   highp float Result = Sign * exp2(Exponent) * (Mantissa * exp2(-23.0));\r\n   return Result;\r\n   }\r\n   `)\r\n   };\r\n }\r\n /**\r\n   * Determines if the machine is little endian or not\r\n   * @credit: https://gist.github.com/TooTallNate/4750953\r\n   */\r\n static isLittleEndian(): boolean {\r\n   const b = new ArrayBuffer(4);\r\n   const a = new Uint32Array(b);\r\n   const c = new Uint8Array(b);\r\n   a[0] = 0xdeadbeef;\r\n   if (c[0] === 0xef) {\r\n   return true;\r\n   }\r\n   if (c[0] === 0xde) {\r\n   return false;\r\n   }\r\n   throw new Error('unknown endianness');\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\nimport {getGlsl} from './glsl-source';\r\n\r\n/**\r\n * This GLSL library handles routines around reading a texlet and writing to it\r\n * Reading and writing could be more than just dealing with one channel\r\n * It may require encoding/decoding to/from 4 channels into one\r\n */\r\nexport class FragColorGlslLib extends GlslLib {\r\n constructor(context: GlslContext) {\r\n   super(context);\r\n }\r\n getFunctions(): {[name: string]: GlslLibRoutine} {\r\n   return {...this.setFragColor(), ...this.getColorAsFloat()};\r\n }\r\n getCustomTypes(): {[name: string]: string} {\r\n   return {};\r\n }\r\n protected setFragColor(): {[name: string]: GlslLibRoutine} {\r\n   const glsl = getGlsl(this.context.glContext.version);\r\n   return {\r\n   setFragColor: new GlslLibRoutine(\r\n   `\r\n        void setFragColor(float value) {\r\n            ${glsl.output} = encode(value);\r\n        }\r\n        `,\r\n   ['encoding.encode'])\r\n   };\r\n }\r\n protected getColorAsFloat(): {[name: string]: GlslLibRoutine} {\r\n   return {\r\n   getColorAsFloat: new GlslLibRoutine(\r\n   `\r\n        float getColorAsFloat(vec4 color) {\r\n            return decode(color);\r\n        }\r\n        `,\r\n   ['encoding.decode'])\r\n   };\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nconst INLINE_FUNC_DEF_REGEX = /@inline[\\s\\n\\r]+(\\w+)[\\s\\n\\r]+([0-9a-zA-Z_]+)\\s*\\(([^)]*)\\)\\s*{(([^}]|[\\n\\r])*)}/gm;\r\nconst FUNC_CALL_REGEX = '(\\\\w+)?\\\\s+([_0-9a-zA-Z]+)\\\\s+=\\\\s+__FUNC__\\\\((.*)\\\\)\\\\s*;';\r\n/**\r\n * GLSL preprocessor responsible for resolving @inline directives\r\n */\r\nexport function replaceInlines(script: string): string {\r\n const inlineDefs: {[name: string]: {params: Array<{type: string; name: string}|null>; body: string}} = {};\r\n let match;\r\n while ((match = INLINE_FUNC_DEF_REGEX.exec(script)) !== null) {\r\n   const params = match[3]\r\n   .split(',')\r\n   .map(s => {\r\n   const tokens = s.trim().split(' ');\r\n   if (tokens && tokens.length === 2) {\r\n   return {type: tokens[0], name: tokens[1]};\r\n   }\r\n   return null;\r\n   })\r\n   .filter(v => v !== null);\r\n   inlineDefs[match[2]] = {params, body: match[4]};\r\n }\r\n for (const name in inlineDefs) {\r\n   const regexString = FUNC_CALL_REGEX.replace('__FUNC__', name);\r\n   const regex = new RegExp(regexString, 'gm');\r\n   while ((match = regex.exec(script)) !== null) {\r\n   const type = match[1];\r\n   const variable = match[2];\r\n

const params = match[3].split(',');\r\n   const declLine = (type) ? `${type} ${variable};` : '';\r\n   let newBody: string = inlineDefs[name].body;\r\n   let paramRedecLine = '';\r\n   inlineDefs[name].params.forEach((v, i) => {\r\n   if (v) {\r\n   paramRedecLine += `${v.type} ${v.name} = ${params[i]};\\n`;\r\n   }\r\n   });\r\n   newBody = `${paramRedecLine}\\n ${newBody}`;\r\n   newBody = newBody.replace('return', `${variable} = `);\r\n   const replacement = `\r\n      ${declLine}\r\n      {\r\n        ${newBody}\r\n      }\r\n      `;\r\n   script = script.replace(match[0], replacement);\r\n   }\r\n }\r\n script = script.replace(INLINE_FUNC_DEF_REGEX, '');\r\n return script;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutineNode, TopologicalSortGlslRoutines} from './glsl-definitions';\r\nimport {replaceInlines} from './glsl-function-inliner';\r\nimport {glslRegistry} from './glsl-registered-libs';\r\nimport {getDefaultFragShaderMain, getFragShaderPreamble} from './glsl-source';\r\nimport {ProgramInfo, TextureLayout, VariableInfo} from './types';\r\nimport {WebGLContext} from './webgl-context';\r\n\r\n/**\r\n * Preprocessor for the additions to the GLSL language\r\n * It deals with:\r\n * @include directives\r\n * @inline\r\n * Loop unrolling (not implemented)\r\n * Macro resolution (not implemented)\r\n */\r\nexport class GlslPreprocessor {\r\n readonly context: GlslContext;\r\n readonly libs: {[name: string]: GlslLib} = {};\r\n readonly glslLibRoutineDependencyGraph: {[routineName: string]: GlslLibRoutineNode} = {};\r\n\r\n constructor(\r\n   glContext: WebGLContext, programInfo: ProgramInfo, inputTextureLayouts: TextureLayout[],\r\n   outputTextureLayout: TextureLayout) {\r\n   this.context = new GlslContext(glContext, programInfo, inputTextureLayouts, outputTextureLayout);\r\n\r\n   // construct GlslLibs\r\n   Object.keys(glslRegistry).forEach((name: string) => {\r\n   const lib = new glslRegistry[name](this.context);\r\n   this.libs[name] = lib;\r\n   });\r\n\r\n   // construct GlslRoutineDependencyGraph\r\n   const map = this.glslLibRoutineDependencyGraph;\r\n   for (const libName in this.libs) {\r\n   const lib = this.libs[libName];\r\n   const routinesInLib = lib.getFunctions();\r\n   for (const routine in routinesInLib) {\r\n   const key = libName + '.' + routine;\r\n   let currentNode: GlslLibRoutineNode;\r\n   if (map[key]) {\r\n   currentNode = map[key];\r\n   currentNode.routineBody = routinesInLib[routine].routineBody;\r\n   } else {\r\n   currentNode = new GlslLibRoutineNode(key, routinesInLib[routine].routineBody);\r\n   map[key] = currentNode;\r\n   }\r\n   const dependencies = routinesInLib[routine].dependencies;\r\n   if (dependencies) {\r\n   for (let i = 0; i < dependencies.length; ++i) {\r\n   if (!map[dependencies[i]]) {\r\n   const node = new GlslLibRoutineNode(dependencies[i]);\r\n   map[dependencies[i]] = node;\r\n   currentNode.addDependency(node);\r\n   } else {\r\n   currentNode.addDependency(map[dependencies[i]]);\r\n   }\r\n   }\r\n   }\r\n   }\r\n   }\r\n }\r\n\r\n preprocess(): string {\r\n   const programInfo = this.context.programInfo;\r\n   let source = programInfo.shaderSource;\r\n\r\n   // append main() function\r\n   if (!this.context.programInfo.hasMain) {\r\n   source = `${source}\r\n      ${getDefaultFragShaderMain(this.context.glContext.version, this.context.outputTextureLayout.shape.length)}`;\r\n   }\r\n   // replace inlines\r\n   source = replaceInlines(source);\r\n\r\n   // concat final source string\r\n   return `${getFragShaderPreamble(this.context.glContext.version)}\r\n    ${this.getUniforms(programInfo.inputNames, programInfo.variables)}\r\n    ${this.getImports(source)}\r\n    ${source}`;\r\n }\r\n\r\n protected getImports(script: string): string {\r\n   const routinesIncluded = this.selectGlslLibRoutinesToBeIncluded(script);\r\n\r\n   if (routinesIncluded.length === 0) {\r\n   return '';\r\n   }\r\n\r\n   let routines = '';\r\n   for (let i = 0; i < routinesIncluded.length; ++i) {\r\n   if (routinesIncluded[i].routineBody) {\r\n   routines += routinesIncluded[i].routineBody + '\\n';\r\n   } else {\r\n   throw new Error(`Missing body for the Glsl Library routine: ${routinesIncluded[i].name}`);\r\n   }\r\n   }\r\n\r\n   return routines;\r\n }\r\n private selectGlslLibRoutinesToBeIncluded(script: string): GlslLibRoutineNode[] {\r\n   const nodes: GlslLibRoutineNode[] = [];\r\n\r\n   Object.keys(this.glslLibRoutineDependencyGraph).forEach(classAndRoutine => {\r\n   const routine = classAndRoutine.split('.')[1];\r\n   if (script.indexOf(routine) !== -1) {\r\n   nodes.push(this.glslLibRoutineDependencyGraph[classAndRoutine]);\r\n   }\r\n   });\r\n\r\n   return TopologicalSortGlslRoutines.returnOrderedNodes(nodes);\r\n }\r\n\r\n protected getUniforms(samplers?: string[], variables?: VariableInfo[]): string {\r\n   const uniformLines: string[] = [];\r\n   if (samplers) {\r\n   for (const sampler of samplers) {\r\n uniformLines.push(`uniform sampler2D ${sampler};`);\r\n }\r\n }\r\n if (variables) {\r\n for (const variable of variables) {\r\n uniformLines.push(\r\n `uniform ${variable.type} ${variable.name}${variable.arrayLength ? `[${variable.arrayLength}]` : ''};`);\r\n }\r\n }\r\n return uniformLines.join('\\n');\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {CoordsGlslLib} from './glsl-coordinate-lib';\r\nimport {GlslContext, GlslLib} from './glsl-definitions';\r\nimport {EncodingGlslLib} from './glsl-encoding-lib';\r\nimport {FragColorGlslLib} from './glsl-fragcolor-lib';\r\nimport {ShapeUtilsGlslLib} from './glsl-shape-utils-lib';\r\nimport {VecGlslLib} from './glsl-vec-lib';\r\n\r\nexport const glslRegistry: {[name: string]: new (context: GlslContext) => GlslLib} = {\r\n 'encoding': EncodingGlslLib,\r\n 'fragcolor': FragColorGlslLib,\r\n 'vec': VecGlslLib,\r\n 'shapeUtils': ShapeUtilsGlslLib,\r\n 'coordinates': CoordsGlslLib,\r\n // 'arrays': ArrayGlslSLib\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\n\r\n/**\r\n * GLSL Library responsible for data types and routines for manipulating\r\n * coordinates and mapping to/from tensor indices\r\n */\r\nexport class ShapeUtilsGlslLib extends GlslLib {\r\n constructor(context: GlslContext) {\r\n super(context);\r\n }\r\n getFunctions(): {[name: string]: GlslLibRoutine} {\r\n return {\r\n ...this.bcastIndex(),\r\n ...this.bcastMatmulIndex(),\r\n ...this.offsetToIndices(),\r\n ...this.indicesToOffset(),\r\n ...this.incrementIndices()\r\n };\r\n }\r\n getCustomTypes() {\r\n return {};\r\n }\r\n protected bcastIndex(): {[name: string]: GlslLibRoutine} {\r\n const outputRank = this.context.outputTextureLayout.shape.length;\r\n const result: {[name: string]: GlslLibRoutine} = {};\r\n this.context.programInfo.inputNames.forEach((name, i) => {\r\n const shape = this.context.inputTextureLayouts[i].unpackedShape;\r\n if (shape.length <= outputRank) {\r\n const rank = shape.length;\r\n const dimOffset = outputRank - rank;\r\n const funcName = `bcastIndices_${name}`;\r\n let block = '';\r\n for (let i = 0; i < rank; ++i) {\r\n block += `\r\n realIndices[${i}] = int( mod(float(bcastedIndices[${dimOffset + i}]), ${shape[i]}.0) );\r\n `;\r\n }\r\n const body = `\r\n void ${funcName} (int bcastedIndices[${outputRank}], out int realIndices[${rank}]) {\r\n ${block}\r\n }\r\n `;\r\n result[funcName] = new GlslLibRoutine(body);\r\n }\r\n });\r\n return result;\r\n }\r\n protected bcastMatmulIndex(): {[name: string]: GlslLibRoutine} {\r\n const outputRank = this.context.outputTextureLayout.shape.length;\r\n const result: {[name: string]: GlslLibRoutine} = {};\r\n this.context.programInfo.inputNames.forEach((name, i) => {\r\n const shape = this.context.inputTextureLayouts[i].shape;\r\n if (!(shape.length < 2 || shape.length > outputRank)) {\r\n const rank = shape.length;\r\n const dimOffset = outputRank - rank;\r\n const funcName = `bcastMatmulIndices_${name}`;\r\n let block = '';\r\n for (let i = 0; i < rank - 2; ++i) {\r\n block += `\r\n realIndices[${i}] = int( mod(float(bcastedIndices[${dimOffset + i}]), ${shape[i]}.0) );\r\n `;\r\n }\r\n const body = `\r\n void ${funcName}(int bcastedIndices[${outputRank}], out int realIndices[${rank}]) {\r\n ${block}\r\n realIndices[${rank - 1}] = bcastedIndices[${outputRank - 1}];\r\n realIndices[${rank - 2}] = bcastedIndices[${outputRank - 2}];\r\n }\r\n `;\r\n result[funcName] = new GlslLibRoutine(body);\r\n }\r\n });\r\n return result;\r\n }\r\n protected indicesToOffset(): {[name: string]: GlslLibRoutine} {\r\n const result: {[name: string]: GlslLibRoutine} = {};\r\n this.context.programInfo.inputNames.forEach((name, i) => {\r\n const shape = this.context.inputTextureLayouts[i].shape;\r\n const strides = this.context.inputTextureLayouts[i].strides;\r\n const rank = shape.length;\r\n let funcName = `indicesToOffset_${name}`;\r\n result[funcName] = new GlslLibRoutine(ShapeUtilsGlslLib.indexToOffsetSingle(funcName, rank, strides));\r\n funcName = `indicesToOffset_${name}_T`;\r\n result[funcName] =\r\n new GlslLibRoutine(ShapeUtilsGlslLib.indexToOffsetSingle(funcName, rank, strides.slice().reverse()));\r\n });\r\n return result;\r\n }\r\n static indexToOffsetSingle(name: string, rank: number, strides: readonly number[]): string {\r\n let block = '';\r\n for (let i = rank - 1; i >= 0; --i) {\r\n block += `\r\n offset += indices[${i}] * ${strides[i]};\r\n `;\r\n }\r\n return `\r\n int ${name}(int indices[${rank}]) {\r\n int offset = 0;\r\n ${block}\r\n return offset;\r\n }\r\n `;\r\n }\r\n protected offsetToIndices(): {[name: string]: GlslLibRoutine} {\r\n const result: {[name: string]: GlslLibRoutine} = {};\r\n this.context.programInfo.inputNames.forEach((name, i) => {\r\n   const shape = this.context.inputTextureLayouts[i].shape;\r\n   const strides = this.context.inputTextureLayouts[i].strides;\r\n   const rank = shape.length;\r\n   let funcName = `offsetToIndices_${name}`;\r\n   result[funcName] = new GlslLibRoutine(ShapeUtilsGlslLib.offsetToIndicesSingle(funcName, rank, strides));\r\n   funcName = `offsetToIndices_${name}_T`;\r\n   result[funcName] =\r\n   new GlslLibRoutine(ShapeUtilsGlslLib.offsetToIndicesSingle(funcName, rank, strides.slice().reverse()));\r\n   });\r\n   return result;\r\n }\r\n static offsetToIndicesSingle(name: string, rank: number, strides: readonly number[]): string {\r\n   const stridesBlock = [];\r\n   for (let i = 0; i < rank - 1; ++i) {\r\n   stridesBlock.push(`\r\n      indices[${i}] = offset / ${strides[i]};`);\r\n   stridesBlock.push(`\r\n        offset -= indices[${i}] * ${strides[i]};`);\r\n   }\r\n   stridesBlock.push(`\r\n      indices[${rank - 1}] = offset;`);\r\n   return `\r\n      void ${name}(int offset, out int indices[${rank}]) {\r\n        ${stridesBlock.join('')}\r\n      }\r\n      `;\r\n }\r\n protected incrementIndices(): {[name: string]: GlslLibRoutine} {\r\n   const result: {[name: string]: GlslLibRoutine} = {};\r\n   this.context.programInfo.inputNames.forEach((name, i) => {\r\n   const shape = this.context.inputTextureLayouts[i].shape;\r\n   const rank = shape.length;\r\n   const funcName = `incrementIndices_${name}`;\r\n   let shapeInit = '';\r\n   for (let i = 0; i < rank; ++i) {\r\n   shapeInit += `\r\n        shape[${i}] = ${shape[i]};`;\r\n   }\r\n   const body = `\r\n   void ${funcName}(int axis, out int indices[${rank}]) {\r\n   int shape[${rank}];\r\n ${shapeInit};\r\n   for(int i = ${rank} -1 ; i >= 0; --i) {\r\n   if(i > axis) continue;\r\n   indices[i] += 1;\r\n   if(indices[i] < shape[i]) {\r\n   break;\r\n   }\r\n   indices[i] = 0;\r\n   }\r\n   }\r\n   `;\r\n   result[funcName] = new GlslLibRoutine(body);\r\n   });\r\n   return result;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\n/**\r\n * represent a version irrelevant abstraction of for GLSL source code\r\n */\r\nexport interface Glsl {\r\n readonly version: string;\r\n readonly attribute: string;\r\n readonly varyingVertex: string;\r\n readonly varyingFrag: string;\r\n readonly texture2D: string;\r\n readonly output: string;\r\n readonly outputDeclaration: string;\r\n}\r\n\r\nconst GLSL_ES_2_0: Glsl = {\r\n version: '',\r\n attribute: 'attribute',\r\n varyingVertex: 'varying',\r\n varyingFrag: 'varying',\r\n texture2D: 'texture2D',\r\n output: 'gl_FragColor',\r\n outputDeclaration: '',\r\n};\r\nconst GLSL_ES_3_0: Glsl = {\r\n version: '#version 300 es',\r\n attribute: 'in',\r\n varyingVertex: 'out',\r\n varyingFrag: 'in',\r\n texture2D: 'texture',\r\n output: 'outputColor',\r\n outputDeclaration: 'out vec4 outputColor;',\r\n};\r\n\r\nexport function getGlsl(version: 1|2) {\r\n return version === 1 ? GLSL_ES_2_0 : GLSL_ES_3_0;\r\n}\r\n\r\nexport function getVertexShaderSource(version: 1|2): string {\r\n const glsl = getGlsl(version);\r\n return `${glsl.version}\r\n   precision highp float;\r\n ${glsl.attribute} vec3 position;\r\n ${glsl.attribute} vec2 textureCoord;\r\n\r\n ${glsl.varyingVertex} vec2 TexCoords;\r\n\r\n   void main()\r\n   {\r\n   gl_Position = vec4(position, 1.0);\r\n   TexCoords = textureCoord;\r\n   }`;\r\n}\r\n\r\nexport function getFragShaderPreamble(version: 1|2): string {\r\n  const glsl = getGlsl(version);\r\n  return `${glsl.version}\r\n   precision highp float;\r\n   precision highp int;\r\n   precision highp sampler2D;\r\n ${glsl.varyingFrag} vec2 TexCoords;\r\n ${glsl.outputDeclaration}\r\n   const vec2 halfCR = vec2(0.5, 0.5);\r\n\r\n   // Custom vector types to handle higher dimenalities.\r\n   struct ivec5\r\n   {\r\n   int x;\r\n   int y;\r\n   int z;\r\n   int w;\r\n   int u;\r\n   };\r\n\r\n   struct ivec6\r\n   {\r\n   int x;\r\n   int y;\r\n   int z;\r\n   int w;\r\n   int u;\r\n   int v;\r\n   };\r\n\r\n   int imod(int x, int y) {\r\n   return x - y * (x / y);\r\n   }\r\n\r\n   `;\r\n}\r\n\r\nexport function getDefaultFragShaderMain(version: 1|2, outputShapeLength: number): string {\r\n  const glsl = getGlsl(version);\r\n  return `\r\n void main() {\r\n   int indices[${outputShapeLength}];\r\n   toVec(TexCoords, indices);\r\n   vec4 result = vec4(process(indices));\r\n ${glsl.output} = result;\r\n }\r\n `;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\n\r\n/**\r\n * GLSL Library responsible for vec routines\r\n * Vec is an varible length int array. The length is fixed at the time of\r\n * generating the library functions from the dimensions of the output.\r\n */\r\nexport class VecGlslLib extends GlslLib {\r\n constructor(context: GlslContext) {\r\n   super(context);\r\n }\r\n getCustomTypes(): {[name: string]: string} {\r\n   return {};\r\n }\r\n getFunctions(): {[name: string]: GlslLibRoutine} {\r\n   return {...this.binaryVecFunctions(), ...this.copyVec(), ...this.setVecItem(), ...this.getVecItem()};\r\n }\r\n protected binaryVecFunctions(): {[name: string]: GlslLibRoutine} {\r\n const outputLayout = this.context.outputTextureLayout;\r\n const rank = outputLayout.shape.length;\r\n const nameOp: {[name: string]: string} = {add: '+=', sub: '-=', mul: '*=', div: '/='};\r\n const result: {[name: string]: GlslLibRoutine} = {};\r\n for (const name in nameOp) {\r\n const fname = `${name}Vec`;\r\n let assignmentBlock = '';\r\n for (let i = 0; i < rank; ++i) {\r\n assignmentBlock += `\r\n dest[${i}] ${nameOp[name]} src[${i}];\r\n `;\r\n }\r\n const body = `\r\n void ${fname}(int src[${rank}], out int dest[${rank}]) {\r\n ${assignmentBlock}\r\n }\r\n `;\r\n result[fname] = new GlslLibRoutine(body);\r\n }\r\n\r\n return result;\r\n }\r\n protected copyVec(): {[name: string]: GlslLibRoutine} {\r\n const outputLayout = this.context.outputTextureLayout;\r\n const rank = outputLayout.shape.length;\r\n let assignmentBlock = '';\r\n for (let i = 0; i < rank; ++i) {\r\n assignmentBlock += `\r\n dest[${i}] = src[${i}];\r\n `;\r\n }\r\n const body = `\r\n void copyVec(int src[${rank}], out int dest[${rank}]) {\r\n ${assignmentBlock}\r\n }\r\n `;\r\n return {copyVec: new GlslLibRoutine(body)};\r\n }\r\n\r\n protected setVecItem(): {[name: string]: GlslLibRoutine} {\r\n const outputLayout = this.context.outputTextureLayout;\r\n const rank = outputLayout.shape.length;\r\n let block = `\r\n if(index < 0)\r\n index =${rank} + index;\r\n if (index == 0)\r\n m[0] = value;\r\n `;\r\n for (let i = 1; i < rank - 1; ++i) {\r\n block += `\r\n else if (index == ${i})\r\n m[${i}] = value;\r\n `;\r\n }\r\n block += `\r\n else\r\n m[${rank - 1}] = value;\r\n `;\r\n const body = `\r\n void setVecItem(out int m[${rank}], int index, int value) {\r\n ${block}\r\n }\r\n `;\r\n return {setVecItem: new GlslLibRoutine(body)};\r\n }\r\n protected getVecItem(): {[name: string]: GlslLibRoutine} {\r\n const outputLayout = this.context.outputTextureLayout;\r\n const rank = outputLayout.shape.length;\r\n let block = `\r\n if(index < 0)\r\n index = ${rank} + index;\r\n if (index == 0)\r\n return m[0];\r\n `;\r\n for (let i = 1; i < rank - 1; ++i) {\r\n block += `\r\n else if (index == ${i})\r\n return m[${i}];\r\n `;\r\n }\r\n block += `\r\n else\r\n return m[${rank - 1}];\r\n `;\r\n const body = `\r\n int getVecItem(int m[${rank}], int index) {\r\n ${block}\r\n }\r\n `;\r\n return {getVecItem: new GlslLibRoutine(body)};\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceHandler} from '../../backend';\r\nimport {Logger} from '../../instrument';\r\nimport {Tensor} from '../../tensor';\r\nimport {ShapeUtil} from '../../util';\r\nimport {createPackProgramInfoLoader} from './ops/pack';\r\nimport {createPackedReshape3DProgramInfoLoader, isReshapeCheap, processDims3D} from './ops/reshape-packed';\r\n\r\nimport {encodeAsUint8} from './ops/uint8-encode';\r\nimport {createUnpackProgramInfoLoader} from './ops/unpack';\r\nimport {WebGLSessionHandler} from './session-handler';\r\nimport {Encoder} from './texture-data-encoder';\r\nimport {calculateTextureWidthAndHeight, createTextureLayoutFromShape, createTextureLayoutFromTextureType} from './texture-layout';\r\nimport {Artifact, ProgramInfo, ProgramInfoLoader, TextureData, TextureLayout, TextureType} from './types';\r\n\r\nconst getProgramInfoUniqueKey =\r\n (programInfo: ProgramInfo|ProgramInfoLoader, inputTextureDatas: TextureData[]): string => {\r\n const inputs =\r\n inputTextureDatas.map(texture => `${texture.unpackedShape.join(',')};${texture.width}x${texture.height}`)\r\n .join('_');\r\n let key = programInfo.name;\r\n if (programInfo.cacheHint) {\r\n key += '[' + programInfo.cacheHint + ']';\r\n }\r\n key += ':' + inputs;\r\n return key;\r\n };\r\n\r\nexport class WebGLInferenceHandler implements InferenceHandler {\r\n private packedTextureDataCache: Map<Tensor.Id, TextureData>;\r\n private unpackedTextureDataCache: Map<Tensor.Id, TextureData>;\r\n constructor(public session: WebGLSessionHandler) {\r\n this.packedTextureDataCache = new Map();\r\n this.unpackedTextureDataCache = new Map();\r\n }\r\n\r\n /**\r\n * @returns [width, height]\r\n */\r\n calculateTextureWidthAndHeight(shape: readonly number[], textureType: TextureType): [number, number] {\r\n return calculateTextureWidthAndHeight(this.session.layoutStrategy, shape, textureType);\r\n }\r\n\r\n executeProgram(program: ProgramInfo|ProgramInfoLoader, inputs: readonly Tensor[]): TextureData {\r\n if (inputs.length < program.inputNames.length) {\r\n throw new Error(`Input size mustn't be less than ${program.inputNames.length}.`);\r\n }\r\n if (program.inputNames.length !== program.inputTypes.length) {\r\n throw new Error('input names size does not match input types');\r\n }\r\n\r\n // create texture info for

```
input\r\n    const inputTextureDatas: TextureData[] = [];\r\n    for (let i = 0; i < program.inputNames.length; ++i)
{\r\n      inputTextureDatas[i] = this.getOrCreateTextureData(inputs[i], program.inputTypes[i]);\r\n    }\r\n\r\n
const key = getProgramInfoUniqueKey(program, inputTextureDatas);\r\n    let artifact =
this.session.programManager.getArtifact(key);\r\n    const programInfo = artifact ?\r\n        artifact.programInfo :\r\n
      (typeof (program as ProgramInfoLoader).get === 'function' ? (program as ProgramInfoLoader).get() :\r\n
                                             (program as ProgramInfo));\r\n\r\n    // create texture info for output\r\n    const
outputTextureLayout = createTextureLayoutFromTextureType(\r\n        this.session.layoutStrategy,
programInfo.output.dims, programInfo.output.textureType);\r\n    const outputTextureData =
this.createTextureData(outputTextureLayout, programInfo.output.type);\r\n\r\n    if (!artifact) {\r\n      artifact =
this.session.programManager.build(programInfo, inputTextureDatas, outputTextureData);\r\n
this.session.programManager.setArtifact(key, artifact);\r\n    }\r\n\r\n    this.runProgram(artifact, inputTextureDatas,
outputTextureData);\r\n    return outputTextureData;\r\n  }\r\n\r\n  run(program: ProgramInfoLoader, inputs:
readonly Tensor[]): Tensor {\r\n    const outputTextureData = this.executeProgram(program, inputs);\r\n    return
outputTextureData.tensor;\r\n  }\r\n\r\n  private runProgram(artifact: Artifact, inputs: TextureData[], output:
TextureData): void {\r\n    // input should match\r\n    for (let i = 0; i < inputs.length; ++i) {\r\n      if
(!!inputs[i].isPacked !== (artifact.programInfo.inputTypes[i] === TextureType.packed)) {\r\n        throw new
Error(`input[${i}] property packed inconsistent`);\r\n      }\r\n    }\r\n\r\n    // output should match\r\n    if
(!!output.isPacked !== (artifact.programInfo.output.textureType === TextureType.packed)) {\r\n      throw new
Error('output property packed inconsistent');\r\n    }\r\n\r\n    this.session.programManager.run(artifact, inputs,
output);\r\n  }\r\n\r\n  /**\r\n   * Create a TextureData object from a tensor.\r\n   * Usage =
Encoder.Usage.UploadOnly.\r\n   * If a related texture data is found in cache, returns it;\r\n   * Otherwise:\r\n   *
Creates a new texture layout if not provided;\r\n   *   Creates WebGLTexture with the layout;\r\n   *   Upload tensor
data to the texture;\r\n   *   Creates a texture data object associated with the given tensor.\r\n   * @param tensor the
tensor with data to upload\r\n   */\r\n  private getOrCreateTextureData(tensor: Tensor, textureType: TextureType)
{\r\n    let td = this.getTextureData(tensor.dataId, textureType === TextureType.packed);\r\n\r\n    if (!td) {\r\n      //
check if we have texture data in different type\r\n      td = this.getTextureData(tensor.dataId, textureType !==
TextureType.packed);\r\n      if (td) {\r\n        if (textureType === TextureType.packed) {\r\n          return
this.pack(td);\r\n        } else {\r\n          return this.unpack(td);\r\n        }\r\n      }\r\n    }\r\n\r\n    if (!td) {\r\n      const
layout = createTextureLayoutFromTextureType(this.session.layoutStrategy, tensor.dims, textureType);\r\n\r\n      if
(textureType === TextureType.packedLastDimension) {\r\n        const group = 1;\r\n        const channels = 4;\r\n
const shape = tensor.dims;\r\n        if (shape.length === 4) {\r\n          // pre-processing for kernel data of Conv.\r\n
    //\r\n          // TODO: currently this is a hacking to overwrite Conv's weight. The correct way to do this should
be:\r\n          // 1. implement texture based const-folding\r\n          // 2. create a WebGL program
\"preprocessConvWeight\" to do the same work as below\r\n          // 3. run the program before dotProduct.\r\n
//\r\n          const adjustedKernelShape = [shape[0], Math.ceil((shape[1] * shape[2] * shape[3]) / channels)];\r\n
const adjustedLayout =\r\n              createTextureLayoutFromTextureType(this.session.layoutStrategy,
adjustedKernelShape, textureType);\r\n          let buffer = tensor.numberData;\r\n          if (shape[1] * shape[2] *
shape[3] % channels !== 0) {\r\n            const numFeatureMaps = shape[0];\r\n            const oldRowSize = shape[1]
* shape[2] * shape[3];\r\n            const newRowSize = Math.ceil(oldRowSize * group / channels) * channels;\r\n
    const newSize = numFeatureMaps * newRowSize;\r\n            buffer = new Float32Array(newSize);\r\n            for
(let f = 0; f < numFeatureMaps; ++f) {\r\n              const oldOffset = f * oldRowSize;\r\n              const newOffset =
f * newRowSize + f % group * oldRowSize;\r\n              buffer.set(tensor.numberData.subarray(oldOffset, oldOffset
+ oldRowSize), newOffset);\r\n            }\r\n          }\r\n          return this.createTextureData(adjustedLayout,
tensor.type, buffer, tensor, Encoder.Usage.UploadOnly);\r\n        }\r\n      }\r\n\r\n      if (textureType ===
TextureType.packed) {\r\n        const unpackedTextureLayout =\r\n
createTextureLayoutFromShape(this.session.layoutStrategy, tensor.dims, 1, [], {reverseWH: true});\r\n        const
unpackedTextureData = this.createTextureData(\r\n            unpackedTextureLayout, tensor.type, tensor.numberData,
tensor, Encoder.Usage.UploadOnly);\r\n        td = this.pack(unpackedTextureData);\r\n      } else {\r\n        td =
```

this.createTextureData(layout, tensor.type, tensor.numberData, tensor, Encoder.Usage.UploadOnly);\r\n   }\r\n   }\r\n   return td;\r\n }\r\n\r\n /**\r\n   * Create a TextureData object using the given data and bind to the given tensor.\r\n   * Usage = Encoder.Usage.UploadOnly.\r\n   * NOTE: this function is a hack for Conv implementation. should remove this function, after rewriting Conv\r\n   * implementation by Graph.Transformer\r\n   * @param dataType the tensor data type\r\n   * @param data the actual data to upload\r\n   * @param tensor the tensor to bind. tensor's data is ignored.\r\n   */\r\n createTextureDataFromLayoutBindTensor(\r\n   layout: TextureLayout, dataType: Tensor.DataType, data: Tensor.NumberType, tensor: Tensor): TextureData {\r\n   return this.createTextureData(layout, dataType, data, tensor, Encoder.Usage.UploadOnly);\r\n }\r\n\r\n private createTextureData(\r\n   layout: TextureLayout, dataType: Tensor.DataType, data?: Tensor.NumberType, tensor?: Tensor,\r\n   usage?: Encoder.Usage): TextureData {\r\n   Logger.verbose('InferenceHandler', `Creating TextureData: layout:[${JSON.stringify(layout)}]`);\r\n   const texture = this.session.textureManager.createTextureFromLayout(dataType, layout, data, usage);\r\n   return this.createTextureDataFromTexture(layout, dataType, texture, tensor);\r\n }\r\n\r\n reshapeUnpacked(input: Tensor, reshapedDims: readonly number[]): Tensor {\r\n   const inputTD = this.getOrCreateTextureData(input, TextureType.unpacked);\r\n   const newTextureLayout: TextureLayout = {\r\n   channels: inputTD.channels,\r\n   height: inputTD.height,\r\n   width: inputTD.width,\r\n   // handle reshaping into scalar Tensors\r\n   shape: reshapedDims.length !== 0 ? reshapedDims : [1],\r\n   strides: ShapeUtil.computeStrides(reshapedDims),\r\n   unpackedShape: reshapedDims,\r\n   };\r\n   const newTextureData = this.createTextureDataFromTexture(newTextureLayout, input.type, inputTD.texture);\r\n   return newTextureData.tensor;\r\n }\r\n\r\n reshapePacked(input: Tensor, reshapedDims: readonly number[]): Tensor {\r\n   const inputTD = this.getOrCreateTextureData(input, TextureType.packed);\r\n\r\n   // check if the reshape is 'cheap'\r\n   if (isReshapeCheap(input.dims, reshapedDims)) {\r\n   const newTextureLayout: TextureLayout = {\r\n   channels: inputTD.channels,\r\n   height: inputTD.height,\r\n   width: inputTD.width,\r\n   // handle reshaping into scalar Tensors\r\n   shape: reshapedDims.length !== 0 ? reshapedDims : [1],\r\n   strides: ShapeUtil.computeStrides(reshapedDims),\r\n   unpackedShape: reshapedDims,\r\n   isPacked: true\r\n   };\r\n   const newTextureData = this.createTextureDataFromTexture(newTextureLayout, input.type, inputTD.texture);\r\n   return newTextureData.tensor;\r\n   }\r\n\r\n   const squeezedInputShape = processDims3D(input.dims);\r\n   const squeezedOutputShape = processDims3D(reshapedDims);\r\n\r\n   const squeezedInputTensor = this.reshapePacked(input, squeezedInputShape);\r\n   const squeezedOutputTensor = this.run(\r\n   createPackedReshape3DProgramInfoLoader(this, squeezedInputTensor, squeezedOutputShape), [squeezedInputTensor]);\r\n   const outputTensor = this.reshapePacked(squeezedOutputTensor, reshapedDims);\r\n   return outputTensor;\r\n }\r\n\r\n private createTextureDataFromTexture(\r\n   layout: TextureLayout, dataType: Tensor.DataType, texture: WebGLTexture, tensor?: Tensor, tensorId?: Tensor.Id) {\r\n   const textureData: TextureData = {\r\n   ...layout,\r\n   tensor: tensor ||\r\n   new Tensor(\r\n   layout.unpackedShape, dataType, (_id: Tensor.Id) => this.readTexture(textureData),\r\n   async (_id: Tensor.Id) => this.readTextureAsync(textureData), undefined, tensorId),\r\n   texture\r\n   };\r\n   this.setTextureData(textureData.tensor.dataId, textureData, layout.isPacked);\r\n   return textureData;\r\n }\r\n\r\n private getTextureData(tensorId: Tensor.Id, isPacked = false): TextureData|undefined {\r\n   return this.session.isInitializer(tensorId) ?\r\n   this.session.getTextureData(tensorId, isPacked) :\r\n   isPacked ? this.packedTextureDataCache.get(tensorId) : this.unpackedTextureDataCache.get(tensorId);\r\n }\r\n setTextureData(tensorId: Tensor.Id, td: TextureData, isPacked = false): void {\r\n   if (this.session.isInitializer(tensorId)) {\r\n   this.session.setTextureData(tensorId, td, isPacked);\r\n   } else {\r\n   (isPacked ? this.packedTextureDataCache : this.unpackedTextureDataCache).set(tensorId, td);\r\n   }\r\n }\r\n isTextureLayoutCached(tensor: Tensor, isPacked = false): boolean {\r\n   return !!this.getTextureData(tensor.dataId, isPacked);\r\n }\r\n\r\n dispose(): void {\r\n   this.session.textureManager.clearActiveTextures();\r\n   this.packedTextureDataCache.forEach(td => this.session.textureManager.releaseTexture(td));\r\n   this.packedTextureDataCache = new Map();\r\n   this.unpackedTextureDataCache.forEach(td => this.session.textureManager.releaseTexture(td));\r\n this.unpackedTextureDataCache = new Map();\r\n }\r\n\r\n readTexture(textureData: TextureData): Tensor.NumberType {\r\n if (textureData.isPacked) {\r\n return this.readTexture(this.unpack(textureData));\r\n }\r\n if (!this.session.backend.glContext.isFloat32DownloadSupported) {\r\n return this.session.textureManager.readUint8TextureAsFloat(encodeAsUint8(this, textureData));\r\n }\r\n return this.session.textureManager.readTexture(textureData, textureData.tensor.type, textureData.channels);\r\n }\r\n\r\n async readTextureAsync(textureData: TextureData): Promise<Tensor.NumberType> {\r\n if (textureData.isPacked) {\r\n return this.readTextureAsync(this.unpack(textureData));\r\n }\r\n if (!this.session.backend.glContext.isFloat32DownloadSupported) {\r\n return this.session.textureManager.readUint8TextureAsFloat(encodeAsUint8(this, textureData));\r\n }\r\n return this.session.textureManager.readTextureAsync(textureData, textureData.tensor.type, textureData.channels);\r\n }\r\n\r\n pack(input: TextureData): TextureData {\r\n const outputTextureData = this.executeProgram(createPackProgramInfoLoader(this, input.tensor), [input.tensor]);\r\n return outputTextureData;\r\n }\r\n\r\n unpack(input: TextureData): TextureData {\r\n const outputTextureData = this.executeProgram(createUnpackProgramInfoLoader(this, input.tensor), [input.tensor]);\r\n return outputTextureData;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {OpSet} from '../../opset';\r\n\r\nimport {batchNormalization, parseBatchNormalizationAttributes} from './ops/batch-normalization';\r\nimport * as binaryOps from './ops/binary-op';\r\nimport {concat, parseConcatAttributes} from './ops/concat';\r\nimport {conv, parseConvAttributes} from './ops/conv';\r\nimport {depthToSpace, parseDepthToSpaceAttributes} from './ops/depth-to-space';\r\nimport {flatten, parseFlattenAttributes} from './ops/flatten';\r\nimport {gather, parseGatherAttributes} from './ops/gather';\r\nimport {gemm, parseGemmAttributesV11, parseGemmAttributesV7} from './ops/gemm';\r\nimport {imageScaler, parseImageScalerAttributes} from './ops/image-scaler';\r\nimport {instanceNormalization, parseInstanceNormalizationAttributes} from './ops/instance-normalization';\r\nimport {matMul, parseMatMulAttributes} from './ops/matmul';\r\nimport {pad, parsePadAttributes} from './ops/pad';\r\nimport {averagePool, parseAveragePoolAttributes} from './ops/pool';\r\nimport {globalAveragePool, parseGlobalAveragePoolAttributes} from './ops/pool';\r\nimport {maxPool, parseMaxPoolAttributes} from './ops/pool';\r\nimport {globalMaxPool} from './ops/pool';\r\nimport {reduceLogSum, reduceLogSumSquare, reduceMax, reduceMean, reduceMin, reduceProd, reduceSum} from './ops/reduce';\r\nimport {parseReduceAttributes} from './ops/reduce';\r\nimport {reshape} from './ops/reshape';\r\nimport {parseResizeAttributesV10, parseResizeAttributesV11, resize} from './ops/resize-packed';\r\nimport {shape} from './ops/shape';\r\nimport {parseSliceAttributes, slice, sliceV10} from './ops/slice';\r\nimport {parseSoftmaxAttributes, softmax} from './ops/softmax';\r\nimport {parseSplitAttributes, split} from './ops/split';\r\nimport {parseSqueezeAttributes, squeeze} from './ops/squeeze';\r\nimport {sum} from './ops/sum';\r\nimport {tile} from './ops/tile';\r\nimport {parseTransposeAttributes, transpose} from './ops/transpose';\r\nimport * as unaryOps from './ops/unary-op';\r\nimport {parseUnsqueezeAttributes, unsqueeze} from './ops/unsqueeze';\r\nimport {parseUpsampleAttributesV7, parseUpsampleAttributesV9, upsample} from './ops/upsample';\r\n\r\nexport const WEBGL_OP_RESOLVE_RULES: readonly OpSet.ResolveRule[] = [\r\n ['Abs', '', '6+', unaryOps.abs],\r\n ['Acos', '', '7+', unaryOps.acos],\r\n ['Add', '', '7+', binaryOps.add],\r\n ['And', '', '7+', binaryOps.and],\r\n ['Asin', '', '7+', unaryOps.asin],\r\n ['Atan', '', '7+', unaryOps.atan],\r\n // TODO: support new attributes for AveragePool-10\r\n ['AveragePool', '', '7-10', averagePool, parseAveragePoolAttributes],\r\n ['BatchNormalization', '', '7+', batchNormalization, parseBatchNormalizationAttributes],\r\n ['Ceil', '', '6+', unaryOps.ceil],\r\n ['Clip', '', '6-10', unaryOps.clip, unaryOps.parseClipAttributes],\r\n ['Concat', '', '4+', concat, parseConcatAttributes],\r\n ['Conv', '', '1+', conv, parseConvAttributes],\r\n ['Cos', '', '7+', unaryOps.cos],\r\n ['Div', '', '7+', binaryOps.div],\r\n ['Dropout', '', '7+', unaryOps.identity],\r\n ['DepthToSpace', '', '1+', depthToSpace, parseDepthToSpaceAttributes],\r\n ['Equal', '', '7+', binaryOps.equal],\r\n ['Elu', '', '6+', unaryOps.elu, unaryOps.parseEluAttributes],\r\n ['Exp', '', '6+', unaryOps.exp],\r\n ['Flatten', '', '1+', flatten, parseFlattenAttributes],\r\n ['Floor', '', '6+', unaryOps.floor],\r\n ['Gather', '', '1+', gather, parseGatherAttributes],\r\n ['Gemm', '', '7-10', gemm, parseGemmAttributesV7],\r\n ['Gemm', '', '11+', gemm, parseGemmAttributesV11],\r\n ['GlobalAveragePool', '', '1+', globalAveragePool, parseGlobalAveragePoolAttributes],\r\n ['GlobalMaxPool', '', '1+', globalMaxPool],\r\n ['Greater', '', '7+', binaryOps.greater],\r\n ['Identity', '', '1+', unaryOps.identity],\r\n ['ImageScaler', '', '1+', imageScaler, parseImageScalerAttributes],\r\n ['InstanceNormalization', '', '6+', instanceNormalization, parseInstanceNormalizationAttributes],\r\n ['LeakyRelu', '', '6+', unaryOps.leakyRelu, unaryOps.parseLeakyReluAttributes],\r\n ['Less', '', '7+', binaryOps.less],\r\n ['Log', '', '6+', unaryOps.log],\r\n ['MatMul', '', '1+', matMul, parseMatMulAttributes],\r\n // TODO: support new attributes for MaxPool-8 and MaxPool-10\r\n ['MaxPool', '', '1-9', maxPool, parseMaxPoolAttributes],\r\n ['Mul', '', '7+', binaryOps.mul],\r\n ['Neg', '', '6+', unaryOps.neg],\r\n ['Not', '', '1+', unaryOps.not],\r\n ['Or', '', '7+', binaryOps.or],\r\n ['Pad', '', '2-10', pad, parsePadAttributes],\r\n ['Pow', '', '7+', binaryOps.pow],\r\n ['PRelu', '', '7+', binaryOps.pRelu],\r\n ['ReduceLogSum', '', '1+', reduceLogSum, parseReduceAttributes],\r\n ['ReduceMax', '', '1+', reduceMax, parseReduceAttributes],\r\n ['ReduceMean', '', '1+', reduceMean, parseReduceAttributes],\r\n ['ReduceMin', '', '1+', reduceMin, parseReduceAttributes],\r\n ['ReduceProd', '', '1+', reduceProd, parseReduceAttributes],\r\n ['ReduceSum', '', '1+', reduceSum, parseReduceAttributes],\r\n ['ReduceSumSquare', '', '1+', reduceLogSumSquare, parseReduceAttributes],\r\n ['Relu', '', '6+', unaryOps.relu],\r\n ['Reshape', '', '5+', reshape],\r\n ['Resize', '', '10', resize, parseResizeAttributesV10],\r\n ['Resize', '', '11+', resize, parseResizeAttributesV11],\r\n ['Shape', '', '1+', shape],\r\n ['Sigmoid', '', '6+', unaryOps.sigmoid],\r\n ['Sin', '', '7+', unaryOps.sin],\r\n ['Slice', '', '10+', sliceV10], // TODO: support 'steps' for Slice-10\r\n ['Slice', '', '1-9', slice, parseSliceAttributes],\r\n ['Softmax', '', '1+', softmax, parseSoftmaxAttributes],\r\n // 'Split' operator has an optional attribute 'split'\r\n // this attribute determines how the specified axis of input data is split.\r\n // When the attribute is missing, we need the count of number of outputs\r\n // so that we can determine the 'split' attribute from the runtime input to the Operator\r\n ['Split', '', '2+', split, parseSplitAttributes],\r\n ['Sqrt', '', '6+', unaryOps.sqrt],\r\n ['Squeeze', '', '1+', squeeze, parseSqueezeAttributes],\r\n ['Sub', '', '7+', binaryOps.sub],\r\n ['Sum', '', '6+', sum],\r\n ['Tan', '', '7+', unaryOps.tan],\r\n ['Tanh', '', '6+', unaryOps.tanh],\r\n ['Tile', '', '6+', tile],\r\n ['Transpose', '', '1+', transpose, parseTransposeAttributes],\r\n ['Upsample', '', '7-8', upsample, parseUpsampleAttributesV7],\r\n ['Upsample', '', '9', upsample, parseUpsampleAttributesV9],\r\n ['Unsqueeze', '', '1+', unsqueeze, parseUnsqueezeAttributes],\r\n ['Xor', '', '7+', binaryOps.xor],\r\n];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface BatchNormalizationAttributes extends AttributeWithCacheKey {\r\n epsilon: number;\r\n momentum: number;\r\n spatial: number;\r\n}\r\n\r\nconst batchNormalizationProgramMetadata = {\r\n name: 'BatchNormalization',\r\n inputNames: ['A', 'Scale', 'B', 'Mean', 'Variance'],\r\n inputTypes:\r\n [TextureType.unpacked, TextureType.unpacked, TextureType.unpacked, TextureType.unpacked, TextureType.unpacked]\r\n};\r\n\r\nexport const batchNormalization: OperatorImplementation<BatchNormalizationAttributes> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: BatchNormalizationAttributes): Tensor[] => {\r\n   validateInputs(inputs);\r\n   const output = inferenceHandler.run(\r\n   {\r\n   ...batchNormalizationProgramMetadata,\r\n   cacheHint: attributes.cacheKey,\r\n   get: () => createBatchNormalizationProgramInfo(inferenceHandler, inputs, attributes)\r\n   },\r\n   inputs);\r\n   return [output];\r\n   };\r\n\r\nexport const parseBatchNormalizationAttributes: OperatorInitialization<BatchNormalizationAttributes> =\r\n   (node: Graph.Node): BatchNormalizationAttributes => {\r\n   const epsilon = node.attributes.getFloat('epsilon', 1e-5);\r\n   const momentum = node.attributes.getFloat('momentum', 0.9);\r\n   const spatial = node.attributes.getInt('spatial', 1);\r\n   return createAttributeWithCacheKey({epsilon, momentum, spatial});\r\n   };\r\n\r\nconst createBatchNormalizationProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: BatchNormalizationAttributes):\r\n   ProgramInfo => {\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const rank = inputs[0].dims.length;\r\n   const [scaleWidth, scaleHeight] =\r\n   inferenceHandler.calculateTextureWidthAndHeight(inputs[1].dims, TextureType.unpacked);\r\n   const shaderSource = `\r\n float process(int[${rank}] indices) {\r\n   vec2 position = offsetToCoords(indices[1], ${scaleWidth}, ${scaleHeight});\r\n   float scale = getColorAsFloat(${glsl.texture2D}(Scale, position));\r\n   float mean = getColorAsFloat(${glsl.texture2D}(Mean, position));\r\n   float variance = getColorAsFloat(${glsl.texture2D}(Variance, position));\r\n   float b = getColorAsFloat(${glsl.texture2D}(B, position));\r\n\r\n   return scale * ((_A(indices) - mean) / sqrt(variance + float(${attributes.epsilon}))) + b;\r\n }`;\r\n   return {\r\n   ...batchNormalizationProgramMetadata,\r\n   output: {dims: inputs[0].dims, type: inputs[0].type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 5) {\r\n   throw new Error('BatchNormalization requires 5 inputs.');\r\n }\r\n\r\n const X = inputs[0];\r\n const scale = inputs[1];\r\n const B = inputs[2];\r\n const mean = inputs[3];\r\n const var_ = inputs[4];\r\n\r\n // input should atleast have three dimensions - N,C,dim1,...,dimn\r\n // other inputs can have only one dimensions\r\n if (X.dims.length < 3 || scale.dims.length !== 1 || B.dims.length !== 1 || mean.dims.length !== 1 ||\r\n   var_.dims.length !== 1) {\r\n   throw new Error('invalid input shape.');\r\n }\r\n if (scale.dims[0] !== X.dims[1] || B.dims[0] !== X.dims[1] || mean.dims[0] !== X.dims[1] ||\r\n   var_.dims[0] !== X.dims[1]) {\r\n   throw new Error('invalid input shape.');\r\n }\r\n if ((X.type !== 'float32' && X.type !== 'float64') || (scale.type !== 'float32' && scale.type !== 'float64') ||\r\n   (B.type !== 'float32' && B.type !== 'float64') || (mean.type !== 'float32' && mean.type !== 'float64') ||\r\n   (var_.type !== 'float32' && var_.type !== 'float64')) {\r\n   throw new Error('invalid input tensor types.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {BroadcastUtil, ShapeUtil} from '../../../util';\r\nimport {FunctionType, GlslValueFunction} from '../glsl-definitions';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, TextureType} from '../types';\r\n\r\nexport function glslAdd(): GlslValueFunction {\r\n const name = 'add_';\r\n const body = `\r\n  float ${name}(float a, float b) {\r\n    return a + b;\r\n  }\r\n  vec4 ${name}(vec4 v1, vec4 v2) {\r\n    return v1 + v2;\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslDiv(): GlslValueFunction {\r\n const name = 'div_';\r\n const body = `\r\n  float ${name}(float a, float b) {\r\n    return a / b;\r\n  }\r\n  vec4 ${name}(vec4 v1, vec4 v2) {\r\n    return v1 / v2;\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslMul(): GlslValueFunction {\r\n const name = 'mul_';\r\n const body = `\r\n  float ${name}(float a, float b) {\r\n    return a * b;\r\n  }\r\n  vec4 ${name}(vec4 v1, vec4 v2) {\r\n    return v1 * v2;\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslSub(): GlslValueFunction {\r\n const name = 'sub_';\r\n const body = `\r\n  float ${name}(float a, float b) {\r\n    return a - b;\r\n  }\r\n  vec4 ${name}(vec4 v1, vec4 v2) {\r\n    return v1 - v2;\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslEqual(): GlslValueFunction {\r\n const name = 'equal_';\r\n const body = `\r\n  float ${name}(float a, float b) {\r\n    return float(a == b);\r\n  }\r\n  vec4 ${name}(vec4 v1, vec4 v2) {\r\n    return vec4(equal(v1, v2));\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslGreater(): GlslValueFunction {\r\n const name = 'greater_';\r\n const body = `\r\n  float ${name}(float a, float b) {\r\n    return float(a > b);\r\n  }\r\n  vec4 ${name}(vec4 v1, vec4 v2) {\r\n    return vec4( v1.r > v2.r ,\r\n      v1.g > v2.g,\r\n      v1.b > v2.b,\r\n      v1.a > v2.a );\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslLess(): GlslValueFunction {\r\n const name = 'less_';\r\n const body = `\r\n  float ${name}(float a, float b) {\r\n    return float(a < b);\r\n  }\r\n  vec4 ${name}(vec4 v1, vec4 v2) {\r\n    return vec4( v1.r < v2.r ,\r\n                v1.g < v2.g,\r\n                v1.b < v2.b,\r\n                v1.a < v2.a );\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslAnd(): GlslValueFunction {\r\n const name = 'and_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n   return float(bool(a) && bool(b));\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n   bvec4 b1 = bvec4(v1);\r\n   bvec4 b2 = bvec4(v2);\r\n   return vec4(b1.r && b2.r ,\r\n   b1.g && b2.g,\r\n   b1.b && b2.b,\r\n   b1.a && b2.a);\r\n }\r\n `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslOr(): GlslValueFunction {\r\n  const name = 'or_';\r\n  const body = `\r\n float ${name}(float a, float b) {\r\n   return float(bool(a) || bool(b));\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n bvec4 b1 = bvec4(v1);\r\n bvec4 b2 = bvec4(v2);\r\n return vec4(b1.r || b2.r ,\r\n b1.g || b2.g,\r\n b1.b || b2.b,\r\n b1.a || b2.a);\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslXor(): GlslValueFunction {\r\n const name = 'xor_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return float(bool(a) ^^ bool(b));\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n bvec4 b1 = bvec4(v1);\r\n bvec4 b2 = bvec4(v2);\r\n return vec4(b1.r ^^ b2.r ,\r\n b1.g ^^ b2.g,\r\n b1.b ^^ b2.b,\r\n b1.a ^^ b2.a);\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslPow(): GlslValueFunction {\r\n return glslBuiltinBinary('pow');\r\n}\r\nexport function glslPRelu(): GlslValueFunction {\r\n const name = 'prelu_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return a < 0.0 ? a * b: a;\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n return vec4(\r\n v1.r < 0.0 ? v1.r * v2.r: v1.r,\r\n v1.g < 0.0 ? v1.g * v2.g: v1.g,\r\n v1.b < 0.0 ? v1.b * v2.b: v1.b,\r\n v1.a < 0.0 ? v1.a * v2.a: v1.a\r\n);\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\n\r\nfunction glslBuiltinBinary(fname: string): GlslValueFunction {\r\n const name = `${fname}_`;\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return ${fname}(a, b);\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n return ${fname}(v1, v2);\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\n\r\nconst createBinaryProgramInfoLoader =\r\n (handler: WebGLInferenceHandler, inputs: Tensor[], glslFunc: GlslValueFunction,\r\n outputTensorType: Tensor.DataType = inputs[0].type, cacheKey?: string): ProgramInfoLoader => {\r\n const textureType = handler.session.pack ? TextureType.packed : TextureType.unpacked;\r\n return {\r\n name: glslFunc.name,\r\n inputNames: ['A', 'B'],\r\n inputTypes: [textureType, textureType],\r\n cacheHint: cacheKey,\r\n get: () => createBinaryProgramInfo(handler, inputs, glslFunc, outputTensorType)\r\n };\r\n };\r\n\r\nconst createBinaryProgramInfo =\r\n (handler: WebGLInferenceHandler, inputs: Tensor[], glslFunc: GlslValueFunction,\r\n outputTensorType: Tensor.DataType = inputs[0].type): ProgramInfo => {\r\n const textureType = handler.session.pack ? TextureType.packed : TextureType.unpacked;\r\n const isBroadcast = !ShapeUtil.areEqual(inputs[0].dims, inputs[1].dims);\r\n let outputShape = inputs[0].dims;\r\n\r\n const usePackedTexture = handler.session.pack;\r\n\r\n if (isBroadcast) {\r\n const calculatedShape = BroadcastUtil.calcShape(inputs[0].dims, inputs[1].dims, false);\r\n if (!calculatedShape) {\r\n throw new Error('Can\\'t perform binary op on the given tensors');\r\n }\r\n outputShape = calculatedShape;\r\n const outputRank = outputShape.length;\r\n const aRank = inputs[0].dims.length !== 0 ? inputs[0].dims.length : 1;\r\n const bRank = inputs[1].dims.length !== 0 ? inputs[1].dims.length : 1;\r\n const aBcast = inputs[0].dims.length !== 0 ? 'bcastIndices_A(indices, aindices);' : 'aindices[0] = 0;';\r\n const bBcast = inputs[1].dims.length !== 0 ? 'bcastIndices_B(indices, bindices);' : 'bindices[0] = 0;';\r\n\r\n const glsl = getGlsl(handler.session.backend.glContext.version);\r\n const shaderSource = usePackedTexture ? `\r\n ${glslFunc.body}\r\n void main() {\r\n vec4 a = getAAtOutCoords();\r\n vec4 b = getBAtOutCoords();\r\n vec4 result = ${glslFunc.name}(a, b);\r\n ${glsl.output} = result;\r\n }` :\r\n `\r\n ${glslFunc.body}\r\n float process(int indices[${outputRank}]) {\r\n int aindices[${aRank}];\r\n int bindices[${bRank}];\r\n ${aBcast}\r\n ${bBcast}\r\n return ${glslFunc.name}(_A(aindices), _B(bindices));\r\n }`;\r\n\r\n return {\r\n name: glslFunc.name,\r\n inputNames: ['A', 'B'],\r\n inputTypes: [textureType, textureType],\r\n output: {dims: outputShape, type: outputTensorType, textureType},\r\n shaderSource,\r\n hasMain: usePackedTexture\r\n };\r\n }\r\n const glsl = getGlsl(handler.session.backend.glContext.version);\r\n const shaderSource = `\r\n ${glslFunc.body}\r\n void main() {\r\n vec4 v1 = ${glsl.texture2D}(A, TexCoords);\r\n vec4 v2 = ${glsl.texture2D}(B, TexCoords);\r\n vec4 result = ${glslFunc.name}(v1, v2);\r\n ${glsl.output} = result;\r\n }\r\n `;\r\n\r\n return {\r\n name: glslFunc.name,\r\n inputNames: ['A', 'B'],\r\n inputTypes: [textureType, textureType],\r\n output: {dims: inputs[0].dims, type: outputTensorType, textureType},\r\n shaderSource,\r\n hasMain: true\r\n };\r\n };\r\n\r\nexport const add = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslAdd()), inputs)];\r\n\r\nexport const and = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslAnd(), 'bool'), inputs)];\r\n\r\nexport const div =

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(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslDiv()), inputs)];\r\n\r\nexport const equal =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslEqual(), 'bool'), inputs)];\r\n\r\nexport const
greater = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslGreater(), 'bool'), inputs)];\r\n\r\nexport const less
= (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslLess(), 'bool'), inputs)];\r\n\r\nexport const mul =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslMul()), inputs)];\r\n\r\nexport const or = (handler:
WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslOr(), 'bool'), inputs)];\r\n\r\nexport const pow =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslPow()), inputs)];\r\n\r\nexport const pRelu =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslPRelu()), inputs)];\r\n\r\nexport const sub =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslSub()), inputs)];\r\n\r\nexport const xor =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslXor(), 'bool'), inputs)];\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from
'../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-
handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport
{getCoordsDataType, getGlChannels} from '../utils';\r\nimport {ConcatAttributes} from './concat';\r\n\r\nimport
{getChannels, unpackFromChannel} from './packing-utils';\r\n\r\nconst createPackedConcatProgramMetadata =
(inputCount: number, cacheHint: string) => ({\r\n  name: 'Concat (packed)',\r\n  inputNames: Array.from({length:
inputCount}, (v, i) => `X${i}`),\r\n  inputTypes: Array(inputCount).fill(TextureType.packed),\r\n
cacheHint\r\n});\r\n\r\nconst createPackedConcatProgramInfo =\r\n    (handler: WebGLInferenceHandler, metadata:
ProgramMetadata, inputs: Tensor[], axis: number): ProgramInfo => {\r\n      const inputShape =
inputs[0].dims.slice();\r\n      if (axis >= inputShape.length || axis < (-1 * inputShape.length)) {\r\n        throw new
Error('axis specified for concat doesn\\'t match input dimensionality');\r\n      }\r\n      if (axis < 0) {\r\n        axis =
inputShape.length + axis;\r\n      }\r\n      // ensure all of the non-concatenated axes match each other\r\n      //
calculate the shape of the output tensor while we do that\r\n      const outputShape = inputShape.slice(0);\r\n      for
(let i = 1; i < inputs.length; i++) {\r\n        const dataNShape = inputs[i].dims.slice();\r\n        for (let axisIndex = 0;
axisIndex < inputShape.length; axisIndex++) {\r\n          // add to the placeholder for computing output shape\r\n
 if (axisIndex === axis) {\r\n            outputShape[axis] += dataNShape[axisIndex];\r\n          }\r\n          // ensure all
non-cancatenated axes match each other\r\n          else if (inputShape[axisIndex] !== dataNShape[axisIndex]) {\r\n
      throw new Error('non concat dimensions must match');\r\n          }\r\n        }\r\n      }\r\n\r\n      const rank =
outputShape.length;\r\n      const coords = getChannels('coords', rank);\r\n      const dtype =
getCoordsDataType(rank);\r\n      const unpackChannel = unpackFromChannel();\r\n\r\n      const shapes =
inputs.map(i => i.dims);\r\n      const channels = getGlChannels(rank);\r\n      const offsets: number[] = new
Array(shapes.length - 1);\r\n\r\n      offsets[0] = shapes[0][axis];\r\n      for (let i = 1; i < offsets.length; i++) {\r\n
offsets[i] = offsets[i - 1] + shapes[i][axis];\r\n      }\r\n\r\n      const channel = channels[axis];\r\n      const
lastChannels = channels.slice(-2);\r\n      const allChannels = channels.join();\r\n\r\n      let getValueSnippet = `if
(${channel} < ${offsets[0]}) {\r\n        return getChannel(\r\n            getX0(${allChannels}),
vec2(${lastChannels.join()}));\r\n        }`;\r\n      for (let i = 1; i < offsets.length; i++) {\r\n        const shift = offsets[i
- 1];\r\n        getValueSnippet += `\r\n            if (${channel} < ${offsets[i]}  && ${channel} >= ${offsets[i - 1]})
{\r\n              return getChannel(\r\n                getX${i}(${getShiftedChannelsSnippet(channels, channel, shift)}),\r\n
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vec2(${getShiftedChannelsSnippet(lastChannels, channel, shift)}));\r\n }`;\r\n }\r\n const lastIndex = offsets.length;\r\n const shift = offsets[offsets.length - 1];\r\n getValueSnippet += `\r\n return getChannel(\r\n getX${lastIndex}(${getShiftedChannelsSnippet(channels, channel, shift)}),\r\n vec2(${getShiftedChannelsSnippet(lastChannels, channel, shift)}));`;\r\n\r\n const glsl = getGlsl(handler.session.backend.glContext.version);\r\n\r\n\r\n const shaderSource = `\r\n ${unpackChannel}\r\n float getValue(${channels.map(x => 'int ' + x)}) {\r\n ${getValueSnippet}\r\n }\r\n\r\n void main() {\r\n ${dtype} coords = getOutputCoords();\r\n int lastDim = coords.${channels[rank - 1]};\r\n coords.${channels[rank - 1]} = coords.${channels[rank - 2]};\r\n coords.${channels[rank - 2]} = lastDim;\r\n\r\n vec4 result = vec4(getValue(${coords}), 0., 0., 0.);\r\n\r\n ${coords[rank - 1]} = ${coords[rank - 1]} + 1;\r\n if (${coords[rank - 1]} < ${outputShape[rank - 1]}) {\r\n result.g = getValue(${coords});\r\n }\r\n\r\n ${coords[rank - 2]} = ${coords[rank - 2]} + 1;\r\n if (${coords[rank - 2]} < ${outputShape[rank - 2]}) {\r\n result.a = getValue(${coords});\r\n }\r\n\r\n ${coords[rank - 1]} = ${coords[rank - 1]} - 1;\r\n if (${coords[rank - 2]} < ${outputShape[rank - 2]} &&\r\n ${coords[rank - 1]} < ${outputShape[rank - 1]}) {\r\n result.b = getValue(${coords});\r\n }\r\n ${glsl.output} = result;\r\n }\r\n `;\r\n\r\n return {\r\n ...metadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.packed},\r\n shaderSource,\r\n hasMain: true,\r\n };\r\n };\r\n\r\nexport const createPackedConcatProgramInfoLoader =\r\n (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: ConcatAttributes): ProgramInfoLoader => {\r\n const metadata = createPackedConcatProgramMetadata(inputs.length, attributes.cacheKey);\r\n return {...metadata, get: () => createPackedConcatProgramInfo(handler, metadata, inputs, attributes.axis)};\r\n };\r\n\r\nconst getShiftedChannelsSnippet = (channels: string[], channel: string, shift: number): string => {\r\n const channelIdx = channels.indexOf(channel);\r\n const res = channels.map((c, idx) => {\r\n if (idx === channelIdx) {\r\n return `${c} - ${shift}`;\r\n } else {\r\n return c;\r\n }\r\n });\r\n return res.join();\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nimport {createPackedConcatProgramInfoLoader} from './concat-packed';\r\n\r\nexport interface ConcatAttributes extends AttributeWithCacheKey {\r\n readonly axis: number;\r\n}\r\n\r\nexport const concat: OperatorImplementation<ConcatAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ConcatAttributes): Tensor[] => {\r\n validateInputs(inputs);\r\n if (inferenceHandler.session.pack && inputs[0].dims.length > 1) {\r\n const output =\r\n inferenceHandler.run(createPackedConcatProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n return [output];\r\n } else {\r\n const output =\r\n inferenceHandler.run(createUnpackedConcatProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n return [output];\r\n }\r\n };\r\n\r\nconst createUnpackedConcatProgramMetadata = (inputCount: number, cacheHint: string) => ({\r\n name: 'Concat',\r\n inputNames: Array.from({length: inputCount}, (v, i) => `X${i}`),\r\n inputTypes: Array(inputCount).fill(TextureType.unpacked),\r\n cacheHint\r\n});\r\n\r\nconst createUnpackedConcatProgramInfo =\r\n (handler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: Tensor[], axis: number): ProgramInfo => {\r\n const inputShape = inputs[0].dims.slice();\r\n if (axis >= inputShape.length || axis < (-1 * inputShape.length)) {\r\n throw new Error('axis specified for concat doesn\\'t match input dimensionality');\r\n }\r\n if (axis < 0) {\r\n axis = inputShape.length + axis;\r\n }\r\n // ensure all of the non-concatenated axes match each other\r\n // calculate the shape of the output tensor while we do that\r\n const outputShape = inputShape.slice(0);\r\n for (let i = 1; i < inputs.length; i++) {\r\n const dataNShape = inputs[i].dims.slice();\r\n for (let axisIndex = 0; axisIndex < inputShape.length; axisIndex++) {\r\n // add to the placeholder for computing output shape\r\n if (axisIndex === axis) {\r\n outputShape[axis] += dataNShape[axisIndex];\r\n }\r\n // ensure all non-cancatenated axes match each

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other\r\n          else if (inputShape[axisIndex] !== dataNShape[axisIndex]) {\r\n            throw new Error('non concat
dimensions must match');\r\n          }\r\n        }\r\n      }\r\n\r\n      const rank = outputShape.length;\r\n\r\n      const
sizeInConcatAxis = new Array<number>(inputs.length);\r\n      let previousSum = 0;\r\n      for (let i = 0; i <
sizeInConcatAxis.length; ++i) {\r\n        previousSum += inputs[i].dims[axis];\r\n        sizeInConcatAxis[i] =
previousSum;\r\n      }\r\n\r\n      let getTextureIndexWhereDataResidesMethod = '';\r\n      // in most cases linear
search is sufficient, as in most scenarios, only 2 tensors are concatenated\r\n      if (inputs.length < 5) {\r\n
getTextureIndexWhereDataResidesMethod =
getTextureIndexWhereDataResidesLinearSearch(sizeInConcatAxis);\r\n      } else {\r\n
getTextureIndexWhereDataResidesMethod =
getTextureIndexWhereDataResidesBinarySearch(sizeInConcatAxis);\r\n      }\r\n\r\n      const
fetchDataFromCorrectTextureMethod = getFetchDataFromCorrectTextureMethod(inputs.length, rank);\r\n      const
getSizeInConcatAxisValueFromIndexMethod =
getGetSizeInConcatAxisValueFromIndexMethod(sizeInConcatAxis);\r\n      const shaderSource = `\r\n
${fetchDataFromCorrectTextureMethod}\r\n        ${getSizeInConcatAxisValueFromIndexMethod}\r\n
${getTextureIndexWhereDataResidesMethod}\r\n        float process(int indices[${rank}]) {\r\n          int
textureIndex = getTextureWhereDataResides (indices[${axis}]);\r\n\r\n          if(textureIndex != 0) {\r\n
indices[${axis}] = indices[${axis}] - int(getSizeInConcatAxisValueFromIndex(textureIndex-int(1)));\r\n
}\r\n\r\n          return fetchDataFromCorrectTexture(textureIndex, indices);\r\n        }`;\r\n      return {\r\n
...metadata,\r\n        output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n
shaderSource,\r\n      };\r\n    };\r\n\r\nconst createUnpackedConcatProgramInfoLoader =\r\n    (handler:
WebGLInferenceHandler, inputs: Tensor[], attributes: ConcatAttributes): ProgramInfoLoader => {\r\n      const
metadata = createUnpackedConcatProgramMetadata(inputs.length, attributes.cacheKey);\r\n      return {...metadata,
get: () => createUnpackedConcatProgramInfo(handler, metadata, inputs, attributes.axis)};\r\n    };\r\n\r\nconst
getTextureIndexWhereDataResidesLinearSearch = (sizeInConcatAxis: number[]): string => {\r\n  const searchAxis
= sizeInConcatAxis.map((size, i) => `if(index<${size}) {return ${i};}\r\n`);\r\n  return `int
getTextureWhereDataResides(int index) {\r\n      ${searchAxis.join('')}\r\n    }`;\r\n};\r\n\r\n// TODO: Implement
BinarySearch in GLSL\r\nconst getTextureIndexWhereDataResidesBinarySearch = (sizeInConcatAxis: number[]):
string =>\r\n    getTextureIndexWhereDataResidesLinearSearch(sizeInConcatAxis);\r\n\r\nconst
getFetchDataFromCorrectTextureMethod = (numberOfTensors: number, tensorRank: number) => {\r\n  const
codeLines: string[] = [`float fetchDataFromCorrectTexture(int textureIndex, int indices[${tensorRank}]) {`];\r\n  for
(let i = 0; i < numberOfTensors; ++i) {\r\n    if (i === 0) {\r\n      codeLines.push(\r\n          '\\t' +\r\n          `if
(textureIndex == ${i}) { return _X${i}(indices); }`);\r\n    } else if (i === numberOfTensors - 1) {\r\n
codeLines.push(\r\n          '\\t' +\r\n          `else { return _X${i}(indices); }`);\r\n    } else {\r\n      codeLines.push(\r\n
       '\\t' +\r\n          `else if (textureIndex == ${i}) { return _X${i}(indices); }`);\r\n    }\r\n  }\r\n
codeLines.push(\r\n      '\\t' +\r\n      '}');\r\n  return codeLines.join('\\n');\r\n};\r\n\r\nconst
getGetSizeInConcatAxisValueFromIndexMethod = (sizeInConcatAxis: number[]): string => {\r\n  const codeLines:
string[] = ['int getSizeInConcatAxisValueFromIndex(int index) {'];\r\n  for (let i = 0; i < sizeInConcatAxis.length;
++i) {\r\n    if (i === 0) {\r\n      codeLines.push(\r\n          '\\t' +\r\n          `if (index == ${i}) { return
${sizeInConcatAxis[i]}; }`);\r\n    } else if (i === sizeInConcatAxis.length - 1) {\r\n      codeLines.push(\r\n
'\\t' +\r\n          `else { return ${sizeInConcatAxis[i]}; }`);\r\n    } else {\r\n      codeLines.push(\r\n          '\\t' +\r\n
 `else if (index == ${i}) { return ${sizeInConcatAxis[i]}; }`);\r\n    }\r\n  }\r\n  codeLines.push(\r\n      '\\t' +\r\n
'}');\r\n\r\n  return codeLines.join('\\n');\r\n};\r\n\r\nexport const parseConcatAttributes:
OperatorInitialization<ConcatAttributes> = (node: Graph.Node): ConcatAttributes =>\r\n
createAttributeWithCacheKey({axis: node.attributes.getInt('axis')});\r\n\r\nconst validateInputs = (inputs: Tensor[]):
void => {\r\n  if (!inputs || inputs.length < 1) {\r\n    throw new Error('too few inputs');\r\n  }\r\n\r\n  const inputType
= inputs[0].type;\r\n  const inputDimensionality = inputs[0].dims.length;\r\n\r\n  // TODO: Support string concat\r\n
if (inputType === 'string') {\r\n    throw new Error('string tensor is not supported yet');\r\n  }\r\n\r\n  for (const input
of inputs) {\r\n    // make sure types of all inputs match\r\n    if (input.type !== inputType) {\r\n      throw new
```

Error('input tensors should be one type');\r\n   }\r\n\r\n   // make sure the dimensionality of all inputs are the same\r\n   if (input.dims.length !== inputDimensionality) {\r\n   throw new Error('input tensors should have the same shape');\r\n   }\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Logger} from '../../../instrument';\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nimport {calculateOutputShape, ConvAttributes} from './conv';\r\nimport {getActicationSnippet} from './fuse-utils';\r\n\r\nconst createUnpackedGroupedConvProgramMetadata = (hasBias: boolean, cacheHint: string): ProgramMetadata => ({\r\n name: 'GroupedConv',\r\n inputNames: hasBias ? ['X', 'W', 'Bias'] : ['X', 'W'],\r\n inputTypes: hasBias ? [TextureType.unpacked, TextureType.unpacked, TextureType.unpacked] :\r\n   [TextureType.unpacked, TextureType.unpacked],\r\n cacheHint\r\n});\r\n\r\nconst createUnpackedGroupedConvProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], metadata: ProgramMetadata,\r\n   attributes: ConvAttributes): ProgramInfo => {\r\n   const hasBias = inputs.length > 2;\r\n   const processBias = hasBias ? 'value += getBias(output_channel);' : '';\r\n   const xShape = inputs[0].dims.slice();\r\n   const wShape = inputs[1].dims.slice();\r\n   const outputChannelsPerGroup = wShape[0] / attributes.group;\r\n   Logger.verbose(\r\n   'GroupedConv',\r\n   `autpPad:${attributes.autoPad}, dilations:${attributes.dilations}, group:${attributes.group}, kernelShape:${\r\n              attributes.kernelShape}, pads:${attributes.pads}, strides:${attributes.strides}`);\r\n   const outputShape =\r\n   calculateOutputShape(xShape, wShape, attributes.dilations, attributes.pads, attributes.strides);\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const {activationFunction, applyActivation} = getActicationSnippet(attributes);\r\n\r\n   const shaderSource = `\r\n const ivec2 strides = ivec2(${attributes.strides[0]}, ${attributes.strides[1]});\r\n const ivec2 pads = ivec2(${attributes.pads[0]}, ${attributes.pads[1]});\r\n ${activationFunction}\r\n void main() {\r\n   ivec4 coords = getOutputCoords();\r\n   int batch = coords.x;\r\n   int output_channel = coords.y;\r\n   ivec2 xRCCorner = coords.zw * strides - pads;\r\n   int group_id = output_channel / ${outputChannelsPerGroup};\r\n\r\n   float value = 0.0;\r\n   for (int wInChannel = 0; wInChannel < ${wShape[1]}; wInChannel++) {\r\n   int input_channel = group_id * ${wShape[1]} + wInChannel;\r\n   for (int wHeight = 0; wHeight < ${wShape[2]}; wHeight++) {\r\n   int xHeight = xRCCorner.x + wHeight * ${attributes.dilations[0]};\r\n\r\n   if (xHeight < 0 || xHeight >= ${xShape[2]}) {\r\n   continue;\r\n   }\r\n\r\n   for (int wWidth = 0; wWidth < ${wShape[3]}; wWidth++) {\r\n   int xWidth = xRCCorner.y + wWidth * ${attributes.dilations[1]};\r\n   if (xWidth < 0 || xWidth >= ${xShape[3]}) {\r\n   continue;\r\n   }\r\n\r\n   float xVal = getX(batch, input_channel, xWidth, xHeight);\r\n   float wVal = getW(output_channel, wInChannel, wWidth, wHeight);\r\n   value += xVal*wVal;\r\n   }\r\n   }\r\n   }\r\n ${processBias}\r\n ${applyActivation}\r\n ${glsl.output} = vec4(value, .0, .0, .0);\r\n }\r\n`;\r\n   return {\r\n   ...metadata,\r\n   output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n   shaderSource,\r\n   hasMain: true,\r\n   };\r\n   };\r\n\r\nexport const createUnpackedGroupedConvProgramInfoLoader =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes):\r\n   ProgramInfoLoader => {\r\n   const metadata = createUnpackedGroupedConvProgramMetadata(inputs.length > 2, attributes.cacheKey);\r\n   return {\r\n   ...metadata,\r\n   get: () => createUnpackedGroupedConvProgramInfo(inferenceHandler, inputs, metadata, attributes)\r\n   };\r\n   };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {calculateOutputShape, ConvAttributes} from './conv';\r\nimport {createPackedIm2ColProgramInfoLoader} from './im2col-pack';\r\nimport {createPackedMatmulProgramInfoLoader} from './matmul-pack';\r\n\r\nexport const conv2DPackedPointwise =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes): Tensor => {\r\n   const xshape = inputs[0].dims;\r\n   const kshape = inputs[1].dims;\r\n   const outputShape =\r\n   calculateOutputShape(xshape, kshape, attributes.dilations, attributes.pads, attributes.strides);\r\n   const reshapedX = inferenceHandler.reshapePacked(inputs[0], [xshape[1], xshape[2] * xshape[3]]);\r\n   const reshapedK =

inferenceHandler.reshapePacked(inputs[1], [kshape[0], kshape[1]]);\r\n\r\n const matmulInputs = inputs.length > 2 ? [reshapedK, reshapedX, inputs[2]] : [reshapedK, reshapedX];\r\n const matmulOutput = inferenceHandler.run(\r\n createPackedMatmulProgramInfoLoader(inferenceHandler, matmulInputs, attributes), matmulInputs);\r\n return inferenceHandler.reshapePacked(matmulOutput, outputShape);\r\n };\r\n\r\nexport const conv2DPacked =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes): Tensor => {\r\n const xshape = inputs[0].dims;\r\n const kshape = inputs[1].dims;\r\n const outputShape =\r\n calculateOutputShape(xshape, kshape, attributes.dilations, attributes.pads, attributes.strides);\r\n\r\n // run im2col\r\n const im2colOutput = inferenceHandler.run(\r\n createPackedIm2ColProgramInfoLoader(inferenceHandler, inputs[0], inputs[1], outputShape, attributes),\r\n [inputs[0]]);\r\n\r\n // reshape kernel\r\n const kernelReshaped = inferenceHandler.reshapePacked(inputs[1], [kshape[0], kshape[1] * kshape[2] * kshape[3]]);\r\n\r\n // run matmul\r\n const matmulInputs =\r\n (inputs.length === 3) ? [kernelReshaped, im2colOutput, inputs[2]] : [kernelReshaped, im2colOutput];\r\n const matmulOutput = inferenceHandler.run(\r\n createPackedMatmulProgramInfoLoader(inferenceHandler, matmulInputs, attributes), matmulInputs);\r\n\r\n // reshape output\r\n const outputReshaped = inferenceHandler.reshapePacked(matmulOutput, outputShape);\r\n return outputReshaped;\r\n };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {InferenceHandler} from '../../../backend';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {PoolConvUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nimport {createUnpackedGroupedConvProgramInfoLoader} from './conv-grouped';\r\nimport {conv2DPacked} from './conv-pack';\r\nimport {createDotProductProgramInfoLoader} from './dot-product';\r\nimport {InternalActivationAttributes, parseInternalActivationAttributes} from './fuse-utils';\r\nimport {createIm2ColProgramInfoLoader} from './im2col';\r\nimport {createMatmulProgramInfoLoader} from './matmul';\r\n\r\n\r\nexport const calculateOutputShape =\r\n (inputShape: readonly number[], kernelShape: readonly number[], dilations: readonly number[],\r\n adjustPads: readonly number[], strides: readonly number[]): number[] => {\r\n const batchSize = inputShape[0];\r\n const inputSpatialShape = inputShape.slice(2);\r\n const spatialRank = inputSpatialShape.length;\r\n const outChannels = kernelShape[0];\r\n const kernelSpatialShape = kernelShape.slice(2);\r\n const dilatedKernelShape = kernelSpatialShape.map((v, i) => v + (v - 1) * (dilations[i] - 1));\r\n const inputSpatialShapeWithPad = inputSpatialShape.map((v, i) => v + adjustPads[i] + adjustPads[i + spatialRank]);\r\n const outputSpatialShape =\r\n inputSpatialShapeWithPad.map((v, i) => Math.floor((v - dilatedKernelShape[i] + strides[i]) / strides[i]));\r\n const outputShape = [batchSize, outChannels].concat(...outputSpatialShape);\r\n return outputShape;\r\n };\r\n\r\nexport interface ConvAttributes extends InternalActivationAttributes, AttributeWithCacheKey {\r\n readonly autoPad: string;\r\n readonly dilations: readonly number[];\r\n readonly group: number;\r\n readonly kernelShape: readonly number[];\r\n readonly pads: readonly number[];\r\n readonly strides: readonly number[];\r\n}\r\n\r\nexport const conv: OperatorImplementation<ConvAttributes> =\r\n (inferenceHandler: InferenceHandler, inputs: Tensor[], attributes: ConvAttributes): Tensor[] => {\r\n validateInputs(inputs, attributes); // currently will fail if not conv2D\r\n return conv2d(inferenceHandler, inputs, attributes);\r\n };\r\n\r\nconst conv2d: OperatorImplementation<ConvAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ConvAttributes): Tensor[] => {\r\n const adjustedAttributes = getAdjustedConvAttributes(attributes, inputs);\r\n const packMode = inferenceHandler.session.pack;\r\n const isPointwise = adjustedAttributes.kernelShape[0] === 1 && adjustedAttributes.kernelShape[1] === 1;\r\n if (adjustedAttributes.group > 1) {\r\n const result = inferenceHandler.run(\r\n createUnpackedGroupedConvProgramInfoLoader(inferenceHandler, inputs, adjustedAttributes), inputs);\r\n return [result];\r\n } else if (isPointwise && packMode) {\r\n return [conv2DUnpackedPointwise(inferenceHandler, inputs, adjustedAttributes)];\r\n } else if (packMode && inputs[0].dims.length === 4 && inputs[0].dims[0] === 1 && !isPointwise) {\r\n return [conv2DPacked(inferenceHandler, inputs, adjustedAttributes)];\r\n } else {\r\n return [conv2DUnpacked(inferenceHandler, inputs, adjustedAttributes)];\r\n }\r\n };\r\n\r\nconst conv2DUnpackedPointwise =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes): Tensor => {\r\n const xshape = inputs[0].dims;\r\n const kshape = inputs[1].dims;\r\n const outputShape =\r\n calculateOutputShape(xshape, kshape, attributes.dilations, attributes.pads, attributes.strides);\r\n const reshapedX = inferenceHandler.reshapeUnpacked(inputs[0], [xshape[1], xshape[2] * xshape[3]]);\r\n const reshapedK = inferenceHandler.reshapeUnpacked(inputs[1], [kshape[0], kshape[1]]);\r\n\r\n const matmulInputs = inputs.length > 2 ? [reshapedK, reshapedX, inputs[2]] : [reshapedK, reshapedX];\r\n const matmulOutput = inferenceHandler.run(createMatmulProgramInfoLoader(matmulInputs, attributes), matmulInputs);\r\n return inferenceHandler.reshapeUnpacked(matmulOutput, outputShape);\r\n };\r\n\r\nconst conv2DUnpacked =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes): Tensor => {\r\n const xshape = inputs[0].dims;\r\n const kshape = inputs[1].dims;\r\n const outputShape =\r\n calculateOutputShape(xshape, kshape, attributes.dilations, attributes.pads, attributes.strides);\r\n const xIm2Col = inferenceHandler.run(\r\n createIm2ColProgramInfoLoader(inferenceHandler, inputs[0], inputs[1], outputShape, attributes), [inputs[0]]);\r\n\r\n const dotProductInputs = inputs.length === 3 ? [xIm2Col, inputs[1], inputs[2]] : [xIm2Col, inputs[1]];\r\n const output = inferenceHandler.run(\r\n createDotProductProgramInfoLoader(inferenceHandler, inputs, outputShape, attributes), dotProductInputs);\r\n return output;\r\n };\r\n\r\nconst getAdjustedConvAttributes = <T extends ConvAttributes>(attributes: T, inputs: Tensor[]): T => {\r\n const kernelShape = attributes.kernelShape.slice();\r\n // if kernelShape is not specified in the attributes of this op, infer it from the weight tensor dims\r\n if (attributes.kernelShape.length === 0) {\r\n for (let i = 2; i < inputs[1].dims.length; ++i) {\r\n kernelShape.push(inputs[1].dims[i]);\r\n }\r\n }\r\n const pads = attributes.pads.slice();\r\n PoolConvUtil.adjustPadsBasedOnAutoPad(\r\n inputs[0].dims, attributes.strides, attributes.dilations, kernelShape, pads, attributes.autoPad);\r\n\r\n // always return a new object so does not modify the original attributes\r\n const newAttributes: T = Object.assign({}, attributes);\r\n Object.assign(newAttributes, {kernelShape, pads, cacheKey: attributes.cacheKey});\r\n return newAttributes;\r\n};\r\n\r\nexport const parseConvAttributes: OperatorInitialization<ConvAttributes> = (node: Graph.Node): ConvAttributes => {\r\n const attributes = node.attributes;\r\n const activationAttributes = parseInternalActivationAttributes(attributes);\r\n // TODO : Make this generic enough to compute default attributes for multi-dimensional conv\r\n const autoPad = attributes.getString('auto_pad', 'NOTSET');\r\n const dilations = attributes.getInts('dilations', [1, 1]);\r\n const group = attributes.getInt('group', 1);\r\n const kernelShape = attributes.getInts('kernel_shape', []);\r\n const pads = attributes.getInts('pads', [0, 0, 0, 0]);\r\n const strides = attributes.getInts('strides', [1, 1]);\r\n\r\n return createAttributeWithCacheKey({autoPad, dilations, group, kernelShape, pads, strides, ...activationAttributes});\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[], attributes: ConvAttributes): void => {\r\n // Refer to the below link for all input checks\r\n // https://github.com/onnx/onnx/blob/master/docs/Operators.md#Conv\r\n if (!inputs || (inputs.length !== 2 && inputs.length !== 3)) {\r\n throw new Error('Conv requires 2 or 3 inputs');\r\n }\r\n\r\n // TODO : Need to add support for multi-dimensional conv\r\n if (inputs[0].dims.length !== 4 || inputs[1].dims.length !== 4) {\r\n throw new Error('currently only support 2-dimensional conv');\r\n }\r\n\r\n // FILTER_IN_CHANNEL should be equal to DATA_CHANNEL\r\n const dataChannel = inputs[0].dims[1];\r\n const filterInChannel = inputs[1].dims[1] * attributes.group;\r\n if (dataChannel !== filterInChannel) {\r\n throw new Error('FILTER_IN_CHANNEL should be equal to DATA_CHANNEL');\r\n }\r\n\r\n // if bias is provided it should be 1D and the number of elements should be equal to the number of feature maps\r\n if (inputs.length === 3 && (inputs[2].dims.length !== 1 || inputs[1].dims[0] !== inputs[2].dims[0])) {\r\n throw new Error('invalid bias');\r\n }\r\n\r\n const spatialRank = inputs[0].dims.length - 2;\r\n // wrong dilations dimension\r\n if (attributes.dilations.length !== spatialRank) {\r\n throw new Error(`dilations should be ${spatialRank}D`);\r\n }\r\n\r\n // Wrong strides dimension\r\n if (attributes.strides.length !== spatialRank) {\r\n throw new Error(`strides should be ${spatialRank}D`);\r\n }\r\n\r\n // Wrong pads dimension\r\n if (attributes.pads.length !== spatialRank * 2) {\r\n throw new Error(`pads should be ${spatialRank * 2}D`);\r\n }\r\n\r\n // if kernelShape is specified, it's data length must be 2 less than dims length of the weights tensor\r\n // (the first 2 dims are batch_size and channels)\r\n if (attributes.kernelShape.length !== 0 && attributes.kernelShape.length !== inputs[1].dims.length - 2) {\r\n throw new Error('invalid kernel shape');\r\n }\r\n\r\n // TODO : Need to add support for float64\r\n if (inputs[0].type !== 'float32' || inputs[1].type !== 'float32') {\r\n throw new Error('Conv input(X,W) should be float tensor');\r\n }\r\n\r\n if (inputs.length === 3 && inputs[2].type !== 'float32') {\r\n throw new Error('Conv input(bias) should be float tensor');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nimport {transpose, TransposeAttributes} from './transpose';\r\n\r\nexport interface DepthToSpaceAttributes {\r\n mode: 'DCR'|'CRD';\r\n blocksize: number;\r\n}\r\n\r\nexport const depthToSpace: OperatorImplementation<DepthToSpaceAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: DepthToSpaceAttributes): Tensor[] => {\r\n validateInputs(inputs);\r\n const blocksize = attributes.blocksize;\r\n const blocksizeSqr = blocksize * blocksize;\r\n const transposePerm = attributes.mode === 'DCR' ? [0, 3, 4, 1, 5, 2] : [0, 1, 4, 2, 5, 3];\r\n const firstReshapeShape = attributes.mode === 'DCR' ?\r\n [\r\n inputs[0].dims[0], blocksize, blocksize, inputs[0].dims[1] / blocksizeSqr, inputs[0].dims[2],\r\n inputs[0].dims[3]\r\n] :\r\n [\r\n inputs[0].dims[0], inputs[0].dims[1] / blocksizeSqr, blocksize, blocksize, inputs[0].dims[2],\r\n inputs[0].dims[3]\r\n];\r\n\r\n // const transpose = new WebGLTranspose();\r\n // const attributes = new Attribute(undefined);\r\n // attributes.set('perm', 'ints', transposePerm);\r\n // transpose.initialize(attributes);\r\n\r\n // First reshape\r\n const firstReshapedTensor = inferenceHandler.reshapeUnpacked(inputs[0], firstReshapeShape);\r\n\r\n // transpose\r\n const transposeAttributes: TransposeAttributes = {perm: transposePerm, cacheKey: `${transposePerm}`};\r\n const [transposeOutput] = transpose(inferenceHandler, [firstReshapedTensor], transposeAttributes);\r\n\r\n // Second reshape\r\n const secondReshapeShape = [\r\n inputs[0].dims[0], inputs[0].dims[1] / blocksizeSqr, inputs[0].dims[2] * blocksize,\r\n inputs[0].dims[3] * blocksize\r\n];\r\n const result = inferenceHandler.reshapeUnpacked(transposeOutput, secondReshapeShape);\r\n return [result];\r\n };\r\n\r\nexport const parseDepthToSpaceAttributes: OperatorInitialization<DepthToSpaceAttributes> =\r\n (node: Graph.Node): DepthToSpaceAttributes => {\r\n // processing node attributes\r\n const blocksize = node.attributes.getInt('blocksize');\r\n if (blocksize < 1) {\r\n throw new Error(`blocksize must be >= 1, but got : ${blocksize} for DepthToSpace`);\r\n }\r\n const mode = node.attributes.getString('mode', 'DCR');\r\n if (mode !== 'DCR' && mode !== 'CRD') {\r\n throw new Error(`unrecognized mode: ${mode} for DepthToSpace`);\r\n }\r\n return {mode, blocksize};\r\n };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (inputs.length !== 1) {\r\n throw new Error(`DepthToSpace expect 1 inputs, but got ${inputs.length}`);\r\n }\r\n\r\n // Input has to be a 4-D tensor\r\n // TODO: Support string depth-to-space.\r\n if (inputs[0].type === 'string' || inputs[0].dims.length !== 4) {\r\n throw new TypeError('DepthToSpace input should be a 4-D numeric tensor');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport {getActicationSnippet, InternalActivationAttributes} from './fuse-utils';\r\nimport {calculateIm2ColDims} from './im2col';\r\n\r\nconst createDotProductProgramMetadata = (hasBias: boolean, attributes: InternalActivationAttributes) => ({\r\n name: 'ConvDotProduct',\r\n inputNames: hasBias ? ['Im2Col', 'K', 'B'] : ['Im2Col', 'K'],\r\n inputTypes: hasBias ? [TextureType.unpacked, TextureType.packedLastDimension, TextureType.unpacked] :\r\n [TextureType.unpacked, TextureType.packedLastDimension],\r\n cacheKey: attributes.activationCacheKey\r\n});\r\n\r\nconst createDotProductProgramInfo =\r\n (inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: readonly Tensor[],\r\n outputShape: number[], attributes: InternalActivationAttributes): ProgramInfo => {\r\n const xshape =

inputs[0].dims;\r\n   const kshape = inputs[1].dims;\r\n   const adjustedKernelShape = [kshape[0], Math.ceil((xshape[1] * kshape[2] * kshape[3]) / 4)];\r\n   const im2colShape = calculateIm2ColDims(xshape, kshape, outputShape);\r\n   const [kWidth, kHeight] =\r\n inferenceHandler.calculateTextureWidthAndHeight(adjustedKernelShape, TextureType.packedLastDimension);\r\n\r\n   const im2colStrides = ShapeUtil.computeStrides(im2colShape);\r\n const [im2colWidth, im2colHeight] =\r\n   inferenceHandler.calculateTextureWidthAndHeight(im2colShape, TextureType.packedLastDimension);\r\n   const rank = outputShape.length;\r\n\r\n   const initValue = (inputs.length < 3) ? '0.0' : '_B(b)';\r\n   const sharedDim = Math.ceil(xshape[1] * kshape[2] * kshape[3] / 4);\r\n const {activationFunction, applyActivation} = getActicationSnippet(attributes);\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const shaderSource = `\r\n${activationFunction}\r\nfloat process(int indices[${rank}]) {\r\n int b[1];\r\n b[0] = indices[1];\r\n int im2col[4];\r\n im2col[0] = indices[0];\r\n im2col[1] = indices[2];\r\n im2col[2] = indices[3];\r\n int im2colOffset = im2col[0] * ${im2colStrides[0]} + im2col[1] * ${im2colStrides[1]} + im2col[2] * ${\r\n im2colStrides[2]};\r\n int kernelOffset = indices[1] * ${adjustedKernelShape[1]};\r\n float value = ${initValue};\r\n for (int i = 0; i < ${sharedDim}; ++i) {\r\n   vec2 im2colCoords = offsetToCoords(im2colOffset, ${im2colWidth}, ${im2colHeight});\r\n   vec2 kernelCoords = offsetToCoords(kernelOffset, ${kWidth}, ${kHeight});\r\n   value += dot(${glsl.texture2D}(Im2Col, im2colCoords), ${glsl.texture2D}(K, kernelCoords));\r\n   ++im2colOffset;\r\n   ++kernelOffset;\r\n }\r\n ${applyActivation}\r\n return value;\r\n}`;\r\n   return {\r\n   ...metadata,\r\n   output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nexport const createDotProductProgramInfoLoader =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], outputShape: number[],\r\n   attributes: InternalActivationAttributes): ProgramInfoLoader => {\r\n const metadata = createDotProductProgramMetadata(inputs.length > 2, attributes);\r\n   return {\r\n ...metadata,\r\n   get: () => createDotProductProgramInfo(inferenceHandler, metadata, inputs, outputShape, attributes)\r\n   };\r\n   };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const flatten: OperatorImplementation<number> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axis: number): Tensor[] => {\r\n   validateInputs(inputs, axis);\r\n\r\n   const outputDims = ShapeUtil.flattenShape(inputs[0].dims, axis);\r\n   return [inferenceHandler.reshapeUnpacked(inputs[0], outputDims)];\r\n   };\r\n\r\nexport const parseFlattenAttributes: OperatorInitialization<number> = (node: Graph.Node): number =>\r\n   node.attributes.getInt('axis', 1); // default axis is 1\r\n\r\nconst validateInputs = (inputs: Tensor[], axis: number): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Flatten requires 1 input.');\r\n }\r\n\r\n const r = inputs[0].dims.length;\r\n if (r === 0) {\r\n   throw new Error('scalar tensor is not supported.');\r\n }\r\n\r\n if (axis < -r || axis > r) {\r\n   throw new Error('Invalid axis');\r\n }\r\n\r\n // TODO: Support string type\r\n if (inputs[0].type === 'string') {\r\n   throw new Error('string tensor is not supported.');\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Attribute} from '../../../attribute';\r\nimport {GlslValueFunction} from '../glsl-definitions';\r\nimport {glslClip, glslRelu, glslSigmoid} from './unary-op';\r\n\r\nexport interface InternalActivationAttributes {\r\n readonly activation: string;\r\n readonly clipMin?: number;\r\n readonly clipMax?: number;\r\n readonly activationCacheKey: string;\r\n}\r\n\r\nexport function getActicationSnippet(attributes: InternalActivationAttributes) {\r\n let func: GlslValueFunction;\r\n switch (attributes.activation) {\r\n   case 'Relu':\r\n   func = glslRelu();\r\n   break;\r\n   case 'Sigmoid':\r\n   func = glslSigmoid();\r\n   break;\r\n   case 'Clip':\r\n   func = glslClip(attributes.clipMin!, attributes.clipMax!);\r\n break;\r\n   // TODO: adding other activations that can be fused.\r\n   default:\r\n   return {activationFunction: '', applyActivation: ''};\r\n }\r\n\r\n const activationName = func.name;\r\n const activationFunction = func.body;\r\n const applyActivation = `value = ${activationName}_(value);`;\r\n return {activationFunction, applyActivation};\r\n}\r\n\r\nexport const parseInternalActivationAttributes = (attributes: Attribute): InternalActivationAttributes => {\r\n const activation = attributes.getString('__internal_activation', '');\r\n\r\n if (activation === 'Clip') {\r\n const clipMax = attributes.getFloat('__clip_max', 3.402823e+38);\r\n const clipMin = attributes.getFloat('__clip_min', -3.402823e+38);\r\n return {activation, clipMax, clipMin, activationCacheKey: `${activation}:${clipMin},${clipMax}`};\r\n }\r\n return {activation, activationCacheKey: activation};\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {NUMBER_TYPES, OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\ninterface GatherAttributes extends AttributeWithCacheKey {\r\n readonly axis: number;\r\n}\r\n\r\nexport const gather: OperatorImplementation<GatherAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: GatherAttributes): Tensor[] => {\r\n validateInputs(inputs, attributes.axis);\r\n const output = inferenceHandler.run(createGatherProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n return [output];\r\n };\r\n\r\nexport const parseGatherAttributes: OperatorInitialization<GatherAttributes> = (node: Graph.Node): GatherAttributes =>\r\n createAttributeWithCacheKey({axis: node.attributes.getInt('axis', 0)});\r\n\r\nconst gatherProgramMetadata = {\r\n name: 'Gather',\r\n inputNames: ['A', 'B'],\r\n inputTypes: [TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nconst createGatherProgramInfo =\r\n (handler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: Tensor[], axis: number): ProgramInfo => {\r\n const inputShape = inputs[0].dims.slice();\r\n const indexDataShape = inputs[1].dims.slice();\r\n const outputShape = new Array(inputShape.length + indexDataShape.length - 1);\r\n\r\n axis = ShapeUtil.normalizeAxis(axis, inputShape.length);\r\n const indexCopyOps: string[] = [];\r\n for (let i = 0; i < outputShape.length; i++) {\r\n // outputShape is divided into three parts: A, B, C\r\n // |0 axis| axis + indexDataShape.length | end|\r\n // | A | B | C |\r\n //\r\n // inputIdx: [A, inputs[1][B], C]\r\n if (i < axis) { // A\r\n outputShape[i] = inputShape[i];\r\n indexCopyOps.push(`inputIdx[${i}] = outputIdx[${i}];`);\r\n } else {\r\n if (i < axis + indexDataShape.length) { // B\r\n outputShape[i] = indexDataShape[i - axis];\r\n indexCopyOps.push(`indexDataIdx[${i - axis}] = outputIdx[${i}];`);\r\n } else { // C\r\n outputShape[i] = inputShape[i - indexDataShape.length + 1]; // skip 1 for axis\r\n indexCopyOps.push(`inputIdx[${i - indexDataShape.length + 1}] = outputIdx[${i}];`);\r\n }\r\n }\r\n }\r\n\r\n const orank = outputShape.length || 1;\r\n const irank = inputShape.length;\r\n const iDrank = indexDataShape.length || 1;\r\n const shaderSource = `\r\n float process(int outputIdx[${orank}]) {\r\n int inputIdx[${irank}];\r\n int indexDataIdx[${iDrank}];\r\n indexDataIdx[0] = 0;\r\n ${indexCopyOps.join('\\n ')}\r\n int idx = int(_B(indexDataIdx));\r\n inputIdx[${axis}] = idx < 0 ? idx + ${inputShape[axis]} : idx;\r\n return _A(inputIdx);\r\n }`;\r\n return {\r\n ...metadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\nconst createGatherProgramInfoLoader =\r\n (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: GatherAttributes): ProgramInfoLoader => {\r\n const metadata = {...gatherProgramMetadata, cacheHint: attributes.cacheKey};\r\n return {...metadata, get: () => createGatherProgramInfo(handler, metadata, inputs, attributes.axis)};\r\n };\r\n\r\nconst validateInputs = (inputs: Tensor[], axis: number): void => {\r\n if (!inputs || inputs.length !== 2) {\r\n throw new Error('Gather requires 2 inputs.');\r\n }\r\n const tensorRank = inputs[0].dims.length;\r\n if (tensorRank < 1) {\r\n throw new Error('Invalid input shape.');\r\n }\r\n if (axis < -tensorRank || axis > tensorRank - 1) {\r\n throw new Error('Invalid axis.');\r\n }\r\n if (NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n throw new Error('Invaid input type.');\r\n }\r\n if (inputs[1].type !== 'int32' && inputs[1].type !== 'int16') {\r\n throw new Error('Invaid input type.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-

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key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from
'../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {GemmUtil} from '../../../util';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader,
ProgramMetadata, TextureType} from '../types';\r\n\r\nexport interface GemmAttributes extends
AttributeWithCacheKey {\r\n  transA: boolean;\r\n  transB: boolean;\r\n  alpha: number;\r\n  beta: number;\r\n
isOptionalC: boolean;  // in opset 11, C becomes optional\r\n}\r\n\r\nexport const gemm:
OperatorImplementation<GemmAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: GemmAttributes): Tensor[] => {\r\n      validateInputs(inputs, attributes);\r\n      const output =
inferenceHandler.run(createGemmProgramInfoLoader(inputs, attributes), inputs);\r\n      return [output];\r\n
};\r\n\r\nconst parseGemmAttributes = (node: Graph.Node, isOptionalC: boolean): GemmAttributes => {\r\n  const
transA = node.attributes.getInt('transA', 0) !== 0;\r\n  const transB = node.attributes.getInt('transB', 0) !== 0;\r\n
const alpha = node.attributes.getFloat('alpha', 1.0);\r\n  const beta = node.attributes.getFloat('beta', 1.0);\r\n  return
createAttributeWithCacheKey({transA, transB, alpha, beta, isOptionalC});\r\n};\r\n\r\nexport const
parseGemmAttributesV7: OperatorInitialization<GemmAttributes> = (node: Graph.Node): GemmAttributes =>\r\n
parseGemmAttributes(node, false);\r\n\r\nexport const parseGemmAttributesV11:
OperatorInitialization<GemmAttributes> = (node: Graph.Node): GemmAttributes =>\r\n
parseGemmAttributes(node, true);\r\n\r\nconst createGemmProgramInfoLoader = (inputs: Tensor[], attributes:
GemmAttributes): ProgramInfoLoader => {\r\n  const metadata = {\r\n    name: 'Gemm',\r\n    inputNames:
inputs.length === 3 ? ['A', 'B', 'C'] : ['A', 'B'],\r\n    inputTypes: inputs.length === 3 ? [TextureType.unpacked,
TextureType.unpacked, TextureType.unpacked] :\r\n                                      [TextureType.unpacked,
TextureType.unpacked],\r\n    key: attributes.cacheKey\r\n  };\r\n\r\n  return {...metadata, get: () =>
createGemmProgramInfo(metadata, inputs, attributes)};\r\n};\r\n\r\nconst createGemmProgramInfo =\r\n
(metadata: ProgramMetadata, inputs: Tensor[], attributes: GemmAttributes): ProgramInfo => {\r\n      const aShape
= inputs[0].dims.slice();\r\n      const bShape = inputs[1].dims.slice();\r\n      const [M, N] =
GemmUtil.getShapeOfGemmResult(\r\n          aShape, attributes.transA, bShape, attributes.transB, inputs.length
=== 3 ? inputs[2].dims : undefined);\r\n      const outputShape = [M, N];\r\n      if (!outputShape) {\r\n        throw
new Error('Can\\'t use gemm on the given tensors');\r\n      }\r\n      let sharedDim = aShape[aShape.length - 1];\r\n
let line = '';\r\n      if (attributes.transA) {\r\n        sharedDim = aShape[0];\r\n      }\r\n      if (attributes.transA &&
attributes.transB) {\r\n        line = 'value += _A_T(a) * _B_T(b);';\r\n      } else if (attributes.transA &&
!attributes.transB) {\r\n        line = 'value += _A_T(a) * _B(b);';\r\n      } else if (!attributes.transA &&
attributes.transB) {\r\n        line = 'value += _A(a) * _B_T(b);';\r\n      } else if (!attributes.transA &&
!attributes.transB) {\r\n        line = 'value += _A(a) * _B(b);';\r\n      }\r\n      const rank = outputShape.length;\r\n
const declareC = inputs.length === 3 ? `int c[${inputs[2].dims.length}];` : '';\r\n      const broadcastC = inputs.length
=== 3 ? 'bcastIndices_C(indices, c);' : '';\r\n      const calculateC = inputs.length === 3 ? 'value += beta * _C(c);' :
'';\r\n      const shaderSource = `\r\n      float process(int indices[${rank}]) {\r\n          int a[${rank}];\r\n          int
b[${rank}];\r\n          ${declareC}\r\n\r\n          copyVec(indices, a);\r\n          copyVec(indices, b);\r\n
${broadcastC}\r\n\r\n          float value = 0.0;\r\n          for (int k=0; k<${sharedDim}; ++k) {\r\n              a[${rank -
1}] = k;\r\n              b[${rank - 2}] = k;\r\n              ${line}\r\n          }\r\n\r\n          value = value * alpha;\r\n
${calculateC}\r\n          return value;\r\n      }`;\r\n      return {\r\n        ...metadata,\r\n        output: {dims:
outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n        variables: [\r\n          {name:
'alpha', type: 'float', data: attributes.alpha}, {name: 'beta', type: 'float', data: attributes.beta}\r\n        ],\r\n
shaderSource\r\n      };\r\n    };\r\n\r\nconst validateInputs = (inputs: Tensor[], attributes: GemmAttributes): void =>
{\r\n  if (!inputs) {\r\n    throw new Error('Input is missing');\r\n  }\r\n  if (attributes.isOptionalC && (inputs.length <
2 || inputs.length > 3)) {\r\n    throw new Error('Invaid input shape.');\r\n  }\r\n  if (!attributes.isOptionalC &&
inputs.length !== 3) {\r\n    throw new Error('Gemm requires 3 inputs');\r\n  }\r\n\r\n  // 'C' can be of dimensionality
1 or 2 only\r\n  if (inputs.length === 3 && inputs[2].dims.length !== 1 && inputs[2].dims.length !== 2) {\r\n
throw new Error('Invalid input shape of C');\r\n  }\r\n\r\n  if ((inputs[0].type !== 'float32' && inputs[0].type !==
'float64') ||\r\n      (inputs[1].type !== 'float32' && inputs[1].type !== 'float64') ||\r\n      (inputs.length === 3 &&
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inputs[2].type !== 'float32' && inputs[2].type !== 'float64')) {\r\n   throw new Error('Invalid input type.');\r\n }\r\n\r\n if ((inputs[0].type !== inputs[1].type) || (inputs.length === 3 && inputs[0].type !== inputs[2].type)) {\r\n   throw new Error('Input types are mismatched');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport {ConvAttributes} from './conv';\r\nimport {unpackFromChannel} from './packing-utils';\r\n\r\nconst createPackedIm2ColProgramMetadata = (cacheHint: string) => ({\r\n name: 'Im2Col (packed)',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.packed],\r\n cacheHint,\r\n});\r\n\r\nconst createPackedIm2ColProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, x: Tensor, w: Tensor,\r\n   outputShape: readonly number[], attributes: ConvAttributes): ProgramInfo => {\r\n   const xshape = x.dims;\r\n   const wshape = w.dims;\r\n   const rowDim = 2;\r\n   const colDim = 3;\r\n   const rank = outputShape.length;\r\n   const im2colShape = [wshape[1] * wshape[2] * wshape[3], outputShape[2] * outputShape[3]];\r\n   const kernelSize = wshape[2] * wshape[3];\r\n   const unpackChannel = unpackFromChannel();\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   let unrolled = '';\r\n\r\n   for (let row = 0; row <= 1; row++) {\r\n   for (let col = 0; col <= 1; col++) {\r\n   unrolled += `\r\n   blockIndex = rc.x + ${col};\r\n   pos = rc.y + ${row};\r\n\r\n   if(blockIndex < ${im2colShape[1]} && pos < ${im2colShape[0]}) {\r\n   offsetY = int(blockIndex / (${outputShape[rank - 1]})) * ${attributes.strides[0]} - ${\r\n   attributes.pads[0]};\r\n   d0 = offsetY + ${attributes.dilations[0]} * (imod(pos, ${kernelSize}) / ${wshape[2]});\r\n\r\n   if(d0 < ${xshape[rowDim]} && d0 >= 0) {\r\n   offsetX = imod(blockIndex, ${outputShape[rank - 1]}) * ${attributes.strides[1]} - ${\r\n   attributes.pads[1]};\r\n   d1 = offsetX + ${attributes.dilations[1]} * imod(imod(pos, ${kernelSize}), ${wshape[2]});\r\n\r\n   if(d1 < ${xshape[colDim]} && d1 >= 0) {\r\n\r\n   ch = int(float(pos)/ ${kernelSize}.);\r\n   innerDims = vec2(d0, d1);\r\n   result[${row * 2 + col}] = getChannel(\r\n   getA(0, ch, int(innerDims.x),\r\n   int(innerDims.y)), innerDims);\r\n   }\r\n   }\r\n   }\r\n\r\n   `;\r\n        }\r\n      }\r\n\r\n      const shaderSource = `\r\n ${unpackChannel}\r\n\r\n   void main() {\r\n   ivec2 rc = getOutputCoords();\r\n   vec4 result = vec4(0.0);\r\n   int blockIndex, pos, offsetY, d0, offsetX, d1, ch;\r\n   vec2 innerDims;\r\n ${unrolled}\r\n ${glsl.output} = result;\r\n   }\r\n   `;\r\n   return {\r\n   ...metadata,\r\n   output: {dims: im2colShape, type: x.type, textureType: TextureType.packed},\r\n   shaderSource,\r\n   hasMain: true\r\n   };\r\n   };\r\n\r\nexport const createPackedIm2ColProgramInfoLoader =\r\n   (inferenceHandler: WebGLInferenceHandler, x: Tensor, w: Tensor, outputShape: readonly number[],\r\n   attributes: ConvAttributes): ProgramInfoLoader => {\r\n   const metadata = createPackedIm2ColProgramMetadata(attributes.cacheKey);\r\n   return {\r\n   ...metadata,\r\n   get: () => createPackedIm2ColProgramInfo(inferenceHandler, metadata, x, w, outputShape, attributes)\r\n   };\r\n   };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport {ConvAttributes} from './conv';\r\n\r\nconst createIm2ColProgramMetadata = (cacheHint: string) => ({\r\n name: 'Im2Col',\r\n inputNames: ['X'],\r\n inputTypes: [TextureType.unpacked],\r\n cacheHint,\r\n});\r\n\r\nconst createIm2ColProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, x: Tensor, w: Tensor,\r\n   outputShape: readonly number[], attributes: ConvAttributes): ProgramInfo => {\r\n   const xshape = x.dims;\r\n   const wshape = w.dims;\r\n\r\n   const rank = outputShape.length;\r\n   const im2colDims = calculateIm2ColDims(xshape, wshape, outputShape, 4);\r\n\r\n   const shaderSource = `\r\n   const int XC = ${xshape[1]};\r\n   const int XH = ${xshape[2]};\r\n   const int XW = ${xshape[3]};\r\n   const int KH = ${attributes.kernelShape[0]};\r\n   const int KW = ${attributes.kernelShape[1]};\r\n   const int dilationH = ${attributes.dilations[0]};\r\n   const int dilationW = ${attributes.dilations[1]};\r\n   const int strideH = ${attributes.strides[0]};\r\n   const int strideW = ${attributes.strides[1]};\r\n   const int padH = ${attributes.pads[0]};\r\n   const int padW =

${attributes.pads[1]};\r\n const int KHKW = KH*KW;\r\n const int XCKHKW = XC * KHKW;\r\n const int outputChannels = 4;\r\n vec4 process(int indices[${rank}]) {\r\n int b = indices[0]; // batch size\r\n int oh = indices[1] * strideH - padH; //output height\r\n int ow = indices[2] * strideW - padW; //output width\r\n int p = indices[3] * outputChannels; //patch\r\n vec4 value = vec4(0.0);\r\n for(int i=0; i < outputChannels; ++i) {\r\n if(p < XCKHKW) {\r\n int patchC = p / KHKW;\r\n int patchH = (p - patchC*KHKW) / KW;\r\n int patchW = (p - patchC*KHKW) - patchH * KW;\r\n int xh2 = oh + patchH * dilationH;\r\n int xw2 = ow + patchW * dilationW;\r\n int x[${xshape.length}];\r\n x[0] = b;\r\n x[1] = patchC;\r\n x[2] = xh2;\r\n x[3] = xw2;\r\n if(xh2 >= 0 &&\r\n xh2 < XH &&\r\n xw2 >= 0 &&\r\n xw2 < XW) {\r\n value[i] = _X(x);\r\n }\r\n }\r\n ++p;\r\n }\r\n return value;\r\n }\r\n `;\r\n return {\r\n ...metadata,\r\n output: {dims: im2colDims, type: x.type, textureType: TextureType.packedLastDimension},\r\n shaderSource\r\n };\r\n };\r\n\r\nexport const createIm2ColProgramInfoLoader =\r\n (inferenceHandler: WebGLInferenceHandler, x: Tensor, w: Tensor, outputShape: readonly number[],\r\n attributes: ConvAttributes): ProgramInfoLoader => {\r\n const metadata = createIm2ColProgramMetadata(attributes.cacheKey);\r\n return {\r\n ...metadata,\r\n get: () => createIm2ColProgramInfo(inferenceHandler, metadata, x, w, outputShape, attributes)\r\n };\r\n };\r\n\r\n\r\nexport const calculateIm2ColDims =\r\n (inputShape: readonly number[], kernelShape: readonly number[], outputShape: readonly number[], channels = 4):\r\n number[] =>\r\n [outputShape[0], outputShape[2], outputShape[3],\r\n Math.ceil(inputShape[1] * kernelShape[2] * kernelShape[3] / channels)];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport interface ImageScalerAttributes extends AttributeWithCacheKey {\r\n scale: number;\r\n bias: number[];\r\n}\r\n\r\nexport const imageScaler: OperatorImplementation<ImageScalerAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ImageScalerAttributes): Tensor[] => {\r\n validateInputs(inputs);\r\n const output =\r\n inferenceHandler.run(createImageScalerProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n return [output];\r\n };\r\n\r\nexport const parseImageScalerAttributes: OperatorInitialization<ImageScalerAttributes> =\r\n (node: Graph.Node): ImageScalerAttributes => {\r\n const scale = node.attributes.getFloat('scale');\r\n const bias = node.attributes.getFloats('bias');\r\n return createAttributeWithCacheKey({scale, bias});\r\n };\r\n\r\nconst imageScalerProgramMetadata = {\r\n name: 'ImageScaler',\r\n inputNames: ['X'],\r\n inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nconst createImageScalerProgramInfo =\r\n (handler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: Tensor[], attributes: ImageScalerAttributes):\r\n ProgramInfo => {\r\n const outputShape = inputs[0].dims.slice();\r\n const rank = outputShape.length;\r\n const getBiasMethod = createGetBiasMethod(attributes.bias.length);\r\n const shaderSource = `\r\n ${getBiasMethod}\r\n float process(int indices[${rank}]) {\r\n return _X(indices) * scale + getBias(bias, indices[1]);\r\n }`;\r\n return {\r\n ...metadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n variables: [\r\n {name: 'bias', type: 'float', arrayLength: attributes.bias.length, data: attributes.bias},\r\n {name: 'scale', type: 'float', data: attributes.scale}\r\n],\r\n shaderSource\r\n };\r\n };\r\n\r\nconst createImageScalerProgramInfoLoader =\r\n (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: ImageScalerAttributes): ProgramInfoLoader => {\r\n const metadata = {...imageScalerProgramMetadata, cacheHint: attributes.cacheKey};\r\n return {...metadata, get: () => createImageScalerProgramInfo(handler, metadata, inputs, attributes)};\r\n };\r\n\r\nconst createGetBiasMethod = (numChannels: number): string => {\r\n const codeLines: string[] = [`float getBias(float bias[${numChannels}], int channel) {`];\r\n for (let i = 0; i < numChannels; ++i) {\r\n if (i === 0) {\r\n codeLines.push(\r\n '\\t' +\r\n

`if (channel == ${i}) { return bias[${i}]; }`);\r\n   } else if (i === numChannels - 1) {\r\n   codeLines.push(\r\n   '\\t' +\r\n   `else { return bias[${i}]; }`);\r\n   } else {\r\n   codeLines.push(\r\n   '\\t' +\r\n   `else if (channel == ${i}) { return bias[${i}]; }`);\r\n   }\r\n }\r\n codeLines.push(\r\n   '\\t' +\r\n   '}');\r\n return codeLines.join('\\n');\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('ImageScaler requires 1 input.');\r\n }\r\n if (inputs[0].dims.length !== 4) {\r\n   throw new Error('Invalid input shape.');\r\n }\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n   throw new Error('Invalid input type.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport const instanceNormalization: OperatorImplementation<number> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], epsilon: number): Tensor[] => {\r\n   validateInputs(inputs);\r\n\r\n   const meanAndVariance = inferenceHandler.run(createMeanAndVarianceProgramInfoLoader(inputs[0]), inputs);\r\n   const output = inferenceHandler.run(\r\n   createComputeOutputProgramInfoLoader(inferenceHandler, inputs[0], epsilon, meanAndVariance.dims),\r\n   [inputs[0], meanAndVariance, inputs[1], inputs[2]]);\r\n   return [output];\r\n   };\r\n\r\nexport const parseInstanceNormalizationAttributes: OperatorInitialization<number> = (node: Graph.Node): number =>\r\n   node.attributes.getFloat('epsilon', 1e-5);\r\n\r\nconst meanAndVarianceProgramMetadata = {\r\n name: 'InstanceNormalization_MeanAndVariance',\r\n inputNames: ['X'],\r\n inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nconst createMeanAndVarianceProgramInfo = (metadata: ProgramMetadata, input: Tensor): ProgramInfo => {\r\n const xDims = input.dims.slice();\r\n const channel = xDims[1];\r\n const channelSize = xDims[2] * xDims[3];\r\n const outputShape = [xDims[0], channel];\r\n\r\n const shaderSource = `\r\n   vec4 process(int[2] indices) {\r\n   vec4 v = vec4(0.0);\r\n   int a[4];\r\n   a[0] = indices[0];\r\n   a[1] = indices[1];\r\n   float temp = 0.0;\r\n   for(int a2=0; a2<${xDims[2]}; a2++) {\r\n   a[2] = a2;\r\n   for(int a3=0; a3<${xDims[3]}; a3++) {\r\n   a[3] = a3;\r\n   float x = _X(a);\r\n   temp += x;\r\n   }\r\n   }\r\n   float mean = temp / float(${channelSize});\r\n   temp = 0.0;\r\n   for(int a2=0; a2<${xDims[2]}; a2++) {\r\n   a[2] = a2;\r\n   for(int a3=0; a3<${xDims[3]}; a3++) {\r\n   a[3] = a3;\r\n   float x = _X(a);\r\n   temp += (x - mean) * (x - mean);\r\n   }\r\n   }\r\n   v.r = mean;\r\n   v.g = temp / float(${channelSize});\r\n\r\n   return v;\r\n   }`;\r\n return {\r\n   ...metadata,\r\n   output: {dims: outputShape, type: input.type, textureType: TextureType.packedLastDimension},\r\n   shaderSource\r\n };\r\n};\r\n\r\nconst createMeanAndVarianceProgramInfoLoader = (input: Tensor): ProgramInfoLoader => ({\r\n ...meanAndVarianceProgramMetadata,\r\n get: () => createMeanAndVarianceProgramInfo(meanAndVarianceProgramMetadata, input)\r\n});\r\n\r\nconst computeOutputProgramMetadata = {\r\n name: 'InstanceNormalization_ComputeOutput',\r\n inputNames: ['X', 'MeanAndVariance', 'Scale', 'B'],\r\n inputTypes: [TextureType.unpacked, TextureType.packedLastDimension, TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nconst createComputeOutputProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, input: Tensor, epsilon: number,\r\n   meanAndVarianceShape: readonly number[]): ProgramInfo => {\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const [textureWidth, textureHeight] =\r\n   inferenceHandler.calculateTextureWidthAndHeight(meanAndVarianceShape, TextureType.packedLastDimension);\r\n   const [meanAndVarianceWidth, meanAndVarianceHeight] = [textureWidth / 4, textureHeight];\r\n   const shaderSource = `\r\n   vec4 get_MeanAndVariance(int[2] mv) {\r\n   int offset = indicesToOffset_MeanAndVariance(mv);\r\n   vec2 coords = offsetToCoords(offset, ${meanAndVarianceWidth}, ${meanAndVarianceHeight});\r\n   return ${glsl.texture2D}(MeanAndVariance, coords);\r\n   }\r\n\r\n   float process(int[4] indices) {\r\n   int mv[2];\r\n   mv[0] = indices[0];\r\n   mv[1] = indices[1];\r\n   vec4 mean_and_variance = get_MeanAndVariance(mv);\r\n   float mean = mean_and_variance.r;\r\n   float variance = mean_and_variance.g;\r\n\r\n   int sb[1];\r\n   sb[0] =

indices[1];\r\n   float scale = _Scale(sb);\r\n   float b = _B(sb);\r\n\r\n   return scale * (_X(indices) - mean) / sqrt(variance + epsilon) + b;\r\n   }`;\r\n   return {\r\n   ...metadata,\r\n   output: {dims: input.dims, type: input.type, textureType: TextureType.unpacked},\r\n   variables: [{name: 'epsilon', type: 'float', data: epsilon}],\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst createComputeOutputProgramInfoLoader =\r\n (inferenceHandler: WebGLInferenceHandler, input: Tensor, epsilon: number, meanAndVarianceShape: readonly number[]):\r\n   ProgramInfoLoader => {\r\n   const metadata = {...computeOutputProgramMetadata, cacheHint: `${epsilon}`};\r\n   return {\r\n   ...metadata,\r\n   get: () => createComputeOutputProgramInfo(inferenceHandler, metadata, input, epsilon, meanAndVarianceShape)\r\n };\r\n   };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 3) {\r\n throw new Error('InstanceNormalization requires 3 inputs.');\r\n }\r\n\r\n const X = inputs[0];\r\n const scale = inputs[1];\r\n const B = inputs[2];\r\n\r\n // input should at least have three dimensions - N,C,dim1,...,dimn\r\n // other inputs can have only one dimensions\r\n if (X.dims.length < 3 || scale.dims.length !== 1 || B.dims.length !== 1) {\r\n   throw new Error('Invalid input shape.');\r\n }\r\n if (scale.dims[0] !== X.dims[1] || B.dims[0] !== X.dims[1]) {\r\n   throw new Error('Input shapes are mismatched.');\r\n }\r\n if ((X.type !== 'float32' && X.type !== 'float64') || (scale.type !== 'float32' && scale.type !== 'float64') ||\r\n   (B.type !== 'float32' && B.type !== 'float64')) {\r\n   throw new Error('Invalid input type.');\r\n }\r\n if (inputs[0].dims.length !== 4) {\r\n   throw new Error('Only support 4-D input shape.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {BroadcastUtil} from '../../../util';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport {getCoordsDataType, getGlChannels} from '../utils';\r\n\r\nimport {getActicationSnippet, InternalActivationAttributes} from './fuse-utils';\r\nimport {getBiasForMatmul} from './matmul';\r\n\r\nconst createPackedMatmulProgramMetadata = (hasBias: boolean, cacheHint: string) => ({\r\n name: 'MatMul (packed)',\r\n inputNames: hasBias ? ['A', 'B', 'Bias'] : ['A', 'B'],\r\n inputTypes: hasBias ? [TextureType.packed, TextureType.packed, TextureType.packed] :\r\n   [TextureType.packed, TextureType.packed],\r\n cacheHint\r\n});\r\n\r\nconst createPackedMatmulProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: Tensor[],\r\n   activationAttributes: InternalActivationAttributes): ProgramInfo => {\r\n const hasBias = inputs.length > 2;\r\n   const processBias = hasBias ? 'value += getBiasForMatmul();' : '';\r\n const aShape = inputs[0].dims;\r\n   const bShape = inputs[1].dims;\r\n   const outputShape = BroadcastUtil.calcShape(aShape, bShape, true);\r\n   const isBroadcast = !ShapeUtil.areEqual(inputs[0].dims, inputs[1].dims);\r\n\r\n   if (!outputShape) {\r\n   throw new Error('Can\\'t use matmul on the given tensors');\r\n   }\r\n   const sharedDim = aShape[aShape.length - 1];\r\n   const sharedDimIndex = Math.ceil(sharedDim / 2);\r\n   const aRank = aShape.length;\r\n   const bRank = bShape.length;\r\n\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const coordsDataType = getCoordsDataType(outputShape.length);\r\n   const outRank = outputShape.length;\r\n   const allGlChannels = getGlChannels();\r\n   const {activationFunction, applyActivation} = getActicationSnippet(activationAttributes);\r\n\r\n   const getBiasForMatmulSnippet =\r\n   hasBias ? `${getBiasForMatmul(coordsDataType, allGlChannels, inputs[2].dims, outputShape, true)}` : '';\r\n\r\n   const getBcastedSamplerForMatmulSnippet =\r\n   isBroadcast ? `${getBcastSamplerForMatmul(coordsDataType, allGlChannels, inputs, outputShape)}` : '';\r\n\r\n   const getSamplerAInLoopSnippet = isBroadcast ? 'getAAtOutCoordsMatmul(i)' : `getA(${getA(allGlChannels, aRank)})`;\r\n   const getSamplerBInLoopSnippet = isBroadcast ? 'getBAtOutCoordsMatmul(i)' : `getB(${getB(allGlChannels, bRank)})`;\r\n   const getOutputCoordsSnippet = isBroadcast ? '' : `${coordsDataType} rc =\r\n          getOutputCoords(); int lastDim = rc.${allGlChannels[outRank - 1]}; rc.${allGlChannels[outRank - 1]} =\r\n          rc.${allGlChannels[outRank - 2]}; rc.${allGlChannels[outRank - 2]} = lastDim;\r\n      `;\r\n   const shaderSource = `\r\n ${getBcastedSamplerForMatmulSnippet}\r\n ${getBiasForMatmulSnippet}\r\n ${activationFunction}\r\n   void main() {\r\n ${getOutputCoordsSnippet}\r\n\r\n   vec4 value =

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vec4(0);\r\n        for (int i = 0; i < ${sharedDimIndex}; i++) {\r\n          vec4 a =
${getSamplerAInLoopSnippet};\r\n          vec4 b = ${getSamplerBInLoopSnippet};\r\n\r\n          value +=
(a.rrbb * b.rgrg);\r\n          value += (a.ggaa * b.baba);\r\n        }\r\n        ${processBias}\r\n
${applyActivation}\r\n        ${glsl.output} = value;\r\n      }`;\r\n    return {\r\n      ...metadata,\r\n
output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.packed},\r\n      shaderSource,\r\n
hasMain: true\r\n    };\r\n  };\r\n\r\nexport const createPackedMatmulProgramInfoLoader =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],\r\n     activationAttributes:
InternalActivationAttributes): ProgramInfoLoader => {\r\n      const metadata =
createPackedMatmulProgramMetadata(inputs.length > 2, activationAttributes.activationCacheKey);\r\n      return
{\r\n        ...metadata,\r\n        get: () => createPackedMatmulProgramInfo(inferenceHandler, metadata, inputs,
activationAttributes)\r\n      };\r\n    };\r\n\r\nfunction getBcastSamplerForMatmul(\r\n    coordsDataType: string,
allGlChannels: readonly string[], inputs: Tensor[], outShape: readonly number[]): string {\r\n  let
unpackedACoordsSnippet = [];\r\n  let unpackedBCoordsSnippet = [];\r\n\r\n  const inAShape = inputs[0].dims;\r\n
const inBShape = inputs[1].dims;\r\n\r\n  const inARank = inAShape.length;\r\n  const inBRank =
inBShape.length;\r\n\r\n  const outRank = outShape.length;\r\n  const rankADiff = outRank - inARank;\r\n  const
rankBDiff = outRank - inBRank;\r\n\r\n  unpackedACoordsSnippet = inAShape.map((s, i) =>
`coords.${allGlChannels[i + rankADiff]}`);\r\n  unpackedACoordsSnippet[inARank - 1] = 'i*2';\r\n
unpackedACoordsSnippet.join(', ');\r\n  unpackedBCoordsSnippet = inBShape.map((s, i) =>
`coords.${allGlChannels[i + rankBDiff]}`);\r\n  unpackedBCoordsSnippet[inBRank - 2] = 'i*2';\r\n
unpackedBCoordsSnippet.join(', ');\r\n\r\n  const broadcastADims = BroadcastUtil.getBroadcastDims(inAShape,
outShape);\r\n  const broadcastBDims = BroadcastUtil.getBroadcastDims(inBShape, outShape);\r\n\r\n  const
coordsASnippet = broadcastADims.map(d => `coords.${allGlChannels[d + rankADiff]} = 0;`).join('\\n');\r\n  const
coordsBSnippet = broadcastBDims.map(d => `coords.${allGlChannels[d + rankBDiff]} = 0;`).join('\\n');\r\n  const
swapDimSnippet = `int lastDim = coords.${allGlChannels[outRank - 1]};\r\n  coords.${allGlChannels[outRank -
1]} = coords.${allGlChannels[outRank - 2]};\r\n  coords.${allGlChannels[outRank - 2]} = lastDim;`;\r\n\r\n  const
getBcastSamplerMatmulSource = `\r\nvec4 getAAtOutCoordsMatmul(int i) {\r\n  ${coordsDataType} coords =
getOutputCoords();\r\n  ${swapDimSnippet}\r\n  ${coordsASnippet}\r\n  vec4 outputValue =
getA(${unpackedACoordsSnippet});\r\n  return outputValue;\r\n}\r\n\r\nvec4 getBAtOutCoordsMatmul(int i) {\r\n
${coordsDataType} coords = getOutputCoords();\r\n  ${swapDimSnippet}\r\n  ${coordsBSnippet}\r\n  vec4
outputValue = getB(${unpackedBCoordsSnippet});\r\n  return outputValue;\r\n}`;\r\n\r\n  return
getBcastSamplerMatmulSource;\r\n}\r\n\r\nfunction getA(allGlChannels: string[], rank: number): string {\r\n  let res
= '';\r\n  for (let i = 0; i < rank - 2; i++) {\r\n    res += `rc.${allGlChannels[i]}, `;\r\n  }\r\n  res +=
`rc.${allGlChannels[rank - 2]}, ` +\r\n      'i*2';\r\n  return res;\r\n}\r\n\r\nfunction getB(allGlChannels: string[],
rank: number): string {\r\n  let res = '';\r\n  for (let i = 0; i < rank - 2; i++) {\r\n    res += `rc.${allGlChannels[i]},
`;\r\n  }\r\n  res += 'i*2, ' +\r\n      `rc.${allGlChannels[rank - 1]}`;\r\n  return res;\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from
'../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor}
from '../../../tensor';\r\nimport {BroadcastUtil, ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler}
from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from
'../types';\r\nimport {getCoordsDataType, getGlChannels} from '../utils';\r\nimport {getActicationSnippet,
InternalActivationAttributes, parseInternalActivationAttributes} from './fuse-utils';\r\nimport
{createPackedMatmulProgramInfoLoader} from './matmul-pack';\r\n\r\nexport const matMul:
OperatorImplementation<InternalActivationAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs:
Tensor[], attributes: InternalActivationAttributes): Tensor[] => {\r\n      validateInputs(inputs);\r\n\r\n      if
(inferenceHandler.session.pack) {\r\n        return [inferenceHandler.run(\r\n
createPackedMatmulProgramInfoLoader(inferenceHandler, inputs, attributes), inputs)];\r\n      } else {\r\n        return
[inferenceHandler.run(createMatmulProgramInfoLoader(inputs, attributes), inputs)];\r\n      }\r\n    };\r\n\r\nexport
const parseMatMulAttributes: OperatorInitialization<InternalActivationAttributes> =\r\n    (node: Graph.Node):
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InternalActivationAttributes => parseInternalActivationAttributes(node.attributes);\r\n\r\nconst
createMatmulProgramMetadata = (hasBias: boolean, cacheHint: string) => ({\r\n  name: 'MatMul',\r\n  inputNames:
hasBias ? ['A', 'B', 'Bias'] : ['A', 'B'],\r\n  inputTypes: hasBias ? [TextureType.unpacked, TextureType.unpacked,
TextureType.unpacked] :\r\n                        [TextureType.unpacked, TextureType.unpacked],\r\n
cacheHint\r\n});\r\n\r\nfunction createMatmulProgramInfo(\r\n    metadata: ProgramMetadata, inputs: Tensor[],
activationAttributes: InternalActivationAttributes): ProgramInfo {\r\n  const aShape = inputs[0].dims;\r\n  const
bShape = inputs[1].dims;\r\n  const outputShape = BroadcastUtil.calcShape(aShape, bShape, true);\r\n  if
(!outputShape) {\r\n    throw new Error('Can\\'t use matmul on the given tensors');\r\n  }\r\n  const coordsDataType
= getCoordsDataType(outputShape.length);\r\n  const allGlChannels = getGlChannels();\r\n  const
{activationFunction, applyActivation} = getActicationSnippet(activationAttributes);\r\n\r\n  const hasBias =
inputs.length > 2;\r\n  const processBias = hasBias ? 'value += getBiasForMatmul();' : '';\r\n  const
getBiasForMatmulSnippet =\r\n      hasBias ? `${getBiasForMatmul(coordsDataType, allGlChannels,
inputs[2].dims, outputShape, false)}` : '';\r\n\r\n  const rank = outputShape.length;\r\n  const arank =
aShape.length;\r\n  const brank = bShape.length;\r\n  const sharedDim = aShape[aShape.length - 1];\r\n  const
shaderSource = `\r\n    ${activationFunction}\r\n    ${getBiasForMatmulSnippet}\r\n    float process(int
indices[${rank}]) {\r\n        int a[${arank}];\r\n        int b[${brank}];\r\n        bcastMatmulIndices_A(indices, a);\r\n
    bcastMatmulIndices_B(indices, b);\r\n\r\n        float value;\r\n        for (int k=0; k<${sharedDim}; ++k) {\r\n
 a[${arank - 1}] = k;\r\n            b[${brank - 2}] = k;\r\n            value += _A(a) * _B(b);\r\n        }\r\n
${processBias}\r\n        ${applyActivation}\r\n        return value;\r\n    }`;\r\n  return {\r\n    ...metadata,\r\n    output:
{dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n    shaderSource,\r\n
};\r\n}\r\n\r\nexport function createMatmulProgramInfoLoader(\r\n    inputs: Tensor[], activationAttributes:
InternalActivationAttributes): ProgramInfoLoader {\r\n  const metadata =
createMatmulProgramMetadata(inputs.length > 2, activationAttributes.activationCacheKey);\r\n  return
{...metadata, get: () => createMatmulProgramInfo(metadata, inputs, activationAttributes)};\r\n}\r\n\r\nconst
validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length !== 2) {\r\n    throw new Error('MatMul
requires 2 inputs.');\r\n  }\r\n\r\n  if (inputs[0].dims[inputs[0].dims.length - 1] !==
inputs[1].dims[inputs[1].dims.length - 2]) {\r\n    throw new Error('shared dimension does not match.');\r\n  }\r\n\r\n
if ((inputs[0].type !== 'float32' && inputs[0].type !== 'float64') ||\r\n      (inputs[1].type !== 'float32' &&
inputs[1].type !== 'float64')) {\r\n    throw new Error('inputs should be float type');\r\n  }\r\n\r\n  if (inputs[0].type
!== inputs[1].type) {\r\n    throw new Error('inputs types should match');\r\n  }\r\n};\r\n\r\nexport function
getBiasForMatmul(\r\n    coordsDataType: string, allGlChannels: readonly string[], inShape: readonly number[],
outShape: readonly number[],\r\n    isPacked: boolean): string {\r\n  let unpackedCoordsSnippet = '';\r\n  const
inRank = inShape.length;\r\n  const outRank = outShape.length;\r\n  const rankDiff = outRank - inRank;\r\n  if
(outRank < 2 && inRank > 0) {\r\n    unpackedCoordsSnippet = 'coords';\r\n  } else {\r\n    unpackedCoordsSnippet
= inShape.map((s, i) => `coords.${allGlChannels[i + rankDiff]}`).join(', ');\r\n  }\r\n  const broadcastDims =
BroadcastUtil.getBroadcastDims(inShape, outShape);\r\n  const coordsSnippet = broadcastDims.map(d =>
`coords.${allGlChannels[d + rankDiff]} = 0;`).join('\\n');\r\n  const inSize = ShapeUtil.size(inShape);\r\n  const
isInputScalar = inSize === 1;\r\n  let output = 'vec4(outputValue.xx, outputValue.yy)';\r\n  if (isInputScalar) {\r\n
output = 'vec4(outputValue.x)';\r\n  }\r\n  const getBiasForMatmulSource = isPacked ? `\r\nvec4
getBiasForMatmul() {\r\n  ${coordsDataType} coords = getOutputCoords();\r\n  ${coordsSnippet}\r\n  vec4
outputValue = getBias(${unpackedCoordsSnippet});\r\n  return ${output};\r\n}` :\r\n
`\r\nfloat getBiasForMatmul() {\r\n  ${coordsDataType} coords = getOutputCoords();\r\n  ${coordsSnippet}\r\n
return getBias(coords.x);\r\n}`;\r\n\r\n  return getBiasForMatmulSource;\r\n}\r\n","// Copyright (c) Microsoft
Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from
'../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-
handler';\r\nimport {ProgramInfo, ProgramInfoLoader, TextureType} from '../types';\r\nimport
{getCoordsDataType} from '../utils';\r\n\r\nimport {getChannels} from './packing-utils';\r\n\r\nconst
packProgramMetadata = {\r\n  name: 'pack',\r\n  inputNames: ['A'],\r\n  inputTypes:
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[TextureType.unpackedReversed]\r\n};\r\n\r\nconst createPackProgramInfo = (handler: WebGLInferenceHandler, input: Tensor): ProgramInfo => {\r\n const glsl = getGlsl(handler.session.backend.glContext.version);\r\n const inputShape = input.dims;\r\n\r\n const inputRank = inputShape.length;\r\n // createTextureLayoutFromShape won't change output rank. Need to verify by running tests\r\n const outputRank = input.dims.length;\r\n\r\n const coordsDataType = getCoordsDataType(outputRank);\r\n const channels = getChannels('rc', outputRank);\r\n const setup = getSetup(outputRank, channels, inputShape[inputShape.length - 2], inputShape[inputShape.length - 1]);\r\n\r\n let reversedInputWH;\r\n if (inputRank === 0) {\r\n   reversedInputWH = [1, 1];\r\n } else if (inputRank === 1) {\r\n   reversedInputWH = [inputShape[0], 1];\r\n } else {\r\n   reversedInputWH = [inputShape[outputRank - 1], inputShape[outputRank - 2]];\r\n }\r\n const outOfBoundsCondition = getOutOfBoundsCondition(outputRank, reversedInputWH, channels);\r\n const output = getOutput(inputShape, channels);\r\n\r\n const shaderSource = `\r\n   void main() {\r\n ${coordsDataType} rc = getOutputCoords();\r\n\r\n   if(${outOfBoundsCondition}) {\r\n ${glsl.output} = vec4(0);\r\n   } else {\r\n ${setup}\r\n\r\n ${glsl.output} = vec4(${output});\r\n   }\r\n   }\r\n   `;\r\n return {\r\n   ...packProgramMetadata,\r\n   hasMain: true,\r\n   output: {dims: input.dims, type: input.type, textureType: TextureType.packed},\r\n   shaderSource\r\n };\r\n};\r\n\r\nexport const createPackProgramInfoLoader = (handler: WebGLInferenceHandler, input: Tensor): ProgramInfoLoader =>\r\n   ({...packProgramMetadata, get: () => createPackProgramInfo(handler, input)});\r\n\r\n/**\r\n * check output coordinate location and return false if it is outside input's width/height boundary\r\n */\r\nfunction getOutOfBoundsCondition(rank: number, shape: readonly number[], dims: string[]): string {\r\n if (rank === 0) {\r\n   return 'false';\r\n }\r\n if (rank === 1) {\r\n   return `rc > ${shape[0]}`;\r\n }\r\n\r\n let cond = '';\r\n for (let i = rank - 2; i < rank; i++) {\r\n   cond += `${dims[i]} >= ${shape[i - rank + 2]}`;\r\n   if (i < rank - 1) {\r\n   cond += '||';\r\n   }\r\n }\r\n\r\n return cond;\r\n}\r\n\r\n/**\r\n * code snippet to sample input texture with output coordiantes\r\n */\r\nfunction getOutput(shape: readonly number[], dims: string[]): string {\r\n const rank = shape.length;\r\n\r\n if (rank === 0) {\r\n   return 'getA(), 0, 0, 0';\r\n }\r\n\r\n if (rank === 1) {\r\n   return `getA(rc),\r\n            rc + 1 >= ${shape[0]} ? 0. : getA(rc + 1),\r\n            0, 0`;\r\n }\r\n\r\n const coord00 = 'r, c';\r\n const coord01 = 'r, cp1';\r\n const coord10 = 'rp1, c';\r\n const coord11 = 'rp1, cp1';\r\n let D = '';\r\n if (rank > 2) {\r\n   for (let i = 0; i < rank - 2; ++i) {\r\n   D = D + `${dims[i]},`;\r\n   }\r\n }\r\n return `getA(${D}${coord00}),\r\n          rEdge ? 0. : getA(${D}${coord10}),\r\n          cEdge ? 0. : getA(${D}${coord01}),\r\n          rEdge || cEdge ? 0. : getA(${D}${coord11})`;\r\n}\r\n\r\n/**\r\n * code snippet to setup 4 coordinates and edge conditions\r\n */\r\nfunction getSetup(rank: number, dims: string[], rows: number, cols: number): string {\r\n if (rank === 0 || rank === 1) {\r\n   return '';\r\n }\r\n // rank >= 2 for width+height pack.\r\n else {\r\n   const setup = `\r\n    int r = ${dims[rank - 2]};\r\n    int c = ${dims[rank - 1]};\r\n    int rp1 = ${dims[rank - 2]} + 1;\r\n    int cp1 = ${dims[rank - 1]} + 1;\r\n    bool rEdge = rp1 >= ${cols};\r\n    bool cEdge = cp1 >= ${rows};\r\n    `;\r\n   return setup;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {getGlChannels} from '../utils';\r\n\r\nexport function getVecChannels(name: string, rank: number): string[] {\r\n return getGlChannels(rank).map(d => `${name}.${d}`);\r\n}\r\n\r\nexport function getChannels(name: string, rank: number): string[] {\r\n if (rank === 1) {\r\n   return [name];\r\n }\r\n return getVecChannels(name, rank);\r\n}\r\n\r\nexport function unpackFromChannel(): string {\r\n return `\r\n   float getChannel(vec4 frag, int dim) {\r\n   int modCoord = imod(dim, 2);\r\n   return modCoord == 0 ? frag.r : frag.g;\r\n   }\r\n\r\n   float getChannel(vec4 frag, vec2 innerDims) {\r\n   vec2 modCoord = mod(innerDims, 2.);\r\n   return modCoord.x == 0. ?\r\n   (modCoord.y == 0. ? frag.r : frag.g) :\r\n   (modCoord.y == 0. ? frag.b : frag.a);\r\n   }\r\n `;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl, Glsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface PadAttributes extends AttributeWithCacheKey {\r\n readonly mode: string;\r\n readonly pads: number[];\r\n readonly value: number;\r\n}\r\n\r\nconst padProgramMetadata = {\r\n name: 'Pad',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nexport const pad: OperatorImplementation<PadAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: PadAttributes): Tensor[] => {\r\n validateInputs(inputs);\r\n const output = inferenceHandler.run(\r\n {\r\n ...padProgramMetadata,\r\n cacheHint: attributes.cacheKey,\r\n get: () => createPadProgramInfo(inferenceHandler, inputs, attributes)\r\n },\r\n inputs);\r\n return [output];\r\n };\r\n\r\nexport const parsePadAttributes: OperatorInitialization<PadAttributes> = (node: Graph.Node): PadAttributes => {\r\n const mode = node.attributes.getString('mode', 'constant');\r\n const value = node.attributes.getFloat('value', 0.0);\r\n const pads = node.attributes.getInts('pads');\r\n return createAttributeWithCacheKey({mode, value, pads});\r\n};\r\n\r\nconst createPadProgramInfo =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: PadAttributes): ProgramInfo => {\r\n const outputShape = ShapeUtil.padShape(inputs[0].dims.slice(), attributes.pads);\r\n const rank = outputShape.length;\r\n const padFunction = getPadFunction(inferenceHandler, inputs[0], attributes);\r\n const shaderSource = `\r\n ${padFunction}\r\n float process(int[${rank}] indices) {\r\n return padA(indices);\r\n }`;\r\n return {\r\n name: 'Pad',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked],\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n throw new Error('Pad requires 1 input');\r\n }\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n throw new Error('Invalid input type.');\r\n }\r\n};\r\n\r\nconst getPadFunction = (inferenceHandler: WebGLInferenceHandler, input: Tensor, attributes: PadAttributes): string => {\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n const [width, height] = inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n const strides = ShapeUtil.computeStrides(input.dims);\r\n\r\n switch (attributes.mode) {\r\n case 'constant':\r\n return getPadConstant(glsl, input.dims, strides, width, height, attributes.pads, attributes.value);\r\n case 'reflect':\r\n return getPadReflect(glsl, input.dims, strides, width, height, attributes.pads);\r\n case 'edge':\r\n return getPadEdge(glsl, input.dims, strides, width, height, attributes.pads);\r\n default:\r\n throw new Error('Invalid mode');\r\n }\r\n};\r\n\r\nconst getPadConstant =\r\n (glsl: Glsl, shape: readonly number[], strides: readonly number[], width: number, height: number, pads: number[],\r\n value: number): string => {\r\n const rank = shape.length;\r\n let block = '';\r\n for (let i = rank - 1; i >= 0; --i) {\r\n block += `\r\n k = m[${i}] - ${pads[i]};\r\n if (k < 0) return constant;\r\n if (k >= ${shape[i]}) return constant;\r\n offset += k * ${strides[i]};\r\n `;\r\n }\r\n return `\r\n float padA(int m[${rank}]) {\r\n const float constant = float(${value});\r\n int offset = 0;\r\n int k = 0;\r\n ${block}\r\n vec2 coords = offsetToCoords(offset, ${width}, ${height});\r\n float value = getColorAsFloat(${glsl.texture2D}(A, coords));\r\n return value;\r\n }\r\n `;\r\n };\r\n\r\nconst getPadReflect =\r\n (glsl: Glsl, shape: readonly number[], strides: readonly number[], width: number, height: number, pads: number[]):\r\n string => {\r\n const rank = shape.length;\r\n\r\n let block = '';\r\n for (let i = rank - 1; i >= 0; --i) {\r\n block += `\r\n k = m[${i}] - ${pads[i]};\r\n if (k < 0) { k = -k; }\r\n {\r\n const int _2n_1 = ${2 * (shape[i] - 1)};\r\n k = int( mod( float(k), float(_2n_1) ) ) ;\r\n if(k >= ${shape[i]}) { k = _2n_1 - k; }\r\n }\r\n offset += k * ${strides[i]};\r\n `;\r\n }\r\n return `\r\n float padA(int m[${rank}]) {\r\n int offset = 0;\r\n int k = 0;\r\n ${block}\r\n vec2 coords = offsetToCoords(offset, ${width}, ${height});\r\n float value = getColorAsFloat(${glsl.texture2D}(A, coords));\r\n return value;\r\n }\r\n `;\r\n };\r\n\r\nconst getPadEdge =\r\n (glsl: Glsl, shape: readonly number[], strides: readonly number[], width: number, height: number, pads: number[]):\r\n string => {\r\n const rank = shape.length;\r\n\r\n let block = '';\r\n for (let i = rank - 1; i >= 0; --i) {\r\n block += `\r\n k = m[${i}] - ${pads[i]};\r\n if (k < 0) k = 0;\r\n if (k >= ${shape[i]}) k = ${shape[i] - 1};\r\n offset += k * ${strides[i]};\r\n `;\r\n }\r\n return `\r\n float padA(int m[${rank}]) {\r\n int offset = 0;\r\n int k = 0;\r\n ${block}\r\n vec2 coords = offsetToCoords(offset, ${width}, ${height});\r\n float value = getColorAsFloat(${glsl.texture2D}(A, coords));\r\n return value;\r\n }\r\n `;\r\n };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport

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{AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph}
from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport
{Tensor} from '../../../tensor';\r\nimport {PoolConvUtil, ShapeUtil} from '../../../util';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramMetadata, TextureType}
from '../types';\r\n\r\nexport interface AveragePoolAttributes extends AttributeWithCacheKey {\r\n  readonly
autoPad: string;\r\n  readonly ceilMode: number;\r\n  readonly countIncludePad: boolean;\r\n  readonly kernelShape:
number[];\r\n  readonly strides: number[];\r\n  readonly pads: number[];\r\n}\r\n\r\nexport const averagePool:
OperatorImplementation<AveragePoolAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs:
Tensor[], attributes: AveragePoolAttributes): Tensor[] => {\r\n      validateInputs(inputs);\r\n      const metadata
=\r\n          {name: 'AveragePool', inputNames: ['X'], inputTypes: [TextureType.unpacked], cacheHint:
attributes.cacheKey};\r\n      const output = inferenceHandler.run(\r\n          {...metadata, get: () =>
createAveragePoolProgramInfo(inputs, metadata, false, attributes)}, inputs);\r\n      return [output];\r\n
};\r\n\r\nexport const parseAveragePoolAttributes: OperatorInitialization<AveragePoolAttributes> =\r\n    (node:
Graph.Node): AveragePoolAttributes => {\r\n      const autoPad = node.attributes.getString('auto_pad',
'NOTSET');\r\n      const ceilMode = node.attributes.getInt('ceil_mode', 0);\r\n      const countIncludePad =
(node.attributes.getInt('count_include_pad', 0) === 0 ? false : true);\r\n      const kernelShape =
node.attributes.getInts('kernel_shape');\r\n      const strides = node.attributes.getInts('strides', []);\r\n      const pads =
node.attributes.getInts('pads', []);\r\n\r\n      // TODO: support attribute 'ceil_mode'\r\n      if (ceilMode !== 0) {\r\n
  throw new Error('using ceil() in shape computation is not yet supported for AveragePool');\r\n      }\r\n\r\n      return
createAttributeWithCacheKey({autoPad, ceilMode, countIncludePad, kernelShape, strides, pads});\r\n
};\r\n\r\nconst createAveragePoolProgramInfo =\r\n    (inputs: Tensor[], metadata: ProgramMetadata,
isGlobalOperator: boolean, attributes: AveragePoolAttributes):\r\n        ProgramInfo => {\r\n          const inputShape
= inputs[0].dims.slice();\r\n          PoolConvUtil.adjustPoolAttributes(\r\n              isGlobalOperator, inputShape,
attributes.kernelShape, attributes.strides, attributes.pads);\r\n          const outputShape =
PoolConvUtil.computePoolOutputShape(\r\n              isGlobalOperator, inputShape, attributes.strides,
attributes.kernelShape, attributes.pads,\r\n              attributes.autoPad);\r\n          const kernelSize =
ShapeUtil.size(attributes.kernelShape);\r\n          const op1 = 'value += _X(x);';\r\n          let op2 = '';\r\n          if
(attributes.countIncludePad) {\r\n            op2 += `value /= float(${kernelSize});`;\r\n          } else {\r\n            op2 +=
`value /= float(${kernelSize} - pad);`;\r\n          }\r\n          const poolingCode =
generatePoolingCode(inputs[0].dims, attributes, op1, op2, '0.0');\r\n          const shaderSource = `\r\n
${poolingCode}\r\n      `;\r\n          return {\r\n            ...metadata,\r\n            output: {dims: outputShape, type:
inputs[0].type, textureType: TextureType.unpacked},\r\n            shaderSource\r\n          };\r\n        };\r\n\r\nexport
const globalAveragePool: OperatorImplementation<AveragePoolAttributes> =\r\n    (inferenceHandler:
WebGLInferenceHandler, inputs: Tensor[], attributes: AveragePoolAttributes): Tensor[] => {\r\n
validateInputs(inputs);\r\n      const metadata = {\r\n        name: 'GlobalAveragePool',\r\n        inputNames: ['X'],\r\n
    inputTypes: [TextureType.unpacked],\r\n        cacheHint: `${attributes.countIncludePad}`\r\n      };\r\n      const
output = inferenceHandler.run(\r\n          {...metadata, get: () => createAveragePoolProgramInfo(inputs, metadata,
true, attributes)}, inputs);\r\n      return [output];\r\n    };\r\n\r\nexport const parseGlobalAveragePoolAttributes:
OperatorInitialization<AveragePoolAttributes> =\r\n    (node: Graph.Node): AveragePoolAttributes => {\r\n
const countIncludePad = (node.attributes.getInt('count_include_pad', 0) === 0 ? false : true);\r\n      return
createAttributeWithCacheKey(\r\n          {autoPad: '', ceilMode: 0, countIncludePad, kernelShape: [], strides: [],
pads: []});\r\n    };\r\n\r\nexport interface MaxPoolAttributes extends AveragePoolAttributes {\r\n  readonly
storageOrder: number;\r\n}\r\n\r\nexport const maxPool: OperatorImplementation<MaxPoolAttributes> =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: MaxPoolAttributes): Tensor[] => {\r\n
validateInputs(inputs);\r\n      const metadata =\r\n          {name: 'MaxPool', inputNames: ['X'], inputTypes:
[TextureType.unpacked], cacheHint: attributes.cacheKey};\r\n      const output = inferenceHandler.run(\r\n
{...metadata, get: () => createMaxPoolProgramInfo(inputs, metadata, false, attributes)}, inputs);\r\n      return
[output];\r\n    };\r\n\r\nexport const parseMaxPoolAttributes: OperatorInitialization<MaxPoolAttributes> =\r\n
```

(node: Graph.Node): MaxPoolAttributes => {\r\n const autoPad = node.attributes.getString('auto_pad', 'NOTSET');\r\n const ceilMode = node.attributes.getInt('ceil_mode', 0);\r\n const kernelShape = node.attributes.getInts('kernel_shape');\r\n const strides = node.attributes.getInts('strides', []);\r\n const pads = node.attributes.getInts('pads', []);\r\n const storageOrder = node.attributes.getInt('storage_order', 0);\r\n\r\n // TODO: support attribute 'ceil_mode' and 'storage_order'\r\n if (storageOrder !== 0) {\r\n throw new Error('column major storage order is not yet supported for MaxPool');\r\n }\r\n if (ceilMode !== 0) {\r\n throw new Error('using ceil() in shape computation is not yet supported for MaxPool');\r\n }\r\n\r\n return createAttributeWithCacheKey(\r\n {autoPad, ceilMode, countIncludePad: false, kernelShape, strides, pads, storageOrder});\r\n };\r\n\r\nconst createMaxPoolProgramInfo =\r\n (inputs: Tensor[], metadata: ProgramMetadata, isGlobalOperator: boolean, attributes: MaxPoolAttributes):\r\n ProgramInfo => {\r\n const inputShape = inputs[0].dims.slice();\r\n PoolConvUtil.adjustPoolAttributes(\r\n isGlobalOperator, inputShape, attributes.kernelShape, attributes.strides, attributes.pads);\r\n const outputShape = PoolConvUtil.computePoolOutputShape(\r\n isGlobalOperator, inputShape, attributes.strides, attributes.kernelShape, attributes.pads,\r\n attributes.autoPad);\r\n const op1 = `\r\n value = max(_X(x), value);\r\n `;\r\n const op2 = '';\r\n const poolingCode = generatePoolingCode(inputShape, attributes, op1, op2, '-1e5');\r\n const shaderSource = `\r\n ${poolingCode}\r\n `;\r\n return {\r\n ...metadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\nconst globalMaxPoolAttributes = {\r\n autoPad: '',\r\n ceilMode: 0,\r\n countIncludePad: false,\r\n kernelShape: [],\r\n strides: [],\r\n pads: [],\r\n storageOrder: 0,\r\n cacheKey: ''\r\n};\r\n\r\nconst globalMaxPoolMetadata = {\r\n name: 'GlobalMaxPool',\r\n inputNames: ['X'],\r\n inputTypes: [TextureType.unpacked]\r\n};\r\n\r\nexport const globalMaxPool = (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n validateInputs(inputs);\r\n const output = inferenceHandler.run(\r\n {\r\n ...globalMaxPoolMetadata,\r\n get: () => createMaxPoolProgramInfo(inputs, globalMaxPoolMetadata, true, globalMaxPoolAttributes)\r\n },\r\n inputs);\r\n return [output];\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n throw new Error('Pool ops requires 1 input.');\r\n }\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n throw new Error('Invalid input type.');\r\n }\r\n};\r\n\r\nconst generatePoolingCode =\r\n (inputDims: readonly number[], attributes: AveragePoolAttributes, op1: string, op2: string, start: string):\r\n string => {\r\n const rank = inputDims.length;\r\n if (attributes.kernelShape.length <= 2) {\r\n const kw = attributes.kernelShape[attributes.kernelShape.length - 1];\r\n const sw = attributes.strides[attributes.strides.length - 1];\r\n const pwStart = attributes.pads[attributes.pads.length / 2 - 1];\r\n const pwEnd = attributes.pads[attributes.pads.length - 1];\r\n const dimW = inputDims[rank - 1];\r\n let codeW = '';\r\n let codeH = '';\r\n let codeHEnd = '';\r\n if (pwStart + pwEnd !== 0) {\r\n codeW = `\r\n for (int i = 0; i < ${kw}; i++) {\r\n x[${rank} - 1] = indices[${rank} - 1] * ${sw} - ${pwStart} + i;\r\n if (x[${rank} - 1] < 0 || x[${rank} - 1] >= ${dimW}) {\r\n pad++;\r\n continue;\r\n }\r\n ${op1}\r\n }`;\r\n } else {\r\n codeW = `\r\n for (int i = 0; i < ${kw}; i++) {\r\n x[${rank} - 1] = indices[${rank} - 1] * ${sw} - ${pwStart} + i;\r\n ${op1}\r\n }`;\r\n }\r\n\r\n if (attributes.kernelShape.length === 2) {\r\n const kh = attributes.kernelShape[attributes.kernelShape.length - 2];\r\n const sh = attributes.strides[attributes.strides.length - 2];\r\n const phStart = attributes.pads[attributes.pads.length / 2 - 2];\r\n const phEnd = attributes.pads[attributes.pads.length - 2];\r\n const dimH = inputDims[rank - 2];\r\n if (phStart + phEnd !== 0) {\r\n codeH = `\r\n for (int j = 0; j < ${kh}; j++) {\r\n x[${rank} - 2] = indices[${rank} - 2] * ${sh} - ${phStart} + j;\r\n if (x[${rank} - 2] < 0 || x[${rank} - 2] >= ${dimH}) {\r\n pad+= ${kw};\r\n continue;\r\n }\r\n `;\r\n } else {\r\n codeH = `\r\n for (int j = 0; j < ${kh}; j++) {\r\n x[${rank} - 2] = indices[${rank} - 2] * ${sh} - ${phStart} + j;\r\n `;\r\n }\r\n codeHEnd = `\r\n }\r\n `;\r\n }\r\n\r\n const poolingCode = `\r\n float process(int indices[${rank}]) {\r\n int x[${rank}];\r\n copyVec(indices, x);\r\n\r\n float value = ${start};\r\n int pad = 0;\r\n ${codeH}\r\n

```
${codeW}\r\n        ${codeHEnd}\r\n        ${op2}\r\n        return value;\r\n      }\r\n    `;\r\n        return
poolingCode;\r\n      } else {\r\n        const kernelSize = ShapeUtil.size(attributes.kernelShape);\r\n        const
kernelStrides = ShapeUtil.computeStrides(attributes.kernelShape);\r\n        const stridesRank =
kernelStrides.length;\r\n        const padsRank = attributes.pads.length;\r\n        const offsetToIndicesFunction =
offsetToIndices(stridesRank);\r\n        const copyInputDims = copyArray(inputDims, 'inputDims');\r\n
const copyPads = copyArray(attributes.pads, 'pads');\r\n        const copyKernelStrides = copyArray(kernelStrides,
'kernelStrides');\r\n        const copyStrides = copyArray(attributes.strides, 'strides');\r\n        const hasPads =
attributes.pads.reduce((sum, cur) => sum + cur);\r\n        let padCode = '';\r\n        if (hasPads) {\r\n
padCode = `\r\n          if (x[j] >= inputDims[j] || x[j] < 0) {\r\n            pad++;\r\n            isPad = true;\r\n
break;\r\n          }\r\n        }\r\n        if (!isPad) {\r\n          ${op1}\r\n        }`;\r\n        } else {\r\n
padCode = `\r\n        }\r\n        ${op1}\r\n      `;\r\n        }\r\n        const poolingCode = `\r\n
${offsetToIndicesFunction}\r\n      float process(int indices[${rank}]) {\r\n        int x[${rank}];\r\n
copyVec(indices, x);\r\n        int offset[${stridesRank}];\r\n        int pads[${padsRank}];\r\n        int
inputDims[${rank}];\r\n        int kernelStrides[${stridesRank}];\r\n        int strides[${stridesRank}];\r\n
${copyPads}\r\n        ${copyInputDims}\r\n        ${copyStrides}\r\n        ${copyKernelStrides}\r\n\r\n
float value = ${start};\r\n        int pad = 0;\r\n        bool isPad = false;\r\n        for (int i = 0; i < ${kernelSize};
i++) {\r\n          offsetToIndices(i, kernelStrides, offset);\r\n          isPad = false;\r\n          for (int j = ${rank} -
${stridesRank}; j < ${rank}; j++) {\r\n            x[j] = indices[j] * strides[j - ${rank} + ${stridesRank}]\r\n
+ offset[j - ${rank} + ${stridesRank}] - pads[j - 2];\r\n            ${padCode}\r\n        }\r\n        ${op2}\r\n\r\n
return value;\r\n      }\r\n    `;\r\n        return poolingCode;\r\n      }\r\n    };\r\n\r\nconst copyArray = (array:
readonly number[], arrayName: string): string => {\r\n  let block = '';\r\n  for (let i = 0; i < array.length; i++) {\r\n
block += `\r\n      ${arrayName}[${i}] = ${array[i]};\r\n    `;\r\n  }\r\n  return block;\r\n};\r\n\r\nconst
offsetToIndices = (rank: number): string => `\r\n  void offsetToIndices(int offset, int[${rank}] strides, out
int[${rank}] indices) {\r\n    if (${rank} == 0) {\r\n      return;\r\n    }\r\n    for (int i = 0; i < ${rank} - 1; ++i) {\r\n
indices[i] = offset / strides[i];\r\n      offset -= indices[i] * strides[i];\r\n    }\r\n    indices[${rank} - 1] = offset;\r\n
}`;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-
key';\r\nimport {Graph} from '../../../graph';\r\nimport {NUMBER_TYPES, OperatorImplementation,
OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from
'../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo,
ProgramMetadata, TextureType} from '../types';\r\n\r\nexport interface ReduceAttributes extends
AttributeWithCacheKey {\r\n  readonly axes: number[];\r\n  readonly keepDims: boolean;\r\n}\r\n\r\n// return [init
ops, reduce ops, final ops]\r\ntype ReduceOp = (inputs: Tensor[], axes: number[]) => string[];\r\n\r\nconst reduce
=\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes, name: string,\r\n
    reduceOp: ReduceOp): Tensor[] => {\r\n      validateInputs(inputs);\r\n\r\n      const reduceProgramMetadata =
{\r\n        name,\r\n        inputNames: ['A'],\r\n        inputTypes: [TextureType.unpacked],\r\n      };\r\n\r\n      const
output = inferenceHandler.run(\r\n          {\r\n            ...reduceProgramMetadata,\r\n            cacheHint:
attributes.cacheKey,\r\n            get: () =>\r\n                createReduceProgramInfo(inferenceHandler, inputs,
attributes, name, reduceOp, reduceProgramMetadata)\r\n          },\r\n          inputs);\r\n      return [output];\r\n
};\r\n\r\nexport const parseReduceAttributes: OperatorInitialization<ReduceAttributes> = (node: Graph.Node):
ReduceAttributes => {\r\n  const axes = node.attributes.getInts('axes', []);\r\n  const keepDims =
node.attributes.getInt('keepdims', 1) === 1;\r\n  return createAttributeWithCacheKey({axes,
keepDims});\r\n};\r\n\r\nconst createReduceProgramInfo =\r\n    (handler: WebGLInferenceHandler, inputs:
Tensor[], attributes: ReduceAttributes, name: string, reduceOp: ReduceOp,\r\n     reduceProgramMetadata:
ProgramMetadata): ProgramInfo => {\r\n      const outputShape: number[] = [];\r\n      const iRank =
inputs[0].dims.length || 1;\r\n\r\n      const idxCopy = [];  // copy output indexes to input indexes\r\n\r\n      const axes
= ShapeUtil.normalizeAxes(attributes.axes, inputs[0].dims.length);\r\n      const ops = reduceOp(inputs, axes);\r\n
let reduceOps = ops[1];\r\n\r\n      for (let k = 0; k < inputs[0].dims.length; k++) {\r\n        // if this axis is reduced\r\n
```

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    if (axes.indexOf(k) >= 0 || axes.length === 0) {\r\n        if (attributes.keepDims) {\r\n
outputShape.push(1);\r\n        }  // else { remove the axis from outputShape; }\r\n\r\n        // loop over the d-th
axis\r\n        reduceOps = `\r\n        for(int j${k} = 0; j${k} < ${inputs[0].dims[k]}; j${k}++) {\r\n
inputIdx[${k}] = j${k};\r\n          ${reduceOps}\r\n        }`;\r\n      } else {\r\n
idxCopy.push(`inputIdx[${k}] = outputIdx[${outputShape.length}];`);\r\n\r\n
outputShape.push(inputs[0].dims[k]);\r\n      }\r\n    }\r\n\r\n    const oRank = outputShape.length || 1;\r\n\r\n
const shaderSource = `\r\n    float process(int outputIdx[${oRank}]) {\r\n      float value;              // final
result\r\n      int inputIdx[${iRank}];    // addressing input data\r\n      ${idxCopy.join('\\n')}\r\n      ${ops[0]}
// init ops for reduce max/min\r\n      ${reduceOps}\r\n      ${ops[2]}      // final computation for reduce mean\r\n
  return value;\r\n    }`;\r\n\r\n    return {\r\n      ...reduceProgramMetadata,\r\n      output: {dims: outputShape,
type: inputs[0].type, textureType: TextureType.unpacked},\r\n      shaderSource\r\n    };\r\n  };\r\n\r\nconst
validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length !== 1) {\r\n    throw new Error('Reduce
op requires 1 input.');\r\n  }\r\n\r\n  if (NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n    throw new
Error('Invalid input type.');\r\n  }\r\n};\r\n\r\nexport const reduceSum: OperatorImplementation<ReduceAttributes>
=\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] =>
{\r\n      const reduceOp: ReduceOp = (): string[] => ['value = 0.0;', 'value += _A(inputIdx);', ''];\r\n      return
reduce(inferenceHandler, inputs, attributes, 'ReduceSum', reduceOp);\r\n    };\r\n\r\nexport const reduceMean:
OperatorImplementation<ReduceAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: ReduceAttributes): Tensor[] => {\r\n      const reduceOp: ReduceOp = (inputs: Tensor[], axes: number[]):
string[] => {\r\n        let size = 1.0;\r\n        for (let k = 0; k < inputs[0].dims.length; k++) {\r\n          if
(axes.indexOf(k) >= 0 || axes.length === 0) {\r\n            size *= inputs[0].dims[k];\r\n          }\r\n        }\r\n\r\n
return ['value = 0.0;', 'value += _A(inputIdx);', `value /= ${size}.;`];  // ensure real number with `.`\r\n      };\r\n
return reduce(inferenceHandler, inputs, attributes, 'ReduceMean', reduceOp);\r\n    };\r\n\r\nexport const reduceMax:
OperatorImplementation<ReduceAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: ReduceAttributes): Tensor[] => {\r\n      const reduceOp: ReduceOp = (inputs: Tensor[], axes: number[]):
string[] => {\r\n        const idxZero = [];\r\n        for (let k = 0; k < inputs[0].dims.length; k++) {\r\n          if
(axes.indexOf(k) >= 0 || axes.length === 0) {\r\n            idxZero.push(`inputIdx[${k}] = 0;`);  // first element\r\n
 }\r\n        }\r\n\r\n        return [`${idxZero.join('\\n')}\\nvalue = _A(inputIdx);`, 'value = max(value, _A(inputIdx));',
''];\r\n      };\r\n      return reduce(inferenceHandler, inputs, attributes, 'ReduceMax', reduceOp);\r\n    };\r\n\r\nexport
const reduceMin: OperatorImplementation<ReduceAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler,
inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n      const reduceOp: ReduceOp = (inputs: Tensor[],
axes: number[]): string[] => {\r\n        const idxZero = [];\r\n        for (let k = 0; k < inputs[0].dims.length; k++) {\r\n
     if (axes.indexOf(k) >= 0 || axes.length === 0) {\r\n            idxZero.push(`inputIdx[${k}] = 0;`);  // first
element\r\n          }\r\n        }\r\n\r\n        return [`${idxZero.join('\\n')}\\nvalue = _A(inputIdx);`, 'value = min(value,
_A(inputIdx));', ''];\r\n      };\r\n      return reduce(inferenceHandler, inputs, attributes, 'ReduceMin', reduceOp);\r\n
};\r\n\r\nexport const reduceProd: OperatorImplementation<ReduceAttributes> =\r\n    (inferenceHandler:
WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n      const reduceOp:
ReduceOp = (): string[] => ['value = 1.0;', 'value *= _A(inputIdx);', ''];\r\n      return reduce(inferenceHandler, inputs,
attributes, 'ReduceProd', reduceOp);\r\n    };\r\n\r\nexport const reduceLogSum:
OperatorImplementation<ReduceAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: ReduceAttributes): Tensor[] => {\r\n      const reduceOp: ReduceOp = (): string[] => ['value = 0.0;', 'value
+= _A(inputIdx);', 'value = log(value);'];\r\n      return reduce(inferenceHandler, inputs, attributes, 'ReduceLogSum',
reduceOp);\r\n    };\r\n\r\nexport const reduceLogSumSquare: OperatorImplementation<ReduceAttributes> =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n
const reduceOp: ReduceOp = (): string[] => ['float t; value = 0.0;', 't = _A(inputIdx); value += t * t;', ''];\r\n      return
reduce(inferenceHandler, inputs, attributes, 'ReduceLogSumSquare', reduceOp);\r\n    };","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from
'../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl} from '../glsl-source';\r\nimport
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{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nimport {unpackFromChannel} from './packing-utils';\r\n\r\nconst createPackedReshape3DProgramMetadata = (outputShape3D: readonly number[]) =>\r\n ({name: 'Reshape (packed)', inputTypes: [TextureType.packed], inputNames: ['A'], cacheHint: `${outputShape3D}`});\r\n\r\nconst createPackedReshape3DProgramInfo =\r\n (handler: WebGLInferenceHandler, input3D: Tensor, metadata: ProgramMetadata, outputShape3D: readonly number[]):\r\n ProgramInfo => {\r\n const inputShape3D = input3D.dims as [number, number, number];\r\n const squeezedOutputShape = outputShape3D as [number, number, number];\r\n\r\n let mainLoop = ";\r\n for (let i = 0; i < 4; i++) {\r\n let outputCoords = ";\r\n switch (i) {\r\n case 0:\r\n outputCoords = 'outputCoords = rc;';\r\n break;\r\n case 1:\r\n outputCoords = 'outputCoords = ivec3(rc.x, rc.y+1, rc.z);';\r\n break;\r\n case 2:\r\n outputCoords = 'outputCoords = ivec3(rc.x, rc.y, rc.z+1);';\r\n break;\r\n case 3:\r\n outputCoords = 'outputCoords = ivec3(rc.x, rc.y+1, rc.z+1);';\r\n break;\r\n default:\r\n throw new Error();\r\n }\r\n\r\n mainLoop += `\r\n ${outputCoords}\r\n ${i > 0 ? 'if(outputCoords.y < rows && outputCoords.z < cols){' : "}\r\n int flattenedIndex = getFlattenedIndex(outputCoords);\r\n\r\n ivec3 inputRC = inputCoordsFromReshapedOutCoords(flattenedIndex);\r\n vec2 innerDims = vec2(float(inputRC.y),float(inputRC.z));\r\n\r\n result[${i}] = getChannel(getA(inputRC.x, inputRC.y, inputRC.z), innerDims);\r\n\r\n ${i > 0 ? '}' : "}\r\n `;\r\n }\r\n const glsl = getGlsl(handler.session.backend.glContext.version);\r\n\r\n const shaderSource = `\r\n ${getReshapedInputCoords(inputShape3D)}\r\n ${getFlattenedIndexFrom3D(squeezedOutputShape)}\r\n ${unpackFromChannel()}\r\n\r\n void main() {\r\n ivec3 rc = getOutputCoords();\r\n\r\n vec4 result = vec4(0.0);\r\n\r\n ivec3 outputCoords;\r\n int rows = ${squeezedOutputShape[2]};\r\n int cols = ${squeezedOutputShape[1]};\r\n\r\n ${mainLoop}\r\n ${glsl.output} = result;\r\n }\r\n `;\r\n\r\n return {\r\n ...metadata,\r\n output: {dims: squeezedOutputShape, type: input3D.type, textureType: TextureType.packed},\r\n shaderSource,\r\n hasMain: true\r\n };\r\n };\r\n\r\nexport const createPackedReshape3DProgramInfoLoader =\r\n (handler: WebGLInferenceHandler, input3D: Tensor, outputShape3D: readonly number[]): ProgramInfoLoader => {\r\n const metadata = createPackedReshape3DProgramMetadata(outputShape3D);\r\n return {...metadata, get: () => createPackedReshape3DProgramInfo(handler, input3D, metadata, outputShape3D)};\r\n };\r\n\r\nexport function processDims3D(shape: ArrayLike<number>): [number, number, number] {\r\n if (shape.length === 0) {\r\n return [1, 1, 1];\r\n }\r\n // TODO: squeeze other shapes to 2D case\r\n let batch = 1;\r\n for (let i = 0; i < shape.length - 2; ++i) {\r\n batch *= shape[i];\r\n }\r\n return [batch, shape.length > 1 ? shape[shape.length - 2] : 1, shape[shape.length - 1]];\r\n}\r\n\r\n// For packed reshape, we need to re-arrange texel data for output shape.\r\n// Our pack is designed to pack a 2x2 tile in last h and w dimension, so\r\n// for the reshaped new tensor, we just need to re-arrange the last h and\r\n// w dimension. For any shape that is not in 3D, i.e. [batch, W, H], we\r\n// first convert it to 3D by collapsing other dimension to batch dim, then\r\n// process with the last two dimensions.\r\n// Note: we only need the shape tensor to calculate output shape, so the\r\n// content in shape tensor is never uploaded to GPU. It is always kept in CPU.\r\n// TODO: optimize the algorithm -- in some cases, if the last two dims are\r\n// the same between input shape and output shape, the packed reshape can be\r\n// treated as no-op.\r\nexport function isReshapeCheap(dims: readonly number[], reshapedDims: readonly number[]) {\r\n let isCheapReshape = false;\r\n if (dims.length === 0 || reshapedDims.length === 0) { // scalar\r\n isCheapReshape = true;\r\n } else if (dims.length < 2 || reshapedDims.length < 2) { // 1D\r\n isCheapReshape = dims[dims.length - 1] === reshapedDims[reshapedDims.length - 1];\r\n } else { // 2D +\r\n isCheapReshape = dims[dims.length - 1] === reshapedDims[reshapedDims.length - 1] &&\r\n dims[dims.length - 2] === reshapedDims[reshapedDims.length - 2];\r\n }\r\n\r\n return isCheapReshape;\r\n}\r\n\r\nfunction getReshapedInputCoords(shape: [number, number, number]): string {\r\n const strides = ShapeUtil.computeStrides(shape);\r\n const coords = ['b', 'r', 'c'];\r\n const index = 'index';\r\n const coordsFromIndexSnippet = strides\r\n .map((stride, i) => {\r\n const line1 = `int ${coords[i]} = ${index} / ${stride}`;\r\n const line2 = i

=== strides.length - 1 ?\r\n `int ${coords[i + 1]} = ${index} - ${coords[i]} * ${stride}` :\r\n `index -= ${coords[i]} * ${stride}`;\r\n return `${line1}; ${line2};`;\r\n })\r\n .join('');\r\n\r\n return `\r\n ivec3 inputCoordsFromReshapedOutCoords(int index) {\r\n ${coordsFromIndexSnippet}\r\n return ivec3(b, r, c);\r\n }\r\n `;\r\n}\r\n\r\nfunction getFlattenedIndexFrom3D(shape: [number, number, number]): string {\r\n const strides = ShapeUtil.computeStrides(shape);\r\n\r\n return `\r\n int getFlattenedIndex(ivec3 coords) {\r\n // reverse y, z order\r\n return coords.x * ${strides[0]} + coords.z * ${strides[1]} + coords.y;\r\n }\r\n`;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const reshape = (handler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n const reshapedDims = ShapeUtil.calculateReshapedDims(inputs[0].dims, inputs[1].integerData);\r\n if (handler.session.pack) {\r\n return [handler.reshapePacked(inputs[0], reshapedDims)];\r\n } else {\r\n return [handler.reshapeUnpacked(inputs[0], reshapedDims)];\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\nimport {getCoordsDataType} from '../utils';\r\n\r\nimport {unpackFromChannel} from './packing-utils';\r\nimport {parseUpsampleAttributes, scalesValidation, UpsampleAttributes, validateInputs} from './upsample';\r\n\r\nconst resizeProgramMetadata = {\r\n name: 'Resize',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.packed]\r\n};\r\n\r\nexport const resize: OperatorImplementation<UpsampleAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: UpsampleAttributes): Tensor[] => {\r\n validateInputs(inputs, attributes);\r\n const output = inferenceHandler.run(\r\n {\r\n ...resizeProgramMetadata,\r\n cacheHint: attributes.cacheKey,\r\n get: () => createPackedResizeProgramInfo(inferenceHandler, inputs, attributes)\r\n },\r\n inputs);\r\n return [output];\r\n };\r\n\r\nexport const parseResizeAttributesV10: OperatorInitialization<UpsampleAttributes> =\r\n (node: Graph.Node): UpsampleAttributes => parseUpsampleAttributes(node, 10);\r\n\r\nexport const parseResizeAttributesV11: OperatorInitialization<UpsampleAttributes> =\r\n (node: Graph.Node): UpsampleAttributes => parseUpsampleAttributes(node, 11);\r\n\r\nconst createPackedResizeProgramInfo =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: UpsampleAttributes): ProgramInfo => {\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n const [scales, outputShape] = prepareInputs(inputs, attributes);\r\n\r\n const isSame =\r\n scales.every((s: number) => s === 1) && attributes.coordinateTransformMode !== 'tf_crop_and_resize';\r\n if (isSame) {\r\n return {\r\n ...resizeProgramMetadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.packed},\r\n hasMain: true,\r\n shaderSource: `void main() {\r\n vec4 v = ${glsl.texture2D}(X, TexCoords);\r\n ${glsl.output} = v;\r\n }`\r\n };\r\n }\r\n\r\n const dim = outputShape.length;\r\n if (dim < 2) {\r\n throw new Error(`output dimension should be at least 2, but got ${dim}`);\r\n }\r\n\r\n const outputHeight = outputShape[dim - 2];\r\n const outputWidth = outputShape[dim - 1];\r\n\r\n const inputShape = inputs[0].dims;\r\n if (dim !== inputShape.length) {\r\n throw new Error(`output dimension should match input ${inputShape.length}, but got ${dim}`);\r\n }\r\n const inputHeight = inputShape[dim - 2];\r\n const inputWidth = inputShape[dim - 1];\r\n\r\n const scalesHeight = scales[dim - 2];\r\n const scalesWidth = scales[dim - 1];\r\n\r\n let getSourceFracIndex = '';\r\n\r\n if (attributes.mode !== 'linear') {\r\n // TODO: support other modes\r\n throw new Error(`resize (packed) does not support mode: '${attributes.mode}'`);\r\n }\r\n switch (attributes.coordinateTransformMode) {\r\n case 'asymmetric':\r\n getSourceFracIndex = `\r\n vec4 getSourceFracIndex(ivec4 coords) {\r\n return vec4(coords) / scaleWHWH;\r\n }\r\n `;\r\n break;\r\n case 'half_pixel':\r\n getSourceFracIndex = `\r\n vec4 getSourceFracIndex(ivec4 coords) {\r\n return (vec4(coords) + 0.5) / scaleWHWH - 0.5;\r\n

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  }\r\n          `;\r\n      break;\r\n     case 'align_corners':\r\n      getSourceFracIndex = `\r\n           vec4
getSourceFracIndex(ivec4 coords) {\r\n             vec4 resized = vec4(${outputWidth}.0 - 1.0,
${outputHeight}.0 - 1.0, ${outputWidth}.0 - 1.0,\r\n               ${outputHeight}.0 - 1.0);\r\n
vec4 original = vec4(${inputWidth}.0 - 1.0, ${inputHeight}.0 - 1.0, ${inputWidth}.0 - 1.0,\r\n
${inputHeight}.0 - 1.0);\r\n             vec4 new_scale = original / resized;\r\n             return vec4(coords)
* new_scale;\r\n            }\r\n          `;\r\n      break;\r\n     default:\r\n      // TODO:supporting other
coordinateTransformModes\r\n      throw new Error(`resize (packed) does not support coordinateTransformMode:
\\\r\n                 '${attributes.coordinateTransformMode}'`);\r\n    }\r\n\r\n    const coordsDataType =
getCoordsDataType(dim);\r\n    const unpackChannel = unpackFromChannel();\r\n    const shaderSource = `\r\n
      const vec2 inputWH = vec2(${inputHeight}.0, ${inputWidth}.0);\r\n        const vec4 scaleWHWH =
vec4(${scalesHeight}.0, ${scalesWidth}.0, ${scalesHeight}.0, ${scalesWidth}.0);\r\n        ${unpackChannel}\r\n
        ${getSourceFracIndex}\r\n        float getAValue(int x10, int r, int c, int d) {\r\n          return
getChannel(getA(x10, r, c, d), vec2(c, d));\r\n        }\r\n        void main() {\r\n          ${coordsDataType} rc
= getOutputCoords();\r\n\r\n          int batch = rc[0];\r\n          int depth = rc[1];\r\n\r\n          // retrieve the
4 coordinates that is used in the 4 packed output values.\r\n          ivec4 coords = ivec4(rc.wz, rc.w + 1, rc.z +
1);\r\n\r\n          // calculate the source index in fraction\r\n          vec4 sourceFrac =
getSourceFracIndex(coords);\r\n\r\n          // get the lower and upper bound of the 4 values that will be packed
into one texel.\r\n          ivec4 x00 = ivec4(max(sourceFrac.xy, vec2(0.0)), min(inputWH - 1.0,
ceil(sourceFrac.xy)));\r\n          ivec4 x01 = ivec4(max(sourceFrac.xw, vec2(0.0)), min(inputWH - 1.0,
ceil(sourceFrac.xw)));\r\n          ivec4 x10 = ivec4(max(sourceFrac.zy, vec2(0.0)), min(inputWH - 1.0,
ceil(sourceFrac.zy)));\r\n          ivec4 x11 = ivec4(max(sourceFrac.zw, vec2(0.0)), min(inputWH - 1.0,
ceil(sourceFrac.zw)));\r\n\r\n          bool hasNextRow = rc.w < ${outputHeight - 1};\r\n          bool
hasNextCol = rc.z < ${outputWidth - 1};\r\n\r\n          // pack x00, x01, x10, x11's top-left corner into one vec4
structure\r\n          vec4 topLeft = vec4(\r\n            getAValue(batch, depth, x00.x, x00.y),\r\n
hasNextCol ? getAValue(batch, depth, x01.x, x01.y) : 0.0,\r\n            hasNextRow ? getAValue(batch, depth,
x10.x, x10.y) : 0.0,\r\n            (hasNextRow && hasNextCol) ? getAValue(batch, depth, x11.x, x11.y) :
0.0);\r\n\r\n          // pack x00, x01, x10, x11's top-right corner into one vec4 structure\r\n          vec4 topRight
= vec4(\r\n            getAValue(batch, depth, x00.x, x00.w),\r\n            hasNextCol ? getAValue(batch,
depth, x01.x, x01.w) : 0.0,\r\n            hasNextRow ? getAValue(batch, depth, x10.x, x10.w) : 0.0,\r\n
 (hasNextRow && hasNextCol) ? getAValue(batch, depth, x11.x, x11.w) : 0.0);\r\n\r\n          // pack x00, x01,
x10, x11's bottom-left corner into one vec4 structure\r\n          vec4 bottomLeft = vec4(\r\n
getAValue(batch, depth, x00.z, x00.y),\r\n            hasNextCol ? getAValue(batch, depth, x01.z, x01.y) : 0.0,\r\n
            hasNextRow ? getAValue(batch, depth, x10.z, x10.y) : 0.0,\r\n            (hasNextRow &&
hasNextCol) ? getAValue(batch, depth, x11.z, x11.y) : 0.0);\r\n\r\n          // pack x00, x01, x10, x11's bottom-
right corner into one vec4 structure\r\n          vec4 bottomRight = vec4(\r\n            getAValue(batch, depth,
x00.z, x00.w),\r\n            hasNextCol ? getAValue(batch, depth, x01.z, x01.w) : 0.0,\r\n
hasNextRow ? getAValue(batch, depth, x10.z, x10.w) : 0.0,\r\n            (hasNextRow && hasNextCol) ?
getAValue(batch, depth, x11.z, x11.w) : 0.0);\r\n\r\n          // calculate the interpolation fraction on u and v
direction\r\n          vec4 frac = vec4(sourceFrac) - floor(sourceFrac);\r\n          vec4 clampFrac = clamp(frac,
vec4(0.0), vec4(1.0));\r\n\r\n          vec4 top = mix(topLeft, topRight, clampFrac.ywyw);\r\n          vec4
bottom = mix(bottomLeft, bottomRight, clampFrac.ywyw);\r\n          vec4 newValue = mix(top, bottom,
clampFrac.xxzz);\r\n\r\n          ${glsl.output} = vec4(newValue);\r\n        }\r\n      `;\r\n    return {\r\n
...resizeProgramMetadata,\r\n      output: {dims: outputShape, type: inputs[0].type, textureType:
TextureType.packed},\r\n      hasMain: true,\r\n      shaderSource\r\n    };\r\n  };\r\n\r\n\r\nconst prepareInputs =
(inputs: Tensor[], attributes: UpsampleAttributes): [readonly number[], readonly number[]] => {\r\n  const x =
inputs[0];\r\n  const xDims = x.dims;\r\n\r\n  let scales = attributes.scales;\r\n  let outputSizes:
number[]|undefined;\r\n  if (scales.length === 0) {\r\n    const scalesTensor = inputs[attributes.scalesInputIdx];\r\n
if (scalesTensor && scalesTensor.size !== 0) {\r\n      if (inputs[attributes.sizesInputIdx]) {\r\n        throw new
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Error('Only one of scales or sizes must be provided as input.');\r\n }\r\n scales = parseScalesData(scalesTensor, attributes.mode, attributes.isResize);\r\n } else {\r\n const sizesTensor = inputs[attributes.sizesInputIdx];\r\n if (!sizesTensor || sizesTensor.size === 0) {\r\n throw new Error('Either scales or sizes MUST be provided as input.');\r\n }\r\n\r\n outputSizes = Array.from(sizesTensor.integerData);\r\n scales = parseScalesDataFromOutputSize(outputSizes, xDims, attributes.mode, attributes.isResize);\r\n }\r\n } else {\r\n if (inputs[attributes.sizesInputIdx]) {\r\n throw new Error('Only one of scales or sizes must be provided as input.');\r\n }\r\n }\r\n\r\n const yDims = outputSizes || (xDims.map((dim, i) => Math.floor(dim * scales[i])));\r\n\r\n return [scales, yDims];\r\n};\r\n\r\nconst parseScalesData = (scale: Tensor, mode: string, isResize: boolean): number[] => {\r\n const scales = Array.from(scale.floatData);\r\n scalesValidation(scales, mode, isResize);\r\n return scales;\r\n};\r\n\r\nconst parseScalesDataFromOutputSize =\r\n (yDims: readonly number[], xDims: readonly number[], mode: string, isResize: boolean): number[] => {\r\n const length = xDims.length;\r\n const scales = new Array<number>(length);\r\n\r\n for (let i = 0, end = length; i < end; i++) {\r\n if (xDims[i] === 0) {\r\n if (yDims[i] !== 0) {\r\n throw new Error('Input dim is zero but required output dim is non-zero.');\r\n }\r\n scales[i] = 1;\r\n } else {\r\n scales[i] = yDims[i] / xDims[i];\r\n }\r\n }\r\n scalesValidation(scales, mode, isResize);\r\n return scales;\r\n };\r\n\r\n// roi data is not used yet. but leave here for future usage.\r\n// const getRoi = (inputs: Tensor[], attributes: UpsampleAttributes) : number[] => {\r\n// let roi: number[] = [];\r\n// if (attributes.needRoiInput) {\r\n// if (attributes.roiInputIdx <= 0) {\r\n// throw new Error('Invalid roi input index.');\r\n// }\r\n// const roiTensor = inputs[attributes.roiInputIdx];\r\n// roi = roiTensor.size > 0 ? Array.from(roiTensor.floatData) : [];\r\n// } else {\r\n// roi = new Array(inputs[0].dims.length * 2).fill(0);\r\n// }\r\n// return roi;\r\n// };","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const shape = (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n validateInputs(inputs);\r\n return [new Tensor([inputs[0].dims.length], 'int32', undefined, undefined, new Int32Array(inputs[0].dims))];\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n throw new Error('Shape requires 1 input.');\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {NUMBER_TYPES, OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface SliceAttributes extends AttributeWithCacheKey {\r\n readonly axes: number[];\r\n readonly ends: number[];\r\n readonly starts: number[];\r\n}\r\n\r\nconst sliceProgramMetadata = {\r\n name: 'Slice',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked]\r\n};\r\n\r\nexport const slice: OperatorImplementation<SliceAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: SliceAttributes): Tensor[] => {\r\n validateInputs(inputs);\r\n const output = inferenceHandler.run(\r\n {\r\n ...sliceProgramMetadata,\r\n cacheHint: attributes.cacheKey,\r\n get: () => createSliceProgramInfo(inferenceHandler, inputs[0], attributes)\r\n },\r\n inputs);\r\n return [output];\r\n };\r\n\r\nexport const parseSliceAttributes: OperatorInitialization<SliceAttributes> = (node: Graph.Node): SliceAttributes => {\r\n const starts = node.attributes.getInts('starts');\r\n const ends = node.attributes.getInts('ends');\r\n const axes = node.attributes.getInts('axes', []);\r\n return createAttributeWithCacheKey({starts, ends, axes});\r\n};\r\n\r\nconst createSliceProgramInfo =\r\n (inferenceHandler: WebGLInferenceHandler, input: Tensor, attributes: SliceAttributes): ProgramInfo => {\r\n const axes = (attributes.axes.length === 0) ? input.dims.slice(0).map((val, i) => i) : attributes.axes;\r\n const normalizedAxes = ShapeUtil.normalizeAxes(axes, input.dims.length);\r\n const starts = attributes.starts.map((start, i) => {\r\n if (start > input.dims[normalizedAxes[i]] - 1) {\r\n return input.dims[normalizedAxes[i]];\r\n }\r\n return ShapeUtil.normalizeAxis(start, input.dims[normalizedAxes[i]]);\r\n });\r\n const ends = attributes.ends.map((end, i) => {\r\n if (end > input.dims[normalizedAxes[i]] - 1) {\r\n return input.dims[normalizedAxes[i]];\r\n }\r\n return ShapeUtil.normalizeAxis(end, input.dims[normalizedAxes[i]]);\r\n });\r\n\r\n const outputShape = input.dims.slice();\r\n\r\n const sliceOps: string[] = [];\r\n for (let i = 0; i < normalizedAxes.length; i++) {\r\n outputShape[normalizedAxes[i]] = ends[i] - starts[i];\r\n if (starts[i] > 0) {\r\n sliceOps.push(`outputIdx[${normalizedAxes[i]}] += ${starts[i]};`);\r\n } // else { sliceOps.push(`outputIdx[${normalizedAxes[i]}] += 0;`); }\r\n }\r\n\r\n const rank = outputShape.length;\r\n const shaderSource = `\r\n float process(int outputIdx[${rank}]) {\r\n ${sliceOps.join('\\n ')}\r\n return _A(outputIdx);\r\n }`;\r\n return {\r\n ...sliceProgramMetadata,\r\n output: {dims: outputShape, type: input.type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n throw new Error('Slice requires 1 input.');\r\n }\r\n if (NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n throw new Error('Invalid input type.');\r\n }\r\n};\r\n\r\nexport const sliceV10 = (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n validateInputsV10(inputs);\r\n const attributes = generateSliceAttributesFromInputs(inferenceHandler, inputs);\r\n const output = inferenceHandler.run(\r\n {\r\n ...sliceProgramMetadata,\r\n cacheHint: attributes.cacheKey,\r\n get: () => createSliceProgramInfo(inferenceHandler, inputs[0], attributes)\r\n },\r\n [inputs[0]]);\r\n return [output];\r\n};\r\n\r\nconst generateSliceAttributesFromInputs =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): SliceAttributes => {\r\n if (!inferenceHandler.session.isInitializer(inputs[1].dataId) ||\r\n !inferenceHandler.session.isInitializer(inputs[2].dataId) ||\r\n (inputs.length >= 4 && !inferenceHandler.session.isInitializer(inputs[3].dataId)) ||\r\n (inputs.length >= 5 && !inferenceHandler.session.isInitializer(inputs[4].dataId))) {\r\n throw new Error('dynamic slice attributes are not allowed');\r\n }\r\n\r\n if (inputs.length >= 5 && inputs[4].integerData.some((i: number) => i !== 1)) {\r\n throw new Error('currently non-1 steps is not supported for Slice');\r\n }\r\n\r\n const starts = Array.from(inputs[1].integerData);\r\n const ends = Array.from(inputs[2].integerData);\r\n const axes = inputs.length >= 4 ? Array.from(inputs[3].integerData) : [];\r\n const cacheKey = `${axes};${starts};${ends}`;\r\n return {starts, ends, axes, cacheKey};\r\n };\r\n\r\nconst validateInputsV10 = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length < 3 || inputs.length > 5) {\r\n throw new Error('Invalid input number.');\r\n }\r\n if (inputs[1].type !== 'int32' || inputs[1].dims.length !== 1) {\r\n throw new Error('Invalid input type.');\r\n }\r\n if (inputs[2].type !== 'int32' || inputs[2].dims.length !== 1) {\r\n throw new Error('Invalid input type.');\r\n }\r\n if (inputs.length >= 4 && (inputs[3].type !== 'int32' || inputs[3].dims.length !== 1)) {\r\n throw new Error('Invalid input type.');\r\n }\r\n if (inputs.length >= 5 && (inputs[4].type !== 'int32' || inputs[4].dims.length !== 1)) {\r\n throw new Error('Invalid input type.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface SoftmaxAttributes extends AttributeWithCacheKey {\r\n readonly axis: number;\r\n}\r\n\r\nconst softmaxComputeMaxProgramMetadata = {\r\n name: 'SoftmaxComputeMax',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nconst softmaxComputeScaleProgramMetadata = {\r\n name: 'SoftmaxComputeScale',\r\n inputNames: ['A', 'Max'],\r\n inputTypes: [TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nconst softmaxProgramMetadata = {\r\n name: 'SoftMax',\r\n inputNames: ['A', 'Max', 'Norm'],\r\n inputTypes: [TextureType.unpacked, TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nexport const softmax: OperatorImplementation<SoftmaxAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: SoftmaxAttributes): Tensor[] => {\r\n validateInputs(inputs);\r\n\r\n const inputShape = inputs[0].dims.slice();\r\n const axis = ShapeUtil.normalizeAxis(attributes.axis, inputShape.length);\r\n const

N = ShapeUtil.sizeToDimension(inputShape, axis);\r\n const D = ShapeUtil.sizeFromDimension(inputShape, axis);\r\n\r\n const computeMaxProgramInfo = createComputeMaxProgramInfo(inferenceHandler, inputs[0], N, D, [N]);\r\n const max = inferenceHandler.run(\r\n {...softmaxComputeMaxProgramMetadata, cacheHint: attributes.cacheKey, get: () => computeMaxProgramInfo},\r\n inputs);\r\n\r\n const computeScaleProgramInfo =\r\n createComputScaleProgramInfo(inferenceHandler, inputs[0], N, D, computeMaxProgramInfo.output.dims, [N]);\r\n const scale = inferenceHandler.run(\r\n {...softmaxComputeScaleProgramMetadata, cacheHint: attributes.cacheKey, get: () => computeScaleProgramInfo},\r\n [inputs[0], max]);\r\n\r\n const softMaxProgramInfo = createSoftMaxProgramInfo(\r\n inferenceHandler, inputs[0], N, D, computeMaxProgramInfo.output.dims, computeScaleProgramInfo.output.dims);\r\n const output = inferenceHandler.run(\r\n {...softmaxProgramMetadata, cacheHint: attributes.cacheKey, get: () => softMaxProgramInfo},\r\n [inputs[0], max, scale]);\r\n return [output];\r\n };\r\n\r\nexport const parseSoftmaxAttributes: OperatorInitialization<SoftmaxAttributes> =\r\n (node: Graph.Node): SoftmaxAttributes => createAttributeWithCacheKey({axis: node.attributes.getInt('axis', 1)});\r\n\r\n/**\r\n * Create a texture that contains the maximum value of each of the 'N' rows\r\n */\r\nconst createComputeMaxProgramInfo =\r\n // eslint-disable-next-line @typescript-eslint/naming-convention\r\n (inferenceHandler: WebGLInferenceHandler, input: Tensor, N: number, D: number, outputShape: number[]):\r\n ProgramInfo => {\r\n const [textureWidth, textureHeight] =\r\n inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n const rank = outputShape.length;\r\n\r\n if (N < 1 || D < 1) {\r\n throw new Error('Logical row count N and feature count D must be greater than or equal to 1');\r\n }\r\n\r\n if (outputShape.length !== 1) {\r\n throw new Error('Dimensionality of the output should be 1');\r\n }\r\n\r\n if (outputShape[0] !== N) {\r\n throw new Error('Shape of the output should be equal to logical row count');\r\n }\r\n\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n const shaderSource = `\r\n float process(int[${rank}] indices) {\r\n int logical_row_start_offset = indices[0] * ${D};\r\n\r\n float max = getColorAsFloat(${glsl.texture2D}(A, offsetToCoords(logical_row_start_offset, ${textureWidth},\r\n ${textureHeight})));\r\n for(int i=1; i<${D}; ++i)\r\n {\r\n float current = getColorAsFloat(${glsl.texture2D}(A, offsetToCoords(logical_row_start_offset + i,\r\n ${textureWidth}, ${textureHeight})));\r\n if(current > max)\r\n max = current;\r\n }\r\n\r\n return max;\r\n }`;\r\n return {\r\n ...softmaxComputeMaxProgramMetadata,\r\n output: {dims: outputShape, type: input.type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\n/**\r\n * Create a texture that contains the normalization factor for each of the 'N' rows\r\n */\r\nconst createComputScaleProgramInfo =\r\n // eslint-disable-next-line @typescript-eslint/naming-convention\r\n (inferenceHandler: WebGLInferenceHandler, input: Tensor, N: number, D: number,\r\n maxElementPerLogicalRow: readonly number[], outputShape: number[]): ProgramInfo => {\r\n const [textureWidth, textureHeight] =\r\n inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n const rank = outputShape.length;\r\n\r\n if (N < 1 || D < 1) {\r\n throw new Error('Logical row count N and feature count D must be greater than or equal to 1');\r\n }\r\n\r\n if (outputShape.length !== 1) {\r\n throw new Error('Dimensionality of the output should be 1');\r\n }\r\n\r\n if (outputShape[0] !== N) {\r\n throw new Error('Shape of the output should be equal to logical row count');\r\n }\r\n\r\n if (maxElementPerLogicalRow.length !== 1) {\r\n throw new Error('Dimensionality of the intermediate results should be 1');\r\n }\r\n\r\n if (maxElementPerLogicalRow[0] !== N) {\r\n throw new Error('Shape of the intermediate results should be equal to logical row count');\r\n }\r\n\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n const shaderSource = `\r\n float process(int[${rank}] indices) {\r\n int logical_row_start_offset = indices[0] * ${D};\r\n\r\n float norm_factor = 0.0;\r\n float max = _Max(indices);\r\n for(int i=0; i<${D}; ++i)\r\n {\r\n norm_factor += exp(getColorAsFloat(${glsl.texture2D}(A, offsetToCoords(logical_row_start_offset + i,\r\n ${textureWidth}, ${textureHeight}))) - max);\r\n }\r\n\r\n return norm_factor;\r\n }`;\r\n return {\r\n

...softmaxComputeScaleProgramMetadata,\r\n output: {dims: outputShape, type: input.type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\nconst createSoftMaxProgramInfo =\r\n // eslint-disable-next-line @typescript-eslint/naming-convention\r\n (inferenceHandler: WebGLInferenceHandler, input: Tensor, N: number, D: number,\r\n maxElementPerLogicalRow: readonly number[], normalizationPerLogicalRow: readonly number[]): ProgramInfo => {\r\n const [textureWidth, textureHeight] =\r\n inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n const rank = input.dims.length;\r\n\r\n if (N < 1 || D < 1) {\r\n throw new Error('Logical row count N and feature count D must be greater than or equal to 1');\r\n }\r\n\r\n if (maxElementPerLogicalRow.length !== 1 || normalizationPerLogicalRow.length !== 1) {\r\n throw new Error('Dimensionality of the intermediate results should be 1');\r\n }\r\n\r\n if (maxElementPerLogicalRow[0] !== N || normalizationPerLogicalRow[0] !== N) {\r\n throw new Error('Shape of the intermediate results should be equal to logical row count');\r\n }\r\n\r\n const shaderSource = `\r\n float process(int[${rank}] indices) {\r\n\r\n // get offset of current logical tensor index from the 2-D texture coordinates (TexCoords)\r\n int offset = coordsToOffset(TexCoords, ${textureWidth}, ${textureHeight});\r\n\r\n //determine the logical row for this index\r\n int logical_row_index[1];\r\n logical_row_index[0] = offset / ${D};\r\n\r\n float norm_factor = _Norm(logical_row_index);\r\n\r\n // avoid possible division by 0\r\n // if norm_facor is 0, all elements are zero\r\n // if so, return 0\r\n if(norm_factor == 0.0)\r\n return 0.0;\r\n\r\n return exp(_A(indices) - _Max(logical_row_index)) / norm_factor;\r\n }`;\r\n return {\r\n ...softmaxProgramMetadata,\r\n output: {dims: input.dims, type: input.type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n throw new Error('Softmax requires 1 input.');\r\n }\r\n\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n throw new Error('Invalid input type');\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil, SplitUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface SplitAttributes extends AttributeWithCacheKey {\r\n readonly axis: number;\r\n readonly split: number[];\r\n readonly numOutputs: number;\r\n}\r\n\r\nconst splitProgramMetadata = {\r\n name: 'Split',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nexport const split: OperatorImplementation<SplitAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: SplitAttributes): Tensor[] => {\r\n validateInputs(inputs);\r\n\r\n const axis = ShapeUtil.normalizeAxis(attributes.axis, inputs[0].dims.length);\r\n const count = getProgramCount(inferenceHandler, inputs, axis, attributes);\r\n const output: Tensor[] = [];\r\n for (let i = 0; i < count; ++i) {\r\n output.push(inferenceHandler.run(\r\n {\r\n ...splitProgramMetadata,\r\n cacheHint: `${attributes.cacheKey};${i}`,\r\n get: () => createSplitProgramInfo(inferenceHandler, inputs[0], attributes, axis, i)\r\n },\r\n inputs));\r\n }\r\n\r\n return output;\r\n };\r\n\r\nexport const parseSplitAttributes: OperatorInitialization<SplitAttributes> = (node: Graph.Node): SplitAttributes => {\r\n const axis = node.attributes.getInt('axis', 0);\r\n const split = node.attributes.getInts('split', []);\r\n const numOutputs = node.outputs.length;\r\n return createAttributeWithCacheKey({axis, split, numOutputs});\r\n};\r\n\r\nconst getProgramCount =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axis: number, attributes: SplitAttributes): number => {\r\n const [, offsets] = SplitUtil.splitShape(inputs[0].dims, axis, attributes.split, attributes.numOutputs);\r\n return offsets.length;\r\n };\r\n\r\nconst createSplitProgramInfo =\r\n (inferenceHandler: WebGLInferenceHandler, input: Tensor, attributes: SplitAttributes, axis: number, index: number):\r\n ProgramInfo => {\r\n const [shapes, offsets] = SplitUtil.splitShape(input.dims, axis, attributes.split, attributes.numOutputs);\r\n const offset = offsets[index];\r\n const outputShape = shapes[index];\r\n const rank = outputShape.length;\r\n const shaderSource = `\r\n float process(int indices[${rank}]) {\r\n indices[${axis}] += ${offset};\r\n return _A(indices);\r\n }\r\n `;\r\n return {\r\n

...splitProgramMetadata,\r\n   cacheHint: `${attributes.cacheKey}:${index}`,\r\n   output: {dims: outputShape, type: input.type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Split requires one input.');\r\n }\r\n\r\n if (inputs[0].type !== 'int8' && inputs[0].type !== 'uint8' && inputs[0].type !== 'int16' &&\r\n   inputs[0].type !== 'uint16' && inputs[0].type !== 'int32' && inputs[0].type !== 'uint32' &&\r\n   inputs[0].type !== 'float32' && inputs[0].type !== 'float64' && inputs[0].type !== 'bool') {\r\n   throw new Error('Invalid input type.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const squeeze: OperatorImplementation<number[]> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axes: number[]): Tensor[] => {\r\n   validateInputs(inputs);\r\n   const outputShape = ShapeUtil.squeezeShape(inputs[0].dims, axes);\r\n   const output = inferenceHandler.reshapeUnpacked(inputs[0], outputShape);\r\n   return [output];\r\n   };\r\n\r\nexport const parseSqueezeAttributes: OperatorInitialization<number[]> = (node: Graph.Node): number[] =>\r\n   node.attributes.getInts('axes');\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Squeeze requires 1 input.');\r\n }\r\n\r\n if (inputs[0].type === 'string') {\r\n   throw new Error('invalid input tensor types.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport const sum = (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n validateInputs(inputs);\r\n\r\n const sumProgramMetadata = {\r\n   name: 'Sum',\r\n   inputNames: inputs.map((v, i) => `X${i}`),\r\n   inputTypes: new Array(inputs.length).fill(TextureType.unpacked)\r\n };\r\n\r\n const output = inferenceHandler.run(\r\n   {...sumProgramMetadata, get: () => createSumProgramInfo(inferenceHandler, inputs, sumProgramMetadata)}, inputs);\r\n return [output];\r\n};\r\n\r\nconst createSumProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], sumProgramMetadata: ProgramMetadata): ProgramInfo => {\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const outputShape = inputs[0].dims.slice();\r\n   const sumLine = inputs.map((v, i) => `${glsl.texture2D}(X${i},TexCoords)`).join(' + ');\r\n   const shaderSource = `\r\n      void main() {\r\n        vec4 result = ${sumLine};\r\n        ${glsl.output} = result;\r\n      }\r\n    `;\r\n   return {\r\n   ...sumProgramMetadata,\r\n   output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n   hasMain: true,\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length === 0) {\r\n   throw new Error('Sum requires inputs.');\r\n }\r\n\r\n const length = inputs[0].dims.length;\r\n for (let i = 1; i < inputs.length; i++) {\r\n   if (length !== inputs[i].dims.length) {\r\n   throw new Error('Input shapes are mismatched.');\r\n   }\r\n\r\n   for (let j = 0; j < length; j++) {\r\n   if (inputs[0].dims[j] !== inputs[i].dims[j]) {\r\n   throw new Error('Input shapes are not matched.');\r\n   }\r\n   }\r\n }\r\n\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n   throw new Error('Invalid input type.');\r\n }\r\n for (let i = 1; i < inputs.length; i++) {\r\n   if (inputs[0].type !== inputs[i].type) {\r\n   throw new Error('Input types are not matched.');\r\n   }\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {NUMBER_TYPES} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport const tile = (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n validateInputs(inputs);\r\n\r\n const tileProgramMetadata = {\r\n   name: 'Tile',\r\n   inputNames: ['A'],\r\n   inputTypes: [TextureType.unpacked],\r\n };\r\n\r\n const output = inferenceHandler.run(\r\n   {...tileProgramMetadata, get: () => createTileProgramInfo(inferenceHandler, inputs, tileProgramMetadata)},\r\n   inputs);\r\n return [output];\r\n};\r\n\r\nconst createTileProgramInfo =\r\n   (handler: WebGLInferenceHandler, inputs: Tensor[], tileProgramMetadata: ProgramMetadata): ProgramInfo => {\r\n   const inputShape =

inputs[0].dims.slice();\r\n   const outputShape = new Array(inputShape.length);\r\n\r\n   const tileOps: string[] = [];\r\n   for (let i = 0; i < inputShape.length; i++) {\r\n   outputShape[i] = inputShape[i] * inputs[1].numberData[i];\r\n   tileOps.push(`inputIdx[${i}] = int(mod(float(outputIdx[${i}]), ${inputShape[i]}.));`);\r\n   }\r\n\r\n   const rank = outputShape.length;\r\n   const shaderSource = `\r\n      float process(int outputIdx[${rank}]) {\r\n        int inputIdx[${rank}];\r\n        ${tileOps.join('\\n')}\r\n        return _A(inputIdx);\r\n      }\r\n    `;\r\n   return {\r\n   ...tileProgramMetadata,\r\n   output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 2) {\r\n   throw new Error('Tile requires 2 input.');\r\n }\r\n if (inputs[1].dims.length !== 1) {\r\n   throw new Error('The second input shape must 1 dimension.');\r\n }\r\n if (inputs[1].dims[0] !== inputs[0].dims.length) {\r\n   throw new Error('Invalid input shape.');\r\n }\r\n if (NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n   throw new Error('Invalid input type.');\r\n }\r\n if (inputs[1].type !== 'int32' && inputs[1].type !== 'int16') {\r\n   throw new Error('Invalid repeat type.');\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface TransposeAttributes extends AttributeWithCacheKey {\r\n readonly perm: number[];\r\n}\r\n\r\nconst transposeProgramMetadata = {\r\n name: 'Transpose',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked]\r\n};\r\n\r\nexport const transpose: OperatorImplementation<TransposeAttributes> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: TransposeAttributes): Tensor[] => {\r\n   validateInputs(inputs);\r\n   const output = inferenceHandler.run(\r\n   {\r\n   ...transposeProgramMetadata,\r\n   cacheHint: attributes.cacheKey,\r\n   get: () => createTransposeProgramInfo(inferenceHandler, inputs[0], attributes.perm)\r\n   },\r\n   inputs);\r\n   return [output];\r\n   };\r\n\r\nexport const parseTransposeAttributes: OperatorInitialization<TransposeAttributes> =\r\n   (node: Graph.Node): TransposeAttributes => createAttributeWithCacheKey({perm: node.attributes.getInts('perm', [])});\r\n\r\nconst createTransposeProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, input: Tensor, perm: number[]): ProgramInfo => {\r\n   const inputShape = input.dims;\r\n   perm = getAdjustedPerm(inputShape, perm);\r\n   const unpackedOutputShape = getOutputShape(inputShape, perm);\r\n   const rank = inputShape.length;\r\n   // A dims=[${inputs[0].dims.toString()}]\r\n   // out Dims=[${unpackedOutputShape.toString()}]\r\n   // based on perm=[${perm.toString()}]\r\n   const shaderSource = `\r\n      ${getPermFunctionBody('perm', perm, rank)}\r\n      float process(int indices[${rank}]) {\r\n        int a[${rank}];\r\n        perm(a, indices);\r\n        return _A(a);\r\n      }`;\r\n   return {\r\n   ...transposeProgramMetadata,\r\n   output: {dims: unpackedOutputShape, type: input.type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst getAdjustedPerm = (inputShape: readonly number[], perm: number[]): number[] => {\r\n if (perm && perm.length !== inputShape.length) {\r\n   perm = [...(inputShape.keys())].reverse();\r\n }\r\n return perm;\r\n};\r\n\r\nconst getOutputShape = (inputShape: readonly number[], perm: number[]): readonly number[] => {\r\n perm = getAdjustedPerm(inputShape, perm);\r\n return ShapeUtil.sortBasedOnPerm(inputShape, perm);\r\n};\r\n\r\nconst getPermFunctionBody = (name: string, perm: number[], rank: number): string => {\r\n const reverseFunc = [];\r\n reverseFunc.push(`void ${name}(out int a[${rank}], int src[${rank}]) {`);\r\n for (let i = 0; i < rank; ++i) {\r\n   reverseFunc.push(`\\ta[${perm[i]}]=src[${i}];`);\r\n }\r\n reverseFunc.push('\\t}');\r\n return reverseFunc.join('\\n');\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Transpose requires 1 input.');\r\n }\r\n\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n   throw new Error('input should be float tensor');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {TextureData, TextureType} from '../types';\r\n\r\nexport const encodeAsUint8 = (inferenceHandler: WebGLInferenceHandler,

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input: TextureData): TextureData => {\r\n  const outputShape = input.shape;\r\n  const glsl =
getGlsl(inferenceHandler.session.backend.glContext.version);\r\n  /**\r\n   * https://github.com/tensorflow/tfjs-
core/blob/master/src/kernels/webgl/encode_float_gpu.ts\r\n   */\r\n  const shaderSource = `\r\n    const float
FLOAT_MAX = 1.70141184e38;\r\n    const float FLOAT_MIN = 1.17549435e-38;\r\n\r\n    bool isNaN(float val)
{\r\n      return (val < 1.0 || 0.0 < val || val == 0.0) ? false : true;\r\n    }\r\n\r\n    highp vec4 encodeAsUint8(highp
float v) {\r\n      if (isNaN(v)) {\r\n        return vec4(255, 255, 255, 255);\r\n      }\r\n\r\n      highp float av =
abs(v);\r\n\r\n      if(av < FLOAT_MIN) {\r\n        return vec4(0.0, 0.0, 0.0, 0.0);\r\n      } else if(v > FLOAT_MAX)
{\r\n        return vec4(0.0, 0.0, 128.0, 127.0) / 255.0;\r\n      } else if(v < -FLOAT_MAX) {\r\n        return vec4(0.0,
0.0,  128.0, 255.0) / 255.0;\r\n      }\r\n\r\n      highp vec4 c = vec4(0,0,0,0);\r\n\r\n      highp float e =
floor(log2(av));\r\n      highp float m = exp2(fract(log2(av))) - 1.0;\r\n\r\n      c[2] = floor(128.0 * m);\r\n      m -=
c[2] / 128.0;\r\n      c[1] = floor(32768.0 * m);\r\n      m -= c[1] / 32768.0;\r\n      c[0] = floor(8388608.0 * m);\r\n\r\n
    highp float ebias = e + 127.0;\r\n      c[3] = floor(ebias / 2.0);\r\n      ebias -= c[3] * 2.0;\r\n      c[2] += floor(ebias)
* 128.0;\r\n\r\n      c[3] += 128.0 * step(0.0, -v);\r\n\r\n      return c / 255.0;\r\n    }\r\n\r\n    void main() {\r\n      float
value = ${glsl.texture2D}(X,TexCoords).r;\r\n      ${glsl.output} = encodeAsUint8(value);\r\n    }`;\r\n  const
programInfo = {\r\n    name: 'Uint8Encode',\r\n    inputTypes: [TextureType.unpacked],\r\n    inputNames: ['X'],\r\n
output: {dims: outputShape, type: input.tensor.type, textureType: TextureType.downloadUint8AsFloat},\r\n
shaderSource,\r\n    hasMain: true\r\n  };\r\n  return inferenceHandler.executeProgram(programInfo,
[input.tensor]);\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-
key';\r\nimport {Graph} from '../../../graph';\r\nimport {Tensor} from '../../../tensor';\r\nimport {FunctionType,
GlslValueFunction} from '../glsl-definitions';\r\nimport {getGlsl} from '../glsl-source';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader,
ProgramMetadata, TextureType} from '../types';\r\n\r\nexport function glslAbs(): GlslValueFunction {\r\n  return
glslBuiltinUnary('abs');\r\n}\r\nexport function glslAcos(): GlslValueFunction {\r\n  return
glslBuiltinUnary('acos');\r\n}\r\nexport function glslAsin(): GlslValueFunction {\r\n  return
glslBuiltinUnary('asin');\r\n}\r\nexport function glslAtan(): GlslValueFunction {\r\n  return
glslBuiltinUnary('atan');\r\n}\r\nexport function glslCeil(): GlslValueFunction {\r\n  return
glslBuiltinUnary('ceil');\r\n}\r\nexport function glslCos(): GlslValueFunction {\r\n  return
glslBuiltinUnary('cos');\r\n}\r\nexport function glslElu(alpha: number): GlslValueFunction {\r\n  const name =
'elu';\r\n  const body = `\r\n  const float alpha = float(${alpha});\r\n\r\n  float ${name}_(float a) {\r\n    return a >=
0.0 ? a: (exp(a) - 1.0) * alpha;\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n    return vec4(${name}_(v.x), ${name}_(v.y),
${name}_(v.z), ${name}_(v.w));\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\nexport function glslExp(): GlslValueFunction {\r\n  return
glslBuiltinUnary('exp');\r\n}\r\nexport function glslFloor(): GlslValueFunction {\r\n  return
glslBuiltinUnary('floor');\r\n}\r\nexport function glslClip(min: number, max: number): GlslValueFunction {\r\n
const name = 'clip';\r\n  const body = `\r\n  const float min = float(${min});\r\n  const float max =
float(${max});\r\n\r\n  float ${name}_(float a) {\r\n    return clamp(a, min, max);\r\n  }\r\n  vec4 ${name}_(vec4 v)
{\r\n    return clamp(v, min, max);\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\nexport function glslIdentity(): GlslValueFunction {\r\n  const name =
'indentity';\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return a;\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n
return v;\r\n  }\r\n  `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function
glslLeakyRelu(alpha: number): GlslValueFunction {\r\n  const name = 'leakyRelu';\r\n  const body = `\r\n  const
float alpha = float(${alpha});\r\n\r\n  float ${name}_(float a) {\r\n    return a < 0.0 ? a * alpha : a;\r\n  }\r\n  vec4
${name}_(vec4 v) {\r\n    return vec4(${name}_(v.x), ${name}_(v.y), ${name}_(v.z), ${name}_(v.w));\r\n  }\r\n
`;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslLog(): GlslValueFunction
{\r\n  return glslBuiltinUnary('log');\r\n}\r\nexport function glslNeg(): GlslValueFunction {\r\n  const name =
'neg';\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return -a;\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n
return -v;\r\n  }\r\n  `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslNot():
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GlslValueFunction {\r\n const name = 'not';\r\n const body = `\r\n float ${name}_(float a) {\r\n return float( !bool(a) );\r\n }\r\n bool ${name}_(bool a) {\r\n return !a;\r\n }\r\n vec4 ${name}_(vec4 v) {\r\n return vec4(!bool(v.x), !bool(v.y), !bool(v.z), !bool(v.w));\r\n }\r\n bvec4 ${name}_(bvec4 v) {\r\n return bvec4(!v.x, !v.y, !v.z, !v.w);\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslSin(): GlslValueFunction {\r\n return glslBuiltinUnary('sin');\r\n}\r\nexport function glslRelu(): GlslValueFunction {\r\n const name = 'relu';\r\n const body = `\r\n float ${name}_(float a) {\r\n return max( a, 0.0 );\r\n }\r\n vec4 ${name}_(vec4 v) {\r\n return max( v, 0.0 );\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslSigmoid(): GlslValueFunction {\r\n const name = 'sigmoid';\r\n const body = `\r\n float ${name}_(float a) {\r\n return 1.0 / (1.0 + exp(-a));\r\n }\r\n vec4 ${name}_(vec4 v) {\r\n return 1.0 / (1.0 + exp(-v));\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslSqrt(): GlslValueFunction {\r\n return glslBuiltinUnary('sqrt');\r\n}\r\nexport function glslTan(): GlslValueFunction {\r\n return glslBuiltinUnary('tan');\r\n}\r\nexport function glslTanh(): GlslValueFunction {\r\n const name = 'tanh';\r\n const body = `\r\n float ${name}_(float a) {\r\n a = clamp(a, -10., 10.);\r\n a = exp(2.*a);\r\n return (a - 1.) / (a + 1.);\r\n }\r\n vec4 ${name}_(vec4 v) {\r\n v = clamp(v, -10., 10.);\r\n v = exp(2.*v);\r\n return (v - 1.) / (v + 1.);\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nfunction glslBuiltinUnary(name: string): GlslValueFunction {\r\n const body = `\r\n float ${name}_(float a) {\r\n return ${name}(a);\r\n }\r\n vec4 ${name}_(vec4 v) {\r\n return ${name}(v);\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\n\r\n/////\r\n/////\r\n/////\r\n\r\nconst createElementwiseProgramInfo =\r\n (handler: WebGLInferenceHandler, metadata: ProgramMetadata, input: Tensor, glslFunc: GlslValueFunction):\r\n ProgramInfo => {\r\n const textureType = handler.session.pack ? TextureType.packed : TextureType.unpacked;\r\n const glsl = getGlsl(handler.session.backend.glContext.version);\r\n return {\r\n ...metadata,\r\n output: {dims: input.dims, type: input.type, textureType},\r\n shaderSource: `\r\n ${glslFunc.body}\r\n void main() {\r\n vec4 v = ${glsl.texture2D}(A, TexCoords);\r\n v = ${glslFunc.name}_(v);\r\n ${glsl.output} = v;\r\n }\r\n `,\r\n hasMain: true\r\n };\r\n };\r\n\r\nconst createElementwiseProgramInfoLoader =\r\n (handler: WebGLInferenceHandler, input: Tensor, glslFunc: GlslValueFunction, cacheKey?: string):\r\n ProgramInfoLoader => {\r\n const textureType = handler.session.pack ? TextureType.packed : TextureType.unpacked;\r\n const metadata = {name: glslFunc.name, inputTypes: [textureType], inputNames: ['A'], cacheHint: cacheKey};\r\n return {...metadata, get: () => createElementwiseProgramInfo(handler, metadata, input, glslFunc)};\r\n };\r\n\r\nexport const abs = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAbs()), inputs)];\r\n\r\nexport const acos = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAcos()), inputs)];\r\n\r\nexport const asin = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAsin()), inputs)];\r\n\r\nexport const atan = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAtan()), inputs)];\r\n\r\nexport interface ClipAttributes extends AttributeWithCacheKey {\r\n readonly min: number;\r\n readonly max: number;\r\n}\r\n\r\nexport const clip =\r\n (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: ClipAttributes): Tensor[] => [handler.run(\r\n createElementwiseProgramInfoLoader(\r\n handler, inputs[0], glslClip(attributes.min, attributes.max), attributes.cacheKey),\r\n inputs)];\r\n\r\nexport const parseClipAttributes = (node: Graph.Node): ClipAttributes => createAttributeWithCacheKey({\r\n min: node.attributes.getFloat('min', -3.4028234663852886e+38),\r\n max: node.attributes.getFloat('max', 3.4028234663852886e+38)\r\n});\r\n\r\nexport const ceil = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslCeil()), inputs)];\r\n\r\nexport const cos = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslCos()), inputs)];\r\n\r\nexport interface

EluAttributes extends AttributeWithCacheKey {\r\n readonly alpha: number;\r\n}\r\n\r\nexport const elu =\r\n
(handler: WebGLInferenceHandler, inputs: Tensor[], attributes: EluAttributes): Tensor[] => [handler.run(\r\n
createElementwiseProgramInfoLoader(handler, inputs[0], glslElu(attributes.alpha), attributes.cacheKey),\r\n
inputs)];\r\n\r\nexport const parseEluAttributes = (node: Graph.Node): EluAttributes =>\r\n
createAttributeWithCacheKey({alpha: node.attributes.getFloat('alpha', 1.0)});\r\n\r\nexport const exp = (handler:
WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslExp()), inputs)];\r\n\r\nexport const floor
= (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslFloor()), inputs)];\r\n\r\nexport const
identity = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslIdentity()), inputs)];\r\n\r\nexport
interface LeakyReluAttributes extends AttributeWithCacheKey {\r\n readonly alpha: number;\r\n}\r\n\r\nexport
const leakyRelu =\r\n   (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: LeakyReluAttributes):
Tensor[] => [handler.run(\r\n   createElementwiseProgramInfoLoader(handler, inputs[0],
glslLeakyRelu(attributes.alpha), attributes.cacheKey),\r\n   inputs)];\r\n\r\nexport const
parseLeakyReluAttributes = (node: Graph.Node): LeakyReluAttributes =>\r\n
createAttributeWithCacheKey({alpha: node.attributes.getFloat('alpha', 0.01)});\r\n\r\nexport const log = (handler:
WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslLog()), inputs)];\r\n\r\nexport const neg
= (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslNeg()), inputs)];\r\n\r\nexport const not =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslNot()), inputs)];\r\n\r\nexport const relu
= (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslRelu()), inputs)];\r\n\r\nexport const
sigmoid = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslSigmoid()), inputs)];\r\n\r\nexport const
sin = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslSin()), inputs)];\r\n\r\nexport const sqrt =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslSqrt()), inputs)];\r\n\r\nexport const tan =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslTan()), inputs)];\r\n\r\nexport const tanh
= (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslTanh()), inputs)];\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from
'../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-
handler';\r\nimport {ProgramInfo, ProgramInfoLoader, TextureType} from '../types';\r\nimport
{getCoordsDataType} from '../utils';\r\nimport {getChannels, unpackFromChannel} from './packing-
utils';\r\n\r\nconst unpackProgramMetadata = {\r\n name: 'unpack',\r\n inputNames: ['A'],\r\n inputTypes:
[TextureType.packed]\r\n};\r\n\r\nexport const createUnpackProgramInfo = (handler: WebGLInferenceHandler,
input: Tensor): ProgramInfo => {\r\n const rank = input.dims.length;\r\n\r\n const channels = getChannels('rc',
rank);\r\n const innerDims = channels.slice(-2);\r\n const coordsDataType = getCoordsDataType(rank);\r\n const
unpackChannel = unpackFromChannel();\r\n const isScalar = (input.dims.length === 0);\r\n const sourceCoords =
isScalar ? '' : getSourceCoords(rank, channels);\r\n const coords = rank <= 1 ? 'rc' :
`vec2(${innerDims.join(',')})`;\r\n const glsl = getGlsl(handler.session.backend.glContext.version);\r\n const
shaderSource = `\r\n ${unpackChannel}\r\n   void main() {\r\n ${coordsDataType} rc =
getOutputCoords();\r\n\r\n   // Sample the texture with the coords to get the rgba channel value.\r\n   vec4

```
packedInput = getA(${sourceCoords});\r\n\r\n      ${glsl.output} = vec4(getChannel(packedInput, ${coords}), 0, 0,
0);\r\n    }\r\n  `;\r\n\r\n  return {\r\n    ...unpackProgramMetadata,\r\n    hasMain: true,\r\n    output: {dims:
input.dims, type: input.type, textureType: TextureType.unpacked},\r\n    shaderSource\r\n  };\r\n};\r\n\r\nexport
const createUnpackProgramInfoLoader = (handler: WebGLInferenceHandler, input: Tensor): ProgramInfoLoader
=>\r\n    ({...unpackProgramMetadata, get: () => createUnpackProgramInfo(handler, input)});\r\n\r\nfunction
getSourceCoords(rank: number, dims: string[]): string {\r\n  if (rank === 1) {\r\n    return 'rc';\r\n  }\r\n\r\n  let
coords = '';\r\n  for (let i = 0; i < rank; i++) {\r\n    coords += dims[i];\r\n    if (i < rank - 1) {\r\n      coords += ',';\r\n
}\r\n  }\r\n  return coords;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under
the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation,
OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from
'../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const unsqueeze:
OperatorImplementation<number[]> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axes:
number[]): Tensor[] => {\r\n      validateInputs(inputs);\r\n      const outputShape =
ShapeUtil.unsqueezeShape(inputs[0].dims, axes);\r\n      const output =
inferenceHandler.reshapeUnpacked(inputs[0], outputShape);\r\n      return [output];\r\n    };\r\n\r\nexport const
parseUnsqueezeAttributes: OperatorInitialization<number[]> = (node: Graph.Node): number[] =>\r\n
node.attributes.getInts('axes');\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs ||
inputs.length !== 1) {\r\n    throw new Error('Unsqueeze requires 1 input.');\r\n  }\r\n\r\n  if (inputs[0].type ===
'string') {\r\n    throw new Error('invalid input tensor types.');\r\n  }\r\n};","// Copyright (c) Microsoft Corporation.
All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey,
createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from
'../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor}
from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from
'../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface
UpsampleAttributes extends AttributeWithCacheKey {\r\n  readonly opset: number;\r\n  readonly isResize:
boolean;\r\n  readonly mode: string;\r\n  readonly scales: number[];\r\n  readonly extrapolationValue: number;\r\n
readonly coordinateTransformMode: string;\r\n  readonly useExtrapolation: boolean;\r\n  readonly needRoiInput:
boolean;\r\n  readonly nearestMode: string;\r\n  readonly cubicCoefficientA: number;\r\n  readonly excludeOutside:
boolean;\r\n  readonly useNearest2xOptimization: boolean;\r\n  readonly roiInputIdx: number;\r\n  readonly
scalesInputIdx: number;\r\n  readonly sizesInputIdx: number;\r\n}\r\n\r\nconst upsampleProgramMetadata = {\r\n
name: 'Upsample',\r\n  inputNames: ['X'],\r\n  inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nexport const
upsample: OperatorImplementation<UpsampleAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler,
inputs: Tensor[], attributes: UpsampleAttributes): Tensor[] => {\r\n      validateInputs(inputs, attributes);\r\n      const
output = inferenceHandler.run(\r\n          {\r\n            ...upsampleProgramMetadata,\r\n            cacheHint:
attributes.cacheKey,\r\n            get: () => createUpsampleProgramInfo(inferenceHandler, inputs, attributes)\r\n
},\r\n          inputs);\r\n      return [output];\r\n    };\r\n\r\nexport const parseUpsampleAttributesV7:
OperatorInitialization<UpsampleAttributes> =\r\n    (node: Graph.Node): UpsampleAttributes =>
parseUpsampleAttributes(node, 7);\r\n\r\nexport const parseUpsampleAttributesV9:
OperatorInitialization<UpsampleAttributes> =\r\n    (node: Graph.Node): UpsampleAttributes =>
parseUpsampleAttributes(node, 9);\r\n\r\nexport const parseUpsampleAttributes = (node: Graph.Node, opset:
number): UpsampleAttributes => {\r\n  const isResize = (opset >= 10);\r\n\r\n  // processing node attributes\r\n
const mode = node.attributes.getString('mode', 'nearest');\r\n  if (mode !== 'nearest' && mode !== 'linear' && (opset
< 11 || mode !== 'cubic')) {\r\n    throw new Error(`unrecognized mode: ${mode}`);\r\n  }\r\n\r\n  let scales:
number[] = [];\r\n  if (opset < 9) {\r\n    scales = node.attributes.getFloats('scales');\r\n    scalesValidation(scales,
mode, isResize);\r\n  }\r\n\r\n  const extrapolationValue = node.attributes.getFloat('extrapolation_value', 0.0);\r\n\r\n
const coordinateTransformMode =\r\n      opset > 10 ? node.attributes.getString('coordinate_transformation_mode',
'half_pixel') : 'asymmetric';\r\n  if ([\r\n        'asymmetric', 'pytorch_half_pixel', 'tf_half_pixel_for_nn',
'align_corners', 'tf_crop_and_resize', 'half_pixel'\r\n      ].indexOf(coordinateTransformMode) === -1) {\r\n    throw
```

new Error(`coordinate_transform_mode '${coordinateTransformMode}' is not supported`);\r\n }\r\n const needRoiInput = (coordinateTransformMode === 'tf_crop_and_resize');\r\n const useExtrapolation = needRoiInput;\r\n\r\n const nearestMode =\r\n (mode === 'nearest' && opset >= 11) ? node.attributes.getString('nearest_mode', 'round_prefer_floor') : '';\r\n if (['round_prefer_floor', 'round_prefer_ceil', 'floor', 'ceil', ''].indexOf(nearestMode) === -1) {\r\n throw new Error(`nearest_mode '${nearestMode}' is not supported`);\r\n }\r\n\r\n const cubicCoefficientA = node.attributes.getFloat('cubic_coeff_a', -0.75);\r\n const excludeOutside = node.attributes.getInt('exclude_outside', 0) !== 0;\r\n if (excludeOutside && mode !== 'cubic') {\r\n throw new Error('exclude_outside can be set to 1 only when mode is CUBIC.');\r\n }\r\n\r\n const useNearest2xOptimization =\r\n (opset < 11) ? true : (mode === 'nearest' && coordinateTransformMode === 'asymmetric' && nearestMode === 'floor');\r\n\r\n let roiInputIdx = 0;\r\n let scalesInputIdx = 0;\r\n let sizesInputIdx = 0;\r\n\r\n if (opset > 10) {\r\n roiInputIdx = 1;\r\n scalesInputIdx = 2;\r\n sizesInputIdx = 3;\r\n } else if (opset === 9) {\r\n scalesInputIdx = 1;\r\n }\r\n\r\n return createAttributeWithCacheKey({\r\n opset,\r\n isResize,\r\n mode,\r\n scales,\r\n extrapolationValue,\r\n coordinateTransformMode,\r\n useExtrapolation,\r\n needRoiInput,\r\n nearestMode,\r\n cubicCoefficientA,\r\n excludeOutside,\r\n useNearest2xOptimization,\r\n roiInputIdx,\r\n scalesInputIdx,\r\n sizesInputIdx\r\n });\r\n};\r\n\r\nconst createUpsampleProgramInfo =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: UpsampleAttributes): ProgramInfo => {\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n const [inputWidth, inputHeight] =\r\n inferenceHandler.calculateTextureWidthAndHeight(inputs[0].dims, TextureType.unpacked);\r\n\r\n const outputShape = inputs[0].dims.map((dim, i) => Math.floor(dim * attributes.scales[i]));\r\n const [outputWidth, outputHeight] =\r\n inferenceHandler.calculateTextureWidthAndHeight(outputShape, TextureType.unpacked);\r\n const dim = outputShape.length;\r\n\r\n const outputPitches = new Array<number>(dim);\r\n const inputPitches = new Array<number>(dim);\r\n let precalculatedPitches = `\r\n int output_pitches[${dim}];\r\n int input_pitches[${dim}];\r\n `;\r\n for (let d = dim - 1; d >= 0; d--) {\r\n outputPitches[d] = (d === dim - 1) ? 1 : outputPitches[d + 1] * outputShape[d + 1];\r\n inputPitches[d] = (d === dim - 1) ? 1 : inputPitches[d + 1] * inputs[0].dims[d + 1];\r\n\r\n precalculatedPitches += `\r\n output_pitches[${d}] = ${outputPitches[d]};\r\n input_pitches[${d}] = ${inputPitches[d]};\r\n `;\r\n }\r\n const getInputFloatFunction = `\r\n float getInputFloat(int index) {\r\n vec2 coords = offsetToCoords(index, ${inputWidth}, ${inputHeight});\r\n float value = getColorAsFloat(${glsl.texture2D}(X, coords));\r\n return value;\r\n }\r\n `;\r\n\r\n const shaderSource = attributes.mode === 'nearest' ?\r\n // nearest\r\n `\r\n ${getInputFloatFunction}\r\n float process(int indices[${dim}]) {\r\n int input_index = 0;\r\n int output_index = coordsToOffset(TexCoords, ${outputWidth}, ${outputHeight});\r\n\r\n ${precalculatedPitches}\r\n\r\n int d, m;\r\n for (int dim = 0; dim < ${dim}; ++dim) {\r\n d = output_index / output_pitches[dim];\r\n m = output_index - d * output_pitches[dim];\r\n output_index = m;\r\n\r\n if (scales[dim] != 1 && d > 0) {\r\n int d2 = d / scales[dim];\r\n m = d - d2 * scales[dim];\r\n d = d2;\r\n }\r\n input_index += input_pitches[dim] * d;\r\n }\r\n\r\n return getInputFloat(input_index);\r\n }` :\r\n dim === 4 ?\r\n // bilinear 4D\r\n `\r\n ${getInputFloatFunction}\r\n float process(int indices[4]) {\r\n int input_index = 0;\r\n int output_index = coordsToOffset(TexCoords, ${outputWidth}, ${outputHeight});\r\n\r\n ${precalculatedPitches}\r\n\r\n int m;\r\n int index_of_dim0, index_of_dim1, index_of_dim2, index_of_dim3;\r\n index_of_dim0 = output_index / output_pitches[0];\r\n m = output_index - index_of_dim0 * output_pitches[0];\r\n index_of_dim1 = m / output_pitches[1];\r\n m = m - index_of_dim1 * output_pitches[1];\r\n index_of_dim2 = m / output_pitches[2];\r\n m = m - index_of_dim2 * output_pitches[2];\r\n index_of_dim3 = m;\r\n\r\n int index_of_input_dim2, index_of_input_dim3, x_offset, y_offset;\r\n index_of_input_dim2 = index_of_dim2 / scales[2];\r\n y_offset = index_of_dim2 - index_of_input_dim2 * scales[2];\r\n index_of_input_dim3 = index_of_dim3 / scales[3];\r\n x_offset = index_of_dim3 - index_of_input_dim3 * scales[3];\r\n\r\n input_index = index_of_dim0 * input_pitches[0] +\r\n index_of_dim1 * input_pitches[1] +\r\n index_of_input_dim2 * input_pitches[2] +\r\n index_of_input_dim3;\r\n\r\n float x00 = getInputFloat(input_index);\r\n float x10, x01, x11;\r\n\r\n bool end_of_dim2 = false;\r\n if (index_of_input_dim2 == (${inputs[0].dims[2]} - 1)) {\r\n // It's the end in dimension 2\r\n x01 = x00;\r\n end_of_dim2 = true;\r\n } else {\r\n x01 = getInputFloat(input_index + input_pitches[2]);\r\n }\r\n\r\n if (index_of_input_dim3 == (input_pitches[2] - 1)) {\r\n // It's the end in dimension 3\r\n x10 = x00;\r\n x11 = x01;\r\n }\r\n else {\r\n x10 = getInputFloat(input_index + 1);\r\n x11 = end_of_dim2 ? x10 : getInputFloat(input_index + input_pitches[2] + 1);\r\n }\r\n\r\n float y0 = x00 + float(y_offset) * (x01 - x00) / float(scales[2]);\r\n float y1 = x10 + float(y_offset) * (x11 - x10) / float(scales[2]);\r\n return y0 + float(x_offset) * (y1 - y0) / float(scales[3]);\r\n }` :\r\n // bilinear 2D\r\n `\r\n ${getInputFloatFunction}\r\n float process(int indices[2]) {\r\n int input_index = 0;\r\n int output_index = coordsToOffset(TexCoords, ${outputWidth}, ${outputHeight});\r\n\r\n ${precalculatedPitches}\r\n\r\n int m;\r\n int index_of_dim0, index_of_dim1;\r\n index_of_dim0 = output_index / output_pitches[0];\r\n m = output_index - index_of_dim0 * output_pitches[0];\r\n index_of_dim1 = m;\r\n\r\n int index_of_input_dim0, index_of_input_dim1, x_offset, y_offset;\r\n index_of_input_dim0 = index_of_dim0 / scales[0];\r\n y_offset = index_of_dim0 - index_of_input_dim0 * scales[0];\r\n index_of_input_dim1 = index_of_dim1 / scales[1];\r\n x_offset = index_of_dim1 - index_of_input_dim1 * scales[1];\r\n\r\n input_index = index_of_input_dim0 * input_pitches[0] + index_of_input_dim1;\r\n\r\n float x00 = getInputFloat(input_index);\r\n float x10, x01, x11;\r\n\r\n bool end_of_dim0 = false;\r\n if (index_of_input_dim0 == (${inputs[0].dims[0]} - 1)) {\r\n // It's the end in dimension 0\r\n x01 = x00;\r\n end_of_dim0 = true;\r\n } else {\r\n x01 = getInputFloat(input_index + input_pitches[0]);\r\n }\r\n\r\n if (index_of_input_dim1 == (input_pitches[0] - 1)) {\r\n // It's the end in dimension 1\r\n x10 = x00;\r\n x11 = x01;\r\n }\r\n else {\r\n x10 = getInputFloat(input_index + 1);\r\n x11 = end_of_dim0 ? x10 : getInputFloat(input_index + input_pitches[0] + 1);\r\n }\r\n\r\n float y0 = x00 + float(y_offset) * (x01 - x00) / float(scales[0]);\r\n float y1 = x10 + float(y_offset) * (x11 - x10) / float(scales[0]);\r\n return y0 + float(x_offset) * (y1 - y0) / float(scales[1]);\r\n }`;\r\n return {\r\n ...upsampleProgramMetadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n shaderSource,\r\n variables: [{\r\n name: 'scales',\r\n type: 'int',\r\n arrayLength: attributes.scales.length,\r\n data: attributes.scales.map(x => Math.ceil(x))\r\n }]\r\n };\r\n };\r\n\r\nexport const validateInputs = (inputs: Tensor[], attribute: UpsampleAttributes): void => {\r\n if (!inputs || (attribute.opset < 9 && inputs.length !== 1) ||\r\n (attribute.opset >= 9 && attribute.opset < 11 && inputs.length !== 2) ||\r\n (attribute.opset >= 11 && inputs.length !== 3 && inputs.length !== 4)) {\r\n throw new Error('invalid inputs.');\r\n }\r\n\r\n if (attribute.scales.length > 0 && inputs[0].dims.length !== attribute.scales.length) {\r\n throw new Error('Invalid input shape.');\r\n }\r\n\r\n if (inputs[0].type === 'string') {\r\n throw new Error('Invalid input tensor types.');\r\n }\r\n};\r\n\r\nexport const scalesValidation = (scales: number[], mode: string, isResize: boolean): void => {\r\n if (!isResize) {\r\n for (const scale of scales) {\r\n if (scale < 1) {\r\n throw new Error('Scale value should be greater than or equal to 1.');\r\n }\r\n }\r\n } else {\r\n for (const scale of scales) {\r\n if (scale <= 0) {\r\n throw new Error('Scale value should be greater than 0.');\r\n }\r\n }\r\n }\r\n if (mode === 'linear' || mode === 'cubic') {\r\n if (scales.length !== 2 && (scales.length !== 4 || scales[0] !== 1 || scales[1] !== 1)) {\r\n throw new Error(`'Linear' mode and 'Cubic' mode only support 2-D inputs ('Bilinear', 'Bicubic') \\\r\n or 4-D inputs with the corresponding outermost 2 scale values being 1 \\\r\n in the ${isResize ? 'Resize' : 'Upsample'} opeartor.`);\r\n }\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env} from 'onnxruntime-common';\r\nimport {Logger, Profiler} from '../../instrument';\r\n\r\nimport {GlslPreprocessor} from './glsl-preprocessor';\r\nimport {getVertexShaderSource} from './glsl-source';\r\nimport {TextureLayoutStrategy} from './texture-layout-strategy';\r\nimport {Artifact, ProgramInfo, ProgramVariable, TextureData, TextureLayout, VariableInfo} from './types';\r\nimport {WebGLContext} from './webgl-context';\r\n\r\n/**\r\n * ProgramManager is the main class behind running computations\r\n * It builds ProgramInfo's into Artifacts\r\n * It compiles given ProgramInfo's into WebGL Prorams (cached as Artifacts)\r\n * Uses the artifact to run the computation by calling Draw on\r\n * the WebGL drawing buffer\r\n * ProgramManager automatically maps (binds) input variables to

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their\r\n * corresponding Location's in the binary program\r\n */\r\nexport class ProgramManager {\r\n  repo:
Map<unknown, Artifact>;  // this should be per-session object\r\n  vertexShader: WebGLShader;\r\n
attributesBound: boolean;\r\n\r\n\r\n  constructor(\r\n      public profiler: Readonly<Profiler>, public glContext:
WebGLContext,\r\n      public textureLayoutStrategy: TextureLayoutStrategy) {\r\n    this.repo = new Map();\r\n
this.attributesBound = false;\r\n  }\r\n  getArtifact(key: unknown): Artifact|undefined {\r\n    return
this.repo.get(key);\r\n  }\r\n  setArtifact(key: unknown, artifact: Artifact): void {\r\n    this.repo.set(key, artifact);\r\n
}\r\n  run(buildArtifact: Artifact, inputs: TextureData[], output: TextureData): void {\r\n    this.profiler.event('op',
`ProgramManager.run ${buildArtifact.programInfo.name ?? 'unknown kernel'}`, () => {\r\n      const gl =
this.glContext.gl;\r\n      const program = buildArtifact.program;\r\n      gl.useProgram(program);\r\n      try {\r\n
this.bindOutput(output);\r\n        if (!this.attributesBound) {\r\n
this.bindAttributes(buildArtifact.attribLocations);\r\n        }\r\n
this.bindUniforms(buildArtifact.uniformLocations, buildArtifact.programInfo.variables ?? [], inputs);\r\n      } catch
(err) {\r\n        Logger.error('ProgramManager', buildArtifact.programInfo.shaderSource);\r\n        throw err;\r\n
}\r\n      this.profiler.event('backend', 'GlContext.draw()', () => {\r\n        this.glContext.draw();\r\n      });\r\n    },
this.glContext);\r\n  }\r\n  dispose(): void {\r\n    if (this.vertexShader) {\r\n
this.glContext.deleteShader(this.vertexShader);\r\n    }\r\n    this.repo.forEach(a =>
this.glContext.deleteProgram(a.program));\r\n  }\r\n  build(programInfo: ProgramInfo, inputTextureLayouts:
TextureLayout[], outputTextureLayout: TextureLayout): Artifact {\r\n    return this.profiler.event('backend',
'ProgramManager.build', () => {\r\n      const preprocessor = new GlslPreprocessor(this.glContext, programInfo,
inputTextureLayouts, outputTextureLayout);\r\n      const fragScript = preprocessor.preprocess();\r\n      const
program = this.compile(fragScript);\r\n      const artifact = {\r\n        programInfo,\r\n        program,\r\n
uniformLocations: this.getUniformLocations(\r\n            program, preprocessor.context.programInfo.inputNames,
preprocessor.context.programInfo.variables),\r\n        attribLocations: this.getAttribLocations(program)\r\n      };\r\n
   return artifact;\r\n    });\r\n  }\r\n  protected compile(fragShaderScript: string): WebGLProgram {\r\n    if
(!this.vertexShader) {\r\n      Logger.verbose('ProrgramManager', 'Compiling and caching Vertex shader for the first
time');\r\n      const vertexShaderScript = getVertexShaderSource(this.glContext.version);\r\n      this.vertexShader =
this.glContext.compileShader(vertexShaderScript, this.glContext.gl.VERTEX_SHADER);\r\n    }\r\n    if
(env.debug) {\r\n      Logger.verbose('ProrgramManager', `FragShader:\r\n${fragShaderScript}\r\n`);\r\n    }\r\n
const fragShader = this.glContext.compileShader(fragShaderScript, this.glContext.gl.FRAGMENT_SHADER);\r\n
const program = this.glContext.createProgram(this.vertexShader, fragShader);\r\n
this.glContext.deleteShader(fragShader);\r\n    return program;\r\n  }\r\n  bindOutput(td: TextureData): void {\r\n
const width = td.width;\r\n    const height = td.height;\r\n    Logger.verbose(\r\n        'ProrgramManager',\r\n
`Binding output texture to Framebuffer: w/h=${width}/${height}, shape=${td.shape}, type=${td.tensor.type}`);\r\n
 this.glContext.attachFramebuffer(td.texture, width, height);\r\n  }\r\n  bindAttributes(attribLocations:
Artifact.AttribLocations): void {\r\n    const positionHandle = attribLocations.position;\r\n    const
textureCoordHandle = attribLocations.textureCoord;\r\n    this.glContext.setVertexAttributes(positionHandle,
textureCoordHandle);\r\n    this.attributesBound = true;\r\n  }\r\n  bindUniforms(uniformLocations:
Artifact.UniformLocations, variables: ProgramVariable[], textures: TextureData[]):\r\n      void {\r\n    const gl =
this.glContext.gl;\r\n    let texturePosition = 0;\r\n    for (const {name, type, location, arrayLength} of
uniformLocations) {\r\n      const value = variables.find(v => v.name === name)?.data;\r\n      if (type !==
'sampler2D' && !value) {\r\n        throw new Error(`variable '${name}' does not have data defined in program
info`);\r\n      }\r\n      switch (type) {\r\n        case 'sampler2D':\r\n          this.bindTexture(textures[texturePosition],
location, texturePosition);\r\n          texturePosition++;\r\n          break;\r\n        case 'float':\r\n          if (arrayLength)
{\r\n            gl.uniform1fv(location, value as number[]);\r\n          } else {\r\n            gl.uniform1f(location, value as
number);\r\n          }\r\n          break;\r\n        case 'int':\r\n          if (arrayLength) {\r\n            gl.uniform1iv(location,
value as number[]);\r\n          } else {\r\n            gl.uniform1i(location, value as number);\r\n          }\r\n
break;\r\n        default:\r\n          throw new Error(`Uniform not implemented: ${type}`);\r\n      }\r\n    }\r\n  }\r\n
bindTexture(td: TextureData, uniformHandle: WebGLUniformLocation, position: number): void {\r\n
```

this.glContext.bindTextureToUniform(td.texture, position, uniformHandle);\r\n }\r\n getAttribLocations(program: WebGLProgram): Artifact.AttribLocations {\r\n   return {\r\n   position: this.getAttribLocation(program, 'position'),\r\n   textureCoord: this.getAttribLocation(program, 'textureCoord')\r\n   };\r\n }\r\n getUniformLocations(program: WebGLProgram, samplers?: string[], variables?: VariableInfo[]):\r\n Artifact.UniformLocations {\r\n   const uniformLocations: Artifact.UniformLocations = [];\r\n   if (samplers) {\r\n   for (const sampler of samplers) {\r\n   uniformLocations.push({name: sampler, type: 'sampler2D', location: this.getUniformLocation(program, sampler)});\r\n   }\r\n   }\r\n   if (variables) {\r\n   for (const variable of variables) {\r\n   uniformLocations.push({...variable, location: this.getUniformLocation(program, variable.name)});\r\n   }\r\n   }\r\n   return uniformLocations;\r\n }\r\n getUniformLocation(program: WebGLProgram, name: string): WebGLUniformLocation {\r\n   const gl = this.glContext.gl;\r\n   const reference = gl.getUniformLocation(program, name);\r\n   if (reference === null) {\r\n   throw new Error(`Uniform ${name} not found.`);\r\n   }\r\n   return reference;\r\n }\r\n getAttribLocation(program: WebGLProgram, name: string): number {\r\n   const gl = this.glContext.gl;\r\n   const attributeLocation: number = gl.getAttribLocation(program, name);\r\n   return attributeLocation;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {SessionHandler} from '../../backend';\r\nimport {Graph} from '../../graph';\r\nimport {Logger} from '../../instrument';\r\nimport {Operator} from '../../operators';\r\nimport {OpSet, resolveOperator} from '../../opset';\r\nimport {Session} from '../../session';\r\nimport {Tensor} from '../../tensor';\r\nimport {WebGLBackend} from '../backend-webgl';\r\n\r\nimport {WebGLInferenceHandler} from './inference-handler';\r\nimport {WEBGL_OP_RESOLVE_RULES} from './op-resolve-rules';\r\nimport {ProgramManager} from './program-manager';\r\nimport {PreferLogicalStrategy, TextureLayoutStrategy} from './texture-layout-strategy';\r\nimport {TextureManager} from './texture-manager';\r\nimport {TextureData} from './types';\r\n\r\nexport class WebGLSessionHandler implements SessionHandler {\r\n programManager: ProgramManager;\r\n textureManager: TextureManager;\r\n layoutStrategy: TextureLayoutStrategy;\r\n packedTextureDataCache: Map<Tensor.Id, TextureData>;\r\n unpackedTextureDataCache: Map<Tensor.Id, TextureData>;\r\n pack2unpackMap: Map<Tensor.Id, Tensor.Id>;\r\n unpack2packMap: Map<Tensor.Id, Tensor.Id>;\r\n initializers: Set<Tensor.Id>;\r\n pack?: boolean;\r\n\r\n constructor(public readonly backend: WebGLBackend, public readonly context: Session.Context) {\r\n   this.layoutStrategy = new PreferLogicalStrategy(backend.glContext.maxTextureSize);\r\n   this.programManager = new ProgramManager(this.context.profiler, backend.glContext, this.layoutStrategy);\r\n   this.textureManager = new TextureManager(\r\n   backend.glContext, this.layoutStrategy, this.context.profiler,\r\n   {reuseTextures: backend.textureCacheMode === 'full'});\r\n   this.packedTextureDataCache = new Map();\r\n this.unpackedTextureDataCache = new Map();\r\n   this.pack = backend.pack;\r\n   this.pack2unpackMap = new Map();\r\n   this.unpack2packMap = new Map();\r\n }\r\n\r\n createInferenceHandler() {\r\n   return new WebGLInferenceHandler(this);\r\n }\r\n onGraphInitialized(graph: Graph): void {\r\n   const initializers = graph.getValues().filter(v => v.from === -1 && v.tensor).map(v => v.tensor!.dataId);\r\n   this.initializers = new Set(initializers);\r\n }\r\n isInitializer(tensorId: Tensor.Id): boolean {\r\n   return this.initializers ? this.initializers.has(tensorId) : false;\r\n }\r\n addInitializer(tensorId: Tensor.Id): void {\r\n this.initializers.add(tensorId);\r\n }\r\n getTextureData(tensorId: Tensor.Id, isPacked: boolean): TextureData|undefined {\r\n   if (isPacked) {\r\n   return this.packedTextureDataCache.get(tensorId);\r\n   } else {\r\n   return this.unpackedTextureDataCache.get(tensorId);\r\n   }\r\n }\r\n setTextureData(tensorId: Tensor.Id, textureData: TextureData, isPacked = false): void {\r\n   Logger.verbose('WebGLSessionHandler', 'Storing Texture data in cache');\r\n   if (isPacked) {\r\n   this.packedTextureDataCache.set(tensorId, textureData);\r\n   } else {\r\n   this.unpackedTextureDataCache.set(tensorId, textureData);\r\n   }\r\n }\r\n dispose(): void {\r\n this.programManager.dispose();\r\n   this.textureManager.clearActiveTextures();\r\n this.packedTextureDataCache.forEach(td => this.textureManager.releaseTexture(td, true));\r\n this.packedTextureDataCache = new Map();\r\n   this.unpackedTextureDataCache.forEach(td => this.textureManager.releaseTexture(td, true));\r\n   this.unpackedTextureDataCache = new Map();\r\n }\r\n

resolve(node: Graph.Node, opsets: readonly OpSet[], graph: Graph): Operator {\r\n   const op = resolveOperator(node, opsets, WEBGL_OP_RESOLVE_RULES);\r\n   return {impl: op.opImpl, context: op.opInit ? op.opInit(node, graph) : node};\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Logger} from '../../instrument';\r\n\r\nexport declare namespace Encoder {\r\n export interface DataTypeMap {\r\n   float: Float32Array;\r\n   byte: Uint8Array;\r\n   int: Uint32Array;\r\n }\r\n export type DataType = keyof DataTypeMap;\r\n type DataArrayType = DataTypeMap[DataType];\r\n\r\n /* eslint-disable @typescript-eslint/naming-convention */\r\n export const enum Usage {\r\n   Default = 0,\r\n   UploadOnly,\r\n   Download4BytesAsFloat32,\r\n }\r\n}\r\n\r\n/**\r\n * Abstraction for mapping data types to texture texlets\r\n * Encoding means how a Float32 is mapped to 1 or 4 channels for each texlet\r\n * Decoding means how a texlet's channels are mapped to a resulting Float32\r\n */\r\nexport interface DataEncoder {\r\n internalFormat: number;\r\n format: number;\r\n textureType: number;\r\n channelSize: number;\r\n encode(src: Encoder.DataArrayType, textureSize: number): Encoder.DataArrayType;\r\n allocate(size: number): Encoder.DataArrayType;\r\n decode(buffer: Encoder.DataArrayType, dataSize: number): Encoder.DataArrayType;\r\n}\r\n/**\r\n * WebGL2 data encoder\r\n * Uses R32F as the format for texlet\r\n */\r\nexport class RedFloat32DataEncoder implements DataEncoder {\r\n internalFormat: number;\r\n format: number;\r\n textureType: number;\r\n channelSize: number;\r\n constructor(gl: WebGL2RenderingContext, channels = 1) {\r\n   if (channels === 1) {\r\n   this.internalFormat = gl.R32F;\r\n   this.format = gl.RED;\r\n   this.textureType = gl.FLOAT;\r\n   this.channelSize = channels;\r\n   } else if (channels === 4) {\r\n   this.internalFormat = gl.RGBA32F;\r\n   this.format = gl.RGBA;\r\n   this.textureType = gl.FLOAT;\r\n   this.channelSize = channels;\r\n   } else {\r\n   throw new Error(`Invalid number of channels: ${channels}`);\r\n   }\r\n }\r\n encode(src: Encoder.DataArrayType, textureSize: number): Encoder.DataArrayType {\r\n   let result: Float32Array;\r\n   let source: Float32Array;\r\n   if (src.constructor !== Float32Array) {\r\n   Logger.warning('Encoder', 'data was not of type Float32; creating new Float32Array');\r\n   source = new Float32Array(src);\r\n   }\r\n   if (textureSize * this.channelSize > src.length) {\r\n   Logger.warning('Encoder', 'Source data too small. Allocating larger array');\r\n   source = src as Float32Array;\r\n   result = this.allocate(textureSize * this.channelSize) as Float32Array;\r\n   source.forEach((v, i) => result[i] = v);\r\n   } else {\r\n   source = src as Float32Array;\r\n   result = source;\r\n   }\r\n   return result;\r\n }\r\n allocate(size: number): Encoder.DataArrayType {\r\n   return new Float32Array(size * 4);\r\n }\r\n decode(buffer: Encoder.DataArrayType, dataSize: number): Float32Array {\r\n   if (this.channelSize === 1) {\r\n   const filteredData = (buffer as Float32Array).filter((value, index) => index % 4 === 0).subarray(0, dataSize);\r\n   return filteredData;\r\n   }\r\n   return buffer.subarray(0, dataSize) as Float32Array;\r\n }\r\n}\r\n/**\r\n * Data encoder for WebGL 1 with support for floating point texture\r\n */\r\nexport class RGBAFloatDataEncoder implements DataEncoder {\r\n internalFormat: number;\r\n format: number;\r\n textureType: number;\r\n channelSize: number;\r\n constructor(gl: WebGLRenderingContext, channels = 1, textureType?: number) {\r\n   if (channels !== 1 && channels !== 4) {\r\n   throw new Error(`Invalid number of channels: ${channels}`);\r\n   }\r\n   this.internalFormat = gl.RGBA;\r\n   this.format = gl.RGBA;\r\n   this.channelSize = channels;\r\n   this.textureType = textureType || gl.FLOAT;\r\n }\r\n encode(src: Float32Array, textureSize: number): Encoder.DataArrayType {\r\n   let dest = src;\r\n   if (this.channelSize === 1) {\r\n   Logger.verbose('Encoder', 'Exploding into a larger array');\r\n   dest = this.allocate(textureSize) as Float32Array;\r\n   src.forEach((v, i) => dest[i * 4] = v);\r\n   }\r\n   return dest;\r\n }\r\n allocate(size: number): Encoder.DataArrayType {\r\n   return new Float32Array(size * 4);\r\n }\r\n decode(buffer: Encoder.DataArrayType, dataSize: number): Float32Array {\r\n   if (this.channelSize === 1) {\r\n   const filteredData = (buffer as Float32Array).filter((value, index) => index % 4 === 0).subarray(0, dataSize);\r\n   return filteredData;\r\n   }\r\n   return buffer.subarray(0, dataSize) as Float32Array;\r\n }\r\n}\r\n\r\nexport class Uint8DataEncoder implements DataEncoder {\r\n internalFormat: number;\r\n format: number;\r\n textureType: number;\r\n channelSize = 4;\r\n constructor(gl: WebGLRenderingContext, channels = 1) {\r\n   if (channels === 1) {\r\n   this.internalFormat = gl.ALPHA;\r\n   this.format = gl.ALPHA; // not tested\r\n   this.textureType = gl.UNSIGNED_BYTE;\r\n   this.channelSize = channels;\r\n   } else if (channels === 4) {\r\n   this.internalFormat = gl.RGBA;\r\n   this.format = gl.RGBA;\r\n

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    this.textureType = gl.UNSIGNED_BYTE;\r\n      this.channelSize = channels;\r\n    } else {\r\n      throw new
Error(`Invalid number of channels: ${channels}`);\r\n    }\r\n  }\r\n  encode(src: Uint8Array, _textureSize: number):
Encoder.DataArrayType {\r\n    return new Uint8Array(src.buffer, src.byteOffset, src.byteLength);\r\n  }\r\n
allocate(size: number): Encoder.DataArrayType {\r\n    return new Uint8Array(size * this.channelSize);\r\n  }\r\n
decode(buffer: Encoder.DataArrayType, dataSize: number): Uint8Array {\r\n    if (buffer instanceof Uint8Array)
{\r\n      return buffer.subarray(0, dataSize);\r\n    }\r\n    throw new Error(`Invalid array type:
${buffer.constructor}`);\r\n  }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed
under the MIT License.\r\n\r\nimport {Logger} from '../../instrument';\r\nimport {assert} from '../../util';\r\n/**
Layout preferences */\r\nexport interface WidthHeightPrefs {\r\n  breakAxis?: number;\r\n  isPacked?: boolean;\r\n
reverseWH?: boolean;\r\n}\r\n/**\r\n * TextureLayoutStrategy is an abstraction for different plans\r\n * for mapping
n-dimensional arrays to 2D textures (and back)\r\n */\r\nexport interface TextureLayoutStrategy {\r\n
computeTextureWH(shape: readonly number[], prefs?: WidthHeightPrefs): [number, number];\r\n}\r\n\r\n/**\r\n *
This strategy try to find the minimal max(W,H) that fulfills (W * H == totalSize)\r\n */\r\nexport class
AlwaysKeepOriginalSizeStrategy implements TextureLayoutStrategy {\r\n  constructor(public maxTextureSize:
number) {}\r\n  computeTextureWH(shape: readonly number[], prefs?: WidthHeightPrefs): [number, number] {\r\n
 // scalar tensor\r\n    if (shape.length === 0) {\r\n      return [1, 1];\r\n    }\r\n    const maxTextureSize =
this.maxTextureSize;\r\n    if (prefs && prefs.breakAxis !== undefined) {\r\n      // check to see if dims fit\r\n
const wsize = prefs.breakAxis >= shape.length ? 1 : shape.slice(prefs.breakAxis).reduce((a, b) => a * b);\r\n
const hsize = prefs.breakAxis <= 0 ? 1 : shape.slice(0, prefs.breakAxis).reduce((a, b) => a * b);\r\n      if (wsize >
maxTextureSize || hsize > maxTextureSize) {\r\n        // ignore preferences\r\n        // continue with default layout\r\n
      Logger.verbose(\r\n            'TextureLayout',\r\n            `Given width/height preferences were unattainable:
shape:${shape}, breakAxis:${prefs.breakAxis}`);\r\n      } else {\r\n        return [wsize, hsize];\r\n      }\r\n    }\r\n
const totalSize = shape.reduce((a, b) => a * b);\r\n\r\n    let width = Math.floor(Math.sqrt(totalSize));\r\n\r\n    for (;
width < maxTextureSize && width < totalSize; width++) {\r\n      if (totalSize % width === 0) {\r\n        break;\r\n
 }\r\n    }\r\n\r\n    if (width >= maxTextureSize || totalSize % width !== 0) {\r\n      throw new Error(`The given
dimensions are outside this GPU's boundaries: ${shape}`);\r\n    }\r\n    return [width, totalSize / width];\r\n
}\r\n}\r\n\r\nexport class PreferLogicalStrategy implements TextureLayoutStrategy {\r\n  constructor(public
maxTextureSize: number) {}\r\n  computeTextureWH(shape: readonly number[], prefs?: WidthHeightPrefs):
[number, number] {\r\n    const wh = this.computeTexture(shape, prefs);\r\n    if (prefs && prefs.isPacked) {\r\n
wh[0] /= 2;\r\n      wh[1] /= 2;\r\n    }\r\n    if (prefs && prefs.reverseWH) {\r\n      return [wh[1], wh[0]];\r\n    }\r\n
return wh;\r\n  }\r\n\r\n  computeTexture(shape: readonly number[], prefs?: WidthHeightPrefs): [number, number]
{\r\n    const isPacked = prefs && prefs.isPacked;\r\n    // scalar tensor\r\n    if (shape.length === 0) {\r\n      return
isPacked ? [2, 2] : [1, 1];\r\n    }\r\n    let maxTextureSize = this.maxTextureSize;\r\n    if (prefs && prefs.breakAxis
!== undefined) {\r\n      // check to see if dims fit\r\n      const wsize = prefs.breakAxis >= shape.length ? 1 :
shape.slice(prefs.breakAxis).reduce((a, b) => a * b);\r\n      const hsize = prefs.breakAxis <= 0 ? 1 : shape.slice(0,
prefs.breakAxis).reduce((a, b) => a * b);\r\n      if (wsize > maxTextureSize || hsize > maxTextureSize) {\r\n        //
ignore preferences\r\n        // continue with default layout\r\n        Logger.verbose(\r\n            'TextureLayout',\r\n
    `Given width/height preferences were unattainable: shape:${shape}, breakAxis:${prefs.breakAxis}`);\r\n      }
else {\r\n        return [wsize, hsize];\r\n      }\r\n    }\r\n    let logShape = shape.slice(0);\r\n    if (isPacked) {\r\n
maxTextureSize = maxTextureSize * 2;\r\n\r\n      // This logic ensures we accurately count the number of packed
texels needed\r\n      // to accommodate the tensor. We can only pack values in the same texel if\r\n      // they are
from adjacent pairs of rows/cols within the same batch. So if a\r\n      // tensor has 3 rows, we pretend it has 4 rows
in order to account for the\r\n      // fact that the texels containing the third row are half empty.\r\n      logShape =
logShape.map(\r\n          (d, i) => i >= logShape.length - 2 ? (logShape[i] % 2 === 0 ? logShape[i] : logShape[i] + 1)
: logShape[i]);\r\n\r\n      // Packed texture height is at least 2 (the channel height of a single\r\n      // texel).\r\n      if
(logShape.length === 1) {\r\n        logShape = [2, logShape[0]];\r\n      }\r\n    }\r\n\r\n    // If logical shape is 2, we
don't squeeze, since we want to match physical.\r\n    if (logShape.length !== 2) {\r\n      const squeezeResult =
squeezeShape(logShape);\r\n      logShape = squeezeResult.newShape;\r\n    }\r\n\r\n    const size =
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sizeFromShape(logShape);\r\n    if (logShape.length <= 1 && size <= maxTextureSize) {\r\n      return [1, size];\r\n
} else if (logShape.length === 2 && logShape[0] <= maxTextureSize && logShape[1] <= maxTextureSize) {\r\n
return logShape as [number, number];\r\n    } else if (logShape.length === 3 && logShape[0] * logShape[1] <=
maxTextureSize && logShape[2] <= maxTextureSize) {\r\n      return [logShape[0] * logShape[1], logShape[2]];\r\n
  } else if (logShape.length === 3 && logShape[0] <= maxTextureSize && logShape[1] * logShape[2] <=
maxTextureSize) {\r\n      return [logShape[0], logShape[1] * logShape[2]];\r\n    } else if (\r\n        logShape.length
=== 4 && logShape[0] * logShape[1] * logShape[2] <= maxTextureSize &&\r\n        logShape[3] <=
maxTextureSize) {\r\n      return [logShape[0] * logShape[1] * logShape[2], logShape[3]];\r\n    } else if (\r\n
logShape.length === 4 && logShape[0] <= maxTextureSize &&\r\n        logShape[1] * logShape[2] * logShape[3]
<= maxTextureSize) {\r\n      return [logShape[0], logShape[1] * logShape[2] * logShape[3]];\r\n    } else {\r\n      if
(isPacked) {\r\n        // For packed textures size equals the number of channels required to\r\n        // accommodate
the texture data. However in order to squarify such that\r\n        // inner dimensions stay even, we rewrite size to
equal the number of\r\n        // texels. Then in the return statement we rehydrate the squarified\r\n        // dimensions
to channel units.\r\n        return sizeToSquarishShape(size / 4).map(d => d * 2) as [number, number];\r\n      }\r\n
return sizeToSquarishShape(size);\r\n    }\r\n  }\r\n}\r\n\r\nexport function squeezeShape(shape: number[], axis?:
number[]): {newShape: number[]; keptDims: number[]} {\r\n  const newShape: number[] = [];\r\n  const keptDims:
number[] = [];\r\n  const isEmptyArray = axis != null && Array.isArray(axis) && axis.length === 0;\r\n  const axes
= (axis == null || isEmptyArray) ? null : parseAxisParam(axis, shape).sort();\r\n  let j = 0;\r\n  for (let i = 0; i <
shape.length; ++i) {\r\n    if (axes != null) {\r\n      if (axes[j] === i && shape[i] !== 1) {\r\n        throw new
Error(`Can't squeeze axis ${i} since its dim '${shape[i]}' is not 1`);\r\n      }\r\n      if ((axes[j] == null || axes[j] > i)
&& shape[i] === 1) {\r\n        newShape.push(shape[i]);\r\n        keptDims.push(i);\r\n      }\r\n      if (axes[j] <= i)
{\r\n        j++;\r\n      }\r\n    }\r\n    if (shape[i] !== 1) {\r\n      newShape.push(shape[i]);\r\n
keptDims.push(i);\r\n    }\r\n  }\r\n  return {newShape, keptDims};\r\n}\r\n\r\nexport function parseAxisParam(axis:
number|number[], shape: number[]): number[] {\r\n  const rank = shape.length;\r\n\r\n  // Normalize input\r\n  axis =
axis == null ? shape.map((s, i) => i) : ([] as number[]).concat(axis);\r\n\r\n  // Check for valid range\r\n  assert(\r\n
axis.every(ax => ax >= -rank && ax < rank),\r\n      () => `All values in axis param must be in range [-${rank},
${rank}) but ` +\r\n          `got axis ${axis}`);\r\n\r\n  // Check for only integers\r\n  assert(\r\n
axis.every(isInt),\r\n      () => 'All values in axis param must be integers but ' +\r\n          `got axis ${axis}`);\r\n\r\n
// Handle negative axis.\r\n  return axis.map(a => a < 0 ? rank + a : a);\r\n}\r\nexport function isInt(a: number):
boolean {\r\n  return a % 1 === 0;\r\n}\r\nexport function sizeFromShape(shape: number[]): number {\r\n  if
(shape.length === 0) {\r\n    // Scalar.\r\n    return 1;\r\n  }\r\n  let size = shape[0];\r\n  for (let i = 1; i < shape.length;
i++) {\r\n    size *= shape[i];\r\n  }\r\n  return size;\r\n}\r\nexport function getRowsCols(shape: number[]): [number,
number] {\r\n  if (shape.length === 0) {\r\n    throw Error('Cannot get rows and columns of an empty shape
array.');\r\n  }\r\n\r\n  return [shape.length > 1 ? shape[shape.length - 2] : 1, shape[shape.length - 1]];\r\n}\r\nexport
function sizeToSquarishShape(size: number): [number, number] {\r\n  const width = Math.ceil(Math.sqrt(size));\r\n
return [width, Math.ceil(size / width)];\r\n}\r\nexport function getBatchDim(shape: number[], dimsToSkip = 2):
number {\r\n  return sizeFromShape(shape.slice(0, shape.length - dimsToSkip));\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {ShapeUtil} from
'../../util';\r\nimport {TextureLayoutStrategy, WidthHeightPrefs} from './texture-layout-strategy';\r\nimport
{TextureLayout, TextureType} from './types';\r\n\r\nexport const createTextureLayoutFromTextureType =\r\n
(textureLayoutStrategy: TextureLayoutStrategy, shape: readonly number[],\r\n     textureType: TextureType):
TextureLayout => {\r\n      const channel = (textureType === TextureType.unpacked || textureType ===
TextureType.unpackedReversed) ? 1 : 4;\r\n      const isPacked = textureType === TextureType.packed;\r\n      const
reverseWH = (textureType === TextureType.unpackedReversed || textureType === TextureType.packed);\r\n
const breakAxis = textureType === TextureType.packedLastDimension ? shape.length - 1 : undefined;\r\n      const
unpackedShape = textureType === TextureType.packedLastDimension ?\r\n          shape.map((d, i) => i ===
shape.length - 1 ? d * 4 : d) :\r\n          undefined;\r\n      return createTextureLayoutFromShape(\r\n
textureLayoutStrategy, shape, channel, unpackedShape, {isPacked, reverseWH, breakAxis});\r\n    };\r\n\r\nexport
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const calculateTextureWidthAndHeight =\r\n    (textureLayoutStrategy: TextureLayoutStrategy, shape: readonly
number[], textureType: TextureType):\r\n        [number, number] => {\r\n          const layout =
createTextureLayoutFromTextureType(textureLayoutStrategy, shape, textureType);\r\n          return [layout.width,
layout.height];\r\n        };\r\n\r\n/**\r\n * Create a TextureLayout object from shape.\r\n */\r\nexport const
createTextureLayoutFromShape =\r\n    (textureLayoutStrategy: TextureLayoutStrategy, shape: readonly number[],
channels: 1|4 = 1,\r\n     unpackedShape?: readonly number[], prefs?: WidthHeightPrefs): TextureLayout => {\r\n
const isPacked = !!(prefs && prefs.isPacked);\r\n      const [width, height] =
textureLayoutStrategy.computeTextureWH(isPacked ? unpackedShape || shape : shape, prefs);\r\n      const rank =
shape.length;\r\n      let inferredDims = shape.slice(0);\r\n      if (rank === 0) {\r\n        inferredDims = [1];\r\n
}\r\n      if (channels === 1) {\r\n        // unpackedShape will take `shape` and not `inferredDims` so as to create a
scalar Tensor if need be\r\n        unpackedShape = shape;\r\n      } else if (isPacked) {\r\n        if (channels !== 4)
{\r\n          throw new Error('a packed texture must be 4-channel');\r\n        }\r\n        unpackedShape = shape;\r\n
if (rank > 0) {\r\n          inferredDims[rank - 1] = Math.ceil(inferredDims[rank - 1] / 2);\r\n        }\r\n        if (rank >
1) {\r\n          inferredDims[rank - 2] = Math.ceil(inferredDims[rank - 2] / 2);\r\n        }\r\n      } else if
(!unpackedShape) {\r\n        throw new Error('Unpacked shape is needed when using channels > 1');\r\n      }\r\n
return {\r\n        width,\r\n        height,\r\n        channels,\r\n        isPacked,\r\n        shape: inferredDims,\r\n
strides: ShapeUtil.computeStrides(inferredDims),\r\n        unpackedShape,\r\n        reversedWH: (prefs &&
prefs.reverseWH)\r\n      };\r\n    };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed
under the MIT License.\r\n\r\nimport {Logger, Profiler} from '../../instrument';\r\nimport {Tensor} from
'../../tensor';\r\n\r\nimport {Encoder} from './texture-data-encoder';\r\nimport {TextureLayoutStrategy} from
'./texture-layout-strategy';\r\nimport {TextureData, TextureLayout} from './types';\r\nimport {WebGLContext} from
'./webgl-context';\r\n\r\nexport interface TextureManagerConfig {\r\n  reuseTextures?: boolean;\r\n}\r\n\r\n/**\r\n *
TextureManager is the mainly responsible for caching Textures\r\n * Textures are cached in 2 levels:\r\n *   1. the
texures which are associated with a dataId (from Tensor)\r\n *    Caching these is crucial to performance. These are
In-use Textures\r\n *   2. textures which are not in use by any current ProgramInfo/Tensor\r\n *     These are called
Free Textures\r\n * TextureManager is also used to help creating textures. For this it\r\n * uses WebGLContext and
TextureLayoutStrategy\r\n */\r\nexport class TextureManager {\r\n  private readonly inUseTextures: Map<string,
WebGLTexture[]>;\r\n  private readonly idleTextures: Map<string, WebGLTexture[]>;\r\n  private readonly
textureLookup: Map<WebGLTexture, string>;\r\n  private readonly pendingRead: Map<Tensor.Id, Array<(arr:
Tensor.NumberType) => void>> = new Map();\r\n\r\n  constructor(\r\n      public glContext: WebGLContext, public
layoutStrategy: TextureLayoutStrategy, public profiler: Readonly<Profiler>,\r\n      private config:
TextureManagerConfig) {\r\n    if (config.reuseTextures) {\r\n      this.inUseTextures = new Map();\r\n
this.idleTextures = new Map();\r\n      this.textureLookup = new Map();\r\n    }\r\n  }\r\n
createTextureFromLayout(\r\n      dataType: Tensor.DataType, layout: TextureLayout, data?: Tensor.NumberType,
usage?: Encoder.Usage) {\r\n    const textureDataType = this.toEncoderType(dataType);\r\n\r\n    const encoder =
this.glContext.getEncoder(textureDataType, layout.channels || 1, usage);\r\n    if (layout.isPacked && usage ===
Encoder.Usage.UploadOnly) {\r\n      throw new Error('not implemented');\r\n    }\r\n    const width =
layout.width;\r\n    const height = layout.height;\r\n\r\n    let key: string|undefined;\r\n    let inUseTextures:
WebGLTexture[]|undefined;\r\n    if (this.config.reuseTextures) {\r\n      key =
`${width}x${height}_${encoder.format}_${encoder.internalFormat}_${encoder.textureType}`;\r\n
inUseTextures = this.inUseTextures.get(key);\r\n      if (!inUseTextures) {\r\n        inUseTextures = [];\r\n
this.inUseTextures.set(key, inUseTextures);\r\n      }\r\n\r\n      const idleTextures = this.idleTextures.get(key);\r\n
if (idleTextures && idleTextures.length > 0) {\r\n        const texture = idleTextures.pop()!;\r\n
inUseTextures.push(texture);\r\n        if (usage === Encoder.Usage.UploadOnly) {\r\n
this.glContext.updateTexture(texture, width, height, encoder, this.toTextureData(dataType, data)!);\r\n        }\r\n
return texture;\r\n      }\r\n    }\r\n\r\n    Logger.verbose('TextureManager', `Creating new texture of size
${layout.width}x${layout.height}`);\r\n    const texture = this.glContext.allocateTexture(width, height, encoder,
this.toTextureData(dataType, data));\r\n\r\n    if (this.config.reuseTextures) {\r\n
```

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inUseTextures!.push(texture);\r\n      this.textureLookup.set(texture, key!);\r\n    }\r\n    return texture;\r\n  }\r\n
readTexture(td: TextureData, dataType: Tensor.DataType, channels?: number): Tensor.NumberType {\r\n    if
(!channels) {\r\n      channels = 1;\r\n    }\r\n    return this.profiler.event('backend', 'TextureManager.readTexture', ()
=> {\r\n      const dataSize = td.shape.reduce((a, b) => a * b) * channels!;\r\n      const data =
this.glContext.readTexture(\r\n          td.texture, td.width, td.height, dataSize, this.toEncoderType(dataType),
channels!);\r\n      return this.toTensorData(dataType, data);\r\n    });\r\n  }\r\n  async readTextureAsync(td:
TextureData, dataType: Tensor.DataType, channels?: number): Promise<Tensor.NumberType> {\r\n    const dataId
= td.tensor.dataId;\r\n    if (!channels) {\r\n      channels = 1;\r\n    }\r\n    if (this.pendingRead.has(dataId)) {\r\n
const subscribers = this.pendingRead.get(dataId);\r\n      return new Promise<Tensor.NumberType>(resolve =>
subscribers?.push(resolve));\r\n    }\r\n    return this.profiler.event('backend', 'TextureManager.readTextureAsync',
async () => {\r\n      this.pendingRead.set(dataId, []);\r\n      const dataSize = td.shape.reduce((a, b) => a * b) *
channels!;\r\n      // add a fence waiting for the data to be ready\r\n      await
this.glContext.createAndWaitForFence();\r\n      const data = this.glContext.readTexture(\r\n          td.texture,
td.width, td.height, dataSize, this.toEncoderType(dataType), channels!);\r\n      const tensorData =
this.toTensorData(dataType, data);\r\n      const subscribers = this.pendingRead.get(dataId);\r\n
this.pendingRead.delete(dataId);\r\n      subscribers?.forEach(resolve => resolve(tensorData));\r\n      return
tensorData;\r\n    });\r\n  }\r\n  readUint8TextureAsFloat(td: TextureData): Float32Array {\r\n    return
this.profiler.event('backend', 'TextureManager.readUint8TextureAsFloat', () => {\r\n      const dataSize =
td.shape.reduce((a, b) => a * b);\r\n      const data = this.glContext.readTexture(td.texture, td.width, td.height,
dataSize * 4, 'byte', 4);\r\n      return new Float32Array(data.buffer, data.byteOffset, dataSize);\r\n    });\r\n  }\r\n
releaseTexture(textureData: TextureData, deleteTexture?: boolean): void {\r\n    let key: string|undefined;\r\n    if
(this.config.reuseTextures) {\r\n      key = this.textureLookup.get(textureData.texture);\r\n      if (key) {\r\n        if
(deleteTexture) {\r\n          this.textureLookup.delete(key);\r\n        }\r\n        const inUseTextures =
this.inUseTextures.get(key);\r\n        if (inUseTextures) {\r\n          const index =
inUseTextures.indexOf(textureData.texture);\r\n          if (index !== -1) {\r\n            inUseTextures.splice(index,
1);\r\n            let idleTextures = this.idleTextures.get(key);\r\n            if (!idleTextures) {\r\n              idleTextures =
[];\r\n              this.idleTextures.set(key, idleTextures);\r\n            }\r\n
idleTextures.push(textureData.texture);\r\n          }\r\n        }\r\n      }\r\n    }\r\n\r\n    if (!key || deleteTexture) {\r\n
 Logger.verbose('TextureManager', `Deleting texture of size ${textureData.width}x${textureData.height}`);\r\n
this.glContext.deleteTexture(textureData.texture);\r\n    }\r\n  }\r\n  toTensorData(dataType: Tensor.DataType, data:
Encoder.DataArrayType): Tensor.NumberType {\r\n    switch (dataType) {\r\n      case 'int16':\r\n        return data
instanceof Int16Array ? data : Int16Array.from(data);\r\n      case 'int32':\r\n        return data instanceof Int32Array ?
data : Int32Array.from(data);\r\n      case 'int8':\r\n        return data instanceof Int8Array ? data :
Int8Array.from(data);\r\n      case 'uint16':\r\n        return data instanceof Uint16Array ? data :
Uint16Array.from(data);\r\n      case 'uint32':\r\n        return data instanceof Uint32Array ? data :
Uint32Array.from(data);\r\n      case 'uint8':\r\n      case 'bool':\r\n        return data instanceof Uint8Array ? data :
Uint8Array.from(data);\r\n      case 'float32':\r\n        return data instanceof Float32Array ? data :
Float32Array.from(data);\r\n      case 'float64':\r\n        return data instanceof Float64Array ? data :
Float64Array.from(data);\r\n      default:\r\n        throw new Error(`TensorData type ${dataType} is not
supported`);\r\n    }\r\n  }\r\n  toTextureData(dataType: Tensor.DataType, data: Tensor.NumberType|undefined):
Encoder.DataArrayType|undefined {\r\n    if (!data) {\r\n      return undefined;\r\n    }\r\n    return (data instanceof
Float32Array) ? data : new Float32Array(data);\r\n    /*\r\n    switch (dataType) {\r\n      case 'int16':\r\n      case
'int32':\r\n      case 'uint16':\r\n      case 'uint32':\r\n        return (data.constructor === Uint32Array) ? data as
Uint32Array : new Uint32Array(data);\r\n      case 'int8':\r\n      case 'uint8':\r\n      case 'bool':\r\n        return
(data.constructor === Uint8Array) ? data as Uint8Array : new Uint8Array(data);\r\n      case 'float32':\r\n      case
'float64':\r\n        return (data.constructor === Float32Array) ? data as Float32Array : new Float32Array(data);\r\n
default:\r\n        throw new Error(`TensorData type ${dataType} is not supported`);\r\n    }\r\n    */\r\n  }\r\n
toEncoderType(_dataType: Tensor.DataType): Encoder.DataType {\r\n    return 'float';\r\n    // switch (dataType)
```

{\r\n // case 'int16':\r\n // case 'int32':\r\n // case 'uint16':\r\n // case 'uint32':\r\n // return 'int';\r\n // case 'uint8':\r\n // case 'bool':\r\n // return 'byte';\r\n // case 'float32':\r\n // case 'float64':\r\n // return 'float';\r\n // default:\r\n // throw new Error(`TensorData type ${dataType} is not supported`);\r\n // }\r\n }\r\n clearActiveTextures(): void {\r\n this.glContext.clearActiveTextures();\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../tensor';\r\n\r\n/**\r\n * Layout info is used for mapping n-dimensional array to 2D textures\r\n * The layout is created by the TextureLayoutStrategy based on\r\n * the Tensor's dimensions and strides\r\n */\r\nexport interface TextureLayout {\r\n width: number;\r\n height: number;\r\n /**\r\n * specify the number of value that encoded in a single pixel\r\n */\r\n channels: 1|2|3|4;\r\n /**\r\n * whether in packed mode or not\r\n */\r\n isPacked?: boolean;\r\n /**\r\n * the normalized shape\r\n */\r\n shape: readonly number[];\r\n /**\r\n * the stride of each dimensions, calculated according to shape\r\n */\r\n strides: readonly number[];\r\n /**\r\n * the original shape(dims) of the corresponding tensor\r\n */\r\n unpackedShape: readonly number[];\r\n\r\n reversedWH?: boolean;\r\n}\r\nexport interface TextureData extends TextureLayout {\r\n tensor: Tensor;\r\n texture: WebGLTexture;\r\n}\r\n\r\nexport enum TextureType {\r\n unpacked, // <-- normal unpacked texture\r\n unpackedReversed, // <-- unpacked texture used in old ONNX.js implementation (deprecated)\r\n packed, // <-- normal packed texture\r\n downloadUint8AsFloat, // <-- ONLY used in texture downloading for iOS devices\r\n packedLastDimension // <-- ONLY used in old ONNX.js Conv implementation for input W (deprecated)\r\n}\r\n\r\nexport interface TensorInfo {\r\n id?: Tensor.Id;\r\n dims: readonly number[];\r\n type: Tensor.DataType;\r\n textureType: TextureType;\r\n}\r\n\r\nexport interface ProgramVariable {\r\n type: 'float'|'int';\r\n name: string;\r\n arrayLength?: number;\r\n data: number|number[];\r\n}\r\n\r\n\r\n/**\r\n * A set of metadata of a shader program.\r\n */\r\nexport interface ProgramMetadata {\r\n /**\r\n * the name of the program. used for debugging and profiling\r\n */\r\n name: string;\r\n /**\r\n * texture types for each input\r\n */\r\n inputTypes: TextureType[];\r\n /**\r\n * names of each input\r\n */\r\n inputNames: string[];\r\n /**\r\n * an optional string as a cache hint in the artifact cache\r\n */\r\n cacheHint?: string;\r\n}\r\n\r\n/**\r\n * A ProgramInfoLoader allows\r\n */\r\nexport interface ProgramInfoLoader extends ProgramMetadata {\r\n /**\r\n * a function to get the program info\r\n */\r\n get(): ProgramInfo;\r\n}\r\n\r\n/**\r\n * A set of data that represent a shader program\r\n */\r\nexport interface ProgramInfo extends ProgramMetadata {\r\n /**\r\n * information of uniform variables\r\n */\r\n variables?: ProgramVariable[];\r\n /**\r\n * tensor info for output\r\n */\r\n output: TensorInfo;\r\n /**\r\n * the shader's processing source code\r\n */\r\n shaderSource: string;\r\n /**\r\n * whether the shader source contains a customized main function implementation\r\n */\r\n hasMain?: boolean;\r\n}\r\n\r\nexport interface VariableInfo {\r\n type: 'float'|'int';\r\n name: string;\r\n arrayLength?: number;\r\n}\r\n\r\nexport interface ProgramVariable {\r\n type: 'float'|'int';\r\n name: string;\r\n arrayLength?: number;\r\n data: number|number[];\r\n}\r\n\r\n/**\r\n * Information of uniforms that shader uses\r\n */\r\nexport interface UniformInfo {\r\n type: 'sampler2D'|VariableInfo['type'];\r\n name: string;\r\n arrayLength?: number;\r\n}\r\n\r\nexport interface UniformLocation extends UniformInfo {\r\n location: WebGLUniformLocation;\r\n}\r\n\r\n/**\r\n * Artifact is the result of compilation\r\n * It does not contain input of output data\r\n * However anything that could be run as a \"program\"\r\n */\r\nexport interface Artifact {\r\n programInfo: ProgramInfo;\r\n program: WebGLProgram;\r\n uniformLocations: UniformLocation[];\r\n attribLocations: {position: number; textureCoord: number};\r\n}\r\nexport declare namespace Artifact {\r\n type UniformLocations = Artifact['uniformLocations'];\r\n type AttribLocations = Artifact['attribLocations'];\r\n}\r\n\r\nexport interface UniformData {\r\n [name: string]: number|number[];\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {assert} from '../../util';\r\n/**\r\n * Given a non RGBA shape calculate the R version\r\n * It is assumed that the dimensions are multiples of given channels\r\n * NOTE: it is always the last dim that gets packed.\r\n * @param unpackedShape original shape to create a packed version from\r\n */\r\nexport function getPackedShape(unpackedShape: readonly number[]): readonly number[] {\r\n const len = unpackedShape.length;\r\n return unpackedShape.slice(0, len - 1).concat(unpackedShape[len - 1] / 4);\r\n}\r\n\r\nexport async function repeatedTry(\r\n checkFn: () => boolean, delayFn = (_counter: number) => 0,

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maxCounter?: number): Promise<void> {\r\n  return new Promise<void>((resolve, reject) => {\r\n    let tryCount =
0;\r\n\r\n    const tryFn = () => {\r\n      if (checkFn()) {\r\n        resolve();\r\n        return;\r\n      }\r\n\r\n
tryCount++;\r\n\r\n      const nextBackoff = delayFn(tryCount);\r\n\r\n      if (maxCounter != null && tryCount >=
maxCounter) {\r\n        reject();\r\n        return;\r\n      }\r\n      setTimeout(tryFn, nextBackoff);\r\n    };\r\n\r\n
tryFn();\r\n  });\r\n}\r\n\r\n/**\r\n * Generates the function name from an input sampler name.\r\n * @param
samplerName Name of the sampler.\r\n */\r\nexport function
generateShaderFuncNameFromInputSamplerName(samplerName: string): string {\r\n  assert(typeof samplerName
!== 'undefined' && samplerName.length !== 0, () => 'empty string found for sampler name');\r\n  return 'get' +
samplerName.charAt(0).toUpperCase() + samplerName.slice(1);\r\n}\r\n\r\n/**\r\n * Generates the function name
from an input sampler name at output coordinates.\r\n * @param samplerName Name of the sampler.\r\n
*/\r\nexport function generateShaderFuncNameFromInputSamplerNameAtOutCoords(samplerName: string): string
{\r\n  assert(typeof samplerName !== 'undefined' && samplerName.length !== 0, () => 'empty string found for
sampler name');\r\n  return 'get' + samplerName.charAt(0).toUpperCase() + samplerName.slice(1) +
'AtOutCoords';\r\n}\r\n\r\n/** Returns a new input shape (a copy) that has a squeezed logical shape. */\r\nexport
function squeezeInputShape(inputShape: readonly number[], squeezedShape: number[]): number[] {\r\n  // Deep
copy.\r\n  let newInputShape: number[] = JSON.parse(JSON.stringify(inputShape));\r\n  newInputShape =
squeezedShape;\r\n  return newInputShape;\r\n}\r\n\r\n/** Returns a list of squeezed parameters for shader functions
*/\r\nexport function getSqueezedParams(params: string[], keptDims: number[]): string {\r\n  return
keptDims.map(d => params[d]).join(', ');\r\n}\r\n\r\n/** Returns the data type for different ranks. */\r\nexport
function getCoordsDataType(rank: number): string {\r\n  if (rank <= 1) {\r\n    return 'int';\r\n  } else if (rank === 2)
{\r\n    return 'ivec2';\r\n  } else if (rank === 3) {\r\n    return 'ivec3';\r\n  } else if (rank === 4) {\r\n    return
'ivec4';\r\n  } else if (rank === 5) {\r\n    return 'ivec5';\r\n  } else if (rank === 6) {\r\n    return 'ivec6';\r\n  } else
{\r\n    throw Error(`GPU for rank ${rank} is not yet supported`);\r\n  }\r\n}\r\n\r\nexport function
getGlChannels(rank = 6): string[] {\r\n  return ['x', 'y', 'z', 'w', 'u', 'v'].slice(0, rank);\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Logger} from
'../../instrument';\r\n\r\nimport {WebGLContext} from './webgl-context';\r\n\r\nconst cache: {[contextId: string]:
WebGLContext} = {};\r\n\r\n/**\r\n * This factory function creates proper WebGLRenderingContext based on\r\n *
the current browsers capabilities\r\n * The order is from higher/most recent versions to most basic\r\n */\r\nexport
function createWebGLContext(contextId?: 'webgl'|'webgl2'): WebGLContext {\r\n  let context:
WebGLContext|undefined;\r\n  if ((!contextId || contextId === 'webgl2') && 'webgl2' in cache) {\r\n    context =
cache.webgl2;\r\n  } else if ((!contextId || contextId === 'webgl') && 'webgl' in cache) {\r\n    context =
cache.webgl;\r\n  }\r\n\r\n  context = context || createNewWebGLContext(contextId);\r\n  contextId = contextId ||
context.version === 1 ? 'webgl' : 'webgl2';\r\n  const gl = context.gl;\r\n\r\n  cache[contextId] = context;\r\n\r\n  if
(gl.isContextLost()) {\r\n    delete cache[contextId];\r\n    return createWebGLContext(contextId);\r\n  }\r\n\r\n
gl.disable(gl.DEPTH_TEST);\r\n  gl.disable(gl.STENCIL_TEST);\r\n  gl.disable(gl.BLEND);\r\n
gl.disable(gl.DITHER);\r\n  gl.disable(gl.POLYGON_OFFSET_FILL);\r\n
gl.disable(gl.SAMPLE_COVERAGE);\r\n  gl.enable(gl.SCISSOR_TEST);\r\n  gl.enable(gl.CULL_FACE);\r\n
gl.cullFace(gl.BACK);\r\n\r\n  return context;\r\n}\r\n\r\nexport function createNewWebGLContext(contextId?:
'webgl'|'webgl2'): WebGLContext {\r\n  const canvas = createCanvas();\r\n  const contextAttributes:
WebGLContextAttributes = {\r\n    alpha: false,\r\n    depth: false,\r\n    antialias: false,\r\n    stencil: false,\r\n
preserveDrawingBuffer: false,\r\n    premultipliedAlpha: false,\r\n    failIfMajorPerformanceCaveat: false\r\n  };\r\n
let gl: WebGLRenderingContext|null;\r\n  const ca = contextAttributes;\r\n  if (!contextId || contextId === 'webgl2')
{\r\n    gl = canvas.getContext('webgl2', ca);\r\n    if (gl) {\r\n      try {\r\n        return new WebGLContext(gl, 2);\r\n
   } catch (err) {\r\n        Logger.warning('GlContextFactory', `failed to create WebGLContext using contextId
'webgl2'. Error: ${err}`);\r\n      }\r\n    }\r\n  }\r\n  if (!contextId || contextId === 'webgl') {\r\n    gl =
canvas.getContext('webgl', ca) || canvas.getContext('experimental-webgl', ca) as WebGLRenderingContext;\r\n    if
(gl) {\r\n      try {\r\n        return new WebGLContext(gl, 1);\r\n      } catch (err) {\r\n        Logger.warning(\r\n
'GlContextFactory',\r\n            `failed to create WebGLContext using contextId 'webgl' or 'experimental-webgl'.
```

Error: ${err}`);\r\n   }\r\n   }\r\n }\r\n\r\n throw new Error('WebGL is not supported');\r\n}\r\n\r\nfunction createCanvas(): HTMLCanvasElement {\r\n const canvas: HTMLCanvasElement = document.createElement('canvas');\r\n canvas.width = 1;\r\n canvas.height = 1;\r\n return canvas;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env} from 'onnxruntime-common';\r\n\r\nimport * as DataEncoders from './texture-data-encoder';\r\nimport {DataEncoder, Encoder} from './texture-data-encoder';\r\nimport {repeatedTry} from './utils';\r\n\r\nexport interface FenceContext {\r\n query: WebGLSync|null;\r\n isFencePassed(): boolean;\r\n}\r\n\r\ntype PollItem = {\r\n isDoneFn: () => boolean; resolveFn: () => void;\r\n};\r\n\r\nexport function linearSearchLastTrue(arr: Array<() => boolean>): number {\r\n let i = 0;\r\n for (; i < arr.length; ++i) {\r\n   const isDone = arr[i]();\r\n   if (!isDone) {\r\n   break;\r\n   }\r\n }\r\n return i - 1;\r\n}\r\n\r\n/**\r\n * Abstraction and wrapper around WebGLRenderingContext and its operations\r\n */\r\nexport class WebGLContext {\r\n gl: WebGLRenderingContext;\r\n version: 1|2;\r\n\r\n private vertexbuffer: WebGLBuffer;\r\n private framebuffer: WebGLFramebuffer;\r\n\r\n // WebGL flags and vital parameters\r\n private isFloatTextureAttachableToFrameBuffer: boolean;\r\n isFloat32DownloadSupported: boolean;\r\n isRenderFloat32Supported: boolean;\r\n isBlendSupported: boolean;\r\n maxTextureSize: number;\r\n // private maxCombinedTextureImageUnits: number;\r\n private maxTextureImageUnits: number;\r\n // private maxCubeMapTextureSize: number;\r\n // private shadingLanguageVersion: string;\r\n // private webglVendor: string;\r\n // private webglVersion: string;\r\n\r\n // WebGL2 flags and vital parameters\r\n // private max3DTextureSize: number;\r\n // private maxArrayTextureLayers: number;\r\n // private maxColorAttachments: number;\r\n // private maxDrawBuffers: number;\r\n\r\n // WebGL extensions\r\n // eslint-disable-next-line camelcase\r\n textureFloatExtension: OES_texture_float|null;\r\n // eslint-disable-next-line camelcase\r\n textureHalfFloatExtension: OES_texture_half_float|null;\r\n\r\n // WebGL2 extensions\r\n colorBufferFloatExtension: unknown|null;\r\n // eslint-disable-next-line @typescript-eslint/naming-convention\r\n disjointTimerQueryWebgl2Extension: {TIME_ELAPSED_EXT: GLenum; GPU_DISJOINT_EXT: GLenum}|null;\r\n\r\n private disposed: boolean;\r\n private frameBufferBound = false;\r\n\r\n constructor(gl: WebGLRenderingContext, version: 1|2) {\r\n   this.gl = gl;\r\n   this.version = version;\r\n\r\n   this.getExtensions();\r\n   this.vertexbuffer = this.createVertexbuffer();\r\n   this.framebuffer = this.createFramebuffer();\r\n   this.queryVitalParameters();\r\n }\r\n\r\n allocateTexture(width: number, height: number, encoder: DataEncoder, data?: Encoder.DataArrayType): WebGLTexture {\r\n   const gl = this.gl;\r\n   // create the texture\r\n   const texture = gl.createTexture();\r\n   // bind the texture so the following methods effect this texture.\r\n   gl.bindTexture(gl.TEXTURE_2D, texture);\r\n   gl.texParameteri(gl.TEXTURE_2D, gl.TEXTURE_MIN_FILTER, gl.NEAREST);\r\n   gl.texParameteri(gl.TEXTURE_2D, gl.TEXTURE_MAG_FILTER, gl.NEAREST);\r\n   gl.texParameteri(gl.TEXTURE_2D, gl.TEXTURE_WRAP_S, gl.CLAMP_TO_EDGE);\r\n   gl.texParameteri(gl.TEXTURE_2D, gl.TEXTURE_WRAP_T, gl.CLAMP_TO_EDGE);\r\n   const buffer = data ? encoder.encode(data, width * height) : null;\r\n   gl.texImage2D(\r\n   gl.TEXTURE_2D,\r\n   0, // Level of detail.\r\n   encoder.internalFormat, width, height,\r\n   0, // Always 0 in OpenGL ES.\r\n   encoder.format, encoder.textureType, buffer);\r\n   this.checkError();\r\n   return texture as WebGLTexture;\r\n }\r\n updateTexture(\r\n   texture: WebGLTexture, width: number, height: number, encoder: DataEncoder, data: Encoder.DataArrayType): void {\r\n   const gl = this.gl;\r\n   gl.bindTexture(gl.TEXTURE_2D, texture);\r\n   const buffer = encoder.encode(data, width * height);\r\n   gl.texSubImage2D(\r\n   gl.TEXTURE_2D,\r\n   0, // level\r\n   0, // xoffset\r\n   0, // yoffset\r\n   width, height, encoder.format, encoder.textureType, buffer);\r\n   this.checkError();\r\n }\r\n attachFramebuffer(texture: WebGLTexture, width: number, height: number): void {\r\n   const gl = this.gl;\r\n   // Make it the target for framebuffer operations - including rendering.\r\n   gl.bindTexture(gl.TEXTURE_2D, texture);\r\n   gl.bindFramebuffer(gl.FRAMEBUFFER, this.framebuffer);\r\n   gl.framebufferTexture2D(\r\n   gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0, gl.TEXTURE_2D, texture,\r\n   0); // 0, we aren't using MIPMAPs\r\n   this.checkError();\r\n   gl.viewport(0, 0, width, height);\r\n   gl.scissor(0, 0, width, height);\r\n }\r\n readTexture(\r\n   texture: WebGLTexture, width: number, height: number, dataSize: number, dataType:

Encoder.DataType,\r\n channels: number): Encoder.DataArrayType {\r\n const gl = this.gl;\r\n if (!channels) {\r\n channels = 1;\r\n }\r\n if (!this.frameBufferBound) {\r\n this.attachFramebuffer(texture, width, height);\r\n }\r\n const encoder = this.getEncoder(dataType, channels);\r\n const buffer = encoder.allocate(width * height);\r\n // bind texture to framebuffer\r\n gl.bindTexture(gl.TEXTURE_2D, texture);\r\n gl.framebufferTexture2D(\r\n gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0, gl.TEXTURE_2D, texture,\r\n 0); // 0, we aren't using MIPMAPs\r\n // TODO: Check if framebuffer is ready\r\n gl.readPixels(0, 0, width, height, gl.RGBA, encoder.textureType, buffer);\r\n this.checkError();\r\n // unbind FB\r\n return encoder.decode(buffer, dataSize);\r\n }\r\n\r\n isFramebufferReady(): boolean {\r\n // TODO: Implement logic to check if the framebuffer is ready\r\n return true;\r\n }\r\n getActiveTexture(): string {\r\n const gl = this.gl;\r\n const n = gl.getParameter(this.gl.ACTIVE_TEXTURE);\r\n return `TEXTURE${(n - gl.TEXTURE0)}`;\r\n }\r\n getTextureBinding(): WebGLTexture {\r\n return this.gl.getParameter(this.gl.TEXTURE_BINDING_2D);\r\n }\r\n getFramebufferBinding(): WebGLFramebuffer {\r\n return this.gl.getParameter(this.gl.FRAMEBUFFER_BINDING);\r\n }\r\n setVertexAttributes(positionHandle: number, textureCoordHandle: number): void {\r\n const gl = this.gl;\r\n gl.vertexAttribPointer(positionHandle, 3, gl.FLOAT, false, 20, 0);\r\n gl.enableVertexAttribArray(positionHandle);\r\n if (textureCoordHandle !== -1) {\r\n gl.vertexAttribPointer(textureCoordHandle, 2, gl.FLOAT, false, 20, 12);\r\n gl.enableVertexAttribArray(textureCoordHandle);\r\n }\r\n this.checkError();\r\n }\r\n createProgram(\r\n vertexShader: WebGLShader,\r\n fragShader: WebGLShader,\r\n): WebGLProgram {\r\n const gl = this.gl;\r\n const program = gl.createProgram()!;\r\n\r\n // the program consists of our shaders\r\n gl.attachShader(program, vertexShader);\r\n gl.attachShader(program, fragShader);\r\n gl.linkProgram(program);\r\n return program;\r\n }\r\n compileShader(shaderSource: string, shaderType: number): WebGLShader {\r\n const gl = this.gl;\r\n const shader = gl.createShader(shaderType);\r\n if (!shader) {\r\n throw new Error(`createShader() returned null with type ${shaderType}`);\r\n }\r\n\r\n gl.shaderSource(shader, shaderSource);\r\n gl.compileShader(shader);\r\n if (gl.getShaderParameter(shader, gl.COMPILE_STATUS) === false) {\r\n throw new Error(`Failed to compile shader: ${gl.getShaderInfoLog(shader)}\r\nShader source:\r\n${shaderSource}`);\r\n }\r\n return shader;\r\n }\r\n deleteShader(shader: WebGLShader): void {\r\n this.gl.deleteShader(shader);\r\n }\r\n bindTextureToUniform(texture: WebGLTexture, position: number, uniformHandle: WebGLUniformLocation): void {\r\n const gl = this.gl;\r\n gl.activeTexture(gl.TEXTURE0 + position);\r\n this.checkError();\r\n gl.bindTexture(gl.TEXTURE_2D, texture);\r\n this.checkError();\r\n gl.uniform1i(uniformHandle, position);\r\n this.checkError();\r\n }\r\n draw(): void {\r\n this.gl.drawArrays(this.gl.TRIANGLE_STRIP, 0, 4);\r\n this.checkError();\r\n }\r\n checkError(): void {\r\n if (env.debug) {\r\n const gl = this.gl;\r\n const error = gl.getError();\r\n let label = '';\r\n switch (error) {\r\n case (gl.NO_ERROR):\r\n return;\r\n case (gl.INVALID_ENUM):\r\n label = 'INVALID_ENUM';\r\n break;\r\n case (gl.INVALID_VALUE):\r\n label = 'INVALID_VALUE';\r\n break;\r\n case (gl.INVALID_OPERATION):\r\n label = 'INVALID_OPERATION';\r\n break;\r\n case (gl.INVALID_FRAMEBUFFER_OPERATION):\r\n label = 'INVALID_FRAMEBUFFER_OPERATION';\r\n break;\r\n case (gl.OUT_OF_MEMORY):\r\n label = 'OUT_OF_MEMORY';\r\n break;\r\n case (gl.CONTEXT_LOST_WEBGL):\r\n label = 'CONTEXT_LOST_WEBGL';\r\n break;\r\n default:\r\n label = `Unknown WebGL Error: ${error.toString(16)}`;\r\n }\r\n throw new Error(label);\r\n }\r\n }\r\n deleteTexture(texture: WebGLTexture): void {\r\n this.gl.deleteTexture(texture);\r\n }\r\n deleteProgram(program: WebGLProgram): void {\r\n this.gl.deleteProgram(program);\r\n }\r\n getEncoder(dataType: Encoder.DataType, channels: number, usage: Encoder.Usage = Encoder.Usage.Default): DataEncoder {\r\n if (this.version === 2) {\r\n return new DataEncoders.RedFloat32DataEncoder(this.gl as WebGL2RenderingContext, channels);\r\n }\r\n\r\n switch (dataType) {\r\n case 'float':\r\n if (usage === Encoder.Usage.UploadOnly || this.isRenderFloat32Supported) {\r\n return new DataEncoders.RGBAFloatDataEncoder(this.gl, channels);\r\n } else {\r\n return

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new DataEncoders.RGBAFloatDataEncoder(\r\n            this.gl, channels,
this.textureHalfFloatExtension!.HALF_FLOAT_OES);\r\n      }\r\n    case 'int':\r\n      throw new Error('not
implemented');\r\n    case 'byte':\r\n      return new DataEncoders.Uint8DataEncoder(this.gl, channels);\r\n
default:\r\n      throw new Error(`Invalid dataType: ${dataType}`);\r\n    }\r\n  }\r\n  clearActiveTextures(): void
{\r\n    const gl = this.gl;\r\n    for (let unit = 0; unit < this.maxTextureImageUnits; ++unit) {\r\n
gl.activeTexture(gl.TEXTURE0 + unit);\r\n      gl.bindTexture(gl.TEXTURE_2D, null);\r\n    }\r\n  }\r\n  dispose():
void {\r\n    if (this.disposed) {\r\n      return;\r\n    }\r\n    const gl = this.gl;\r\n
gl.bindFramebuffer(gl.FRAMEBUFFER, null);\r\n    gl.deleteFramebuffer(this.framebuffer);\r\n
gl.bindBuffer(gl.ARRAY_BUFFER, null);\r\n    gl.deleteBuffer(this.vertexbuffer);\r\n
gl.bindBuffer(gl.ELEMENT_ARRAY_BUFFER, null);\r\n    gl.finish();\r\n    this.disposed = true;\r\n  }\r\n\r\n
private createDefaultGeometry(): Float32Array {\r\n    // Sets of x,y,z(=0),s,t coordinates.\r\n    return new
Float32Array([\r\n      -1.0, 1.0,  0.0, 0.0, 1.0,  // upper left\r\n      -1.0, -1.0, 0.0, 0.0, 0.0,  // lower left\r\n      1.0,
1.0,  0.0, 1.0, 1.0,  // upper right\r\n      1.0,  -1.0, 0.0, 1.0, 0.0   // lower right\r\n    ]);\r\n  }\r\n  private
createVertexbuffer(): WebGLBuffer {\r\n    const gl = this.gl;\r\n    const buffer = gl.createBuffer();\r\n    if (!buffer)
{\r\n      throw new Error('createBuffer() returned null');\r\n    }\r\n    const geometry =
this.createDefaultGeometry();\r\n    gl.bindBuffer(gl.ARRAY_BUFFER, buffer);\r\n
gl.bufferData(gl.ARRAY_BUFFER, geometry, gl.STATIC_DRAW);\r\n    this.checkError();\r\n    return buffer;\r\n
}\r\n  private createFramebuffer(): WebGLFramebuffer {\r\n    const fb = this.gl.createFramebuffer();\r\n    if (!fb)
{\r\n      throw new Error('createFramebuffer returned null');\r\n    }\r\n    return fb;\r\n  }\r\n\r\n  private
queryVitalParameters(): void {\r\n    const gl = this.gl;\r\n\r\n    this.isFloatTextureAttachableToFrameBuffer =
this.checkFloatTextureAttachableToFrameBuffer();\r\n    this.isRenderFloat32Supported =
this.checkRenderFloat32();\r\n    this.isFloat32DownloadSupported = this.checkFloat32Download();\r\n\r\n    if
(this.version === 1 && !this.textureHalfFloatExtension && !this.isRenderFloat32Supported) {\r\n      throw new
Error('both float32 and float16 TextureType are not supported');\r\n    }\r\n\r\n    this.isBlendSupported =
!this.isRenderFloat32Supported || this.checkFloat32Blend();\r\n\r\n    // this.maxCombinedTextureImageUnits =
gl.getParameter(gl.MAX_COMBINED_TEXTURE_IMAGE_UNITS);\r\n    this.maxTextureSize =
gl.getParameter(gl.MAX_TEXTURE_SIZE);\r\n    this.maxTextureImageUnits =
gl.getParameter(gl.MAX_TEXTURE_IMAGE_UNITS);\r\n    // this.maxCubeMapTextureSize =
gl.getParameter(gl.MAX_CUBE_MAP_TEXTURE_SIZE);\r\n    // this.shadingLanguageVersion =
gl.getParameter(gl.SHADING_LANGUAGE_VERSION);\r\n    // this.webglVendor =
gl.getParameter(gl.VENDOR);\r\n    // this.webglVersion = gl.getParameter(gl.VERSION);\r\n\r\n    if (this.version
=== 2) {\r\n      // this.max3DTextureSize =
gl.getParameter(WebGL2RenderingContext.MAX_3D_TEXTURE_SIZE);\r\n      // this.maxArrayTextureLayers =
gl.getParameter(WebGL2RenderingContext.MAX_ARRAY_TEXTURE_LAYERS);\r\n      //
this.maxColorAttachments = gl.getParameter(WebGL2RenderingContext.MAX_COLOR_ATTACHMENTS);\r\n
 // this.maxDrawBuffers = gl.getParameter(WebGL2RenderingContext.MAX_DRAW_BUFFERS);\r\n    }\r\n  }\r\n
private getExtensions(): void {\r\n    if (this.version === 2) {\r\n      this.colorBufferFloatExtension =
this.gl.getExtension('EXT_color_buffer_float');\r\n      this.disjointTimerQueryWebgl2Extension =
this.gl.getExtension('EXT_disjoint_timer_query_webgl2');\r\n    } else {\r\n      this.textureFloatExtension =
this.gl.getExtension('OES_texture_float');\r\n      this.textureHalfFloatExtension =
this.gl.getExtension('OES_texture_half_float');\r\n    }\r\n  }\r\n\r\n  private
checkFloatTextureAttachableToFrameBuffer(): boolean {\r\n    // test whether Float32 texture is supported:\r\n    //
STEP.1 create a float texture\r\n    const gl = this.gl;\r\n    const texture = gl.createTexture();\r\n
gl.bindTexture(gl.TEXTURE_2D, texture);\r\n    // eslint-disable-next-line @typescript-eslint/naming-
convention\r\n    const internalFormat = this.version === 2 ? (gl as unknown as {RGBA32F: number}).RGBA32F :
gl.RGBA;\r\n    gl.texImage2D(gl.TEXTURE_2D, 0, internalFormat, 1, 1, 0, gl.RGBA, gl.FLOAT, null);\r\n    //
STEP.2 bind a frame buffer\r\n    const frameBuffer = gl.createFramebuffer();\r\n
gl.bindFramebuffer(gl.FRAMEBUFFER, frameBuffer);\r\n    // STEP.3 attach texture to framebuffer\r\n
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gl.framebufferTexture2D(gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0, gl.TEXTURE_2D, texture, 0);\r\n
// STEP.4 test whether framebuffer is complete\r\n    const isComplete =
gl.checkFramebufferStatus(gl.FRAMEBUFFER) === gl.FRAMEBUFFER_COMPLETE;\r\n
gl.bindTexture(gl.TEXTURE_2D, null);\r\n    gl.bindFramebuffer(gl.FRAMEBUFFER, null);\r\n
gl.deleteTexture(texture);\r\n    gl.deleteFramebuffer(frameBuffer);\r\n    return isComplete;\r\n  }\r\n\r\n  private
checkRenderFloat32(): boolean {\r\n    if (this.version === 2) {\r\n      if (!this.colorBufferFloatExtension) {\r\n
return false;\r\n      }\r\n    } else {\r\n      if (!this.textureFloatExtension) {\r\n        return false;\r\n      }\r\n    }\r\n
return this.isFloatTextureAttachableToFrameBuffer;\r\n  }\r\n\r\n  private checkFloat32Download(): boolean {\r\n
if (this.version === 2) {\r\n      if (!this.colorBufferFloatExtension) {\r\n        return false;\r\n      }\r\n    } else {\r\n
 if (!this.textureFloatExtension) {\r\n        return false;\r\n      }\r\n      if
(!this.gl.getExtension('WEBGL_color_buffer_float')) {\r\n        return false;\r\n      }\r\n    }\r\n    return
this.isFloatTextureAttachableToFrameBuffer;\r\n  }\r\n\r\n  /**\r\n   * Check whether GL_BLEND is supported\r\n
*/\r\n  private checkFloat32Blend(): boolean {\r\n    // it looks like currently (2019-05-08) there is no easy way to
detect whether BLEND is supported\r\n    // https://github.com/microsoft/onnxjs/issues/145\r\n\r\n    const gl =
this.gl;\r\n\r\n    let texture: WebGLTexture|null|undefined;\r\n    let frameBuffer:
WebGLFramebuffer|null|undefined;\r\n    let vertexShader: WebGLShader|null|undefined;\r\n    let fragmentShader:
WebGLShader|null|undefined;\r\n    let program: WebGLProgram|null|undefined;\r\n\r\n    try {\r\n      texture =
gl.createTexture();\r\n      frameBuffer = gl.createFramebuffer();\r\n      gl.bindTexture(gl.TEXTURE_2D,
texture);\r\n\r\n      // eslint-disable-next-line @typescript-eslint/naming-convention\r\n      const internalFormat =
this.version === 2 ? (gl as unknown as {RGBA32F: number}).RGBA32F : gl.RGBA;\r\n
gl.texImage2D(gl.TEXTURE_2D, 0, internalFormat, 1, 1, 0, gl.RGBA, gl.FLOAT, null);\r\n\r\n
gl.bindFramebuffer(gl.FRAMEBUFFER, frameBuffer);\r\n      gl.framebufferTexture2D(gl.FRAMEBUFFER,
gl.COLOR_ATTACHMENT0, gl.TEXTURE_2D, texture, 0);\r\n\r\n      gl.enable(gl.BLEND);\r\n\r\n
vertexShader = gl.createShader(gl.VERTEX_SHADER);\r\n      if (!vertexShader) {\r\n        return false;\r\n      }\r\n
    gl.shaderSource(vertexShader, 'void main(){}');\r\n      gl.compileShader(vertexShader);\r\n\r\n
fragmentShader = gl.createShader(gl.FRAGMENT_SHADER);\r\n      if (!fragmentShader) {\r\n        return
false;\r\n      }\r\n      gl.shaderSource(fragmentShader, 'precision highp float;void
main(){gl_FragColor=vec4(0.5);}');\r\n      gl.compileShader(fragmentShader);\r\n\r\n      program =
gl.createProgram();\r\n      if (!program) {\r\n        return false;\r\n      }\r\n      gl.attachShader(program,
vertexShader);\r\n      gl.attachShader(program, fragmentShader);\r\n      gl.linkProgram(program);\r\n
gl.useProgram(program);\r\n\r\n      gl.drawArrays(gl.POINTS, 0, 1);\r\n      return gl.getError() ===
gl.NO_ERROR;\r\n\r\n    } finally {\r\n      gl.disable(gl.BLEND);\r\n\r\n      if (program) {\r\n
gl.deleteProgram(program);\r\n      }\r\n      if (vertexShader) {\r\n        gl.deleteShader(vertexShader);\r\n      }\r\n
if (fragmentShader) {\r\n        gl.deleteShader(fragmentShader);\r\n      }\r\n      if (frameBuffer) {\r\n
gl.bindFramebuffer(gl.FRAMEBUFFER, null);\r\n        gl.deleteFramebuffer(frameBuffer);\r\n      }\r\n      if
(texture) {\r\n        gl.bindTexture(gl.TEXTURE_2D, null);\r\n        gl.deleteTexture(texture);\r\n      }\r\n    }\r\n
}\r\n\r\n  beginTimer(): WebGLQuery {\r\n    if (this.version === 2 && this.disjointTimerQueryWebgl2Extension)
{\r\n      const gl2 = this.gl as WebGL2RenderingContext;\r\n      const ext =
this.disjointTimerQueryWebgl2Extension;\r\n\r\n      const query = gl2.createQuery() as WebGLQuery;\r\n
gl2.beginQuery(ext.TIME_ELAPSED_EXT, query);\r\n      return query;\r\n    } else {\r\n      // TODO: add webgl 1
handling.\r\n      throw new Error('WebGL1 profiling currently not supported.');\r\n    }\r\n  }\r\n\r\n  endTimer()
{\r\n    if (this.version === 2 && this.disjointTimerQueryWebgl2Extension) {\r\n      const gl2 = this.gl as
WebGL2RenderingContext;\r\n      const ext = this.disjointTimerQueryWebgl2Extension;\r\n
gl2.endQuery(ext.TIME_ELAPSED_EXT);\r\n      return;\r\n    } else {\r\n      // TODO: add webgl 1 handling.\r\n
 throw new Error('WebGL1 profiling currently not supported');\r\n    }\r\n  }\r\n\r\n  isTimerResultAvailable(query:
WebGLQuery): boolean {\r\n    let available = false, disjoint = false;\r\n    if (this.version === 2 &&
this.disjointTimerQueryWebgl2Extension) {\r\n      const gl2 = this.gl as WebGL2RenderingContext;\r\n      const
ext = this.disjointTimerQueryWebgl2Extension;\r\n\r\n      available = gl2.getQueryParameter(query,
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gl2.QUERY_RESULT_AVAILABLE);\r\n   disjoint = gl2.getParameter(ext.GPU_DISJOINT_EXT);\r\n   } else
{\r\n   // TODO: add webgl 1 handling.\r\n   throw new Error('WebGL1 profiling currently not supported');\r\n
}\r\n\r\n   return available && !disjoint;\r\n }\r\n\r\n getTimerResult(query: WebGLQuery): number {\r\n   let
timeElapsed = 0;\r\n   if (this.version === 2) {\r\n   const gl2 = this.gl as WebGL2RenderingContext;\r\n
timeElapsed = gl2.getQueryParameter(query, gl2.QUERY_RESULT);\r\n   gl2.deleteQuery(query);\r\n   } else
{\r\n   // TODO: add webgl 1 handling.\r\n   throw new Error('WebGL1 profiling currently not supported');\r\n
}\r\n   // return miliseconds\r\n   return timeElapsed / 1000000;\r\n }\r\n\r\n async
waitForQueryAndGetTime(query: WebGLQuery): Promise<number> {\r\n   await repeatedTry(() =>
this.isTimerResultAvailable(query));\r\n   return this.getTimerResult(query);\r\n }\r\n\r\n public async
createAndWaitForFence(): Promise<void> {\r\n   const fenceContext = this.createFence(this.gl);\r\n   return
this.pollFence(fenceContext);\r\n }\r\n\r\n private createFence(gl: WebGLRenderingContext): FenceContext {\r\n
let isFencePassed: () => boolean;\r\n   const gl2 = gl as WebGL2RenderingContext;\r\n   const query =
gl2.fenceSync(gl2.SYNC_GPU_COMMANDS_COMPLETE, 0);\r\n   gl.flush();\r\n   if (query === null) {\r\n
isFencePassed = () => true;\r\n   } else {\r\n   isFencePassed = () => {\r\n   const status =
gl2.clientWaitSync(query, 0, 0);\r\n   return status === gl2.ALREADY_SIGNALED || status ===
gl2.CONDITION_SATISFIED;\r\n   };\r\n   }\r\n   return {query, isFencePassed};\r\n }\r\n\r\n async
pollFence(fenceContext: FenceContext) {\r\n   return new Promise<void>(resolve => {\r\n   void
this.addItemToPoll(() => fenceContext.isFencePassed(), () => resolve());\r\n   });\r\n }\r\n\r\n private itemsToPoll:
PollItem[] = [];\r\n\r\n pollItems(): void {\r\n   // Find the last query that has finished.\r\n   const index =
linearSearchLastTrue(this.itemsToPoll.map(x => x.isDoneFn));\r\n   for (let i = 0; i <= index; ++i) {\r\n   const
{resolveFn} = this.itemsToPoll[i];\r\n   resolveFn();\r\n   }\r\n   this.itemsToPoll = this.itemsToPoll.slice(index +
1);\r\n }\r\n\r\n private async addItemToPoll(isDoneFn: () => boolean, resolveFn: () => void) {\r\n
this.itemsToPoll.push({isDoneFn, resolveFn});\r\n   if (this.itemsToPoll.length > 1) {\r\n   // We already have a
running loop that polls.\r\n   return;\r\n   }\r\n   // Start a new loop that polls.\r\n   await repeatedTry(() => {\r\n
 this.pollItems();\r\n   // End the loop if no more items to poll.\r\n   return this.itemsToPoll.length === 0;\r\n
});\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {SessionHandler} from './backend';\r\nimport {Graph} from './graph';\r\nimport {Logger,
Profiler} from './instrument';\r\nimport {Operator} from './operators';\r\nimport {Tensor} from './tensor';\r\n\r\nclass
KernelOp {\r\n constructor(public op: Operator, public node: Graph.Node) {}\r\n}\r\n\r\nexport class
ExecutionPlan {\r\n constructor(private graph: Graph, ops: Operator[], private profiler: Readonly<Profiler>) {\r\n
this.initialize(ops);\r\n }\r\n\r\n initialize(ops: Operator[]) {\r\n   this.profiler.event('session',
'ExecutionPlan.initialize', () => {\r\n   const graphNodes = this.graph.getNodes();\r\n   if (graphNodes.length !==
ops.length) {\r\n   throw new Error('The size of nodes and OPs do not match.');\r\n   }\r\n\r\n   this._ops =
ops.map((op, i) => new KernelOp(op, graphNodes[i]));\r\n   this.reset();\r\n\r\n   // look for starter node(s)\r\n
this._starter = [];\r\n   this._ops.forEach((op, i) => {\r\n   let resolved = true;\r\n   for (const input of
op.node.inputs) {\r\n   if (\r\n   !this._values[input]   // not an initialized input\r\n
    && this.graph.getInputIndices().indexOf(input) === -1 // not model input\r\n   ) {\r\n   resolved =
false;\r\n   break;\r\n   }\r\n   }\r\n   if (resolved) {\r\n   this._starter.push(i);\r\n   }\r\n
});\r\n   });\r\n }\r\n\r\n reset() {\r\n   this._values = this.graph.getValues().map(i => i.tensor);\r\n }\r\n\r\n async
execute(sessionHandler: SessionHandler, modelInputs: Tensor[]): Promise<Tensor[]> {\r\n   return
this.profiler.event('session', 'ExecutionPlan.execute', async () => {\r\n   // reset mediem result\r\n
this.reset();\r\n\r\n   // create inference handler\r\n   const inferenceHandler =
sessionHandler.createInferenceHandler();\r\n\r\n   // populate inputs value\r\n   const graphInputs =
this.graph.getInputIndices();\r\n   if (modelInputs.length !== graphInputs.length) {\r\n   throw new
Error(`number of input tensors don't match the number of inputs to the model: actual: ${\r\n
modelInputs.length} expected: ${graphInputs.length}`);\r\n   }\r\n\r\n   modelInputs.forEach((input, i) => {\r\n
   const index = graphInputs[i];\r\n   this._values[index] = input;\r\n   });\r\n\r\n   // prepare running
sequence\r\n   const sequence: number[] = this._starter.slice(0);\r\n\r\n   // execution iterations\r\n   const

graphValues = this.graph.getValues();\r\n   const graphNodes = this.graph.getNodes();\r\n\r\n   let rear = 0;\r\n   while (rear < sequence.length) {\r\n   const thisOpIndex = sequence[rear++];\r\n   const thisOp = this._ops[thisOpIndex];\r\n\r\n   // check input\r\n   const inputList = thisOp.node.inputs.map(i => this._values[i]);\r\n   if (inputList.indexOf(undefined) !== -1) {\r\n   throw new Error(`unresolved input detected: op: ${thisOp.node}`);\r\n   }\r\n\r\n   // run\r\n   const inputTensors = inputList as Tensor[];\r\n   Logger.verbose(\r\n   'ExecPlan',\r\n   `Runing op:${thisOp.node.name} (${\r\n                inputTensors.map((t, i) => `'${thisOp.node.inputs[i]}': ${t.type}[${t.dims.join(',')}]`).join(', ')})`);\r\n\r\n   const outputList = await this.profiler.event(\r\n   'node', thisOp.node.name, async () => thisOp.op.impl(inferenceHandler, inputTensors, thisOp.op.context));\r\n\r\n   // check output\r\n   if (outputList.length !== thisOp.node.outputs.length) {\r\n   throw new Error('the size of output does not match model definition.');\r\n   }\r\n\r\n   // fill value\r\n   outputList.forEach((output, i) => {\r\n   const j = thisOp.node.outputs[i];\r\n   if (this._values[j]) {\r\n   throw new Error(`output [${j}] already has value: op:${thisOp.node.name}`);\r\n   }\r\n   this._values[j] = output;\r\n   });\r\n\r\n   // resolve downstream nodes\r\n   const downstreamNodes = new Set<number>();\r\n   outputList.forEach((output, i) => {\r\n   const j = thisOp.node.outputs[i];\r\n   for (const currentDownstreamNodeIndex of graphValues[j].to) {\r\n   const currentDownstreamNode = graphNodes[currentDownstreamNodeIndex];\r\n   let resolved = true;\r\n   for (const k of currentDownstreamNode.inputs) {\r\n   if (!this._values[k]) {\r\n   resolved = false;\r\n   break;\r\n   }\r\n   }\r\n   if (resolved) {\r\n   downstreamNodes.add(currentDownstreamNodeIndex);\r\n   }\r\n   }\r\n   });\r\n   sequence.push(...downstreamNodes);\r\n   }\r\n\r\n   const output: Tensor[] = [];\r\n   for (let i = 0; i < this.graph.getOutputIndices().length; i++) {\r\n   const outputIndex = this.graph.getOutputIndices()[i];\r\n   const outputTensor = this._values[outputIndex];\r\n   if (outputTensor === undefined) {\r\n   throw new Error(`required output [${outputIndex}] does not have value`);\r\n   }\r\n   if (outputIndex === 0) {\r\n   await outputTensor.getData();\r\n   } else {\r\n   // eslint-disable-next-line no-unused-expressions\r\n   outputTensor.data;\r\n   }\r\n   output.push(outputTensor);\r\n   }\r\n   Logger.verbose('ExecPlan', 'disposing of inferenceHandler');\r\n   inferenceHandler.dispose();\r\n   return output;\r\n   });\r\n }\r\n\r\n _values: Array<Tensor|undefined>;\r\n _ops: KernelOp[];\r\n _starter: number[];\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {onnx} from 'onnx-proto';\r\n\r\nimport {Attribute} from './attribute';\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\nimport {Tensor} from './tensor';\r\nimport {LongUtil, ProtoUtil} from './util';\r\n\r\nexport declare namespace Graph {\r\n export interface Shape {\r\n   readonly dims: readonly number[];\r\n }\r\n export interface ValueType {\r\n   readonly tensorType: Tensor.DataType;\r\n   readonly shape: Shape;\r\n }\r\n export interface Value {\r\n   // the tensor data. empty for non-initialized inputs\r\n   readonly tensor?: Tensor;\r\n\r\n   // index to the Node where the value comes from. -1 for initializer.\r\n   readonly from: number;\r\n\r\n   // indices to the Nodes where the values go to.\r\n   readonly to: readonly number[];\r\n\r\n   // value type specification. empty for non-input values.\r\n   readonly type?: ValueType;\r\n }\r\n export interface Node {\r\n   // name of the node\r\n   readonly name: string;\r\n\r\n   // the operator type\r\n   readonly opType: string;\r\n\r\n   // indices to the Values where the inputs come from.\r\n   readonly inputs: readonly number[];\r\n\r\n   // indices to the Values where the outpus go to.\r\n   readonly outputs: readonly number[];\r\n\r\n   // the attributes that used by the operator\r\n   readonly attributes: Attribute;\r\n }\r\n\r\n /**\r\n   * a Transformer is an instance that allows all possible transformation operations that applied to a graph\r\n   */\r\n export interface Transformer {\r\n   removeAllIdentityNodes(): void;\r\n   removeAllDropoutNodes(): void;\r\n   fuseConvActivationNodes(): void;\r\n   // TODO: add generic functions to manipulate the graph\r\n }\r\n\r\n // an initializer can use transformer to transform the graph\r\n export interface Initializer {\r\n   transformGraph(transformer: Transformer): void;\r\n }\r\n}\r\n\r\n// eslint-disable-next-line @typescript-eslint/no-redeclare\r\nexport interface Graph {\r\n getInputIndices(): readonly number[];\r\n getInputNames(): readonly string[];\r\n getOutputIndices(): readonly number[];\r\n getOutputNames(): readonly string[];\r\n getValues(): readonly Graph.Value[];\r\n getNodes(): readonly Graph.Node[];\r\n}\r\n\r\n// eslint-disable-next-line @typescript-eslint/naming-convention, @typescript-eslint/no-redeclare\r\nexport const Graph = {\r\n /**\r\n   * construct a graph from a graph protobuf type\r\n   */\r\n from: (graphProto: onnx.IGraphProto|ortFbs.Graph, initializer?: Graph.Initializer) =>\r\n   new GraphImpl(graphProto, initializer),\r\n};\r\n\r\nclass Value implements Graph.Value {\r\n constructor(valueInfo?: onnx.IValueInfoProto) {\r\n   this._from = undefined;\r\n   this._to = [];\r\n   this.tensor = undefined;\r\n   this.type = undefined;\r\n\r\n   if (valueInfo) {\r\n   this.type = ProtoUtil.tensorValueTypeFromProto(valueInfo.type!.tensorType!);\r\n   }\r\n }\r\n\r\n _from?: number; // -1 represent from initializer\r\n get from() {\r\n   return this._from!;\r\n }\r\n _to: number[];\r\n get to() {\r\n   return this._to;\r\n }\r\n type?: Graph.ValueType;\r\n tensor?: Tensor;\r\n}\r\n\r\nclass Node implements Graph.Node {\r\n constructor(_nodeProto: onnx.INodeProto|ortFbs.Node, name?: string) {\r\n   if (_nodeProto instanceof onnx.NodeProto) {\r\n   this.name = _nodeProto.name;\r\n   this.opType = _nodeProto.opType;\r\n   this.attributes = new Attribute(_nodeProto.attribute);\r\n   } else if (_nodeProto instanceof ortFbs.Node) {\r\n   this.name = name ?? _nodeProto.name()!;\r\n   this.opType = _nodeProto.opType()!;\r\n   this.attributes = new Attribute(ProtoUtil.tensorAttributesFromORTFormat(_nodeProto));\r\n   }\r\n\r\n   this.inputs = [];\r\n   this.outputs = [];\r\n   this.executeNode = true;\r\n }\r\n\r\n name: string;\r\n opType: string;\r\n inputs: number[];\r\n outputs: number[];\r\n attributes: Attribute;\r\n executeNode: boolean;\r\n}\r\n\r\nclass GraphImpl implements Graph, Graph.Transformer {\r\n private _allData: Value[];\r\n\r\n private _allInputIndices: number[];\r\n private _allInputNames: string[];\r\n\r\n private _allOutputIndices: number[];\r\n private _allOutputNames: string[];\r\n\r\n private _nodes: Node[];\r\n\r\n constructor(graph: onnx.IGraphProto|ortFbs.Graph, graphInitializer?: Graph.Initializer) {\r\n   if (!graph) {\r\n   throw new TypeError('graph is empty');\r\n   }\r\n\r\n   // build the graph - will throw exceptions if something fatal is detected\r\n   this.buildGraph(graph);\r\n\r\n   // execute any transformation logic for the graph (if applicable)\r\n   this.transformGraph(graphInitializer);\r\n\r\n   // check for cycles and other inconsistencies - will throw exceptions if something fatal is detected\r\n   this.checkIsAcyclic();\r\n }\r\n\r\n getInputIndices(): readonly number[] {\r\n   return this._allInputIndices;\r\n }\r\n\r\n getInputNames(): readonly string[] {\r\n   return this._allInputNames;\r\n }\r\n\r\n getOutputIndices(): readonly number[] {\r\n   return this._allOutputIndices;\r\n }\r\n\r\n getOutputNames(): readonly string[] {\r\n   return this._allOutputNames;\r\n }\r\n\r\n getValues(): readonly Graph.Value[] {\r\n   return this._allData;\r\n }\r\n\r\n getNodes(): readonly Graph.Node[] {\r\n   return this._nodes;\r\n }\r\n\r\n private buildGraph(graph: onnx.IGraphProto|ortFbs.Graph) {\r\n   // build the graph - will throw exceptions if something fatal is detected\r\n   if (graph instanceof onnx.GraphProto) {\r\n   this.buildGraphFromOnnxFormat(graph);\r\n   } else if (graph instanceof ortFbs.Graph) {\r\n   this.buildGraphFromOrtFormat(graph);\r\n   } else {\r\n   throw new TypeError('Graph type is not supported.');\r\n   }\r\n }\r\n private buildGraphFromOnnxFormat(graph: onnx.IGraphProto) {\r\n   const dataIndices = new Map<string, number>();\r\n   this._allData = [];\r\n\r\n   this._allInputIndices = [];\r\n   this._allInputNames = [];\r\n\r\n   this._allOutputIndices = [];\r\n   this._allOutputNames = [];\r\n\r\n   this._nodes = [];\r\n\r\n   const nodesIndices = new Map<string, number>();\r\n\r\n   // scan all inputs\r\n   if (!graph.input) {\r\n   throw new Error('missing information in graph: input');\r\n   }\r\n   const inputValueNames = [];\r\n   for (const i of graph.input) {\r\n   if (dataIndices.has(i.name!)) {\r\n   throw new Error(`duplicated input name: ${i.name}`);\r\n   }\r\n   const currentIndex = this._allData.push(new Value(i)) - 1;\r\n   dataIndices.set(i.name!, currentIndex);\r\n   inputValueNames.push(i.name!);\r\n   }\r\n\r\n   // scan all initializers\r\n   if (!graph.initializer) {\r\n   throw new Error('missing information in graph: initializer');\r\n   }\r\n   for (const i of graph.initializer) {\r\n   let index = dataIndices.get(i.name!);\r\n   if (index === undefined) {\r\n   const value = new Value();\r\n   value.type = {\r\n   shape: {dims: ProtoUtil.tensorDimsFromProto(i.dims!)},\r\n   tensorType: ProtoUtil.tensorDataTypeFromProto(i.dataType!)\r\n   };\r\n   index = this._allData.push(value) - 1;\r\n   dataIndices.set(i.name!, index);\r\n   }\r\n   this._allData[index]._from = -1;\r\n   this._allData[index].tensor = Tensor.fromProto(i);\r\n   }\r\n\r\n   // filter out input indices\r\n   for (let i = 0; i < this._allData.length; i++) {\r\n   if (!this._allData[i].tensor) {\r\n   this._allInputIndices.push(i);\r\n

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this._allInputNames.push(inputValueNames[i]);\r\n      }\r\n    }\r\n\r\n    // scan all outputs\r\n    if (!graph.output)
{\r\n      throw new Error('missing information in graph: output');\r\n    }\r\n    for (const i of graph.output) {\r\n      if
(dataIndices.has(i.name!)) {\r\n        throw new Error(`duplicated output name: ${i.name}`);\r\n      }\r\n      const
currentIndex = this._allData.push(new Value(i)) - 1;\r\n      dataIndices.set(i.name!, currentIndex);\r\n
this._allOutputIndices.push(currentIndex);\r\n      this._allOutputNames.push(i.name!);\r\n    }\r\n\r\n    // scan all
nodes\r\n    if (!graph.node) {\r\n      throw new Error('missing information in graph: node');\r\n    }\r\n    for (const
nodeProto of graph.node) {\r\n      if (!nodeProto.name) {\r\n        // assign a name to the node if it doesn't have
one\r\n        for (let pick = 0;; pick++) {\r\n          const name = `unnamed_${nodeProto.opType}_${pick}`;\r\n
if (!nodesIndices.has(name)) {\r\n            nodeProto.name = name;\r\n            break;\r\n          }\r\n        }\r\n
}\r\n\r\n      if (nodesIndices.has(nodeProto.name)) {\r\n        throw new Error(`duplicated node name:
${nodeProto.name}`);\r\n      }\r\n      const currentIndex = this._nodes.push(new Node(nodeProto)) - 1;\r\n
nodesIndices.set(nodeProto.name, currentIndex);\r\n    }\r\n\r\n    // scan node's outputs\r\n    for (let i = 0; i <
this._nodes.length; i++) {\r\n      const node = this._nodes[i];\r\n      const nodeProto = graph.node[i];\r\n      if
(!nodeProto.output) {\r\n        throw new Error(`missing output for node: ${nodeProto.name}`);\r\n      }\r\n      for
(const output of nodeProto.output) {\r\n        let dataIndex = dataIndices.get(output);\r\n        if (typeof dataIndex
=== 'undefined') {\r\n          dataIndex = this._allData.push(new Value()) - 1;\r\n          dataIndices.set(output,
dataIndex);\r\n        }\r\n        node.outputs.push(dataIndex);\r\n\r\n        if (this._allData[dataIndex]._from !==
undefined) {\r\n          throw new Error(`multiple nodes output to one data value: ${dataIndex}`);\r\n        }\r\n
this._allData[dataIndex]._from = i;\r\n\r\n        // for the 'Constant' operator, just create a new edge in the graph
corresponding to the 'output' of the\r\n        // operator and ignore the node from the graph\r\n        if
(nodeProto.opType === 'Constant') {\r\n          if (!nodeProto.attribute || nodeProto.attribute.length !== 1 ||
!nodeProto.attribute[0].t) {\r\n            throw new Error('missing attributes or missing tensor value in attributes for
this Constant operator');\r\n          }\r\n          if (!nodeProto.output || nodeProto.output.length !== 1) {\r\n
throw new Error('missing output or incorrect number of outputs for this Constant operator');\r\n          }\r\n
node.outputs.pop();\r\n          node.executeNode = false;\r\n\r\n          this._allData[dataIndex]._from = -1;\r\n
this._allData[dataIndex].tensor = Tensor.fromProto(nodeProto.attribute[0].t);\r\n        }\r\n      }\r\n    }\r\n\r\n    //
scan node's inputs\r\n    for (let i = 0; i < this._nodes.length; i++) {\r\n      const node = this._nodes[i];\r\n      const
nodeProto = graph.node[i];\r\n\r\n      if (!nodeProto.input) {\r\n        throw new Error(`missing input for node:
${nodeProto.name}`);\r\n      }\r\n      for (const input of nodeProto.input) {\r\n        const dataIndex =
dataIndices.get(input);\r\n        if (typeof dataIndex === 'undefined') {\r\n          throw new Error(`unrecognized
input '${input}' for node: ${nodeProto.name}`);\r\n        }\r\n        node.inputs.push(dataIndex);\r\n\r\n
this._allData[dataIndex]._to.push(i);\r\n      }\r\n    }\r\n\r\n    return true;\r\n  }\r\n\r\n  private
buildGraphFromOrtFormat(graph: ortFbs.Graph) {\r\n    const dataIndices = new Map<string, number>();\r\n
this._allData = [];\r\n\r\n    this._allInputIndices = [];\r\n    this._allInputNames = [];\r\n\r\n    this._allOutputIndices
= [];\r\n    this._allOutputNames = [];\r\n\r\n    this._nodes = [];\r\n\r\n    const nodesIndices = new Map<string,
number>();\r\n\r\n    // scan all inputs\r\n    const inputValueNames = [];\r\n    for (let i = 0; i < graph.inputsLength();
i++) {\r\n      const inputName = graph.inputs(i);\r\n      if (dataIndices.has(inputName)) {\r\n        throw new
Error(`duplicated input name: ${inputName}`);\r\n      }\r\n      // Find the input typeInfo from nodeargs\r\n      for
(let j = 0; j < graph.nodeArgsLength(); j++) {\r\n        if (graph.nodeArgs(j)?.name() === inputName) {\r\n
const value = new Value();\r\n          const valueType = graph.nodeArgs(j)?.type()?.valueType();\r\n          if
(valueType !== ortFbs.TypeInfoValue.tensor_type) {\r\n            throw new Error('Unexpected value type for the
nodeArg.');\r\n          }\r\n          const valueInfo = graph.nodeArgs(j)!.type()!.value(new
ortFbs.TensorTypeAndShape())!;\r\n          const type =
ProtoUtil.tensorDataTypeFromProto(valueInfo.elemType());\r\n          const shape = valueInfo.shape()!;\r\n
const dims = [];\r\n          for (let k = 0; k < shape.dimLength()!; k++) {\r\n
dims.push(LongUtil.longToNumber(shape.dim(k)!.value()!.dimValue()!));\r\n          }\r\n          value.type = {shape:
{dims}, tensorType: type};\r\n          const currentIndex = this._allData.push(value) - 1;\r\n
dataIndices.set(inputName, currentIndex);\r\n          inputValueNames.push(inputName);\r\n        }\r\n      }\r\n
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}\r\n    // check initializers\r\n    for (let i = 0; i < graph.initializersLength(); i++) {\r\n      const initializer =
graph.initializers(i)!;\r\n      let index = dataIndices.get(initializer.name()!);\r\n      if (index === undefined) {\r\n
const value = new Value();\r\n        const dims = ProtoUtil.tensorDimsFromORTFormat(initializer);\r\n        const
type = ProtoUtil.tensorDataTypeFromProto(initializer.dataType());\r\n        value.type = {shape: {dims},
tensorType: type};\r\n        index = this._allData.push(value) - 1;\r\n        dataIndices.set(initializer.name()!,
index);\r\n      }\r\n      this._allData[index]._from = -1;\r\n      this._allData[index].tensor =
Tensor.fromOrtTensor(initializer);\r\n    }\r\n\r\n    // filter out input indices\r\n    for (let i = 0; i <
this._allData.length; i++) {\r\n      if (!this._allData[i].tensor) {\r\n        this._allInputIndices.push(i);\r\n
this._allInputNames.push(inputValueNames[i]);\r\n      }\r\n    }\r\n\r\n    // scan all outputs\r\n    for (let i = 0; i <
graph.outputsLength(); i++) {\r\n      const outputName = graph.outputs(i);\r\n      if (dataIndices.has(outputName))
{\r\n        throw new Error(`duplicated output name: ${outputName}`);\r\n      }\r\n      const currentIndex =
this._allData.push(new Value()) - 1;\r\n      dataIndices.set(outputName, currentIndex);\r\n
this._allOutputIndices.push(currentIndex);\r\n      this._allOutputNames.push(outputName);\r\n    }\r\n\r\n    // scan
all nodes\r\n    if (!graph.nodes) {\r\n      throw new Error('missing information in graph: node');\r\n    }\r\n    for (let
i = 0; i < graph.nodesLength(); i++) {\r\n      const nodeProto = graph.nodes(i);\r\n      let name =
nodeProto!.name();\r\n      if (!name) {\r\n        // assign a name to the node if it doesn't have one\r\n        for (let pick
= 0;; pick++) {\r\n          name = `unnamed_${nodeProto!.opType()}_${pick}`;\r\n          if
(!nodesIndices.has(name)) {\r\n            // an unique name is found. break.\r\n            break;\r\n          }\r\n        }\r\n
 }\r\n\r\n      if (nodesIndices.has(name)) {\r\n        throw new Error(`duplicated node name: ${name}`);\r\n      }\r\n
  const currentIndex = this._nodes.push(new Node(nodeProto!, name)) - 1;\r\n      nodesIndices.set(name,
currentIndex);\r\n    }\r\n\r\n    // scan node's outputs\r\n    for (let i = 0; i < this._nodes.length; i++) {\r\n      const
node = this._nodes[i];\r\n      const nodeProto = graph.nodes(i);\r\n      if (nodeProto == null) {\r\n        throw new
Error(`No node exists at index ${i}`);\r\n      }\r\n      if (nodeProto?.outputsLength() === 0) {\r\n        throw new
Error(`missing output for node: ${nodeProto.name}`);\r\n      }\r\n      for (let j = 0; j < nodeProto?.outputsLength();
j++) {\r\n        const output = nodeProto?.outputs(j);\r\n        let dataIndex = dataIndices.get(output);\r\n        if
(typeof dataIndex === 'undefined') {\r\n          dataIndex = this._allData.push(new Value()) - 1;\r\n
dataIndices.set(output, dataIndex);\r\n        }\r\n        node.outputs.push(dataIndex);\r\n\r\n        if
(this._allData[dataIndex]._from !== undefined) {\r\n          throw new Error(`multiple nodes output to one data
value: ${dataIndex}`);\r\n        }\r\n        this._allData[dataIndex]._from = i;\r\n\r\n        // for the 'Constant' operator,
just create a new edge in the graph corresponding to the 'output' of the\r\n        // operator and ignore the node from
the graph\r\n        if (nodeProto.opType() === 'Constant') {\r\n          if (nodeProto.attributesLength() !== 1 ||
!nodeProto.attributes(0)!.t()) {\r\n            throw new Error('missing attributes or missing tensor value in attributes for
this Constant operator');\r\n          }\r\n          if (nodeProto.outputsLength() !== 1) {\r\n            throw new
Error('missing output or incorrect number of outputs for this Constant operator');\r\n          }\r\n
node.outputs.pop();\r\n          node.executeNode = false;\r\n\r\n          this._allData[dataIndex]._from = -1;\r\n
this._allData[dataIndex].tensor = Tensor.fromOrtTensor(nodeProto.attributes(0)!.t()!);\r\n        }\r\n      }\r\n
}\r\n\r\n    // scan node's inputs\r\n    for (let i = 0; i < this._nodes.length; i++) {\r\n      const node =
this._nodes[i];\r\n      const nodeProto = graph.nodes(i)!;\r\n\r\n      if (nodeProto.inputsLength() === 0) {\r\n
throw new Error(`missing input for node: ${nodeProto.name}`);\r\n      }\r\n      for (let j = 0; j <
nodeProto.inputsLength()!; j++) {\r\n        const input = nodeProto.inputs(j)!;\r\n        const dataIndex =
dataIndices.get(input);\r\n        if (typeof dataIndex === 'undefined') {\r\n          throw new Error(`unrecognized
input '${input}' for node: ${nodeProto!.name()}`);\r\n        }\r\n        node.inputs.push(dataIndex);\r\n\r\n
this._allData[dataIndex]._to.push(i);\r\n      }\r\n    }\r\n  }\r\n\r\n  private checkIsAcyclic() {\r\n    // go through the
graph and check for cycles or other fatal inconsistencies\r\n    const starters: Set<number> = new
Set<number>();\r\n    this._allInputIndices.forEach(i => {\r\n      const data = this._allData[i];\r\n
data._to.forEach(j => {\r\n        starters.add(j);\r\n      });\r\n    });\r\n\r\n    // Iterative DFS to check for cycles\r\n
const nodesStack = Array.from(starters);\r\n    const nodesState = new
Array<string>(this._nodes.length).fill('white');\r\n\r\n    while (nodesStack.length > 0) {\r\n      const nodeIndex =
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nodesStack.pop()!;\r\n   // this node has now been processed completely. Mark this node 'black' to denote this.\r\n   if (nodesState[nodeIndex] === 'gray') {\r\n   nodesState[nodeIndex] = 'black';\r\n   } else {\r\n   // this node is under processing stage. mark this node 'gray' to denote this.\r\n   nodesStack.push(nodeIndex);\r\n   nodesState[nodeIndex] = 'gray';\r\n\r\n   this._nodes[nodeIndex].outputs.forEach((outgoingEdgeIndex) => {\r\n   const data = this._allData[outgoingEdgeIndex];\r\n   if (typeof data.tensor !== 'undefined') {\r\n   throw new Error('node outputs should not be initialized');\r\n   }\r\n   if (data._from !== nodeIndex) {\r\n   throw new Error('from property of the Value object doesn\\'t match index of Node being processed');\r\n   }\r\n   data._to.forEach((downstreamNodeIndex) => {\r\n   // back edge found - cyclic\r\n   if (nodesState[downstreamNodeIndex] === 'gray') {\r\n   throw new Error('model graph is cyclic');\r\n   }\r\n   // tree edge found - continue processing by adding it to stack\r\n   else if (nodesState[downstreamNodeIndex] === 'white') {\r\n   nodesStack.push(downstreamNodeIndex);\r\n   }\r\n   });\r\n   });\r\n   }\r\n   }\r\n }\r\n\r\n private transformGraph(graphInitializer?: Graph.Initializer): void {\r\n   // apply common transform\r\n   this.removeAllIdentityNodes();\r\n   this.removeAllDropoutNodes();\r\n   this.fuseConvActivationNodes();\r\n   // apply initializer specific transform\r\n   if (graphInitializer) {\r\n   graphInitializer.transformGraph(this);\r\n   }\r\n\r\n   // finalize graph\r\n   this.finalizeGraph();\r\n }\r\n\r\n /**\r\n   * finalize the graph.\r\n   *\r\n   * this function should be called after all the transformation completed.\r\n   * this function removes all unnecessary nodes and values from the graph\r\n   */\r\n finalizeGraph() {\r\n   let offset = 0;\r\n   // delete all nodes that are not being executed\r\n   for (let i = 0; i < this._nodes.length; i++) {\r\n   if (!this._nodes[i].executeNode) {\r\n   // delete this node and shift all subsequent nodes up\r\n   offset++;\r\n   // delete all output values\r\n   this._nodes[i].outputs.forEach(ind => {\r\n   this._allData[ind]._from = -2;\r\n   });\r\n   this._nodes.splice(i, 1);\r\n   i--;\r\n   continue;\r\n   }\r\n   if (offset > 0) {\r\n   // update the value table\r\n   this._nodes[i].inputs.forEach(value => {\r\n   const ind = this._allData[value]._to.indexOf(i + offset);\r\n   if (ind !== -1) {\r\n   this._allData[value]._to[ind] = i;\r\n   }\r\n   });\r\n   this._nodes[i].outputs.forEach(value => {\r\n   if (this._allData[value]._from && this._allData[value]._from! === i + offset) {\r\n   this._allData[value]._from! = i;\r\n   }\r\n   });\r\n   }\r\n   }\r\n   offset = 0;\r\n   // delete all values that are not being referenced\r\n   for (let i = 0; i < this._allData.length; i++) {\r\n   // if current value is neither linked to next node, nor an output value, remove it.\r\n   if (this._allData[i].from === -2 && this._allOutputIndices.indexOf(i + offset) === -1) {\r\n   offset++;\r\n   this._allData.splice(i, 1);\r\n   i--;\r\n   continue;\r\n   }\r\n   if (offset > 0) {\r\n   let ind = -1;\r\n   // if current value is neither an input value nor an initializer, find the node it's\r\n   // coming from and update the corresponding node output\r\n   if (this._allData[i].from !== undefined && this._allData[i].from !== -1) {\r\n   ind = this._nodes[this._allData[i].from].outputs.indexOf(i + offset);\r\n   if (ind !== -1) {\r\n   this._nodes[this._allData[i].from].outputs[ind] = i;\r\n   }\r\n   } else {\r\n   // if current value is an input value, update its reference in inputIndices\r\n   ind = this._allInputIndices.indexOf(i + offset);\r\n   if (ind !== -1) {\r\n   this._allInputIndices[ind] = i;\r\n   }\r\n   }\r\n\r\n   // find the node that the current value is linking to and update its input reference\r\n   this._allData[i].to.forEach(node => {\r\n   ind = this._nodes[node].inputs.indexOf(i + offset);\r\n   if (ind !== -1) {\r\n   this._nodes[node].inputs[ind] = i;\r\n   }\r\n   });\r\n   if (this._allData[i].to.length === 0) {\r\n   // if current value is a graph output, update its reference in outputIndices\r\n   ind = this._allOutputIndices.indexOf(i + offset);\r\n   if (ind !== -1) {\r\n   this._allOutputIndices[ind] = i;\r\n   }\r\n   }\r\n   }\r\n   }\r\n }\r\n\r\n /**\r\n   * Delete the specifed node. Assume the node has only one input and the first output connected to other nodes\r\n   * @param nodeIndex The index of node to be deleted\r\n   */\r\n private deleteNode(nodeIndex: number) {\r\n   const node = this._nodes[nodeIndex];\r\n   if (node.inputs.length > 1) {\r\n   throw new Error('Node deletion with multiple inputs is not supported. ');\r\n   }\r\n   if (node.outputs.length > 1) {\r\n   for (let i = 1; i < node.outputs.length; i++) {\r\n   if (this._allData[node.outputs[i]].to.length > 0) {\r\n   throw new Error('Node deletion with more than one output connected to other nodes is not supported. ');\r\n   }\r\n   }\r\n   }\r\n\r\n   // this node wil not be executed\r\n   node.executeNode = false;\r\n   const inputValueIndex = node.inputs[0];\r\n   const outputValueIndex = node.outputs[0];\r\n   const nodesConsumingOutput = this._allData[outputValueIndex].to;\r\n\r\n   // remove this node from the to property of the input Value\r\n   const delIndex = this._allData[inputValueIndex].to.indexOf(nodeIndex);\r\n   // should not happen\r\n   if (delIndex === -1) {\r\n   throw new Error('The Value object doesn\\'t have the current Node in it\\'s \\'to\\' property ');\r\n   }\r\n   this._allData[inputValueIndex].to.splice(delIndex, 1);\r\n\r\n   // clear node indices consuming this output Value\r\n   this._allData[outputValueIndex]._to = [];\r\n\r\n   // if the output of this node is a graph output, adjust the index appropriately\r\n   const index = this._allOutputIndices.indexOf(outputValueIndex);\r\n   if (index !== -1) {\r\n   this._allOutputIndices[index] = inputValueIndex;\r\n   }\r\n\r\n   // override the inputs for nodes consuming this node's output with the input to this node\r\n   if (nodesConsumingOutput && nodesConsumingOutput.length > 0) {\r\n   for (const nodeIndex of nodesConsumingOutput) {\r\n   const replaceIndex = this._nodes[nodeIndex].inputs.indexOf(outputValueIndex);\r\n   // should not happen\r\n   if (replaceIndex === -1) {\r\n   throw new Error('The Node object doesn\\'t have the output Value in it\\'s \\'inputs\\' property ');\r\n   }\r\n   this._nodes[nodeIndex].inputs[replaceIndex] = inputValueIndex;\r\n   this._allData[inputValueIndex].to.push(nodeIndex);\r\n   }\r\n   }\r\n }\r\n\r\n removeAllDropoutNodes() {\r\n   let nodeIndex = 0;\r\n   for (const node of this._nodes) {\r\n   // weed out 'Dropout' nodes so that no time is wasted in execution\r\n   if (node.opType === 'Dropout') {\r\n   // the node should have exactly 1 input and 1 or 2 outputs\r\n   if (node.inputs.length !== 1) {\r\n   throw new Error('Dropout nodes should only contain one input. ');\r\n   }\r\n   if (node.outputs.length !== 1 && node.outputs.length !== 2) {\r\n   throw new Error('Dropout nodes should contain either 1 or 2 output(s)');\r\n   }\r\n   // the second output should not be referenced by any other node\r\n   if (node.outputs.length === 2 && this._allData[node.outputs[1]]._to.length !== 0) {\r\n   throw new Error('Dropout nodes\\'s second output should not be referenced by other nodes');\r\n   }\r\n   this.deleteNode(nodeIndex);\r\n   }\r\n   nodeIndex++;\r\n   }\r\n }\r\n\r\n removeAllIdentityNodes() {\r\n   let nodeIndex = 0;\r\n   for (const node of this._nodes) {\r\n   // weed out 'Identity' nodes so that no time is wasted in execution\r\n   if (node.opType === 'Identity') {\r\n   this.deleteNode(nodeIndex);\r\n   }\r\n   nodeIndex++;\r\n   }\r\n }\r\n\r\n isActivation(n: Node): boolean {\r\n   switch (n.opType) {\r\n   // TODO: add other activation methods\r\n   case 'Relu':\r\n   case 'Sigmoid':\r\n   case 'Clip':\r\n   return true;\r\n   default:\r\n   return false;\r\n   }\r\n }\r\n\r\n fuseConvActivationNodes() {\r\n   for (const node of this._nodes) {\r\n   if (node.opType === 'Conv') {\r\n   const next = this._allData[node.outputs[0]]._to;\r\n   if (next.length === 1 && this.isActivation(this._nodes[next[0]])) {\r\n   const child = this._nodes[next[0]];\r\n   node.attributes.set('__internal_activation', 'string', (child.opType));\r\n   // TODO: need add support for Clip after opset 11, which has min/max as inputs\r\n   if (child.opType === 'Clip') {\r\n   node.attributes.set('__clip_min', 'float', child.attributes.getFloat('min'));\r\n   node.attributes.set('__clip_max', 'float', child.attributes.getFloat('max'));\r\n   }\r\n   this.deleteNode(next[0]);\r\n   }\r\n   }\r\n   }\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Env} from 'onnxruntime-common';\r\n\r\nimport {WebGLContext} from './backends/webgl/webgl-context';\r\n\r\nexport declare namespace Logger {\r\n export interface SeverityTypeMap {\r\n   verbose: 'v';\r\n   info: 'i';\r\n   warning: 'w';\r\n   error: 'e';\r\n   fatal: 'f';\r\n }\r\n\r\n export type Severity = keyof SeverityTypeMap;\r\n\r\n export type Provider = 'none'|'console';\r\n\r\n /**\r\n   * Logging config that used to control the behavior of logger\r\n   */\r\n export interface Config {\r\n   /**\r\n   * Specify the logging provider. 'console' by default\r\n   */\r\n   provider?: Provider;\r\n   /**\r\n   * Specify the minimal logger serverity. 'warning' by default\r\n   */\r\n   minimalSeverity?: Logger.Severity;\r\n   /**\r\n   * Whether to output date time in log. true by default\r\n   */\r\n   logDateTime?: boolean;\r\n   /**\r\n   * Whether to output source information (Not yet supported). false by default\r\n   */\r\n   logSourceLocation?: boolean;\r\n }\r\n\r\n export interface CategorizedLogger {\r\n   verbose(content: string): void;\r\n   info(content: string): void;\r\n   warning(content: string): void;\r\n   error(content: string): void;\r\n   fatal(content: string): void;\r\n }\r\n}\r\n\r\n// eslint-disable-next-line @typescript-eslint/no-redeclare\r\nexport interface Logger {\r\n (category: string): Logger.CategorizedLogger;\r\n\r\n verbose(content: string): void;\r\n verbose(category: string, content: string): void;\r\n info(content: string): void;\r\n info(category: string, content: string): void;\r\n warning(content: string):

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void;\r\n  warning(category: string, content: string): void;\r\n  error(content: string): void;\r\n  error(category: string,
content: string): void;\r\n  fatal(content: string): void;\r\n  fatal(category: string, content: string): void;\r\n\r\n  /**\r\n
 * Reset the logger configuration.\r\n   * @param config specify an optional default config\r\n   */\r\n  reset(config?:
Logger.Config): void;\r\n  /**\r\n   * Set the logger's behavior on the given category\r\n   * @param category specify
a category string. If '*' is specified, all previous configuration will be overwritten. If\r\n   * '' is specified, the default
behavior will be updated.\r\n   * @param config the config object to indicate the logger's behavior\r\n   */\r\n
set(category: string, config: Logger.Config): void;\r\n\r\n  /**\r\n   * Set the logger's behavior from ort-common
env\r\n   * @param env the env used to set logger. Currently only setting loglevel is supported through Env.\r\n
*/\r\n  setWithEnv(env: Env): void;\r\n}\r\n\r\ninterface LoggerProvider {\r\n  log(severity: Logger.Severity,
content: string, category?: string): void;\r\n}\r\nclass NoOpLoggerProvider implements LoggerProvider {\r\n
log(_severity: Logger.Severity, _content: string, _category?: string) {\r\n    // do nothing\r\n  }\r\n}\r\nclass
ConsoleLoggerProvider implements LoggerProvider {\r\n  log(severity: Logger.Severity, content: string, category?:
string) {\r\n    // eslint-disable-next-line no-console\r\n    console.log(`${this.color(severity)} ${category ?
'\\x1b[35m' + category + '\\x1b[0m ' : ''}${content}`);\r\n  }\r\n\r\n  private color(severity: Logger.Severity) {\r\n
switch (severity) {\r\n      case 'verbose':\r\n        return '\\x1b[34;40mv\\x1b[0m';\r\n      case 'info':\r\n        return
'\\x1b[32mi\\x1b[0m';\r\n      case 'warning':\r\n        return '\\x1b[30;43mw\\x1b[0m';\r\n      case 'error':\r\n
return '\\x1b[31;40me\\x1b[0m';\r\n      case 'fatal':\r\n        return '\\x1b[101mf\\x1b[0m';\r\n      default:\r\n
throw new Error(`unsupported severity: ${severity}`);\r\n    }\r\n  }\r\n}\r\n\r\nconst SEVERITY_VALUE = {\r\n
verbose: 1000,\r\n  info: 2000,\r\n  warning: 4000,\r\n  error: 5000,\r\n  fatal: 6000\r\n};\r\n\r\nconst
LOGGER_PROVIDER_MAP: {readonly [provider: string]: Readonly<LoggerProvider>} = {\r\n  ['none']: new
NoOpLoggerProvider(),\r\n  ['console']: new ConsoleLoggerProvider()\r\n};\r\nconst
LOGGER_DEFAULT_CONFIG = {\r\n  provider: 'console',\r\n  minimalSeverity: 'warning',\r\n  logDateTime:
true,\r\n  logSourceLocation: false\r\n};\r\nlet LOGGER_CONFIG_MAP:\r\n    {[category: string]:
Readonly<Required<Logger.Config>>} = {['']: LOGGER_DEFAULT_CONFIG as
Required<Logger.Config>};\r\n\r\nfunction log(category: string): Logger.CategorizedLogger;\r\nfunction
log(severity: Logger.Severity, content: string): void;\r\nfunction log(severity: Logger.Severity, category: string,
content: string): void;\r\nfunction log(severity: Logger.Severity, arg1: string, arg2?: string): void;\r\nfunction
log(\r\n    arg0: string|Logger.Severity, arg1?: string, arg2?: string|number, arg3?: number):
Logger.CategorizedLogger|void {\r\n  if (arg1 === undefined) {\r\n    // log(category: string):
Logger.CategorizedLogger;\r\n    return createCategorizedLogger(arg0);\r\n  } else if (arg2 === undefined) {\r\n    //
log(severity, content);\r\n    logInternal(arg0 as Logger.Severity, arg1, 1);\r\n  } else if (typeof arg2 === 'number'
&& arg3 === undefined) {\r\n    // log(severity, content, stack)\r\n    logInternal(arg0 as Logger.Severity, arg1,
arg2);\r\n  } else if (typeof arg2 === 'string' && arg3 === undefined) {\r\n    // log(severity, category, content)\r\n
logInternal(arg0 as Logger.Severity, arg2, 1, arg1);\r\n  } else if (typeof arg2 === 'string' && typeof arg3 ===
'number') {\r\n    // log(severity, category, content, stack)\r\n    logInternal(arg0 as Logger.Severity, arg2, arg3,
arg1);\r\n  } else {\r\n    throw new TypeError('input is valid');\r\n  }\r\n}\r\n\r\nfunction
createCategorizedLogger(category: string): Logger.CategorizedLogger {\r\n  return {\r\n    verbose:
log.verbose.bind(null, category),\r\n    info: log.info.bind(null, category),\r\n    warning: log.warning.bind(null,
category),\r\n    error: log.error.bind(null, category),\r\n    fatal: log.fatal.bind(null, category)\r\n  };\r\n}\r\n\r\n//
NOTE: argument 'category' is put the last parameter beacause typescript\r\n// doesn't allow optional argument put in
front of required argument. This\r\n// order is different from a usual logging API.\r\nfunction logInternal(severity:
Logger.Severity, content: string, stack: number, category?: string) {\r\n  const config =
LOGGER_CONFIG_MAP[category || ''] || LOGGER_CONFIG_MAP[''];\r\n  if (SEVERITY_VALUE[severity] <
SEVERITY_VALUE[config.minimalSeverity]) {\r\n    return;\r\n  }\r\n\r\n  if (config.logDateTime) {\r\n    content
= `${new Date().toISOString()}|${content}`;\r\n  }\r\n\r\n  if (config.logSourceLocation) {\r\n    // TODO: calculate
source location from 'stack'\r\n  }\r\n\r\n  LOGGER_PROVIDER_MAP[config.provider].log(severity, content,
category);\r\n}\r\n\r\n// eslint-disable-next-line @typescript-eslint/no-namespace\r\nnamespace log {\r\n  export
function verbose(content: string): void;\r\n  export function verbose(category: string, content: string): void;\r\n
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export function verbose(arg0: string, arg1?: string) {\r\n    log('verbose', arg0, arg1);\r\n  }\r\n  export function
info(content: string): void;\r\n  export function info(category: string, content: string): void;\r\n  export function
info(arg0: string, arg1?: string) {\r\n    log('info', arg0, arg1);\r\n  }\r\n  export function warning(content: string):
void;\r\n  export function warning(category: string, content: string): void;\r\n  export function warning(arg0: string,
arg1?: string) {\r\n    log('warning', arg0, arg1);\r\n  }\r\n  export function error(content: string): void;\r\n  export
function error(category: string, content: string): void;\r\n  export function error(arg0: string, arg1?: string) {\r\n
log('error', arg0, arg1);\r\n  }\r\n  export function fatal(content: string): void;\r\n  export function fatal(category:
string, content: string): void;\r\n  export function fatal(arg0: string, arg1?: string) {\r\n    log('fatal', arg0, arg1);\r\n
}\r\n\r\n  export function reset(config?: Logger.Config): void {\r\n    LOGGER_CONFIG_MAP = {};\r\n    set('',
config || {});\r\n  }\r\n  export function set(category: string, config: Logger.Config): void {\r\n    if (category === '*')
{\r\n      reset(config);\r\n    } else {\r\n      const previousConfig = LOGGER_CONFIG_MAP[category] ||
LOGGER_DEFAULT_CONFIG;\r\n      LOGGER_CONFIG_MAP[category] = {\r\n        provider: config.provider
|| previousConfig.provider,\r\n        minimalSeverity: config.minimalSeverity || previousConfig.minimalSeverity,\r\n
     logDateTime: (config.logDateTime === undefined) ? previousConfig.logDateTime : config.logDateTime,\r\n
logSourceLocation: (config.logSourceLocation === undefined) ? previousConfig.logSourceLocation :\r\n
                                            config.logSourceLocation\r\n      };\r\n    }\r\n\r\n    // TODO: we want to support
wildcard or regex?\r\n  }\r\n\r\n  export function setWithEnv(env: Env): void {\r\n    const config: Logger.Config =
{};\r\n    if (env.logLevel) {\r\n      config.minimalSeverity = env.logLevel as Logger.Severity;\r\n    }\r\n    set('',
config);\r\n  }\r\n}\r\n\r\n// eslint-disable-next-line @typescript-eslint/no-redeclare, @typescript-eslint/naming-
convention\r\nexport const Logger: Logger = log;\r\n\r\nexport declare namespace Profiler {\r\n  export interface
Config {\r\n    maxNumberEvents?: number;\r\n    flushBatchSize?: number;\r\n    flushIntervalInMilliseconds?:
number;\r\n  }\r\n\r\n  export type EventCategory = 'session'|'node'|'op'|'backend';\r\n\r\n  export interface Event {\r\n
  end(): void|Promise<void>;\r\n  }\r\n}\r\n// TODO\r\n// class WebGLEvent implements Profiler.Event
{}\r\n\r\nclass Event implements Profiler.Event {\r\n  constructor(\r\n      public category: Profiler.EventCategory,
public name: string, public startTime: number,\r\n      private endCallback: (e: Event) => void|Promise<void>,
public timer?: WebGLQuery, public ctx?: WebGLContext) {}\r\n\r\n  end() {\r\n    return this.endCallback(this);\r\n
}\r\n\r\n  async checkTimer(): Promise<number> {\r\n    if (this.ctx === undefined || this.timer === undefined) {\r\n
   throw new Error('No webgl timer found');\r\n    } else {\r\n      this.ctx.endTimer();\r\n      return
this.ctx.waitForQueryAndGetTime(this.timer);\r\n    }\r\n  }\r\n}\r\n\r\nclass EventRecord {\r\n  constructor(\r\n
public category: Profiler.EventCategory, public name: string, public startTime: number, public endTime: number)
{}\r\n}\r\n\r\nexport class Profiler {\r\n  static create(config?: Profiler.Config): Profiler {\r\n    if (config ===
undefined) {\r\n      return new this();\r\n    }\r\n    return new this(config.maxNumberEvents, config.flushBatchSize,
config.flushIntervalInMilliseconds);\r\n  }\r\n\r\n  private constructor(maxNumberEvents?: number,
flushBatchSize?: number, flushIntervalInMilliseconds?: number) {\r\n    this._started = false;\r\n
this._maxNumberEvents = maxNumberEvents === undefined ? 10000 : maxNumberEvents;\r\n
this._flushBatchSize = flushBatchSize === undefined ? 10 : flushBatchSize;\r\n    this._flushIntervalInMilliseconds
= flushIntervalInMilliseconds === undefined ? 5000 : flushIntervalInMilliseconds;\r\n  }\r\n\r\n  // start profiling\r\n
start() {\r\n    this._started = true;\r\n    this._timingEvents = [];\r\n    this._flushTime = now();\r\n
this._flushPointer = 0;\r\n  }\r\n\r\n  // stop profiling\r\n  stop() {\r\n    this._started = false;\r\n    for (;
this._flushPointer < this._timingEvents.length; this._flushPointer++) {\r\n
this.logOneEvent(this._timingEvents[this._flushPointer]);\r\n    }\r\n  }\r\n\r\n  // create an event scope for the
specific function\r\n  event<T>(category: Profiler.EventCategory, name: string, func: () => T, ctx?:
WebGLContext): T;\r\n  event<T>(category: Profiler.EventCategory, name: string, func: () => Promise<T>, ctx?:
WebGLContext): Promise<T>;\r\n\r\n  event<T>(category: Profiler.EventCategory, name: string, func: () => T |
Promise<T>, ctx?: WebGLContext): T\r\n      |Promise<T> {\r\n    const event = this._started ? this.begin(category,
name, ctx) : undefined;\r\n    let isPromise = false;\r\n\r\n    const res = func();\r\n\r\n    // we consider a then-able
object is a promise\r\n    if (res && typeof (res as Promise<T>).then === 'function') {\r\n      isPromise = true;\r\n
return new Promise<T>((resolve, reject) => {\r\n        (res as Promise<T>)\r\n          .then(\r\n              async value
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=> {  // fulfilled\r\n                  if (event) {\r\n                    await event.end();\r\n                  }\r\n
resolve(value);\r\n                },\r\n                async reason => {  // rejected\r\n                  if (event) {\r\n
await event.end();\r\n                  }\r\n                  reject(reason);\r\n                });\r\n      });\r\n    }\r\n    if (!isPromise
&& event) {\r\n      const eventRes = event.end();\r\n      if (eventRes && typeof eventRes.then === 'function') {\r\n
     return new Promise<T>((resolve, reject) => {\r\n          (eventRes).then(\r\n              () => {  // fulfilled\r\n
  resolve(res);\r\n              },\r\n              (reason) => {  // rejected\r\n                reject(reason);\r\n              });\r\n
});\r\n      }\r\n    }\r\n    return res;\r\n  }\r\n\r\n  // begin an event\r\n  begin(category: Profiler.EventCategory, name:
string, ctx?: WebGLContext): Event {\r\n    if (!this._started) {\r\n      throw new Error('profiler is not started
yet');\r\n    }\r\n    if (ctx === undefined) {\r\n      const startTime = now();\r\n      this.flush(startTime);\r\n      return
new Event(category, name, startTime, e => this.endSync(e));\r\n    } else {\r\n      const timer: WebGLQuery =
ctx.beginTimer();\r\n      return new Event(category, name, 0, async e => this.end(e), timer, ctx);\r\n    }\r\n  }\r\n\r\n
// end the specific event\r\n  private async end(event: Event): Promise<void> {\r\n    const endTime: number = await
event.checkTimer();\r\n    if (this._timingEvents.length < this._maxNumberEvents) {\r\n
this._timingEvents.push(new EventRecord(event.category, event.name, event.startTime, endTime));\r\n
this.flush(endTime);\r\n    }\r\n  }\r\n\r\n  private endSync(event: Event): void {\r\n    const endTime: number =
now();\r\n    if (this._timingEvents.length < this._maxNumberEvents) {\r\n      this._timingEvents.push(new
EventRecord(event.category, event.name, event.startTime, endTime));\r\n      this.flush(endTime);\r\n    }\r\n
}\r\n\r\n  private logOneEvent(event: EventRecord) {\r\n    Logger.verbose(\r\n        `Profiler.${event.category}`,\r\n
      `${(event.endTime - event.startTime).toFixed(2)}ms on event '${event.name}' at
${event.endTime.toFixed(2)}`);\r\n  }\r\n\r\n  private flush(currentTime: number) {\r\n    if
(this._timingEvents.length - this._flushPointer >= this._flushBatchSize ||\r\n        currentTime - this._flushTime >=
this._flushIntervalInMilliseconds) {\r\n      // should flush when either batch size accumlated or interval
elepsed\r\n\r\n      for (const previousPointer = this._flushPointer; this._flushPointer < previousPointer +
this._flushBatchSize &&\r\n           this._flushPointer < this._timingEvents.length;\r\n           this._flushPointer++)
{\r\n        this.logOneEvent(this._timingEvents[this._flushPointer]);\r\n      }\r\n\r\n      this._flushTime = now();\r\n
}\r\n  }\r\n\r\n  get started() {\r\n    return this._started;\r\n  }\r\n  private _started = false;\r\n  private _timingEvents:
EventRecord[];\r\n\r\n  private readonly _maxNumberEvents: number;\r\n\r\n  private readonly _flushBatchSize:
number;\r\n  private readonly _flushIntervalInMilliseconds: number;\r\n\r\n  private _flushTime: number;\r\n
private _flushPointer = 0;\r\n}\r\n\r\n/**\r\n * returns a number to represent the current timestamp in a resolution as
high as possible.\r\n */\r\nexport const now = (typeof performance !== 'undefined' && performance.now) ? () =>
performance.now() : Date.now;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed
under the MIT License.\r\n\r\nimport {flatbuffers} from 'flatbuffers';\r\nimport {onnx} from 'onnx-
proto';\r\n\r\nimport {Graph} from './graph';\r\nimport {OpSet} from './opset';\r\nimport {onnxruntime} from './ort-
schema/ort-generated';\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\nimport {LongUtil} from
'./util';\r\n\r\nexport class Model {\r\n  // empty model\r\n  constructor() {}\r\n\r\n  load(buf: Uint8Array,
graphInitializer?: Graph.Initializer, isOrtFormat?: boolean): void {\r\n    if (!isOrtFormat) {\r\n      // isOrtFormat
=== false || isOrtFormat === undefined\r\n      try {\r\n        this.loadFromOnnxFormat(buf, graphInitializer);\r\n
return;\r\n      } catch (e) {\r\n        if (isOrtFormat !== undefined) {\r\n          throw e;\r\n        }\r\n      }\r\n
}\r\n\r\n    this.loadFromOrtFormat(buf, graphInitializer);\r\n  }\r\n\r\n  private loadFromOnnxFormat(buf:
Uint8Array, graphInitializer?: Graph.Initializer): void {\r\n    const modelProto = onnx.ModelProto.decode(buf);\r\n
 const irVersion = LongUtil.longToNumber(modelProto.irVersion);\r\n    if (irVersion < 3) {\r\n      throw new
Error('only support ONNX model with IR_VERSION>=3');\r\n    }\r\n\r\n    this._opsets =\r\n
modelProto.opsetImport.map(i => ({domain: i.domain as string, version:
LongUtil.longToNumber(i.version!)}));\r\n\r\n    this._graph = Graph.from(modelProto.graph!, graphInitializer);\r\n
}\r\n\r\n  private loadFromOrtFormat(buf: Uint8Array, graphInitializer?: Graph.Initializer): void {\r\n    const fb =
new flatbuffers.ByteBuffer(buf);\r\n    const ortModel =
ortFbs.InferenceSession.getRootAsInferenceSession(fb).model()!;\r\n    const irVersion =
LongUtil.longToNumber(ortModel.irVersion());\r\n    if (irVersion < 3) {\r\n      throw new Error('only support
```

ONNX model with IR_VERSION>=3');\r\n   }\r\n   this._opsets = [];\r\n   for (let i = 0; i <
ortModel.opsetImportLength(); i++) {\r\n   const opsetId = ortModel.opsetImport(i)!;\r\n
this._opsets.push({domain: opsetId?.domain() as string, version: LongUtil.longToNumber(opsetId.version()!)});\r\n
 }\r\n\r\n   this._graph = Graph.from(ortModel.graph()!, graphInitializer);\r\n }\r\n\r\n private _graph: Graph;\r\n
get graph(): Graph {\r\n   return this._graph;\r\n }\r\n\r\n private _opsets: OpSet[];\r\n get opsets(): readonly
OpSet[] {\r\n   return this._opsets;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n//
Licensed under the MIT License.\r\n\r\nimport {InferenceHandler} from './backend';\r\nimport {Graph} from
'./graph';\r\nimport {Tensor} from './tensor';\r\n\r\nexport type OperatorImplementation<T> = (inferenceHandler:
InferenceHandler, inputs: Tensor[], context: T) => Tensor[];\r\nexport type OperatorInitialization<T> = (node:
Graph.Node, graph: Graph) => T;\r\n\r\nexport interface Operator {\r\n readonly impl:
OperatorImplementation<unknown>;\r\n readonly context: Graph.Node|unknown;\r\n}\r\n\r\nexport const
NUMBER_TYPES: readonly Tensor.DataType[] =\r\n   ['float32', 'float64', 'int32', 'int16', 'int8', 'uint16', 'uint32',
'uint8'];\r\nexport const INT_TYPES: readonly Tensor.DataType[] = ['int32', 'int16', 'int8', 'uint16', 'uint32',
'uint8'];\r\nexport const FLOAT_TYPES: readonly Tensor.DataType[] = ['float32', 'float64'];\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from
'./graph';\r\nimport {OperatorImplementation, OperatorInitialization} from './operators';\r\n\r\nexport interface
OpSet {\r\n domain: string;\r\n version: number;\r\n}\r\n\r\nexport declare namespace OpSet {\r\n /**\r\n   *
Domain of an opset, it can be an empty string(default value, represent for ai.onnx), or 'ai.onnx.ml'\r\n   */\r\n type
Domain = ''|'ai.onnx.ml';\r\n\r\n /**\r\n   * A resolve rule consists of 4 or 5 items: opType, opSetDomain,
versionSelector, operatorImplementation and\r\n   * operatorInitialization (optional)\r\n   */\r\n type ResolveRule =
[\r\n   string, Domain, string, OperatorImplementation<Graph.Node>\r\n]|[string, Domain, string,
OperatorImplementation<unknown>, OperatorInitialization<unknown>];\r\n}\r\n\r\nexport function
resolveOperator(node: Graph.Node, opsets: readonly OpSet[], rules: readonly OpSet.ResolveRule[]) {\r\n for (const
rule of rules) {\r\n   const opType = rule[0];\r\n   const domain = rule[1];\r\n   const versionSelector = rule[2];\r\n
const opImpl = rule[3];\r\n   const opInit = rule[4];\r\n\r\n   if (node.opType === opType) { // operator type
matches\r\n   for (const opset of opsets) {\r\n   // opset '' and 'ai.onnx' are considered the same.\r\n   if
(opset.domain === domain || (opset.domain === 'ai.onnx' && domain === '')) { // opset domain found\r\n   if
(matchSelector(opset.version, versionSelector)) {\r\n   return {opImpl, opInit};\r\n   }\r\n   }\r\n
}\r\n   }\r\n }\r\n\r\n throw new TypeError(`cannot resolve operator '${node.opType}' with opsets: ${\r\n
opsets.map(set => `${set.domain || 'ai.onnx'} v${set.version}`).join(', ')}`);\r\n}\r\n\r\nfunction
matchSelector(version: number, selector: string): boolean {\r\n if (selector.endsWith('+')) {\r\n   // minimum
version match ('7+' expects version>=7)\r\n   const rangeStart = Number.parseInt(selector.substring(0,
selector.length - 1), 10);\r\n   return !isNaN(rangeStart) && rangeStart <= version;\r\n } else if (selector.split('-
').length === 2) {\r\n   // range match ('6-8' expects 6<=version<=8)\r\n   const pair = selector.split('-');\r\n   const
rangeStart = Number.parseInt(pair[0], 10);\r\n   const rangeEnd = Number.parseInt(pair[1], 10);\r\n   return
!isNaN(rangeStart) && !isNaN(rangeEnd) && rangeStart <= version && version <= rangeEnd;\r\n } else {\r\n   //
exact match ('7' expects version===7)\r\n   return Number.parseInt(selector, 10) === version;\r\n }\r\n}\r\n","//
automatically generated by the FlatBuffers compiler, do not modify\r\n\r\n/* eslint-disable */\r\n\r\nimport {flatbuffers}
from 'flatbuffers';\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n
export enum AttributeType {\r\n   UNDEFINED = 0,\r\n   FLOAT = 1,\r\n   INT = 2,\r\n   STRING = 3,\r\n
TENSOR = 4,\r\n   GRAPH = 5,\r\n   FLOATS = 6,\r\n   INTS = 7,\r\n   STRINGS = 8,\r\n   TENSORS = 9,\r\n
GRAPHS = 10,\r\n   SPARSE_TENSOR = 11,\r\n   SPARSE_TENSORS = 12\r\n }\r\n}\r\n\r\n/**\r\n * @enum
{number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export enum DimensionValueType
{UNKNOWN = 0, VALUE = 1, PARAM = 2}\r\n}\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n export enum TensorDataType {\r\n   UNDEFINED = 0,\r\n   FLOAT = 1,\r\n
UINT8 = 2,\r\n   INT8 = 3,\r\n   UINT16 = 4,\r\n   INT16 = 5,\r\n   INT32 = 6,\r\n   INT64 = 7,\r\n   STRING =
8,\r\n   BOOL = 9,\r\n   FLOAT16 = 10,\r\n   DOUBLE = 11,\r\n   UINT32 = 12,\r\n   UINT64 = 13,\r\n
COMPLEX64 = 14,\r\n   COMPLEX128 = 15,\r\n   BFLOAT16 = 16\r\n }\r\n}\r\n\r\n/**\r\n * @enum

{number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export enum NodeType {Primitive = 0, Fused = 1}\r\n}\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export enum TypeInfoValue {NONE = 0, tensor_type = 1, sequence_type = 2, map_type = 3}\r\n}\r\n\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class Shape {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns Shape\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): Shape {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Shape= obj\r\n * @returns Shape\r\n */\r\n static getRootAsShape(bb: flatbuffers.ByteBuffer, obj?: Shape): Shape {\r\n return (obj || new Shape()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Shape= obj\r\n * @returns Shape\r\n */\r\n static getSizePrefixedRootAsShape(bb: flatbuffers.ByteBuffer, obj?: Shape): Shape {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new Shape()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param onnxruntime.experimental.fbs.Dimension= obj\r\n * @returns onnxruntime.experimental.fbs.Dimension\r\n */\r\n dim(index: number, obj?: onnxruntime.experimental.fbs.Dimension): onnxruntime.experimental.fbs.Dimension|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Dimension())\r\n .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n dimLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startShape(builder: flatbuffers.Builder) {\r\n builder.startObject(1);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset dimOffset\r\n */\r\n static addDim(builder: flatbuffers.Builder, dimOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, dimOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createDimVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startDimVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endShape(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createShape(builder: flatbuffers.Builder, dimOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n Shape.startShape(builder);\r\n Shape.addDim(builder, dimOffset);\r\n return Shape.endShape(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class Dimension {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns Dimension\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): Dimension {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Dimension= obj\r\n * @returns Dimension\r\n */\r\n static getRootAsDimension(bb: flatbuffers.ByteBuffer, obj?: Dimension): Dimension {\r\n return (obj || new Dimension()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Dimension= obj\r\n * @returns Dimension\r\n */\r\n static getSizePrefixedRootAsDimension(bb: flatbuffers.ByteBuffer, obj?: Dimension): Dimension {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new Dimension()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.DimensionValue= obj\r\n * @returns onnxruntime.experimental.fbs.DimensionValue|null\r\n */\r\n value(obj?:

onnxruntime.experimental.fbs.DimensionValue): onnxruntime.experimental.fbs.DimensionValue|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.DimensionValue())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n denotation(): string|null;\r\n denotation(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n denotation(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startDimension(builder: flatbuffers.Builder) {\r\n builder.startObject(2);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset valueOffset\r\n */\r\n static addValue(builder: flatbuffers.Builder, valueOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, valueOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset denotationOffset\r\n */\r\n static addDenotation(builder: flatbuffers.Builder, denotationOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, denotationOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endDimension(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createDimension(\r\n builder: flatbuffers.Builder, valueOffset: flatbuffers.Offset,\r\n denotationOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n Dimension.startDimension(builder);\r\n Dimension.addValue(builder, valueOffset);\r\n Dimension.addDenotation(builder, denotationOffset);\r\n return Dimension.endDimension(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class DimensionValue {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns DimensionValue\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): DimensionValue {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param DimensionValue= obj\r\n * @returns DimensionValue\r\n */\r\n static getRootAsDimensionValue(bb: flatbuffers.ByteBuffer, obj?: DimensionValue): DimensionValue {\r\n return (obj || new DimensionValue()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param DimensionValue= obj\r\n * @returns DimensionValue\r\n */\r\n static getSizePrefixedRootAsDimensionValue(bb: flatbuffers.ByteBuffer, obj?: DimensionValue): DimensionValue {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new DimensionValue()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @returns onnxruntime.experimental.fbs.DimensionValueType\r\n */\r\n dimType(): onnxruntime.experimental.fbs.DimensionValueType {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? /** */ (this.bb!.readInt8(this.bb_pos + offset)) :\r\n onnxruntime.experimental.fbs.DimensionValueType.UNKNOWN;\r\n }\r\n\r\n /**\r\n * @returns flatbuffers.Long\r\n */\r\n dimValue(): flatbuffers.Long {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n dimParam(): string|null;\r\n dimParam(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n dimParam(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startDimensionValue(builder: flatbuffers.Builder) {\r\n builder.startObject(3);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param onnxruntime.experimental.fbs.DimensionValueType dimType\r\n */\r\n static addDimType(builder: flatbuffers.Builder, dimType: onnxruntime.experimental.fbs.DimensionValueType) {\r\n builder.addFieldInt8(0, dimType, onnxruntime.experimental.fbs.DimensionValueType.UNKNOWN);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Long dimValue\r\n */\r\n static addDimValue(builder:

```
flatbuffers.Builder, dimValue: flatbuffers.Long) {\r\n      builder.addFieldInt64(1, dimValue, builder.createLong(0,
0));\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset
dimParamOffset\r\n     */\r\n    static addDimParam(builder: flatbuffers.Builder, dimParamOffset: flatbuffers.Offset)
{\r\n      builder.addFieldOffset(2, dimParamOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static endDimensionValue(builder: flatbuffers.Builder):
flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static
createDimensionValue(\r\n        builder: flatbuffers.Builder, dimType:
onnxruntime.experimental.fbs.DimensionValueType,\r\n        dimValue: flatbuffers.Long, dimParamOffset:
flatbuffers.Offset): flatbuffers.Offset {\r\n      DimensionValue.startDimensionValue(builder);\r\n
DimensionValue.addDimType(builder, dimType);\r\n      DimensionValue.addDimValue(builder, dimValue);\r\n
DimensionValue.addDimParam(builder, dimParamOffset);\r\n      return
DimensionValue.endDimensionValue(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport
namespace onnxruntime.experimental.fbs {\r\n  export class TensorTypeAndShape {\r\n    bb:
flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @returns TensorTypeAndShape\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): TensorTypeAndShape {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param TensorTypeAndShape= obj\r\n     *
@returns TensorTypeAndShape\r\n     */\r\n    static getRootAsTensorTypeAndShape(bb: flatbuffers.ByteBuffer,
obj?: TensorTypeAndShape): TensorTypeAndShape {\r\n      return (obj || new
TensorTypeAndShape()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.ByteBuffer bb\r\n     * @param TensorTypeAndShape= obj\r\n     * @returns
TensorTypeAndShape\r\n     */\r\n    static getSizePrefixedRootAsTensorTypeAndShape(bb: flatbuffers.ByteBuffer,
obj?: TensorTypeAndShape):\r\n        TensorTypeAndShape {\r\n      bb.setPosition(bb.position() +
flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
TensorTypeAndShape()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     *
@returns onnxruntime.experimental.fbs.TensorDataType\r\n     */\r\n    elemType():
onnxruntime.experimental.fbs.TensorDataType {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return
offset ? /**  */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n
onnxruntime.experimental.fbs.TensorDataType.UNDEFINED;\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.Shape= obj\r\n     * @returns onnxruntime.experimental.fbs.Shape|null\r\n     */\r\n
shape(obj?: onnxruntime.experimental.fbs.Shape): onnxruntime.experimental.fbs.Shape|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Shape())\r\n
          .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     */\r\n    static startTensorTypeAndShape(builder: flatbuffers.Builder) {\r\n
    builder.startObject(2);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
onnxruntime.experimental.fbs.TensorDataType elemType\r\n     */\r\n    static addElemType(builder:
flatbuffers.Builder, elemType: onnxruntime.experimental.fbs.TensorDataType) {\r\n      builder.addFieldInt32(0,
elemType, onnxruntime.experimental.fbs.TensorDataType.UNDEFINED);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset shapeOffset\r\n     */\r\n    static addShape(builder:
flatbuffers.Builder, shapeOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1, shapeOffset, 0);\r\n    }\r\n\r\n
 /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
endTensorTypeAndShape(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset =
builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createTensorTypeAndShape(\r\n        builder:
flatbuffers.Builder, elemType: onnxruntime.experimental.fbs.TensorDataType,\r\n        shapeOffset:
flatbuffers.Offset): flatbuffers.Offset {\r\n      TensorTypeAndShape.startTensorTypeAndShape(builder);\r\n
TensorTypeAndShape.addElemType(builder, elemType);\r\n      TensorTypeAndShape.addShape(builder,
shapeOffset);\r\n      return TensorTypeAndShape.endTensorTypeAndShape(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n *
@constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class MapType {\r\n    bb:
```

```
flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @returns MapType\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer):
MapType {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param MapType= obj\r\n     * @returns MapType\r\n     */\r\n    static
getRootAsMapType(bb: flatbuffers.ByteBuffer, obj?: MapType): MapType {\r\n      return (obj || new
MapType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param MapType= obj\r\n     * @returns MapType\r\n     */\r\n    static
getSizePrefixedRootAsMapType(bb: flatbuffers.ByteBuffer, obj?: MapType): MapType {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
MapType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @returns
onnxruntime.experimental.fbs.TensorDataType\r\n     */\r\n    keyType():
onnxruntime.experimental.fbs.TensorDataType {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return
offset ? /**  */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n
onnxruntime.experimental.fbs.TensorDataType.UNDEFINED;\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.TypeInfo= obj\r\n     * @returns onnxruntime.experimental.fbs.TypeInfo|null\r\n
*/\r\n    valueType(obj?: onnxruntime.experimental.fbs.TypeInfo): onnxruntime.experimental.fbs.TypeInfo|null {\r\n
    let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.TypeInfo())\r\n                          .__init(this.bb!.__indirect(this.bb_pos + offset),
this.bb!) :\r\n                      null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static
startMapType(builder: flatbuffers.Builder) {\r\n      builder.startObject(2);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param onnxruntime.experimental.fbs.TensorDataType keyType\r\n     */\r\n
static addKeyType(builder: flatbuffers.Builder, keyType: onnxruntime.experimental.fbs.TensorDataType) {\r\n
builder.addFieldInt32(0, keyType, onnxruntime.experimental.fbs.TensorDataType.UNDEFINED);\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset valueTypeOffset\r\n     */\r\n
static addValueType(builder: flatbuffers.Builder, valueTypeOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, valueTypeOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
* @returns flatbuffers.Offset\r\n     */\r\n    static endMapType(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n
  let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createMapType(\r\n        builder:
flatbuffers.Builder, keyType: onnxruntime.experimental.fbs.TensorDataType,\r\n        valueTypeOffset:
flatbuffers.Offset): flatbuffers.Offset {\r\n      MapType.startMapType(builder);\r\n
MapType.addKeyType(builder, keyType);\r\n      MapType.addValueType(builder, valueTypeOffset);\r\n      return
MapType.endMapType(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n  export class SequenceType {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n
  bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @returns
SequenceType\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): SequenceType {\r\n      this.bb_pos =
i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     *
@param SequenceType= obj\r\n     * @returns SequenceType\r\n     */\r\n    static getRootAsSequenceType(bb:
flatbuffers.ByteBuffer, obj?: SequenceType): SequenceType {\r\n      return (obj || new
SequenceType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param SequenceType= obj\r\n     * @returns SequenceType\r\n     */\r\n    static
getSizePrefixedRootAsSequenceType(bb: flatbuffers.ByteBuffer, obj?: SequenceType): SequenceType {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
SequenceType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.TypeInfo= obj\r\n     * @returns onnxruntime.experimental.fbs.TypeInfo|null\r\n
*/\r\n    elemType(obj?: onnxruntime.experimental.fbs.TypeInfo): onnxruntime.experimental.fbs.TypeInfo|null {\r\n
   let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.TypeInfo())\r\n                          .__init(this.bb!.__indirect(this.bb_pos + offset),
this.bb!) :\r\n                      null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static
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startSequenceType(builder: flatbuffers.Builder) {\r\n builder.startObject(1);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset elemTypeOffset\r\n */\r\n static addElemType(builder: flatbuffers.Builder, elemTypeOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, elemTypeOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endSequenceType(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createSequenceType(builder: flatbuffers.Builder, elemTypeOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n SequenceType.startSequenceType(builder);\r\n SequenceType.addElemType(builder, elemTypeOffset);\r\n return SequenceType.endSequenceType(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class EdgeEnd {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns EdgeEnd\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): EdgeEnd {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n nodeIndex(): number {\r\n return this.bb!.readUint32(this.bb_pos);\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n srcArgIndex(): number {\r\n return this.bb!.readInt32(this.bb_pos + 4);\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n dstArgIndex(): number {\r\n return this.bb!.readInt32(this.bb_pos + 8);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number node_index\r\n * @param number src_arg_index\r\n * @param number dst_arg_index\r\n * @returns flatbuffers.Offset\r\n */\r\n static createEdgeEnd(\r\n builder: flatbuffers.Builder, node_index: number, src_arg_index: number,\r\n dst_arg_index: number): flatbuffers.Offset {\r\n builder.prep(4, 12);\r\n builder.writeInt32(dst_arg_index);\r\n builder.writeInt32(src_arg_index);\r\n builder.writeInt32(node_index);\r\n return builder.offset();\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class NodeEdge {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns NodeEdge\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): NodeEdge {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param NodeEdge= obj\r\n * @returns NodeEdge\r\n */\r\n static getRootAsNodeEdge(bb: flatbuffers.ByteBuffer, obj?: NodeEdge): NodeEdge {\r\n return (obj || new NodeEdge()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param NodeEdge= obj\r\n * @returns NodeEdge\r\n */\r\n static getSizePrefixedRootAsNodeEdge(bb: flatbuffers.ByteBuffer, obj?: NodeEdge): NodeEdge {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new NodeEdge()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n nodeIndex(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.readUint32(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param onnxruntime.experimental.fbs.EdgeEnd= obj\r\n * @returns onnxruntime.experimental.fbs.EdgeEnd\r\n */\r\n inputEdges(index: number, obj?: onnxruntime.experimental.fbs.EdgeEnd): onnxruntime.experimental.fbs.EdgeEnd|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.EdgeEnd())\r\n .__init(this.bb!.__vector(this.bb_pos + offset) + index * 12, this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n inputEdgesLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param onnxruntime.experimental.fbs.EdgeEnd= obj\r\n * @returns onnxruntime.experimental.fbs.EdgeEnd\r\n */\r\n outputEdges(index: number, obj?: onnxruntime.experimental.fbs.EdgeEnd): onnxruntime.experimental.fbs.EdgeEnd|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.EdgeEnd())\r\n .__init(this.bb!.__vector(this.bb_pos + offset) + index * 12, this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n outputEdgesLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n

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/**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startNodeEdge(builder: flatbuffers.Builder) {\r\n
   builder.startObject(3);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param number
nodeIndex\r\n     */\r\n    static addNodeIndex(builder: flatbuffers.Builder, nodeIndex: number) {\r\n
builder.addFieldInt32(0, nodeIndex, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     *
@param flatbuffers.Offset inputEdgesOffset\r\n     */\r\n    static addInputEdges(builder: flatbuffers.Builder,
inputEdgesOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1, inputEdgesOffset, 0);\r\n    }\r\n\r\n    /**\r\n
   * @param flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startInputEdgesVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(12, numElems,
4);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset
outputEdgesOffset\r\n     */\r\n    static addOutputEdges(builder: flatbuffers.Builder, outputEdgesOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(2, outputEdgesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startOutputEdgesVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(12, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static endNodeEdge(builder:
flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n
static createNodeEdge(\r\n        builder: flatbuffers.Builder, nodeIndex: number, inputEdgesOffset:
flatbuffers.Offset,\r\n        outputEdgesOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
NodeEdge.startNodeEdge(builder);\r\n      NodeEdge.addNodeIndex(builder, nodeIndex);\r\n
NodeEdge.addInputEdges(builder, inputEdgesOffset);\r\n      NodeEdge.addOutputEdges(builder,
outputEdgesOffset);\r\n      return NodeEdge.endNodeEdge(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n
*/\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class Node {\r\n    bb: flatbuffers.ByteBuffer|null
= null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     *
@returns Node\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): Node {\r\n      this.bb_pos = i;\r\n
this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param
Node= obj\r\n     * @returns Node\r\n     */\r\n    static getRootAsNode(bb: flatbuffers.ByteBuffer, obj?: Node):
Node {\r\n      return (obj || new Node()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param Node= obj\r\n     * @returns Node\r\n     */\r\n
static getSizePrefixedRootAsNode(bb: flatbuffers.ByteBuffer, obj?: Node): Node {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
Node()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    name():
string|null;\r\n    name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
name(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    docString():
string|null;\r\n    docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
docString(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
  return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    domain():
string|null;\r\n    domain(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
domain(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 8);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @returns
number\r\n     */\r\n    sinceVersion(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 10);\r\n      return
offset ? this.bb!.readInt32(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n
index(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ?
this.bb!.readUint32(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Encoding=
optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    opType(): string|null;\r\n
opType(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n    opType(optionalEncoding?: any):
```

string|Uint8Array|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 14);\r\n   return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n   }\r\n\r\n   /**\r\n   * @returns onnxruntime.experimental.fbs.NodeType\r\n   */\r\n   type(): onnxruntime.experimental.fbs.NodeType {\r\n   let offset = this.bb!.__offset(this.bb_pos, 16);\r\n   return offset ? /** */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n   onnxruntime.experimental.fbs.NodeType.Primitive;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Encoding= optionalEncoding\r\n   * @returns string|Uint8Array|null\r\n   */\r\n   executionProviderType(): string|null;\r\n   executionProviderType(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n   executionProviderType(optionalEncoding?: any): string|Uint8Array|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 18);\r\n   return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n   }\r\n\r\n   /**\r\n   * @param number index\r\n   * @param flatbuffers.Encoding= optionalEncoding\r\n   * @returns string|Uint8Array\r\n   */\r\n   inputs(index: number): string;\r\n   inputs(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n   inputs(index: number, optionalEncoding?: any): string|Uint8Array|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 20);\r\n   return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n   }\r\n\r\n   /**\r\n   * @returns number\r\n   */\r\n   inputsLength(): number {\r\n   let offset = this.bb!.__offset(this.bb_pos, 20);\r\n   return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n   }\r\n\r\n   /**\r\n   * @param number index\r\n   * @param flatbuffers.Encoding= optionalEncoding\r\n   * @returns string|Uint8Array\r\n   */\r\n   outputs(index: number): string;\r\n   outputs(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n   outputs(index: number, optionalEncoding?: any): string|Uint8Array|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 22);\r\n   return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n   }\r\n\r\n   /**\r\n   * @returns number\r\n   */\r\n   outputsLength(): number {\r\n   let offset = this.bb!.__offset(this.bb_pos, 22);\r\n   return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n   }\r\n\r\n   /**\r\n   * @param number index\r\n   * @param onnxruntime.experimental.fbs.Attribute= obj\r\n   * @returns onnxruntime.experimental.fbs.Attribute\r\n   */\r\n   attributes(index: number, obj?: onnxruntime.experimental.fbs.Attribute): onnxruntime.experimental.fbs.Attribute\r\n |null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 24);\r\n   return offset ? (obj || new onnxruntime.experimental.fbs.Attribute())\r\n   .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n null;\r\n   }\r\n\r\n   /**\r\n   * @returns number\r\n   */\r\n   attributesLength(): number {\r\n   let offset = this.bb!.__offset(this.bb_pos, 24);\r\n   return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n   }\r\n\r\n   /**\r\n   * @param number index\r\n   * @returns number\r\n   */\r\n   inputArgCounts(index: number): number|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 26);\r\n   return offset ? this.bb!.readInt32(this.bb!.__vector(this.bb_pos + offset) + index * 4) : 0;\r\n   }\r\n\r\n   /**\r\n   * @returns number\r\n   */\r\n   inputArgCountsLength(): number {\r\n   let offset = this.bb!.__offset(this.bb_pos, 26);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n   }\r\n\r\n   /**\r\n   * @returns Int32Array\r\n */\r\n   inputArgCountsArray(): Int32Array|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 26);\r\n   return offset ?\r\n   new Int32Array(\r\n   this.bb!.bytes().buffer, this.bb!.bytes().byteOffset + this.bb!.__vector(this.bb_pos + offset),\r\n   this.bb!.__vector_len(this.bb_pos + offset)) :\r\n   null;\r\n }\r\n\r\n   /**\r\n   * @param number index\r\n   * @param flatbuffers.Encoding= optionalEncoding\r\n   * @returns string|Uint8Array\r\n   */\r\n   implicitInputs(index: number): string;\r\n   implicitInputs(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n   implicitInputs(index: number, optionalEncoding?: any): string|Uint8Array|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 28);\r\n   return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n   }\r\n\r\n   /**\r\n   * @returns number\r\n   */\r\n   implicitInputsLength(): number {\r\n   let offset = this.bb!.__offset(this.bb_pos, 28);\r\n   return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   */\r\n   static startNode(builder: flatbuffers.Builder) {\r\n builder.startObject(13);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset nameOffset\r\n   */\r\n   static addName(builder: flatbuffers.Builder, nameOffset:

flatbuffers.Offset) {\r\n builder.addFieldOffset(0, nameOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset docStringOffset\r\n */\r\n static addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, docStringOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset domainOffset\r\n */\r\n static addDomain(builder: flatbuffers.Builder, domainOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, domainOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number sinceVersion\r\n */\r\n static addSinceVersion(builder: flatbuffers.Builder, sinceVersion: number) {\r\n builder.addFieldInt32(3, sinceVersion, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number index\r\n */\r\n static addIndex(builder: flatbuffers.Builder, index: number) {\r\n builder.addFieldInt32(4, index, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset opTypeOffset\r\n */\r\n static addOpType(builder: flatbuffers.Builder, opTypeOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(5, opTypeOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param onnxruntime.experimental.fbs.NodeType type\r\n */\r\n static addType(builder: flatbuffers.Builder, type: onnxruntime.experimental.fbs.NodeType) {\r\n builder.addFieldInt32(6, type, onnxruntime.experimental.fbs.NodeType.Primitive);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset executionProviderTypeOffset\r\n */\r\n static addExecutionProviderType(builder: flatbuffers.Builder, executionProviderTypeOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(7, executionProviderTypeOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset inputsOffset\r\n */\r\n static addInputs(builder: flatbuffers.Builder, inputsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(8, inputsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createInputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startInputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset outputsOffset\r\n */\r\n static addOutputs(builder: flatbuffers.Builder, outputsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(9, outputsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createOutputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startOutputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset attributesOffset\r\n */\r\n static addAttributes(builder: flatbuffers.Builder, attributesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(10, attributesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createAttributesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startAttributesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset inputArgCountsOffset\r\n */\r\n static addInputArgCounts(builder: flatbuffers.Builder, inputArgCountsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(11, inputArgCountsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<number> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createInputArgCountsVector(builder: flatbuffers.Builder, data: number[]|Uint8Array): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addInt32(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startInputArgCountsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset implicitInputsOffset\r\n */\r\n static addImplicitInputs(builder: flatbuffers.Builder, implicitInputsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(12, implicitInputsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createImplicitInputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startImplicitInputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endNode(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createNode(\r\n builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset, docStringOffset: flatbuffers.Offset,\r\n domainOffset: flatbuffers.Offset, sinceVersion: number, index: number, opTypeOffset: flatbuffers.Offset,\r\n type: onnxruntime.experimental.fbs.NodeType, executionProviderTypeOffset: flatbuffers.Offset,\r\n inputsOffset: flatbuffers.Offset, outputsOffset: flatbuffers.Offset, attributesOffset: flatbuffers.Offset,\r\n inputArgCountsOffset: flatbuffers.Offset, implicitInputsOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n Node.startNode(builder);\r\n Node.addName(builder, nameOffset);\r\n Node.addDocString(builder, docStringOffset);\r\n Node.addDomain(builder, domainOffset);\r\n Node.addSinceVersion(builder, sinceVersion);\r\n Node.addIndex(builder, index);\r\n Node.addOpType(builder, opTypeOffset);\r\n Node.addType(builder, type);\r\n Node.addExecutionProviderType(builder, executionProviderTypeOffset);\r\n Node.addInputs(builder, inputsOffset);\r\n Node.addOutputs(builder, outputsOffset);\r\n Node.addAttributes(builder, attributesOffset);\r\n Node.addInputArgCounts(builder, inputArgCountsOffset);\r\n Node.addImplicitInputs(builder, implicitInputsOffset);\r\n return Node.endNode(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class ValueInfo {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns ValueInfo\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): ValueInfo {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param ValueInfo= obj\r\n * @returns ValueInfo\r\n */\r\n static getRootAsValueInfo(bb: flatbuffers.ByteBuffer, obj?: ValueInfo): ValueInfo {\r\n return (obj || new ValueInfo()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param ValueInfo= obj\r\n * @returns ValueInfo\r\n */\r\n static getSizePrefixedRootAsValueInfo(bb: flatbuffers.ByteBuffer, obj?: ValueInfo): ValueInfo {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new ValueInfo()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n name(): string|null;\r\n name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n name(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n docString(): string|null;\r\n docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n docString(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param

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onnxruntime.experimental.fbs.TypeInfo= obj\r\n     * @returns onnxruntime.experimental.fbs.TypeInfo|null\r\n
*/\r\n    type(obj?: onnxruntime.experimental.fbs.TypeInfo): onnxruntime.experimental.fbs.TypeInfo|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.TypeInfo())\r\n                      .__init(this.bb!.__indirect(this.bb_pos + offset),
this.bb!) :\r\n                      null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static
startValueInfo(builder: flatbuffers.Builder) {\r\n      builder.startObject(3);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset nameOffset\r\n     */\r\n    static addName(builder:
flatbuffers.Builder, nameOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, nameOffset, 0);\r\n    }\r\n\r\n
 /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset docStringOffset\r\n     */\r\n
static addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, docStringOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
* @param flatbuffers.Offset typeOffset\r\n     */\r\n    static addType(builder: flatbuffers.Builder, typeOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(2, typeOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static endValueInfo(builder:
flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n
static createValueInfo(\r\n        builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset, docStringOffset:
flatbuffers.Offset,\r\n        typeOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
ValueInfo.startValueInfo(builder);\r\n      ValueInfo.addName(builder, nameOffset);\r\n
ValueInfo.addDocString(builder, docStringOffset);\r\n      ValueInfo.addType(builder, typeOffset);\r\n      return
ValueInfo.endValueInfo(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n  export class TypeInfo {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n
bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @returns
TypeInfo\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): TypeInfo {\r\n      this.bb_pos = i;\r\n
this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param
TypeInfo= obj\r\n     * @returns TypeInfo\r\n     */\r\n    static getRootAsTypeInfo(bb: flatbuffers.ByteBuffer, obj?:
TypeInfo): TypeInfo {\r\n      return (obj || new TypeInfo()).__init(bb.readInt32(bb.position()) + bb.position(),
bb);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param TypeInfo= obj\r\n     * @returns
TypeInfo\r\n     */\r\n    static getSizePrefixedRootAsTypeInfo(bb: flatbuffers.ByteBuffer, obj?: TypeInfo):
TypeInfo {\r\n      bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
TypeInfo()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    denotation():
string|null;\r\n    denotation(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
denotation(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
   return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     *
@returns onnxruntime.experimental.fbs.TypeInfoValue\r\n     */\r\n    valueType():
onnxruntime.experimental.fbs.TypeInfoValue {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return
offset ? /**  */ (this.bb!.readUint8(this.bb_pos + offset)) :\r\n
onnxruntime.experimental.fbs.TypeInfoValue.NONE;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Table obj\r\n
  * @returns ?flatbuffers.Table\r\n     */\r\n    value<T extends flatbuffers.Table>(obj: T): T|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.__union(obj, this.bb_pos + offset) : null;\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startTypeInfo(builder:
flatbuffers.Builder) {\r\n      builder.startObject(3);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param flatbuffers.Offset denotationOffset\r\n     */\r\n    static addDenotation(builder:
flatbuffers.Builder, denotationOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, denotationOffset, 0);\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
onnxruntime.experimental.fbs.TypeInfoValue valueType\r\n     */\r\n    static addValueType(builder:
flatbuffers.Builder, valueType: onnxruntime.experimental.fbs.TypeInfoValue) {\r\n      builder.addFieldInt8(1,
valueType, onnxruntime.experimental.fbs.TypeInfoValue.NONE);\r\n    }\r\n\r\n    /**\r\n     * @param
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flatbuffers.Builder builder\r\n * @param flatbuffers.Offset valueOffset\r\n */\r\n static addValue(builder: flatbuffers.Builder, valueOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, valueOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endTypeInfo(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createTypeInfo(\r\n builder: flatbuffers.Builder, denotationOffset: flatbuffers.Offset,\r\n valueType: onnxruntime.experimental.fbs.TypeInfoValue, valueOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n TypeInfo.startTypeInfo(builder);\r\n TypeInfo.addDenotation(builder, denotationOffset);\r\n TypeInfo.addValueType(builder, valueType);\r\n TypeInfo.addValue(builder, valueOffset);\r\n return TypeInfo.endTypeInfo(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class OperatorSetId {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns OperatorSetId\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): OperatorSetId {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param OperatorSetId= obj\r\n * @returns OperatorSetId\r\n */\r\n static getRootAsOperatorSetId(bb: flatbuffers.ByteBuffer, obj?: OperatorSetId): OperatorSetId {\r\n return (obj || new OperatorSetId()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param OperatorSetId= obj\r\n * @returns OperatorSetId\r\n */\r\n static getSizePrefixedRootAsOperatorSetId(bb: flatbuffers.ByteBuffer, obj?: OperatorSetId): OperatorSetId {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new OperatorSetId()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n domain(): string|null;\r\n domain(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n domain(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @returns flatbuffers.Long\r\n */\r\n version(): flatbuffers.Long {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startOperatorSetId(builder: flatbuffers.Builder) {\r\n builder.startObject(2);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset domainOffset\r\n */\r\n static addDomain(builder: flatbuffers.Builder, domainOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, domainOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Long version\r\n */\r\n static addVersion(builder: flatbuffers.Builder, version: flatbuffers.Long) {\r\n builder.addFieldInt64(1, version, builder.createLong(0, 0));\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endOperatorSetId(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createOperatorSetId(\r\n builder: flatbuffers.Builder, domainOffset: flatbuffers.Offset, version: flatbuffers.Long): flatbuffers.Offset {\r\n OperatorSetId.startOperatorSetId(builder);\r\n OperatorSetId.addDomain(builder, domainOffset);\r\n OperatorSetId.addVersion(builder, version);\r\n return OperatorSetId.endOperatorSetId(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class Tensor {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns Tensor\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): Tensor {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Tensor= obj\r\n * @returns Tensor\r\n */\r\n static getRootAsTensor(bb: flatbuffers.ByteBuffer, obj?: Tensor): Tensor {\r\n return (obj || new Tensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Tensor= obj\r\n * @returns Tensor\r\n */\r\n static getSizePrefixedRootAsTensor(bb: flatbuffers.ByteBuffer, obj?: Tensor): Tensor {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new

Tensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Encoding= optionalEncoding\r\n   * @returns string|Uint8Array|null\r\n   */\r\n   name(): string|null;\r\n   name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n name(optionalEncoding?: any): string|Uint8Array|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Encoding= optionalEncoding\r\n   * @returns string|Uint8Array|null\r\n   */\r\n   docString(): string|null;\r\n   docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n docString(optionalEncoding?: any): string|Uint8Array|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 6);\r\n   return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n   }\r\n\r\n   /**\r\n   * @param number index\r\n   * @returns flatbuffers.Long\r\n   */\r\n   dims(index: number): flatbuffers.Long|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n   return offset ? this.bb!.readInt64(this.bb!.__vector(this.bb_pos + offset) + index * 8) :\r\n   this.bb!.createLong(0, 0);\r\n   }\r\n\r\n   /**\r\n   * @returns number\r\n */\r\n   dimsLength(): number {\r\n   let offset = this.bb!.__offset(this.bb_pos, 8);\r\n   return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n   }\r\n\r\n   /**\r\n   * @returns onnxruntime.experimental.fbs.TensorDataType\r\n   */\r\n   dataType(): onnxruntime.experimental.fbs.TensorDataType {\r\n   let offset = this.bb!.__offset(this.bb_pos, 10);\r\n   return offset ? /** */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n onnxruntime.experimental.fbs.TensorDataType.UNDEFINED;\r\n   }\r\n\r\n   /**\r\n   * @param number index\r\n   * @returns number\r\n   */\r\n   rawData(index: number): number|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 12);\r\n   return offset ? this.bb!.readUint8(this.bb!.__vector(this.bb_pos + offset) + index) : 0;\r\n   }\r\n\r\n   /**\r\n   * @returns number\r\n   */\r\n   rawDataLength(): number {\r\n   let offset = this.bb!.__offset(this.bb_pos, 12);\r\n   return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n   }\r\n\r\n   /**\r\n   * @returns Uint8Array\r\n   */\r\n   rawDataArray(): Uint8Array|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 12);\r\n   return offset ?\r\n   new Uint8Array(\r\n   this.bb!.bytes().buffer, this.bb!.bytes().byteOffset + this.bb!.__vector(this.bb_pos + offset),\r\n   this.bb!.__vector_len(this.bb_pos + offset)) :\r\n   null;\r\n   }\r\n\r\n   /**\r\n   * @param number index\r\n   * @param flatbuffers.Encoding= optionalEncoding\r\n   * @returns string|Uint8Array\r\n   */\r\n   stringData(index: number): string;\r\n stringData(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n   stringData(index: number, optionalEncoding?: any): string|Uint8Array|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 14);\r\n return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n }\r\n\r\n   /**\r\n   * @returns number\r\n   */\r\n   stringDataLength(): number {\r\n   let offset = this.bb!.__offset(this.bb_pos, 14);\r\n   return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   */\r\n   static startTensor(builder: flatbuffers.Builder) {\r\n builder.startObject(6);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset nameOffset\r\n   */\r\n   static addName(builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(0, nameOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset docStringOffset\r\n   */\r\n   static addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(1, docStringOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset dimsOffset\r\n   */\r\n   static addDims(builder: flatbuffers.Builder, dimsOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(2, dimsOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param Array.<flatbuffers.Long> data\r\n   * @returns flatbuffers.Offset\r\n */\r\n   static createDimsVector(builder: flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n builder.startVector(8, data.length, 8);\r\n   for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addInt64(data[i]);\r\n   }\r\n   return builder.endVector();\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param number numElems\r\n   */\r\n   static startDimsVector(builder: flatbuffers.Builder, numElems: number) {\r\n   builder.startVector(8, numElems, 8);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param onnxruntime.experimental.fbs.TensorDataType dataType\r\n

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*/\r\n    static addDataType(builder: flatbuffers.Builder, dataType: onnxruntime.experimental.fbs.TensorDataType)
{\r\n      builder.addFieldInt32(3, dataType, onnxruntime.experimental.fbs.TensorDataType.UNDEFINED);\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset rawDataOffset\r\n
*/\r\n    static addRawData(builder: flatbuffers.Builder, rawDataOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(4, rawDataOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     *
@param Array.<number> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createRawDataVector(builder: flatbuffers.Builder, data: number[]|Uint8Array): flatbuffers.Offset {\r\n
builder.startVector(1, data.length, 1);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addInt8(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startRawDataVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(1, numElems, 1);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset stringDataOffset\r\n     */\r\n    static
addStringData(builder: flatbuffers.Builder, stringDataOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(5,
stringDataOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createStringDataVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startStringDataVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static endTensor(builder:
flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n
static createTensor(\r\n        builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset, docStringOffset:
flatbuffers.Offset,\r\n        dimsOffset: flatbuffers.Offset, dataType:
onnxruntime.experimental.fbs.TensorDataType,\r\n        rawDataOffset: flatbuffers.Offset, stringDataOffset:
flatbuffers.Offset): flatbuffers.Offset {\r\n      Tensor.startTensor(builder);\r\n      Tensor.addName(builder,
nameOffset);\r\n      Tensor.addDocString(builder, docStringOffset);\r\n      Tensor.addDims(builder,
dimsOffset);\r\n      Tensor.addDataType(builder, dataType);\r\n      Tensor.addRawData(builder,
rawDataOffset);\r\n      Tensor.addStringData(builder, stringDataOffset);\r\n      return
Tensor.endTensor(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n  export class SparseTensor {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n
bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @returns
SparseTensor\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): SparseTensor {\r\n      this.bb_pos = i;\r\n
  this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param
SparseTensor= obj\r\n     * @returns SparseTensor\r\n     */\r\n    static getRootAsSparseTensor(bb:
flatbuffers.ByteBuffer, obj?: SparseTensor): SparseTensor {\r\n      return (obj || new
SparseTensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param SparseTensor= obj\r\n     * @returns SparseTensor\r\n     */\r\n    static
getSizePrefixedRootAsSparseTensor(bb: flatbuffers.ByteBuffer, obj?: SparseTensor): SparseTensor {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
SparseTensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.Tensor= obj\r\n     * @returns onnxruntime.experimental.fbs.Tensor|null\r\n     */\r\n
values(obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n
          .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     *
@param onnxruntime.experimental.fbs.Tensor= obj\r\n     * @returns onnxruntime.experimental.fbs.Tensor|null\r\n
  */\r\n    indices(obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? (obj || new
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onnxruntime.experimental.fbs.Tensor())\r\n                        .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!)
:\r\n                     null;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @returns flatbuffers.Long\r\n
*/\r\n    dims(index: number): flatbuffers.Long|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 8);\r\n
return offset ? this.bb!.readInt64(this.bb!.__vector(this.bb_pos + offset) + index * 8) :\r\n
this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    dimsLength(): number {\r\n
let offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n
 }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startSparseTensor(builder:
flatbuffers.Builder) {\r\n      builder.startObject(3);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param flatbuffers.Offset valuesOffset\r\n     */\r\n    static addValues(builder: flatbuffers.Builder,
valuesOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, valuesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset indicesOffset\r\n     */\r\n    static
addIndices(builder: flatbuffers.Builder, indicesOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1,
indicesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset
dimsOffset\r\n     */\r\n    static addDims(builder: flatbuffers.Builder, dimsOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(2, dimsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     *
@param Array.<flatbuffers.Long> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createDimsVector(builder: flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n
builder.startVector(8, data.length, 8);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addInt64(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startDimsVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(8, numElems, 8);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
endSparseTensor(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n
return offset;\r\n    }\r\n\r\n    static createSparseTensor(\r\n        builder: flatbuffers.Builder, valuesOffset:
flatbuffers.Offset, indicesOffset: flatbuffers.Offset,\r\n        dimsOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
SparseTensor.startSparseTensor(builder);\r\n      SparseTensor.addValues(builder, valuesOffset);\r\n
SparseTensor.addIndices(builder, indicesOffset);\r\n      SparseTensor.addDims(builder, dimsOffset);\r\n      return
SparseTensor.endSparseTensor(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n  export class Attribute {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n
bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @returns
Attribute\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): Attribute {\r\n      this.bb_pos = i;\r\n      this.bb
= bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param Attribute=
obj\r\n     * @returns Attribute\r\n     */\r\n    static getRootAsAttribute(bb: flatbuffers.ByteBuffer, obj?: Attribute):
Attribute {\r\n      return (obj || new Attribute()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n
  /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param Attribute= obj\r\n     * @returns Attribute\r\n
*/\r\n    static getSizePrefixedRootAsAttribute(bb: flatbuffers.ByteBuffer, obj?: Attribute): Attribute {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
Attribute()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    name():
string|null;\r\n    name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
name(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    docString():
string|null;\r\n    docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
docString(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
  return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @returns
onnxruntime.experimental.fbs.AttributeType\r\n     */\r\n    type(): onnxruntime.experimental.fbs.AttributeType {\r\n
    let offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? /**  */ (this.bb!.readInt32(this.bb_pos + offset))
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:\r\n                    onnxruntime.experimental.fbs.AttributeType.UNDEFINED;\r\n    }\r\n\r\n    /**\r\n     * @returns
number\r\n     */\r\n    f(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 10);\r\n      return offset ?
this.bb!.readFloat32(this.bb_pos + offset) : 0.0;\r\n    }\r\n\r\n    /**\r\n     * @returns flatbuffers.Long\r\n     */\r\n
i(): flatbuffers.Long {\r\n      let offset = this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ?
this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    s(): string|null;\r\n
s(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n    s(optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 14);\r\n      return offset ?
this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.Tensor= obj\r\n     * @returns onnxruntime.experimental.fbs.Tensor|null\r\n     */\r\n
t(obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 16);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n
            .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     *
@param onnxruntime.experimental.fbs.Graph= obj\r\n     * @returns onnxruntime.experimental.fbs.Graph|null\r\n
*/\r\n    g(obj?: onnxruntime.experimental.fbs.Graph): onnxruntime.experimental.fbs.Graph|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 18);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Graph())\r\n
            .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     *
@param number index\r\n     * @returns number\r\n     */\r\n    floats(index: number): number|null {\r\n      let offset
= this.bb!.__offset(this.bb_pos, 20);\r\n      return offset ? this.bb!.readFloat32(this.bb!.__vector(this.bb_pos +
offset) + index * 4) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    floatsLength(): number {\r\n
let offset = this.bb!.__offset(this.bb_pos, 20);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) :
0;\r\n    }\r\n\r\n    /**\r\n     * @returns Float32Array\r\n     */\r\n    floatsArray(): Float32Array|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 20);\r\n      return offset ?\r\n          new Float32Array(\r\n
this.bb!.bytes().buffer, this.bb!.bytes().byteOffset + this.bb!.__vector(this.bb_pos + offset),\r\n
this.bb!.__vector_len(this.bb_pos + offset)) :\r\n          null;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n
* @returns flatbuffers.Long\r\n     */\r\n    ints(index: number): flatbuffers.Long|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 22);\r\n      return offset ? this.bb!.readInt64(this.bb!.__vector(this.bb_pos + offset) +
index * 8) :\r\n                    this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n
intsLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 22);\r\n      return offset ?
this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array\r\n     */\r\n    strings(index: number):
string;\r\n    strings(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n    strings(index:
number, optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 24);\r\n
 return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    stringsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 24);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.Tensor= obj\r\n     * @returns
onnxruntime.experimental.fbs.Tensor\r\n     */\r\n    tensors(index: number, obj?:
onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 26);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n
            .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n
null;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    tensorsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 26);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.Graph= obj\r\n     * @returns
onnxruntime.experimental.fbs.Graph\r\n     */\r\n    graphs(index: number, obj?:
onnxruntime.experimental.fbs.Graph): onnxruntime.experimental.fbs.Graph|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 28);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Graph())\r\n
            .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n
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null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n graphsLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 28);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startAttribute(builder: flatbuffers.Builder) {\r\n builder.startObject(13);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nameOffset\r\n */\r\n static addName(builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, nameOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset docStringOffset\r\n */\r\n static addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, docStringOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param onnxruntime.experimental.fbs.AttributeType type\r\n */\r\n static addType(builder: flatbuffers.Builder, type: onnxruntime.experimental.fbs.AttributeType) {\r\n builder.addFieldInt32(2, type, onnxruntime.experimental.fbs.AttributeType.UNDEFINED);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number f\r\n */\r\n static addF(builder: flatbuffers.Builder, f: number) {\r\n builder.addFieldFloat32(3, f, 0.0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Long i\r\n */\r\n static addI(builder: flatbuffers.Builder, i: flatbuffers.Long) {\r\n builder.addFieldInt64(4, i, builder.createLong(0, 0));\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset sOffset\r\n */\r\n static addS(builder: flatbuffers.Builder, sOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(5, sOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset tOffset\r\n */\r\n static addT(builder: flatbuffers.Builder, tOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(6, tOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset gOffset\r\n */\r\n static addG(builder: flatbuffers.Builder, gOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(7, gOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset floatsOffset\r\n */\r\n static addFloats(builder: flatbuffers.Builder, floatsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(8, floatsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<number> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createFloatsVector(builder: flatbuffers.Builder, data: number[]|Uint8Array): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addFloat32(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startFloatsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset intsOffset\r\n */\r\n static addInts(builder: flatbuffers.Builder, intsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(9, intsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Long> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createIntsVector(builder: flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n builder.startVector(8, data.length, 8);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addInt64(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startIntsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(8, numElems, 8);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset stringsOffset\r\n */\r\n static addStrings(builder: flatbuffers.Builder, stringsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(10, stringsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createStringsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startStringsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset tensorsOffset\r\n */\r\n static

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addTensors(builder: flatbuffers.Builder, tensorsOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(11,
tensorsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static createTensorsVector(builder:
flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n      builder.startVector(4, data.length, 4);\r\n
for (let i = data.length - 1; i >= 0; i--) {\r\n        builder.addOffset(data[i]);\r\n      }\r\n      return
builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param number
numElems\r\n     */\r\n    static startTensorsVector(builder: flatbuffers.Builder, numElems: number) {\r\n
builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     *
@param flatbuffers.Offset graphsOffset\r\n     */\r\n    static addGraphs(builder: flatbuffers.Builder, graphsOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(12, graphsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n
*/\r\n    static createGraphsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startGraphsVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static endAttribute(builder:
flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n
static createAttribute(\r\n        builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset, docStringOffset:
flatbuffers.Offset,\r\n        type: onnxruntime.experimental.fbs.AttributeType, f: number, i: flatbuffers.Long, sOffset:
flatbuffers.Offset,\r\n        tOffset: flatbuffers.Offset, gOffset: flatbuffers.Offset, floatsOffset: flatbuffers.Offset,\r\n
   intsOffset: flatbuffers.Offset, stringsOffset: flatbuffers.Offset, tensorsOffset: flatbuffers.Offset,\r\n
graphsOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n      Attribute.startAttribute(builder);\r\n
Attribute.addName(builder, nameOffset);\r\n      Attribute.addDocString(builder, docStringOffset);\r\n
Attribute.addType(builder, type);\r\n      Attribute.addF(builder, f);\r\n      Attribute.addI(builder, i);\r\n
Attribute.addS(builder, sOffset);\r\n      Attribute.addT(builder, tOffset);\r\n      Attribute.addG(builder, gOffset);\r\n
   Attribute.addFloats(builder, floatsOffset);\r\n      Attribute.addInts(builder, intsOffset);\r\n
Attribute.addStrings(builder, stringsOffset);\r\n      Attribute.addTensors(builder, tensorsOffset);\r\n
Attribute.addGraphs(builder, graphsOffset);\r\n      return Attribute.endAttribute(builder);\r\n    }\r\n
}\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class Graph
{\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     *
@param flatbuffers.ByteBuffer bb\r\n     * @returns Graph\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): Graph {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n
   * @param flatbuffers.ByteBuffer bb\r\n     * @param Graph= obj\r\n     * @returns Graph\r\n     */\r\n    static
getRootAsGraph(bb: flatbuffers.ByteBuffer, obj?: Graph): Graph {\r\n      return (obj || new
Graph()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param Graph= obj\r\n     * @returns Graph\r\n     */\r\n    static
getSizePrefixedRootAsGraph(bb: flatbuffers.ByteBuffer, obj?: Graph): Graph {\r\n      bb.setPosition(bb.position()
+ flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new Graph()).__init(bb.readInt32(bb.position()) +
bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.Tensor= obj\r\n     * @returns onnxruntime.experimental.fbs.Tensor\r\n     */\r\n
initializers(index: number, obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null
{\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.Tensor())\r\n                          .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos
+ offset) + index * 4), this.bb!) :\r\n                      null;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n
initializersLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ?
this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.ValueInfo= obj\r\n     * @returns onnxruntime.experimental.fbs.ValueInfo\r\n
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*/\r\n    nodeArgs(index: number, obj?: onnxruntime.experimental.fbs.ValueInfo):
onnxruntime.experimental.fbs.ValueInfo|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return
offset ? (obj || new onnxruntime.experimental.fbs.ValueInfo())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodeArgsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.Node= obj\r\n     * @returns
onnxruntime.experimental.fbs.Node\r\n     */\r\n    nodes(index: number, obj?: onnxruntime.experimental.fbs.Node):
onnxruntime.experimental.fbs.Node|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ?
(obj || new onnxruntime.experimental.fbs.Node())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodesLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    maxNodeIndex(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 10);\r\n      return offset ? this.bb!.readUint32(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.NodeEdge= obj\r\n     * @returns
onnxruntime.experimental.fbs.NodeEdge\r\n     */\r\n    nodeEdges(index: number, obj?:
onnxruntime.experimental.fbs.NodeEdge): onnxruntime.experimental.fbs.NodeEdge|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.NodeEdge())\r\n
                  .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n
 null;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodeEdgesLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns
string|Uint8Array\r\n     */\r\n    inputs(index: number): string;\r\n    inputs(index: number, optionalEncoding:
flatbuffers.Encoding): string|Uint8Array;\r\n    inputs(index: number, optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 14);\r\n      return offset ?
this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    inputsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 14);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns
string|Uint8Array\r\n     */\r\n    outputs(index: number): string;\r\n    outputs(index: number, optionalEncoding:
flatbuffers.Encoding): string|Uint8Array;\r\n    outputs(index: number, optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 16);\r\n      return offset ?
this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    outputsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 16);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.SparseTensor= obj\r\n     *
@returns onnxruntime.experimental.fbs.SparseTensor\r\n     */\r\n    sparseInitializers(index: number, obj?:
onnxruntime.experimental.fbs.SparseTensor):\r\n        onnxruntime.experimental.fbs.SparseTensor|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 18);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.SparseTensor())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    sparseInitializersLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 18);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startGraph(builder: flatbuffers.Builder) {\r\n
builder.startObject(8);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset initializersOffset\r\n     */\r\n    static addInitializers(builder: flatbuffers.Builder, initializersOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, initializersOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
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flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createInitializersVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startInitializersVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nodeArgsOffset\r\n */\r\n static addNodeArgs(builder: flatbuffers.Builder, nodeArgsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, nodeArgsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createNodeArgsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startNodeArgsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nodesOffset\r\n */\r\n static addNodes(builder: flatbuffers.Builder, nodesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, nodesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createNodesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startNodesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number maxNodeIndex\r\n */\r\n static addMaxNodeIndex(builder: flatbuffers.Builder, maxNodeIndex: number) {\r\n builder.addFieldInt32(3, maxNodeIndex, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nodeEdgesOffset\r\n */\r\n static addNodeEdges(builder: flatbuffers.Builder, nodeEdgesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(4, nodeEdgesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createNodeEdgesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startNodeEdgesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset inputsOffset\r\n */\r\n static addInputs(builder: flatbuffers.Builder, inputsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(5, inputsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createInputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startInputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset outputsOffset\r\n */\r\n static addOutputs(builder: flatbuffers.Builder, outputsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(6, outputsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createOutputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n

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builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startOutputsVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset sparseInitializersOffset\r\n     */\r\n    static
addSparseInitializers(builder: flatbuffers.Builder, sparseInitializersOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(7, sparseInitializersOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createSparseInitializersVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]):\r\n        flatbuffers.Offset {\r\n
   builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startSparseInitializersVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4,
numElems, 4);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns
flatbuffers.Offset\r\n     */\r\n    static endGraph(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset =
builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createGraph(\r\n        builder: flatbuffers.Builder,
initializersOffset: flatbuffers.Offset, nodeArgsOffset: flatbuffers.Offset,\r\n        nodesOffset: flatbuffers.Offset,
maxNodeIndex: number, nodeEdgesOffset: flatbuffers.Offset,\r\n        inputsOffset: flatbuffers.Offset,
outputsOffset: flatbuffers.Offset,\r\n        sparseInitializersOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
Graph.startGraph(builder);\r\n      Graph.addInitializers(builder, initializersOffset);\r\n
Graph.addNodeArgs(builder, nodeArgsOffset);\r\n      Graph.addNodes(builder, nodesOffset);\r\n
Graph.addMaxNodeIndex(builder, maxNodeIndex);\r\n      Graph.addNodeEdges(builder, nodeEdgesOffset);\r\n
Graph.addInputs(builder, inputsOffset);\r\n      Graph.addOutputs(builder, outputsOffset);\r\n
Graph.addSparseInitializers(builder, sparseInitializersOffset);\r\n      return Graph.endGraph(builder);\r\n    }\r\n
}\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class Model
{\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     *
@param flatbuffers.ByteBuffer bb\r\n     * @returns Model\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): Model {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n
   * @param flatbuffers.ByteBuffer bb\r\n     * @param Model= obj\r\n     * @returns Model\r\n     */\r\n    static
getRootAsModel(bb: flatbuffers.ByteBuffer, obj?: Model): Model {\r\n      return (obj || new
Model()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param Model= obj\r\n     * @returns Model\r\n     */\r\n    static
getSizePrefixedRootAsModel(bb: flatbuffers.ByteBuffer, obj?: Model): Model {\r\n      bb.setPosition(bb.position()
+ flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new Model()).__init(bb.readInt32(bb.position()) +
bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @returns flatbuffers.Long\r\n     */\r\n    irVersion(): flatbuffers.Long
{\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? this.bb!.readInt64(this.bb_pos + offset) :
this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.OperatorSetId= obj\r\n     * @returns onnxruntime.experimental.fbs.OperatorSetId\r\n
   */\r\n    opsetImport(index: number, obj?: onnxruntime.experimental.fbs.OperatorSetId):\r\n
onnxruntime.experimental.fbs.OperatorSetId|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return
offset ? (obj || new onnxruntime.experimental.fbs.OperatorSetId())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    opsetImportLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n
producerName(): string|null;\r\n    producerName(optionalEncoding: flatbuffers.Encoding):
string|Uint8Array|null;\r\n    producerName(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) :
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null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns
string|Uint8Array|null\r\n     */\r\n    producerVersion(): string|null;\r\n    producerVersion(optionalEncoding:
flatbuffers.Encoding): string|Uint8Array|null;\r\n    producerVersion(optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 10);\r\n      return offset ?
this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    domain():
string|null;\r\n    domain(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
domain(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 12);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @returns
flatbuffers.Long\r\n     */\r\n    modelVersion(): flatbuffers.Long {\r\n      let offset = this.bb!.__offset(this.bb_pos,
14);\r\n      return offset ? this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n
  * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n
docString(): string|null;\r\n    docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
docString(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 16);\r\n
    return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     *
@param onnxruntime.experimental.fbs.Graph= obj\r\n     * @returns onnxruntime.experimental.fbs.Graph|null\r\n
*/\r\n    graph(obj?: onnxruntime.experimental.fbs.Graph): onnxruntime.experimental.fbs.Graph|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 18);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.Graph())\r\n                         .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!)
:\r\n                      null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     *
@returns string|Uint8Array|null\r\n     */\r\n    graphDocString(): string|null;\r\n
graphDocString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
graphDocString(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos,
20);\r\n      return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     */\r\n    static startModel(builder: flatbuffers.Builder) {\r\n
builder.startObject(9);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Long irVersion\r\n     */\r\n    static addIrVersion(builder: flatbuffers.Builder, irVersion: flatbuffers.Long)
{\r\n      builder.addFieldInt64(0, irVersion, builder.createLong(0, 0));\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset opsetImportOffset\r\n     */\r\n    static
addOpsetImport(builder: flatbuffers.Builder, opsetImportOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, opsetImportOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
 * @param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createOpsetImportVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startOpsetImportVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset producerNameOffset\r\n     */\r\n    static
addProducerName(builder: flatbuffers.Builder, producerNameOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(2, producerNameOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param flatbuffers.Offset producerVersionOffset\r\n     */\r\n    static addProducerVersion(builder:
flatbuffers.Builder, producerVersionOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(3,
producerVersionOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset domainOffset\r\n     */\r\n    static addDomain(builder: flatbuffers.Builder, domainOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(4, domainOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Long modelVersion\r\n     */\r\n    static
addModelVersion(builder: flatbuffers.Builder, modelVersion: flatbuffers.Long) {\r\n      builder.addFieldInt64(5,
modelVersion, builder.createLong(0, 0));\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     *
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@param flatbuffers.Offset docStringOffset\r\n */\r\n static addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(6, docStringOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset graphOffset\r\n */\r\n static addGraph(builder: flatbuffers.Builder, graphOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(7, graphOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset graphDocStringOffset\r\n */\r\n static addGraphDocString(builder: flatbuffers.Builder, graphDocStringOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(8, graphDocStringOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endModel(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createModel(\r\n builder: flatbuffers.Builder, irVersion: flatbuffers.Long, opsetImportOffset: flatbuffers.Offset,\r\n producerNameOffset: flatbuffers.Offset, producerVersionOffset: flatbuffers.Offset,\r\n domainOffset: flatbuffers.Offset, modelVersion: flatbuffers.Long, docStringOffset: flatbuffers.Offset,\r\n graphOffset: flatbuffers.Offset, graphDocStringOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n Model.startModel(builder);\r\n Model.addIrVersion(builder, irVersion);\r\n Model.addOpsetImport(builder, opsetImportOffset);\r\n Model.addProducerName(builder, producerNameOffset);\r\n Model.addProducerVersion(builder, producerVersionOffset);\r\n Model.addDomain(builder, domainOffset);\r\n Model.addModelVersion(builder, modelVersion);\r\n Model.addDocString(builder, docStringOffset);\r\n Model.addGraph(builder, graphOffset);\r\n Model.addGraphDocString(builder, graphDocStringOffset);\r\n return Model.endModel(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class KernelCreateInfos {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns KernelCreateInfos\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): KernelCreateInfos {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param KernelCreateInfos= obj\r\n * @returns KernelCreateInfos\r\n */\r\n static getRootAsKernelCreateInfos(bb: flatbuffers.ByteBuffer, obj?: KernelCreateInfos): KernelCreateInfos {\r\n return (obj || new KernelCreateInfos()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param KernelCreateInfos= obj\r\n * @returns KernelCreateInfos\r\n */\r\n static getSizePrefixedRootAsKernelCreateInfos(bb: flatbuffers.ByteBuffer, obj?: KernelCreateInfos):\r\n KernelCreateInfos {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new KernelCreateInfos()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @returns number\r\n */\r\n nodeIndices(index: number): number|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.readUint32(this.bb!.__vector(this.bb_pos + offset) + index * 4) : 0;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n nodeIndicesLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @returns Uint32Array\r\n */\r\n nodeIndicesArray(): Uint32Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ?\r\n new Uint32Array(\r\n this.bb!.bytes().buffer, this.bb!.bytes().byteOffset + this.bb!.__vector(this.bb_pos + offset),\r\n this.bb!.__vector_len(this.bb_pos + offset)) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @returns flatbuffers.Long\r\n */\r\n kernelDefHashes(index: number): flatbuffers.Long|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.readUint64(this.bb!.__vector(this.bb_pos + offset) + index * 8) :\r\n this.bb!.createLong(0, 0);\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n kernelDefHashesLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startKernelCreateInfos(builder: flatbuffers.Builder) {\r\n builder.startObject(2);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nodeIndicesOffset\r\n */\r\n static addNodeIndices(builder: flatbuffers.Builder, nodeIndicesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, nodeIndicesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n

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 * @param Array.<number> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createNodeIndicesVector(builder: flatbuffers.Builder, data: number[]|Uint8Array): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addInt32(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startNodeIndicesVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset kernelDefHashesOffset\r\n     */\r\n    static
addKernelDefHashes(builder: flatbuffers.Builder, kernelDefHashesOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, kernelDefHashesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param Array.<flatbuffers.Long> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createKernelDefHashesVector(builder: flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n
builder.startVector(8, data.length, 8);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addInt64(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startKernelDefHashesVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(8,
numElems, 8);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns
flatbuffers.Offset\r\n     */\r\n    static endKernelCreateInfos(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n
let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createKernelCreateInfos(\r\n        builder:
flatbuffers.Builder, nodeIndicesOffset: flatbuffers.Offset,\r\n        kernelDefHashesOffset: flatbuffers.Offset):
flatbuffers.Offset {\r\n      KernelCreateInfos.startKernelCreateInfos(builder);\r\n
KernelCreateInfos.addNodeIndices(builder, nodeIndicesOffset);\r\n
KernelCreateInfos.addKernelDefHashes(builder, kernelDefHashesOffset);\r\n      return
KernelCreateInfos.endKernelCreateInfos(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport
namespace onnxruntime.experimental.fbs {\r\n  export class SubGraphSessionState {\r\n    bb:
flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @returns SubGraphSessionState\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): SubGraphSessionState {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param SubGraphSessionState= obj\r\n     *
@returns SubGraphSessionState\r\n     */\r\n    static getRootAsSubGraphSessionState(bb: flatbuffers.ByteBuffer,
obj?: SubGraphSessionState): SubGraphSessionState {\r\n      return (obj || new
SubGraphSessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.ByteBuffer bb\r\n     * @param SubGraphSessionState= obj\r\n     * @returns
SubGraphSessionState\r\n     */\r\n    static getSizePrefixedRootAsSubGraphSessionState(bb:
flatbuffers.ByteBuffer, obj?: SubGraphSessionState):\r\n        SubGraphSessionState {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
SubGraphSessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    graphId():
string|null;\r\n    graphId(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
graphId(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.SessionState= obj\r\n     * @returns
onnxruntime.experimental.fbs.SessionState|null\r\n     */\r\n    sessionState(obj?:
onnxruntime.experimental.fbs.SessionState): onnxruntime.experimental.fbs.SessionState|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.SessionState())\r\n
                  .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n
 * @param flatbuffers.Builder builder\r\n     */\r\n    static startSubGraphSessionState(builder: flatbuffers.Builder)
{\r\n      builder.startObject(2);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset graphIdOffset\r\n     */\r\n    static addGraphId(builder: flatbuffers.Builder, graphIdOffset:
```

flatbuffers.Offset) {\r\n builder.addFieldOffset(0, graphIdOffset, 0);\r\n }\r\n\r\n /**\r\n * @param
flatbuffers.Builder builder\r\n * @param flatbuffers.Offset sessionStateOffset\r\n */\r\n static
addSessionState(builder: flatbuffers.Builder, sessionStateOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, sessionStateOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n
* @returns flatbuffers.Offset\r\n */\r\n static endSubGraphSessionState(builder: flatbuffers.Builder):
flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n builder.requiredField(offset, 4); // graph_id\r\n
return offset;\r\n }\r\n\r\n static createSubGraphSessionState(\r\n builder: flatbuffers.Builder, graphIdOffset:
flatbuffers.Offset,\r\n sessionStateOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
SubGraphSessionState.startSubGraphSessionState(builder);\r\n SubGraphSessionState.addGraphId(builder,
graphIdOffset);\r\n SubGraphSessionState.addSessionState(builder, sessionStateOffset);\r\n return
SubGraphSessionState.endSubGraphSessionState(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n
*/\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class SessionState {\r\n bb:
flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param
flatbuffers.ByteBuffer bb\r\n * @returns SessionState\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer):
SessionState {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param
flatbuffers.ByteBuffer bb\r\n * @param SessionState= obj\r\n * @returns SessionState\r\n */\r\n static
getRootAsSessionState(bb: flatbuffers.ByteBuffer, obj?: SessionState): SessionState {\r\n return (obj || new
SessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param
flatbuffers.ByteBuffer bb\r\n * @param SessionState= obj\r\n * @returns SessionState\r\n */\r\n static
getSizePrefixedRootAsSessionState(bb: flatbuffers.ByteBuffer, obj?: SessionState): SessionState {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new
SessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param
onnxruntime.experimental.fbs.KernelCreateInfos= obj\r\n * @returns
onnxruntime.experimental.fbs.KernelCreateInfos|null\r\n */\r\n kernels(obj?:
onnxruntime.experimental.fbs.KernelCreateInfos): onnxruntime.experimental.fbs.KernelCreateInfos|null {\r\n let
offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? (obj || new
onnxruntime.experimental.fbs.KernelCreateInfos())\r\n .__init(this.bb!.__indirect(this.bb_pos +
offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param
onnxruntime.experimental.fbs.SubGraphSessionState= obj\r\n * @returns
onnxruntime.experimental.fbs.SubGraphSessionState\r\n */\r\n subGraphSessionStates(index: number, obj?:
onnxruntime.experimental.fbs.SubGraphSessionState):\r\n
onnxruntime.experimental.fbs.SubGraphSessionState|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
return offset ? (obj || new onnxruntime.experimental.fbs.SubGraphSessionState())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n null;\r\n
}\r\n\r\n /**\r\n * @returns number\r\n */\r\n subGraphSessionStatesLength(): number {\r\n let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n
/**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startSessionState(builder: flatbuffers.Builder)
{\r\n builder.startObject(2);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param
flatbuffers.Offset kernelsOffset\r\n */\r\n static addKernels(builder: flatbuffers.Builder, kernelsOffset:
flatbuffers.Offset) {\r\n builder.addFieldOffset(0, kernelsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param
flatbuffers.Builder builder\r\n * @param flatbuffers.Offset subGraphSessionStatesOffset\r\n */\r\n static
addSubGraphSessionStates(builder: flatbuffers.Builder, subGraphSessionStatesOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, subGraphSessionStatesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder
builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static
createSubGraphSessionStatesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]):\r\n
flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param
flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static

startSubGraphSessionStatesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endSessionState(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createSessionState(\r\n builder: flatbuffers.Builder, kernelsOffset: flatbuffers.Offset,\r\n subGraphSessionStatesOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n SessionState.startSessionState(builder);\r\n SessionState.addKernels(builder, kernelsOffset);\r\n SessionState.addSubGraphSessionStates(builder, subGraphSessionStatesOffset);\r\n return SessionState.endSessionState(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class InferenceSession {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns InferenceSession\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): InferenceSession {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param InferenceSession= obj\r\n * @returns InferenceSession\r\n */\r\n static getRootAsInferenceSession(bb: flatbuffers.ByteBuffer, obj?: InferenceSession): InferenceSession {\r\n return (obj || new InferenceSession()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param InferenceSession= obj\r\n * @returns InferenceSession\r\n */\r\n static getSizePrefixedRootAsInferenceSession(bb: flatbuffers.ByteBuffer, obj?: InferenceSession): InferenceSession {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new InferenceSession()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns boolean\r\n */\r\n static bufferHasIdentifier(bb: flatbuffers.ByteBuffer): boolean {\r\n return bb.__has_identifier('ORTM');\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n ortVersion(): string|null;\r\n ortVersion(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n ortVersion(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.Model= obj\r\n * @returns onnxruntime.experimental.fbs.Model|null\r\n */\r\n model(obj?: onnxruntime.experimental.fbs.Model): onnxruntime.experimental.fbs.Model|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Model())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.SessionState= obj\r\n * @returns onnxruntime.experimental.fbs.SessionState|null\r\n */\r\n sessionState(obj?: onnxruntime.experimental.fbs.SessionState): onnxruntime.experimental.fbs.SessionState|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.SessionState())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startInferenceSession(builder: flatbuffers.Builder) {\r\n builder.startObject(3);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset ortVersionOffset\r\n */\r\n static addOrtVersion(builder: flatbuffers.Builder, ortVersionOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, ortVersionOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset modelOffset\r\n */\r\n static addModel(builder: flatbuffers.Builder, modelOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, modelOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset sessionStateOffset\r\n */\r\n static addSessionState(builder: flatbuffers.Builder, sessionStateOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, sessionStateOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endInferenceSession(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset offset\r\n */\r\n static finishInferenceSessionBuffer(builder: flatbuffers.Builder, offset: flatbuffers.Offset) {\r\n builder.finish(offset, 'ORTM');\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset

offset\r\n */\r\n static finishSizePrefixedInferenceSessionBuffer(builder: flatbuffers.Builder, offset: flatbuffers.Offset) {\r\n builder.finish(offset, 'ORTM', true);\r\n }\r\n\r\n static createInferenceSession(\r\n builder: flatbuffers.Builder, ortVersionOffset: flatbuffers.Offset, modelOffset: flatbuffers.Offset,\r\n sessionStateOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n InferenceSession.startInferenceSession(builder);\r\n InferenceSession.addOrtVersion(builder, ortVersionOffset);\r\n InferenceSession.addModel(builder, modelOffset);\r\n InferenceSession.addSessionState(builder, sessionStateOffset);\r\n return InferenceSession.endInferenceSession(builder);\r\n }\r\n }\r\n}\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceSession, SessionHandler, Tensor} from 'onnxruntime-common';\r\nimport {Session} from './session';\r\nimport {Tensor as OnnxjsTensor} from './tensor';\r\n\r\nexport class OnnxjsSessionHandler implements SessionHandler {\r\n constructor(private session: Session) {\r\n this.inputNames = this.session.inputNames;\r\n this.outputNames = this.session.outputNames;\r\n }\r\n\r\n async dispose(): Promise<void> {}\r\n inputNames: readonly string[];\r\n outputNames: readonly string[];\r\n async run(\r\n feeds: SessionHandler.FeedsType, _fetches: SessionHandler.FetchesType,\r\n _options: InferenceSession.RunOptions): Promise<SessionHandler.ReturnType> {\r\n const inputMap = new Map<string, OnnxjsTensor>();\r\n for (const name in feeds) {\r\n if (Object.hasOwnProperty.call(feeds, name)) {\r\n const feed = feeds[name];\r\n inputMap.set(\r\n name,\r\n new OnnxjsTensor(\r\n feed.dims, feed.type as OnnxjsTensor.DataType, undefined, undefined,\r\n feed.data as OnnxjsTensor.NumberType));\r\n }\r\n }\r\n const outputMap = await this.session.run(inputMap);\r\n const output: SessionHandler.ReturnType = {};\r\n outputMap.forEach((tensor, name) => {\r\n output[name] = new Tensor(tensor.type, tensor.data, tensor.dims);\r\n });\r\n return output;\r\n }\r\n startProfiling(): void {\r\n this.session.startProfiling();\r\n }\r\n endProfiling(): void {\r\n this.session.endProfiling();\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {readFile} from 'fs';\r\nimport {promisify} from 'util';\r\n\r\nimport {resolveBackend, SessionHandlerType} from './backend';\r\nimport {ExecutionPlan} from './execution-plan';\r\nimport {Graph} from './graph';\r\nimport {Profiler} from './instrument';\r\nimport {Model} from './model';\r\nimport {Operator} from './operators';\r\nimport {Tensor} from './tensor';\r\n\r\nexport declare namespace Session {\r\n export interface Config {\r\n backendHint?: string;\r\n profiler?: Profiler.Config;\r\n }\r\n\r\n export interface Context {\r\n profiler: Readonly<Profiler>;\r\n graphInputTypes?: Tensor.DataType[];\r\n graphInputDims?: Array<readonly number[]>;\r\n }\r\n}\r\n\r\nexport class Session {\r\n constructor(config: Session.Config = {}) {\r\n this._initialized = false;\r\n this.backendHint = config.backendHint;\r\n this.profiler = Profiler.create(config.profiler);\r\n this.context = {profiler: this.profiler, graphInputTypes: [], graphInputDims: []};\r\n }\r\n\r\n get inputNames(): readonly string[] {\r\n return this._model.graph.getInputNames();\r\n }\r\n get outputNames(): readonly string[] {\r\n return this._model.graph.getOutputNames();\r\n }\r\n\r\n startProfiling() {\r\n this.profiler.start();\r\n }\r\n\r\n endProfiling() {\r\n this.profiler.stop();\r\n }\r\n\r\n async loadModel(uri: string): Promise<void>;\r\n async loadModel(buffer: ArrayBuffer, byteOffset?: number, length?: number): Promise<void>;\r\n async loadModel(buffer: Uint8Array): Promise<void>;\r\n async loadModel(arg: string|ArrayBuffer|Uint8Array, byteOffset?: number, length?: number): Promise<void> {\r\n await this.profiler.event('session', 'Session.loadModel', async () => {\r\n // resolve backend and session handler\r\n const backend = await resolveBackend(this.backendHint);\r\n this.sessionHandler = backend.createSessionHandler(this.context);\r\n\r\n this._model = new Model();\r\n if (typeof arg === 'string') {\r\n const isOrtFormat = arg.endsWith('.ort');\r\n if (typeof fetch === 'undefined') {\r\n // node\r\n const buf = await promisify(readFile)(arg);\r\n this.initialize(Buffer.from(buf), isOrtFormat);\r\n } else {\r\n // browser\r\n const response = await fetch(arg);\r\n const buf = await response.arrayBuffer();\r\n this.initialize(new Uint8Array(buf), isOrtFormat);\r\n }\r\n } else if (!ArrayBuffer.isView(arg)) {\r\n // load model from ArrayBuffer\r\n const arr = new Uint8Array(arg, byteOffset || 0, length || arg.byteLength);\r\n this.initialize(arr);\r\n } else {\r\n // load model from Uint8array\r\n this.initialize(arg);\r\n }\r\n });\r\n }\r\n\r\n private initialize(modelProtoBlob: Uint8Array,

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isOrtFormat?: boolean): void {\r\n    if (this._initialized) {\r\n      throw new Error('already initialized');\r\n
}\r\n\r\n    this.profiler.event('session', 'Session.initialize', () => {\r\n      // load graph\r\n      const graphInitializer
=\r\n          this.sessionHandler.transformGraph ? this.sessionHandler as Graph.Initializer : undefined;\r\n
this._model.load(modelProtoBlob, graphInitializer, isOrtFormat);\r\n\r\n      // graph is completely initialzied at this
stage , let the interested handlers know\r\n      if (this.sessionHandler.onGraphInitialized) {\r\n
this.sessionHandler.onGraphInitialized(this._model.graph);\r\n      }\r\n      // initialize each operator in the graph\r\n
   this.initializeOps(this._model.graph);\r\n\r\n\r\n      // instantiate an ExecutionPlan object to be used by the Session
object\r\n      this._executionPlan = new ExecutionPlan(this._model.graph, this._ops, this.profiler);\r\n    });\r\n\r\n
this._initialized = true;\r\n  }\r\n\r\n  async run(inputs: Map<string, Tensor>|Tensor[]): Promise<Map<string,
Tensor>> {\r\n    if (!this._initialized) {\r\n      throw new Error('session not initialized yet');\r\n    }\r\n\r\n    return
this.profiler.event('session', 'Session.run', async () => {\r\n      const inputTensors =
this.normalizeAndValidateInputs(inputs);\r\n\r\n\r\n      const outputTensors = await
this._executionPlan.execute(this.sessionHandler, inputTensors);\r\n\r\n\r\n      return
this.createOutput(outputTensors);\r\n    });\r\n  }\r\n\r\n  private normalizeAndValidateInputs(inputs: Map<string,
Tensor>|Tensor[]): Tensor[] {\r\n    const modelInputNames = this._model.graph.getInputNames();\r\n\r\n\r\n    //
normalize inputs\r\n    // inputs: Tensor[]\r\n    if (Array.isArray(inputs)) {\r\n      if (inputs.length !==
modelInputNames.length) {\r\n        throw new Error(`incorrect input array length: expected
${modelInputNames.length} but got ${inputs.length}`);\r\n      }\r\n    }\r\n    // convert map to array\r\n    // inputs:
Map<string, Tensor>\r\n    else {\r\n      if (inputs.size !== modelInputNames.length) {\r\n        throw new
Error(`incorrect input map size: expected ${modelInputNames.length} but got ${inputs.size}`);\r\n      }\r\n\r\n
const sortedInputs = new Array<Tensor>(inputs.size);\r\n      let sortedInputsIndex = 0;\r\n      for (let i = 0; i <
modelInputNames.length; ++i) {\r\n        const tensor = inputs.get(modelInputNames[i]);\r\n        if (!tensor) {\r\n
   throw new Error(`missing input tensor for: '${name}'`);\r\n        }\r\n        sortedInputs[sortedInputsIndex++] =
tensor;\r\n      }\r\n\r\n      inputs = sortedInputs;\r\n    }\r\n\r\n    // validate dims requirements\r\n    // First session
run - graph input data is not cached for the session\r\n    if (!this.context.graphInputTypes ||
this.context.graphInputTypes.length === 0 || !this.context.graphInputDims ||\r\n
this.context.graphInputDims.length === 0) {\r\n      const modelInputIndices =
this._model.graph.getInputIndices();\r\n      const modelValues = this._model.graph.getValues();\r\n\r\n\r\n      const
graphInputDims = new Array<readonly number[]>(modelInputIndices.length);\r\n\r\n\r\n      for (let i = 0; i <
modelInputIndices.length; ++i) {\r\n        const graphInput = modelValues[modelInputIndices[i]];\r\n
graphInputDims[i] = graphInput.type!.shape.dims;\r\n\r\n\r\n        // cached for second and subsequent runs.\r\n        //
Some parts of the framework works on the assumption that the graph and types and shapes are static\r\n
this.context.graphInputTypes!.push(graphInput.type!.tensorType);\r\n
this.context.graphInputDims!.push(inputs[i].dims);\r\n      }\r\n\r\n
this.validateInputTensorDims(graphInputDims, inputs, true);\r\n    }\r\n\r\n    // Second and subsequent session runs
- graph input data is cached for the session\r\n    else {\r\n
this.validateInputTensorDims(this.context.graphInputDims, inputs, false);\r\n    }\r\n\r\n    // validate types
requirement\r\n    this.validateInputTensorTypes(this.context.graphInputTypes!, inputs);\r\n\r\n\r\n    return inputs;\r\n
}\r\n\r\n  private validateInputTensorTypes(graphInputTypes: Tensor.DataType[], givenInputs: Tensor[]) {\r\n    for
(let i = 0; i < givenInputs.length; i++) {\r\n      const expectedType = graphInputTypes[i];\r\n      const actualType =
givenInputs[i].type;\r\n      if (expectedType !== actualType) {\r\n        throw new Error(`input tensor[${i}] check
failed: expected type '${expectedType}' but got ${actualType}`);\r\n      }\r\n    }\r\n  }\r\n\r\n  private
validateInputTensorDims(\r\n      graphInputDims: Array<readonly number[]>, givenInputs: Tensor[],
noneDimSupported: boolean) {\r\n    for (let i = 0; i < givenInputs.length; i++) {\r\n      const expectedDims =
graphInputDims[i];\r\n      const actualDims = givenInputs[i].dims;\r\n      if
(!this.compareTensorDims(expectedDims, actualDims, noneDimSupported)) {\r\n        throw new Error(`input
tensor[${i}] check failed: expected shape '[${expectedDims.join(',')}]' but got [${\r\n
actualDims.join(',')}]`);\r\n      }\r\n    }\r\n  }\r\n\r\n  private compareTensorDims(expectedDims: readonly
```

```
number[], actualDims: readonly number[], noneDimSupported: boolean):\r\n      boolean {\r\n    if
(expectedDims.length !== actualDims.length) {\r\n      return false;\r\n    }\r\n\r\n    for (let i = 0; i <
expectedDims.length; ++i) {\r\n      if (expectedDims[i] !== actualDims[i] && (!noneDimSupported ||
expectedDims[i] !== 0)) {\r\n        // data shape mis-match AND not a 'None' dimension.\r\n        return false;\r\n
}\r\n    }\r\n\r\n    return true;\r\n  }\r\n\r\n  private createOutput(outputTensors: Tensor[]): Map<string, Tensor>
{\r\n    const modelOutputNames = this._model.graph.getOutputNames();\r\n    if (outputTensors.length !==
modelOutputNames.length) {\r\n      throw new Error('expected number of outputs do not match number of
generated outputs');\r\n    }\r\n\r\n    const output = new Map<string, Tensor>();\r\n    for (let i = 0; i <
modelOutputNames.length; ++i) {\r\n      output.set(modelOutputNames[i], outputTensors[i]);\r\n    }\r\n\r\n    return
output;\r\n  }\r\n\r\n  private initializeOps(graph: Graph): void {\r\n    const nodes = graph.getNodes();\r\n
this._ops = new Array(nodes.length);\r\n\r\n    for (let i = 0; i < nodes.length; i++) {\r\n      this._ops[i] =
this.sessionHandler.resolve(nodes[i], this._model.opsets, graph);\r\n    }\r\n  }\r\n\r\n  private _model: Model;\r\n
private _initialized: boolean;\r\n\r\n  private _ops: Operator[];\r\n  private _executionPlan: ExecutionPlan;\r\n\r\n
private backendHint?: string;\r\n\r\n  private sessionHandler: SessionHandlerType;\r\n  private context:
Session.Context;\r\n  private profiler: Readonly<Profiler>;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All
rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Guid} from 'guid-typescript';\r\nimport Long
from 'long';\r\nimport {onnx} from 'onnx-proto';\r\n\r\nimport {onnxruntime} from './ort-schema/ort-
generated';\r\n\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\n\r\nimport {ProtoUtil, ShapeUtil} from
'./util';\r\n\r\nexport declare namespace Tensor {\r\n  export interface DataTypeMap {\r\n    bool: Uint8Array;\r\n
float32: Float32Array;\r\n    float64: Float64Array;\r\n    string: string[];\r\n    int8: Int8Array;\r\n    uint8:
Uint8Array;\r\n    int16: Int16Array;\r\n    uint16: Uint16Array;\r\n    int32: Int32Array;\r\n    uint32:
Uint32Array;\r\n  }\r\n\r\n  export type DataType = keyof DataTypeMap;\r\n\r\n  export type StringType =
Tensor.DataTypeMap['string'];\r\n  export type BooleanType = Tensor.DataTypeMap['bool'];\r\n  export type
IntegerType = Tensor.DataTypeMap['int8']|Tensor.DataTypeMap['uint8']|Tensor.DataTypeMap['int16']|\r\n
      Tensor.DataTypeMap['uint16']|Tensor.DataTypeMap['int32']|Tensor.DataTypeMap['uint32'];\r\n  export type
FloatType = Tensor.DataTypeMap['float32']|Tensor.DataTypeMap['float64'];\r\n  export type NumberType =
BooleanType|IntegerType|FloatType;\r\n\r\n  export type Id = Guid;\r\n}\r\n\r\ntype TensorData =
Tensor.DataTypeMap[Tensor.DataType];\r\n\r\ntype DataProvider = (id: Tensor.Id) => TensorData;\r\ntype
AsyncDataProvider = (id: Tensor.Id) => Promise<TensorData>;\r\n\r\nexport class Tensor {\r\n  /**\r\n   * get the
underlying tensor data\r\n   */\r\n  get data(): TensorData {\r\n    if (this.cache === undefined) {\r\n      const data =
this.dataProvider!(this.dataId);\r\n      if (data.length !== this.size) {\r\n        throw new Error('Length of data
provided by the Data Provider is inconsistent with the dims of this Tensor.');\r\n      }\r\n      this.cache = data;\r\n
}\r\n    return this.cache;\r\n  }\r\n\r\n  /**\r\n   * get the underlying string tensor data. Should only use when type is
STRING\r\n   */\r\n  get stringData() {\r\n    if (this.type !== 'string') {\r\n      throw new TypeError('data type is not
string');\r\n    }\r\n\r\n    return this.data as Tensor.StringType;\r\n  }\r\n\r\n  /**\r\n   * get the underlying integer
tensor data. Should only use when type is one of the following: (UINT8, INT8, UINT16,\r\n   * INT16, INT32,
UINT32, BOOL)\r\n   */\r\n  get integerData() {\r\n    switch (this.type) {\r\n      case 'uint8':\r\n      case 'int8':\r\n
case 'uint16':\r\n      case 'int16':\r\n      case 'int32':\r\n      case 'uint32':\r\n      case 'bool':\r\n        return this.data as
Tensor.IntegerType;\r\n\r\n      default:\r\n        throw new TypeError('data type is not integer (uint8, int8, uint16,
int16, int32, uint32, bool)');\r\n    }\r\n  }\r\n\r\n  /**\r\n   * get the underlying float tensor data. Should only use
when type is one of the following: (FLOAT, DOUBLE)\r\n   */\r\n  get floatData() {\r\n    switch (this.type) {\r\n
case 'float32':\r\n      case 'float64':\r\n        return this.data as Tensor.FloatType;\r\n\r\n      default:\r\n        throw
new TypeError('data type is not float (float32, float64)');\r\n    }\r\n  }\r\n\r\n  /**\r\n   * get the underlying number
tensor data. Should only use when type is one of the following: (UINT8, INT8, UINT16,\r\n   * INT16, INT32,
UINT32, BOOL, FLOAT, DOUBLE)\r\n   */\r\n  get numberData() {\r\n    if (this.type !== 'string') {\r\n      return
this.data as Tensor.NumberType;\r\n    }\r\n    throw new TypeError('type cannot be non-number (string)');\r\n
}\r\n\r\n  /**\r\n   * get value of an element at the given indices\r\n   */\r\n  get(indices: readonly number[]):
Tensor.DataTypeMap[Tensor.DataType][number] {\r\n    return this.data[ShapeUtil.indicesToOffset(indices,
```

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this.strides)];\r\n  }\r\n\r\n  /**\r\n   * set value of an element at the given indices\r\n   */\r\n  set(indices: readonly
number[], value: Tensor.DataTypeMap[Tensor.DataType][number]) {\r\n
this.data[ShapeUtil.indicesToOffset(indices, this.strides)] = value;\r\n  }\r\n\r\n  /**\r\n   * get the underlying tensor
data asynchronously\r\n   */\r\n  async getData(): Promise<TensorData> {\r\n    if (this.cache === undefined) {\r\n
 this.cache = await this.asyncDataProvider!(this.dataId);\r\n    }\r\n    return this.cache;\r\n  }\r\n\r\n  /**\r\n   * get
the number of elements in the tensor\r\n   */\r\n  public readonly size: number;\r\n\r\n  private _strides: readonly
number[];\r\n  /**\r\n   * get the strides for each dimension\r\n   */\r\n  get strides(): readonly number[] {\r\n    if
(!this._strides) {\r\n      this._strides = ShapeUtil.computeStrides(this.dims);\r\n    }\r\n    return this._strides;\r\n
}\r\n\r\n  constructor(\r\n      /**\r\n       * get the dimensions of the tensor\r\n       */\r\n      public readonly dims:
readonly number[],\r\n      /**\r\n       * get the type of the tensor\r\n       */\r\n      public readonly type:
Tensor.DataType, private dataProvider?: DataProvider,\r\n      private asyncDataProvider?: AsyncDataProvider,
private cache?: TensorData,\r\n      /**\r\n       * get the data ID that used to map to a tensor data\r\n       */\r\n
public readonly dataId: Guid = Guid.create()) {\r\n    this.size = ShapeUtil.validateDimsAndCalcSize(dims);\r\n
const size = this.size;\r\n    const empty = (dataProvider === undefined && asyncDataProvider === undefined &&
cache === undefined);\r\n\r\n    if (cache !== undefined) {\r\n      if (cache.length !== size) {\r\n        throw new
RangeError('Input dims doesn\\'t match data length.');\r\n      }\r\n    }\r\n\r\n    if (type === 'string') {\r\n      if (cache
!== undefined && (!Array.isArray(cache) || !cache.every(i => typeof i === 'string'))) {\r\n        throw new
TypeError('cache should be a string array');\r\n      }\r\n\r\n      if (empty) {\r\n        this.cache = new
Array<string>(size);\r\n      }\r\n    } else {\r\n      if (cache !== undefined) {\r\n        const constructor =
dataviewConstructor(type);\r\n        if (!(cache instanceof constructor)) {\r\n          throw new TypeError(`cache
should be type ${constructor.name}`);\r\n        }\r\n      }\r\n\r\n      if (empty) {\r\n        const buf = new
ArrayBuffer(size * sizeof(type));\r\n        this.cache = createView(buf, type);\r\n      }\r\n    }\r\n  }\r\n\r\n  /**\r\n   *
Construct new Tensor from a ONNX Tensor object\r\n   * @param tensorProto the ONNX Tensor\r\n   */\r\n  static
fromProto(tensorProto: onnx.ITensorProto): Tensor {\r\n    if (!tensorProto) {\r\n      throw new Error('cannot
construct Value from an empty tensor');\r\n    }\r\n    const type =
ProtoUtil.tensorDataTypeFromProto(tensorProto.dataType!);\r\n    const dims =
ProtoUtil.tensorDimsFromProto(tensorProto.dims!);\r\n\r\n    const value = new Tensor(dims, type);\r\n\r\n    if
(type === 'string') {\r\n      // When it's STRING type, the value should always be stored in field\r\n      //
'stringData'\r\n      tensorProto.stringData!.forEach((str, i) => {\r\n        const buf = Buffer.from(str.buffer,
str.byteOffset, str.byteLength);\r\n        value.data[i] = buf.toString();\r\n      });\r\n\r\n    } else if (\r\n
tensorProto.rawData && typeof tensorProto.rawData.byteLength === 'number' &&\r\n
tensorProto.rawData.byteLength > 0) {\r\n      // NOT considering segment for now (IMPORTANT)\r\n\r\n      //
populate value from rawData\r\n      const dataDest = value.data;\r\n      const dataSource =\r\n          new
DataView(tensorProto.rawData.buffer, tensorProto.rawData.byteOffset, tensorProto.rawData.byteLength);\r\n
const elementSize = sizeofProto(tensorProto.dataType!);\r\n      const length = tensorProto.rawData.byteLength /
elementSize;\r\n\r\n      if (tensorProto.rawData.byteLength % elementSize !== 0) {\r\n        throw new Error('invalid
buffer length');\r\n      }\r\n      if (dataDest.length !== length) {\r\n        throw new Error('buffer length
mismatch');\r\n      }\r\n\r\n      for (let i = 0; i < length; i++) {\r\n        const n = readProto(dataSource,
tensorProto.dataType!, i * elementSize);\r\n        dataDest[i] = n;\r\n      }\r\n    } else {\r\n      // populate value from
array\r\n      let array: Array<number|Long>;\r\n      switch (tensorProto.dataType) {\r\n        case
onnx.TensorProto.DataType.FLOAT:\r\n          array = tensorProto.floatData!;\r\n          break;\r\n        case
onnx.TensorProto.DataType.INT32:\r\n        case onnx.TensorProto.DataType.INT16:\r\n        case
onnx.TensorProto.DataType.UINT16:\r\n        case onnx.TensorProto.DataType.INT8:\r\n        case
onnx.TensorProto.DataType.UINT8:\r\n        case onnx.TensorProto.DataType.BOOL:\r\n          array =
tensorProto.int32Data!;\r\n          break;\r\n        case onnx.TensorProto.DataType.INT64:\r\n          array =
tensorProto.int64Data!;\r\n          break;\r\n        case onnx.TensorProto.DataType.DOUBLE:\r\n          array =
tensorProto.doubleData!;\r\n          break;\r\n        case onnx.TensorProto.DataType.UINT32:\r\n        case
onnx.TensorProto.DataType.UINT64:\r\n          array = tensorProto.uint64Data!;\r\n          break;\r\n        default:\r\n
```

// should never run here\r\n throw new Error('unspecific error');\r\n }\r\n\r\n if (array === null || array === undefined) {\r\n throw new Error('failed to populate data from a tensorproto value');\r\n }\r\n\r\n const data = value.data;\r\n if (data.length !== array.length) {\r\n throw new Error('array length mismatch');\r\n }\r\n\r\n for (let i = 0; i < array.length; i++) {\r\n const element = array[i];\r\n if (Long.isLong(element)) {\r\n data[i] = longToNumber(element, tensorProto.dataType);\r\n } else {\r\n data[i] = element;\r\n }\r\n }\r\n }\r\n\r\n return value;\r\n }\r\n\r\n /**\r\n * Construct new Tensor from raw data\r\n * @param data the raw data object. Should be a string array for 'string' tensor, and the corresponding typed array\r\n * for other types of tensor.\r\n * @param dims the dimensions of the tensor\r\n * @param type the type of the tensor\r\n */\r\n static fromData(data: Tensor.DataTypeMap[Tensor.DataType], dims: readonly number[], type: Tensor.DataType) {\r\n return new Tensor(dims, type, undefined, undefined, data);\r\n }\r\n\r\n static fromOrtTensor(ortTensor: ortFbs.Tensor) {\r\n if (!ortTensor) {\r\n throw new Error('cannot construct Value from an empty tensor');\r\n }\r\n const dims = ProtoUtil.tensorDimsFromORTFormat(ortTensor);\r\n const type = ProtoUtil.tensorDataTypeFromProto(ortTensor.dataType());\r\n\r\n const value = new Tensor(dims, type);\r\n\r\n if (type === 'string') {\r\n // When it's STRING type, the value should always be stored in field\r\n // 'stringData'\r\n for (let i = 0; i < ortTensor.stringDataLength(); i++) {\r\n value.data[i] = ortTensor.stringData(i);\r\n }\r\n\r\n } else if (\r\n ortTensor.rawDataArray() && typeof ortTensor.rawDataLength() === 'number' && ortTensor.rawDataLength() > 0) {\r\n // NOT considering segment for now (IMPORTANT)\r\n\r\n // populate value from rawData\r\n const dataDest = value.data;\r\n const dataSource = new DataView(\r\n ortTensor.rawDataArray()!.buffer, ortTensor.rawDataArray()!.byteOffset, ortTensor.rawDataLength());\r\n const elementSize = sizeofProto(ortTensor.dataType());\r\n const length = ortTensor.rawDataLength() / elementSize;\r\n\r\n if (ortTensor.rawDataLength() % elementSize !== 0) {\r\n throw new Error('invalid buffer length');\r\n }\r\n if (dataDest.length !== length) {\r\n throw new Error('buffer length mismatch');\r\n }\r\n\r\n for (let i = 0; i < length; i++) {\r\n const n = readProto(dataSource, ortTensor.dataType(), i * elementSize);\r\n dataDest[i] = n;\r\n }\r\n }\r\n return value;\r\n }\r\n}\r\n\r\nfunction sizeof(type: Tensor.DataType): number {\r\n switch (type) {\r\n case 'bool':\r\n case 'int8':\r\n case 'uint8':\r\n return 1;\r\n case 'int16':\r\n case 'uint16':\r\n return 2;\r\n case 'int32':\r\n case 'uint32':\r\n case 'float32':\r\n return 4;\r\n case 'float64':\r\n return 8;\r\n default:\r\n throw new Error(`cannot calculate sizeof() on type ${type}`);\r\n }\r\n}\r\n\r\nfunction sizeofProto(type: onnx.TensorProto.DataType|ortFbs.TensorDataType): number {\r\n switch (type) {\r\n case onnx.TensorProto.DataType.UINT8:\r\n case onnx.TensorProto.DataType.INT8:\r\n case onnx.TensorProto.DataType.BOOL:\r\n return 1;\r\n case onnx.TensorProto.DataType.UINT16:\r\n case onnx.TensorProto.DataType.INT16:\r\n return 2;\r\n case onnx.TensorProto.DataType.FLOAT:\r\n case onnx.TensorProto.DataType.INT32:\r\n case onnx.TensorProto.DataType.UINT32:\r\n return 4;\r\n case onnx.TensorProto.DataType.INT64:\r\n case onnx.TensorProto.DataType.DOUBLE:\r\n case onnx.TensorProto.DataType.UINT64:\r\n return 8;\r\n default:\r\n throw new Error(`cannot calculate sizeof() on type ${onnx.TensorProto.DataType[type]}`);\r\n }\r\n}\r\n\r\nfunction createView(dataBuffer: ArrayBuffer, type: Tensor.DataType) {\r\n return new (dataviewConstructor(type))(dataBuffer);\r\n}\r\n\r\nfunction dataviewConstructor(type: Tensor.DataType) {\r\n switch (type) {\r\n case 'bool':\r\n case 'uint8':\r\n return Uint8Array;\r\n case 'int8':\r\n return Int8Array;\r\n case 'int16':\r\n return Int16Array;\r\n case 'uint16':\r\n return Uint16Array;\r\n case 'int32':\r\n return Int32Array;\r\n case 'uint32':\r\n return Uint32Array;\r\n case 'float32':\r\n return Float32Array;\r\n case 'float64':\r\n return Float64Array;\r\n default:\r\n // should never run to here\r\n throw new Error('unspecified error');\r\n }\r\n}\r\n\r\n// convert a long number to a 32-bit integer (cast-down)\r\nfunction longToNumber(i: Long, type: onnx.TensorProto.DataType|ortFbs.TensorDataType): number {\r\n // INT64, UINT32, UINT64\r\n if (type === onnx.TensorProto.DataType.INT64 || type === ortFbs.TensorDataType.INT64) {\r\n if (i.greaterThanOrEqual(2147483648) || i.lessThan(-2147483648)) {\r\n throw new TypeError('int64 is not supported');\r\n }\r\n } else if (\r\n type === onnx.TensorProto.DataType.UINT32 || type ===

ortFbs.TensorDataType.UINT32 ||\r\n type === onnx.TensorProto.DataType.UINT64 || type === ortFbs.TensorDataType.UINT64) {\r\n if (i.greaterThanOrEqual(4294967296) || i.lessThan(0)) {\r\n throw new TypeError('uint64 is not supported');\r\n }\r\n } else {\r\n throw new TypeError(`not a LONG type: ${onnx.TensorProto.DataType[type]}`);\r\n }\r\n\r\n return i.toNumber();\r\n}\r\n\r\n// read one value from TensorProto\r\nfunction readProto(view: DataView, type: onnx.TensorProto.DataType|ortFbs.TensorDataType, byteOffset: number): number {\r\n switch (type) {\r\n case onnx.TensorProto.DataType.BOOL:\r\n case onnx.TensorProto.DataType.UINT8:\r\n return view.getUint8(byteOffset);\r\n case onnx.TensorProto.DataType.INT8:\r\n return view.getInt8(byteOffset);\r\n case onnx.TensorProto.DataType.UINT16:\r\n return view.getUint16(byteOffset, true);\r\n case onnx.TensorProto.DataType.INT16:\r\n return view.getInt16(byteOffset, true);\r\n case onnx.TensorProto.DataType.FLOAT:\r\n return view.getFloat32(byteOffset, true);\r\n case onnx.TensorProto.DataType.INT32:\r\n return view.getInt32(byteOffset, true);\r\n case onnx.TensorProto.DataType.UINT32:\r\n return view.getUint32(byteOffset, true);\r\n case onnx.TensorProto.DataType.INT64:\r\n return longToNumber(\r\n Long.fromBits(view.getUint32(byteOffset, true), view.getUint32(byteOffset + 4, true), false), type);\r\n case onnx.TensorProto.DataType.DOUBLE:\r\n return view.getFloat64(byteOffset, true);\r\n case onnx.TensorProto.DataType.UINT64:\r\n return longToNumber(\r\n Long.fromBits(view.getUint32(byteOffset, true), view.getUint32(byteOffset + 4, true), true), type);\r\n default:\r\n throw new Error(`cannot read from DataView for type ${onnx.TensorProto.DataType[type]}`);\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {flatbuffers} from 'flatbuffers';\r\nimport Long from 'long';\r\nimport {onnx} from 'onnx-proto';\r\n\r\nimport {Graph} from './graph';\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\nimport {Tensor} from './tensor';\r\n\r\n// check the inputs shape before running an OP.\r\n// return true when the inputs pass the check\r\n// return false when the inputs do not fit the requirement\r\n// throw exception when fatal error or not implemented\r\nexport function checkInputsShape(inputs: Tensor[], ...expectedDimensions: number[]): boolean {\r\n if (!inputs || inputs.length !== expectedDimensions.length) {\r\n return false;\r\n }\r\n for (let i = 0; i < inputs.length; i++) {\r\n if (!inputs[i].dims || inputs[i].dims.length !== expectedDimensions[i]) {\r\n return false;\r\n }\r\n }\r\n return true;\r\n}\r\n\r\n// Evaluates the given expression and asserts error message if condition is unmet.\r\nexport function assert(expr: boolean, msg: () => string) {\r\n if (!expr) {\r\n throw new Error(typeof msg === 'string' ? msg : msg());\r\n }\r\n}\r\n\r\nexport class ArrayUtil {\r\n /**\r\n * Verifies if 2 input arrays contain the same elements.\r\n * @param n1 Array 1\r\n * @param n2 Array 2\r\n * @returns Whether these 2 are equal\r\n */\r\n static arraysEqual(\r\n n1: readonly number[]|Int8Array|Uint8Array|Int16Array|Uint16Array|Int32Array|Uint32Array|Uint8ClampedArray|\r\n Float32Array|Float64Array,\r\n n2: readonly number[]|Int8Array|Uint8Array|Int16Array|Uint16Array|Int32Array|Uint32Array|Uint8ClampedArray|\r\n Float32Array|Float64Array) {\r\n if (n1.length !== n2.length) {\r\n return false;\r\n }\r\n for (let i = 0; i < n1.length; i++) {\r\n if (n1[i] !== n2[i]) {\r\n return false;\r\n }\r\n }\r\n return true;\r\n }\r\n}\r\n\r\nexport class MatMulUtil {\r\n /**\r\n * Fix the input shapes for MatMul operation if they need fixing\r\n * @param dimsA The shape of tensor A. Should be an array of positive integers\r\n * @param dimsB The shape of tensor B. Should be an array of positive integers\r\n * @returns A tuple containing the preprocessed input shapes as required by ONNX specifications\r\n */\r\n static preprocessInputShapes(dimsA: readonly number[], dimsB: readonly number[]):\r\n [readonly number[], readonly number[]] {\r\n // If the first argument is 1-D, it is promoted to a matrix by prepending\r\n // a 1 to its dimensions. After matrix multiplication the prepended 1 is\r\n // removed.\r\n const a = (dimsA.length === 1) ? [1, dimsA[0]] : dimsA;\r\n\r\n // If the second argument is 1-D, it is promoted to a matrix by appending\r\n // a 1 to its dimensions. After matrix multiplication the appended 1 is\r\n // removed.\r\n const b = (dimsB.length === 1) ? [dimsB[0], 1] : dimsB;\r\n\r\n return [a, b];\r\n }\r\n\r\n /**\r\n * Fix the output shape computed for MatMul operation if it needs fixing\r\n * @param outputShape The computed outputShape. Should be an array (atleast of length 2) of positive integers.\r\n   * This will be mutated.\r\n   * @param aRank The rank of tensor A.\r\n   * @param bRank The rank of tensor B.\r\n   */\r\n static postprocessOutputShape(outputShape: number[], aRank: number, bRank: number) {\r\n   // Remove prepended dimension if first input is 1d\r\n   if (aRank === 1) {\r\n   // outputShape = outputShape.slice(0, outputShape.length - 2).concat(outputShape.slice(outputShape.length - 1));\r\n outputShape.splice(outputShape.length - 2, 1);\r\n   }\r\n   // Remove appended dimension if second input is 1d\r\n if (bRank === 1) {\r\n   outputShape.pop();\r\n   }\r\n }\r\n\r\n /**\r\n   * Calculate the expected shape when matrix multiplication\r\n   * @param a The shape of tensor A. Should be a tuple of 2 positive integers\r\n   * @param b The shape of tensor B. Should be a tuple of 2 positive integers\r\n   * @returns The expected shape of the result, or undefined if N/A\r\n   */\r\n static calcMatMulShape(a: [number, number], b: [number, number]): [number, number]|undefined {\r\n   return (a[1] !== b[0]) ? undefined : [a[0], b[1]];\r\n }\r\n}\r\n\r\nexport class BroadcastUtil {\r\n /**\r\n   * Calculate the expected shape when broadcasting 2 tensors\r\n   * @param a The shape of tensor A. Should be an array of positive integers\r\n   * @param b The shape of tensor B. Should be an array of positive integers\r\n   * @param isMatMul Whether the operation is MatMul\r\n   * @returns The expected shape of the result, or undefined if N/A\r\n   */\r\n static calcShape(adims: readonly number[], bdims: readonly number[], isMatMul = false): readonly number[]|undefined {\r\n   const arank = adims.length;\r\n   const brank = bdims.length;\r\n   if (arank === 0) {\r\n   return bdims;\r\n   }\r\n   if (brank === 0) {\r\n   return adims;\r\n   }\r\n   const crank = Math.max(adims.length, bdims.length);\r\n   const cdims = new Array<number>(crank);\r\n\r\n   // calculate the last 2 dimension if it is MatMul\r\n   if (isMatMul) {\r\n   if (arank < 2 || brank < 2) {\r\n   return undefined;\r\n   }\r\n   const cShapeMatMul =\r\n MatMulUtil.calcMatMulShape([adims[arank - 2], adims[arank - 1]], [bdims[brank - 2], bdims[brank - 1]]);\r\n   if (cShapeMatMul === undefined) {\r\n   return undefined;\r\n   }\r\n   [cdims[crank - 2], cdims[crank - 1]] = cShapeMatMul;\r\n   }\r\n\r\n   for (let i = isMatMul ? 3 : 1; i <= crank; i++) {\r\n   const aLen = arank - i < 0 ? 1 : adims[arank - i];\r\n   const bLen = brank - i < 0 ? 1 : bdims[brank - i];\r\n\r\n   if (aLen !== bLen && aLen > 1 && bLen > 1) {\r\n   return undefined;\r\n   }\r\n   cdims[crank - i] = Math.max(aLen, bLen);\r\n   }\r\n\r\n return cdims;\r\n }\r\n\r\n /**\r\n   * Given the indices of a broadcasted tensor, calculate the original indices\r\n   * @param broadcastedIndices The given indices of the broadcasted tensor.\r\n   * @param originalShape The original shape of the tensor before broadcas\r\n   * @returns The calculated indices that maps to the original tensor.\r\n   */\r\n static index(broadcastedIndices: readonly number[], originalShape: readonly number[]): number[] {\r\n   // NOTE 1: we assume the parameter broadcastedIndices is valid. ie. it should have the same\r\n   // length as the broadcasted shape, and for each dimension the index should\r\n   // not be out of range.\r\n   const originalIndices = new Array(originalShape.length);\r\n   BroadcastUtil.fillIndex(broadcastedIndices, originalShape, originalIndices);\r\n   return originalIndices;\r\n }\r\n\r\n /**\r\n   * Given the indices of a broadcasted tensor, calculate the original indices\r\n   * @param broadcastedIndices The given indices of the broadcasted tensor.\r\n   * @param originalShape The original shape of the tensor before broadcast\r\n   * @param originalIndices The mapping of broadcastedIndices to the originalIndices (output parameter - will be\r\n   *   mutated).\r\n   */\r\n static fillIndex(broadcastedIndices: readonly number[], originalShape: readonly number[], originalIndices: number[]) {\r\n   // NOTE 1: we assume the parameter broadcastedIndices is valid. ie. it should have the same length as the\r\n   // broadcasted shape, and for each dimension the index should not be out of range.\r\n   // NOTE 2: we assume the parameter originalIndices has the same length as the originalShape\r\n   const dimOffset = broadcastedIndices.length - originalShape.length;\r\n   for (let i = 0; i < originalShape.length; i++) {\r\n originalIndices[i] = broadcastedIndices[dimOffset + i] % originalShape[i];\r\n   }\r\n }\r\n\r\n /**\r\n   * Perform the broadcasting operation on the specific operator\r\n   * @param a The input tensor A\r\n   * @param b The input tensor B\r\n   * @param op The operator lambda function\r\n   * @param inplace Whether to write the result back to A.\r\n   * @returns The result tensor, or undefined if input not broadcastable.\r\n   */\r\n static calc(\r\n   a: Tensor, b: Tensor, op: (a: string|number, b: string|number) => (string | number), inplace: boolean,\r\n resultType?: Tensor.DataType): Tensor|undefined {\r\n   const outputShape = BroadcastUtil.calcShape(a.dims, b.dims);\r\n\r\n   if (outputShape) {\r\n   if (inplace && !ShapeUtil.areEqual(outputShape, a.dims)) {\r\n   // B is not broadcastable to A, failed to calculate inplace.\r\n   return undefined;\r\n   }\r\n\r\n   const size =

ShapeUtil.size(outputShape);\r\n const c = inplace ? a : new Tensor(outputShape, resultType || a.type);\r\n\r\n // both inputs are scalars\r\n if (outputShape.length === 0) {\r\n c.set([], op(a.get([]), b.get([])));\r\n }\r\n\r\n // atleast one input is a non-scalar\r\n else {\r\n const outputIndices = new Array<number>(outputShape.length);\r\n const originalIndicesA = new Array(a.dims.length);\r\n const originalIndicesB = new Array(b.dims.length);\r\n let valA: string|number = 0;\r\n let valB: string|number = 0;\r\n let isAScalar = false;\r\n let isBScalar = false;\r\n if (a.dims.length === 0) {\r\n valA = a.get([]);\r\n isAScalar = true;\r\n }\r\n if (b.dims.length === 0) {\r\n valB = b.get([]);\r\n isBScalar = true;\r\n }\r\n let rest: number;\r\n for (let i = 0; i < size; i++) {\r\n // traversal indices\r\n rest = i;\r\n for (let j = outputShape.length - 1; j >= 0; j--) {\r\n outputIndices[j] = rest % outputShape[j];\r\n rest = Math.floor(rest / outputShape[j]);\r\n }\r\n\r\n if (!isAScalar) {\r\n // map outputIndices (which is actually broadcasted) to the originalIndices\r\n BroadcastUtil.fillIndex(outputIndices, a.dims, originalIndicesA);\r\n valA = a.get(originalIndicesA);\r\n }\r\n if (!isBScalar) {\r\n BroadcastUtil.fillIndex(outputIndices, b.dims, originalIndicesB);\r\n valB = b.get(originalIndicesB);\r\n }\r\n\r\n c.set(outputIndices, op(valA, valB));\r\n }\r\n }\r\n\r\n return c;\r\n }\r\n\r\n return undefined;\r\n }\r\n\r\n /**\r\n * Determine if a shape is unidirectional broadcastable to another shape\r\n * @param shape The input shape\r\n * @param finalShape The desired shape after broadcasting\r\n */\r\n static isValidBroadcast(shape: readonly number[], finalShape: readonly number[]): boolean {\r\n // align shape to the right\r\n const inputRank = shape.length;\r\n const finalRank = finalShape.length;\r\n if (inputRank > finalRank) {\r\n return false;\r\n }\r\n for (let i = 1; i <= inputRank; i++) {\r\n if (shape[inputRank - i] !== 1 && shape[inputRank - i] !== finalShape[finalRank - i]) {\r\n return false;\r\n }\r\n }\r\n return true;\r\n }\r\n\r\n /**\r\n * Determine the broadcasted dims in input shape based on the given output shape.\r\n * Note that this function only returns the broadcasted dims.\r\n * @param inputShape The input shape\r\n * @param outputShape The output shape\r\n * @returns The broadcasted dims in input shape.\r\n */\r\n static getBroadcastDims(inputShape: readonly number[], outputShape: readonly number[]): number[] {\r\n const inRank = inputShape.length;\r\n const dims: number[] = [];\r\n for (let i = 0; i < inRank; i++) {\r\n const dim = inRank - 1 - i;\r\n const a = inputShape[dim] || 1;\r\n const b = outputShape[outputShape.length - 1 - i] || 1;\r\n if (b > 1 && a === 1) {\r\n dims.unshift(dim);\r\n }\r\n }\r\n return dims;\r\n }\r\n}\r\n\r\n// copy array helper\r\n// mimics memcpy as much as possible\r\nexport function arrayCopyHelper(\r\n target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number, sourceIndex: number,\r\n blockSize: number) {\r\n if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n throw new Error('sourceIndex out of bounds');\r\n }\r\n if (targetIndex < 0 || targetIndex >= target.length) {\r\n throw new Error('targetIndex out of bounds');\r\n }\r\n if (sourceIndex + blockSize > source.length) {\r\n throw new Error('source indices to be copied are outside bounds');\r\n }\r\n if (targetIndex + blockSize > target.length) {\r\n throw new Error('target array is too small to hold result');\r\n }\r\n\r\n for (let offset = 0; offset < blockSize; offset++) {\r\n target[targetIndex + offset] = source[sourceIndex + offset];\r\n }\r\n}\r\n\r\nexport class GemmUtil {\r\n // will make sure input shapes are compatible for this op\r\n // and return back the shape of the output in the form of a tuple\r\n // will throw exception if the input shapes are not compatible\r\n static getShapeOfGemmResult(\r\n leftShape: readonly number[], transLeft: boolean, rightShape: readonly number[], transRight: boolean,\r\n biasShape?: readonly number[]): readonly number[] {\r\n if (leftShape.length !== 2 || rightShape.length !== 2) {\r\n throw new Error('shape need to be of size 2');\r\n }\r\n\r\n let M: number;\r\n let K: number;\r\n let N: number;\r\n\r\n if (transLeft) {\r\n M = leftShape[1];\r\n K = leftShape[0];\r\n } else {\r\n M = leftShape[0];\r\n K = leftShape[1];\r\n }\r\n\r\n let kDim = -1;\r\n\r\n if (transRight) {\r\n N = rightShape[0];\r\n kDim = 1;\r\n } else {\r\n N = rightShape[1];\r\n kDim = 0;\r\n }\r\n\r\n if (rightShape[kDim] !== K) {\r\n throw new Error('dimension mismatch');\r\n }\r\n\r\n if (M <= 0 || N <= 0 || K <= 0) {\r\n throw new Error('invalid shape specified');\r\n }\r\n\r\n if (biasShape && !BroadcastUtil.isValidBroadcast(biasShape, [M, N])) {\r\n throw new Error('gemm: invalid bias shape for broadcast');\r\n }\r\n\r\n return [M, N, K];\r\n }\r\n}\r\n\r\nexport class ProtoUtil {\r\n static tensorDataTypeFromProto(typeProto: onnx.TensorProto.DataType|\r\n onnxruntime.experimental.fbs.TensorDataType): Tensor.DataType {\r\n switch (typeProto) {\r\n case onnx.TensorProto.DataType.INT8:\r\n return 'int8';\r\n case onnx.TensorProto.DataType.UINT8:\r\n return 'uint8';\r\n case onnx.TensorProto.DataType.BOOL:\r\n return 'bool';\r\n case onnx.TensorProto.DataType.INT16:\r\n return 'int16';\r\n case onnx.TensorProto.DataType.UINT16:\r\n return 'uint16';\r\n case onnx.TensorProto.DataType.INT32:\r\n return 'int32';\r\n case onnx.TensorProto.DataType.UINT32:\r\n return 'uint32';\r\n case onnx.TensorProto.DataType.FLOAT:\r\n return 'float32';\r\n case onnx.TensorProto.DataType.DOUBLE:\r\n return 'float64';\r\n case onnx.TensorProto.DataType.STRING:\r\n return 'string';\r\n\r\n // For INT64/UINT64, reduce their value to 32-bits.\r\n // Should throw exception when overflow\r\n case onnx.TensorProto.DataType.INT64:\r\n return 'int32';\r\n case onnx.TensorProto.DataType.UINT64:\r\n return 'uint32';\r\n\r\n default:\r\n throw new Error(`unsupported data type: ${onnx.TensorProto.DataType[typeProto]}`);\r\n }\r\n }\r\n\r\n static tensorDataTypeStringToEnum(type: string): onnx.TensorProto.DataType {\r\n switch (type) {\r\n case 'int8':\r\n return onnx.TensorProto.DataType.INT8;\r\n case 'uint8':\r\n return onnx.TensorProto.DataType.UINT8;\r\n case 'bool':\r\n return onnx.TensorProto.DataType.BOOL;\r\n case 'int16':\r\n return onnx.TensorProto.DataType.INT16;\r\n case 'uint16':\r\n return onnx.TensorProto.DataType.UINT16;\r\n case 'int32':\r\n return onnx.TensorProto.DataType.INT32;\r\n case 'uint32':\r\n return onnx.TensorProto.DataType.UINT32;\r\n case 'float32':\r\n return onnx.TensorProto.DataType.FLOAT;\r\n case 'float64':\r\n return onnx.TensorProto.DataType.DOUBLE;\r\n case 'string':\r\n return onnx.TensorProto.DataType.STRING;\r\n case 'int64':\r\n return onnx.TensorProto.DataType.INT64;\r\n case 'uint64':\r\n return onnx.TensorProto.DataType.UINT64;\r\n\r\n default:\r\n throw new Error(`unsupported data type: ${type}`);\r\n }\r\n }\r\n\r\n static tensorDimsFromProto(dims: Array<number|Long>): number[] {\r\n // get rid of Long type for dims\r\n return dims.map(d => Long.isLong(d) ? d.toNumber() : d);\r\n }\r\n\r\n static tensorValueTypeFromProto(valueType: onnx.TypeProto.ITensor): Graph.ValueType {\r\n return {\r\n tensorType: ProtoUtil.tensorDataTypeFromProto(valueType.elemType!),\r\n shape: {dims: ProtoUtil.tensorDimsFromProto(valueType.shape!.dim!.map(d => d.dimValue!))}\r\n };\r\n }\r\n\r\n static tensorDimsFromORTFormat(tensor: onnxruntime.experimental.fbs.Tensor) {\r\n const dims = [];\r\n for (let i = 0; i < tensor.dimsLength(); i++) {\r\n dims.push(LongUtil.longToNumber(tensor.dims(i)!));\r\n }\r\n return dims;\r\n }\r\n\r\n static tensorAttributesFromORTFormat(node: onnxruntime.experimental.fbs.Node) {\r\n const attributes = [];\r\n for (let i = 0; i < node.attributesLength(); i++) {\r\n attributes.push(node.attributes(i)!);\r\n }\r\n return attributes;\r\n }\r\n}\r\n\r\nexport class LongUtil {\r\n static longToNumber(n: Long|flatbuffers.Long|number) {\r\n if (Long.isLong(n)) {\r\n return n.toNumber();\r\n } else if (n instanceof flatbuffers.Long) {\r\n return Long.fromValue({low: n.low, high: n.high, unsigned: true}).toNumber();\r\n }\r\n return n;\r\n }\r\n static isLong(n: unknown) {\r\n return Long.isLong(n) || n instanceof flatbuffers.Long;\r\n }\r\n}\r\n\r\nexport class ShapeUtil {\r\n static size(dims: readonly number[]): number {\r\n return ShapeUtil.getSizeFromDimensionRange(dims, 0, dims.length);\r\n }\r\n\r\n // `axis` inclusive\r\n static sizeFromDimension(dims: readonly number[], axis: number): number {\r\n if (axis < 0 || axis > dims.length) {\r\n throw new Error(`invalid dimension of ${axis} for sizeFromDimension as Tensor has ${dims.length} dimensions.`);\r\n }\r\n return ShapeUtil.getSizeFromDimensionRange(dims, axis, dims.length);\r\n }\r\n\r\n // `axis` exclusive\r\n static sizeToDimension(dims: readonly number[], axis: number): number {\r\n if (axis < 0 || axis > dims.length) {\r\n throw new Error(`invalid dimension of ${axis} for sizeToDimension as Tensor has ${dims.length} dimensions.`);\r\n }\r\n return ShapeUtil.getSizeFromDimensionRange(dims, 0, axis);\r\n }\r\n\r\n static getSizeFromDimensionRange(dims: readonly number[], start: number, end: number): number {\r\n let size = 1;\r\n for (let i = start; i < end; i++) {\r\n // safety check as this method is called by multiple other methods requiring size.\r\n // size cannot be 0 or negative.\r\n if (dims[i] <= 0) {\r\n throw new Error(\r\n // eslint-disable-next-line max-len\r\n 'cannot get valid size from specified dimension range. Most likely the range contains 0 or negative values in them.');\r\n }\r\n size *= dims[i];\r\n }\r\n return size;\r\n }\r\n\r\n static computeStrides(dims: readonly number[]): readonly number[] {\r\n const rank = dims.length;\r\n

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if (rank === 0) {\r\n      return [];\r\n    } else if (rank === 1) {\r\n      return [1];\r\n    }\r\n    const strides = new
Array(rank);\r\n    strides[rank - 1] = 1;\r\n    strides[rank - 2] = dims[rank - 1];\r\n    for (let i = rank - 3; i >= 0; --i)
{\r\n      strides[i] = strides[i + 1] * dims[i + 1];\r\n    }\r\n    return strides;\r\n  }\r\n\r\n  static transpose(dims:
readonly number[]): readonly number[] {\r\n    const copy = dims.slice();\r\n    return copy.reverse();\r\n  }\r\n\r\n
static indicesToOffset(indices: readonly number[], strides: readonly number[], axis?: number): number {\r\n    if
(axis === undefined) {\r\n      axis = indices.length;\r\n    }\r\n    let offset = 0;\r\n    for (let i = 0; i < axis; ++i) {\r\n
   offset += strides[i] * indices[i];\r\n    }\r\n    return offset;\r\n  }\r\n\r\n  static offsetToIndices(offset: number,
strides: readonly number[]): readonly number[] {\r\n    const rank = strides.length;\r\n    if (rank === 0) {\r\n
return [];\r\n    } else if (rank === 1) {\r\n      return [offset * strides[0]];\r\n    }\r\n    const indices: number[] = new
Array(strides.length);\r\n    for (let i = 0; i < indices.length - 1; ++i) {\r\n      indices[i] = Math.floor(offset /
strides[i]);\r\n      offset -= indices[i] * strides[i];\r\n    }\r\n    indices[indices.length - 1] = offset;\r\n    return
indices;\r\n  }\r\n\r\n  /**\r\n   * normailze axis of range [-r, r) into [0, r).\r\n   */\r\n  static normalizeAxis(axis:
number, tensorRank: number): number {\r\n    if (axis < -tensorRank && axis >= tensorRank) {\r\n      throw new
Error('unsupported axis for this operation.');\r\n    }\r\n    return axis < 0 ? axis + tensorRank : axis;\r\n  }\r\n\r\n
static normalizeAxes(axes: readonly number[], tensorRank: number): number[] {\r\n    return axes.map(x =>
this.normalizeAxis(x, tensorRank));\r\n  }\r\n\r\n  // Increment an index into a tensor (in lexicographic\r\n  //
ordering), wrapping around the specified upper_bound.\r\n  /**\r\n   * Increment an index into a tensor (in
lexicographic ordering), wrapping around the specified upper_bound.\r\n   * @param index Given index to
increment (Will be mutated)\r\n   * @param dims The dimensions of the tensor for which the given index
corresponds to\r\n   * @param axisToIncrementOn The 1-indexed axis to increment on. If undefined,
axisToIncrementOn == rank\r\n   */\r\n  static incrementIndex(index: number[], dims: readonly number[],
axisToIncrementOn?: number) {\r\n    if (dims.length === 0 || index.length === 0) {\r\n      throw new Error('Index
incrementing unsupported for scalar Tensor');\r\n    }\r\n    if (axisToIncrementOn === undefined) {\r\n
axisToIncrementOn = dims.length;\r\n    } else {\r\n      if (axisToIncrementOn <= 0 || axisToIncrementOn >
dims.length) {\r\n        throw new Error('Incorrect axis to increment on');\r\n      }\r\n    }\r\n\r\n    for (let k =
axisToIncrementOn - 1; k >= 0; --k) {\r\n      index[k]++;\r\n      if (index[k] < dims[k]) {\r\n        break;\r\n      }\r\n
  index[k] = 0;\r\n    }\r\n  }\r\n\r\n  /**\r\n   * Produces a new dimensions array based on the values in the
'originalDimensions' and 'shape' array\r\n   * Used in Reshape\r\n   * @param originalDims Original Shape array\r\n
 * @param shapeHints array containing values to compute the new dimensions\r\n   * For example:\r\n   *
originalDims = [2,2] and shapeHints = [0,-1] will return [2,2]\r\n   * originalDims = [2,2] and shapeHints = [4] will
return [4]\r\n   * originalDims = [2,2] and shapeHints = [5] will throw an exception\r\n   *
https://github.com/onnx/onnx/blob/master/docs/Operators.md#Reshape\r\n   */\r\n\r\n  static
calculateReshapedDims(originalDims: readonly number[], shapeHints: ArrayLike<number>): number[] {\r\n    //
reshape to a Scalar Tensor\r\n    if (shapeHints.length === 0) {\r\n      if (originalDims.length === 0 ||
ShapeUtil.size(originalDims) === 1) {\r\n        return [];\r\n      } else {\r\n        throw new Error('cannot reshape to a
scalar Tensor');\r\n      }\r\n    }\r\n\r\n    const nDims = shapeHints.length;\r\n    const reshapedDims = new
Array<number>(nDims);\r\n    let unknownDimension = -1;\r\n    let newTensorSize = 1;\r\n    for (let i = 0; i <
nDims; i++) {\r\n      if (shapeHints[i] < -1) {\r\n        throw new Error('a dimension in shape hints cannot be less
than -1');\r\n      }\r\n      if (shapeHints[i] === -1) {\r\n        if (unknownDimension !== -1) {\r\n          throw new
Error('at most one dimension in shape hints can be -1');\r\n        }\r\n        unknownDimension = i;\r\n      } else {\r\n
     if (shapeHints[i] === 0) {\r\n          if (i >= originalDims.length) {\r\n            throw new Error('the dimension
with value zero exceeds the dimension size of the input tensor');\r\n          }\r\n          reshapedDims[i] =
originalDims[i];\r\n        } else {\r\n          reshapedDims[i] = shapeHints[i];\r\n        }\r\n        newTensorSize *=
reshapedDims[i];\r\n      }\r\n    }\r\n\r\n    const oldTensorSize = ShapeUtil.size(originalDims);\r\n    if
(unknownDimension !== -1) {\r\n      if (oldTensorSize % newTensorSize !== 0) {\r\n        throw new Error(`the
input tensor cannot be reshaped to the requested shape. Input shape: [${\r\n            originalDims}] Output shape:
[${shapeHints}]`);\r\n      }\r\n      reshapedDims[unknownDimension] = oldTensorSize / newTensorSize;\r\n    }\r\n
  // validate sizes from originalDims and reshapedDims match\r\n    else {\r\n      if (newTensorSize !==
```

oldTensorSize) {\r\n   throw new Error('reshapedDims and originalDims don\\'t have matching sizes');\r\n   }\r\n   }\r\n   return reshapedDims;\r\n }\r\n\r\n /**\r\n   * Sorts a given array based on the indices in the Perm array\r\n   * Used in Transpose\r\n   * @param a Array to be sorted such as dims or strides\r\n   * @param perm Perm given; if null a will be reversed\r\n   */\r\n static sortBasedOnPerm(a: readonly number[], perm?: readonly number[]): readonly number[] {\r\n   if (perm) {\r\n   return perm.map((v) => a[v]);\r\n   } else {\r\n   return a.slice().reverse();\r\n   }\r\n }\r\n\r\n /**\r\n   * Pads a given shape according to the padding values\r\n   * @param dims shape of the Tensor to be padded\r\n   * @param pad pad values\r\n   */\r\n static padShape(dims: readonly number[], pad: readonly number[]): readonly number[] {\r\n   const rank = dims.length;\r\n   return dims.map((v, i) => v + pad[i] + pad[i + rank]);\r\n }\r\n\r\n /**\r\n   * Determines if the two shapes are identical\r\n   * @param shape1\r\n   * @param shape2\r\n   */\r\n static areEqual(shape1: readonly number[], shape2: readonly number[]): boolean {\r\n   if (shape1.length !== shape2.length) {\r\n   return false;\r\n   }\r\n   return shape1.every((v, i) => v === shape2[i]);\r\n }\r\n\r\n /**\r\n   * Validates if the given `dims` or `shape` is valid in ONNX.js context and returns data size\r\n   * @param dims - input `dims` that needs to be checked\r\n   */\r\n static validateDimsAndCalcSize(dims: readonly number[]): number {\r\n   if (dims.length > 6) {\r\n   throw new TypeError('Only rank 0 to 6 is supported for tensor shape.');\r\n   }\r\n   let size = 1;\r\n   for (const n of dims) {\r\n   if (!Number.isInteger(n)) {\r\n   throw new TypeError(`Invalid shape: ${n} is not an integer`);\r\n   }\r\n   if (n < 0 || n > 2147483647) {\r\n   throw new TypeError(`Invalid shape: length ${n} is not allowed`);\r\n   }\r\n   size *= n;\r\n   }\r\n   return size;\r\n }\r\n\r\n /**\r\n   * Determines the shape of output tensor y = flatten(x, axis)\r\n   * @param dims - shape of input tensor\r\n   * @param axis - flatten axis, in the range [-r, r]\r\n   */\r\n static flattenShape(dims: readonly number[], axis: number): readonly number[] {\r\n   if (axis < 0) {\r\n   axis += dims.length;\r\n   }\r\n   const total = dims.reduce((x, y) => x * y, 1);\r\n   const right = dims.slice(axis).reduce((x, y) => x * y, 1);\r\n   const outputDims = [total / right, right];\r\n\r\n   return outputDims;\r\n }\r\n\r\n /**\r\n   * Determines the shape of output tensor y = squeeze(x, axes)\r\n   * @param dims - shape of input tensor\r\n   * @param axes - squeeze axes\r\n   */\r\n static squeezeShape(dims: readonly number[], axes: readonly number[]): readonly number[] {\r\n   const outputDims = new Array<number>();\r\n\r\n   // sanity check\r\n   axes = ShapeUtil.normalizeAxes(axes, dims.length);\r\n\r\n   for (let i = 0; i < dims.length; i++) {\r\n   const inSqueezeList = axes.indexOf(i) >= 0;\r\n   if (inSqueezeList && dims[i] !== 1) {\r\n   throw new Error('squeeze an axis of size different than 1');\r\n   }\r\n\r\n   if ((axes.length === 0 && dims[i] > 1) || (axes.length > 0 && !inSqueezeList)) {\r\n   outputDims.push(dims[i]);\r\n   }\r\n   }\r\n\r\n   return outputDims;\r\n }\r\n\r\n /**\r\n   * Determines the shape of output tensor y = unsqueeze(x, axes)\r\n   * @param dims - shape of input tensor\r\n   * @param axes - unsqueeze axes\r\n   */\r\n static unsqueezeShape(dims: readonly number[], axes: readonly number[]): readonly number[] {\r\n   const outputDims = new Array<number>(dims.length + axes.length);\r\n\r\n   // initialize the array elements to 0\r\n   outputDims.fill(0);\r\n\r\n   // set all axes indices to 1 in outputDims and check for duplicates\r\n   for (let i = 0; i < axes.length; i++) {\r\n   const axis = ShapeUtil.normalizeAxis(axes[i], dims.length);\r\n   if (axis >= outputDims.length) {\r\n   throw new Error('\\'axes\\' has an out of range axis');\r\n   }\r\n   if (outputDims[axis] !== 0) {\r\n   throw new Error('\\'axes\\' has a duplicate axis');\r\n   }\r\n\r\n   outputDims[axis] = 1;\r\n   }\r\n\r\n   // fill in the zero entries of outputDims with the input tensor's shape\r\n   let inputDimsIterator = 0;\r\n   for (let i = 0; i < outputDims.length; i++) {\r\n   if (outputDims[i] === 0) {\r\n   outputDims[i] = dims[inputDimsIterator++];\r\n   }\r\n   }\r\n\r\n   // sanity check assertion. 'inputDimsIterator'\r\n   // should be equal to the length of 'dims'\r\n   if (inputDimsIterator !== dims.length) {\r\n   throw new Error('the unsqueezed dimension could not be established');\r\n   }\r\n\r\n   return outputDims;\r\n }\r\n}\r\n\r\n// bunch of helper methods that do a variety of math operations\r\nexport class MathUtil {\r\n // y = (x*x) + y\r\n static sqr(\r\n   target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number, sourceIndex: number,\r\n   blockSize: number) {\r\n   if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n   throw new Error('sourceIndex out of bounds');\r\n   }\r\n   if (targetIndex < 0 || targetIndex >= target.length) {\r\n   throw new Error('targetIndex out of bounds');\r\n   }\r\n   if (sourceIndex + blockSize > source.length) {\r\n   throw new Error('source indices to be copied are outside bounds');\r\n   }\r\n   if (targetIndex + blockSize > target.length) {\r\n   throw new Error('target array is too small to hold result');\r\n   }\r\n\r\n   for (let offset = 0; offset < blockSize; offset++) {\r\n   target[targetIndex + offset] += Math.pow(source[sourceIndex + offset], 2);\r\n   }\r\n }\r\n\r\n // y = ax + y\r\n static axpy(\r\n   target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number, sourceIndex: number,\r\n   blockSize: number, alpha: number) {\r\n   if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n   throw new Error('sourceIndex out of bounds');\r\n   }\r\n   if (targetIndex < 0 || targetIndex >= target.length) {\r\n   throw new Error('targetIndex out of bounds');\r\n   }\r\n   if (sourceIndex + blockSize > source.length) {\r\n   throw new Error('source indices to be copied are outside bounds');\r\n   }\r\n   if (targetIndex + blockSize > target.length) {\r\n   throw new Error('target array is too small to hold result');\r\n   }\r\n\r\n   for (let offset = 0; offset < blockSize; offset++) {\r\n   target[targetIndex + offset] += (alpha * source[sourceIndex + offset]);\r\n   }\r\n }\r\n\r\n // y = pow(x, b)\r\n static powx(\r\n   target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number, sourceIndex: number,\r\n   blockSize: number, b: number) {\r\n   if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n   throw new Error('sourceIndex out of bounds');\r\n   }\r\n   if (targetIndex < 0 || targetIndex >= target.length) {\r\n   throw new Error('targetIndex out of bounds');\r\n   }\r\n   if (sourceIndex + blockSize > source.length) {\r\n   throw new Error('source indices to be copied are outside bounds');\r\n   }\r\n   if (targetIndex + blockSize > target.length) {\r\n   throw new Error('target array is too small to hold result');\r\n   }\r\n\r\n   for (let offset = 0; offset < blockSize; offset++) {\r\n   target[targetIndex + offset] = Math.pow(source[sourceIndex + offset], b);\r\n   }\r\n }\r\n\r\n // y = x * y\r\n static mul(\r\n   target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number, sourceIndex: number,\r\n   blockSize: number) {\r\n   if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n   throw new Error('sourceIndex out of bounds');\r\n   }\r\n   if (targetIndex < 0 || targetIndex >= target.length) {\r\n   throw new Error('targetIndex out of bounds');\r\n   }\r\n   if (sourceIndex + blockSize > source.length) {\r\n   throw new Error('source indices to be copied are outside bounds');\r\n   }\r\n   if (targetIndex + blockSize > target.length) {\r\n   throw new Error('target array is too small to hold result');\r\n   }\r\n\r\n   for (let offset = 0; offset < blockSize; offset++) {\r\n   target[targetIndex + offset] = (source[sourceIndex + offset] * target[targetIndex + offset]);\r\n   }\r\n }\r\n}\r\n\r\nexport class SplitUtil {\r\n /**\r\n   * Calculates new Shapes from existing one and the splits given along the axis provides\r\n   * @param dims Shape of the Tensor to be splitted into two or more Shapes\r\n   * @param axis The dimension along which the Tensor will be split\r\n   * @param splits Offsets for the start of each split\r\n   */\r\n static splitShape(dims: readonly number[], axis: number, split: number[], numOutputs?: number):\r\n   [number[][], number[]] {\r\n   if (split.length === 0) {\r\n   if (!numOutputs) {\r\n   throw new Error('need to know number of outputs when the \\'split\\' attribute is not specified');\r\n   }\r\n   SplitUtil.determineSplit(dims[axis], numOutputs, split);\r\n   }\r\n\r\n   const shapes: number[][] = [];\r\n   const offsets = [0];\r\n   for (let i = 0; i < split.length; ++i) {\r\n   if (i !== 0) {\r\n   offsets.push(offsets[i - 1] + split[i - 1]);\r\n   }\r\n   const shape = dims.slice();\r\n   shape[axis] = split[i];\r\n   shapes.push(shape);\r\n   }\r\n   return [shapes, offsets];\r\n }\r\n\r\n static determineSplit(numElementsAlongAxis: number, numOutputs: number, split: number[]) {\r\n   // If 'split' is not specified by the user, we need to partition the number of elements equally among the outputs\r\n   if (numElementsAlongAxis % numOutputs !== 0) {\r\n   throw new Error('cannot split tensor to equal sized parts');\r\n   }\r\n   for (let i = 0; i < numOutputs; ++i) {\r\n   split.push(numElementsAlongAxis / numOutputs);\r\n   }\r\n }\r\n}\r\n\r\nexport class ReduceUtil {\r\n /**\r\n   * Perform reduce operations on the specific operator\r\n   * @param a Input tensor data\r\n   * @param axes The dimensions along which the Tensor will be reduced\r\n   * @param keepdims If set to true, the axes which are reduced are left in the\r\n   *   result as dimensions with size one.\r\n   * @param op1 The operation to be performed on each element in the tensor\r\n   * @param op2 The operation to be performed between elements in the tensor\r\n   */\r\n static calcReduce(\r\n   a: Tensor, axes: number[], keepdims: boolean, op1: (b: number) => number,\r\n   op2: (a: number, b: number) => number): Tensor {\r\n   const dims = a.dims.slice(0);\r\n   // if axes is not set, perform reduce on all axes\r\n   if (axes.length === 0) {\r\n   dims.forEach((d, ind) => axes.push(ind));\r\n   }\r\n   // get a temporary broadcastable output shape\r\n   const outputDims = ReduceUtil.calcReduceShape(dims, axes, true);\r\n\r\n   // loop through the output and calculate result one by one\r\n   const size = ShapeUtil.size(outputDims);\r\n   const y = new Tensor(outputDims, a.type);\r\n   const strides = ShapeUtil.computeStrides(outputDims);\r\n   const inputStrides = ShapeUtil.computeStrides(dims);\r\n   const indicesY = new Array(dims.length);\r\n   for (let i = 0; i < size; i++) {\r\n   const indices = ShapeUtil.offsetToIndices(i, strides);\r\n   // map index\r\n BroadcastUtil.fillIndex(indices, dims, indicesY);\r\n   y.set(\r\n   indices,\r\n ReduceUtil.calcReduceByAxis(\r\n   a.numberData, axes, dims, 0, ShapeUtil.indicesToOffset(indicesY, inputStrides), op1, op2));\r\n   }\r\n\r\n   if (keepdims) {\r\n   return y;\r\n   } else {\r\n   // keepdims == 0, calculate the expected shape\r\n   return new Tensor(\r\n   ReduceUtil.calcReduceShape(dims, axes, keepdims), y.type, undefined, undefined, y.data, y.dataId);\r\n   }\r\n }\r\n\r\n /**\r\n   * Perform reduce operations on the specific operator on specific axes\r\n   * @param a Input tensor data\r\n   * @param axes The dimensions along which the Tensor will be reduced\r\n   * @param dims The input dimension.\r\n   * @param curAxisInd Index in axes specifying the current dimension along\r\n   *   which the tensor will be reduced\r\n   * @param pos The current index of element to perform operation\r\n   * @param op1 The operation to be performed on each element in the tensor\r\n   * @param op2 The operation to be performed between elements in the tensor\r\n   */\r\n static calcReduceByAxis(\r\n   input: Tensor.NumberType, axes: number[], dims: number[], curAxisInd: number, pos: number,\r\n   op1: (b: number) => number, op2: (a: number, b: number) => number): number {\r\n   let res = 0;\r\n   if (curAxisInd >= axes.length) {\r\n   return op1(input[pos]);\r\n   }\r\n   const axis = axes[curAxisInd];\r\n   const step = axis >= dims.length ? 1 : ShapeUtil.size(dims.slice(axis + 1));\r\n   for (let i = 0; i < dims[axis]; i++) {\r\n   res = i === 0 ? ReduceUtil.calcReduceByAxis(input, axes, dims, curAxisInd + 1, pos, op1, op2) :\r\n   op2(res, ReduceUtil.calcReduceByAxis(input, axes, dims, curAxisInd + 1, pos, op1, op2));\r\n   pos += step;\r\n   }\r\n   return res;\r\n }\r\n\r\n /**\r\n   * Calculate the expected shape of a reduce operation\r\n   * @param dims The input tensor dimension\r\n   * @param axes The dimensions along which the Tensor will be reduced\r\n   * @param keepdims If set to true, the axes which are reduced are left in the\r\n   *   result as dimensions with size one.\r\n   */\r\n static calcReduceShape(dims: readonly number[], axes: readonly number[], keepDims: boolean): number[] {\r\n   const outputDims = dims.slice();\r\n   for (let i = 0; i < axes.length; i++) {\r\n   if (keepDims) {\r\n   outputDims[axes[i]] = 1;\r\n   } else {\r\n   outputDims[axes[i]] = 0;\r\n   }\r\n   }\r\n   return outputDims.filter(dim => dim !== 0);\r\n }\r\n}\r\n\r\nexport class PoolConvUtil {\r\n /**\r\n   * Adjust the kernel, strides, pads to correct rank. Set to default value if not present\r\n   * @param isGlobalOperator If true, perform global pooling.\r\n   * @param inputDims The input tensor dimension.\r\n   * @param kernelShape The size of the kernel along each axis.\r\n   * @param strides Stride along each axis.\r\n   * @param pads Padding for the beginning and ending along each axis.\r\n   */\r\n static adjustPoolAttributes(\r\n   isGlobalOperator: boolean, inputDims: readonly number[], kernelShape: number[], strides: number[],\r\n   pads: number[]) {\r\n   if (!isGlobalOperator && kernelShape.length !== inputDims.length - 2) {\r\n   throw new Error('length of specified kernel shapes should be 2 less than length of input dimensions');\r\n   }\r\n\r\n   if (isGlobalOperator) {\r\n   // adjust kernel shape to cover the input dims\r\n   for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n   if (dim >= kernelShape.length) {\r\n   kernelShape.push(inputDims[dim + 2]);\r\n   } else {\r\n kernelShape[dim] = inputDims[dim + 2];\r\n   }\r\n   }\r\n   }\r\n\r\n   // adjust strides length to match kernel shape length\r\n   for (let dim = 0; dim < kernelShape.length; dim++) {\r\n   if (dim < strides.length) {\r\n   if (strides[dim] < 0) {\r\n   throw new Error('strides should be greater than or equal to 1');\r\n   }\r\n   } else {\r\n   strides.push(1);\r\n   }\r\n   }\r\n\r\n   // adjust pads length to match 2 * kernel shape length\r\n   for (let dim = 0; dim < kernelShape.length * 2; dim++) {\r\n   if (dim < pads.length) {\r\n   if (pads[dim] < 0) {\r\n throw new Error('pad should be greater than or equal to 1');\r\n   }\r\n   } else {\r\n   pads.push(0);\r\n   }\r\n   }\r\n\r\n   // sanity checks for values in kernel shapes and pads\r\n   for (let dim = 0; dim < kernelShape.length; dim++) {\r\n   if (kernelShape[dim] <= 0) {\r\n   throw new Error('kernel shapes need to be greater than 0');\r\n   }\r\n\r\n   if (pads[dim] >= kernelShape[dim] || pads[dim + kernelShape.length] >= kernelShape[dim]) {\r\n   throw new Error('pads should be smaller than kernel');\r\n   }\r\n   }\r\n }\r\n\r\n // adjust pad values based on 'autoPad' attribute\r\n static adjustPadsBasedOnAutoPad(\r\n   inputDims: readonly number[], strides: readonly number[], dilations: readonly number[],\r\n   kernelShape: readonly number[], pads:

number[], autoPad?: string) {\r\n if (!autoPad) {\r\n return;\r\n }\r\n\r\n if (pads.length !== 2 * (inputDims.length - 2)) {\r\n throw new Error('length of pads should be twice the length of data dimensions');\r\n }\r\n\r\n if (strides.length !== (inputDims.length - 2)) {\r\n throw new Error('length of strides should be the length of data dimensions');\r\n }\r\n\r\n if (kernelShape.length !== (inputDims.length - 2)) {\r\n throw new Error('length of kernel shapes should be the length of data dimensions');\r\n }\r\n\r\n for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n PoolConvUtil.adjustPadAndReturnShape(\r\n inputDims[dim + 2], strides[dim], dilations[dim], kernelShape[dim], pads, dim, dim + inputDims.length - 2,\r\n autoPad);\r\n }\r\n }\r\n\r\n /**\r\n * Calculate the output shape for Pool ops based on input attributes. (Should be used only for Pool ops)\r\n * @param isGlobalOperator If true, perform global pooling.\r\n * @param inputDims The input tensor dimension. (inputs[0].dims)\r\n * @param strides Stride along each axis.\r\n * @param kernelShape The size of the kernel along each axis.\r\n * @param pads Padding for the beginning and ending along each axis.\r\n * @param autoPad DEPRECATED attribute supported for legacy models. Specifies how to implicitly calculate pads in each\r\n * dimension. Can take values NOTSET, SAME_UPPER, SAME_LOWER, or VALID.\r\n */\r\n static computePoolOutputShape(\r\n isGlobalOperator: boolean, inputDims: readonly number[], strides: number[], kernelShape: number[], pads: number[],\r\n autoPad?: string): number[] {\r\n if (inputDims.length <= 0) {\r\n throw new Error('input shape must be of size greater than 0');\r\n }\r\n\r\n // Add batch size and number of channels of output\r\n const outputDims = [inputDims[0], inputDims[1]];\r\n\r\n // TODO: support dilations for pool operators\r\n const dilations = new Array<number>(kernelShape.length).fill(1);\r\n\r\n PoolConvUtil.computeShapeHelper(\r\n isGlobalOperator, inputDims, outputDims, strides, dilations, kernelShape, pads, autoPad);\r\n return outputDims;\r\n }\r\n\r\n /**\r\n * Calculate the output shape for Conv op based on input attributes. (Should be used only for Conv op)\r\n * @param inputDims The input tensor dimension. (inputs[0].dims)\r\n * @param filterDims The filter tensor dimension. (inputs[1].dims)\r\n * @param strides Stride along each axis.\r\n * @param kernelShape The size of the kernel along each axis.\r\n * @param pads Padding for the beginning and ending along each axis.\r\n * @param autoPad DEPRECATED attribute supported for legacy models. Specifies how to implicitly calculate pads in each\r\n * dimension. Can take values NOTSET, SAME_UPPER, SAME_LOWER, or VALID.\r\n */\r\n static computeConvOutputShape(\r\n inputDims: readonly number[], filterDims: readonly number[], strides: number[], dilations: number[],\r\n kernelShape: number[], pads: number[], autoPad?: string): number[] {\r\n if (inputDims.length <= 0 || filterDims.length <= 0) {\r\n throw new Error('invalid input tensor dims or invalid filter tensor dims');\r\n }\r\n\r\n // Add batch size and number of channels of output\r\n const outputDims = [inputDims[0], filterDims[0]];\r\n\r\n PoolConvUtil.computeShapeHelper(false, inputDims, outputDims, strides, dilations, kernelShape, pads, autoPad);\r\n return outputDims;\r\n }\r\n\r\n // will compute output shapes for data dimensions ONLY (i.e.) no batch size and channels\r\n // called by computePoolOutputShape() and computeConvOutputShape()\r\n // adjust pads based on 'autoPad' attribute prior to shape computation\r\n private static computeShapeHelper(\r\n isGlobalOperator: boolean, inputDims: readonly number[], outputDims: number[], strides: readonly number[],\r\n dilations: readonly number[], kernelShape: readonly number[], pads: number[], autoPad?: string) {\r\n if (isGlobalOperator) {\r\n for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n outputDims.push(1);\r\n }\r\n } else {\r\n for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n outputDims.push(PoolConvUtil.adjustPadAndReturnShape(\r\n inputDims[dim + 2], strides[dim], dilations[dim], kernelShape[dim], pads, dim, dim + inputDims.length - 2,\r\n autoPad));\r\n }\r\n }\r\n }\r\n\r\n // helper for computeShapeHelper() and adjustPadsBasedOnAutoPad()\r\n // adjusts pad value for given 'autoPad' string and computes output shape along a particular dimension\r\n private static adjustPadAndReturnShape(\r\n inSize: number, stride: number, dilation: number, kernel: number, pads: number[], padHeadIndex: number,\r\n padTailIndex: number, autoPad?: string): number {\r\n const dkernel = dilation * (kernel - 1) + 1;\r\n if (autoPad && autoPad !== 'NOTSET') {\r\n switch (autoPad) {\r\n case 'VALID':\r\n pads[padHeadIndex] = 0;\r\n pads[padTailIndex] = 0;\r\n return Math.floor(((inSize - dkernel) / stride) + 1);\r\n case 'SAME_LOWER':\r\n case 'SAME_UPPER':\r\n if (dilation !== 1) {\r\n throw new Error('Dilation not supported for SAME_UPPER or SAME_LOWER');\r\n } else {\r\n const legacyTargetSize = (inSize + stride - 1) / stride;\r\n const padNeeded = (legacyTargetSize - 1) * stride + kernel - inSize;\r\n pads[padHeadIndex] =\r\n (autoPad === 'SAME_LOWER') ? Math.floor((padNeeded + 1) / 2) : Math.floor(padNeeded / 2);\r\n pads[padTailIndex] = padNeeded - pads[padHeadIndex];\r\n return Math.floor(((inSize + padNeeded - kernel) / stride) + 1);\r\n }\r\n default:\r\n throw new Error('Unsupported AutoPad type');\r\n }\r\n } else {\r\n return Math.floor(((inSize + pads[padHeadIndex] + pads[padTailIndex] - dkernel) / stride) + 1);\r\n }\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\ninterface ExtraOptionsHandler {\r\n (name: string, value: string): void;\r\n}\r\n\r\nexport const iterateExtraOptions =\r\n (options: Record<string, unknown>, prefix: string, seen: WeakSet<Record<string, unknown>>,\r\n handler: ExtraOptionsHandler): void => {\r\n if (typeof options == 'object' && options !== null) {\r\n if (seen.has(options)) {\r\n throw new Error('Circular reference in options');\r\n } else {\r\n seen.add(options);\r\n }\r\n }\r\n\r\n Object.entries(options).forEach(([key, value]) => {\r\n const name = (prefix) ? prefix + key : key;\r\n if (typeof value === 'object') {\r\n iterateExtraOptions(value as Record<string, unknown>, name + '.', seen, handler);\r\n } else if (typeof value === 'string' || typeof value === 'number') {\r\n handler(name, value.toString());\r\n } else if (typeof value === 'boolean') {\r\n handler(name, (value) ? '1' : '0');\r\n } else {\r\n throw new Error(`Can't handle extra config type: ${typeof value}`);\r\n }\r\n });\r\n };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env, InferenceSession} from 'onnxruntime-common';\r\nimport {OrtWasmMessage, SerializableSessionMetadata, SerializableTensor} from './proxy-messages';\r\nimport * as core from './wasm-core-impl';\r\nimport {initializeWebAssembly} from './wasm-factory';\r\n\r\nconst isProxy = (): boolean => !!env.wasm.proxy && typeof document !== 'undefined';\r\nlet proxyWorker: Worker|undefined;\r\nlet initializing = false;\r\nlet initialized = false;\r\nlet aborted = false;\r\n\r\n// resolve; reject\r\ntype PromiseCallbacks<T = void> = [(result: T) => void, (reason: unknown) => void];\r\n\r\nlet initWasmCallbacks: PromiseCallbacks;\r\nlet initOrtCallbacks: PromiseCallbacks;\r\nconst createSessionCallbacks: Array<PromiseCallbacks<SerializableSessionMetadata>> = [];\r\nconst releaseSessionCallbacks: Array<PromiseCallbacks<void>> = [];\r\nconst runCallbacks: Array<PromiseCallbacks<SerializableTensor[]>> = [];\r\nconst endProfilingCallbacks: Array<PromiseCallbacks<void>> = [];\r\n\r\nconst ensureWorker = (): void => {\r\n if (initializing || !initialized || aborted || !proxyWorker) {\r\n throw new Error('worker not ready');\r\n }\r\n};\r\n\r\nconst onProxyWorkerMessage = (ev: MessageEvent<OrtWasmMessage>): void => {\r\n switch (ev.data.type) {\r\n case 'init-wasm':\r\n initializing = false;\r\n if (ev.data.err) {\r\n aborted = true;\r\n initWasmCallbacks[1](ev.data.err);\r\n } else {\r\n initialized = true;\r\n initWasmCallbacks[0]();\r\n }\r\n break;\r\n case 'init-ort':\r\n if (ev.data.err) {\r\n initOrtCallbacks[1](ev.data.err);\r\n } else {\r\n initOrtCallbacks[0]();\r\n }\r\n break;\r\n case 'create':\r\n if (ev.data.err) {\r\n createSessionCallbacks.shift()![1](ev.data.err);\r\n } else {\r\n createSessionCallbacks.shift()![0](ev.data.out!);\r\n }\r\n break;\r\n case 'release':\r\n if (ev.data.err) {\r\n releaseSessionCallbacks.shift()![1](ev.data.err);\r\n } else {\r\n releaseSessionCallbacks.shift()![0]();\r\n }\r\n break;\r\n case 'run':\r\n if (ev.data.err) {\r\n runCallbacks.shift()![1](ev.data.err);\r\n } else {\r\n runCallbacks.shift()![0](ev.data.out!);\r\n }\r\n break;\r\n case 'end-profiling':\r\n if (ev.data.err) {\r\n endProfilingCallbacks.shift()![1](ev.data.err);\r\n } else {\r\n endProfilingCallbacks.shift()![0]();\r\n }\r\n break;\r\n default:\r\n }\r\n};\r\n\r\nconst scriptSrc = typeof document !== 'undefined' ? (document?.currentScript as HTMLScriptElement)?.src : undefined;\r\n\r\nexport const initWasm = async(): Promise<void> => {\r\n if (isProxy()) {\r\n if (initialized) {\r\n return;\r\n }\r\n if (initializing) {\r\n throw new Error('multiple calls to \\'initWasm()\\' detected.');\r\n }\r\n if (aborted) {\r\n throw new Error('previous call to \\'initWasm()\\' failed.');\r\n }\r\n\r\n initializing = true;\r\n\r\n // overwrite wasm filepaths\r\n if (env.wasm.wasmPaths === undefined) {\r\n if (scriptSrc && scriptSrc.indexOf('blob:') !== 0) {\r\n env.wasm.wasmPaths = scriptSrc.substr(0, (scriptSrc as string).lastIndexOf('/') + 1);\r\n }\r\n }\r\n\r\n return new Promise<void>((resolve, reject) => {\r\n proxyWorker?.terminate();\r\n // eslint-disable-next-line @typescript-eslint/no-var-requires, @typescript-eslint/no-require-imports\r\n proxyWorker =

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require('worker-loader?inline=no-fallback!./proxy-worker/main').default() as Worker;\r\n
proxyWorker.onmessage = onProxyWorkerMessage;\r\n      initWasmCallbacks = [resolve, reject];\r\n      const
message: OrtWasmMessage = {type: 'init-wasm', in : env.wasm};\r\n      proxyWorker.postMessage(message);\r\n
});\r\n\r\n  } else {\r\n    return initializeWebAssembly(env.wasm);\r\n  }\r\n};\r\n\r\nexport const initOrt =
async(numThreads: number, loggingLevel: number): Promise<void> => {\r\n  if (isProxy()) {\r\n
ensureWorker();\r\n    return new Promise<void>((resolve, reject) => {\r\n      initOrtCallbacks = [resolve,
reject];\r\n      const message: OrtWasmMessage = {type: 'init-ort', in : {numThreads, loggingLevel}};\r\n
proxyWorker!.postMessage(message);\r\n    });\r\n  } else {\r\n    core.initOrt(numThreads, loggingLevel);\r\n
}\r\n};\r\n\r\nexport const createSession =\r\n    async(model: Uint8Array, options?:
InferenceSession.SessionOptions): Promise<SerializableSessionMetadata> => {\r\n  if (isProxy()) {\r\n
ensureWorker();\r\n    return new Promise<SerializableSessionMetadata>((resolve, reject) => {\r\n
createSessionCallbacks.push([resolve, reject]);\r\n      const message: OrtWasmMessage = {type: 'create', in :
{model, options}};\r\n      proxyWorker!.postMessage(message, [model.buffer]);\r\n    });\r\n  } else {\r\n    return
core.createSession(model, options);\r\n  }\r\n};\r\n\r\nexport const releaseSession = async(sessionId: number):
Promise<void> => {\r\n  if (isProxy()) {\r\n    ensureWorker();\r\n    return new Promise<void>((resolve, reject) =>
{\r\n      releaseSessionCallbacks.push([resolve, reject]);\r\n      const message: OrtWasmMessage = {type: 'release',
in : sessionId};\r\n      proxyWorker!.postMessage(message);\r\n    });\r\n  } else {\r\n
core.releaseSession(sessionId);\r\n  }\r\n};\r\n\r\nexport const run = async(\r\n    sessionId: number, inputIndices:
number[], inputs: SerializableTensor[], outputIndices: number[],\r\n    options: InferenceSession.RunOptions):
Promise<SerializableTensor[]> => {\r\n  if (isProxy()) {\r\n    ensureWorker();\r\n    return new
Promise<SerializableTensor[]>((resolve, reject) => {\r\n      runCallbacks.push([resolve, reject]);\r\n      const
message: OrtWasmMessage = {type: 'run', in : {sessionId, inputIndices, inputs, outputIndices, options}};\r\n
proxyWorker!.postMessage(message, core.extractTransferableBuffers(inputs));\r\n    });\r\n  } else {\r\n    return
core.run(sessionId, inputIndices, inputs, outputIndices, options);\r\n  }\r\n};\r\n\r\nexport const endProfiling =
async(sessionId: number): Promise<void> => {\r\n  if (isProxy()) {\r\n    ensureWorker();\r\n    return new
Promise<void>((resolve, reject) => {\r\n      endProfilingCallbacks.push([resolve, reject]);\r\n      const message:
OrtWasmMessage = {type: 'end-profiling', in : sessionId};\r\n      proxyWorker!.postMessage(message);\r\n    });\r\n
} else {\r\n    core.endProfiling(sessionId);\r\n  }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights
reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceSession} from 'onnxruntime-
common';\r\n\r\nimport {iterateExtraOptions} from './options-utils';\r\nimport {allocWasmString} from './string-
utils';\r\nimport {getInstance} from './wasm-factory';\r\n\r\nexport const setRunOptions = (options:
InferenceSession.RunOptions): [number, number[]] => {\r\n  const wasm = getInstance();\r\n  let runOptionsHandle
= 0;\r\n  const allocs: number[] = [];\r\n\r\n  const runOptions: InferenceSession.RunOptions = options || {};\r\n\r\n
try {\r\n    if (options?.logSeverityLevel === undefined) {\r\n      runOptions.logSeverityLevel = 2;  // Default to
warning\r\n    } else if (\r\n        typeof options.logSeverityLevel !== 'number' ||
!Number.isInteger(options.logSeverityLevel) ||\r\n        options.logSeverityLevel < 0 || options.logSeverityLevel > 4)
{\r\n      throw new Error(`log serverity level is not valid: ${options.logSeverityLevel}`);\r\n    }\r\n\r\n    if
(options?.logVerbosityLevel === undefined) {\r\n      runOptions.logVerbosityLevel = 0;  // Default to 0\r\n    } else
if (typeof options.logVerbosityLevel !== 'number' || !Number.isInteger(options.logVerbosityLevel)) {\r\n      throw
new Error(`log verbosity level is not valid: ${options.logVerbosityLevel}`);\r\n    }\r\n\r\n    if (options?.terminate
=== undefined) {\r\n      runOptions.terminate = false;\r\n    }\r\n\r\n    let tagDataOffset = 0;\r\n    if (options?.tag
!== undefined) {\r\n      tagDataOffset = allocWasmString(options.tag, allocs);\r\n    }\r\n\r\n    runOptionsHandle =
wasm._OrtCreateRunOptions(\r\n        runOptions.logSeverityLevel!, runOptions.logVerbosityLevel!,
!!runOptions.terminate!, tagDataOffset);\r\n    if (runOptionsHandle === 0) {\r\n      throw new Error('Can\\'t create
run options');\r\n    }\r\n\r\n    if (options?.extra !== undefined) {\r\n      iterateExtraOptions(options.extra, '', new
WeakSet<Record<string, unknown>>(), (key, value) => {\r\n        const keyDataOffset = allocWasmString(key,
allocs);\r\n        const valueDataOffset = allocWasmString(value, allocs);\r\n\r\n        if
(wasm._OrtAddRunConfigEntry(runOptionsHandle, keyDataOffset, valueDataOffset) !== 0) {\r\n          throw new
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Error(`Can't set a run config entry: ${key} - ${value}`);\r\n }\r\n });\r\n }\r\n\r\n return [runOptionsHandle, allocs];\r\n } catch (e) {\r\n if (runOptionsHandle !== 0) {\r\n wasm._OrtReleaseRunOptions(runOptionsHandle);\r\n }\r\n allocs.forEach(wasm._free);\r\n throw e;\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env, InferenceSession, SessionHandler, Tensor} from 'onnxruntime-common';\r\n\r\nimport {createSession, endProfiling, initOrt, releaseSession, run} from './proxy-wrapper';\r\n\r\nlet ortInit: boolean;\r\n\r\n\r\nconst getLogLevel = (logLevel: 'verbose'|'info'|'warning'|'error'|'fatal'): number => {\r\n switch (logLevel) {\r\n case 'verbose':\r\n return 0;\r\n case 'info':\r\n return 1;\r\n case 'warning':\r\n return 2;\r\n case 'error':\r\n return 3;\r\n case 'fatal':\r\n return 4;\r\n default:\r\n throw new Error(`unsupported logging level: ${logLevel}`);\r\n }\r\n};\r\n\r\nexport class OnnxruntimeWebAssemblySessionHandler implements SessionHandler {\r\n private sessionId: number;\r\n\r\n inputNames: string[];\r\n outputNames: string[];\r\n\r\n async loadModel(model: Uint8Array, options?: InferenceSession.SessionOptions): Promise<void> {\r\n if (!ortInit) {\r\n await initOrt(env.wasm.numThreads!, getLogLevel(env.logLevel!));\r\n ortInit = true;\r\n }\r\n\r\n [this.sessionId, this.inputNames, this.outputNames] = await createSession(model, options);\r\n }\r\n\r\n async dispose(): Promise<void> {\r\n return releaseSession(this.sessionId);\r\n }\r\n\r\n async run(feeds: SessionHandler.FeedsType, fetches: SessionHandler.FetchesType, options: InferenceSession.RunOptions):\r\n Promise<SessionHandler.ReturnType> {\r\n const inputArray: Tensor[] = [];\r\n const inputIndices: number[] = [];\r\n Object.entries(feeds).forEach(kvp => {\r\n const name = kvp[0];\r\n const tensor = kvp[1];\r\n const index = this.inputNames.indexOf(name);\r\n if (index === -1) {\r\n throw new Error(`invalid input '${name}'`);\r\n }\r\n inputArray.push(tensor);\r\n inputIndices.push(index);\r\n });\r\n\r\n const outputIndices: number[] = [];\r\n Object.entries(fetches).forEach(kvp => {\r\n const name = kvp[0];\r\n // TODO: support pre-allocated output\r\n const index = this.outputNames.indexOf(name);\r\n if (index === -1) {\r\n throw new Error(`invalid output '${name}'`);\r\n }\r\n outputIndices.push(index);\r\n });\r\n\r\n const outputs =\r\n await run(this.sessionId, inputIndices, inputArray.map(t => [t.type, t.dims, t.data]), outputIndices, options);\r\n\r\n const result: SessionHandler.ReturnType = {};\r\n for (let i = 0; i < outputs.length; i++) {\r\n result[this.outputNames[outputIndices[i]]] = new Tensor(outputs[i][0], outputs[i][2], outputs[i][1]);\r\n }\r\n return result;\r\n }\r\n\r\n startProfiling(): void {\r\n // TODO: implement profiling\r\n }\r\n\r\n endProfiling(): void {\r\n void endProfiling(this.sessionId);\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceSession} from 'onnxruntime-common';\r\n\r\nimport {iterateExtraOptions} from './options-utils';\r\nimport {allocWasmString} from './string-utils';\r\nimport {getInstance} from './wasm-factory';\r\n\r\nconst getGraphOptimzationLevel = (graphOptimizationLevel: string|unknown): number => {\r\n switch (graphOptimizationLevel) {\r\n case 'disabled':\r\n return 0;\r\n case 'basic':\r\n return 1;\r\n case 'extended':\r\n return 2;\r\n case 'all':\r\n return 99;\r\n default:\r\n throw new Error(`unsupported graph optimization level: ${graphOptimizationLevel}`);\r\n }\r\n};\r\n\r\nconst getExecutionMode = (executionMode: 'sequential'|'parallel'): number => {\r\n switch (executionMode) {\r\n case 'sequential':\r\n return 0;\r\n case 'parallel':\r\n return 1;\r\n default:\r\n throw new Error(`unsupported execution mode: ${executionMode}`);\r\n }\r\n};\r\n\r\nconst appendDefaultOptions = (options: InferenceSession.SessionOptions): void => {\r\n if (!options.extra) {\r\n options.extra = {};\r\n }\r\n if (!options.extra.session) {\r\n options.extra.session = {};\r\n }\r\n const session = options.extra.session as Record<string, string>;\r\n if (!session.use_ort_model_bytes_directly) {\r\n // eslint-disable-next-line camelcase\r\n session.use_ort_model_bytes_directly = '1';\r\n }\r\n};\r\n\r\nexport const setSessionOptions = (options?: InferenceSession.SessionOptions): [number, number[]] => {\r\n const wasm = getInstance();\r\n let sessionOptionsHandle = 0;\r\n const allocs: number[] = [];\r\n\r\n const sessionOptions: InferenceSession.SessionOptions = options || {};\r\n appendDefaultOptions(sessionOptions);\r\n\r\n try {\r\n if (options?.graphOptimizationLevel === undefined) {\r\n sessionOptions.graphOptimizationLevel = 'all';\r\n }\r\n const graphOptimizationLevel = getGraphOptimzationLevel(sessionOptions.graphOptimizationLevel!);\r\n\r\n if (options?.enableCpuMemArena

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=== undefined) {\r\n      sessionOptions.enableCpuMemArena = true;\r\n    }\r\n\r\n    if
(options?.enableMemPattern === undefined) {\r\n      sessionOptions.enableMemPattern = true;\r\n    }\r\n\r\n    if
(options?.executionMode === undefined) {\r\n      sessionOptions.executionMode = 'sequential';\r\n    }\r\n    const
executionMode = getExecutionMode(sessionOptions.executionMode!);\r\n\r\n    let logIdDataOffset = 0;\r\n    if
(options?.logId !== undefined) {\r\n      logIdDataOffset = allocWasmString(options.logId, allocs);\r\n    }\r\n\r\n
if (options?.logSeverityLevel === undefined) {\r\n      sessionOptions.logSeverityLevel = 2;  // Default to
warning\r\n    } else if (\r\n        typeof options.logSeverityLevel !== 'number' ||
!Number.isInteger(options.logSeverityLevel) ||\r\n        options.logSeverityLevel < 0 || options.logSeverityLevel > 4)
{\r\n      throw new Error(`log serverity level is not valid: ${options.logSeverityLevel}`);\r\n    }\r\n\r\n    if
(options?.logVerbosityLevel === undefined) {\r\n      sessionOptions.logVerbosityLevel = 0;  // Default to 0\r\n    }
else if (typeof options.logVerbosityLevel !== 'number' || !Number.isInteger(options.logVerbosityLevel)) {\r\n
throw new Error(`log verbosity level is not valid: ${options.logVerbosityLevel}`);\r\n    }\r\n\r\n    if
(options?.enableProfiling === undefined) {\r\n      sessionOptions.enableProfiling = false;\r\n    }\r\n\r\n
sessionOptionsHandle = wasm._OrtCreateSessionOptions(\r\n        graphOptimizationLevel,
!!sessionOptions.enableCpuMemArena!, !!sessionOptions.enableMemPattern!, executionMode,\r\n
!!sessionOptions.enableProfiling!, 0, logIdDataOffset, sessionOptions.logSeverityLevel!,\r\n
sessionOptions.logVerbosityLevel!);\r\n    if (sessionOptionsHandle === 0) {\r\n      throw new Error('Can\\'t create
session options');\r\n    }\r\n\r\n    if (options?.extra !== undefined) {\r\n      iterateExtraOptions(options.extra, '', new
WeakSet<Record<string, unknown>>(), (key, value) => {\r\n        const keyDataOffset = allocWasmString(key,
allocs);\r\n        const valueDataOffset = allocWasmString(value, allocs);\r\n\r\n        if
(wasm._OrtAddSessionConfigEntry(sessionOptionsHandle, keyDataOffset, valueDataOffset) !== 0) {\r\n
throw new Error(`Can't set a session config entry: ${key} - ${value}`);\r\n        }\r\n      });\r\n    }\r\n\r\n    return
[sessionOptionsHandle, allocs];\r\n  } catch (e) {\r\n    if (sessionOptionsHandle !== 0) {\r\n
wasm._OrtReleaseSessionOptions(sessionOptionsHandle);\r\n    }\r\n    allocs.forEach(wasm._free);\r\n    throw
e;\r\n  }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {getInstance} from './wasm-factory';\r\n\r\nexport const allocWasmString = (data: string,
allocs: number[]): number => {\r\n  const wasm = getInstance();\r\n\r\n  const dataLength =
wasm.lengthBytesUTF8(data) + 1;\r\n  const dataOffset = wasm._malloc(dataLength);\r\n
wasm.stringToUTF8(data, dataOffset, dataLength);\r\n  allocs.push(dataOffset);\r\n\r\n  return
dataOffset;\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {InferenceSession, Tensor} from 'onnxruntime-common';\r\nimport
{SerializableSessionMetadata, SerializableTensor} from './proxy-messages';\r\nimport {setRunOptions} from './run-
options';\r\nimport {setSessionOptions} from './session-options';\r\nimport {allocWasmString} from './string-
utils';\r\nimport {getInstance} from './wasm-factory';\r\n\r\n/**\r\n * initialize ORT environment.\r\n * @param
numThreads SetGlobalIntraOpNumThreads(numThreads)\r\n * @param loggingLevel
CreateEnv(static_cast<OrtLoggingLevel>(logging_level))\r\n */\r\nexport const initOrt = (numThreads: number,
loggingLevel: number): void => {\r\n  const errorCode = getInstance()._OrtInit(numThreads, loggingLevel);\r\n  if
(errorCode !== 0) {\r\n    throw new Error(`Can't initialize onnxruntime. error code = ${errorCode}`);\r\n
}\r\n};\r\n\r\n/**\r\n *  tuple elements are: InferenceSession ID; inputNamesUTF8Encoded;
outputNamesUTF8Encoded\r\n */\r\ntype SessionMetadata = [number, number[], number[]];\r\n\r\nconst
activeSessions: Array<SessionMetadata|undefined> = [];\r\n\r\n/**\r\n * create an instance of InferenceSession.\r\n
* @returns the metadata of InferenceSession. 0-value handle for failure.\r\n */\r\nexport const createSession =\r\n
(model: Uint8Array, options?: InferenceSession.SessionOptions): SerializableSessionMetadata => {\r\n      const
wasm = getInstance();\r\n      const modelDataOffset = wasm._malloc(model.byteLength);\r\n      let sessionHandle
= 0;\r\n      let sessionOptionsHandle = 0;\r\n      let allocs: number[] = [];\r\n\r\n      try {\r\n
[sessionOptionsHandle, allocs] = setSessionOptions(options);\r\n\r\n        wasm.HEAPU8.set(model,
modelDataOffset);\r\n        sessionHandle = wasm._OrtCreateSession(modelDataOffset, model.byteLength,
sessionOptionsHandle);\r\n        if (sessionHandle === 0) {\r\n          throw new Error('Can\\'t create a session');\r\n
```

}\r\n } finally {\r\n wasm._free(modelDataOffset);\r\n wasm._OrtReleaseSessionOptions(sessionOptionsHandle);\r\n allocs.forEach(wasm._free);\r\n }\r\n\r\n const inputCount = wasm._OrtGetInputCount(sessionHandle);\r\n const outputCount = wasm._OrtGetOutputCount(sessionHandle);\r\n\r\n const inputNames = [];\r\n const inputNamesUTF8Encoded = [];\r\n const outputNames = [];\r\n const outputNamesUTF8Encoded = [];\r\n for (let i = 0; i < inputCount; i++) {\r\n const name = wasm._OrtGetInputName(sessionHandle, i);\r\n if (name === 0) {\r\n throw new Error('Can\\'t get an input name');\r\n }\r\n inputNamesUTF8Encoded.push(name);\r\n inputNames.push(wasm.UTF8ToString(name));\r\n }\r\n for (let i = 0; i < outputCount; i++) {\r\n const name = wasm._OrtGetOutputName(sessionHandle, i);\r\n if (name === 0) {\r\n throw new Error('Can\\'t get an output name');\r\n }\r\n outputNamesUTF8Encoded.push(name);\r\n outputNames.push(wasm.UTF8ToString(name));\r\n }\r\n\r\n activeSessions.push([sessionHandle, inputNamesUTF8Encoded, outputNamesUTF8Encoded]);\r\n return [activeSessions.length - 1, inputNames, outputNames];\r\n };\r\n\r\nexport const releaseSession = (sessionId: number): void => {\r\n const wasm = getInstance();\r\n const session = activeSessions[sessionId];\r\n if (!session) {\r\n throw new Error('invalid session id');\r\n }\r\n const sessionHandle = session[0];\r\n const inputNamesUTF8Encoded = session[1];\r\n const outputNamesUTF8Encoded = session[2];\r\n\r\n inputNamesUTF8Encoded.forEach(wasm._OrtFree);\r\n outputNamesUTF8Encoded.forEach(wasm._OrtFree);\r\n wasm._OrtReleaseSession(sessionHandle);\r\n activeSessions[sessionId] = undefined;\r\n};\r\n\r\n/**\r\n * Copied from ONNX definition. Use this to drop dependency 'onnx_proto' to decrease compiled .js file size.\r\n */\r\nconst enum DataType {\r\n undefined = 0,\r\n float = 1,\r\n uint8 = 2,\r\n int8 = 3,\r\n uint16 = 4,\r\n int16 = 5,\r\n int32 = 6,\r\n int64 = 7,\r\n string = 8,\r\n bool = 9,\r\n float16 = 10,\r\n double = 11,\r\n uint32 = 12,\r\n uint64 = 13,\r\n complex64 = 14,\r\n complex128 = 15,\r\n bfloat16 = 16\r\n}\r\n\r\n\r\nconst tensorDataTypeStringToEnum = (type: string): DataType => {\r\n switch (type) {\r\n case 'int8':\r\n return DataType.int8;\r\n case 'uint8':\r\n return DataType.uint8;\r\n case 'bool':\r\n return DataType.bool;\r\n case 'int16':\r\n return DataType.int16;\r\n case 'uint16':\r\n return DataType.uint16;\r\n case 'int32':\r\n return DataType.int32;\r\n case 'uint32':\r\n return DataType.uint32;\r\n case 'float32':\r\n return DataType.float;\r\n case 'float64':\r\n return DataType.double;\r\n case 'string':\r\n return DataType.string;\r\n case 'int64':\r\n return DataType.int64;\r\n case 'uint64':\r\n return DataType.uint64;\r\n\r\n default:\r\n throw new Error(`unsupported data type: ${type}`);\r\n }\r\n};\r\n\r\nconst tensorDataTypeEnumToString = (typeProto: DataType): Tensor.Type => {\r\n switch (typeProto) {\r\n case DataType.int8:\r\n return 'int8';\r\n case DataType.uint8:\r\n return 'uint8';\r\n case DataType.bool:\r\n return 'bool';\r\n case DataType.int16:\r\n return 'int16';\r\n case DataType.uint16:\r\n return 'uint16';\r\n case DataType.int32:\r\n return 'int32';\r\n case DataType.uint32:\r\n return 'uint32';\r\n case DataType.float:\r\n return 'float32';\r\n case DataType.double:\r\n return 'float64';\r\n case DataType.string:\r\n return 'string';\r\n case DataType.int64:\r\n return 'int32';\r\n case DataType.uint64:\r\n return 'uint32';\r\n\r\n default:\r\n throw new Error(`unsupported data type: ${typeProto}`);\r\n }\r\n};\r\n\r\nconst numericTensorTypeToTypedArray = (type: Tensor.Type): Float32ArrayConstructor|Uint8ArrayConstructor|\r\n Int8ArrayConstructor|Uint16ArrayConstructor|Int16ArrayConstructor|Int32ArrayConstructor|BigInt64ArrayConstructor|\r\n Uint8ArrayConstructor|Float64ArrayConstructor|Uint32ArrayConstructor|BigUint64ArrayConstructor => {\r\n switch (type) {\r\n case 'float32':\r\n return Float32Array;\r\n case 'uint8':\r\n return Uint8Array;\r\n case 'int8':\r\n return Int8Array;\r\n case 'uint16':\r\n return Uint16Array;\r\n case 'int16':\r\n return Int16Array;\r\n case 'int32':\r\n return Int32Array;\r\n case 'bool':\r\n return Uint8Array;\r\n case 'float64':\r\n return Float64Array;\r\n case 'uint32':\r\n return Uint32Array;\r\n case 'int64':\r\n return BigInt64Array;\r\n case 'uint64':\r\n return BigUint64Array;\r\n default:\r\n throw new Error(`unsupported type: ${type}`);\r\n }\r\n };\r\n\r\n/**\r\n * perform inference run\r\n */\r\nexport const run =\r\n (sessionId: number, inputIndices: number[], inputs: SerializableTensor[], outputIndices: number[],\r\n options: InferenceSession.RunOptions):

```
SerializableTensor[] => {\r\n      const wasm = getInstance();\r\n      const session = activeSessions[sessionId];\r\n
if (!session) {\r\n        throw new Error('invalid session id');\r\n      }\r\n      const sessionHandle = session[0];\r\n
const inputNamesUTF8Encoded = session[1];\r\n      const outputNamesUTF8Encoded = session[2];\r\n\r\n      const
inputCount = inputIndices.length;\r\n      const outputCount = outputIndices.length;\r\n\r\n      let runOptionsHandle
= 0;\r\n      let runOptionsAllocs: number[] = [];\r\n\r\n      const inputValues: number[] = [];\r\n      const
inputAllocs: number[] = [];\r\n\r\n      try {\r\n        [runOptionsHandle, runOptionsAllocs] =
setRunOptions(options);\r\n\r\n        // create input tensors\r\n        for (let i = 0; i < inputCount; i++) {\r\n          const
dataType = inputs[i][0];\r\n          const dims = inputs[i][1];\r\n          const data = inputs[i][2];\r\n\r\n          let
dataOffset: number;\r\n          let dataByteLength: number;\r\n\r\n          if (Array.isArray(data)) {\r\n            // string
tensor\r\n            dataByteLength = 4 * data.length;\r\n            dataOffset = wasm._malloc(dataByteLength);\r\n
  inputAllocs.push(dataOffset);\r\n            let dataIndex = dataOffset / 4;\r\n            for (let i = 0; i < data.length; i++)
{\r\n              if (typeof data[i] !== 'string') {\r\n                throw new TypeError(`tensor data at index ${i} is not a
string`);\r\n              }\r\n              wasm.HEAPU32[dataIndex++] = allocWasmString(data[i], inputAllocs);\r\n
}\r\n          } else {\r\n            dataByteLength = data.byteLength;\r\n            dataOffset =
wasm._malloc(dataByteLength);\r\n            inputAllocs.push(dataOffset);\r\n            wasm.HEAPU8.set(new
Uint8Array(data.buffer, data.byteOffset, dataByteLength), dataOffset);\r\n          }\r\n\r\n          const stack =
wasm.stackSave();\r\n          const dimsOffset = wasm.stackAlloc(4 * dims.length);\r\n          try {\r\n            let
dimIndex = dimsOffset / 4;\r\n            dims.forEach(d => wasm.HEAP32[dimIndex++] = d);\r\n            const tensor
= wasm._OrtCreateTensor(\r\n                tensorDataTypeStringToEnum(dataType), dataOffset, dataByteLength,
dimsOffset, dims.length);\r\n            if (tensor === 0) {\r\n              throw new Error('Can\\'t create a tensor');\r\n
   }\r\n            inputValues.push(tensor);\r\n          } finally {\r\n            wasm.stackRestore(stack);\r\n          }\r\n
}\r\n\r\n        const beforeRunStack = wasm.stackSave();\r\n        const inputValuesOffset =
wasm.stackAlloc(inputCount * 4);\r\n        const inputNamesOffset = wasm.stackAlloc(inputCount * 4);\r\n
const outputValuesOffset = wasm.stackAlloc(outputCount * 4);\r\n        const outputNamesOffset =
wasm.stackAlloc(outputCount * 4);\r\n\r\n        try {\r\n          let inputValuesIndex = inputValuesOffset / 4;\r\n
let inputNamesIndex = inputNamesOffset / 4;\r\n          let outputValuesIndex = outputValuesOffset / 4;\r\n          let
outputNamesIndex = outputNamesOffset / 4;\r\n          for (let i = 0; i < inputCount; i++) {\r\n
wasm.HEAPU32[inputValuesIndex++] = inputValues[i];\r\n            wasm.HEAPU32[inputNamesIndex++] =
inputNamesUTF8Encoded[inputIndices[i]];\r\n          }\r\n          for (let i = 0; i < outputCount; i++) {\r\n
wasm.HEAPU32[outputValuesIndex++] = 0;\r\n            wasm.HEAPU32[outputNamesIndex++] =
outputNamesUTF8Encoded[outputIndices[i]];\r\n          }\r\n\r\n          // support RunOptions\r\n          let errorCode
= wasm._OrtRun(\r\n              sessionHandle, inputNamesOffset, inputValuesOffset, inputCount,
outputNamesOffset, outputCount,\r\n              outputValuesOffset, runOptionsHandle);\r\n\r\n          const output:
SerializableTensor[] = [];\r\n\r\n          if (errorCode === 0) {\r\n            for (let i = 0; i < outputCount; i++) {\r\n
    const tensor = wasm.HEAPU32[outputValuesOffset / 4 + i];\r\n\r\n              const beforeGetTensorDataStack =
wasm.stackSave();\r\n              // stack allocate 4 pointer value\r\n              const tensorDataOffset =
wasm.stackAlloc(4 * 4);\r\n\r\n              let type: Tensor.Type|undefined, dataOffset = 0;\r\n              try {\r\n
 errorCode = wasm._OrtGetTensorData(\r\n                    tensor, tensorDataOffset, tensorDataOffset + 4,
tensorDataOffset + 8, tensorDataOffset + 12);\r\n                if (errorCode !== 0) {\r\n                  throw new
Error(`Can't get a tensor data. error code = ${errorCode}`);\r\n                }\r\n                let tensorDataIndex =
tensorDataOffset / 4;\r\n                const dataType = wasm.HEAPU32[tensorDataIndex++];\r\n                dataOffset
= wasm.HEAPU32[tensorDataIndex++];\r\n                const dimsOffset = wasm.HEAPU32[tensorDataIndex++];\r\n
            const dimsLength = wasm.HEAPU32[tensorDataIndex++];\r\n                const dims = [];\r\n                for
(let i = 0; i < dimsLength; i++) {\r\n                  dims.push(wasm.HEAPU32[dimsOffset / 4 + i]);\r\n                }\r\n
          wasm._OrtFree(dimsOffset);\r\n\r\n                const size = dims.length === 0 ? 1 : dims.reduce((a, b) => a *
b);\r\n                type = tensorDataTypeEnumToString(dataType);\r\n                if (type === 'string') {\r\n
const stringData: string[] = [];\r\n                  let dataIndex = dataOffset / 4;\r\n                  for (let i = 0; i < size; i++)
{\r\n                    const offset = wasm.HEAPU32[dataIndex++];\r\n                    const maxBytesToRead = i === size
```

- 1 ? undefined : wasm.HEAPU32[dataIndex] - offset;\r\n stringData.push(wasm.UTF8ToString(offset, maxBytesToRead));\r\n }\r\n output.push([type, dims, stringData]);\r\n } else {\r\n const typedArrayConstructor = numericTensorTypeToTypedArray(type);\r\n const data = new typedArrayConstructor(size);\r\n new Uint8Array(data.buffer, data.byteOffset, data.byteLength)\r\n .set(wasm.HEAPU8.subarray(dataOffset, dataOffset + data.byteLength));\r\n output.push([type, dims, data]);\r\n }\r\n } finally {\r\n wasm.stackRestore(beforeGetTensorDataStack);\r\n if (type === 'string' && dataOffset) {\r\n wasm._free(dataOffset);\r\n }\r\n wasm._OrtReleaseTensor(tensor);\r\n }\r\n }\r\n }\r\n\r\n if (errorCode === 0) {\r\n return output;\r\n } else {\r\n throw new Error(`failed to call OrtRun(). error code = ${errorCode}.`);\r\n }\r\n } finally {\r\n wasm.stackRestore(beforeRunStack);\r\n }\r\n } finally {\r\n inputValues.forEach(wasm._OrtReleaseTensor);\r\n inputAllocs.forEach(wasm._free);\r\n\r\n wasm._OrtReleaseRunOptions(runOptionsHandle);\r\n runOptionsAllocs.forEach(wasm._free);\r\n }\r\n };\r\n\r\n/**\r\n * end profiling\r\n */\r\nexport const endProfiling = (sessionId: number): void => {\r\n const wasm = getInstance();\r\n const session = activeSessions[sessionId];\r\n if (!session) {\r\n throw new Error('invalid session id');\r\n }\r\n const sessionHandle = session[0];\r\n\r\n // profile file name is not used yet, but it must be freed.\r\n const profileFileName = wasm._OrtEndProfiling(sessionHandle);\r\n if (profileFileName === 0) {\r\n throw new Error('Can\\'t get an profile file name');\r\n }\r\n wasm._OrtFree(profileFileName);\r\n};\r\n\r\nexport const extractTransferableBuffers = (tensors: readonly SerializableTensor[]): ArrayBufferLike[] => {\r\n const buffers: ArrayBufferLike[] = [];\r\n for (const tensor of tensors) {\r\n const data = tensor[2];\r\n if (!Array.isArray(data) && data.buffer) {\r\n buffers.push(data.buffer);\r\n }\r\n }\r\n return buffers;\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Env} from 'onnxruntime-common';\r\nimport * as path from 'path';\r\n\r\nimport {OrtWasmModule} from './binding/ort-wasm';\r\nimport {OrtWasmThreadedModule} from './binding/ort-wasm-threaded';\r\nimport ortWasmFactoryThreaded from './binding/ort-wasm-threaded.js';\r\nimport ortWasmFactory from './binding/ort-wasm.js';\r\n\r\nlet wasm: OrtWasmModule|undefined;\r\nlet initialized = false;\r\nlet initializing = false;\r\nlet aborted = false;\r\n\r\nconst isMultiThreadSupported = (): boolean => {\r\n try {\r\n // If 'SharedArrayBuffer' is not available, WebAssembly threads will not work.\r\n if (typeof SharedArrayBuffer === 'undefined') {\r\n return false;\r\n }\r\n\r\n // Test for transferability of SABs (for browsers. needed for Firefox)\r\n // https://groups.google.com/forum/#!msg/mozilla.dev.platform/IHkBZlHETpA/dwsMNchWEQAJ\r\n if (typeof MessageChannel !== 'undefined') {\r\n new MessageChannel().port1.postMessage(new SharedArrayBuffer(1));\r\n }\r\n\r\n // Test for WebAssembly threads capability (for both browsers and Node.js)\r\n // This typed array is a WebAssembly program containing threaded instructions.\r\n return WebAssembly.validate(new Uint8Array([\r\n 0, 97, 115, 109, 1, 0, 0, 0, 1, 4, 1, 96, 0, 0, 3, 2, 1, 0, 5,\r\n 4, 1, 3, 1, 1, 10, 11, 1, 9, 0, 65, 0, 254, 16, 2, 0, 26, 11\r\n]));\r\n } catch (e) {\r\n return false;\r\n }\r\n};\r\n\r\nconst isSimdSupported = (): boolean => {\r\n try {\r\n // Test for WebAssembly SIMD capability (for both browsers and Node.js)\r\n // This typed array is a WebAssembly program containing SIMD instructions.\r\n return WebAssembly.validate(new Uint8Array(\r\n [0, 97, 115, 109, 1, 0, 0, 0, 1, 4, 1, 96, 0, 0, 3, 2, 1, 0, 10, 9, 1, 7, 0, 65, 0, 253, 15, 26, 11]));\r\n } catch (e) {\r\n return false;\r\n }\r\n};\r\n\r\nconst getWasmFileName = (useSimd: boolean, useThreads: boolean) => {\r\n if (useThreads) {\r\n return useSimd ? 'ort-wasm-simd-threaded.wasm' : 'ort-wasm-threaded.wasm';\r\n } else {\r\n return useSimd ? 'ort-wasm-simd.wasm' : 'ort-wasm.wasm';\r\n }\r\n};\r\n\r\nexport const initializeWebAssembly = async(flags: Env.WebAssemblyFlags): Promise<void> => {\r\n if (initialized) {\r\n return Promise.resolve();\r\n }\r\n if (initializing) {\r\n throw new Error('multiple calls to \\'initializeWebAssembly()\\' detected.');\r\n }\r\n if (aborted) {\r\n throw new Error('previous call to \\'initializeWebAssembly()\\' failed.');\r\n }\r\n\r\n initializing = true;\r\n\r\n // wasm flags are already initialized\r\n const timeout = flags.initTimeout!;\r\n const numThreads = flags.numThreads!;\r\n const simd = flags.simd!;\r\n\r\n const useThreads = numThreads > 1 && isMultiThreadSupported();\r\n const useSimd = simd && isSimdSupported();\r\n\r\n const wasmPrefixOverride =

```
typeof flags.wasmPaths === 'string' ? flags.wasmPaths : undefined;\r\n  const wasmFileName =
getWasmFileName(false, useThreads);\r\n  const wasmOverrideFileName = getWasmFileName(useSimd,
useThreads);\r\n  const wasmPathOverride = typeof flags.wasmPaths === 'object' ?
flags.wasmPaths[wasmOverrideFileName] : undefined;\r\n\r\n  let isTimeout = false;\r\n\r\n  const tasks:
Array<Promise<void>> = [];\r\n\r\n  // promise for timeout\r\n  if (timeout > 0) {\r\n    tasks.push(new
Promise((resolve) => {\r\n      setTimeout(() => {\r\n        isTimeout = true;\r\n        resolve();\r\n      }, timeout);\r\n
}));\r\n  }\r\n\r\n  // promise for module initialization\r\n  tasks.push(new Promise((resolve, reject) => {\r\n    const
factory = useThreads ? ortWasmFactoryThreaded : ortWasmFactory;\r\n    const config: Partial<OrtWasmModule>
= {\r\n      locateFile: (fileName: string, scriptDirectory: string) => {\r\n        if (fileName.endsWith('.worker.js') &&
typeof Blob !== 'undefined') {\r\n          return URL.createObjectURL(new Blob(\r\n              [\r\n                // This
require() function is handled by webpack to load file content of the corresponding .worker.js\r\n                // eslint-
disable-next-line @typescript-eslint/no-require-imports\r\n                require('./binding/ort-wasm-
threaded.worker.js')\r\n              ],\r\n              {type: 'text/javascript'}));\r\n        }\r\n\r\n        if (fileName ===
wasmFileName) {\r\n          const prefix: string = wasmPrefixOverride ?? scriptDirectory;\r\n          return
wasmPathOverride ?? prefix + wasmOverrideFileName;\r\n        }\r\n\r\n        return scriptDirectory + fileName;\r\n
   }\r\n    };\r\n\r\n    if (useThreads) {\r\n      if (typeof Blob === 'undefined') {\r\n        config.mainScriptUrlOrBlob
= path.join(__dirname, 'ort-wasm-threaded.js');\r\n      } else {\r\n        const scriptSourceCode =\r\n            `var
ortWasmThreaded=(function(){var _scriptDir;return ${ortWasmFactoryThreaded.toString()}})();`;\r\n
config.mainScriptUrlOrBlob = new Blob([scriptSourceCode], {type: 'text/javascript'});\r\n      }\r\n    }\r\n\r\n
factory(config).then(\r\n        // wasm module initialized successfully\r\n        module => {\r\n          initializing =
false;\r\n          initialized = true;\r\n          wasm = module;\r\n          resolve();\r\n        },\r\n        // wasm module
failed to initialize\r\n        (what) => {\r\n          initializing = false;\r\n          aborted = true;\r\n          reject(what);\r\n
      });\r\n  }));\r\n\r\n  await Promise.race(tasks);\r\n\r\n  if (isTimeout) {\r\n    throw new Error(`WebAssembly
backend initializing failed due to timeout: ${timeout}ms`);\r\n  }\r\n};\r\n\r\nexport const getInstance = ():
OrtWasmModule => {\r\n  if (initialized && wasm) {\r\n    return wasm;\r\n  }\r\n\r\n  throw new
Error('WebAssembly is not initialized yet.');\r\n};\r\n\r\nexport const dispose = (): void => {\r\n  if (initialized &&
!initializing && !aborted) {\r\n    initializing = true;\r\n\r\n    (wasm as
OrtWasmThreadedModule).PThread?.terminateAllThreads();\r\n    wasm = undefined;\r\n\r\n    initializing =
false;\r\n    initialized = false;\r\n    aborted = true;\r\n  }\r\n};\r\n","\nimport worker from
\"!!../../../node_modules/worker-loader/dist/runtime/inline.js\";\n\nexport default function Worker_fn() {\n  return
worker(\"/*!\\n* ONNX Runtime Web v1.9.0\\n* Copyright (c) Microsoft Corporation. All rights reserved.\\n*
Licensed under the MIT License.\\n*/\\n!function(){var e={474:function(e,t,n){var
_scriptDir,r=(_scriptDir=(_scriptDir=\\\"undefined\\\"!=typeof
document&&document.currentScript?document.currentScript.src:void 0)||\\\"/index.js\\\",function(e){function
t(){return R.buffer!=j&&Q(R.buffer),L}function r(){return R.buffer!=j&&Q(R.buffer),W}function a(){return
R.buffer!=j&&Q(R.buffer),H}function i(){return R.buffer!=j&&Q(R.buffer),Y}function o(){return
R.buffer!=j&&Q(R.buffer),z}var u,s,c;e=e||{},u||(u=void 0!==e?e:{}),u.ready=new
Promise((function(e,t){s=e,c=t}));var l,f={};for(l in u)u.hasOwnProperty(l)&&(f[l]=u[l]);var
p=\\\"./this.program\\\";function d(e,t){throw t}var m,h,g,b,y,v=\\\"object\\\"==typeof
window,_=\\\"function\\\"==typeof importScripts,w=\\\"object\\\"==typeof process&&\\\"object\\\"==typeof
process.versions&&\\\"string\\\"==typeof
process.versions.node,O=u.ENVIRONMENT_IS_PTHREAD||!1,A=\\\"\\\";function E(e){return
u.locateFile?u.locateFile(e,A):A+e}if(w){var S;A=_?n(908).dirname(A)+\\\"/\\\":\\\"//\\\",m=function(e,t){return
b||(b=n(384)),y||(y=n(908)),e=y.normalize(e),b.readFileSync(e,t?null:\\\"utf8\\\")},g=function(e){return(e=m(e,!0)).b
uffer||(e=new
Uint8Array(e)),F(e.buffer),e},h=function(e,t,r){b||(b=n(384)),y||(y=n(908)),e=y.normalize(e),b.readFile(e,(function(
e,n){e?r(e):t(n.buffer)}))},1<process.argv.length&&(p=process.argv[1].replace(/\\\\\\\\/g,\\\"/\\\")),process.argv.slice(
2),process.on(\\\"uncaughtException\\\",(function(e){if(!(e instanceof Bt))throw
```

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e})),process.on(\\\"unhandledRejection\\\",le),d=function(e,t){if(ae())throw
process.exitCode=e,t;process.exit(e)},u.inspect=function(){return\\\"[Emscripten Module
object]\\\"};try{S=n(925)}catch(e){throw console.error('The \\\"worker_threads\\\" module is not supported in this
node.js build - perhaps a newer version is
needed?'),e}n.g.Worker=S.Worker}else(v||_)&&(_?A=self.location.href:\\\"undefined\\\"!=typeof
document&&document.currentScript&&(A=document.currentScript.src),_scriptDir&&(A=_scriptDir),A=0!==A.in
dexOf(\\\"blob:\\\")?A.substr(0,A.lastIndexOf(\\\"/\\\")+1):\\\"\\\",w?(m=function(e,t){return
b||(b=n(384)),y||(y=n(908)),e=y.normalize(e),b.readFileSync(e,t?null:\\\"utf8\\\")},g=function(e){return(e=m(e,!0)).b
uffer||(e=new
Uint8Array(e)),F(e.buffer),e},h=function(e,t,r){b||(b=n(384)),y||(y=n(908)),e=y.normalize(e),b.readFile(e,(function(
e,n){e?r(e):t(n.buffer)}))}}):(m=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.send(null),t.responseText},_&&(g=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.responseType=\\\"arraybuffer\\\",t.send(null),new
Uint8Array(t.response)}),h=function(e,t,n){var r=new
XMLHttpRequest;r.open(\\\"GET\\\",e,!0),r.responseType=\\\"arraybuffer\\\",r.onload=function(){200==r.status||0=
=r.status&&r.response?t(r.response):n()},r.onerror=n,r.send(null)}));w&&\\\"undefined\\\"==typeof
performance&&(n.g.performance=n(953).performance);var
T,M,k=u.print||console.log.bind(console),x=u.printErr||console.warn.bind(console);for(l in
f)f.hasOwnProperty(l)&&(u[l]=f[l]);f=null,u.thisProgram&&(p=u.thisProgram),u.quit&&(d=u.quit),u.wasmBinary
&&(M=u.wasmBinary);var D=u.noExitRuntime||!1;\\\"object\\\"!=typeof WebAssembly&&le(\\\"no native wasm
support detected\\\");var R,C,P,I=!1;function F(e,t){e||le(\\\"Assertion failed: \\\"+t)}function U(e){var t=new
TextDecoder(e);this.decode=function(e){return e.buffer instanceof SharedArrayBuffer&&(e=new
Uint8Array(e)),t.decode.call(t,e)}}var j,L,W,H,Y,z,B=\\\"undefined\\\"!=typeof TextDecoder?new
U(\\\"utf8\\\"):void 0;function G(e,t,n){var r=t+n;for(n=t;e[n]&&!(n>=r);)++n;if(16<n-t&&e.subarray&&B)return
B.decode(e.subarray(t,n));for(r=\\\"\\\";t<n;){var a=e[t++];if(128&a){var
i=63&e[t++];if(192==(224&a))r+=String.fromCharCode((31&a)<<6|i);else{var
o=63&e[t++];65536>(a=224==(240&a)?(15&a)<<12|i<<6|o:(7&a)<<18|i<<12|o<<6|63&e[t++])?r+=String.fromCh
arCode(a):(a-=65536,r+=String.fromCharCode(55296|a>>10,56320|1023&a))}}else
r+=String.fromCharCode(a)}return r}function N(e,t){return e?G(r(),e,t):\\\"\\\"}function q(e,t,n,r){if(!(0<r))return
0;var a=n;r=n+r-1;for(var i=0;i<e.length;++i){var
o=e.charCodeAt(i);if(55296<=o&&57343>=o&&(o=65536+((1023&o)<<10)|1023&e.charCodeAt(++i)),127>=o){i
f(n>=r)break;t[n++]=o}else{if(2047>=o){if(n+1>=r)break;t[n++]=192|o>>6}else{if(65535>=o){if(n+2>=r)break;t[
n++]=224|o>>12}else{if(n+3>=r)break;t[n++]=240|o>>18,t[n++]=128|o>>12&63}t[n++]=128|o>>6&63}t[n++]=1
28|63&o}}return t[n]=0,n-a}function V(e,t,n){return q(e,r(),t,n)}function X(e){for(var t=0,n=0;n<e.length;++n){var
r=e.charCodeAt(n);55296<=r&&57343>=r&&(r=65536+((1023&r)<<10)|1023&e.charCodeAt(++n)),127>=r?++t:t
=2047>=r?t+2:65535>=r?t+3:t+4}return t}function J(e){var n=X(e)+1,r=bt(n);return r&&q(e,t(),r,n),r}function
Q(e){j=e,u.HEAP8=L=new Int8Array(e),u.HEAP16=new Int16Array(e),u.HEAP32=H=new
Int32Array(e),u.HEAPU8=W=new Uint8Array(e),u.HEAPU16=new Uint16Array(e),u.HEAPU32=Y=new
Uint32Array(e),u.HEAPF32=new Float32Array(e),u.HEAPF64=z=new Float64Array(e)}\\\"undefined\\\"!=typeof
TextDecoder&&new U(\\\"utf-16le\\\"),O&&(j=u.buffer);var
Z=u.INITIAL_MEMORY||16777216;if(O)R=u.wasmMemory,j=u.buffer;else
if(u.wasmMemory)R=u.wasmMemory;else if(!((R=new
WebAssembly.Memory({initial:Z/65536,maximum:32768,shared:!0})).buffer instanceof SharedArrayBuffer))throw
x(\\\"requested a shared WebAssembly.Memory but the returned buffer is not a SharedArrayBuffer, indicating that
while the browser has SharedArrayBuffer it does not have WebAssembly threads support - you may need to set a
flag\\\"),w&&console.log(\\\"(on node you may need: --experimental-wasm-threads --experimental-wasm-bulk-
memory and also use a recent version)\\\"),Error(\\\"bad memory\\\");R&&(j=R.buffer),Z=j.byteLength,Q(j);var
K,$=[],ee=[],te=[],ne=[],re=0;function ae(){return D||0<re}function ie(){var e=u.preRun.shift();$.unshift(e)}var
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oe,ue=0,se=null,ce=null;function le(e){throw u.onAbort&&u.onAbort(e),F(!O),x(e),I=!0,P=1,e=new
WebAssembly.RuntimeError(\\\"abort(\\\"+e+\\\"). Build with -s ASSERTIONS=1 for more
info.\\\"),c(e),e}function fe(){return oe.startsWith(\\\"data:application/octet-stream;base64,\\\")}function pe(){var
e=oe;try{if(e==oe&&M)return new Uint8Array(M);if(g)return g(e);throw\\\"both async and sync fetching of the
wasm failed\\\"}catch(e){le(e)}}u.preloadedImages={},u.preloadedAudios={},oe=\\\"ort-wasm-
threaded.wasm\\\",fe()||(oe=E(oe));var de={973748:function(){throw\\\"Canceled!\\\"}};function
me(e){for(;0<e.length;){var t=e.shift();if(\\\"function\\\"==typeof t)t(u);else{var n=t.Nb;\\\"number\\\"==typeof
n?void 0===t.ib?K.get(n)():K.get(n)(t.ib):n(void 0===t.ib?null:t.ib)}}}function
he(e,n){if(0>=e||e>t().length||1&e||0>n)return-28;if(0==n)return 0;2147483647<=n&&(n=1/0);var
r=Atomics.load(a(),zt>>2),i=0;if(r==e&&Atomics.compareExchange(a(),zt>>2,r,0)==r&&(i=1,0>=--n))return
1;if(0<=(e=Atomics.notify(a(),e>>2,n)))return e+i;throw\\\"Atomics.notify returned an unexpected value
\\\"+e}function ge(e){if(O)throw\\\"Internal Error! cleanupThread() can only ever be called from main application
thread!\\\";if(!e)throw\\\"Internal Error! Null pthread_ptr in cleanupThread!\\\";var
t=ye.cb[e];t&&(a()[e+12>>2]=0,ye.sb(t.worker))}u._emscripten_futex_wake=he;var
be,ye={gb:[],fb:[],zb:[],xc:function(){},Rb:function(){for(var
e=bt(228),t=0;57>t;++t)i()[e/4+t]=0;a()[e+12>>2]=e,t=e+152,a()[t>>2]=t;var
n=bt(512);for(t=0;128>t;++t)i()[n/4+t]=0;Atomics.store(i(),e+100>>2,n),Atomics.store(i(),e+40>>2,e),Dt(e,!_,1),Ot
(e)},Sb:function(){ye.receiveObjectTransfer=ye.Xb,ye.threadInit=ye.hc,ye.threadCancel=ye.fc,ye.threadExit=ye.Hb
,ye.setExitStatus=ye.Zb},cb:{},yb:[],Eb:function(){for(;0<ye.yb.length;)ye.yb.pop()();Ct()},Fb:function(e,t){Atomi
cs.store(i(),e+56>>2,1),Atomics.store(i(),e+60>>2,0),ye.Eb(),Atomics.store(i(),e+4>>2,t),Atomics.store(i(),e+0>>2,
1),he(e+0,2147483647),Dt(0,0,0)},Zb:function(e){P=e},Hb:function(e){var
t=_t();t&&(ye.Fb(t,e),O&&postMessage({cmd:\\\"exit\\\"}))},fc:function(){ye.Fb(_t(),-
1),postMessage({cmd:\\\"cancelDone\\\"})},Gb:function(){for(var e in ye.cb){var
t=ye.cb[e];t&&t.worker&&ye.sb(t.worker)}for(ye.cb={},e=0;e<ye.gb.length;++e){var
n=ye.gb[e];n.terminate()}for(ye.gb=[],e=0;e<ye.fb.length;++e)t=(n=ye.fb[e]).bb,ye.xb(t),n.terminate();ye.fb=[]},xb:
function(e){if(e){if(e.eb){var
t=a()[e.eb+100>>2];a()[e.eb+100>>2]=0,vt(t),vt(e.eb)}e.eb=0,e.wb&&e.hb&&vt(e.hb),e.hb=0,e.worker&&(e.work
er.bb=null)}},sb:function(e){ye.Yb((function(){delete
ye.cb[e.bb.eb],ye.gb.push(e),ye.fb.splice(ye.fb.indexOf(e),1),ye.xb(e.bb),e.bb=void
0}))},Yb:function(e){a()[Yt>>2]=0;try{e()}finally{a()[Yt>>2]=1}},Xb:function(){},hc:function(){for(var e in
ye.zb)ye.zb[e]()},Ub:function(e,t){e.onmessage=function(n){var
r=n.data,o=r.cmd;if(e.bb&&(ye.Lb=e.bb.eb),r.targetThread&&r.targetThread!=_t()){var
u=ye.cb[r.Dc];u?u.worker.postMessage(n.data,r.transferList):x('Internal error! Worker sent a message \\\"'+o+'\\\" to
target pthread '+r.targetThread+\\\", but that thread no longer exists!\\\")}else
if(\\\"processQueuedMainThreadWork\\\"===o)St();else if(\\\"spawnThread\\\"===o)Oe(n.data);else
if(\\\"cleanupThread\\\"===o)ge(r.thread);else if(\\\"killThread\\\"===o){if(n=r.thread,O)throw\\\"Internal Error!
killThread() can only ever be called from main application thread!\\\";if(!n)throw\\\"Internal Error! Null pthread_ptr
in killThread!\\\";a()[n+12>>2]=0,r=ye.cb[n],delete
ye.cb[n],r.worker.terminate(),ye.xb(r),ye.fb.splice(ye.fb.indexOf(r.worker),1),r.worker.bb=void 0}else
if(\\\"cancelThread\\\"===o){if(n=r.thread,O)throw\\\"Internal Error! cancelThread() can only ever be called from
main application thread!\\\";if(!n)throw\\\"Internal Error! Null pthread_ptr in
cancelThread!\\\";ye.cb[n].worker.postMessage({cmd:\\\"cancel\\\"})}else
if(\\\"loaded\\\"===o)e.loaded=!0,t&&t(e),e.mb&&(e.mb(),delete e.mb);else if(\\\"print\\\"===o)k(\\\"Thread
\\\"+r.threadId+\\\": \\\"+r.text);else if(\\\"printErr\\\"===o)x(\\\"Thread \\\"+r.threadId+\\\": \\\"+r.text);else
if(\\\"alert\\\"===o)alert(\\\"Thread \\\"+r.threadId+\\\": \\\"+r.text);else
if(\\\"exit\\\"===o)e.bb&&Atomics.load(i(),e.bb.eb+64>>2)&&ye.sb(e);else
if(\\\"exitProcess\\\"===o)try{Nt(r.returnCode)}catch(e){if(e instanceof Bt)return;throw
e}else\\\"cancelDone\\\"===o?ye.sb(e):\\\"objectTransfer\\\"!==o&&(\\\"setimmediate\\\"===n.data.target?e.postMe
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ssage(n.data):x(\\\"worker sent an unknown command \\\"+o));ye.Lb=void 0},e.onerror=function(e){x(\\\"pthread
sent an error! \\\"+e.filename+\\\":\\\"+e.lineno+\\\":
\\\"+e.message)},w&&(e.on(\\\"message\\\",(function(t){e.onmessage({data:t})})),e.on(\\\"error\\\",(function(t){e.on
error(t)})),e.on(\\\"exit\\\",(function(){})),e.postMessage({cmd:\\\"load\\\",urlOrBlob:u.mainScriptUrlOrBlob||_scri
ptDir,wasmMemory:R,wasmModule:C})},Ib:function(){var e=E(\\\"ort-wasm-
threaded.worker.js\\\");ye.gb.push(new Worker(e))},Ob:function(){return
0==ye.gb.length&&(ye.Ib(),ye.Ub(ye.gb[0])),ye.gb.pop()},nc:function(e){for(e=performance.now()+e;performance.
now()<e;);}};function ve(e,t){if(0===e)e=Date.now();else{if(1!==e&&4!==e)return a()[yt()>>2]=28,-
1;e=be()}return a()[t>>2]=e/1e3|0,a()[t+4>>2]=e%1e3*1e6|0,0}function _e(e,t){if(O)return
Ne(1,1,e,t);te.unshift({Nb:e,ib:t})}function we(e){this.lb=e-
16,this.dc=function(e){a()[this.lb+4>>2]=e},this.ac=function(e){a()[this.lb+8>>2]=e},this.bc=function(){a()[this.lb
>>2]=0},this.$b=function(){t()[this.lb+12>>0]=0},this.cc=function(){t()[this.lb+13>>0]=0},this.Pb=function(e,t){t
his.dc(e),this.ac(t),this.bc(),this.$b(),this.cc()}}function Oe(e){if(O)throw\\\"Internal Error! spawnThread() can only
ever be called from main application thread!\\\";var t=ye.Ob();if(!t)return 6;if(void 0!==t.bb)throw\\\"Internal
error!\\\";if(!e.rb)throw\\\"Internal error, no pthread ptr!\\\";ye.fb.push(t);for(var
n=bt(512),r=0;128>r;++r)a()[n+4*r>>2]=0;var
o=e.hb+e.jb,u=(r=ye.cb[e.rb]={worker:t,hb:e.hb,jb:e.jb,wb:e.wb,eb:e.rb}).eb>>2;Atomics.store(i(),u+16,e.detached)
,Atomics.store(i(),u+25,n),Atomics.store(i(),u+10,r.eb),Atomics.store(i(),u+20,e.jb),Atomics.store(i(),u+19,o),Atom
ics.store(i(),u+26,e.jb),Atomics.store(i(),u+28,o),Atomics.store(i(),u+29,e.detached),n=Rt()+40,Atomics.store(i(),u+
43,n),t.bb=r;var
s={cmd:\\\"run\\\",start_routine:e.ec,arg:e.ib,threadInfoStruct:e.rb,stackBase:e.hb,stackSize:e.jb};return
t.mb=function(){s.time=performance.now(),t.postMessage(s,e.mc)},t.loaded&&(t.mb(),delete t.mb),0}function
Ae(e,n,r){if(0>=e||e>t().length||1&e)return-28;if(v){if(Atomics.load(a(),e>>2)!=n)return-6;var
i=performance.now();for(r=i+r,Atomics.exchange(a(),zt>>2,e);;){if((i=performance.now())>r)return
Atomics.exchange(a(),zt>>2,0),-
73;if(0==(i=Atomics.exchange(a(),zt>>2,0)))break;if(St(),Atomics.load(a(),e>>2)!=n)return-
6;Atomics.exchange(a(),zt>>2,e)}return 0}if(\\\"timed-out\\\"===(e=Atomics.wait(a(),e>>2,n,r)))return-
73;if(\\\"not-equal\\\"===e)return-6;if(\\\"ok\\\"===e)return 0;throw\\\"Atomics.wait returned an unexpected value
\\\"+e}function Ee(){w||_||(T||(T={}),T[\\\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-thread\\\"]||(T[\\\"Blocking on the
main thread is very dangerous, see https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-
browser-thread\\\"]=1,x(\\\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-
thread\\\")))}u.establishStackSpace=function(e,t){Wt(e,t),jt(e)},u.invokeEntryPoint=function(e,t){return
K.get(e)(t)},be=w?function(){var e=process.hrtime();return 1e3*e[0]+e[1]/1e6}:O?function(){return
performance.now()-u.__performance_now_clock_drift}:function(){return performance.now()};var
Se={},Te=[null,[],[]];function Me(e,t){var n=Te[e];0===t||10===t?((1===e?k:x)(G(n,0)),n.length=0):n.push(t)}var
ke={};function xe(e,t){return O?Ne(2,1,e,t):(e=N(e),ke.rc(e,t))}function De(e,t,n){return O?Ne(3,1,e,t,n):0}function
Re(e,t){if(O)return Ne(4,1,e,t)}function Ce(e,t,n){if(O)return Ne(5,1,e,t,n)}function Pe(e,t,n){return
O?Ne(6,1,e,t,n):0}function Ie(e,t){if(O)return Ne(7,1,e,t)}function Fe(e,t){return
O?Ne(8,1,e,t):(e=N(e),ke.sc(e,t))}function Ue(e,t,n,a,i,o){if(O)t=Ne(9,1,e,t,n,a,i,o);else
if(o<<=12,0!=(16&a)&&0!=e%65536)t=-28;else if(0!=(32&a)){var
u=65536*Math.ceil(t/65536);(e=Ht(65536,u))?r().fill(0,e,e+u):e=0,e?(Se[e]={Wb:e,Tb:t,Jb:!0,fd:i,Ac:n,flags:a,offse
t:o},t=e):t=-48}else t=-52;return t}function je(e,t){if(O)e=Ne(10,1,e,t);else{var
n=Se[e];0!==t&&n?(t===n.Tb&&(Se[e]=null,n.Jb&&vt(n.Wb)),e=0):e=-28}return e}function Le(e,t,n){if(O)return
Ne(11,1,e,t,n)}function We(e,t,n){return O?Ne(12,1,e,t,n):(e=N(e),ke.tc(e,t,n))}function He(e){if(O)return
Ne(13,1,e)}function Ye(e,t){if(O)return Ne(14,1,e,t)}function ze(e){if(O)return Ne(15,1,e)}function
Be(){if(O)return Ne(16,1);le()}var Ge=[];function Ne(e,t){for(var n=arguments.length-
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2,r=Ut(),a=Lt(8*n),i=a>>3,u=0;u<n;u++){var s=arguments[2+u];o()[i+u]=s}return n=Tt(e,n,a,t),jt(r),n}var
qe=[],Ve=[0,\\\"undefined\\\"!=typeof document?document:0,\\\"undefined\\\"!=typeof window?window:0];function
Xe(e){return e=2<e?N(e):e,Ve[e]||(\\\"undefined\\\"!=typeof document?document.querySelector(e):void 0)}function
Je(e,t,n){var r=Xe(e);if(!r)return-
4;if(r.qb&&(a()[r.qb>>2]=t,a()[r.qb+4>>2]=n),!r.Db&&r.pc){if(r.qb){r=a()[r.qb+8>>2],e=e?N(e):\\\"\\\";var
i=Ut(),o=Lt(12),u=0;if(e){u=X(e)+1;var s=bt(u);V(e,s,u),u=s}return
a()[o>>2]=u,a()[o+4>>2]=t,a()[o+8>>2]=n,Mt(0,r,657457152,0,u,o),jt(i),1}return-4}return
r.Db&&(r=r.Db),e=!1,r.pb&&r.pb.ob&&(e=0===(e=r.pb.ob.getParameter(2978))[0]&&0===e[1]&&e[2]===r.widt
h&&e[3]===r.height),r.width=t,r.height=n,e&&r.pb.ob.viewport(0,0,t,n),0}function Qe(e,t,n){return
O?Ne(17,1,e,t,n):Je(e,t,n)}var Ze,Ke=[\\\"default\\\",\\\"low-power\\\",\\\"high-performance\\\"],$e={};function
et(){if(!Ze){var
e,t={USER:\\\"web_user\\\",LOGNAME:\\\"web_user\\\",PATH:\\\"/\\\",PWD:\\\"/\\\",HOME:\\\"/home/web_user\\\
",LANG:(\\\"object\\\"==typeof navigator&&navigator.languages&&navigator.languages[0]||\\\"C\\\").replace(\\\"-
\\\",\\\"_\\\")+\\\".UTF-8\\\",_:p||\\\"./this.program\\\"};for(e in $e)void 0===$e[e]?delete t[e]:t[e]=$e[e];var
n=[];for(e in t)n.push(e+\\\"=\\\"+t[e]);Ze=n}return Ze}function tt(e,n){if(O)return Ne(18,1,e,n);var r=0;return
et().forEach((function(i,o){var
u=n+r;for(o=a()[e+4*o>>2]=u,u=0;u<i.length;++u)t()[o++>>0]=i.charCodeAt(u);t()[o>>0]=0,r+=i.length+1})),0}fu
nction nt(e,t){if(O)return Ne(19,1,e,t);var n=et();a()[e>>2]=n.length;var r=0;return
n.forEach((function(e){r+=e.length+1})),a()[t>>2]=r,0}function rt(e){return O?Ne(20,1,e):0}function at(e,n){return
O?Ne(21,1,e,n):(e=1==e||2==e?2:le(),t()[n>>0]=e,0)}function it(e,t,n,r){return
O?Ne(22,1,e,t,n,r):(e=ke.vc(e),t=ke.uc(e,t,n),a()[r>>2]=t,0)}function ot(e,t,n,r,a){if(O)return
Ne(23,1,e,t,n,r,a)}function ut(e,t,n,i){if(O)return Ne(24,1,e,t,n,i);for(var o=0,u=0;u<n;u++){for(var
s=a()[t+8*u>>2],c=a()[t+(8*u+4)>>2],l=0;l<c;l++)Me(e,r()[s+l]);o+=c}return a()[i>>2]=o,0}function st(){function
e(e){return(e=e.toTimeString().match(/\\\\(([A-Za-z ]+)\\\\)$/))?e[1]:\\\"GMT\\\"}if(O)return
Ne(25,1);if(!st.Kb){st.Kb=!0;var t=(new Date).getFullYear(),n=new Date(t,0,1),r=new
Date(t,6,1);t=n.getTimezoneOffset();var
i=r.getTimezoneOffset(),o=Math.max(t,i);a()[Ft()>>2]=60*o,a()[It()>>2]=Number(t!=i),n=e(n),r=e(r),n=J(n),r=J(r),i
<t?(a()[Pt()>>2]=n,a()[Pt()+4>>2]=r):(a()[Pt()>>2]=r,a()[Pt()+4>>2]=n)}}function ct(e){return
0==e%4&&(0!=e%100||0==e%400)}function lt(e,t){for(var n=0,r=0;r<=t;n+=e[r++]);return n}var
ft=[31,29,31,30,31,30,31,31,30,31,30,31],pt=[31,28,31,30,31,30,31,31,30,31,30,31];function dt(e,t){for(e=new
Date(e.getTime());0<t;){var n=e.getMonth(),r=(ct(e.getFullYear())?ft:pt)[n];if(!(t>r-
e.getDate())){e.setDate(e.getDate()+t);break}t-=r-
e.getDate()+1,e.setDate(1),11>n?e.setMonth(n+1):(e.setMonth(0),e.setFullYear(e.getFullYear()+1))}return
e}function mt(e,n,r,i){function o(e,t,n){for(e=\\\"number\\\"==typeof
e?e.toString():e||\\\"\\\";e.length<t;)e=n[0]+e;return e}function u(e,t){return o(e,t,\\\"0\\\")}function s(e,t){function
n(e){return 0>e?-1:0<e?1:0}var r;return 0===(r=n(e.getFullYear()-t.getFullYear()))&&0===(r=n(e.getMonth()-
t.getMonth()))&&(r=n(e.getDate()-t.getDate())),r}function c(e){switch(e.getDay()){case 0:return new
Date(e.getFullYear()-1,11,29);case 1:return e;case 2:return new Date(e.getFullYear(),0,3);case 3:return new
Date(e.getFullYear(),0,2);case 4:return new Date(e.getFullYear(),0,1);case 5:return new Date(e.getFullYear()-
1,11,31);case 6:return new Date(e.getFullYear()-1,11,30)}}function l(e){e=dt(new Date(e.ab+1900,0,1),e.vb);var
t=new Date(e.getFullYear()+1,0,4),n=c(new Date(e.getFullYear(),0,4));return
t=c(t),0>=s(n,e)?0>=s(t,e)?e.getFullYear()+1:e.getFullYear():e.getFullYear()-1}var f=a()[i+40>>2];for(var p in
i={kc:a()[i>>2],jc:a()[i+4>>2],tb:a()[i+8>>2],nb:a()[i+12>>2],kb:a()[i+16>>2],ab:a()[i+20>>2],ub:a()[i+24>>2],vb
:a()[i+28>>2],Ec:a()[i+32>>2],ic:a()[i+36>>2],lc:f?N(f):\\\"\\\"},r=N(r),f={\\\"%c\\\":\\\"%a %b %d %H:%M:%S
%Y\\\",\\\"%D\\\":\\\"%m/%d/%y\\\",\\\"%F\\\":\\\"%Y-%m-%d\\\",\\\"%h\\\":\\\"%b\\\",\\\"%r\\\":\\\"%I:%M:%S
%p\\\",\\\"%R\\\":\\\"%H:%M\\\",\\\"%T\\\":\\\"%H:%M:%S\\\",\\\"%x\\\":\\\"%m/%d/%y\\\",\\\"%X\\\":\\\"%H:%M:
%S\\\",\\\"%Ec\\\":\\\"%c\\\",\\\"%EC\\\":\\\"%C\\\",\\\"%Ex\\\":\\\"%m/%d/%y\\\",\\\"%EX\\\":\\\"%H:%M:%S\\\",\\\
"%Ey\\\":\\\"%y\\\",\\\"%EY\\\":\\\"%Y\\\",\\\"%Od\\\":\\\"%d\\\",\\\"%Oe\\\":\\\"%e\\\",\\\"%OH\\\":\\\"%H\\\",\\\"%
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OI\\\":\\\"%I\\\",\\\"%Om\\\":\\\"%m\\\",\\\"%OM\\\":\\\"%M\\\",\\\"%OS\\\":\\\"%S\\\",\\\"%Ou\\\":\\\"%u\\\",\\\"%O
U\\\":\\\"%U\\\",\\\"%OV\\\":\\\"%V\\\",\\\"%Ow\\\":\\\"%w\\\",\\\"%OW\\\":\\\"%W\\\",\\\"%Oy\\\":\\\"%y\\\"})r=r.re
place(new RegExp(p,\\\"g\\\"),f[p]);var d=\\\"Sunday Monday Tuesday Wednesday Thursday Friday
Saturday\\\".split(\\\" \\\"),m=\\\"January February March April May June July August September October
November December\\\".split(\\\" \\\");for(p in f={\\\"%a\\\":function(e){return
d[e.ub].substring(0,3)},\\\"%A\\\":function(e){return d[e.ub]},\\\"%b\\\":function(e){return
m[e.kb].substring(0,3)},\\\"%B\\\":function(e){return m[e.kb]},\\\"%C\\\":function(e){return
u((e.ab+1900)/100|0,2)},\\\"%d\\\":function(e){return u(e.nb,2)},\\\"%e\\\":function(e){return o(e.nb,2,\\\"
\\\")},\\\"%g\\\":function(e){return l(e).toString().substring(2)},\\\"%G\\\":function(e){return
l(e)},\\\"%H\\\":function(e){return u(e.tb,2)},\\\"%I\\\":function(e){return 0==(e=e.tb)?e=12:12<e&&(e-
=12),u(e,2)},\\\"%j\\\":function(e){return u(e.nb+lt(ct(e.ab+1900)?ft:pt,e.kb-1),3)},\\\"%m\\\":function(e){return
u(e.kb+1,2)},\\\"%M\\\":function(e){return
u(e.jc,2)},\\\"%n\\\":function(){return\\\"\\\\n\\\"},\\\"%p\\\":function(e){return
0<=e.tb&&12>e.tb?\\\"AM\\\":\\\"PM\\\"},\\\"%S\\\":function(e){return
u(e.kc,2)},\\\"%t\\\":function(){return\\\"\\\\t\\\"},\\\"%u\\\":function(e){return e.ub||7},\\\"%U\\\":function(e){var
t=new Date(e.ab+1900,0,1),n=0===t.getDay()?t:dt(t,7-t.getDay());return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(lt(ct(e.getFullYear())?ft:pt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%V\\\":function(e){var t=new
Date(e.ab+1901,0,4),n=c(new Date(e.ab+1900,0,4));t=c(t);var r=dt(new Date(e.ab+1900,0,1),e.vb);return
0>s(r,n)?\\\"53\\\":0>=s(t,r)?\\\"01\\\":u(Math.ceil((n.getFullYear()<e.ab+1900?e.vb+32-n.getDate():e.vb+1-
n.getDate())/7),2)},\\\"%w\\\":function(e){return e.ub},\\\"%W\\\":function(e){var t=new
Date(e.ab,0,1),n=1===t.getDay()?t:dt(t,0===t.getDay()?1:7-t.getDay()+1);return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(lt(ct(e.getFullYear())?ft:pt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%y\\\":function(e){return(e.ab+1900).toString().substring(
2)},\\\"%Y\\\":function(e){return e.ab+1900},\\\"%z\\\":function(e){var t=0<=(e=e.ic);return
e=Math.abs(e)/60,(t?\\\"+\\\":\\\"-\\\")+String(\\\"0000\\\"+(e/60*100+e%60)).slice(-4)},\\\"%Z\\\":function(e){return
e.lc},\\\"%%\\\":function(){return\\\"%\\\"}})r.includes(p)&&(r=r.replace(new
RegExp(p,\\\"g\\\"),f[p](i)));return(p=function(e){var t=Array(X(e)+1);return
q(e,t,0,t.length),t}(r)).length>n?0:(function(e,n){t().set(e,n)}(p,e),p.length-1)}var
ht=[null,_e,xe,De,Re,Ce,Pe,Ie,Fe,Ue,je,Le,We,He,Ye,ze,Be,Qe,tt,nt,rt,at,it,ot,ut,st],gt={h:function(e,t,n,r){le(\\\"Ass
ertion failed: \\\"+N(e)+\\\", at: \\\"+[t?N(t):\\\"unknown filename\\\",n,r?N(r):\\\"unknown
function\\\"])},M:function(e,t){return ve(e,t)},b:function(e){return bt(e+16)+16},d:function(e,t){return
_e(e,t)},e:function(e,t){ye.yb.push((function(){K.get(e)(t)}))},c:function(e,t,n){throw new
we(e).Pb(t,n),e},Z:function(e,t,n,r){if(\\\"undefined\\\"==typeof SharedArrayBuffer)return x(\\\"Current
environment does not support SharedArrayBuffer, pthreads are not available!\\\"),6;if(!e)return x(\\\"pthread_create
called with a null thread pointer!\\\"),28;var o=[];if(O&&0===o.length)return Et(687865856,e,t,n,r);var
u=0,s=0;if(t&&-1!=t){var c=a()[t>>2];c+=81920,u=a()[t+8>>2],s=0!==a()[t+12>>2]}else
c=2097152;(t=0==u)?u=Ht(16,c):F(0<(u-=c));for(var l=bt(228),f=0;57>f;++f)i()[(l>>2)+f]=0;return
a()[e>>2]=l,a()[l+12>>2]=l,e=l+152,a()[e>>2]=e,n={hb:u,jb:c,wb:t,detached:s,ec:n,rb:l,ib:r,mc:o},O?(n.oc=\\\"spaw
nThread\\\",postMessage(n,o),0):Oe(n)},X:function(e){throw
O?ye.Hb(e):(ye.Eb(),Nt(e)),\\\"unwind\\\"},Y:function(e,t){return function(e,t){if(!e)return x(\\\"pthread_join
attempted on a null thread pointer!\\\"),71;if(O&&_t()==e)return x(\\\"PThread \\\"+e+\\\" is attempting to join to
itself!\\\"),16;if(!O&&At()==e)return x(\\\"Main thread \\\"+e+\\\" is attempting to join to
itself!\\\"),16;if(a()[e+12>>2]!==e)return x(\\\"pthread_join attempted on thread \\\"+e+\\\", which does not point to
a valid thread, or does not exist anymore!\\\"),71;if(Atomics.load(i(),e+64>>2))return x(\\\"Attempted to join thread
\\\"+e+\\\", which was already detached!\\\"),28;for(Ee();;){var n=Atomics.load(i(),e+0>>2);if(1==n)return
n=Atomics.load(i(),e+4>>2),t&&(a()[t>>2]=n),Atomics.store(i(),e+64>>2,1),O?postMessage({cmd:\\\"cleanupThre
ad\\\",thread:e}):ge(e),0;kt(),O||St(),Ae(e+0,n,O?100:1)}}(e,t)},L:xe,s:De,S:Re,V:Ce,u:function(){return
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42},F:Pe,Q:Ie,P:Fe,U:Ue,T:je,q:Le,K:We,N:He,v:Ye,O:ze,da:function(e,t){if(e==t)postMessage({cmd:\\\"processQ
ueuedMainThreadWork\\\"});else
if(O)postMessage({targetThread:e,cmd:\\\"processThreadQueue\\\"});else{if(!(e=(e=ye.cb[e])&&e.worker))return;e.
postMessage({cmd:\\\"processThreadQueue\\\"})}return 1},f:Be,w:ve,ga:function(e,t){return e-
t},A:function(){le(\\\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},l:function(){le(\\\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},C:function(){le(\\\"To use dlopen, you need to use Emscripten's linking support,
see https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},z:function(){le(\\\"To use dlopen, you need to
use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},ea:function(e,t,n){var
i;for(Ge.length=0,n>>=2;i=r()[t++];)(i=105>i)&&1&n&&n++,Ge.push(i?o()[n++>>1]:a()[n]),++n;return
de[e].apply(null,Ge)},G:Ee,n:function(){},k:Ae,j:he,W:function(){return
2147483648},i:be,D:function(e,t,n){r().copyWithin(e,t,t+n)},o:function(){return
w?n(993).cpus().length:navigator.hardwareConcurrency},aa:function(e,t,n){qe.length=t,n>>=3;for(var
r=0;r<t;r++)qe[r]=o()[n+r];return(0>e?de[-e-1]:ht[e]).apply(null,qe)},E:function(e){var
t=r().length;if((e>>>=0)<=t||2147483648<e)return!1;for(var n=1;4>=n;n*=2){var
a=t*(1+.2/n);a=Math.min(a,e+100663296),0<(a=Math.max(e,a))%65536&&(a+=65536-
a%65536);e:{try{R.grow(Math.min(2147483648,a)-j.byteLength+65535>>>16),Q(R.buffer);var i=1;break
e}catch(e){}i=void 0}if(i)return!0}return!1},ba:function(e,t,n){return
Xe(e)?Je(e,t,n):Qe(e,t,n)},x:function(){},$:function(e,t,n){return re+=1,setTimeout((function(){--
re,function(e){if(!I){try{e()}catch(e){if(e instanceof Bt)return;if(\\\"unwind\\\"!==e)throw
e&&\\\"object\\\"==typeof e&&e.stack&&x(\\\"exception thrown:
\\\"+[e,e.stack]),e}if(!ae())try{O?xt(P):Nt(P)}catch(e){if(!(e instanceof Bt))throw
e}}}((function(){K.get(e)(n)}))}),t)},ca:function(e,t){t>>=2;var n=a()[t+6];return
t={alpha:!!a()[t],depth:!!a()[t+1],stencil:!!a()[t+2],antialias:!!a()[t+3],premultipliedAlpha:!!a()[t+4],preserveDrawin
gBuffer:!!a()[t+5],powerPreference:Ke[n],failIfMajorPerformanceCaveat:!!a()[t+7],Vb:a()[t+8],yc:a()[t+9],Bb:a()[t
+10],Mb:a()[t+11],Bc:a()[t+12],Cc:a()[t+13]},!(e=Xe(e))||t.Mb?0:function(e,t){e.Cb||(e.Cb=e.getContext,e.getConte
xt=function(t,n){return\\\"webgl\\\"==t==(n=e.Cb(t,n))instanceof WebGLRenderingContext?n:null});var
n=e.getContext(\\\"webgl\\\",t);return n?function(e,t){var n=bt(8);a()[n+4>>2]=_t();var
r={wc:n,attributes:t,version:t.Vb,ob:e};return e.canvas&&(e.canvas.pb=r),(void
0===t.Bb||t.Bb)&&function(e){if(e||(e=void 0),!e.Qb){e.Qb=!0;var t=e.ob;!function(e){var
t=e.getExtension(\\\"ANGLE_instanced_arrays\\\");t&&(e.vertexAttribDivisor=function(e,n){t.vertexAttribDivisor
ANGLE(e,n)},e.drawArraysInstanced=function(e,n,r,a){t.drawArraysInstancedANGLE(e,n,r,a)},e.drawElementsIns
tanced=function(e,n,r,a,i){t.drawElementsInstancedANGLE(e,n,r,a,i)})}(t),function(e){var
t=e.getExtension(\\\"OES_vertex_array_object\\\");t&&(e.createVertexArray=function(){return
t.createVertexArrayOES()},e.deleteVertexArray=function(e){t.deleteVertexArrayOES(e)},e.bindVertexArray=funct
ion(e){t.bindVertexArrayOES(e)},e.isVertexArray=function(e){return t.isVertexArrayOES(e)})}(t),function(e){var
t=e.getExtension(\\\"WEBGL_draw_buffers\\\");t&&(e.drawBuffers=function(e,n){t.drawBuffersWEBGL(e,n)})}(t
),t.qc=t.getExtension(\\\"EXT_disjoint_timer_query\\\"),t.zc=t.getExtension(\\\"WEBGL_multi_draw\\\"),(t.getSupp
ortedExtensions()||[]).forEach((function(e){e.includes(\\\"lose_context\\\")||e.includes(\\\"debug\\\")||t.getExtension(e
)}))}}(r),n}(n,t):0}(e,t)},I:tt,J:nt,m:rt,H:at,t:it,B:ot,p:ut,R:function(e){var t=Date.now();return
a()[e>>2]=t/1e3|0,a()[e+4>>2]=t%1e3*1e3|0,0},ha:function e(t,n){return t=new
Date(1e3*a()[t>>2]),a()[n>>2]=t.getUTCSeconds(),a()[n+4>>2]=t.getUTCMinutes(),a()[n+8>>2]=t.getUTCHours()
,a()[n+12>>2]=t.getUTCDate(),a()[n+16>>2]=t.getUTCMonth(),a()[n+20>>2]=t.getUTCFullYear()-
1900,a()[n+24>>2]=t.getUTCDay(),a()[n+36>>2]=0,a()[n+32>>2]=0,t=(t.getTime()-
Date.UTC(t.getUTCFullYear(),0,1,0,0,0,0))/864e5|0,a()[n+28>>2]=t,e.Ab||(e.Ab=J(\\\"GMT\\\")),a()[n+40>>2]=e.A
b,n},_:function(){ye.Rb()},r:function(e,t){st(),e=new
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Date(1e3*a()[e>>2]),a()[t>>2]=e.getSeconds(),a()[t+4>>2]=e.getMinutes(),a()[t+8>>2]=e.getHours(),a()[t+12>>2]
=e.getDate(),a()[t+16>>2]=e.getMonth(),a()[t+20>>2]=e.getFullYear()-1900,a()[t+24>>2]=e.getDay();var n=new
Date(e.getFullYear(),0,1),r=(e.getTime()-n.getTime())/864e5|0;return a()[t+28>>2]=r,a()[t+36>>2]=-
60*e.getTimezoneOffset(),r=new
Date(e.getFullYear(),6,1).getTimezoneOffset(),e=0|(r!=(n=n.getTimezoneOffset())&&e.getTimezoneOffset()==Mat
h.min(n,r)),a()[t+32>>2]=e,e=a()[Pt()+(e?4:0)>>2],a()[t+40>>2]=e,t},a:R||u.wasmMemory,y:function(e){st();var
t=new
Date(a()[e+20>>2]+1900,a()[e+16>>2],a()[e+12>>2],a()[e+8>>2],a()[e+4>>2],a()[e>>2],0),n=a()[e+32>>2],r=t.get
TimezoneOffset(),i=new Date(t.getFullYear(),0,1),o=new
Date(t.getFullYear(),6,1).getTimezoneOffset(),u=i.getTimezoneOffset(),s=Math.min(u,o);return
0>n?a()[e+32>>2]=Number(o!=u&&s==r):0<n!=(s==r)&&(o=Math.max(u,o),t.setTime(t.getTime()+6e4*((0<n?s:o
)-r))),a()[e+24>>2]=t.getDay(),n=(t.getTime()-
i.getTime())/864e5|0,a()[e+28>>2]=n,a()[e>>2]=t.getSeconds(),a()[e+4>>2]=t.getMinutes(),a()[e+8>>2]=t.getHours
(),a()[e+12>>2]=t.getDate(),a()[e+16>>2]=t.getMonth(),t.getTime()/1e3|0},fa:mt,g:function(e,t,n,r){return
mt(e,t,n,r)}};!function(){function
e(e,t){u.asm=e.exports,K=u.asm.Ca,ee.unshift(u.asm.ia),ye.zb.push(u.asm.Ha),C=t,O||(ue--
,u.monitorRunDependencies&&u.monitorRunDependencies(ue),0==ue&&(null!==se&&(clearInterval(se),se=null),
ce&&(e=ce,ce=null,e())))}function t(t){e(t.instance,t.module)}function n(e){return
function(){if(!M&&(v||_)){if(\\\"function\\\"==typeof fetch&&!oe.startsWith(\\\"file://\\\"))return
fetch(oe,{credentials:\\\"same-origin\\\"}).then((function(e){if(!e.ok)throw\\\"failed to load wasm binary file at
'\\\"+oe+\\\"'\\\";return e.arrayBuffer()})).catch((function(){return pe()}));if(h)return new
Promise((function(e,t){h(oe,(function(t){e(new Uint8Array(t))}),t)}))}return
Promise.resolve().then((function(){return pe()}))}().then((function(e){return
WebAssembly.instantiate(e,r)})).then(e,(function(e){x(\\\"failed to asynchronously prepare wasm:
\\\"+e),le(e)}))}var
r={a:gt};if(O||(ue++,u.monitorRunDependencies&&u.monitorRunDependencies(ue)),u.instantiateWasm)try{return
u.instantiateWasm(r,e)}catch(e){return x(\\\"Module.instantiateWasm callback failed with error:
\\\"+e),!1}(M||\\\"function\\\"!=typeof
WebAssembly.instantiateStreaming||fe()||oe.startsWith(\\\"file://\\\")||\\\"function\\\"!=typeof
fetch?n(t):fetch(oe,{credentials:\\\"same-origin\\\"}).then((function(e){return
WebAssembly.instantiateStreaming(e,r).then(t,(function(e){return x(\\\"wasm streaming compile failed:
\\\"+e),x(\\\"falling back to ArrayBuffer
instantiation\\\"),n(t)}))}))).catch(c)}(),u.___wasm_call_ctors=function(){return(u.___wasm_call_ctors=u.asm.ia).a
pply(null,arguments)},u._OrtInit=function(){return(u._OrtInit=u.asm.ja).apply(null,arguments)},u._OrtCreateSessio
nOptions=function(){return(u._OrtCreateSessionOptions=u.asm.ka).apply(null,arguments)},u._OrtAddSessionConfi
gEntry=function(){return(u._OrtAddSessionConfigEntry=u.asm.la).apply(null,arguments)},u._OrtReleaseSessionO
ptions=function(){return(u._OrtReleaseSessionOptions=u.asm.ma).apply(null,arguments)},u._OrtCreateSession=fu
nction(){return(u._OrtCreateSession=u.asm.na).apply(null,arguments)},u._OrtReleaseSession=function(){return(u._
OrtReleaseSession=u.asm.oa).apply(null,arguments)},u._OrtGetInputCount=function(){return(u._OrtGetInputCount
=u.asm.pa).apply(null,arguments)},u._OrtGetOutputCount=function(){return(u._OrtGetOutputCount=u.asm.qa).app
ly(null,arguments)},u._OrtGetInputName=function(){return(u._OrtGetInputName=u.asm.ra).apply(null,arguments)
},u._OrtGetOutputName=function(){return(u._OrtGetOutputName=u.asm.sa).apply(null,arguments)},u._OrtFree=f
unction(){return(u._OrtFree=u.asm.ta).apply(null,arguments)},u._OrtCreateTensor=function(){return(u._OrtCreate
Tensor=u.asm.ua).apply(null,arguments)},u._OrtGetTensorData=function(){return(u._OrtGetTensorData=u.asm.va)
.apply(null,arguments)},u._OrtReleaseTensor=function(){return(u._OrtReleaseTensor=u.asm.wa).apply(null,argum
ents)},u._OrtCreateRunOptions=function(){return(u._OrtCreateRunOptions=u.asm.xa).apply(null,arguments)},u._O
rtAddRunConfigEntry=function(){return(u._OrtAddRunConfigEntry=u.asm.ya).apply(null,arguments)},u._OrtRele
aseRunOptions=function(){return(u._OrtReleaseRunOptions=u.asm.za).apply(null,arguments)},u._OrtRun=function
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(){return(u._OrtRun=u.asm.Aa).apply(null,arguments)},u._OrtEndProfiling=function(){return(u._OrtEndProfiling=
u.asm.Ba).apply(null,arguments)};var
bt=u._malloc=function(){return(bt=u._malloc=u.asm.Da).apply(null,arguments)},yt=u.___errno_location=function(
){return(yt=u.___errno_location=u.asm.Ea).apply(null,arguments)},vt=u._free=function(){return(vt=u._free=u.asm.
Fa).apply(null,arguments)},_t=u._pthread_self=function(){return(_t=u._pthread_self=u.asm.Ga).apply(null,argumen
ts)};u._emscripten_tls_init=function(){return(u._emscripten_tls_init=u.asm.Ha).apply(null,arguments)},u._emscript
en_current_thread_process_queued_calls=function(){return(u._emscripten_current_thread_process_queued_calls=u.
asm.Ia).apply(null,arguments)};var
wt,Ot=u._emscripten_register_main_browser_thread_id=function(){return(Ot=u._emscripten_register_main_brows
er_thread_id=u.asm.Ja).apply(null,arguments)},At=u._emscripten_main_browser_thread_id=function(){return(At=u
._emscripten_main_browser_thread_id=u.asm.Ka).apply(null,arguments)},Et=u._emscripten_sync_run_in_main_thr
ead_4=function(){return(Et=u._emscripten_sync_run_in_main_thread_4=u.asm.La).apply(null,arguments)},St=u._e
mscripten_main_thread_process_queued_calls=function(){return(St=u._emscripten_main_thread_process_queued_c
alls=u.asm.Ma).apply(null,arguments)},Tt=u._emscripten_run_in_main_runtime_thread_js=function(){return(Tt=u.
_emscripten_run_in_main_runtime_thread_js=u.asm.Na).apply(null,arguments)},Mt=u.__emscripten_call_on_threa
d=function(){return(Mt=u.__emscripten_call_on_thread=u.asm.Oa).apply(null,arguments)},kt=u._pthread_testcanc
el=function(){return(kt=u._pthread_testcancel=u.asm.Pa).apply(null,arguments)},xt=u._pthread_exit=function(){ret
urn(xt=u._pthread_exit=u.asm.Qa).apply(null,arguments)},Dt=u.__emscripten_thread_init=function(){return(Dt=u.
__emscripten_thread_init=u.asm.Ra).apply(null,arguments)},Rt=u._emscripten_get_global_libc=function(){return(
Rt=u._emscripten_get_global_libc=u.asm.Sa).apply(null,arguments)},Ct=u.___pthread_tsd_run_dtors=function(){re
turn(Ct=u.___pthread_tsd_run_dtors=u.asm.Ta).apply(null,arguments)},Pt=u.__get_tzname=function(){return(Pt=u.
__get_tzname=u.asm.Ua).apply(null,arguments)},It=u.__get_daylight=function(){return(It=u.__get_daylight=u.asm
.Va).apply(null,arguments)},Ft=u.__get_timezone=function(){return(Ft=u.__get_timezone=u.asm.Wa).apply(null,ar
guments)},Ut=u.stackSave=function(){return(Ut=u.stackSave=u.asm.Xa).apply(null,arguments)},jt=u.stackRestore
=function(){return(jt=u.stackRestore=u.asm.Ya).apply(null,arguments)},Lt=u.stackAlloc=function(){return(Lt=u.st
ackAlloc=u.asm.Za).apply(null,arguments)},Wt=u._emscripten_stack_set_limits=function(){return(Wt=u._emscript
en_stack_set_limits=u.asm._a).apply(null,arguments)},Ht=u._memalign=function(){return(Ht=u._memalign=u.asm.
$a).apply(null,arguments)},Yt=u.__emscripten_allow_main_runtime_queued_calls=973296,zt=u.__emscripten_mai
n_thread_futex=977204;function Bt(e){this.name=\\\"ExitStatus\\\",this.message=\\\"Program terminated with
exit(\\\"+e+\\\")\\\",this.status=e}function Gt(){function
e(){if(!wt&&(wt=!0,u.calledRun=!0,!I)&&(O||me(ee),s(u),u.onRuntimeInitialized&&u.onRuntimeInitialized(),!O))
{if(u.postRun)for(\\\"function\\\"==typeof u.postRun&&(u.postRun=[u.postRun]);u.postRun.length;){var
e=u.postRun.shift();ne.unshift(e)}me(ne)}}if(!(0<ue))if(O)s(u),O||me(ee),postMessage({cmd:\\\"loaded\\\"});else{if
(!O){if(u.preRun)for(\\\"function\\\"==typeof
u.preRun&&(u.preRun=[u.preRun]);u.preRun.length;)ie();me($)}0<ue||(u.setStatus?(u.setStatus(\\\"Running...\\\"),s
etTimeout((function(){setTimeout((function(){u.setStatus(\\\"\\\")}),1),e()}),1)):e())}}function
Nt(e){if(P=e,O)throw postMessage({cmd:\\\"exitProcess\\\",returnCode:e}),new
Bt(e);ae()||(ye.Gb(),O||(me(te),\\\"undefined\\\"!=typeof
_fflush&&_fflush(0),Te[1].length&&Me(1,10),Te[2].length&&Me(2,10))),P=e,ae()||(ye.Gb(),u.onExit&&u.onExit(
e),I=!0),d(e,new
Bt(e))}if(u.UTF8ToString=N,u.stringToUTF8=V,u.lengthBytesUTF8=X,u.keepRuntimeAlive=ae,u.PThread=ye,u.s
tackSave=Ut,u.stackRestore=jt,u.stackAlloc=Lt,u.PThread=ye,u.wasmMemory=R,u.ExitStatus=Bt,ce=function
e(){wt||Gt(),wt||(ce=e)},u.run=Gt,u.preInit)for(\\\"function\\\"==typeof
u.preInit&&(u.preInit=[u.preInit]);0<u.preInit.length;)u.preInit.pop()();return
O&&(D=!1,ye.Sb()),Gt(),e.ready});e.exports=r},118:function(e){\\\"use strict\\\";e.exports='\\\"use strict\\\";var
e={};if(\\\"object\\\"==typeof process&&\\\"object\\\"==typeof process.versions&&\\\"string\\\"==typeof
process.versions.node){var
a=require(\\\"worker_threads\\\"),t=a.parentPort;t.on(\\\"message\\\",(function(e){onmessage({data:e})}));var
```

```
r=require(\\\"fs\\\");Object.assign(global,{self:global,require:require,Module:e,location:{href:__filename},Worker:a.
Worker,importScripts:function(e){(0,eval)(r.readFileSync(e,\\\"utf8\\\"))},postMessage:function(e){t.postMessage(e
)},performance:global.performance||{now:function(){return Date.now()}}})}var s=function(){var
e=Array.prototype.slice.call(arguments).join(\\\" \\\");console.error(e)};self.alert=function(){var
a=Array.prototype.slice.call(arguments).join(\\\"
\\\");postMessage({cmd:\\\"alert\\\",text:a,threadId:e._pthread_self()})},e.instantiateWasm=function(a,t){var r=new
WebAssembly.Instance(e.wasmModule,a);return
t(r),e.wasmModule=null,r.exports},self.onmessage=function(a){try{if(\\\"load\\\"===a.data.cmd){if(e.wasmModule
=a.data.wasmModule,e.wasmMemory=a.data.wasmMemory,e.buffer=e.wasmMemory.buffer,e.ENVIRONMENT_I
S_PTHREAD=!0,\\\"string\\\"==typeof a.data.urlOrBlob)importScripts(a.data.urlOrBlob);else{var
t=URL.createObjectURL(a.data.urlOrBlob);importScripts(t),URL.revokeObjectURL(t)}ortWasmThreaded(e).then((
function(a){e=a}))}else if(\\\"objectTransfer\\\"===a.data.cmd)e.PThread.receiveObjectTransfer(a.data);else
if(\\\"run\\\"===a.data.cmd){e.__performance_now_clock_drift=performance.now()-
a.data.time,e.__emscripten_thread_init(a.data.threadInfoStruct,0,0);var
r=a.data.stackBase,o=a.data.stackBase+a.data.stackSize;e.establishStackSpace(o,r),e.PThread.receiveObjectTransfer
(a.data),e.PThread.threadInit();try{var
n=e.invokeEntryPoint(a.data.start_routine,a.data.arg);e.keepRuntimeAlive()?e.PThread.setExitStatus(n):e.PThread.t
hreadExit(n)}catch(a){if(\\\"Canceled!\\\"===a)e.PThread.threadCancel();else if(\\\"unwind\\\"!=a){if(!(a instanceof
e.ExitStatus))throw e.PThread.threadExit(-
2),a;e.keepRuntimeAlive()||e.PThread.threadExit(a.status)}}}else\\\"cancel\\\"===a.data.cmd?e._pthread_self()&&e
.PThread.threadCancel():\\\"setimmediate\\\"===a.data.target||(\\\"processThreadQueue\\\"===a.data.cmd?e._pthrea
d_self()&&e._emscripten_current_thread_process_queued_calls():(s(\\\"worker.js received unknown command
\\\"+a.data.cmd),s(a.data)))}catch(e){throw s(\\\"worker.js onmessage() captured an uncaught exception:
\\\"+e),e&&e.stack&&s(e.stack),e}};\\\\n'},932:function(e,t,n){var
_scriptDir,r=(_scriptDir=(_scriptDir=\\\"undefined\\\"!=typeof
document&&document.currentScript?document.currentScript.src:void 0)||\\\"/index.js\\\",function(e){var
t,r,a;e=e||{},t||(t=void 0!==e?e:{}),t.ready=new Promise((function(e,t){r=e,a=t}));var i,o={};for(i in
t)t.hasOwnProperty(i)&&(o[i]=t[i]);var u,s,c,l,f,p=\\\"./this.program\\\",d=\\\"object\\\"==typeof
window,m=\\\"function\\\"==typeof importScripts,h=\\\"object\\\"==typeof process&&\\\"object\\\"==typeof
process.versions&&\\\"string\\\"==typeof
process.versions.node,g=\\\"\\\";h?(g=m?n(908).dirname(g)+\\\"/\\\":\\\"//\\\",u=function(e,t){return
l||(l=n(384)),f||(f=n(908)),e=f.normalize(e),l.readFileSync(e,t?null:\\\"utf8\\\")},c=function(e){return(e=u(e,!0)).buff
er||(e=new Uint8Array(e)),e.buffer||B(\\\"Assertion failed:
undefined\\\"),e},s=function(e,t,r){l||(l=n(384)),f||(f=n(908)),e=f.normalize(e),l.readFile(e,(function(e,n){e?r(e):t(n.b
uffer)}))},1<process.argv.length&&(p=process.argv[1].replace(/\\\\\\\\/g,\\\"/\\\")),process.argv.slice(2),process.on(\\\
"uncaughtException\\\",(function(e){throw
e})),process.on(\\\"unhandledRejection\\\",B),t.inspect=function(){return\\\"[Emscripten Module
object]\\\"}):(d||m)&&(m?g=self.location.href:\\\"undefined\\\"!=typeof
document&&document.currentScript&&(g=document.currentScript.src),_scriptDir&&(g=_scriptDir),g=0!==g.inde
xOf(\\\"blob:\\\")?g.substr(0,g.lastIndexOf(\\\"/\\\")+1):\\\"\\\",u=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.send(null),t.responseText},m&&(c=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.responseType=\\\"arraybuffer\\\",t.send(null),new
Uint8Array(t.response)}),s=function(e,t,n){var r=new
XMLHttpRequest;r.open(\\\"GET\\\",e,!0),r.responseType=\\\"arraybuffer\\\",r.onload=function(){200==r.status||0=
=r.status&&r.response?t(r.response):n()},r.onerror=n,r.send(null)});var
b,y=t.print||console.log.bind(console),v=t.printErr||console.warn.bind(console);for(i in
o)o.hasOwnProperty(i)&&(t[i]=o[i]);o=null,t.thisProgram&&(p=t.thisProgram),t.wasmBinary&&(b=t.wasmBinary)
,t.noExitRuntime,\\\"object\\\"!=typeof WebAssembly&&B(\\\"no native wasm support detected\\\");var
```

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_,w,O,A,E,S=!1,T=\\\"undefined\\\"!=typeof TextDecoder?new TextDecoder(\\\"utf8\\\"):void 0;function
M(e,t,n){var r=t+n;for(n=t;e[n]&&!(n>=r);)++n;if(16<n-t&&e.subarray&&T)return
T.decode(e.subarray(t,n));for(r=\\\"\\\";t<n;){var a=e[t++];if(128&a){var
i=63&e[t++];if(192==(224&a))r+=String.fromCharCode((31&a)<<6|i);else{var
o=63&e[t++];65536>(a=224==(240&a)?(15&a)<<12|i<<6|o:(7&a)<<18|i<<12|o<<6|63&e[t++])?r+=String.fromCh
arCode(a):(a-=65536,r+=String.fromCharCode(55296|a>>10,56320|1023&a))}}else
r+=String.fromCharCode(a)}return r}function k(e,t){return e?M(A,e,t):\\\"\\\"}function x(e,t,n,r){if(!(0<r))return
0;var a=n;r=n+r-1;for(var i=0;i<e.length;++i){var
o=e.charCodeAt(i);if(55296<=o&&57343>=o&&(o=65536+((1023&o)<<10)|1023&e.charCodeAt(++i)),127>=o){i
f(n>=r)break;t[n++]=o}else{if(2047>=o){if(n+1>=r)break;t[n++]=192|o>>6}else{if(65535>=o){if(n+2>=r)break;t[
n++]=224|o>>12}else{if(n+3>=r)break;t[n++]=240|o>>18,t[n++]=128|o>>12&63}t[n++]=128|o>>6&63}t[n++]=1
28|63&o}}return t[n]=0,n-a}function D(e){for(var t=0,n=0;n<e.length;++n){var
r=e.charCodeAt(n);55296<=r&&57343>=r&&(r=65536+((1023&r)<<10)|1023&e.charCodeAt(++n)),127>=r?++t:t
=2047>=r?t+2:65535>=r?t+3:t+4}return t}function R(e){var t=D(e)+1,n=pe(t);return n&&x(e,O,n,t),n}function
C(){var e=_.buffer;w=e,t.HEAP8=O=new Int8Array(e),t.HEAP16=new Int16Array(e),t.HEAP32=E=new
Int32Array(e),t.HEAPU8=A=new Uint8Array(e),t.HEAPU16=new Uint16Array(e),t.HEAPU32=new
Uint32Array(e),t.HEAPF32=new Float32Array(e),t.HEAPF64=new Float64Array(e)}var
P,I=[],F=[],U=[],j=[];function L(){var e=t.preRun.shift();I.unshift(e)}var W,H=0,Y=null,z=null;function B(e){throw
t.onAbort&&t.onAbort(e),v(e),S=!0,e=new WebAssembly.RuntimeError(\\\"abort(\\\"+e+\\\"). Build with -s
ASSERTIONS=1 for more info.\\\"),a(e),e}function G(){return W.startsWith(\\\"data:application/octet-
stream;base64,\\\")}if(t.preloadedImages={},t.preloadedAudios={},W=\\\"ort-wasm.wasm\\\",!G()){var
N=W;W=t.locateFile?t.locateFile(N,g):g+N}function q(){var e=W;try{if(e==W&&b)return new
Uint8Array(b);if(c)return c(e);throw\\\"both async and sync fetching of the wasm failed\\\"}catch(e){B(e)}}function
V(e){for(;0<e.length;){var n=e.shift();if(\\\"function\\\"==typeof n)n(t);else{var r=n.Ea;\\\"number\\\"==typeof
r?void 0===n.xa?P.get(r)():P.get(r)(n.xa):r(void 0===n.xa?null:n.xa)}}}function X(e){this.ya=e-
16,this.Na=function(e){E[this.ya+4>>2]=e},this.Ka=function(e){E[this.ya+8>>2]=e},this.La=function(){E[this.ya>
>2]=0},this.Ja=function(){O[this.ya+12>>0]=0},this.Ma=function(){O[this.ya+13>>0]=0},this.Ga=function(e,t){thi
s.Na(e),this.Ka(t),this.La(),this.Ja(),this.Ma()}}var J,Q={},Z=[null,[],[]],K={};J=h?function(){var
e=process.hrtime();return 1e3*e[0]+e[1]/1e6}:function(){return performance.now()};var $,ee,te={};function
ne(){if(!$){var
e,t={USER:\\\"web_user\\\",LOGNAME:\\\"web_user\\\",PATH:\\\"/\\\",PWD:\\\"/\\\",HOME:\\\"/home/web_user\\\
",LANG:(\\\"object\\\"==typeof navigator&&navigator.languages&&navigator.languages[0]||\\\"C\\\").replace(\\\"-
\\\",\\\"_\\\")+\\\".UTF-8\\\",_:p||\\\"./this.program\\\"};for(e in te)void 0===te[e]?delete t[e]:t[e]=te[e];var n=[];for(e
in t)n.push(e+\\\"=\\\"+t[e]);$=n}return $}function re(){function e(e){return(e=e.toTimeString().match(/\\\\(([A-Za-z
]+)\\\\)$/))?e[1]:\\\"GMT\\\"}if(!ee){ee=!0;var t=(new Date).getFullYear(),n=new Date(t,0,1),r=new
Date(t,6,1);t=n.getTimezoneOffset();var
a=r.getTimezoneOffset(),i=Math.max(t,a);E[be()>>2]=60*i,E[ge()>>2]=Number(t!=a),n=e(n),r=e(r),n=R(n),r=R(r),
a<t?(E[he()>>2]=n,E[he()+4>>2]=r):(E[he()>>2]=r,E[he()+4>>2]=n)}}function ae(e){return
0==e%4&&(0!=e%100||0==e%400)}function ie(e,t){for(var n=0,r=0;r<=t;n+=e[r++]);return n}var
oe=[31,29,31,30,31,30,31,31,30,31,30,31],ue=[31,28,31,30,31,30,31,31,30,31,30,31];function se(e,t){for(e=new
Date(e.getTime());0<t;){var n=e.getMonth(),r=(ae(e.getFullYear())?oe:ue)[n];if(!(t>r-
e.getDate())){e.setDate(e.getDate()+t);break}t-=r-
e.getDate()+1,e.setDate(1),11>n?e.setMonth(n+1):(e.setMonth(0),e.setFullYear(e.getFullYear()+1))}return
e}function ce(e,t,n,r){function a(e,t,n){for(e=\\\"number\\\"==typeof
e?e.toString():e||\\\"\\\";e.length<t;)e=n[0]+e;return e}function i(e,t){return a(e,t,\\\"0\\\")}function o(e,t){function
n(e){return 0>e?-1:0<e?1:0}var r;return 0===(r=n(e.getFullYear()-t.getFullYear()))&&0===(r=n(e.getMonth()-
t.getMonth()))&&(r=n(e.getDate()-t.getDate())),r}function u(e){switch(e.getDay()){case 0:return new
Date(e.getFullYear()-1,11,29);case 1:return e;case 2:return new Date(e.getFullYear(),0,3);case 3:return new
```

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Date(e.getFullYear(),0,2);case 4:return new Date(e.getFullYear(),0,1);case 5:return new Date(e.getFullYear()-
1,11,31);case 6:return new Date(e.getFullYear()-1,11,30)}}function s(e){e=se(new Date(e.va+1900,0,1),e.Ca);var
t=new Date(e.getFullYear()+1,0,4),n=u(new Date(e.getFullYear(),0,4));return
t=u(t),0>=o(n,e)?0>=o(t,e)?e.getFullYear()+1:e.getFullYear():e.getFullYear()-1}var c=E[r+40>>2];for(var l in
r={Qa:E[r>>2],Pa:E[r+4>>2],Aa:E[r+8>>2],za:E[r+12>>2],wa:E[r+16>>2],va:E[r+20>>2],Ba:E[r+24>>2],Ca:E[r+
28>>2],Ya:E[r+32>>2],Oa:E[r+36>>2],Ra:c?k(c):\\\"\\\"},n=k(n),c={\\\"%c\\\":\\\"%a %b %d %H:%M:%S
%Y\\\",\\\"%D\\\":\\\"%m/%d/%y\\\",\\\"%F\\\":\\\"%Y-%m-%d\\\",\\\"%h\\\":\\\"%b\\\",\\\"%r\\\":\\\"%I:%M:%S
%p\\\",\\\"%R\\\":\\\"%H:%M\\\",\\\"%T\\\":\\\"%H:%M:%S\\\",\\\"%x\\\":\\\"%m/%d/%y\\\",\\\"%X\\\":\\\"%H:%M:
%S\\\",\\\"%Ec\\\":\\\"%c\\\",\\\"%EC\\\":\\\"%C\\\",\\\"%Ex\\\":\\\"%m/%d/%y\\\",\\\"%EX\\\":\\\"%H:%M:%S\\\",\\\
"%Ey\\\":\\\"%y\\\",\\\"%EY\\\":\\\"%Y\\\",\\\"%Od\\\":\\\"%d\\\",\\\"%Oe\\\":\\\"%e\\\",\\\"%OH\\\":\\\"%H\\\",\\\"%
OI\\\":\\\"%I\\\",\\\"%Om\\\":\\\"%m\\\",\\\"%OM\\\":\\\"%M\\\",\\\"%OS\\\":\\\"%S\\\",\\\"%Ou\\\":\\\"%u\\\",\\\"%O
U\\\":\\\"%U\\\",\\\"%OV\\\":\\\"%V\\\",\\\"%Ow\\\":\\\"%w\\\",\\\"%OW\\\":\\\"%W\\\",\\\"%Oy\\\":\\\"%y\\\"})n=n.r
eplace(new RegExp(l,\\\"g\\\"),c[l]);var f=\\\"Sunday Monday Tuesday Wednesday Thursday Friday
Saturday\\\".split(\\\" \\\"),p=\\\"January February March April May June July August September October November
December\\\".split(\\\" \\\");for(l in c={\\\"%a\\\":function(e){return
f[e.Ba].substring(0,3)},\\\"%A\\\":function(e){return f[e.Ba]},\\\"%b\\\":function(e){return
p[e.wa].substring(0,3)},\\\"%B\\\":function(e){return p[e.wa]},\\\"%C\\\":function(e){return
i((e.va+1900)/100|0,2)},\\\"%d\\\":function(e){return i(e.za,2)},\\\"%e\\\":function(e){return a(e.za,2,\\\"
\\\")},\\\"%g\\\":function(e){return s(e).toString().substring(2)},\\\"%G\\\":function(e){return
s(e)},\\\"%H\\\":function(e){return i(e.Aa,2)},\\\"%I\\\":function(e){return 0==(e=e.Aa)?e=12:12<e&&(e-
=12),i(e,2)},\\\"%j\\\":function(e){return i(e.za+ie(ae(e.va+1900)?oe:ue,e.wa-1),3)},\\\"%m\\\":function(e){return
i(e.wa+1,2)},\\\"%M\\\":function(e){return
i(e.Pa,2)},\\\"%n\\\":function(){return\\\"\\\\n\\\"},\\\"%p\\\":function(e){return
0<=e.Aa&&12>e.Aa?\\\"AM\\\":\\\"PM\\\"},\\\"%S\\\":function(e){return
i(e.Qa,2)},\\\"%t\\\":function(){return\\\"\\\\t\\\"},\\\"%u\\\":function(e){return e.Ba||7},\\\"%U\\\":function(e){var
t=new Date(e.va+1900,0,1),n=0===t.getDay()?t:se(t,7-t.getDay());return 0>o(n,e=new
Date(e.va+1900,e.wa,e.za))?i(Math.ceil((31-n.getDate()+(ie(ae(e.getFullYear())?oe:ue,e.getMonth()-1)-
31)+e.getDate())/7),2):0===o(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%V\\\":function(e){var t=new
Date(e.va+1901,0,4),n=u(new Date(e.va+1900,0,4));t=u(t);var r=se(new Date(e.va+1900,0,1),e.Ca);return
0>o(r,n)?\\\"53\\\":0>=o(t,r)?\\\"01\\\":i(Math.ceil((n.getFullYear()<e.va+1900?e.Ca+32-n.getDate():e.Ca+1-
n.getDate())/7),2)},\\\"%w\\\":function(e){return e.Ba},\\\"%W\\\":function(e){var t=new
Date(e.va,0,1),n=1===t.getDay()?t:se(t,0===t.getDay()?1:7-t.getDay()+1);return 0>o(n,e=new
Date(e.va+1900,e.wa,e.za))?i(Math.ceil((31-n.getDate()+(ie(ae(e.getFullYear())?oe:ue,e.getMonth()-1)-
31)+e.getDate())/7),2):0===o(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%y\\\":function(e){return(e.va+1900).toString().substring(
2)},\\\"%Y\\\":function(e){return e.va+1900},\\\"%z\\\":function(e){var t=0<=(e=e.Oa);return
e=Math.abs(e)/60,(t?\\\"+\\\":\\\"-\\\")+String(\\\"0000\\\"+(e/60*100+e%60)).slice(-4)},\\\"%Z\\\":function(e){return
e.Ra},\\\"%%\\\":function(){return\\\"%\\\"}})n.includes(l)&&(n=n.replace(new
RegExp(l,\\\"g\\\"),c[l](r)));return(l=function(e){var t=Array(D(e)+1);return
x(e,t,0,t.length),t}(n)).length>t?0:(O.set(l,e),l.length-1)}var le={a:function(e){return
pe(e+16)+16},c:function(e,t){U.unshift({Ea:e,xa:t})},d:function(e,t){U.unshift({Ea:e,xa:t})},b:function(e,t,n){thro
w new X(e).Ga(t,n),e},D:function(e,t){return e=k(e),K.Sa(e,t)},m:function(){return
0},I:function(){},L:function(){},o:function(){return 42},x:function(){return
0},H:function(){},G:function(e,t){return
e=k(e),K.Ta(e,t)},K:function(e,t,n,r,a,i){if(i<<=12,0!=(16&r)&&0!=e%65536)t=-28;else
if(0!=(32&r)){e=65536*Math.ceil(t/65536);var
o=we(65536,e);o?(A.fill(0,o,o+e),e=o):e=0,e?(Q[e]={Ia:e,Ha:t,Fa:!0,fd:a,Xa:n,flags:r,offset:i},t=e):t=-48}else t=-
52;return t},J:function(e,t){var n=Q[e];return 0!==t&&n?(t===n.Ha&&(Q[e]=null,n.Fa&&me(n.Ia)),e=0):e=-
28,e},j:function(){},C:function(e,t,n){return
```

```
e=k(e),K.Ua(e,t,n)},E:function(){},r:function(){},F:function(){},h:function(){B()},p:function(e,t){if(0===e)e=Date.
now();else{if(1!==e&&4!==e)return E[de()>>2]=28,-1;e=J()}return
E[t>>2]=e/1e3|0,E[t+4>>2]=e%1e3*1e6|0,0},s:function(e,t){return e-t},P:function(){B(\\\"To use dlopen, you need
to use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},g:function(){B(\\\"To use dlopen, you need to use Emscripten's linking support,
see https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},Q:function(){B(\\\"To use dlopen, you need to
use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},O:function(){B(\\\"To use dlopen, you need to use Emscripten's linking support,
see https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},M:function(){return
2147483648},v:function(e,t,n){A.copyWithin(e,t,t+n)},i:function(e){var
t=A.length;if(2147483648<(e>>>=0))return!1;for(var n=1;4>=n;n*=2){var
r=t*(1+.2/n);r=Math.min(r,e+100663296),0<(r=Math.max(e,r))%65536&&(r+=65536-
r%65536);e:{try{_.grow(Math.min(2147483648,r)-w.byteLength+65535>>>16),C();var a=1;break
e}catch(e){}a=void 0}if(a)return!0}return!1},B:function(e){for(var t=J();J()-t<e;);},z:function(e,t){var n=0;return
ne().forEach((function(r,a){var
i=t+n;for(a=E[e+4*a>>2]=i,i=0;i<r.length;++i)O[a++>>0]=r.charCodeAt(i);O[a>>0]=0,n+=r.length+1})),0},A:func
tion(e,t){var n=ne();E[e>>2]=n.length;var r=0;return
n.forEach((function(e){r+=e.length+1})),E[t>>2]=r,0},f:function(){return 0},y:function(e,t){return
e=1==e||2==e?2:B(),O[t>>0]=e,0},n:function(e,t,n,r){return
e=K.Wa(e),t=K.Va(e,t,n),E[r>>2]=t,0},u:function(){},q:function(e,t,n,r){for(var a=0,i=0;i<n;i++){for(var
o=E[t+8*i>>2],u=E[t+(8*i+4)>>2],s=0;s<u;s++){var
c=A[o+s],l=Z[e];0===c||10===c?((1===e?y:v)(M(l,0)),l.length=0):l.push(c)}a+=u}return
E[r>>2]=a,0},w:function(e){var t=Date.now();return E[e>>2]=t/1e3|0,E[e+4>>2]=t%1e3*1e3|0,0},t:function
e(t,n){return t=new
Date(1e3*E[t>>2]),E[n>>2]=t.getUTCSeconds(),E[n+4>>2]=t.getUTCMinutes(),E[n+8>>2]=t.getUTCHours(),E[n
+12>>2]=t.getUTCDate(),E[n+16>>2]=t.getUTCMonth(),E[n+20>>2]=t.getUTCFullYear()-
1900,E[n+24>>2]=t.getUTCDay(),E[n+36>>2]=0,E[n+32>>2]=0,E[n+28>>2]=(t.getTime()-
Date.UTC(t.getUTCFullYear(),0,1,0,0,0,0))/864e5|0,e.Da||(e.Da=R(\\\"GMT\\\")),E[n+40>>2]=e.Da,n},l:function(e,
t){re(),e=new
Date(1e3*E[e>>2]),E[t>>2]=e.getSeconds(),E[t+4>>2]=e.getMinutes(),E[t+8>>2]=e.getHours(),E[t+12>>2]=e.get
Date(),E[t+16>>2]=e.getMonth(),E[t+20>>2]=e.getFullYear()-1900,E[t+24>>2]=e.getDay();var n=new
Date(e.getFullYear(),0,1);E[t+28>>2]=(e.getTime()-n.getTime())/864e5|0,E[t+36>>2]=-
60*e.getTimezoneOffset();var r=new Date(e.getFullYear(),6,1).getTimezoneOffset();return
e=0|(r!=(n=n.getTimezoneOffset())&&e.getTimezoneOffset()==Math.min(n,r)),E[t+32>>2]=e,e=E[he()+(e?4:0)>>2
],E[t+40>>2]=e,t},k:function(e){re();var t=new
Date(E[e+20>>2]+1900,E[e+16>>2],E[e+12>>2],E[e+8>>2],E[e+4>>2],E[e>>2],0),n=E[e+32>>2],r=t.getTimezon
eOffset(),a=new Date(t.getFullYear(),0,1),i=new
Date(t.getFullYear(),6,1).getTimezoneOffset(),o=a.getTimezoneOffset(),u=Math.min(o,i);return
0>n?E[e+32>>2]=Number(i!=o&&u==r):0<n!=(u==r)&&(i=Math.max(o,i),t.setTime(t.getTime()+6e4*((0<n?u:i)-
r))),E[e+24>>2]=t.getDay(),E[e+28>>2]=(t.getTime()-
a.getTime())/864e5|0,E[e>>2]=t.getSeconds(),E[e+4>>2]=t.getMinutes(),E[e+8>>2]=t.getHours(),E[e+12>>2]=t.ge
tDate(),E[e+16>>2]=t.getMonth(),t.getTime()/1e3|0},N:ce,e:function(e,t,n,r){return
ce(e,t,n,r)}};!function(){function e(e){t.asm=e.exports,_=t.asm.R,C(),P=t.asm.ua,F.unshift(t.asm.S),H--
,t.monitorRunDependencies&&t.monitorRunDependencies(H),0==H&&(null!==Y&&(clearInterval(Y),Y=null),z&
&(e=z,z=null,e()))}function n(t){e(t.instance)}function r(e){return
function(){if(!b&&(d||m)){if(\\\"function\\\"==typeof fetch&&!W.startsWith(\\\"file://\\\"))return
fetch(W,{credentials:\\\"same-origin\\\"}).then((function(e){if(!e.ok)throw\\\"failed to load wasm binary file at
'\\\"+W+\\\"'\\\";return e.arrayBuffer()})).catch((function(){return q()}));if(s)return new
```

```
Promise((function(e,t){s(W,(function(t){e(new Uint8Array(t))}),t)}))}return
Promise.resolve().then((function(){return q()}))}().then((function(e){return
WebAssembly.instantiate(e,i)})).then(e,(function(e){v(\\\"failed to asynchronously prepare wasm:
\\\"+e),B(e)}))}var
i={a:le};if(H++,t.monitorRunDependencies&&t.monitorRunDependencies(H),t.instantiateWasm)try{return
t.instantiateWasm(i,e)}catch(e){return v(\\\"Module.instantiateWasm callback failed with error:
\\\"+e),!1}(b||\\\"function\\\"!=typeof
WebAssembly.instantiateStreaming||G()||W.startsWith(\\\"file://\\\")||\\\"function\\\"!=typeof
fetch?r(n):fetch(W,{credentials:\\\"same-origin\\\"}).then((function(e){return
WebAssembly.instantiateStreaming(e,i).then(n,(function(e){return v(\\\"wasm streaming compile failed:
\\\"+e),v(\\\"falling back to ArrayBuffer
instantiation\\\"),r(n)}))}))).catch(a)}(),t.___wasm_call_ctors=function(){return(t.___wasm_call_ctors=t.asm.S).app
ly(null,arguments)},t._OrtInit=function(){return(t._OrtInit=t.asm.T).apply(null,arguments)},t._OrtCreateSessionOpt
ions=function(){return(t._OrtCreateSessionOptions=t.asm.U).apply(null,arguments)},t._OrtAddSessionConfigEntry
=function(){return(t._OrtAddSessionConfigEntry=t.asm.V).apply(null,arguments)},t._OrtReleaseSessionOptions=f
unction(){return(t._OrtReleaseSessionOptions=t.asm.W).apply(null,arguments)},t._OrtCreateSession=function(){ret
urn(t._OrtCreateSession=t.asm.X).apply(null,arguments)},t._OrtReleaseSession=function(){return(t._OrtReleaseSes
sion=t.asm.Y).apply(null,arguments)},t._OrtGetInputCount=function(){return(t._OrtGetInputCount=t.asm.Z).apply(
null,arguments)},t._OrtGetOutputCount=function(){return(t._OrtGetOutputCount=t.asm._).apply(null,arguments)},t
._OrtGetInputName=function(){return(t._OrtGetInputName=t.asm.$).apply(null,arguments)},t._OrtGetOutputName
=function(){return(t._OrtGetOutputName=t.asm.aa).apply(null,arguments)},t._OrtFree=function(){return(t._OrtFree
=t.asm.ba).apply(null,arguments)},t._OrtCreateTensor=function(){return(t._OrtCreateTensor=t.asm.ca).apply(null,a
rguments)},t._OrtGetTensorData=function(){return(t._OrtGetTensorData=t.asm.da).apply(null,arguments)},t._OrtR
eleaseTensor=function(){return(t._OrtReleaseTensor=t.asm.ea).apply(null,arguments)},t._OrtCreateRunOptions=fu
nction(){return(t._OrtCreateRunOptions=t.asm.fa).apply(null,arguments)},t._OrtAddRunConfigEntry=function(){re
turn(t._OrtAddRunConfigEntry=t.asm.ga).apply(null,arguments)},t._OrtReleaseRunOptions=function(){return(t._O
rtReleaseRunOptions=t.asm.ha).apply(null,arguments)},t._OrtRun=function(){return(t._OrtRun=t.asm.ia).apply(nul
l,arguments)},t._OrtEndProfiling=function(){return(t._OrtEndProfiling=t.asm.ja).apply(null,arguments)};var
fe,pe=t._malloc=function(){return(pe=t._malloc=t.asm.ka).apply(null,arguments)},de=t.___errno_location=function
(){return(de=t.___errno_location=t.asm.la).apply(null,arguments)},me=t._free=function(){return(me=t._free=t.asm.
ma).apply(null,arguments)},he=t.__get_tzname=function(){return(he=t.__get_tzname=t.asm.na).apply(null,argumen
ts)},ge=t.__get_daylight=function(){return(ge=t.__get_daylight=t.asm.oa).apply(null,arguments)},be=t.__get_timez
one=function(){return(be=t.__get_timezone=t.asm.pa).apply(null,arguments)},ye=t.stackSave=function(){return(ye
=t.stackSave=t.asm.qa).apply(null,arguments)},ve=t.stackRestore=function(){return(ve=t.stackRestore=t.asm.ra).ap
ply(null,arguments)},_e=t.stackAlloc=function(){return(_e=t.stackAlloc=t.asm.sa).apply(null,arguments)},we=t._m
emalign=function(){return(we=t._memalign=t.asm.ta).apply(null,arguments)};function Oe(){function
e(){if(!fe&&(fe=!0,t.calledRun=!0,!S)){if(V(F),r(t),t.onRuntimeInitialized&&t.onRuntimeInitialized(),t.postRun)for
(\\\"function\\\"==typeof t.postRun&&(t.postRun=[t.postRun]);t.postRun.length;){var
e=t.postRun.shift();j.unshift(e)}V(j)}}if(!(0<H)){if(t.preRun)for(\\\"function\\\"==typeof
t.preRun&&(t.preRun=[t.preRun]);t.preRun.length;)L();V(I),0<H||(t.setStatus?(t.setStatus(\\\"Running...\\\"),setTime
out((function(){setTimeout((function(){t.setStatus(\\\"\\\")}),1),e()}),1)):e())}}if(t.UTF8ToString=k,t.stringToUTF8
=function(e,t,n){return
x(e,A,t,n)},t.lengthBytesUTF8=D,t.stackSave=ye,t.stackRestore=ve,t.stackAlloc=_e,z=function
e(){fe||Oe(),fe||(z=e)},t.run=Oe,t.preInit)for(\\\"function\\\"==typeof
t.preInit&&(t.preInit=[t.preInit]);0<t.preInit.length;)t.preInit.pop()();return
Oe(),e.ready});e.exports=r},967:function(e,t){\\\"use strict\\\";var n=this&&this.__read||function(e,t){var
n=\\\"function\\\"==typeof Symbol&&e[Symbol.iterator];if(!n)return e;var r,a,i=n.call(e),o=[];try{for(;(void
0===t||t--
```

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>0)&&!(r=i.next()).done;)o.push(r.value)}catch(e){a={error:e}}finally{try{r&&!r.done&&(n=i.return)&&n.call(i)}
finally{if(a)throw a.error}}return
o};Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.iterateExtraOptions=void
0,t.iterateExtraOptions=function(e,r,a,i){if(\\\"object\\\"==typeof e&&null!==e){if(a.has(e))throw new
Error(\\\"Circular reference in options\\\");a.add(e)}Object.entries(e).forEach((function(e){var
o=n(e,2),u=o[0],s=o[1],c=r?r+u:u;if(\\\"object\\\"==typeof s)t.iterateExtraOptions(s,c+\\\".\\\",a,i);else
if(\\\"string\\\"==typeof s||\\\"number\\\"==typeof s)i(c,s.toString());else{if(\\\"boolean\\\"!=typeof s)throw new
Error(\\\"Can't handle extra config type: \\\"+typeof s);i(c,s?\\\"1\\\":\\\"0\\\")}}))}},586:function(e,t,n){\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.setRunOptions=void 0;var
r=n(967),a=n(983),i=n(361);t.setRunOptions=function(e){var t=i.getInstance(),n=0,o=[],u=e||{};try{if(void
0===(null==e?void 0:e.logSeverityLevel))u.logSeverityLevel=2;else if(\\\"number\\\"!=typeof
e.logSeverityLevel||!Number.isInteger(e.logSeverityLevel)||e.logSeverityLevel<0||e.logSeverityLevel>4)throw new
Error(\\\"log serverity level is not valid: \\\"+e.logSeverityLevel);if(void 0===(null==e?void
0:e.logVerbosityLevel))u.logVerbosityLevel=0;else if(\\\"number\\\"!=typeof
e.logVerbosityLevel||!Number.isInteger(e.logVerbosityLevel))throw new Error(\\\"log verbosity level is not valid:
\\\"+e.logVerbosityLevel);void 0===(null==e?void 0:e.terminate)&&(u.terminate=!1);var s=0;if(void
0!==(null==e?void
0:e.tag)&&(s=a.allocWasmString(e.tag,o)),0===(n=t._OrtCreateRunOptions(u.logSeverityLevel,u.logVerbosityLev
el,!!u.terminate,s)))throw new Error(\\\"Can't create run options\\\");return void 0!==(null==e?void
0:e.extra)&&r.iterateExtraOptions(e.extra,\\\"\\\",new WeakSet,(function(e,r){var
i=a.allocWasmString(e,o),u=a.allocWasmString(r,o);if(0!==t._OrtAddRunConfigEntry(n,i,u))throw new
Error(\\\"Can't set a run config entry: \\\"+e+\\\" - \\\"+r)})),[n,o]}catch(e){throw
0!==n&&t._OrtReleaseRunOptions(n),o.forEach(t._free),e}}},919:function(e,t,n){\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.setSessionOptions=void 0;var
r=n(967),a=n(983),i=n(361);t.setSessionOptions=function(e){var
t=i.getInstance(),n=0,o=[],u=e||{};!function(e){e.extra||(e.extra={}),e.extra.session||(e.extra.session={});var
t=e.extra.session;t.use_ort_model_bytes_directly||(t.use_ort_model_bytes_directly=\\\"1\\\")}(u);try{void
0===(null==e?void 0:e.graphOptimizationLevel)&&(u.graphOptimizationLevel=\\\"all\\\");var
s=function(e){switch(e){case\\\"disabled\\\":return 0;case\\\"basic\\\":return 1;case\\\"extended\\\":return
2;case\\\"all\\\":return 99;default:throw new Error(\\\"unsupported graph optimization level:
\\\"+e)}}(u.graphOptimizationLevel);void 0===(null==e?void
0:e.enableCpuMemArena)&&(u.enableCpuMemArena=!0),void 0===(null==e?void
0:e.enableMemPattern)&&(u.enableMemPattern=!0),void 0===(null==e?void
0:e.executionMode)&&(u.executionMode=\\\"sequential\\\");var
c=function(e){switch(e){case\\\"sequential\\\":return 0;case\\\"parallel\\\":return 1;default:throw new
Error(\\\"unsupported execution mode: \\\"+e)}}(u.executionMode),l=0;if(void 0!==(null==e?void
0:e.logId)&&(l=a.allocWasmString(e.logId,o)),void 0===(null==e?void
0:e.logSeverityLevel))u.logSeverityLevel=2;else if(\\\"number\\\"!=typeof
e.logSeverityLevel||!Number.isInteger(e.logSeverityLevel)||e.logSeverityLevel<0||e.logSeverityLevel>4)throw new
Error(\\\"log serverity level is not valid: \\\"+e.logSeverityLevel);if(void 0===(null==e?void
0:e.logVerbosityLevel))u.logVerbosityLevel=0;else if(\\\"number\\\"!=typeof
e.logVerbosityLevel||!Number.isInteger(e.logVerbosityLevel))throw new Error(\\\"log verbosity level is not valid:
\\\"+e.logVerbosityLevel);if(void 0===(null==e?void
0:e.enableProfiling)&&(u.enableProfiling=!1),0===(n=t._OrtCreateSessionOptions(s,!!u.enableCpuMemArena,!!u.
enableMemPattern,c,!!u.enableProfiling,0,l,u.logSeverityLevel,u.logVerbosityLevel)))throw new Error(\\\"Can't
create session options\\\");return void 0!==(null==e?void 0:e.extra)&&r.iterateExtraOptions(e.extra,\\\"\\\",new
WeakSet,(function(e,r){var
i=a.allocWasmString(e,o),u=a.allocWasmString(r,o);if(0!==t._OrtAddSessionConfigEntry(n,i,u))throw new
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Error(\\\"Can't set a session config entry: \\\"+e+\\\" - \\\"+r)})),[n,o]}catch(e){throw
0!==n&&t._OrtReleaseSessionOptions(n),o.forEach(t._free),e}}},983:function(e,t,n){\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.allocWasmString=void 0;var
r=n(361);t.allocWasmString=function(e,t){var n=r.getInstance(),a=n.lengthBytesUTF8(e)+1,i=n._malloc(a);return
n.stringToUTF8(e,i,a),t.push(i),i}},349:function(e,t,n){\\\"use strict\\\";var r=this&&this.__read||function(e,t){var
n=\\\"function\\\"==typeof Symbol&&e[Symbol.iterator];if(!n)return e;var r,a,i=n.call(e),o=[];try{for(;(void
0===t||t--
>0)&&!(r=i.next()).done;)o.push(r.value)}catch(e){a={error:e}}finally{try{r&&!r.done&&(n=i.return)&&n.call(i)}
finally{if(a)throw a.error}}return o},a=this&&this.__values||function(e){var t=\\\"function\\\"==typeof
Symbol&&Symbol.iterator,n=t&&e[t],r=0;if(n)return n.call(e);if(e&&\\\"number\\\"==typeof
e.length)return{next:function(){return e&&r>=e.length&&(e=void 0),{value:e&&e[r++],done:!e}}};throw new
TypeError(t?\\\"Object is not iterable.\\\":\\\"Symbol.iterator is not
defined.\\\")};Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.extractTransferableBuffers=t.endProfiling=t.r
un=t.releaseSession=t.createSession=t.initOrt=void 0;var
i=n(586),o=n(919),u=n(983),s=n(361);t.initOrt=function(e,t){var n=s.getInstance()._OrtInit(e,t);if(0!==n)throw new
Error(\\\"Can't initialize onnxruntime. error code = \\\"+n)};var c=[];t.createSession=function(e,t){var
n,a=s.getInstance(),i=a._malloc(e.byteLength),u=0,l=0,f=[];try{if(l=(n=r(o.setSessionOptions(t),2))[0],f=n[1],a.HE
APU8.set(e,i),0===(u=a._OrtCreateSession(i,e.byteLength,l)))throw new Error(\\\"Can't create a
session\\\")}finally{a._free(i),a._OrtReleaseSessionOptions(l),f.forEach(a._free)}for(var
p=a._OrtGetInputCount(u),d=a._OrtGetOutputCount(u),m=[],h=[],g=[],b=[],y=0;y<p;y++){var
v=a._OrtGetInputName(u,y);if(0===v)throw new Error(\\\"Can't get an input
name\\\");h.push(v),m.push(a.UTF8ToString(v))}for(y=0;y<d;y++){var
_=a._OrtGetOutputName(u,y);if(0===_)throw new Error(\\\"Can't get an output
name\\\");b.push(_),g.push(a.UTF8ToString(_))}return c.push([u,h,b]),[c.length-
1,m,g]},t.releaseSession=function(e){var t=s.getInstance(),n=c[e];if(!n)throw new Error(\\\"invalid session
id\\\");var r=n[0],a=n[1],i=n[2];a.forEach(t._OrtFree),i.forEach(t._OrtFree),t._OrtReleaseSession(r),c[e]=void 0};var
l=function(e){switch(e){case 3:return\\\"int8\\\";case 2:return\\\"uint8\\\";case 9:return\\\"bool\\\";case
5:return\\\"int16\\\";case 4:return\\\"uint16\\\";case 6:return\\\"int32\\\";case 12:return\\\"uint32\\\";case
1:return\\\"float32\\\";case 11:return\\\"float64\\\";case 8:return\\\"string\\\";case 7:return\\\"int32\\\";case
13:return\\\"uint32\\\";default:throw new Error(\\\"unsupported data type:
\\\"+e)}},f=function(e){switch(e){case\\\"float32\\\":return Float32Array;case\\\"uint8\\\":return
Uint8Array;case\\\"int8\\\":return Int8Array;case\\\"uint16\\\":return Uint16Array;case\\\"int16\\\":return
Int16Array;case\\\"int32\\\":return Int32Array;case\\\"bool\\\":return Uint8Array;case\\\"float64\\\":return
Float64Array;case\\\"uint32\\\":return Uint32Array;case\\\"int64\\\":return BigInt64Array;case\\\"uint64\\\":return
BigUint64Array;default:throw new Error(\\\"unsupported type: \\\"+e)}};t.run=function(e,t,n,a,o){var
p,d=s.getInstance(),m=c[e];if(!m)throw new Error(\\\"invalid session id\\\");var
h=m[0],g=m[1],b=m[2],y=t.length,v=a.length,_=0,w=[],O=[],A=[];try{_=(p=r(i.setRunOptions(o),2))[0],w=p[1];for
(var E=function(e){var t=n[e][0],r=n[e][1],a=n[e][2],i=void 0,o=void
0;if(Array.isArray(a)){o=4*a.length,i=d._malloc(o),A.push(i);for(var
s=i/4,c=0;c<a.length;c++){if(\\\"string\\\"!=typeof a[c])throw new TypeError(\\\"tensor data at index \\\"+c+\\\" is
not a string\\\");d.HEAPU32[s++]=u.allocWasmString(a[c],A)}}else
o=a.byteLength,i=d._malloc(o),A.push(i),d.HEAPU8.set(new Uint8Array(a.buffer,a.byteOffset,o),i);var
l=d.stackSave(),f=d.stackAlloc(4*r.length);try{var p=f/4;r.forEach((function(e){return d.HEAP32[p++]=e}));var
m=d._OrtCreateTensor(function(e){switch(e){case\\\"int8\\\":return 3;case\\\"uint8\\\":return
2;case\\\"bool\\\":return 9;case\\\"int16\\\":return 5;case\\\"uint16\\\":return 4;case\\\"int32\\\":return
6;case\\\"uint32\\\":return 12;case\\\"float32\\\":return 1;case\\\"float64\\\":return 11;case\\\"string\\\":return
8;case\\\"int64\\\":return 7;case\\\"uint64\\\":return 13;default:throw new Error(\\\"unsupported data type:
\\\"+e)}}(t),i,o,f,r.length);if(0===m)throw new Error(\\\"Can't create a
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tensor\\\");O.push(m)}finally{d.stackRestore(l)}},S=0;S<y;S++)E(S);var
T=d.stackSave(),M=d.stackAlloc(4*y),k=d.stackAlloc(4*y),x=d.stackAlloc(4*v),D=d.stackAlloc(4*v);try{var
R=M/4,C=k/4,P=x/4,I=D/4;for(S=0;S<y;S++)d.HEAPU32[R++]=O[S],d.HEAPU32[C++]=g[t[S]];for(S=0;S<v;S+
+)d.HEAPU32[P++]=0,d.HEAPU32[I++]=b[a[S]];var
F=d._OrtRun(h,k,M,y,D,v,x,_),U=[];if(0===F)for(S=0;S<v;S++){var
j=d.HEAPU32[x/4+S],L=d.stackSave(),W=d.stackAlloc(16),H=void
0,Y=0;try{if(0!==(F=d._OrtGetTensorData(j,W,W+4,W+8,W+12)))throw new Error(\\\"Can't get a tensor data.
error code = \\\"+F);var z=W/4,B=d.HEAPU32[z++];Y=d.HEAPU32[z++];for(var
G=d.HEAPU32[z++],N=d.HEAPU32[z++],q=[],V=0;V<N;V++)q.push(d.HEAPU32[G/4+V]);d._OrtFree(G);var
X=0===q.length?1:q.reduce((function(e,t){return e*t}));if(\\\"string\\\"===(H=l(B))){for(var
J=[],Q=Y/4,Z=0;Z<X;Z++){var K=d.HEAPU32[Q++],$=Z===X-1?void 0:d.HEAPU32[Q]-
K;J.push(d.UTF8ToString(K,$))}U.push([H,q,J])}else{var ee=new(f(H))(X);new
Uint8Array(ee.buffer,ee.byteOffset,ee.byteLength).set(d.HEAPU8.subarray(Y,Y+ee.byteLength)),U.push([H,q,ee])
}}finally{d.stackRestore(L),\\\"string\\\"===H&&Y&&d._free(Y),d._OrtReleaseTensor(j)}}if(0===F)return
U;throw new Error(\\\"failed to call OrtRun(). error code =
\\\"+F+\\\".\\\")}finally{d.stackRestore(T)}}finally{O.forEach(d._OrtReleaseTensor),A.forEach(d._free),d._OrtRele
aseRunOptions(_),w.forEach(d._free)}},t.endProfiling=function(e){var t=s.getInstance(),n=c[e];if(!n)throw new
Error(\\\"invalid session id\\\");var r=n[0],a=t._OrtEndProfiling(r);if(0===a)throw new Error(\\\"Can't get an profile
file name\\\");t._OrtFree(a)},t.extractTransferableBuffers=function(e){var t,n,r=[];try{for(var
i=a(e),o=i.next();!o.done;o=i.next()){var
u=o.value[2];!Array.isArray(u)&&u.buffer&&r.push(u.buffer)}}catch(e){t={error:e}}finally{try{o&&!o.done&&(
n=i.return)&&n.call(i)}finally{if(t)throw t.error}}return r}},361:function(e,t,n){\\\"use strict\\\";var
r=this&&this.__createBinding||(Object.create?function(e,t,n,r){void
0===r&&(r=n),Object.defineProperty(e,r,{enumerable:!0,get:function(){return t[n]}})}:function(e,t,n,r){void
0===r&&(r=n),e[r]=t[n]}),a=this&&this.__setModuleDefault||(Object.create?function(e,t){Object.defineProperty(e,
\\\"default\\\",{enumerable:!0,value:t})}:function(e,t){e.default=t}),i=this&&this.__importStar||function(e){if(e&&e
.__esModule)return e;var t={};if(null!=e)for(var n in
e)\\\"default\\\"!==n&&Object.prototype.hasOwnProperty.call(e,n)&&r(t,e,n);return
a(t,e),t},o=this&&this.__awaiter||function(e,t,n,r){return new(n||(n=Promise))((function(a,i){function
o(e){try{s(r.next(e))}catch(e){i(e)}}function u(e){try{s(r.throw(e))}catch(e){i(e)}}function s(e){var
t;e.done?a(e.value):(t=e.value,t instanceof n?t:new
n((function(e){e(t)}))).then(o,u)}s((r=r.apply(e,t||[])).next())}))},u=this&&this.__generator||function(e,t){var
n,r,a,i,o={label:0,sent:function(){if(1&a[0])throw a[1];return a[1]},trys:[],ops:[]};return
i={next:u(0),throw:u(1),return:u(2)},\\\"function\\\"==typeof Symbol&&(i[Symbol.iterator]=function(){return
this}),i;function u(i){return function(u){return function(i){if(n)throw new TypeError(\\\"Generator is already
executing.\\\");for(;o;)try{if(n=1,r&&(a=2&i[0]?r.return:i[0]?r.throw||((a=r.return)&&a.call(r),0):r.next)&&!(a=a.ca
ll(r,i[1])).done)return a;switch(r=0,a&&(i=[2&i[0],a.value]),i[0]){case 0:case 1:a=i;break;case 4:return
o.label++,{value:i[1],done:!1};case 5:o.label++,r=i[1],i=[0];continue;case
7:i=o.ops.pop(),o.trys.pop();continue;default:if(!((a=(a=o.trys).length>0&&a[a.length-
1])||6!==i[0]&&2!==i[0])){o=0;continue}if(3===i[0]&&(!a||i[1]>a[0]&&i[1]<a[3])){o.label=i[1];break}if(6===i[0]
&&o.label<a[1]){o.label=a[1],a=i;break}if(a&&o.label<a[2]){o.label=a[2],o.ops.push(i);break}a[2]&&o.ops.pop(),
o.trys.pop();continue}i=t.call(e,o)}catch(e){i=[6,e],r=0}finally{n=a=0}if(5&i[0])throw
i[1];return{value:i[0]?i[1]:void 0,done:!0}}([i,u])}}},s=this&&this.__importDefault||function(e){return
e&&e.__esModule?e:{default:e}};Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.dispose=t.getInstance=t.i
nitializeWebAssembly=void 0;var c,l=i(n(449)),f=s(n(474)),p=s(n(932)),d=!1,m=!1,h=!1,g=function(e,t){return
t?e?\\\"ort-wasm-simd-threaded.wasm\\\":\\\"ort-wasm-threaded.wasm\\\":e?\\\"ort-wasm-simd.wasm\\\":\\\"ort-
wasm.wasm\\\"};t.initializeWebAssembly=function(e){return o(void 0,void 0,void 0,(function(){var
t,r,a,i,o,s,b,y,v,_,w;return u(this,(function(u){switch(u.label){case 0:if(d)return[2,Promise.resolve()];if(m)throw new
```

```
Error(\\\"multiple calls to 'initializeWebAssembly()' detected.\\\");if(h)throw new Error(\\\"previous call to
'initializeWebAssembly()' failed.\\\");return
m=!0,t=e.initTimeout,r=e.numThreads,a=e.simd,i=r>1&&function(){try{return\\\"undefined\\\"!=typeof
SharedArrayBuffer&&(\\\"undefined\\\"!=typeof MessageChannel&&(new
MessageChannel).port1.postMessage(new SharedArrayBuffer(1)),WebAssembly.validate(new
Uint8Array([0,97,115,109,1,0,0,0,1,4,1,96,0,0,3,2,1,0,5,4,1,3,1,1,10,11,1,9,0,65,0,254,16,2,0,26,11])))}catch(e){ret
urn!1}}(),o=a&&function(){try{return WebAssembly.validate(new
Uint8Array([0,97,115,109,1,0,0,0,1,4,1,96,0,0,3,2,1,0,10,9,1,7,0,65,0,253,15,26,11]))}catch(e){return!1}}(),s=\\\"str
ing\\\"==typeof e.wasmPaths?e.wasmPaths:void 0,b=g(!1,i),y=g(o,i),v=\\\"object\\\"==typeof
e.wasmPaths?e.wasmPaths[y]:void 0,_=!1,w=[],t>0&&w.push(new
Promise((function(e){setTimeout((function(){_=!0,e()}),t)}))),w.push(new Promise((function(e,t){var
r=i?f.default:p.default,a={locateFile:function(e,t){return e.endsWith(\\\".worker.js\\\")&&\\\"undefined\\\"!=typeof
Blob?URL.createObjectURL(new
Blob([n(118)],{type:\\\"text/javascript\\\"})):e===b?null!=v?v:(null!=s?s:t)+y:t+e}};if(i)if(\\\"undefined\\\"==typeof
Blob)a.mainScriptUrlOrBlob=l.join(\\\"/\\\",\\\"ort-wasm-threaded.js\\\");else{var o=\\\"var
ortWasmThreaded=(function(){var _scriptDir;return
\\\"+f.default.toString()+\\\"})();\\\";a.mainScriptUrlOrBlob=new
Blob([o],{type:\\\"text/javascript\\\"})}r(a).then((function(t){m=!1,d=!0,c=t,e()}),(function(e){m=!1,h=!0,t(e)}))})))
,[4,Promise.race(w)];case 1:if(u.sent(),_)throw new Error(\\\"WebAssembly backend initializing failed due to
timeout: \\\"+t+\\\"ms\\\");return[2]}}))}))},t.getInstance=function(){if(d&&c)return c;throw new
Error(\\\"WebAssembly is not initialized yet.\\\")},t.dispose=function(){var
e;!d||m||h||(m=!0,null===(e=c.PThread)||void 0===e||e.terminateAllThreads(),c=void
0,m=!1,d=!1,h=!0)}},384:function(){},993:function(){},908:function(){},953:function(){},925:function(){},449:fu
nction(){}},t={};function n(r){var a=t[r];if(void 0!==a)return a.exports;var i=t[r]={exports:{}};return
e[r].call(i.exports,i,i.exports,n),i.exports}n.g=function(){if(\\\"object\\\"==typeof globalThis)return
globalThis;try{return this||new Function(\\\"return this\\\")()}catch(e){if(\\\"object\\\"==typeof window)return
window}}(),function(){\\\"use strict\\\";var
e=n(349),t=n(361);self.onmessage=function(n){switch(n.data.type){case\\\"init-
wasm\\\":t.initializeWebAssembly(n.data.in).then((function(){return postMessage({type:\\\"init-
wasm\\\"})}),(function(e){return postMessage({type:\\\"init-wasm\\\",err:e})}));break;case\\\"init-ort\\\":try{var
r=n.data.in,a=r.numThreads,i=r.loggingLevel;e.initOrt(a,i),postMessage({type:\\\"init-
ort\\\"})}catch(e){postMessage({type:\\\"init-ort\\\",err:e})}break;case\\\"create\\\":try{var
o=n.data.in,u=o.model,s=o.options,c=e.createSession(u,s);postMessage({type:\\\"create\\\",out:c})}catch(e){postMe
ssage({type:\\\"create\\\",err:e})}break;case\\\"release\\\":try{var
l=n.data.in;e.releaseSession(l),postMessage({type:\\\"release\\\"})}catch(e){postMessage({type:\\\"release\\\",err:e})
}break;case\\\"run\\\":try{var
f=n.data.in,p=f.sessionId,d=f.inputIndices,m=f.inputs,h=f.outputIndices,g=(s=f.options,e.run(p,d,m,h,s));postMessa
ge({type:\\\"run\\\",out:g},e.extractTransferableBuffers(g))}catch(e){postMessage({type:\\\"run\\\",err:e})}break;cas
e\\\"end-profiling\\\":try{l=n.data.in,e.endProfiling(l),postMessage({type:\\\"end-
profiling\\\"})}catch(e){postMessage({type:\\\"end-profiling\\\",err:e})}}}}()}();\\n\", \"Worker\", undefined,
undefined);\n}\n","\"use strict\";\n\n/* eslint-env browser */\n\n/* eslint-disable no-undef, no-use-before-define,
new-cap */\nmodule.exports = function (content, workerConstructor, workerOptions, url) {\n  var globalScope = self
|| window;\n\n  try {\n    try {\n      var blob;\n\n      try {\n        // New API\n        blob = new
globalScope.Blob([content]);\n      } catch (e) {\n        // BlobBuilder = Deprecated, but widely implemented\n
var BlobBuilder = globalScope.BlobBuilder || globalScope.WebKitBlobBuilder || globalScope.MozBlobBuilder ||
globalScope.MSBlobBuilder;\n        blob = new BlobBuilder();\n        blob.append(content);\n        blob =
blob.getBlob();\n      }\n\n      var URL = globalScope.URL || globalScope.webkitURL;\n      var objectURL =
URL.createObjectURL(blob);\n      var worker = new globalScope[workerConstructor](objectURL,
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workerOptions);\n   URL.revokeObjectURL(objectURL);\n   return worker;\n   } catch (e) {\n   return new globalScope[workerConstructor](\"data:application/javascript,\".concat(encodeURIComponent(content)), workerOptions);\n   }\n } catch (e) {\n   if (!url) {\n   throw Error(\"Inline worker is not supported\");\n   }\n\n   return new globalScope[workerConstructor](url, workerOptions);\n }\n};","module.exports = __WEBPACK_EXTERNAL_MODULE__2174__;","// The module cache\nvar __webpack_module_cache__ = {};\n\n// The require function\nfunction __webpack_require__(moduleId) {\n\t// Check if module is in cache\n\tvar cachedModule = __webpack_module_cache__[moduleId];\n\tif (cachedModule !== undefined) {\n\t\treturn cachedModule.exports;\n\t}\n\t// Create a new module (and put it into the cache)\n\tvar module = __webpack_module_cache__[moduleId] = {\n\t\t// no module.id needed\n\t\t// no module.loaded needed\n\t\texports: {}\n\t};\n\n\t// Execute the module function\n\t__webpack_modules__[moduleId].call(module.exports, module, module.exports, __webpack_require__);\n\n\t// Return the exports of the module\n\treturn module.exports;\n}\n\n","// getDefaultExport function for compatibility with non-harmony modules\n__webpack_require__.n = function(module) {\n\tvar getter = module && module.__esModule ?\n\t\tfunction() { return module['default']; } :\n\t\tfunction() { return module; };\n\t__webpack_require__.d(getter, { a: getter });\n\treturn getter;\n};","// define getter functions for harmony exports\n__webpack_require__.d = function(exports, definition) {\n\tfor(var key in definition) {\n\t\tif(__webpack_require__.o(definition, key) && !__webpack_require__.o(exports, key)) {\n\t\t\tObject.defineProperty(exports, key, { enumerable: true, get: definition[key] });\n\t\t}\n\t}\n};","__webpack_require__.g = (function() {\n\tif (typeof globalThis === 'object') return globalThis;\n\ttry {\n\t\treturn this || new Function('return this')();\n\t} catch (e) {\n\t\tif (typeof window === 'object') return window;\n\t}\n})();","__webpack_require__.o = function(obj, prop) { return Object.prototype.hasOwnProperty.call(obj, prop); }","// define __esModule on exports\n__webpack_require__.r = function(exports) {\n\tif(typeof Symbol !== 'undefined' && Symbol.toStringTag) {\n\t\tObject.defineProperty(exports, Symbol.toStringTag, { value: 'Module' });\n\t}\n\tObject.defineProperty(exports, '__esModule', { value: true });\n};","// startup\n// Load entry module and return exports\n// This entry module is referenced by other modules so it can't be inlined\nvar __webpack_exports__ = __webpack_require__(6018);\n"],"sourceRoot":""}

Found in path(s):
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/dist/ort-web.min.js.map
No license file was found, but licenses were detected in source scan.

{"version":3,"sources":["webpack://onnxruntime-web/webpack/universalModuleDefinition","webpack://onnxruntime-web/./lib/wasm/binding/ort-wasm-threaded.min.js","webpack://onnxruntime-web/./lib/wasm/binding/ort-wasm.js","webpack://onnxruntime-web/./node_modules/@protobufjs/aspromise/index.js","webpack://onnxruntime-web/./node_modules/@protobufjs/base64/index.js","webpack://onnxruntime-web/./node_modules/@protobufjs/eventemitter/index.js","webpack://onnxruntime-web/./node_modules/@protobufjs/float/index.js","webpack://onnxruntime-web/./node_modules/@protobufjs/inquire/index.js","webpack://onnxruntime-web/./node_modules/@protobufjs/pool/index.js","webpack://onnxruntime-web/./node_modules/@protobufjs/utf8/index.js","webpack://onnxruntime-web/./node_modules/flatbuffers/js/flatbuffers.mjs","webpack://onnxruntime-web/./node_modules/guid-typescript/dist/guid.js","webpack://onnxruntime-web/./node_modules/long/src/long.js","webpack://onnxruntime-web/./node_modules/onnx-proto/dist/onnx.js","webpack://onnxruntime-web/./node_modules/protobufjs/minimal.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/index-minimal.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/reader.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/reader_buffer.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/roots.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/rpc.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/rpc/service.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/util/longbits.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/util/minimal.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/writer.js","webpack://onnxruntime-web/./node_modules/protobufjs/src/writer_buffer.js","webpack://onnxruntime-web/./lib/backend-onnxjs.ts","webpack://onnxruntime-web/./lib/backend-wasm.ts","webpack://onnxruntime-web/./lib/index.ts","webpack://onnxruntime-web/./lib/onnxjs/attribute-with-cache-key.ts","webpack://onnxruntime-web/./lib/onnxjs/attribute.ts","webpack://onnxruntime-web/./lib/onnxjs/backend.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/backend-webgl.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-coordinate-lib.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-definitions.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-encoding-lib.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-fragcolor-lib.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-function-inliner.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-preprocessor.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-registered-libs.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-shape-utils-lib.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-source.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/glsl-vec-lib.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/inference-handler.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/op-resolve-rules.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/batch-normalization.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/binary-op.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/concat-packed.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/concat.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/conv-grouped.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/conv-pack.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/conv.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/depth-to-space.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/dot-product.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/flatten.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/fuse-utils.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/gather.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/gemm.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/im2col-pack.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/im2col.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/image-scaler.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/instance-normalization.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/matmul-pack.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/matmul.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/pack.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/packing-utils.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/pad.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/pool.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/reduce.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/reshape-packed.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/reshape.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/resize-packed.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/shape.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/slice.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/softmax.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/split.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/squeeze.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/sum.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/tile.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/transpose.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/uint8-encode.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/unary-op.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/unpack.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/unsqueeze.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/ops/upsample.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/program-manager.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/session-handler.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/texture-data-encoder.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/texture-layout-strategy.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/texture-layout.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/texture-manager.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/types.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/utils.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/webgl-context-factory.ts","webpack://onnxruntime-web/./lib/onnxjs/backends/webgl/webgl-context.ts","webpack://onnxruntime-web/./lib/onnxjs/execution-plan.ts","webpack://onnxruntime-web/./lib/onnxjs/graph.ts","webpack://onnxruntime-web/./lib/onnxjs/instrument.ts","webpack://onnxruntime-web/./lib/onnxjs/model.ts","webpack://onnxruntime-web/./lib/onnxjs/operators.ts","webpack://onnxruntime-web/./lib/onnxjs/opset.ts","webpack://onnxruntime-web/./lib/onnxjs/ort-schema/ort-generated.ts","webpack://onnxruntime-web/./lib/onnxjs/session-handler.ts","webpack://onnxruntime-web/./lib/onnxjs/session.ts","webpack://onnxruntime-web/./lib/onnxjs/tensor.ts","webpack://onnxruntime-web/./lib/onnxjs/util.ts","webpack://onnxruntime-web/./lib/wasm/options-utils.ts","webpack://onnxruntime-web/./lib/wasm/proxy-wrapper.ts","webpack://onnxruntime-web/./lib/wasm/run-options.ts","webpack://onnxruntime-web/./lib/wasm/session-handler.ts","webpack://onnxruntime-web/./lib/wasm/session-options.ts","webpack://onnxruntime-web/./lib/wasm/string-utils.ts","webpack://onnxruntime-web/./lib/wasm/wasm-core-impl.ts","webpack://onnxruntime-web/./lib/wasm/wasm-factory.ts","webpack://onnxruntime-web/./lib/wasm/proxy-worker/main.ts","webpack://onnxruntime-web/./node_modules/worker-loader/dist/runtime/inline.js","webpack://onnxruntime-web/external {\"commonjs\":\"onnxruntime-common\",\"commonjs2\":\"onnxruntime-common\",\"root\":\"ort\"}","webpack://onnxruntime-web/webpack/bootstrap","webpack://onnxruntime-web/webpack/runtime/compat get default export","webpack://onnxruntime-web/webpack/runtime/define property getters","webpack://onnxruntime-web/webpack/runtime/global","webpack://onnxruntime-web/webpack/runtime/hasOwnProperty shorthand","webpack://onnxruntime-web/webpack/runtime/make namespace object","webpack://onnxruntime-web/webpack/startup"],"names":["root","factory","exports","module","require","define","amd","a","i","self","__WEBPACK_EXTERNAL_MODULE__2174__","_scriptDir","e","document","currentScript","src","t","S","buffer","Y","Q","P","n","W","r","q","U","B","o","u","s","ready","Promise","c","f","hasOwnProperty","l","p","d","m","b","h","g","_","window","y","importScripts","w","process","versions","node","v","ENVIRONMENT_IS_PTHREAD","A","T","locateFile","O","__dirname","normalize","readFileSync","Uint8Array","F","readFile","argv","length","replace","slice","on","Gt","ce","re","exitCode","exit","inspect","console","error","Worker","location","href","indexOf","substr","lastIndexOf","XMLHttpRequest","open","send","responseText","responseType","response","onload","status","onerror","performance","k","E","x","print","log","bind","M","printErr","warn","thisProgram","quit","wasmBinary","D","noExitRuntime","WebAssembly","C","R","I","j","TextDecoder","this","decode","SharedArrayBuffer","call","G","H","subarray","String","fromCharCode","z","L","charCodeAt","N","V","X","ht","HEAP8","Int8Array","HEA

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P16","Int16Array","HEAP32","Int32Array","HEAPU8","HEAPU16","Uint16Array","HEAPU32","Uint32Array","
HEAPF32","Float32Array","HEAPF64","Float64Array","J","INITIAL_MEMORY","wasmMemory","Memory","in
itial","maximum","shared","Error","byteLength","Z","$","K","ee","te","ne","ae","preRun","shift","unshift","ie","oe"
,"ue","se","onAbort","RuntimeError","fe","startsWith","le","preloadedImages","preloadedAudios","pe","973748","d
e","Nb","ib","get","me","Atomics","load","Bt","compareExchange","notify","be","ge","cb","sb","worker","_emscri
pten_futex_wake","he","gb","fb","zb","xc","Rb","store","Dt","vt","Sb","receiveObjectTransfer","Xb","threadInit","
hc","threadCancel","fc","threadExit","Hb","setExitStatus","Zb","yb","Eb","pop","Ct","Fb","yt","postMessage","cm
d","Gb","terminate","bb","xb","eb","_t","wb","hb","Yb","push","splice","Ut","Ub","onmessage","data","Lb","target
Thread","Dc","transferList","Ot","ve","thread","loaded","mb","threadId","text","alert","zt","returnCode","target","fi
lename","lineno","message","urlOrBlob","mainScriptUrlOrBlob","wasmModule","Ib","Ob","nc","now","_e","Date"
,"gt","ye","ze","we","lb","dc","ac","bc","$b","cc","Pb","rb","jb","detached","St","start_routine","ec","arg","threadIn
foStruct","stackBase","stackSize","time","mc","Ae","exchange","wait","Te","establishStackSpace","Wt","Yt","invo
keEntryPoint","hrtime","__performance_now_clock_drift","Oe","ke","Ee","xe","Me","rc","De","Se","Ce","Re","Ie"
,"Fe","sc","je","Math","ceil","qt","fill","Wb","Tb","Jb","fd","Ac","flags","offset","Ye","Pe","We","tc","qe","Ue","B
e","Ge","He","arguments","jt","Pt","kt","Le","Ne","Ve","querySelector","Xe","qb","Db","pc","Et","pb","ob","getPa
rameter","width","height","viewport","Qe","Je","Ze","$e","Ke","USER","LOGNAME","PATH","PWD","HOME",
"LANG","navigator","languages","et","forEach","tt","nt","rt","at","vc","uc","it","ot","ut","toTimeString","match","
Kb","getFullYear","getTimezoneOffset","max","Ft","It","Number","Rt","st","ct","ft","lt","pt","getTime","getMonth
","getDate","setDate","setMonth","setFullYear","dt","toString","getDay","ab","vb","kc","jc","tb","nb","kb","ub","E
c","ic","lc","RegExp","split","substring","abs","includes","Array","set","mt","bt","Tt","oc","At","xt","da","ga","ea",
"apply","copyWithin","hardwareConcurrency","aa","min","grow","ba","setTimeout","stack","Mt","ca","alpha","dep
th","stencil","antialias","premultipliedAlpha","preserveDrawingBuffer","powerPreference","failIfMajorPerformance
Caveat","Vb","yc","Bb","Mb","Bc","Cc","Cb","getContext","WebGLRenderingContext","wc","attributes","version
","canvas","Qb","getExtension","vertexAttribDivisor","vertexAttribDivisorANGLE","drawArraysInstanced","draw
ArraysInstancedANGLE","drawElementsInstanced","drawElementsInstancedANGLE","createVertexArray","create
VertexArrayOES","deleteVertexArray","deleteVertexArrayOES","bindVertexArray","bindVertexArrayOES","isVer
texArray","isVertexArrayOES","drawBuffers","drawBuffersWEBGL","qc","zc","getSupportedExtensions","ha","ge
tUTCSeconds","getUTCMinutes","getUTCHours","getUTCDate","getUTCMonth","getUTCFullYear","getUTCDa
y","UTC","Ab","getSeconds","getMinutes","getHours","setTime","fa","asm","Ca","ia","Ha","monitorRunDependen
cies","clearInterval","instance","fetch","credentials","then","ok","arrayBuffer","catch","resolve","instantiate","insta
ntiateWasm","instantiateStreaming","___wasm_call_ctors","_OrtInit","ja","_OrtCreateSessionOptions","ka","_OrtA
ddSessionConfigEntry","la","_OrtReleaseSessionOptions","ma","_OrtCreateSession","na","_OrtReleaseSession","o
a","_OrtGetInputCount","pa","_OrtGetOutputCount","qa","_OrtGetInputName","ra","_OrtGetOutputName","sa","_
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mc,EAAKztB,OAAOhB,SAAS8wF,EAAYA,EAAa3pF,EAAKlF,aAC5Dq4B,EAAOxzB,KAAAK,CAAACgxB,EAA
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M81E,GAEbriE,EAAKzU,kBAAkB++B,IAK7B,GAAkB,IAAdg4C,EACF,OAAOz2D,EAEP,MAAM,IAAIt4B,M
AAM,yCAAyC+uF,M,QAG3DtiE,EAAKnR,aAAa00E,I,QAGpBJ,EAAYziF,QAAQsf,EAAKzU,mBACzB63E,EA
AY1iF,QAAQsf,EAAKzT,OAEzByT,EAAKnU,sBAAsBy0E,GAC3B4C,EAAiBxiF,QAAQsf,EAAKzT,SAOzB,E
AAAqoE,aAAgBqL,IAC3B,MAAMjgE,EAAO,EAAAAqgE,cACPzqD,EAAAU2sD,EAAAetC,GAC/B,IAAKrqD,EAC
H,MAAM,IAAIriC,MAAM,sBAElB,MAAMkvF,EAAgB7sD,EAAAQ,GAGxBwuD,EAAkBpkE,EAAK/T,iBAAiB
w2E,GAC9C,GAAwB,IAApB2B,EACF,MAAM,IAAI7wF,MAAM,kCAElBysB,EAAK/U,SAASm5E,IAGH,EAA
AjE,2BAA8Bl3D,IACzC,MAAMo7D,EAA6B,GACnC,IAAK,MAAM/5C,KAAAUrhB,EAAS,CAC5B,MAAMvwB,
EAAO4xC,EAAO,IACf1mC,MAAM6mB,QAAAQ/xB,IAASA,EAAKvN,QAC/Bk5F,EAAQhsF,KAAKK,EAAKvN
,QAGtB,OAAOk5F,I,mjCC1ZT,mBAIA,aACA,YAEA,IAAIrkE,EACA++D,GAAAc,EACdD,GAAAe,EACfE,GAAAU,
EAEd,MAmCMsF,EAAkB,CAACC,EAAkBC,IACrCA,EACKD,EAAU,8BAAgC,yBAE1CA,EAAU,qBAAAuB,gB
AI/B,EAAAA5E,sBAA8B7hF,GAA+C,OAAD,6BACvF,GAAAIihF,EACF,OAAO9yF,QAAQud,UAEjB,GAAIs1E,E
ACF,MAAM,IAAIvrF,MAAM,yDAElB,GAAIyrF,EACF,MAAM,IAAIzrF,MAAM,sDAGlBurF,GAAe,EAGf,MA
AM2F,EAAU3mF,EAAMo4B,YAChBG,EAAav4B,EAAMu4B,WACnBF,EAAOr4B,EAAMq4B,KAEbquD,EAA
anuD,EAAa,GA7DH,MAC7B,IAEE,MAAiC,oBAAtBllC,oBAMmB,oBAAnBuzF,iBACT,IAAIA,gBAAiBC,MAA
MjtF,YAAY,IAAIvG,kBAAkB,IAKxDR,YAAYi0F,SAAS,IAAI/2F,WAAW,CACzC,EAAG,GAAI,IAAK,IAAK,E

AAG,EAAI,EAAI,EAAG,EAAG,EAAG,EAAI,GAAI,EAAK,EAAI,EAAG,EAAG,EAAI,EAAG,EACnE,EAAG,E
AAI,EAAK,EAAK,EAAG,GAAI,GAAI,EAAG,EAAG,EAAG,GAAI,EAAI,IAAK,GAAI,EAAG,EAAG,GAAI,O
AElE,MAAOhD,GACP,OAAO,IAyC4Bg6F,GAC/BN,EAAUpuD,GAtCM,MACtB,IAGE,OAAOxlC,YAAYi0F,S
AAS,IAAI/2F,WAC5B,CAAC,EAAG,GAAI,IAAK,IAAK,EAAG,EAAG,EAAG,EAAG,EAAG,EAAG,EAAG,GA
AI,EAAG,EAAG,EAAG,EAAG,EAAG,EAAG,GAAI,EAAG,EAAG,EAAG,EAAG,GAAI,EAAG,IAAK,GAAI,G
AAI,MACrG,MAAOhD,GACP,OAAO,IA+Bei6F,GAElBC,EAAgD,iBAApBjnF,EAAM2hF,UAAyB3hF,EAAM2
hF,eAAYjvE,EAC7Ew0E,EAAAeV,GAAAgB,EAAAOE,GACtCS,EAAAuBX,EAAAgBC,EAASC,GAChDU,EAA8C,iBA
ApBpnF,EAAM2hF,UAAyB3hF,EAAM2hF,UAAUwF,QAAwBz0E,EAEvG,IAAI20E,GAAY,EAEhB,MAAMC,E
AA8B,GAgEpC,GA7DIX,EAAU,GACZW,EAAM/sF,KAAK,IAAIpM,SAASud,IACtB1E,YAAW,KACTqgF,GA
AY,EACZ37E,MACCi7E,OAKPW,EAAM/sF,KAAK,IAAIpM,SAAQ,CAACud,EAASsH,KAC/B,MAAM5mB,E
AAUs6F,EAAAa,UAAyB,UAChDxwB,EAAAiC,CACrCxmE,WAAY,CAAC63F,EAAkBC,KAC7B,GAAID,EAASld
,SAAS,eAAiC,oBAATod,KAC5C,OAAOC,IAAIC,gBAAgB,IAAIF,KAC3B,CAGE,EAAQ,OAEV,CAACl8D,KA
AM,qBAGb,GAAIg8D,IAAaL,EAAc,CAC7B,MAAMzG,EAAiBwG,UAAsBO,EAC7C,OAAOJ,UAAoB3G,EAA
S0G,EAGtC,OAAOK,EAAkBD,IAI7B,GAAIb,EACF,GAAoB,oBAATe,KACTvxB,EAAOl6D,oBAAsB4rF,EAA
Kh0E,K,IAAgB,4BAC7C,CACL,MAAMi0E,EACF,yDAAyD,UAAuBjjF,kBACpFsxD,EAAOl6D,oBAAsB,IAAIy
rF,KAAK,CAACI,GAAmB,CAACt8D,KAAM,oBAIrEn/B,EAAQ8pE,GAAQ5qD,MAEZhf,IACE00F,GAAe,EAC
fC,GAAc,EACd/+D,EAAO51B,EACPof,OAGDo8E,IACC9G,GAAe,EACfE,GAAU,EACVluE,EAAO80E,gBAIT
35F,QAAQ45F,KAAKT,GAEfD,EACF,MAAM,IAAI5xF,MAAM,2DAA2DkxF,UAIlE,EAAAApE,YAAc,KACzB,
GAAItB,GAAe/+D,EACjB,OAAOA,EAGT,MAAM,IAAIzsB,MAAM,wCAGL,EAAAA4mC,QAAU,K,OACjB4kD,
GAAgBD,GAAiBE,IACnCF,GAAe,EAEwB,QAAtC,EAAAA9+D,EAAA+B7P,eAAO,SAAE21E,sBACzC9lE,OAAAO
xP,EAEPsuE,GAAe,EACfC,GAAc,EACdC,GAAU,K,mEC1KC,SAAS+G,IACtB,OAAO,IAAO,impEAAkyrE,cA
AUv1E,OAAWA,K,qBCCv0rEpmB,EAAOD,QAAU,SAAUm6E,EAAS0hB,EAAmBC,EAAeC,GACpE,IAAAIC,E
AAcz7F,MAAQmC,OAE1B,IACE,IACE,IAAIu5F,EAEJ,IAEEA,EAAO,IAAID,EAAYZ,KAAK,CAACjhB,IAC7
B,MAAOz5E,IAGPu7F,EAAO,IADWD,EAAYE,aAAeF,EAAYG,mBAAqBH,EAAYI,gBAAkBJ,EAAYK,gBAEn
HC,OAAOniB,GACZ8hB,EAAOA,EAAKM,UAGd,IAAIlB,EAAMW,EAAYX,KAAOW,EAAYQ,UACrCC,EAA
YpB,EAAIC,gBAAgBW,GAChCtwF,EAAS,IAAIqwF,EAAYH,GAAmBY,EAAWX,GAE3D,OADAT,EAAIqB,g
BAAgBD,GACb9wF,EACP,MAAOjL,GACP,OAAO,IAAIs7F,EAAYH,GAAmB,+BAA+Bz3C,OAAOu4C,mBA
AmBxiB,IAAW2hB,IAEhH,MAAOp7F,GACP,IAAKq7F,EACH,MAAM3yF,MAAM,kCAGd,OAAO,IAAI4yF,E
AAYH,GAAmBE,EAAKD,M,sBCpCnD77F,EAAOD,QAAUQ,mC,oICCbo8F,yBAA2B,GAG/B,SAASC,oBAAo
BC,GAE5B,IAAIC,EAAeH,yBAAyBE,GAC5C,QAAqBz2E,IAAjB02E,EACH,OAAOA,EAAa/8F,QAGrB,IAAIC,
EAAS28F,yBAAyBE,GAAY,CAGjD98F,QAAS,IAOV,OAHAg9F,oBAAoBF,GAAU71F,KAAKhH,EAAOD,QA
ASC,EAAQA,EAAOD,QAAS68F,qBAGpE58F,EAAOD,QCpBf68F,oBAAoBz7F,EAAKnB,IACxB,IAAIg9F,EA
ASh9F,GAAUA,EAAO40B,WAC7B,IAAO50B,EAAAiB,QACxB,IAAM,EAEP,OADA48F,oBAAoBz6F,EAAE66F
,EAAQ,CAAE58F,EAAG48F,IAC5BA,GCLRJ,oBAAoBz6F,EAAI,CAACpC,EAASk9F,KACjC,IAAI,IAAI16D,
KAAO06D,EACXL,oBAAoBn7F,EAAEw7F,EAAY16D,KAASq6D,oBAAoBn7F,EAAE1B,EAASwiC,IAC5EnX,
OAAO8K,eAAen2B,EAASwiC,EAAK,CAAE26D,YAAY,EAAMnyF,IAAKkyF,EAAW16D,MCJ3Eq6D,oBAAo
Br6F,EAAI,WACvB,GAA0B,iBAAf46F,WAAyB,OAAOA,WAC3C,IACC,OAAOt2F,MAAQ,IAAIu2F,SAAS,cA
Ab,GACd,MAAO38F,GACR,GAAsB,iBAAXgC,OAAqB,OAAOA,QALjB,GCAxBm6F,oBAAoBn7F,EAAI,CAA
CovB,EAAKqY,IAAU9d,OAAOzD,UAAU3lB,eAAegF,KAAK6pB,EAAKqY,GCClF0zD,oBAAoBv7F,EAAKtB,
IACH,oBAAXs9F,QAA0BA,OAAOC,aAC1ClyE,OAAO8K,eAAen2B,EAASs9F,OAAOC,YAAa,CAAEluE,MAA
O,WAE7DhE,OAAO8K,eAAen2B,EAAS,aAAc,CAAEqvB,OAAO,KCFvD,IAAImuE,oBAAsBX,oBAAoB,M","fi
le":"ort-web.es6.min.js","sourcesContent":["(function webpackUniversalModuleDefinition(root, factory)
{\n\tif(typeof exports === 'object' && typeof module === 'object')\n\t\tmodule.exports =
factory(require(\"onnxruntime-common\"));\n\telse if(typeof define === 'function' && define.amd)\n\t\tdefine([],
factory);\n\telse {\n\t\tvar a = typeof exports === 'object' ? factory(require(\"onnxruntime-common\")) :
factory(root[\"ort\"]);\n\t\tfor(var i in a) (typeof exports === 'object' ? exports : root)[i] = a[i];\n\t}\n})(self,
function(__WEBPACK_EXTERNAL_MODULE__2174__) {\nreturn ","var
_scriptDir,e=(_scriptDir=\"undefined\"!=typeof

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document&&document.currentScript?document.currentScript.src:void 0,\"undefined\"!=typeof
__filename&&(_scriptDir=_scriptDir||__filename),function(e){function t(){return
S.buffer!=Y&&Q(S.buffer),P}function n(){return S.buffer!=Y&&Q(S.buffer),W}function r(){return
S.buffer!=Y&&Q(S.buffer),q}function a(){return S.buffer!=Y&&Q(S.buffer),U}function i(){return
S.buffer!=Y&&Q(S.buffer),B}var o,u,s;e=e||{},o||(o=void 0!==e?e:{}),o.ready=new
Promise((function(e,t){u=e,s=t}));var c,f={};for(c in o)o.hasOwnProperty(c)&&(f[c]=o[c]);var
l=\"./this.program\";function p(e,t){throw t}var d,m,b,h,g,_=\"object\"==typeof window,y=\"function\"==typeof
importScripts,w=\"object\"==typeof process&&\"object\"==typeof process.versions&&\"string\"==typeof
process.versions.node,v=o.ENVIRONMENT_IS_PTHREAD||!1,A=\"\";function T(e){return
o.locateFile?o.locateFile(e,A):A+e}if(w){var
O;A=y?require(\"path\").dirname(A)+\"/\":__dirname+\"/\",d=function(e,t){return
h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.readFileSync(e,t?null:\"utf8\")},b=function(e){retur
n(e=d(e,!0)).buffer||(e=new
Uint8Array(e)),F(e.buffer),e},m=function(e,t,n){h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.rea
dFile(e,(function(e,r){e?n(e):t(r.buffer)}))},1<process.argv.length&&(l=process.argv[1].replace(/\\\\/g,\"/\")),process
.argv.slice(2),process.on(\"uncaughtException\",(function(e){if(!(e instanceof Gt))throw
e})),process.on(\"unhandledRejection\",ce),p=function(e,t){if(re())throw
process.exitCode=e,t;process.exit(e)},o.inspect=function(){return\"[Emscripten Module
object]\"};try{O=require(\"worker_threads\")}catch(e){throw console.error('The \"worker_threads\" module is not
supported in this node.js build - perhaps a newer version is
needed?'),e}global.Worker=O.Worker}else(_||y)&&(y?A=self.location.href:\"undefined\"!=typeof
document&&document.currentScript&&(A=document.currentScript.src),_scriptDir&&(A=_scriptDir),A=0!==A.in
dexOf(\"blob:\")?A.substr(0,A.lastIndexOf(\"/\")+1):\"\",w?(d=function(e,t){return
h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.readFileSync(e,t?null:\"utf8\")},b=function(e){retur
n(e=d(e,!0)).buffer||(e=new
Uint8Array(e)),F(e.buffer),e},m=function(e,t,n){h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.rea
dFile(e,(function(e,r){e?n(e):t(r.buffer)}))}):(d=function(e){var t=new XMLHttpRequest;return
t.open(\"GET\",e,!1),t.send(null),t.responseText},y&&(b=function(e){var t=new XMLHttpRequest;return
t.open(\"GET\",e,!1),t.responseType=\"arraybuffer\",t.send(null),new
Uint8Array(t.response)}),m=function(e,t,n){var r=new
XMLHttpRequest;r.open(\"GET\",e,!0),r.responseType=\"arraybuffer\",r.onload=function(){200==r.status||0==r.stat
us&&r.response?t(r.response):n()},r.onerror=n,r.send(null)}));w&&\"undefined\"==typeof
performance&&(global.performance=require(\"perf_hooks\").performance);var
k,E,x=o.print||console.log.bind(console),M=o.printErr||console.warn.bind(console);for(c in
f)f.hasOwnProperty(c)&&(o[c]=f[c]);f=null,o.thisProgram&&(l=o.thisProgram),o.quit&&(p=o.quit),o.wasmBinary
&&(E=o.wasmBinary);var D=o.noExitRuntime||!1;\"object\"!=typeof WebAssembly&&ce(\"no native wasm
support detected\");var S,C,R,I=!1;function F(e,t){e||ce(\"Assertion failed: \"+t)}function j(e){var t=new
TextDecoder(e);this.decode=function(e){return e.buffer instanceof SharedArrayBuffer&&(e=new
Uint8Array(e)),t.decode.call(t,e)}}var Y,P,W,q,U,B,G=\"undefined\"!=typeof TextDecoder?new j(\"utf8\"):void
0;function H(e,t,n){var r=t+n;for(n=t;e[n]&&!(n>=r);)++n;if(16<n-t&&e.subarray&&G)return
G.decode(e.subarray(t,n));for(r=\"\";t<n;){var a=e[t++];if(128&a){var
i=63&e[t++];if(192==(224&a))r+=String.fromCharCode((31&a)<<6|i);else{var
o=63&e[t++];65536>(a=224==(240&a)?(15&a)<<12|i<<6|o:(7&a)<<18|i<<12|o<<6|63&e[t++])?r+=String.fromCh
arCode(a):(a-=65536,r+=String.fromCharCode(55296|a>>10,56320|1023&a))}}else
r+=String.fromCharCode(a)}return r}function z(e,t){return e?H(n(),e,t):\"\"}function L(e,t,n,r){if(!(0<r))return 0;var
a=n;r=n+r-1;for(var i=0;i<e.length;++i){var
o=e.charCodeAt(i);if(55296<=o&&57343>=o&&(o=65536+((1023&o)<<10)|1023&e.charCodeAt(++i)),127>=o){i
f(n>=r)break;t[n++]=o}else{if(2047>=o){if(n+1>=r)break;t[n++]=192|o>>6}else{if(65535>=o){if(n+2>=r)break;t[
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n++]=224|o>>12}else{if(n+3>=r)break;t[n++]=240|o>>18,t[n++]=128|o>>12&63}t[n++]=128|o>>6&63}t[n++]=1
28|63&o}}return t[n]=0,n-a}function N(e,t,r){return L(e,n(),t,r)}function V(e){for(var t=0,n=0;n<e.length;++n){var
r=e.charCodeAt(n);55296<=r&&57343>=r&&(r=65536+((1023&r)<<10)|1023&e.charCodeAt(++n)),127>=r?++t:t
=2047>=r?t+2:65535>=r?t+3:t+4}return t}function X(e){var n=V(e)+1,r=ht(n);return r&&L(e,t(),r,n),r}function
Q(e){Y=e,o.HEAP8=P=new Int8Array(e),o.HEAP16=new Int16Array(e),o.HEAP32=q=new
Int32Array(e),o.HEAPU8=W=new Uint8Array(e),o.HEAPU16=new Uint16Array(e),o.HEAPU32=U=new
Uint32Array(e),o.HEAPF32=new Float32Array(e),o.HEAPF64=B=new Float64Array(e)}\"undefined\"!=typeof
TextDecoder&&new j(\"utf-16le\"),v&&(Y=o.buffer);var
J=o.INITIAL_MEMORY||16777216;if(v)S=o.wasmMemory,Y=o.buffer;else
if(o.wasmMemory)S=o.wasmMemory;else if(!((S=new
WebAssembly.Memory({initial:J/65536,maximum:32768,shared:!0})).buffer instanceof SharedArrayBuffer))throw
M(\"requested a shared WebAssembly.Memory but the returned buffer is not a SharedArrayBuffer, indicating that
while the browser has SharedArrayBuffer it does not have WebAssembly threads support - you may need to set a
flag\"),w&&console.log(\"(on node you may need: --experimental-wasm-threads --experimental-wasm-bulk-
memory and also use a recent version)\"),Error(\"bad memory\");S&&(Y=S.buffer),J=Y.byteLength,Q(Y);var
Z,$=[],K=[],ee=[],te=[],ne=0;function re(){return D||0<ne}function ae(){var e=o.preRun.shift();$.unshift(e)}var
ie,oe=0,ue=null,se=null;function ce(e){throw o.onAbort&&o.onAbort(e),F(!v),M(e),I=!0,R=1,e=new
WebAssembly.RuntimeError(\"abort(\"+e+\"). Build with -s ASSERTIONS=1 for more info.\"),s(e),e}function
fe(){return ie.startsWith(\"data:application/octet-stream;base64,\")}function le(){var e=ie;try{if(e==ie&&E)return
new Uint8Array(E);if(b)return b(e);throw\"both async and sync fetching of the wasm
failed\"}catch(e){ce(e)}}o.preloadedImages={},o.preloadedAudios={},ie=\"ort-wasm-
threaded.wasm\",fe()||(ie=T(ie));var pe={973748:function(){throw\"Canceled!\"}};function
de(e){for(;0<e.length;){var t=e.shift();if(\"function\"==typeof t)t(o);else{var n=t.Nb;\"number\"==typeof n?void
0===t.ib?Z.get(n)():Z.get(n)(t.ib):n(void 0===t.ib?null:t.ib)}}}function
me(e,n){if(0>=e||e>t().length||1&e||0>n)return-28;if(0==n)return 0;2147483647<=n&&(n=1/0);var
a=Atomics.load(r(),Bt>>2),i=0;if(a==e&&Atomics.compareExchange(r(),Bt>>2,a,0)==a&&(i=1,0>=--n))return
1;if(0<=(e=Atomics.notify(r(),e>>2,n)))return e+i;throw\"Atomics.notify returned an unexpected value
\"+e}function be(e){if(v)throw\"Internal Error! cleanupThread() can only ever be called from main application
thread!\";if(!e)throw\"Internal Error! Null pthread_ptr in cleanupThread!\";var
t=ge.cb[e];t&&(r()[e+12>>2]=0,ge.sb(t.worker))}o._emscripten_futex_wake=me;var
he,ge={gb:[],fb:[],zb:[],xc:function(){},Rb:function(){for(var
e=ht(228),t=0;57>t;++t)a()[e/4+t]=0;r()[e+12>>2]=e,t=e+152,r()[t>>2]=t;var
n=ht(512);for(t=0;128>t;++t)a()[n/4+t]=0;Atomics.store(a(),e+100>>2,n),Atomics.store(a(),e+40>>2,e),Dt(e,!y,1),v
t(e)},Sb:function(){ge.receiveObjectTransfer=ge.Xb,ge.threadInit=ge.hc,ge.threadCancel=ge.fc,ge.threadExit=ge.H
b,ge.setExitStatus=ge.Zb},cb:{},yb:[],Eb:function(){for(;0<ge.yb.length;)ge.yb.pop()();Ct()},Fb:function(e,t){Atom
ics.store(a(),e+56>>2,1),Atomics.store(a(),e+60>>2,0),ge.Eb(),Atomics.store(a(),e+4>>2,t),Atomics.store(a(),e+0>
>2,1),me(e+0,2147483647),Dt(0,0,0)},Zb:function(e){R=e},Hb:function(e){var
t=yt();t&&(ge.Fb(t,e),v&&postMessage({cmd:\"exit\"}))},fc:function(){ge.Fb(yt(),-
1),postMessage({cmd:\"cancelDone\"})},Gb:function(){for(var e in ge.cb){var
t=ge.cb[e];t&&t.worker&&ge.sb(t.worker)}for(ge.cb={},e=0;e<ge.gb.length;++e){var
n=ge.gb[e];n.terminate()}for(ge.gb=[],e=0;e<ge.fb.length;++e)t=(n=ge.fb[e]).bb,ge.xb(t),n.terminate();ge.fb=[]},xb:
function(e){if(e){if(e.eb){var
t=r()[e.eb+100>>2];r()[e.eb+100>>2]=0,_t(t),_t(e.eb)}e.eb=0,e.wb&&e.hb&&_t(e.hb),e.hb=0,e.worker&&(e.worke
r.bb=null)}},sb:function(e){ge.Yb((function(){delete
ge.cb[e.bb.eb],ge.gb.push(e),ge.fb.splice(ge.fb.indexOf(e),1),ge.xb(e.bb),e.bb=void
0}))},Yb:function(e){r()[Ut>>2]=0;try{e()}finally{r()[Ut>>2]=1}},Xb:function(){},hc:function(){for(var e in
ge.zb)ge.zb[e]()},Ub:function(e,t){e.onmessage=function(n){var
i=n.data,o=i.cmd;if(e.bb&&(ge.Lb=e.bb.eb),i.targetThread&&i.targetThread!=yt()){var
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u=ge.cb[i.Dc];u?u.worker.postMessage(n.data,i.transferList):M('Internal error! Worker sent a message \"'+o+'\" to
target pthread '+i.targetThread+\", but that thread no longer exists!\")}else
if(\"processQueuedMainThreadWork\"===o)Ot();else if(\"spawnThread\"===o)ve(n.data);else
if(\"cleanupThread\"===o)be(i.thread);else if(\"killThread\"===o){if(n=i.thread,v)throw\"Internal Error!
killThread() can only ever be called from main application thread!\";if(!n)throw\"Internal Error! Null pthread_ptr in
killThread!\";r()[n+12>>2]=0,i=ge.cb[n],delete
ge.cb[n],i.worker.terminate(),ge.xb(i),ge.fb.splice(ge.fb.indexOf(i.worker),1),i.worker.bb=void 0}else
if(\"cancelThread\"===o){if(n=i.thread,v)throw\"Internal Error! cancelThread() can only ever be called from main
application thread!\";if(!n)throw\"Internal Error! Null pthread_ptr in
cancelThread!\";ge.cb[n].worker.postMessage({cmd:\"cancel\"})}else
if(\"loaded\"===o)e.loaded=!0,t&&t(e),e.mb&&(e.mb(),delete e.mb);else if(\"print\"===o)x(\"Thread
\"+i.threadId+\": \"+i.text);else if(\"printErr\"===o)M(\"Thread \"+i.threadId+\": \"+i.text);else
if(\"alert\"===o)alert(\"Thread \"+i.threadId+\": \"+i.text);else
if(\"exit\"===o)e.bb&&Atomics.load(a(),e.bb.eb+64>>2)&&ge.sb(e);else
if(\"exitProcess\"===o)try{zt(i.returnCode)}catch(e){if(e instanceof Gt)return;throw
e}else\"cancelDone\"===o?ge.sb(e):\"objectTransfer\"!==o&&(\"setimmediate\"===n.data.target?e.postMessage(n.
data):M(\"worker sent an unknown command \"+o));ge.Lb=void 0},e.onerror=function(e){M(\"pthread sent an
error! \"+e.filename+\":\"+e.lineno+\":
\"+e.message)},w&&(e.on(\"message\",(function(t){e.onmessage({data:t})})),e.on(\"error\",(function(t){e.onerror(t)
})),e.on(\"exit\",(function(){}))),e.postMessage({cmd:\"load\",urlOrBlob:o.mainScriptUrlOrBlob||_scriptDir,wasm
Memory:S,wasmModule:C})},Ib:function(){var e=T(\"ort-wasm-threaded.worker.js\");ge.gb.push(new
Worker(e))},Ob:function(){return
0==ge.gb.length&&(ge.Ib(),ge.Ub(ge.gb[0])),ge.gb.pop()},nc:function(e){for(e=performance.now()+e;performance.
now()<e;);}};function _e(e,t){if(0===e)e=Date.now();else{if(1!==e&&4!==e)return r()[gt()>>2]=28,-
1;e=he()}return r()[t>>2]=e/1e3|0,r()[t+4>>2]=e%1e3*1e6|0,0}function ye(e,t){if(v)return
ze(1,1,e,t);ee.unshift({Nb:e,ib:t})}function we(e){this.lb=e-
16,this.dc=function(e){r()[this.lb+4>>2]=e},this.ac=function(e){r()[this.lb+8>>2]=e},this.bc=function(){r()[this.lb>
>2]=0},this.$b=function(){t()[this.lb+12>>0]=0},this.cc=function(){t()[this.lb+13>>0]=0},this.Pb=function(e,t){thi
s.dc(e),this.ac(t),this.bc(),this.$b(),this.cc()}}function ve(e){if(v)throw\"Internal Error! spawnThread() can only ever
be called from main application thread!\";var t=ge.Ob();if(!t)return 6;if(void 0!==t.bb)throw\"Internal
error!\";if(!e.rb)throw\"Internal error, no pthread ptr!\";ge.fb.push(t);for(var
n=ht(512),i=0;128>i;++i)r()[n+4*i>>2]=0;var
o=e.hb+e.jb,u=(i=ge.cb[e.rb]={worker:t,hb:e.hb,jb:e.jb,wb:e.wb,eb:e.rb}).eb>>2;Atomics.store(a(),u+16,e.detached)
,Atomics.store(a(),u+25,n),Atomics.store(a(),u+10,i.eb),Atomics.store(a(),u+20,e.jb),Atomics.store(a(),u+19,o),Ato
mics.store(a(),u+26,e.jb),Atomics.store(a(),u+28,o),Atomics.store(a(),u+29,e.detached),n=St()+40,Atomics.store(a()
,u+43,n),t.bb=i;var
s={cmd:\"run\",start_routine:e.ec,arg:e.ib,threadInfoStruct:e.rb,stackBase:e.hb,stackSize:e.jb};return
t.mb=function(){s.time=performance.now(),t.postMessage(s,e.mc)},t.loaded&&(t.mb(),delete t.mb),0}function
Ae(e,n,a){if(0>=e||e>t().length||1&e)return-28;if(_){if(Atomics.load(r(),e>>2)!=n)return-6;var
i=performance.now();for(a=i+a,Atomics.exchange(r(),Bt>>2,e);;){if((i=performance.now())>a)return
Atomics.exchange(r(),Bt>>2,0),-
73;if(0==(i=Atomics.exchange(r(),Bt>>2,0)))break;if(Ot(),Atomics.load(r(),e>>2)!=n)return-
6;Atomics.exchange(r(),Bt>>2,e)}return 0}if(\"timed-out\"===(e=Atomics.wait(r(),e>>2,n,a)))return-73;if(\"not-
equal\"===e)return-6;if(\"ok\"===e)return 0;throw\"Atomics.wait returned an unexpected value \"+e}function
Te(){w||y||(k||(k={}),k[\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-thread\"]||(k[\"Blocking on the
main thread is very dangerous, see https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-
browser-thread\"]=1,M(\"Blocking on the main thread is very dangerous, see
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https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-
thread\")))}o.establishStackSpace=function(e,t){Wt(e,t),Yt(e)},o.invokeEntryPoint=function(e,t){return
Z.get(e)(t)},he=w?function(){var e=process.hrtime();return 1e3*e[0]+e[1]/1e6}:v?function(){return
performance.now()-o.__performance_now_clock_drift}:function(){return performance.now()};var
Oe={},ke=[null,[],[]];function Ee(e,t){var n=ke[e];0===t||10===t?((1===e?x:M)(H(n,0)),n.length=0):n.push(t)}var
xe={};function Me(e,t){return v?ze(2,1,e,t):(e=z(e),xe.rc(e,t))}function De(e,t,n){return v?ze(3,1,e,t,n):0}function
Se(e,t){if(v)return ze(4,1,e,t)}function Ce(e,t,n){if(v)return ze(5,1,e,t,n)}function Re(e,t,n){return
v?ze(6,1,e,t,n):0}function Ie(e,t){if(v)return ze(7,1,e,t)}function Fe(e,t){return
v?ze(8,1,e,t):(e=z(e),xe.sc(e,t))}function je(e,t,r,a,i,o){if(v)t=ze(9,1,e,t,r,a,i,o);else
if(o<<=12,0!=(16&a)&&0!=e%65536)t=-28;else if(0!=(32&a)){var
u=65536*Math.ceil(t/65536);(e=qt(65536,u))?n().fill(0,e,e+u):e=0,e?(Oe[e]={Wb:e,Tb:t,Jb:!0,fd:i,Ac:r,flags:a,offse
t:o},t=e):t=-48}else t=-52;return t}function Ye(e,t){if(v)e=ze(10,1,e,t);else{var
n=Oe[e];0!==t&&n?(t===n.Tb&&(Oe[e]=null,n.Jb&&_t(n.Wb)),e=0):e=-28}return e}function Pe(e,t,n){if(v)return
ze(11,1,e,t,n)}function We(e,t,n){return v?ze(12,1,e,t,n):(e=z(e),xe.tc(e,t,n))}function qe(e){if(v)return
ze(13,1,e)}function Ue(e,t){if(v)return ze(14,1,e,t)}function Be(e){if(v)return ze(15,1,e)}function Ge(){if(v)return
ze(16,1);ce()}var He=[];function ze(e,t){for(var n=arguments.length-2,r=jt(),a=Pt(8*n),o=a>>3,u=0;u<n;u++){var
s=arguments[2+u];i()[o+u]=s}return n=kt(e,n,a,t),Yt(r),n}var Le=[],Ne=[0,\"undefined\"!=typeof
document?document:0,\"undefined\"!=typeof window?window:0];function Ve(e){return
e=2<e?z(e):e,Ne[e]||(\"undefined\"!=typeof document?document.querySelector(e):void 0)}function Xe(e,t,n){var
a=Ve(e);if(!a)return-
4;if(a.qb&&(r()[a.qb>>2]=t,r()[a.qb+4>>2]=n),!a.Db&&a.pc){if(a.qb){a=r()[a.qb+8>>2],e=e?z(e):\"\";var
i=jt(),o=Pt(12),u=0;if(e){u=V(e)+1;var s=ht(u);N(e,s,u),u=s}return
r()[o>>2]=u,r()[o+4>>2]=t,r()[o+8>>2]=n,Et(0,a,657457152,0,u,o),Yt(i),1}return-4}return
a.Db&&(a=a.Db),e=!1,a.pb&&a.pb.ob&&(e=0===(e=a.pb.ob.getParameter(2978))[0]&&0===e[1]&&e[2]===a.wi
dth&&e[3]===a.height),a.width=t,a.height=n,e&&a.pb.ob.viewport(0,0,t,n),0}function Qe(e,t,n){return
v?ze(17,1,e,t,n):Xe(e,t,n)}var Je,Ze=[\"default\",\"low-power\",\"high-performance\"],$e={};function
Ke(){if(!Je){var
e,t={USER:\"web_user\",LOGNAME:\"web_user\",PATH:\"/\",PWD:\"/\",HOME:\"/home/web_user\",LANG:(\"ob
ject\"==typeof navigator&&navigator.languages&&navigator.languages[0]||\"C\").replace(\"-\",\"_\")+\".UTF-
8\",_:l||\"./this.program\"};for(e in $e)void 0===$e[e]?delete t[e]:t[e]=$e[e];var n=[];for(e in
t)n.push(e+\"=\"+t[e]);Je=n}return Je}function et(e,n){if(v)return ze(18,1,e,n);var a=0;return
Ke().forEach((function(i,o){var
u=n+a;for(o=r()[e+4*o>>2]=u,u=0;u<i.length;++u)t()[o++>>0]=i.charCodeAt(u);t()[o>>0]=0,a+=i.length+1})),0}f
unction tt(e,t){if(v)return ze(19,1,e,t);var n=Ke();r()[e>>2]=n.length;var a=0;return
n.forEach((function(e){a+=e.length+1})),r()[t>>2]=a,0}function nt(e){return v?ze(20,1,e):0}function rt(e,n){return
v?ze(21,1,e,n):(e=1==e||2==e?2:ce(),t()[n>>0]=e,0)}function at(e,t,n,a){return
v?ze(22,1,e,t,n,a):(e=xe.vc(e),t=xe.uc(e,t,n),r()[a>>2]=t,0)}function it(e,t,n,r,a){if(v)return
ze(23,1,e,t,n,r,a)}function ot(e,t,a,i){if(v)return ze(24,1,e,t,a,i);for(var o=0,u=0;u<a;u++){for(var
s=r()[t+8*u>>2],c=r()[t+(8*u+4)>>2],f=0;f<c;f++)Ee(e,n()[s+f]);o+=c}return r()[i>>2]=o,0}function ut(){function
e(e){return(e=e.toTimeString().match(/\\(([A-Za-z ]+)\\)$/))?e[1]:\"GMT\"}if(v)return
ze(25,1);if(!ut.Kb){ut.Kb=!0;var t=(new Date).getFullYear(),n=new Date(t,0,1),a=new
Date(t,6,1);t=n.getTimezoneOffset();var
i=a.getTimezoneOffset(),o=Math.max(t,i);r()[Ft()>>2]=60*o,r()[It()>>2]=Number(t!=i),n=e(n),a=e(a),n=X(n),a=X(
a),i<t?(r()[Rt()>>2]=n,r()[Rt()+4>>2]=a):(r()[Rt()>>2]=a,r()[Rt()+4>>2]=n)}}function st(e){return
0==e%4&&(0!=e%100||0==e%400)}function ct(e,t){for(var n=0,r=0;r<=t;n+=e[r++]);return n}var
ft=[31,29,31,30,31,30,31,31,30,31,30,31],lt=[31,28,31,30,31,30,31,31,30,31,30,31];function pt(e,t){for(e=new
Date(e.getTime());0<t;){var n=e.getMonth(),r=(st(e.getFullYear())?ft:lt)[n];if(!(t>r-
e.getDate())){e.setDate(e.getDate()+t);break}t-=r-
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e.getDate()+1,e.setDate(1),11>n?e.setMonth(n+1):(e.setMonth(0),e.setFullYear(e.getFullYear()+1))}return
e}function dt(e,n,a,i){function o(e,t,n){for(e=\"number\"==typeof e?e.toString():e||\"\";e.length<t;)e=n[0]+e;return
e}function u(e,t){return o(e,t,\"0\")}function s(e,t){function n(e){return 0>e?-1:0<e?1:0}var r;return
0===(r=n(e.getFullYear()-t.getFullYear()))&&0===(r=n(e.getMonth()-t.getMonth()))&&(r=n(e.getDate()-
t.getDate())),r}function c(e){switch(e.getDay()){case 0:return new Date(e.getFullYear()-1,11,29);case 1:return
e;case 2:return new Date(e.getFullYear(),0,3);case 3:return new Date(e.getFullYear(),0,2);case 4:return new
Date(e.getFullYear(),0,1);case 5:return new Date(e.getFullYear()-1,11,31);case 6:return new Date(e.getFullYear()-
1,11,30)}}function f(e){e=pt(new Date(e.ab+1900,0,1),e.vb);var t=new Date(e.getFullYear()+1,0,4),n=c(new
Date(e.getFullYear(),0,4));return t=c(t),0>=s(n,e)?0>=s(t,e)?e.getFullYear()+1:e.getFullYear():e.getFullYear()-
1}var l=r()[i+40>>2];for(var p in
i={kc:r()[i>>2],jc:r()[i+4>>2],tb:r()[i+8>>2],nb:r()[i+12>>2],kb:r()[i+16>>2],ab:r()[i+20>>2],ub:r()[i+24>>2],vb:r(
)[i+28>>2],Ec:r()[i+32>>2],ic:r()[i+36>>2],lc:l?z(l):\"\"},a=z(a),l={\"%c\":\"%a %b %d %H:%M:%S
%Y\",\"%D\":\"%m/%d/%y\",\"%F\":\"%Y-%m-%d\",\"%h\":\"%b\",\"%r\":\"%I:%M:%S
%p\",\"%R\":\"%H:%M\",\"%T\":\"%H:%M:%S\",\"%x\":\"%m/%d/%y\",\"%X\":\"%H:%M:%S\",\"%Ec\":\"%c\",\
"%EC\":\"%C\",\"%Ex\":\"%m/%d/%y\",\"%EX\":\"%H:%M:%S\",\"%Ey\":\"%y\",\"%EY\":\"%Y\",\"%Od\":\"%d
\",\"%Oe\":\"%e\",\"%OH\":\"%H\",\"%OI\":\"%I\",\"%Om\":\"%m\",\"%OM\":\"%M\",\"%OS\":\"%S\",\"%Ou\":\"
%u\",\"%OU\":\"%U\",\"%OV\":\"%V\",\"%Ow\":\"%w\",\"%OW\":\"%W\",\"%Oy\":\"%y\"})a=a.replace(new
RegExp(p,\"g\"),l[p]);var d=\"Sunday Monday Tuesday Wednesday Thursday Friday Saturday\".split(\"
\"),m=\"January February March April May June July August September October November December\".split(\"
\");for(p in l={\"%a\":function(e){return d[e.ub].substring(0,3)},\"%A\":function(e){return
d[e.ub]},\"%b\":function(e){return m[e.kb].substring(0,3)},\"%B\":function(e){return
m[e.kb]},\"%C\":function(e){return u((e.ab+1900)/100|0,2)},\"%d\":function(e){return
u(e.nb,2)},\"%e\":function(e){return o(e.nb,2,\" \")},\"%g\":function(e){return
f(e).toString().substring(2)},\"%G\":function(e){return f(e)},\"%H\":function(e){return
u(e.tb,2)},\"%I\":function(e){return 0==(e=e.tb)?e=12:12<e&&(e-=12),u(e,2)},\"%j\":function(e){return
u(e.nb+ct(st(e.ab+1900)?ft:lt,e.kb-1),3)},\"%m\":function(e){return u(e.kb+1,2)},\"%M\":function(e){return
u(e.jc,2)},\"%n\":function(){return\"\\n\"},\"%p\":function(e){return
0<=e.tb&&12>e.tb?\"AM\":\"PM\"},\"%S\":function(e){return
u(e.kc,2)},\"%t\":function(){return\"\\t\"},\"%u\":function(e){return e.ub||7},\"%U\":function(e){var t=new
Date(e.ab+1900,0,1),n=0===t.getDay()?t:pt(t,7-t.getDay());return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(ct(st(e.getFullYear())?ft:lt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\"01\":\"00\"},\"%V\":function(e){var t=new Date(e.ab+1901,0,4),n=c(new
Date(e.ab+1900,0,4));t=c(t);var r=pt(new Date(e.ab+1900,0,1),e.vb);return
0>s(r,n)?\"53\":0>=s(t,r)?\"01\":u(Math.ceil((n.getFullYear()<e.ab+1900?e.vb+32-n.getDate():e.vb+1-
n.getDate())/7),2)},\"%w\":function(e){return e.ub},\"%W\":function(e){var t=new
Date(e.ab,0,1),n=1===t.getDay()?t:pt(t,0===t.getDay()?1:7-t.getDay()+1);return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(ct(st(e.getFullYear())?ft:lt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\"01\":\"00\"},\"%y\":function(e){return(e.ab+1900).toString().substring(2)},\"%
Y\":function(e){return e.ab+1900},\"%z\":function(e){var t=0<=(e=e.ic);return e=Math.abs(e)/60,(t?\"+\":\"-
\")+String(\"0000\"+(e/60*100+e%60)).slice(-4)},\"%Z\":function(e){return
e.lc},\"%%\":function(){return\"%\"}})a.includes(p)&&(a=a.replace(new
RegExp(p,\"g\"),l[p](i)));return(p=function(e){var t=Array(V(e)+1);return
L(e,t,0,t.length),t}(a)).length>n?0:(function(e,n){t().set(e,n)}(p,e),p.length-1)}var
mt=[null,ye,Me,De,Se,Ce,Re,Ie,Fe,je,Ye,Pe,We,qe,Ue,Be,Ge,Qe,et,tt,nt,rt,at,it,ot,ut],bt={h:function(e,t,n,r){ce(\"As
sertion failed: \"+z(e)+\", at: \"+[t?z(t):\"unknown filename\",n,r?z(r):\"unknown
function\"])},M:function(e,t){return _e(e,t)},b:function(e){return ht(e+16)+16},d:function(e,t){return
ye(e,t)},e:function(e,t){ge.yb.push((function(){Z.get(e)(t)}))},c:function(e,t,n){throw new
we(e).Pb(t,n),e},Z:function(e,t,n,i){if(\"undefined\"==typeof SharedArrayBuffer)return M(\"Current environment
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does not support SharedArrayBuffer, pthreads are not available!\"),6;if(!e)return M(\"pthread_create called with a
null thread pointer!\"),28;var o=[];if(v&&0===o.length)return Tt(687865856,e,t,n,i);var u=0,s=0;if(t&&-1!=t){var
c=r()[t>>2];c+=81920,u=r()[t+8>>2],s=0!==r()[t+12>>2]}else c=2097152;(t=0==u)?u=qt(16,c):F(0<(u-=c));for(var
f=ht(228),l=0;57>l;++l)a()[(f>>2)+l]=0;return
r()[e>>2]=f,r()[f+12>>2]=f,e=f+152,r()[e>>2]=e,n={hb:u,jb:c,wb:t,detached:s,ec:n,rb:f,ib:i,mc:o},v?(n.oc=\"spawn
Thread\",postMessage(n,o),0):ve(n)},X:function(e){throw
v?ge.Hb(e):(ge.Eb(),zt(e)),\"unwind\"},Y:function(e,t){return function(e,t){if(!e)return M(\"pthread_join attempted
on a null thread pointer!\"),71;if(v&&yt()==e)return M(\"PThread \"+e+\" is attempting to join to
itself!\"),16;if(!v&&At()==e)return M(\"Main thread \"+e+\" is attempting to join to
itself!\"),16;if(r()[e+12>>2]!==e)return M(\"pthread_join attempted on thread \"+e+\", which does not point to a
valid thread, or does not exist anymore!\"),71;if(Atomics.load(a(),e+64>>2))return M(\"Attempted to join thread
\"+e+\", which was already detached!\"),28;for(Te();;){var n=Atomics.load(a(),e+0>>2);if(1==n)return
n=Atomics.load(a(),e+4>>2),t&&(r()[t>>2]=n),Atomics.store(a(),e+64>>2,1),v?postMessage({cmd:\"cleanupThrea
d\",thread:e}):be(e),0;xt(),v||Ot(),Ae(e+0,n,v?100:1)}}(e,t)},L:Me,s:De,S:Se,V:Ce,u:function(){return
42},F:Re,Q:Ie,P:Fe,U:je,T:Ye,q:Pe,K:We,N:qe,v:Ue,O:Be,da:function(e,t){if(e==t)postMessage({cmd:\"processQu
euedMainThreadWork\"});else
if(v)postMessage({targetThread:e,cmd:\"processThreadQueue\"});else{if(!(e=(e=ge.cb[e])&&e.worker))return;e.po
stMessage({cmd:\"processThreadQueue\"})}return 1},f:Ge,w:_e,ga:function(e,t){return e-t},A:function(){ce(\"To
use dlopen, you need to use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},l:function(){ce(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},C:function(){ce(\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},z:function(){ce(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},ea:function(e,t,a){var
o;for(He.length=0,a>>=2;o=n()[t++];)(o=105>o)&&1&a&&a++,He.push(o?i()[a++>>1]:r()[a]),++a;return
pe[e].apply(null,He)},G:Te,n:function(){},k:Ae,j:me,W:function(){return
2147483648},i:he,D:function(e,t,r){n().copyWithin(e,t,t+r)},o:function(){return
w?require(\"os\").cpus().length:navigator.hardwareConcurrency},aa:function(e,t,n){Le.length=t,n>>=3;for(var
r=0;r<t;r++)Le[r]=i()[n+r];return(0>e?pe[-e-1]:mt[e]).apply(null,Le)},E:function(e){var
t=n().length;if((e>>>=0)<=t||2147483648<e)return!1;for(var r=1;4>=r;r*=2){var
a=t*(1+.2/r);a=Math.min(a,e+100663296),0<(a=Math.max(e,a))%65536&&(a+=65536-
a%65536);e:{try{S.grow(Math.min(2147483648,a)-Y.byteLength+65535>>>16),Q(S.buffer);var i=1;break
e}catch(e){}i=void 0}if(i)return!0}return!1},ba:function(e,t,n){return
Ve(e)?Xe(e,t,n):Qe(e,t,n)},x:function(){},$:function(e,t,n){return ne+=1,setTimeout((function(){--
ne,function(e){if(!I){try{e()}catch(e){if(e instanceof Gt)return;if(\"unwind\"!==e)throw e&&\"object\"==typeof
e&&e.stack&&M(\"exception thrown: \"+[e,e.stack]),e}if(!re())try{v?Mt(R):zt(R)}catch(e){if(!(e instanceof
Gt))throw e}}}((function(){Z.get(e)(n)}))}),t)},ca:function(e,t){t>>=2;var n=r()[t+6];return
t={alpha:!!r()[t],depth:!!r()[t+1],stencil:!!r()[t+2],antialias:!!r()[t+3],premultipliedAlpha:!!r()[t+4],preserveDrawing
Buffer:!!r()[t+5],powerPreference:Ze[n],failIfMajorPerformanceCaveat:!!r()[t+7],Vb:r()[t+8],yc:r()[t+9],Bb:r()[t+10
],Mb:r()[t+11],Bc:r()[t+12],Cc:r()[t+13]},!(e=Ve(e))||t.Mb?0:function(e,t){e.Cb||(e.Cb=e.getContext,e.getContext=f
unction(t,n){return\"webgl\"==t==(n=e.Cb(t,n))instanceof WebGLRenderingContext?n:null});var
n=e.getContext(\"webgl\",t);return n?function(e,t){var n=ht(8);r()[n+4>>2]=yt();var
a={wc:n,attributes:t,version:t.Vb,ob:e};return e.canvas&&(e.canvas.pb=a),(void
0===t.Bb||t.Bb)&&function(e){if(e||(e=void 0),!e.Qb){e.Qb=!0;var t=e.ob;!function(e){var
t=e.getExtension(\"ANGLE_instanced_arrays\");t&&(e.vertexAttribDivisor=function(e,n){t.vertexAttribDivisorAN
GLE(e,n)},e.drawArraysInstanced=function(e,n,r,a){t.drawArraysInstancedANGLE(e,n,r,a)},e.drawElementsInstan
ced=function(e,n,r,a,i){t.drawElementsInstancedANGLE(e,n,r,a,i)})}(t),function(e){var
t=e.getExtension(\"OES_vertex_array_object\");t&&(e.createVertexArray=function(){return
```

```
t.createVertexArrayOES()},e.deleteVertexArray=function(e){t.deleteVertexArrayOES(e)},e.bindVertexArray=funct
ion(e){t.bindVertexArrayOES(e)},e.isVertexArray=function(e){return t.isVertexArrayOES(e)}}(t),function(e){var
t=e.getExtension(\"WEBGL_draw_buffers\");t&&(e.drawBuffers=function(e,n){t.drawBuffersWEBGL(e,n)})}(t),t.
qc=t.getExtension(\"EXT_disjoint_timer_query\"),t.zc=t.getExtension(\"WEBGL_multi_draw\"),(t.getSupportedExt
ensions()||[]).forEach((function(e){e.includes(\"lose_context\")||e.includes(\"debug\")||t.getExtension(e)}))}}(a),n}(n
,t):0}(e,t)},I:et,J:tt,m:nt,H:rt,t:at,B:it,p:ot,R:function(e){var t=Date.now();return
r()[e>>2]=t/1e3|0,r()[e+4>>2]=t%1e3*1e3|0,0},ha:function e(t,n){return t=new
Date(1e3*r()[t>>2]),r()[n>>2]=t.getUTCSeconds(),r()[n+4>>2]=t.getUTCMinutes(),r()[n+8>>2]=t.getUTCHours(),
r()[n+12>>2]=t.getUTCDate(),r()[n+16>>2]=t.getUTCMonth(),r()[n+20>>2]=t.getUTCFullYear()-
1900,r()[n+24>>2]=t.getUTCDay(),r()[n+36>>2]=0,r()[n+32>>2]=0,t=(t.getTime()-
Date.UTC(t.getUTCFullYear(),0,1,0,0,0,0))/864e5|0,r()[n+28>>2]=t,e.Ab||(e.Ab=X(\"GMT\")),r()[n+40>>2]=e.Ab,
n},_:function(){ge.Rb()},r:function(e,t){ut(),e=new
Date(1e3*r()[e>>2]),r()[t>>2]=e.getSeconds(),r()[t+4>>2]=e.getMinutes(),r()[t+8>>2]=e.getHours(),r()[t+12>>2]=e
.getDate(),r()[t+16>>2]=e.getMonth(),r()[t+20>>2]=e.getFullYear()-1900,r()[t+24>>2]=e.getDay();var n=new
Date(e.getFullYear(),0,1),a=(e.getTime()-n.getTime())/864e5|0;return r()[t+28>>2]=a,r()[t+36>>2]=-
60*e.getTimezoneOffset(),a=new
Date(e.getFullYear(),6,1).getTimezoneOffset(),e=0|(a!=(n=n.getTimezoneOffset())&&e.getTimezoneOffset()==Mat
h.min(n,a)),r()[t+32>>2]=e,e=r()[Rt()+(e?4:0)>>2],r()[t+40>>2]=e,t},a:S||o.wasmMemory,y:function(e){ut();var
t=new
Date(r()[e+20>>2]+1900,r()[e+16>>2],r()[e+12>>2],r()[e+8>>2],r()[e+4>>2],r()[e>>2],0),n=r()[e+32>>2],a=t.getT
imezoneOffset(),i=new Date(t.getFullYear(),0,1),o=new
Date(t.getFullYear(),6,1).getTimezoneOffset(),u=i.getTimezoneOffset(),s=Math.min(u,o);return
0>n?r()[e+32>>2]=Number(o!=u&&s==a):0<n!=(s==a)&&(o=Math.max(u,o),t.setTime(t.getTime()+6e4*((0<n?s:o
)-a))),r()[e+24>>2]=t.getDay(),n=(t.getTime()-
i.getTime())/864e5|0,r()[e+28>>2]=n,r()[e>>2]=t.getSeconds(),r()[e+4>>2]=t.getMinutes(),r()[e+8>>2]=t.getHours(
),r()[e+12>>2]=t.getDate(),r()[e+16>>2]=t.getMonth(),t.getTime()/1e3|0},fa:dt,g:function(e,t,n,r){return
dt(e,t,n,r)}};!function(){function
e(e,t){o.asm=e.exports,Z=o.asm.Ca,K.unshift(o.asm.ia),ge.zb.push(o.asm.Ha),C=t,v||(oe--
,o.monitorRunDependencies&&o.monitorRunDependencies(oe),0==oe&&(null!==ue&&(clearInterval(ue),ue=null)
,se&&(e=se,se=null,e())))}function t(t){e(t.instance,t.module)}function n(e){return
function(){if(!E&&(_||y)){if(\"function\"==typeof fetch&&!ie.startsWith(\"file://\"))return
fetch(ie,{credentials:\"same-origin\"}).then((function(e){if(!e.ok)throw\"failed to load wasm binary file at
'\"+ie+\"'\";return e.arrayBuffer()})).catch((function(){return le()}));if(m)return new
Promise((function(e,t){m(ie,(function(t){e(new Uint8Array(t))}),t)}))}return
Promise.resolve().then((function(){return le()}))}().then((function(e){return
WebAssembly.instantiate(e,r)})).then(e,(function(e){M(\"failed to asynchronously prepare wasm: \"+e),ce(e)}))}var
r={a:bt};if(v||(oe++,o.monitorRunDependencies&&o.monitorRunDependencies(oe)),o.instantiateWasm)try{return
o.instantiateWasm(r,e)}catch(e){return M(\"Module.instantiateWasm callback failed with error:
\"+e),!1}(E||\"function\"!=typeof
WebAssembly.instantiateStreaming||fe()||ie.startsWith(\"file://\")||\"function\"!=typeof
fetch?n(t):fetch(ie,{credentials:\"same-origin\"}).then((function(e){return
WebAssembly.instantiateStreaming(e,r).then(t,(function(e){return M(\"wasm streaming compile failed:
\"+e),M(\"falling back to ArrayBuffer
instantiation\"),n(t)}))}))).catch(s)}(),o.___wasm_call_ctors=function(){return(o.___wasm_call_ctors=o.asm.ia).app
ly(null,arguments)},o._OrtInit=function(){return(o._OrtInit=o.asm.ja).apply(null,arguments)},o._OrtCreateSession
Options=function(){return(o._OrtCreateSessionOptions=o.asm.ka).apply(null,arguments)},o._OrtAddSessionConfig
Entry=function(){return(o._OrtAddSessionConfigEntry=o.asm.la).apply(null,arguments)},o._OrtReleaseSessionOpt
ions=function(){return(o._OrtReleaseSessionOptions=o.asm.ma).apply(null,arguments)},o._OrtCreateSession=funct
```

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ion(){return(o._OrtCreateSession=o.asm.na).apply(null,arguments)},o._OrtReleaseSession=function(){return(o._Ort
ReleaseSession=o.asm.oa).apply(null,arguments)},o._OrtGetInputCount=function(){return(o._OrtGetInputCount=o.
asm.pa).apply(null,arguments)},o._OrtGetOutputCount=function(){return(o._OrtGetOutputCount=o.asm.qa).apply(
null,arguments)},o._OrtGetInputName=function(){return(o._OrtGetInputName=o.asm.ra).apply(null,arguments)},o.
_OrtGetOutputName=function(){return(o._OrtGetOutputName=o.asm.sa).apply(null,arguments)},o._OrtFree=funct
ion(){return(o._OrtFree=o.asm.ta).apply(null,arguments)},o._OrtCreateTensor=function(){return(o._OrtCreateTens
or=o.asm.ua).apply(null,arguments)},o._OrtGetTensorData=function(){return(o._OrtGetTensorData=o.asm.va).appl
y(null,arguments)},o._OrtReleaseTensor=function(){return(o._OrtReleaseTensor=o.asm.wa).apply(null,arguments)
},o._OrtCreateRunOptions=function(){return(o._OrtCreateRunOptions=o.asm.xa).apply(null,arguments)},o._OrtAd
dRunConfigEntry=function(){return(o._OrtAddRunConfigEntry=o.asm.ya).apply(null,arguments)},o._OrtReleaseR
unOptions=function(){return(o._OrtReleaseRunOptions=o.asm.za).apply(null,arguments)},o._OrtRun=function(){re
turn(o._OrtRun=o.asm.Aa).apply(null,arguments)},o._OrtEndProfiling=function(){return(o._OrtEndProfiling=o.as
m.Ba).apply(null,arguments)};var
ht=o._malloc=function(){return(ht=o._malloc=o.asm.Da).apply(null,arguments)},gt=o.___errno_location=function(
){return(gt=o.___errno_location=o.asm.Ea).apply(null,arguments)},_t=o._free=function(){return(_t=o._free=o.asm.
Fa).apply(null,arguments)},yt=o._pthread_self=function(){return(yt=o._pthread_self=o.asm.Ga).apply(null,argumen
ts)};o._emscripten_tls_init=function(){return(o._emscripten_tls_init=o.asm.Ha).apply(null,arguments)},o._emscript
en_current_thread_process_queued_calls=function(){return(o._emscripten_current_thread_process_queued_calls=o.
asm.Ia).apply(null,arguments)};var
wt,vt=o._emscripten_register_main_browser_thread_id=function(){return(vt=o._emscripten_register_main_browser
_thread_id=o.asm.Ja).apply(null,arguments)},At=o._emscripten_main_browser_thread_id=function(){return(At=o._
emscripten_main_browser_thread_id=o.asm.Ka).apply(null,arguments)},Tt=o._emscripten_sync_run_in_main_thre
ad_4=function(){return(Tt=o._emscripten_sync_run_in_main_thread_4=o.asm.La).apply(null,arguments)},Ot=o._e
mscripten_main_thread_process_queued_calls=function(){return(Ot=o._emscripten_main_thread_process_queued_
calls=o.asm.Ma).apply(null,arguments)},kt=o._emscripten_run_in_main_runtime_thread_js=function(){return(kt=o.
_emscripten_run_in_main_runtime_thread_js=o.asm.Na).apply(null,arguments)},Et=o.__emscripten_call_on_threa
d=function(){return(Et=o.__emscripten_call_on_thread=o.asm.Oa).apply(null,arguments)},xt=o._pthread_testcance
l=function(){return(xt=o._pthread_testcancel=o.asm.Pa).apply(null,arguments)},Mt=o._pthread_exit=function(){ret
urn(Mt=o._pthread_exit=o.asm.Qa).apply(null,arguments)},Dt=o.__emscripten_thread_init=function(){return(Dt=o.
__emscripten_thread_init=o.asm.Ra).apply(null,arguments)},St=o._emscripten_get_global_libc=function(){return(S
t=o._emscripten_get_global_libc=o.asm.Sa).apply(null,arguments)},Ct=o.___pthread_tsd_run_dtors=function(){ret
urn(Ct=o.___pthread_tsd_run_dtors=o.asm.Ta).apply(null,arguments)},Rt=o.__get_tzname=function(){return(Rt=o.
__get_tzname=o.asm.Ua).apply(null,arguments)},It=o.__get_daylight=function(){return(It=o.__get_daylight=o.asm
.Va).apply(null,arguments)},Ft=o.__get_timezone=function(){return(Ft=o.__get_timezone=o.asm.Wa).apply(null,ar
guments)},jt=o.stackSave=function(){return(jt=o.stackSave=o.asm.Xa).apply(null,arguments)},Yt=o.stackRestore=f
unction(){return(Yt=o.stackRestore=o.asm.Ya).apply(null,arguments)},Pt=o.stackAlloc=function(){return(Pt=o.stac
kAlloc=o.asm.Za).apply(null,arguments)},Wt=o._emscripten_stack_set_limits=function(){return(Wt=o._emscripten
_stack_set_limits=o.asm._a).apply(null,arguments)},qt=o._memalign=function(){return(qt=o._memalign=o.asm.$a)
.apply(null,arguments)},Ut=o.__emscripten_allow_main_runtime_queued_calls=973296,Bt=o.__emscripten_main_
thread_futex=977204;function Gt(e){this.name=\"ExitStatus\",this.message=\"Program terminated with
exit(\"+e+\")\",this.status=e}function Ht(){function
e(){if(!wt&&(wt=!0,o.calledRun=!0,!I)&&(v||de(K),u(o),o.onRuntimeInitialized&&o.onRuntimeInitialized(),!v)){if
(o.postRun)for(\"function\"==typeof o.postRun&&(o.postRun=[o.postRun]);o.postRun.length;){var
e=o.postRun.shift();te.unshift(e)}de(te)}}if(!(0<oe))if(v)u(o),v||de(K),postMessage({cmd:\"loaded\"});else{if(!v){if
(o.preRun)for(\"function\"==typeof
o.preRun&&(o.preRun=[o.preRun]);o.preRun.length;)ae();de($)}0<oe||(o.setStatus?(o.setStatus(\"Running...\"),setT
imeout((function(){setTimeout((function(){o.setStatus(\"\")}),1),e()}),1)):e())}}function zt(e){if(R=e,v)throw
postMessage({cmd:\"exitProcess\",returnCode:e}),new Gt(e);re()||(ge.Gb(),v||(de(ee),\"undefined\"!=typeof
```

```
_fflush&&_fflush(0),ke[1].length&&Ee(1,10),ke[2].length&&Ee(2,10))),R=e,re()||(ge.Gb(),o.onExit&&o.onExit(e),
I=!0),p(e,new
Gt(e))}if(o.UTF8ToString=z,o.stringToUTF8=N,o.lengthBytesUTF8=V,o.keepRuntimeAlive=re,o.PThread=ge,o.st
ackSave=jt,o.stackRestore=Yt,o.stackAlloc=Pt,o.PThread=ge,o.wasmMemory=S,o.ExitStatus=Gt,se=function
e(){wt||Ht(),wt||(se=e)},o.run=Ht,o.preInit)for(\"function\"==typeof
o.preInit&&(o.preInit=[o.preInit]);0<o.preInit.length;)o.preInit.pop()();return
v&&(D=!1,ge.Sb()),Ht(),e.ready});\"object\"==typeof exports&&\"object\"==typeof
module?module.exports=e:\"function\"==typeof define&&define.amd?define([],(function(){return
e})):\"object\"==typeof exports&&(exports.ortWasmThreaded=e);\n","\r\nvar ortWasm = (function() {\r\n  var
_scriptDir = typeof document !== 'undefined' && document.currentScript ? document.currentScript.src :
undefined;\r\n  if (typeof __filename !== 'undefined') _scriptDir = _scriptDir || __filename;\r\n  return
(\r\nfunction(ortWasm) {\r\n  ortWasm = ortWasm || {};\r\n\r\n\r\nvar c;c||(c=typeof ortWasm !== 'undefined' ?
ortWasm : {});var aa,g;c.ready=new Promise(function(a,b){aa=a;g=b});var r={},t;for(t in
c)c.hasOwnProperty(t)&&(r[t]=c[t]);var v=\"./this.program\",ba=\"object\"===typeof
window,w=\"function\"===typeof importScripts,ca=\"object\"===typeof process&&\"object\"===typeof
process.versions&&\"string\"===typeof
process.versions.node,x=\"\",y,z,B,C,D;\r\nif(ca)x=w?require(\"path\").dirname(x)+\"/\":__dirname+\"/\",y=function
(a,b){C||(C=require(\"fs\"));D||(D=require(\"path\"));a=D.normalize(a);return
C.readFileSync(a,b?null:\"utf8\")},B=function(a){a=y(a,!0);a.buffer||(a=new Uint8Array(a));a.buffer||E(\"Assertion
failed: undefined\");return
a},z=function(a,b,e){C||(C=require(\"fs\"));D||(D=require(\"path\"));a=D.normalize(a);C.readFile(a,function(f,h){f?e
(f):b(h.buffer)})},1<process.argv.length&&(v=process.argv[1].replace(/\\\\/g,\"/\")),process.argv.slice(2),process.on(
\"uncaughtException\",\r\nfunction(a){throw
a;}),process.on(\"unhandledRejection\",E),c.inspect=function(){return\"[Emscripten Module object]\"};else
if(ba||w)w?x=self.location.href:\"undefined\"!==typeof
document&&document.currentScript&&(x=document.currentScript.src),_scriptDir&&(x=_scriptDir),0!==x.indexO
f(\"blob:\")?x=x.substr(0,x.lastIndexOf(\"/\")+1):x=\"\",y=function(a){var b=new
XMLHttpRequest;b.open(\"GET\",a,!1);b.send(null);return b.responseText},w&&(B=function(a){var b=new
XMLHttpRequest;b.open(\"GET\",a,!1);b.responseType=\"arraybuffer\";\r\nb.send(null);return new
Uint8Array(b.response)}),z=function(a,b,e){var f=new
XMLHttpRequest;f.open(\"GET\",a,!0);f.responseType=\"arraybuffer\";f.onload=function(){200==f.status||0==f.stat
us&&f.response?b(f.response):e()};f.onerror=e;f.send(null)};var
da=c.print||console.log.bind(console),F=c.printErr||console.warn.bind(console);for(t in
r)r.hasOwnProperty(t)&&(c[t]=r[t]);r=null;c.thisProgram&&(v=c.thisProgram);var
H;c.wasmBinary&&(H=c.wasmBinary);var noExitRuntime=c.noExitRuntime||!1;\r\n\"object\"!==typeof
WebAssembly&&E(\"no native wasm support detected\");var I,ea=!1,fa=\"undefined\"!==typeof TextDecoder?new
TextDecoder(\"utf8\"):void 0;\r\nfunction ha(a,b,e){var f=b+e;for(e=b;a[e]&&!(e>=f);)++e;if(16<e-
b&&a.subarray&&fa)return fa.decode(a.subarray(b,e));for(f=\"\";b<e;){var h=a[b++];if(h&128){var
k=a[b++]&63;if(192==(h&224))f+=String.fromCharCode((h&31)<<6|k);else{var
l=a[b++]&63;h=224==(h&240)?(h&15)<<12|k<<6|l:(h&7)<<18|k<<12|l<<6|a[b++]&63;65536>h?f+=String.fromC
harCode(h):(h-=65536,f+=String.fromCharCode(55296|h>>10,56320|h&1023))}}else
f+=String.fromCharCode(h)}return f}function J(a,b){return a?ha(K,a,b):\"\"}\r\nfunction L(a,b,e,f){if(!(0<f))return
0;var h=e;f=e+f-1;for(var k=0;k<a.length;++k){var l=a.charCodeAt(k);if(55296<=l&&57343>=l){var
q=a.charCodeAt(++k);l=65536+((l&1023)<<10)|q&1023}if(127>=l){if(e>=f)break;b[e++]=l}else{if(2047>=l){if(e
+1>=f)break;b[e++]=192|l>>6}else{if(65535>=l){if(e+2>=f)break;b[e++]=224|l>>12}else{if(e+3>=f)break;b[e++]
=240|l>>18;b[e++]=128|l>>12&63}b[e++]=128|l>>6&63}b[e++]=128|l&63}}b[e]=0;return e-h}\r\nfunction
ia(a){for(var b=0,e=0;e<a.length;++e){var
f=a.charCodeAt(e);55296<=f&&57343>=f&&(f=65536+((f&1023)<<10)|a.charCodeAt(++e)&1023);127>=f?++b:
```

```
b=2047>=f?b+2:65535>=f?b+3:b+4}return b}function ja(a){var b=ia(a)+1,e=ka(b);e&&L(a,M,e,b);return e}var
la,M,K,N;\r\nfunction ma(){var a=I.buffer;la=a;c.HEAP8=M=new Int8Array(a);c.HEAP16=new
Int16Array(a);c.HEAP32=N=new Int32Array(a);c.HEAPU8=K=new Uint8Array(a);c.HEAPU16=new
Uint16Array(a);c.HEAPU32=new Uint32Array(a);c.HEAPF32=new Float32Array(a);c.HEAPF64=new
Float64Array(a)}var na,oa=[],pa=[],qa=[],ra=[];function sa(){var a=c.preRun.shift();oa.unshift(a)}var
O=0,ta=null,P=null;c.preloadedImages={};c.preloadedAudios={};\r\nfunction
E(a){if(c.onAbort)c.onAbort(a);F(a);ea=!0;a=new WebAssembly.RuntimeError(\"abort(\"+a+\"). Build with -s
ASSERTIONS=1 for more info.\");g(a);throw a;}function ua(){return Q.startsWith(\"data:application/octet-
stream;base64,\")}var Q;Q=\"ort-wasm.wasm\";if(!ua()){var va=Q;Q=c.locateFile?c.locateFile(va,x):x+va}function
wa(){var a=Q;try{if(a==Q&&H)return new Uint8Array(H);if(B)return B(a);throw\"both async and sync fetching of
the wasm failed\";}catch(b){E(b)}}\r\nfunction xa(){if(!H&&(ba||w)){if(\"function\"===typeof
fetch&&!Q.startsWith(\"file://\"))return fetch(Q,{credentials:\"same-
origin\"}).then(function(a){if(!a.ok)throw\"failed to load wasm binary file at '\"+Q+\"'\";return
a.arrayBuffer()}).catch(function(){return wa()});if(z)return new Promise(function(a,b){z(Q,function(e){a(new
Uint8Array(e))},b)})}return Promise.resolve().then(function(){return wa()})}\r\nfunction
ya(a){for(;0<a.length;){var b=a.shift();if(\"function\"==typeof b)b(c);else{var e=b.Ea;\"number\"===typeof e?void
0===b.xa?na.get(e)():na.get(e)(b.xa):e(void 0===b.xa?null:b.xa)}}}function za(a){this.ya=a-
16;this.Na=function(b){N[this.ya+4>>2]=b};this.Ka=function(b){N[this.ya+8>>2]=b};this.La=function(){N[this.ya
>>2]=0};this.Ja=function(){M[this.ya+12>>0]=0};this.Ma=function(){M[this.ya+13>>0]=0};this.Ga=function(b,e)
{this.Na(b);this.Ka(e);this.La();this.Ja();this.Ma()}}\r\nvar Aa=0,Ba={},Ca=[null,[],[]],R={},S;S=ca?function(){var
a=process.hrtime();return 1E3*a[0]+a[1]/1E6}:function(){return performance.now()};var Da={};function
Ea(){if(!Fa){var
a={USER:\"web_user\",LOGNAME:\"web_user\",PATH:\"/\",PWD:\"/\",HOME:\"/home/web_user\",LANG:(\"obj
ect\"===typeof navigator&&navigator.languages&&navigator.languages[0]||\"C\").replace(\"-\",\"_\")+\".UTF-
8\",_:v||\"./this.program\"},b;for(b in Da)void 0===Da[b]?delete a[b]:a[b]=Da[b];var e=[];for(b in
a)e.push(b+\"=\"+a[b]);Fa=e}return Fa}var Fa;\r\nfunction T(a,b){a=new
Date(1E3*N[a>>2]);N[b>>2]=a.getUTCSeconds();N[b+4>>2]=a.getUTCMinutes();N[b+8>>2]=a.getUTCHours();
N[b+12>>2]=a.getUTCDate();N[b+16>>2]=a.getUTCMonth();N[b+20>>2]=a.getUTCFullYear()-
1900;N[b+24>>2]=a.getUTCDay();N[b+36>>2]=0;N[b+32>>2]=0;N[b+28>>2]=(a.getTime()-
Date.UTC(a.getUTCFullYear(),0,1,0,0,0,0))/864E5|0;T.Da||(T.Da=ja(\"GMT\"));N[b+40>>2]=T.Da;return
b}\r\nfunction Ga(){function a(l){return(l=l.toTimeString().match(/\\(([A-Za-z
]+)\\)$/))?l[1]:\"GMT\"}if(!Ka){Ka=!0;var b=(new Date).getFullYear(),e=new Date(b,0,1),f=new
Date(b,6,1);b=e.getTimezoneOffset();var
h=f.getTimezoneOffset(),k=Math.max(b,h);N[La()>>2]=60*k;N[Ma()>>2]=Number(b!=h);e=a(e);f=a(f);e=ja(e);f=j
a(f);h<b?(N[U()>>2]=e,N[U()+4>>2]=f):(N[U()>>2]=f,N[U()+4>>2]=e)}}var Ka;function V(a){return
0===a%4&&(0!==a%100||0===a%400)}function Na(a,b){for(var e=0,f=0;f<=b;e+=a[f++]);return e}\r\nvar
W=[31,29,31,30,31,30,31,31,30,31,30,31],X=[31,28,31,30,31,30,31,31,30,31,30,31];function Y(a,b){for(a=new
Date(a.getTime());0<b;){var e=a.getMonth(),f=(V(a.getFullYear())?W:X)[e];if(b>f-a.getDate())b-=f-
a.getDate()+1,a.setDate(1),11>e?a.setMonth(e+1):(a.setMonth(0),a.setFullYear(a.getFullYear()+1));else{a.setDate(
a.getDate()+b);break}}return a}\r\nfunction Oa(a,b,e,f){function h(d,m,n){for(d=\"number\"===typeof
d?d.toString():d||\"\";d.length<m;)d=n[0]+d;return d}function k(d,m){return h(d,m,\"0\")}function l(d,m){function
n(Ha){return 0>Ha?-1:0<Ha?1:0}var A;0===(A=n(d.getFullYear()-m.getFullYear()))&&0===(A=n(d.getMonth()-
m.getMonth()))&&(A=n(d.getDate()-m.getDate()));return A}function q(d){switch(d.getDay()){case 0:return new
Date(d.getFullYear()-1,11,29);case 1:return d;case 2:return new Date(d.getFullYear(),0,3);case 3:return new
Date(d.getFullYear(),\r\n0,2);case 4:return new Date(d.getFullYear(),0,1);case 5:return new Date(d.getFullYear()-
1,11,31);case 6:return new Date(d.getFullYear()-1,11,30)}}function G(d){d=Y(new Date(d.va+1900,0,1),d.Ca);var
m=new Date(d.getFullYear()+1,0,4),n=q(new Date(d.getFullYear(),0,4));m=q(m);return
0>=l(n,d)?0>=l(m,d)?d.getFullYear()+1:d.getFullYear():d.getFullYear()-1}var
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u=N[f+40>>2];f={Qa:N[f>>2],Pa:N[f+4>>2],Aa:N[f+8>>2],za:N[f+12>>2],wa:N[f+16>>2],va:N[f+20>>2],Ba:N[
f+24>>2],Ca:N[f+28>>2],Ya:N[f+32>>2],Oa:N[f+\r\n36>>2],Ra:u?J(u):\"\"};e=J(e);u={\"%c\":\"%a %b %d
%H:%M:%S %Y\",\"%D\":\"%m/%d/%y\",\"%F\":\"%Y-%m-%d\",\"%h\":\"%b\",\"%r\":\"%I:%M:%S
%p\",\"%R\":\"%H:%M\",\"%T\":\"%H:%M:%S\",\"%x\":\"%m/%d/%y\",\"%X\":\"%H:%M:%S\",\"%Ec\":\"%c\",\
"%EC\":\"%C\",\"%Ex\":\"%m/%d/%y\",\"%EX\":\"%H:%M:%S\",\"%Ey\":\"%y\",\"%EY\":\"%Y\",\"%Od\":\"%d
\",\"%Oe\":\"%e\",\"%OH\":\"%H\",\"%OI\":\"%I\",\"%Om\":\"%m\",\"%OM\":\"%M\",\"%OS\":\"%S\",\"%Ou\":\"
%u\",\"%OU\":\"%U\",\"%OV\":\"%V\",\"%Ow\":\"%w\",\"%OW\":\"%W\",\"%Oy\":\"%y\"};for(var p in
u)e=e.replace(new RegExp(p,\"g\"),u[p]);var Ia=\"Sunday Monday Tuesday Wednesday Thursday Friday
Saturday\".split(\" \"),\r\nJa=\"January February March April May June July August September October November
December\".split(\" \");u={\"%a\":function(d){return Ia[d.Ba].substring(0,3)},\"%A\":function(d){return
Ia[d.Ba]},\"%b\":function(d){return Ja[d.wa].substring(0,3)},\"%B\":function(d){return
Ja[d.wa]},\"%C\":function(d){return k((d.va+1900)/100|0,2)},\"%d\":function(d){return
k(d.za,2)},\"%e\":function(d){return h(d.za,2,\" \")},\"%g\":function(d){return
G(d).toString().substring(2)},\"%G\":function(d){return G(d)},\"%H\":function(d){return
k(d.Aa,\r\n2)},\"%I\":function(d){d=d.Aa;0==d?d=12:12<d&&(d-=12);return k(d,2)},\"%j\":function(d){return
k(d.za+Na(V(d.va+1900)?W:X,d.wa-1),3)},\"%m\":function(d){return k(d.wa+1,2)},\"%M\":function(d){return
k(d.Pa,2)},\"%n\":function(){return\"\\n\"},\"%p\":function(d){return
0<=d.Aa&&12>d.Aa?\"AM\":\"PM\"},\"%S\":function(d){return
k(d.Qa,2)},\"%t\":function(){return\"\\t\"},\"%u\":function(d){return d.Ba||7},\"%U\":function(d){var m=new
Date(d.va+1900,0,1),n=0===m.getDay()?m:Y(m,7-m.getDay());d=new Date(d.va+1900,d.wa,d.za);return
0>\r\nl(n,d)?k(Math.ceil((31-n.getDate()+(Na(V(d.getFullYear())?W:X,d.getMonth()-1)-
31)+d.getDate())/7),2):0===l(n,m)?\"01\":\"00\"},\"%V\":function(d){var m=new Date(d.va+1901,0,4),n=q(new
Date(d.va+1900,0,4));m=q(m);var A=Y(new Date(d.va+1900,0,1),d.Ca);return
0>l(A,n)?\"53\":0>=l(m,A)?\"01\":k(Math.ceil((n.getFullYear()<d.va+1900?d.Ca+32-n.getDate():d.Ca+1-
n.getDate())/7),2)},\"%w\":function(d){return d.Ba},\"%W\":function(d){var m=new
Date(d.va,0,1),n=1===m.getDay()?m:Y(m,0===m.getDay()?1:7-m.getDay()+1);d=new
Date(d.va+\r\n1900,d.wa,d.za);return 0>l(n,d)?k(Math.ceil((31-
n.getDate()+(Na(V(d.getFullYear())?W:X,d.getMonth()-1)-
31)+d.getDate())/7),2):0===l(n,m)?\"01\":\"00\"},\"%y\":function(d){return(d.va+1900).toString().substring(2)},\"
%Y\":function(d){return d.va+1900},\"%z\":function(d){d=d.Oa;var m=0<=d;d=Math.abs(d)/60;return(m?\"+\":\"-
\")+String(\"0000\"+(d/60*100+d%60)).slice(-4)},\"%Z\":function(d){return
d.Ra},\"%%\":function(){return\"%\"}};for(p in u)e.includes(p)&&(e=e.replace(new
RegExp(p,\"g\"),u[p](f)));p=Pa(e);if(p.length>b)return 0;\r\nM.set(p,a);return p.length-1}function Pa(a){var
b=Array(ia(a)+1);L(a,b,0,b.length);return b}\r\nvar Ta={a:function(a){return
ka(a+16)+16},c:function(a,b){qa.unshift({Ea:a,xa:b})},d:function(a,b){qa.unshift({Ea:a,xa:b})},b:function(a,b,e){(
new za(a)).Ga(b,e);Aa++;throw a;},D:function(a,b){a=J(a);return R.Sa(a,b)},m:function(){return
0},I:function(){},L:function(){},o:function(){return 42},x:function(){return
0},H:function(){},G:function(a,b){a=J(a);return
R.Ta(a,b)},K:function(a,b,e,f,h,k){k<<=12;if(0!==(f&16)&&0!==a%65536)b=-28;else
if(0!==(f&32)){a=65536*Math.ceil(b/65536);var
l=Qa(65536,a);\r\nl?(K.fill(0,l,l+a),a=l):a=0;a?(Ba[a]={Ia:a,Ha:b,Fa:!0,fd:h,Xa:e,flags:f,offset:k},b=a):b=-48}else
b=-52;return b},J:function(a,b){var e=Ba[a];0!==b&&e?(b===e.Ha&&(Ba[a]=null,e.Fa&&Ra(e.Ia)),a=0):a=-
28;return a},j:function(){},C:function(a,b,e){a=J(a);return
R.Ua(a,b,e)},E:function(){},r:function(){},F:function(){},h:function(){E()},p:function(a,b){if(0===a)a=Date.now();
else if(1===a||4===a)a=S();else return N[Sa()>>2]=28,-1;N[b>>2]=a/1E3|0;N[b+4>>2]=a%1E3*1E6|0;return
0},s:function(a,b){return a-\r\nb},P:function(){E(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},g:function(){E(\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
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core/emscripten/wiki/Linking\")},Q:function(){E(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},O:function(){E(\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},\r\nM:function(){return
2147483648},v:function(a,b,e){K.copyWithin(a,b,b+e)},i:function(a){var
b=K.length;a>>>=0;if(2147483648<a)return!1;for(var e=1;4>=e;e*=2){var
f=b*(1+.2/e);f=Math.min(f,a+100663296);f=Math.max(a,f);0<f%65536&&(f+=65536-
f%65536);a:{try{I.grow(Math.min(2147483648,f)-la.byteLength+65535>>>16);ma();var h=1;break
a}catch(k){}h=void 0}if(h)return!0}return!1},B:function(a){for(var b=S();S()-b<a;);},z:function(a,b){var
e=0;Ea().forEach(function(f,h){var
k=b+e;h=N[a+4*h>>2]=k;for(k=0;k<f.length;++k)M[h++>>\r\n0]=f.charCodeAt(k);M[h>>0]=0;e+=f.length+1});re
turn 0},A:function(a,b){var e=Ea();N[a>>2]=e.length;var
f=0;e.forEach(function(h){f+=h.length+1});N[b>>2]=f;return 0},f:function(){return
0},y:function(a,b){a=1==a||2==a?2:E();M[b>>0]=a;return
0},n:function(a,b,e,f){a=R.Wa(a);b=R.Va(a,b,e);N[f>>2]=b;return 0},u:function(){},q:function(a,b,e,f){for(var
h=0,k=0;k<e;k++){for(var l=N[b+8*k>>2],q=N[b+(8*k+4)>>2],G=0;G<q;G++){var
u=K[l+G],p=Ca[a];0===u||10===u?((1===a?da:F)(ha(p,0)),p.length=0):p.push(u)}h+=\r\nq}N[f>>2]=h;return
0},w:function(a){var b=Date.now();N[a>>2]=b/1E3|0;N[a+4>>2]=b%1E3*1E3|0;return
0},t:T,l:function(a,b){Ga();a=new
Date(1E3*N[a>>2]);N[b>>2]=a.getSeconds();N[b+4>>2]=a.getMinutes();N[b+8>>2]=a.getHours();N[b+12>>2]=a.
getDate();N[b+16>>2]=a.getMonth();N[b+20>>2]=a.getFullYear()-1900;N[b+24>>2]=a.getDay();var e=new
Date(a.getFullYear(),0,1);N[b+28>>2]=(a.getTime()-e.getTime())/864E5|0;N[b+36>>2]=-
(60*a.getTimezoneOffset());var f=(new
Date(a.getFullYear(),6,1)).getTimezoneOffset();e=\r\ne.getTimezoneOffset();a=(f!=e&&a.getTimezoneOffset()==
Math.min(e,f))|0;N[b+32>>2]=a;a=N[U()+(a?4:0)>>2];N[b+40>>2]=a;return b},k:function(a){Ga();var b=new
Date(N[a+20>>2]+1900,N[a+16>>2],N[a+12>>2],N[a+8>>2],N[a+4>>2],N[a>>2],0),e=N[a+32>>2],f=b.getTimez
oneOffset(),h=new Date(b.getFullYear(),0,1),k=(new
Date(b.getFullYear(),6,1)).getTimezoneOffset(),l=h.getTimezoneOffset(),q=Math.min(l,k);0>e?N[a+32>>2]=Numb
er(k!=l&&q==f):0<e!=(q==f)&&(k=Math.max(l,k),b.setTime(b.getTime()+6E4*((0<e?q:k)-
f)));N[a+\r\n24>>2]=b.getDay();N[a+28>>2]=(b.getTime()-
h.getTime())/864E5|0;N[a>>2]=b.getSeconds();N[a+4>>2]=b.getMinutes();N[a+8>>2]=b.getHours();N[a+12>>2]=
b.getDate();N[a+16>>2]=b.getMonth();return b.getTime()/1E3|0},N:Oa,e:function(a,b,e,f){return
Oa(a,b,e,f)}};\r\n(function(){function a(h){c.asm=h.exports;I=c.asm.R;ma();na=c.asm.ua;pa.unshift(c.asm.S);O--
;c.monitorRunDependencies&&c.monitorRunDependencies(O);0==O&&(null!==ta&&(clearInterval(ta),ta=null),P
&&(h=P,P=null,h()))}function b(h){a(h.instance)}function e(h){return xa().then(function(k){return
WebAssembly.instantiate(k,f)}).then(h,function(k){F(\"failed to asynchronously prepare wasm: \"+k);E(k)})}var
f={a:Ta};O++;c.monitorRunDependencies&&c.monitorRunDependencies(O);if(c.instantiateWasm)try{return
c.instantiateWasm(f,\r\na)}catch(h){return F(\"Module.instantiateWasm callback failed with error:
\"+h),!1}(function(){return H||\"function\"!==typeof
WebAssembly.instantiateStreaming||ua()||Q.startsWith(\"file://\")||\"function\"!==typeof
fetch?e(b):fetch(Q,{credentials:\"same-origin\"}).then(function(h){return
WebAssembly.instantiateStreaming(h,f).then(b,function(k){F(\"wasm streaming compile failed: \"+k);F(\"falling
back to ArrayBuffer instantiation\");return
e(b)})}))})().catch(g);return{}})();\r\nc.___wasm_call_ctors=function(){return(c.___wasm_call_ctors=c.asm.S).appl
y(null,arguments)};c._OrtInit=function(){return(c._OrtInit=c.asm.T).apply(null,arguments)};c._OrtCreateSessionO
ptions=function(){return(c._OrtCreateSessionOptions=c.asm.U).apply(null,arguments)};c._OrtAddSessionConfigE
ntry=function(){return(c._OrtAddSessionConfigEntry=c.asm.V).apply(null,arguments)};c._OrtReleaseSessionOptio
ns=function(){return(c._OrtReleaseSessionOptions=c.asm.W).apply(null,arguments)};\r\nc._OrtCreateSession=func
```

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tion(){return(c._OrtCreateSession=c.asm.X).apply(null,arguments)};c._OrtReleaseSession=function(){return(c._Ort
ReleaseSession=c.asm.Y).apply(null,arguments)};c._OrtGetInputCount=function(){return(c._OrtGetInputCount=c.a
sm.Z).apply(null,arguments)};c._OrtGetOutputCount=function(){return(c._OrtGetOutputCount=c.asm._).apply(null
,arguments)};c._OrtGetInputName=function(){return(c._OrtGetInputName=c.asm.$).apply(null,arguments)};\r\nc._
OrtGetOutputName=function(){return(c._OrtGetOutputName=c.asm.aa).apply(null,arguments)};c._OrtFree=functio
n(){return(c._OrtFree=c.asm.ba).apply(null,arguments)};c._OrtCreateTensor=function(){return(c._OrtCreateTensor
=c.asm.ca).apply(null,arguments)};c._OrtGetTensorData=function(){return(c._OrtGetTensorData=c.asm.da).apply(
null,arguments)};c._OrtReleaseTensor=function(){return(c._OrtReleaseTensor=c.asm.ea).apply(null,arguments)};\r\
nc._OrtCreateRunOptions=function(){return(c._OrtCreateRunOptions=c.asm.fa).apply(null,arguments)};c._OrtAdd
RunConfigEntry=function(){return(c._OrtAddRunConfigEntry=c.asm.ga).apply(null,arguments)};c._OrtReleaseRu
nOptions=function(){return(c._OrtReleaseRunOptions=c.asm.ha).apply(null,arguments)};c._OrtRun=function(){ret
urn(c._OrtRun=c.asm.ia).apply(null,arguments)};c._OrtEndProfiling=function(){return(c._OrtEndProfiling=c.asm.j
a).apply(null,arguments)};\r\nvar
ka=c._malloc=function(){return(ka=c._malloc=c.asm.ka).apply(null,arguments)},Sa=c.___errno_location=function(
){return(Sa=c.___errno_location=c.asm.la).apply(null,arguments)},Ra=c._free=function(){return(Ra=c._free=c.asm
.ma).apply(null,arguments)},U=c.__get_tzname=function(){return(U=c.__get_tzname=c.asm.na).apply(null,argume
nts)},Ma=c.__get_daylight=function(){return(Ma=c.__get_daylight=c.asm.oa).apply(null,arguments)},La=c.__get_t
imezone=function(){return(La=c.__get_timezone=c.asm.pa).apply(null,\r\narguments)},Ua=c.stackSave=function()
{return(Ua=c.stackSave=c.asm.qa).apply(null,arguments)},Va=c.stackRestore=function(){return(Va=c.stackRestore
=c.asm.ra).apply(null,arguments)},Wa=c.stackAlloc=function(){return(Wa=c.stackAlloc=c.asm.sa).apply(null,argu
ments)},Qa=c._memalign=function(){return(Qa=c._memalign=c.asm.ta).apply(null,arguments)};c.UTF8ToString=J
;c.stringToUTF8=function(a,b,e){return
L(a,K,b,e)};c.lengthBytesUTF8=ia;c.stackSave=Ua;c.stackRestore=Va;c.stackAlloc=Wa;var Z;\r\nP=function
Xa(){Z||Ya();Z||(P=Xa)};\r\nfunction Ya(){function
a(){if(!Z&&(Z=!0,c.calledRun=!0,!ea)){ya(pa);aa(c);if(c.onRuntimeInitialized)c.onRuntimeInitialized();if(c.postRu
n)for(\"function\"==typeof c.postRun&&(c.postRun=[c.postRun]);c.postRun.length;){var
b=c.postRun.shift();ra.unshift(b)}ya(ra)}}if(!(0<O)){if(c.preRun)for(\"function\"==typeof
c.preRun&&(c.preRun=[c.preRun]);c.preRun.length;)sa();ya(oa);0<O||(c.setStatus?(c.setStatus(\"Running...\"),setTi
meout(function(){setTimeout(function(){c.setStatus(\"\")},1);a()},1)):a())}}c.run=Ya;\r\nif(c.preInit)for(\"function\"
==typeof c.preInit&&(c.preInit=[c.preInit]);0<c.preInit.length;)c.preInit.pop()();Ya();\r\n\r\n\r\n  return
ortWasm.ready\r\n}\r\n);\r\n})();\r\nif (typeof exports === 'object' && typeof module === 'object')\r\n
module.exports = ortWasm;\r\nelse if (typeof define === 'function' && define['amd'])\r\n  define([], function() {
return ortWasm; });\r\nelse if (typeof exports === 'object')\r\n  exports[\"ortWasm\"] = ortWasm;\r\n","\"use
strict\";\r\nmodule.exports = asPromise;\r\n\r\n/**\r\n * Callback as used by {@link util.asPromise}.\r\n * @typedef
asPromiseCallback\r\n * @type {function}\r\n * @param {Error|null} error Error, if any\r\n * @param {...*}
params Additional arguments\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n * Returns a promise from a node-style
callback function.\r\n * @memberof util\r\n * @param {asPromiseCallback} fn Function to call\r\n * @param {*}
ctx Function context\r\n * @param {...*} params Function arguments\r\n * @returns {Promise<*>} Promisified
function\r\n */\r\nfunction asPromise(fn, ctx/*, varargs */) {\r\n    var params  = new Array(arguments.length -
1),\r\n        offset  = 0,\r\n        index   = 2,\r\n        pending = true;\r\n    while (index < arguments.length)\r\n
params[offset++] = arguments[index++];\r\n    return new Promise(function executor(resolve, reject) {\r\n
params[offset] = function callback(err/*, varargs */) {\r\n            if (pending) {\r\n                pending = false;\r\n
     if (err)\r\n                    reject(err);\r\n                else {\r\n                    var params = new Array(arguments.length -
1),\r\n                        offset = 0;\r\n                    while (offset < params.length)\r\n                        params[offset++] =
arguments[offset];\r\n                    resolve.apply(null, params);\r\n                }\r\n            }\r\n        };\r\n        try {\r\n
        fn.apply(ctx || null, params);\r\n        } catch (err) {\r\n            if (pending) {\r\n                pending = false;\r\n
         reject(err);\r\n            }\r\n        }\r\n    });\r\n}\r\n","\"use strict\";\r\n\r\n/**\r\n * A minimal base64
implementation for number arrays.\r\n * @memberof util\r\n * @namespace\r\n */\r\nvar base64 =
```

exports;\r\n\r\n/**\r\n * Calculates the byte length of a base64 encoded string.\r\n * @param {string} string Base64 encoded string\r\n * @returns {number} Byte length\r\n */\r\nbase64.length = function length(string) {\r\n   var p = string.length;\r\n   if (!p)\r\n   return 0;\r\n   var n = 0;\r\n   while (--p % 4 > 1 && string.charAt(p) === \"=\")\r\n   ++n;\r\n   return Math.ceil(string.length * 3) / 4 - n;\r\n};\r\n\r\n// Base64 encoding table\r\nvar b64 = new Array(64);\r\n\r\n// Base64 decoding table\r\nvar s64 = new Array(123);\r\n\r\n// 65..90, 97..122, 48..57, 43, 47\r\nfor (var i = 0; i < 64;)\r\n   s64[b64[i] = i < 26 ? i + 65 : i < 52 ? i + 71 : i < 62 ? i - 4 : i - 59 | 43] = i++;\r\n\r\n/**\r\n * Encodes a buffer to a base64 encoded string.\r\n * @param {Uint8Array} buffer Source buffer\r\n * @param {number} start Source start\r\n * @param {number} end Source end\r\n * @returns {string} Base64 encoded string\r\n */\r\nbase64.encode = function encode(buffer, start, end) {\r\n   var parts = null,\r\n   chunk = [];\r\n   var i = 0, // output index\r\n   j = 0, // goto index\r\n   t;   // temporary\r\n   while (start < end) {\r\n   var b = buffer[start++];\r\n   switch (j) {\r\n   case 0:\r\n   chunk[i++] = b64[b >> 2];\r\n   t = (b & 3) << 4;\r\n   j = 1;\r\n   break;\r\n   case 1:\r\n   chunk[i++] = b64[t | b >> 4];\r\n   t = (b & 15) << 2;\r\n   j = 2;\r\n   break;\r\n   case 2:\r\n   chunk[i++] = b64[t | b >> 6];\r\n   chunk[i++] = b64[b & 63];\r\n   j = 0;\r\n   break;\r\n   }\r\n   if (i > 8191) {\r\n   (parts || (parts = [])).push(String.fromCharCode.apply(String, chunk));\r\n   i = 0;\r\n   }\r\n   }\r\n   if (j) {\r\n   chunk[i++] = b64[t];\r\n   chunk[i++] = 61;\r\n   if (j === 1)\r\n   chunk[i++] = 61;\r\n   }\r\n   if (parts) {\r\n   if (i)\r\n   parts.push(String.fromCharCode.apply(String, chunk.slice(0, i)));\r\n   return parts.join(\"\");\r\n   }\r\n   return String.fromCharCode.apply(String, chunk.slice(0, i));\r\n};\r\n\r\nvar invalidEncoding = \"invalid encoding\";\r\n\r\n/**\r\n * Decodes a base64 encoded string to a buffer.\r\n * @param {string} string Source string\r\n * @param {Uint8Array} buffer Destination buffer\r\n * @param {number} offset Destination offset\r\n * @returns {number} Number of bytes written\r\n * @throws {Error} If encoding is invalid\r\n */\r\nbase64.decode = function decode(string, buffer, offset) {\r\n   var start = offset;\r\n   var j = 0, // goto index\r\n   t;   // temporary\r\n   for (var i = 0; i < string.length;) {\r\n   var c = string.charCodeAt(i++);\r\n   if (c === 61 && j > 1)\r\n   break;\r\n   if ((c = s64[c]) === undefined)\r\n   throw Error(invalidEncoding);\r\n   switch (j) {\r\n   case 0:\r\n   t = c;\r\n   j = 1;\r\n   break;\r\n   case 1:\r\n   buffer[offset++] = t << 2 | (c & 48) >> 4;\r\n   t = c;\r\n   j = 2;\r\n   break;\r\n   case 2:\r\n   buffer[offset++] = (t & 15) << 4 | (c & 60) >> 2;\r\n   t = c;\r\n   j = 3;\r\n   break;\r\n   case 3:\r\n   buffer[offset++] = (t & 3) << 6 | c;\r\n   j = 0;\r\n   break;\r\n   }\r\n   }\r\n   if (j === 1)\r\n   throw Error(invalidEncoding);\r\n   return offset - start;\r\n};\r\n\r\n/**\r\n * Tests if the specified string appears to be base64 encoded.\r\n * @param {string} string String to test\r\n * @returns {boolean} `true` if probably base64 encoded, otherwise false\r\n */\r\nbase64.test = function test(string) {\r\n   return /^(?:[A-Za-z0-9+/]{4})*(?:[A-Za-z0-9+/]{2}==|[A-Za-z0-9+/]{3}=)?$/.test(string);\r\n};\r\n","\"use strict\";\r\nmodule.exports = EventEmitter;\r\n\r\n/**\r\n * Constructs a new event emitter instance.\r\n * @classdesc A minimal event emitter.\r\n * @memberof util\r\n * @constructor\r\n */\r\nfunction EventEmitter() {\r\n\r\n   /**\r\n   * Registered listeners.\r\n   * @type {Object.<string,*>}\r\n   * @private\r\n   */\r\n   this._listeners = {};\r\n}\r\n\r\n/**\r\n * Registers an event listener.\r\n * @param {string} evt Event name\r\n * @param {function} fn Listener\r\n * @param {*} [ctx] Listener context\r\n * @returns {util.EventEmitter} `this`\r\n */\r\nEventEmitter.prototype.on = function on(evt, fn, ctx) {\r\n   (this._listeners[evt] || (this._listeners[evt] = [])).push({\r\n   fn : fn,\r\n   ctx : ctx || this\r\n   });\r\n   return this;\r\n};\r\n\r\n/**\r\n * Removes an event listener or any matching listeners if arguments are omitted.\r\n * @param {string} [evt] Event name. Removes all listeners if omitted.\r\n * @param {function} [fn] Listener to remove. Removes all listeners of `evt` if omitted.\r\n * @returns {util.EventEmitter} `this`\r\n */\r\nEventEmitter.prototype.off = function off(evt, fn) {\r\n   if (evt === undefined)\r\n   this._listeners = {};\r\n   else {\r\n   if (fn === undefined)\r\n   this._listeners[evt] = [];\r\n   else {\r\n   var listeners = this._listeners[evt];\r\n   for (var i = 0; i < listeners.length;)\r\n   if (listeners[i].fn === fn)\r\n   listeners.splice(i, 1);\r\n   else\r\n   ++i;\r\n   }\r\n   }\r\n   return this;\r\n};\r\n\r\n/**\r\n * Emits an event by calling its listeners with the specified arguments.\r\n * @param {string} evt Event name\r\n * @param {...*} args Arguments\r\n * @returns {util.EventEmitter} `this`\r\n

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*/\r\nEventEmitter.prototype.emit = function emit(evt) {\r\n    var listeners = this._listeners[evt];\r\n    if (listeners)
{\r\n        var args = [],\r\n            i = 1;\r\n        for (; i < arguments.length;)\r\n
args.push(arguments[i++]);\r\n        for (i = 0; i < listeners.length;)\r\n            listeners[i].fn.apply(listeners[i++].ctx,
args);\r\n    }\r\n    return this;\r\n};\r\n","\"use strict\";\r\n\r\nmodule.exports = factory(factory);\r\n\r\n/**\r\n *
Reads / writes floats / doubles from / to buffers.\r\n * @name util.float\r\n * @namespace\r\n */\r\n\r\n/**\r\n *
Writes a 32 bit float to a buffer using little endian byte order.\r\n * @name util.float.writeFloatLE\r\n *
@function\r\n * @param {number} val Value to write\r\n * @param {Uint8Array} buf Target buffer\r\n * @param
{number} pos Target buffer offset\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n * Writes a 32 bit float to a buffer
using big endian byte order.\r\n * @name util.float.writeFloatBE\r\n * @function\r\n * @param {number} val
Value to write\r\n * @param {Uint8Array} buf Target buffer\r\n * @param {number} pos Target buffer offset\r\n *
@returns {undefined}\r\n */\r\n\r\n/**\r\n * Reads a 32 bit float from a buffer using little endian byte order.\r\n *
@name util.float.readFloatLE\r\n * @function\r\n * @param {Uint8Array} buf Source buffer\r\n * @param
{number} pos Source buffer offset\r\n * @returns {number} Value read\r\n */\r\n\r\n/**\r\n * Reads a 32 bit float
from a buffer using big endian byte order.\r\n * @name util.float.readFloatBE\r\n * @function\r\n * @param
{Uint8Array} buf Source buffer\r\n * @param {number} pos Source buffer offset\r\n * @returns {number} Value
read\r\n */\r\n\r\n/**\r\n * Writes a 64 bit double to a buffer using little endian byte order.\r\n * @name
util.float.writeDoubleLE\r\n * @function\r\n * @param {number} val Value to write\r\n * @param {Uint8Array}
buf Target buffer\r\n * @param {number} pos Target buffer offset\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n *
Writes a 64 bit double to a buffer using big endian byte order.\r\n * @name util.float.writeDoubleBE\r\n *
@function\r\n * @param {number} val Value to write\r\n * @param {Uint8Array} buf Target buffer\r\n * @param
{number} pos Target buffer offset\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n * Reads a 64 bit double from a
buffer using little endian byte order.\r\n * @name util.float.readDoubleLE\r\n * @function\r\n * @param
{Uint8Array} buf Source buffer\r\n * @param {number} pos Source buffer offset\r\n * @returns {number} Value
read\r\n */\r\n\r\n/**\r\n * Reads a 64 bit double from a buffer using big endian byte order.\r\n * @name
util.float.readDoubleBE\r\n * @function\r\n * @param {Uint8Array} buf Source buffer\r\n * @param {number}
pos Source buffer offset\r\n * @returns {number} Value read\r\n */\r\n\r\n// Factory function for the purpose of
node-based testing in modified global environments\r\nfunction factory(exports) {\r\n\r\n    // float: typed array\r\n
if (typeof Float32Array !== \"undefined\") (function() {\r\n\r\n        var f32 = new Float32Array([ -0 ]),\r\n
f8b = new Uint8Array(f32.buffer),\r\n            le  = f8b[3] === 128;\r\n\r\n        function writeFloat_f32_cpy(val, buf,
pos) {\r\n            f32[0] = val;\r\n            buf[pos    ] = f8b[0];\r\n            buf[pos + 1] = f8b[1];\r\n            buf[pos +
2] = f8b[2];\r\n            buf[pos + 3] = f8b[3];\r\n        }\r\n\r\n        function writeFloat_f32_rev(val, buf, pos) {\r\n
     f32[0] = val;\r\n            buf[pos    ] = f8b[3];\r\n            buf[pos + 1] = f8b[2];\r\n            buf[pos + 2] = f8b[1];\r\n
         buf[pos + 3] = f8b[0];\r\n        }\r\n\r\n        /* istanbul ignore next */\r\n        exports.writeFloatLE = le ?
writeFloat_f32_cpy : writeFloat_f32_rev;\r\n        /* istanbul ignore next */\r\n        exports.writeFloatBE = le ?
writeFloat_f32_rev : writeFloat_f32_cpy;\r\n\r\n        function readFloat_f32_cpy(buf, pos) {\r\n            f8b[0] =
buf[pos    ];\r\n            f8b[1] = buf[pos + 1];\r\n            f8b[2] = buf[pos + 2];\r\n            f8b[3] = buf[pos + 3];\r\n
      return f32[0];\r\n        }\r\n\r\n        function readFloat_f32_rev(buf, pos) {\r\n            f8b[3] = buf[pos    ];\r\n
    f8b[2] = buf[pos + 1];\r\n            f8b[1] = buf[pos + 2];\r\n            f8b[0] = buf[pos + 3];\r\n            return
f32[0];\r\n        }\r\n\r\n        /* istanbul ignore next */\r\n        exports.readFloatLE = le ? readFloat_f32_cpy :
readFloat_f32_rev;\r\n        /* istanbul ignore next */\r\n        exports.readFloatBE = le ? readFloat_f32_rev :
readFloat_f32_cpy;\r\n\r\n    // float: ieee754\r\n    })(); else (function() {\r\n\r\n        function
writeFloat_ieee754(writeUint, val, buf, pos) {\r\n            var sign = val < 0 ? 1 : 0;\r\n            if (sign)\r\n
val = -val;\r\n            if (val === 0)\r\n                writeUint(1 / val > 0 ? /* positive */ 0 : /* negative 0 */
2147483648, buf, pos);\r\n            else if (isNaN(val))\r\n                writeUint(2143289344, buf, pos);\r\n            else
if (val > 3.4028234663852886e+38) // +-Infinity\r\n                writeUint((sign << 31 | 2139095040) >>> 0, buf,
pos);\r\n            else if (val < 1.1754943508222875e-38) // denormal\r\n                writeUint((sign << 31 |
Math.round(val / 1.401298464324817e-45)) >>> 0, buf, pos);\r\n            else {\r\n                var exponent =
Math.floor(Math.log(val) / Math.LN2),\r\n                    mantissa = Math.round(val * Math.pow(2, -exponent) *
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8388608) & 8388607;\r\n                writeUint((sign << 31 | exponent + 127 << 23 | mantissa) >>> 0, buf, pos);\r\n
       }\r\n        }\r\n\r\n        exports.writeFloatLE = writeFloat_ieee754.bind(null, writeUintLE);\r\n
exports.writeFloatBE = writeFloat_ieee754.bind(null, writeUintBE);\r\n\r\n        function
readFloat_ieee754(readUint, buf, pos) {\r\n            var uint = readUint(buf, pos),\r\n                sign = (uint >> 31) * 2
+ 1,\r\n                exponent = uint >>> 23 & 255,\r\n                mantissa = uint & 8388607;\r\n            return exponent
=== 255\r\n                ? mantissa\r\n                ? NaN\r\n                : sign * Infinity\r\n                : exponent === 0 //
denormal\r\n                ? sign * 1.401298464324817e-45 * mantissa\r\n                : sign * Math.pow(2, exponent -
150) * (mantissa + 8388608);\r\n        }\r\n\r\n        exports.readFloatLE = readFloat_ieee754.bind(null,
readUintLE);\r\n        exports.readFloatBE = readFloat_ieee754.bind(null, readUintBE);\r\n\r\n    })();\r\n\r\n    //
double: typed array\r\n    if (typeof Float64Array !== \"undefined\") (function() {\r\n\r\n        var f64 = new
Float64Array([-0]),\r\n            f8b = new Uint8Array(f64.buffer),\r\n            le  = f8b[7] === 128;\r\n\r\n
function writeDouble_f64_cpy(val, buf, pos) {\r\n            f64[0] = val;\r\n            buf[pos    ] = f8b[0];\r\n
buf[pos + 1] = f8b[1];\r\n            buf[pos + 2] = f8b[2];\r\n            buf[pos + 3] = f8b[3];\r\n            buf[pos + 4] =
f8b[4];\r\n            buf[pos + 5] = f8b[5];\r\n            buf[pos + 6] = f8b[6];\r\n            buf[pos + 7] = f8b[7];\r\n
}\r\n\r\n        function writeDouble_f64_rev(val, buf, pos) {\r\n            f64[0] = val;\r\n            buf[pos    ] =
f8b[7];\r\n            buf[pos + 1] = f8b[6];\r\n            buf[pos + 2] = f8b[5];\r\n            buf[pos + 3] = f8b[4];\r\n
buf[pos + 4] = f8b[3];\r\n            buf[pos + 5] = f8b[2];\r\n            buf[pos + 6] = f8b[1];\r\n            buf[pos + 7] =
f8b[0];\r\n        }\r\n\r\n        /* istanbul ignore next */\r\n        exports.writeDoubleLE = le ? writeDouble_f64_cpy :
writeDouble_f64_rev;\r\n        /* istanbul ignore next */\r\n        exports.writeDoubleBE = le ? writeDouble_f64_rev
: writeDouble_f64_cpy;\r\n\r\n        function readDouble_f64_cpy(buf, pos) {\r\n            f8b[0] = buf[pos    ];\r\n
   f8b[1] = buf[pos + 1];\r\n            f8b[2] = buf[pos + 2];\r\n            f8b[3] = buf[pos + 3];\r\n            f8b[4] =
buf[pos + 4];\r\n            f8b[5] = buf[pos + 5];\r\n            f8b[6] = buf[pos + 6];\r\n            f8b[7] = buf[pos + 7];\r\n
        return f64[0];\r\n        }\r\n\r\n        function readDouble_f64_rev(buf, pos) {\r\n            f8b[7] = buf[pos    ];\r\n
         f8b[6] = buf[pos + 1];\r\n            f8b[5] = buf[pos + 2];\r\n            f8b[4] = buf[pos + 3];\r\n            f8b[3] =
buf[pos + 4];\r\n            f8b[2] = buf[pos + 5];\r\n            f8b[1] = buf[pos + 6];\r\n            f8b[0] = buf[pos + 7];\r\n
        return f64[0];\r\n        }\r\n\r\n        /* istanbul ignore next */\r\n        exports.readDoubleLE = le ?
readDouble_f64_cpy : readDouble_f64_rev;\r\n        /* istanbul ignore next */\r\n        exports.readDoubleBE = le ?
readDouble_f64_rev : readDouble_f64_cpy;\r\n\r\n    // double: ieee754\r\n    })(); else (function() {\r\n\r\n
function writeDouble_ieee754(writeUint, off0, off1, val, buf, pos) {\r\n            var sign = val < 0 ? 1 : 0;\r\n            if
(sign)\r\n                val = -val;\r\n            if (val === 0) {\r\n                writeUint(0, buf, pos + off0);\r\n
writeUint(1 / val > 0 ? /* positive */ 0 : /* negative 0 */ 2147483648, buf, pos + off1);\r\n            } else if
(isNaN(val)) {\r\n                writeUint(0, buf, pos + off0);\r\n                writeUint(2146959360, buf, pos + off1);\r\n
       } else if (val > 1.7976931348623157e+308) { // +-Infinity\r\n                writeUint(0, buf, pos + off0);\r\n
 writeUint((sign << 31 | 2146435072) >>> 0, buf, pos + off1);\r\n            } else {\r\n                var mantissa;\r\n
     if (val < 2.2250738585072014e-308) { // denormal\r\n                    mantissa = val / 5e-324;\r\n
writeUint(mantissa >>> 0, buf, pos + off0);\r\n                    writeUint((sign << 31 | mantissa / 4294967296) >>> 0,
buf, pos + off1);\r\n                } else {\r\n                    var exponent = Math.floor(Math.log(val) / Math.LN2);\r\n
          if (exponent === 1024)\r\n                        exponent = 1023;\r\n                    mantissa = val * Math.pow(2, -
exponent);\r\n                    writeUint(mantissa * 4503599627370496 >>> 0, buf, pos + off0);\r\n
writeUint((sign << 31 | exponent + 1023 << 20 | mantissa * 1048576 & 1048575) >>> 0, buf, pos + off1);\r\n
   }\r\n            }\r\n        }\r\n\r\n        exports.writeDoubleLE = writeDouble_ieee754.bind(null, writeUintLE, 0,
4);\r\n        exports.writeDoubleBE = writeDouble_ieee754.bind(null, writeUintBE, 4, 0);\r\n\r\n        function
readDouble_ieee754(readUint, off0, off1, buf, pos) {\r\n            var lo = readUint(buf, pos + off0),\r\n                hi =
readUint(buf, pos + off1);\r\n            var sign = (hi >> 31) * 2 + 1,\r\n                exponent = hi >>> 20 & 2047,\r\n
         mantissa = 4294967296 * (hi & 1048575) + lo;\r\n            return exponent === 2047\r\n                ?
mantissa\r\n                ? NaN\r\n                : sign * Infinity\r\n                : exponent === 0 // denormal\r\n                ?
sign * 5e-324 * mantissa\r\n                : sign * Math.pow(2, exponent - 1075) * (mantissa + 4503599627370496);\r\n
       }\r\n\r\n        exports.readDoubleLE = readDouble_ieee754.bind(null, readUintLE, 0, 4);\r\n
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exports.readDoubleBE = readDouble_ieee754.bind(null, readUintBE, 4, 0);\r\n\r\n    })();\r\n\r\n    return
exports;\r\n}\r\n\r\n// uint helpers\r\n\r\nfunction writeUintLE(val, buf, pos) {\r\n    buf[pos    ] =  val        & 255;\r\n
    buf[pos + 1] =  val >>> 8  & 255;\r\n    buf[pos + 2] =  val >>> 16 & 255;\r\n    buf[pos + 3] =  val >>>
24;\r\n}\r\n\r\nfunction writeUintBE(val, buf, pos) {\r\n    buf[pos    ] =  val >>> 24;\r\n    buf[pos + 1] =  val >>>
16 & 255;\r\n    buf[pos + 2] =  val >>> 8  & 255;\r\n    buf[pos + 3] =  val        & 255;\r\n}\r\n\r\nfunction
readUintLE(buf, pos) {\r\n    return (buf[pos    ]\r\n          | buf[pos + 1] << 8\r\n          | buf[pos + 2] << 16\r\n          |
buf[pos + 3] << 24) >>> 0;\r\n}\r\n\r\nfunction readUintBE(buf, pos) {\r\n    return (buf[pos    ] << 24\r\n          |
buf[pos + 1] << 16\r\n          | buf[pos + 2] << 8\r\n          | buf[pos + 3]) >>> 0;\r\n}\r\n","\"use
strict\";\r\nmodule.exports = inquire;\r\n\r\n/**\r\n * Requires a module only if available.\r\n * @memberof util\r\n
 * @param {string} moduleName Module to require\r\n * @returns {?Object} Required module if available and not
empty, otherwise `null`\r\n */\r\nfunction inquire(moduleName) {\r\n    try {\r\n        var mod =
eval(\"quire\".replace(/^/,\"re\"))(moduleName); // eslint-disable-line no-eval\r\n        if (mod && (mod.length ||
Object.keys(mod).length))\r\n            return mod;\r\n    } catch (e) {} // eslint-disable-line no-empty\r\n    return
null;\r\n}\r\n","\"use strict\";\r\nmodule.exports = pool;\r\n\r\n/**\r\n * An allocator as used by {@link
util.pool}.\r\n * @typedef PoolAllocator\r\n * @type {function}\r\n * @param {number} size Buffer size\r\n *
@returns {Uint8Array} Buffer\r\n */\r\n\r\n/**\r\n * A slicer as used by {@link util.pool}.\r\n * @typedef
PoolSlicer\r\n * @type {function}\r\n * @param {number} start Start offset\r\n * @param {number} end End
offset\r\n * @returns {Uint8Array} Buffer slice\r\n * @this {Uint8Array}\r\n */\r\n\r\n/**\r\n * A general purpose
buffer pool.\r\n * @memberof util\r\n * @function\r\n * @param {PoolAllocator} alloc Allocator\r\n * @param
{PoolSlicer} slice Slicer\r\n * @param {number} [size=8192] Slab size\r\n * @returns {PoolAllocator} Pooled
allocator\r\n */\r\nfunction pool(alloc, slice, size) {\r\n    var SIZE   = size || 8192;\r\n    var MAX    = SIZE >>>
1;\r\n    var slab   = null;\r\n    var offset = SIZE;\r\n    return function pool_alloc(size) {\r\n        if (size < 1 || size >
MAX)\r\n            return alloc(size);\r\n        if (offset + size > SIZE) {\r\n            slab = alloc(SIZE);\r\n            offset
= 0;\r\n        }\r\n        var buf = slice.call(slab, offset, offset += size);\r\n        if (offset & 7) // align to 32 bit\r\n
    offset = (offset | 7) + 1;\r\n        return buf;\r\n    };\r\n}\r\n","\"use strict\";\r\n\r\n/**\r\n * A minimal UTF8
implementation for number arrays.\r\n * @memberof util\r\n * @namespace\r\n */\r\nvar utf8 =
exports;\r\n\r\n/**\r\n * Calculates the UTF8 byte length of a string.\r\n * @param {string} string String\r\n *
@returns {number} Byte length\r\n */\r\nutf8.length = function utf8_length(string) {\r\n    var len = 0,\r\n        c =
0;\r\n    for (var i = 0; i < string.length; ++i) {\r\n        c = string.charCodeAt(i);\r\n        if (c < 128)\r\n            len +=
1;\r\n        else if (c < 2048)\r\n            len += 2;\r\n        else if ((c & 0xFC00) === 0xD800 && (string.charCodeAt(i
+ 1) & 0xFC00) === 0xDC00) {\r\n            ++i;\r\n            len += 4;\r\n        } else\r\n            len += 3;\r\n    }\r\n
return len;\r\n};\r\n\r\n/**\r\n * Reads UTF8 bytes as a string.\r\n * @param {Uint8Array} buffer Source buffer\r\n
 * @param {number} start Source start\r\n * @param {number} end Source end\r\n * @returns {string} String
read\r\n */\r\nutf8.read = function utf8_read(buffer, start, end) {\r\n    var len = end - start;\r\n    if (len < 1)\r\n
return \"\";\r\n    var parts = null,\r\n        chunk = [],\r\n        i = 0, // char offset\r\n        t;     // temporary\r\n    while
(start < end) {\r\n        t = buffer[start++];\r\n        if (t < 128)\r\n            chunk[i++] = t;\r\n        else if (t > 191 && t
< 224)\r\n            chunk[i++] = (t & 31) << 6 | buffer[start++] & 63;\r\n        else if (t > 239 && t < 365) {\r\n
t = ((t & 7) << 18 | (buffer[start++] & 63) << 12 | (buffer[start++] & 63) << 6 | buffer[start++] & 63) - 0x10000;\r\n
        chunk[i++] = 0xD800 + (t >> 10);\r\n            chunk[i++] = 0xDC00 + (t & 1023);\r\n        } else\r\n
chunk[i++] = (t & 15) << 12 | (buffer[start++] & 63) << 6 | buffer[start++] & 63;\r\n        if (i > 8191) {\r\n
(parts || (parts = [])).push(String.fromCharCode.apply(String, chunk));\r\n            i = 0;\r\n        }\r\n    }\r\n    if
(parts) {\r\n        if (i)\r\n            parts.push(String.fromCharCode.apply(String, chunk.slice(0, i)));\r\n        return
parts.join(\"\");\r\n    }\r\n    return String.fromCharCode.apply(String, chunk.slice(0, i));\r\n};\r\n\r\n/**\r\n * Writes
a string as UTF8 bytes.\r\n * @param {string} string Source string\r\n * @param {Uint8Array} buffer Destination
buffer\r\n * @param {number} offset Destination offset\r\n * @returns {number} Bytes written\r\n */\r\nutf8.write
= function utf8_write(string, buffer, offset) {\r\n    var start = offset,\r\n        c1, // character 1\r\n        c2; // character
2\r\n    for (var i = 0; i < string.length; ++i) {\r\n        c1 = string.charCodeAt(i);\r\n        if (c1 < 128) {\r\n
buffer[offset++] = c1;\r\n        } else if (c1 < 2048) {\r\n            buffer[offset++] = c1 >> 6       | 192;\r\n
```

```
buffer[offset++] = c1       & 63 | 128;\r\n        } else if ((c1 & 0xFC00) === 0xD800 && ((c2 = string.charCodeAt(i
+ 1)) & 0xFC00) === 0xDC00) {\r\n            c1 = 0x10000 + ((c1 & 0x03FF) << 10) + (c2 & 0x03FF);\r\n
++i;\r\n            buffer[offset++] = c1 >> 18      | 240;\r\n            buffer[offset++] = c1 >> 12 & 63 | 128;\r\n
buffer[offset++] = c1 >> 6  & 63 | 128;\r\n            buffer[offset++] = c1       & 63 | 128;\r\n        } else {\r\n
buffer[offset++] = c1 >> 12      | 224;\r\n            buffer[offset++] = c1 >> 6  & 63 | 128;\r\n            buffer[offset++] =
c1       & 63 | 128;\r\n        }\r\n    }\r\n    return offset - start;\r\n};\r\n","/// @file\n/// @addtogroup
flatbuffers_javascript_api\n/// @{\n/// @cond FLATBUFFERS_INTERNAL\n\n/**\n * @fileoverview\n *\n *
Need to suppress 'global this' error so the Node.js export line doesn't cause\n * closure compile to error out.\n *
@suppress {globalThis}\n */\n\n/**\n * @const\n * @namespace\n */\nvar flatbuffers = {};\n\n/**\n * @typedef
{number}\n */\nflatbuffers.Offset;\n\n/**\n * @typedef {{\n *   bb: flatbuffers.ByteBuffer,\n *   bb_pos: number\n *
}}\n */\nflatbuffers.Table;\n\n/**\n * @type {number}\n * @const\n */\nflatbuffers.SIZEOF_SHORT = 2;\n\n/**\n
* @type {number}\n * @const\n */\nflatbuffers.SIZEOF_INT = 4;\n\n/**\n * @type {number}\n * @const\n
*/\nflatbuffers.FILE_IDENTIFIER_LENGTH = 4;\n\n/**\n * @type {number}\n * @const\n
*/\nflatbuffers.SIZE_PREFIX_LENGTH = 4;\n\n/**\n * @enum {number}\n */\nflatbuffers.Encoding = {\n
UTF8_BYTES: 1,\n  UTF16_STRING: 2\n};\n\n/**\n * @type {Int32Array}\n * @const\n */\nflatbuffers.int32 =
new Int32Array(2);\n\n/**\n * @type {Float32Array}\n * @const\n */\nflatbuffers.float32 = new
Float32Array(flatbuffers.int32.buffer);\n\n/**\n * @type {Float64Array}\n * @const\n */\nflatbuffers.float64 = new
Float64Array(flatbuffers.int32.buffer);\n\n/**\n * @type {boolean}\n * @const\n */\nflatbuffers.isLittleEndian =
new Uint16Array(new Uint8Array([1, 0]).buffer)[0] ===
1;\n\n////////////////////////////////////////////////////////////////////////////////\n\n/**\n * @constructor\n * @param {number} low\n
* @param {number} high\n */\nflatbuffers.Long = function(low, high) {\n  /**\n   * @type {number}\n   *
@const\n   */\n  this.low = low | 0;\n\n  /**\n   * @type {number}\n   * @const\n   */\n  this.high = high |
0;\n};\n\n/**\n * @param {number} low\n * @param {number} high\n * @returns {!flatbuffers.Long}\n
*/\nflatbuffers.Long.create = function(low, high) {\n  // Special-case zero to avoid GC overhead for default values\n
return low == 0 && high == 0 ? flatbuffers.Long.ZERO : new flatbuffers.Long(low, high);\n};\n\n/**\n * @returns
{number}\n */\nflatbuffers.Long.prototype.toFloat64 = function() {\n  return (this.low >>> 0) + this.high *
0x100000000;\n};\n\n/**\n * @param {flatbuffers.Long} other\n * @returns {boolean}\n
*/\nflatbuffers.Long.prototype.equals = function(other) {\n  return this.low == other.low && this.high ==
other.high;\n};\n\n/**\n * @type {!flatbuffers.Long}\n * @const\n */\nflatbuffers.Long.ZERO = new
flatbuffers.Long(0, 0);\n\n/// @endcond\n////////////////////////////////////////////////////////////////////////////////\n/**\n * Create a
FlatBufferBuilder.\n *\n * @constructor\n * @param {number=} opt_initial_size\n */\nflatbuffers.Builder =
function(opt_initial_size) {\n  if (!opt_initial_size) {\n    var initial_size = 1024;\n  } else {\n    var initial_size =
opt_initial_size;\n  }\n\n  /**\n   * @type {flatbuffers.ByteBuffer}\n   * @private\n   */\n  this.bb =
flatbuffers.ByteBuffer.allocate(initial_size);\n\n  /**\n   * Remaining space in the ByteBuffer.\n   *\n   * @type
{number}\n   * @private\n   */\n  this.space = initial_size;\n\n  /**\n   * Minimum alignment encountered so far.\n
*\n   * @type {number}\n   * @private\n   */\n  this.minalign = 1;\n\n  /**\n   * The vtable for the current table.\n
*\n   * @type {Array.<number>}\n   * @private\n   */\n  this.vtable = null;\n\n  /**\n   * The amount of fields we're
actually using.\n   *\n   * @type {number}\n   * @private\n   */\n  this.vtable_in_use = 0;\n\n  /**\n   * Whether we
are currently serializing a table.\n   *\n   * @type {boolean}\n   * @private\n   */\n  this.isNested = false;\n\n  /**\n
* Starting offset of the current struct/table.\n   *\n   * @type {number}\n   * @private\n   */\n  this.object_start =
0;\n\n  /**\n   * List of offsets of all vtables.\n   *\n   * @type {Array.<number>}\n   * @private\n   */\n  this.vtables
= [];\n\n  /**\n   * For the current vector being built.\n   *\n   * @type {number}\n   * @private\n   */\n
this.vector_num_elems = 0;\n\n  /**\n   * False omits default values from the serialized data\n   *\n   * @type
{boolean}\n   * @private\n   */\n  this.force_defaults = false;\n};\n\nflatbuffers.Builder.prototype.clear = function()
{\n  this.bb.clear();\n  this.space = this.bb.capacity();\n  this.minalign = 1;\n  this.vtable = null;\n  this.vtable_in_use
= 0;\n  this.isNested = false;\n  this.object_start = 0;\n  this.vtables = [];\n  this.vector_num_elems = 0;\n
this.force_defaults = false;\n};\n\n/**\n * In order to save space, fields that are set to their default value\n * don't get
serialized into the buffer. Forcing defaults provides a\n * way to manually disable this optimization.\n *\n * @param
```

{boolean} forceDefaults true always serializes default values\n */\nflatbuffers.Builder.prototype.forceDefaults = function(forceDefaults) {\n this.force_defaults = forceDefaults;\n};\n\n/**\n * Get the ByteBuffer representing the FlatBuffer. Only call this after you've\n * called finish(). The actual data starts at the ByteBuffer's current position,\n * not necessarily at 0.\n *\n * @returns {flatbuffers.ByteBuffer}\n */\nflatbuffers.Builder.prototype.dataBuffer = function() {\n return this.bb;\n};\n\n/**\n * Get the bytes representing the FlatBuffer. Only call this after you've\n * called finish().\n *\n * @returns {!Uint8Array}\n */\nflatbuffers.Builder.prototype.asUint8Array = function() {\n return this.bb.bytes().subarray(this.bb.position(), this.bb.position() + this.offset());\n};\n\n/// @cond FLATBUFFERS_INTERNAL\n/**\n * Prepare to write an element of `size` after `additional_bytes` have been\n * written, e.g. if you write a string, you need to align such the int length\n * field is aligned to 4 bytes, and the string data follows it directly. If all\n * you need to do is alignment, `additional_bytes` will be 0.\n *\n * @param {number} size This is the of the new element to write\n * @param {number} additional_bytes The padding size\n */\nflatbuffers.Builder.prototype.prep = function(size, additional_bytes) {\n // Track the biggest thing we've ever aligned to.\n if (size > this.minalign) {\n   this.minalign = size;\n }\n\n // Find the amount of alignment needed such that `size` is properly\n // aligned after `additional_bytes`\n var align_size = ((~(this.bb.capacity() - this.space + additional_bytes)) + 1) & (size - 1);\n\n // Reallocate the buffer if needed.\n while (this.space < align_size + size + additional_bytes) {\n   var old_buf_size = this.bb.capacity();\n   this.bb = flatbuffers.Builder.growByteBuffer(this.bb);\n   this.space += this.bb.capacity() - old_buf_size;\n }\n\n this.pad(align_size);\n};\n\n/**\n * @param {number} byte_size\n */\nflatbuffers.Builder.prototype.pad = function(byte_size) {\n for (var i = 0; i < byte_size; i++) {\n   this.bb.writeInt8(--this.space, 0);\n }\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeInt8 = function(value) {\n this.bb.writeInt8(this.space -= 1, value);\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeInt16 = function(value) {\n this.bb.writeInt16(this.space -= 2, value);\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeInt32 = function(value) {\n this.bb.writeInt32(this.space -= 4, value);\n};\n\n/**\n * @param {flatbuffers.Long} value\n */\nflatbuffers.Builder.prototype.writeInt64 = function(value) {\n this.bb.writeInt64(this.space -= 8, value);\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeFloat32 = function(value) {\n this.bb.writeFloat32(this.space -= 4, value);\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeFloat64 = function(value) {\n this.bb.writeFloat64(this.space -= 8, value);\n};\n/// @endcond\n\n/**\n * Add an `int8` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `int8` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addInt8 = function(value) {\n this.prep(1, 0);\n this.writeInt8(value);\n};\n\n/**\n * Add an `int16` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `int16` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addInt16 = function(value) {\n this.prep(2, 0);\n this.writeInt16(value);\n};\n\n/**\n * Add an `int32` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `int32` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addInt32 = function(value) {\n this.prep(4, 0);\n this.writeInt32(value);\n};\n\n/**\n * Add an `int64` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {flatbuffers.Long} value The `int64` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addInt64 = function(value) {\n this.prep(8, 0);\n this.writeInt64(value);\n};\n\n/**\n * Add a `float32` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `float32` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addFloat32 = function(value) {\n this.prep(4, 0);\n this.writeFloat32(value);\n};\n\n/**\n * Add a `float64` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `float64` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addFloat64 = function(value) {\n this.prep(8, 0);\n this.writeFloat64(value);\n};\n\n/// @cond FLATBUFFERS_INTERNAL\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt8 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n this.addInt8(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt16 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addInt16(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt32 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addInt32(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {flatbuffers.Long} value\n * @param {flatbuffers.Long} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt64 = function(voffset, value, defaultValue) {\n if (this.force_defaults || !value.equals(defaultValue)) {\n   this.addInt64(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldFloat32 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addFloat32(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldFloat64 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addFloat64(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {flatbuffers.Offset} value\n * @param {flatbuffers.Offset} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldOffset = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addOffset(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * Structs are stored inline, so nothing additional is being added. `d` is always 0.\n *\n * @param {number} voffset\n * @param {flatbuffers.Offset} value\n * @param {flatbuffers.Offset} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldStruct = function(voffset, value, defaultValue) {\n if (value != defaultValue) {\n   this.nested(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * Structures are always stored inline, they need to be created right\n * where they're used. You'll get this assertion failure if you\n * created it elsewhere.\n *\n * @param {flatbuffers.Offset} obj The offset of the created object\n */\nflatbuffers.Builder.prototype.nested = function(obj) {\n if (obj != this.offset()) {\n   throw new Error('FlatBuffers: struct must be serialized inline.');\n }\n};\n\n/**\n * Should not be creating any other object, string or vector\n * while an object is being constructed\n */\nflatbuffers.Builder.prototype.notNested = function() {\n if (this.isNested) {\n   throw new Error('FlatBuffers: object serialization must not be nested.');\n }\n};\n\n/**\n * Set the current vtable at `voffset` to the current location in the buffer.\n *\n * @param {number} voffset\n */\nflatbuffers.Builder.prototype.slot = function(voffset) {\n this.vtable[voffset] = this.offset();\n};\n\n/**\n * @returns {flatbuffers.Offset} Offset relative to the end of the buffer.\n */\nflatbuffers.Builder.prototype.offset = function() {\n return this.bb.capacity() - this.space;\n};\n\n/**\n * Doubles the size of the backing ByteBuffer and copies the old data towards\n * the end of the new buffer (since we build the buffer backwards).\n *\n * @param {flatbuffers.ByteBuffer} bb The current buffer with the existing data\n * @returns {!flatbuffers.ByteBuffer} A new byte buffer with the old data copied\n * to it. The data is located at the end of the buffer.\n *\n * uint8Array.set() formally takes {Array<number>|ArrayBufferView}, so to pass\n * it a uint8Array we need to suppress the type check:\n * @suppress {checkTypes}\n */\nflatbuffers.Builder.growByteBuffer = function(bb) {\n var old_buf_size = bb.capacity();\n\n // Ensure we don't grow beyond what fits in an int.\n if (old_buf_size & 0xC0000000) {\n   throw new Error('FlatBuffers: cannot grow buffer beyond 2 gigabytes.');\n }\n\n var new_buf_size = old_buf_size << 1;\n var nbb = flatbuffers.ByteBuffer.allocate(new_buf_size);\n nbb.setPosition(new_buf_size - old_buf_size);\n nbb.bytes().set(bb.bytes(), new_buf_size - old_buf_size);\n return nbb;\n};\n/// @endcond\n\n/**\n * Adds on offset, relative to where it will be written.\n *\n * @param {flatbuffers.Offset} offset The offset to add.\n */\nflatbuffers.Builder.prototype.addOffset = function(offset) {\n this.prep(flatbuffers.SIZEOF_INT, 0); // Ensure alignment is already done.\n this.writeInt32(this.offset() - offset + flatbuffers.SIZEOF_INT);\n};\n\n/// @cond FLATBUFFERS_INTERNAL\n/**\n * Start encoding a new object in the buffer. Users will not usually need to\n * call this directly. The FlatBuffers compiler will generate helper methods\n * that call this method internally.\n *\n * @param {number} numfields\n */\nflatbuffers.Builder.prototype.startObject = function(numfields) {\n this.notNested();\n if (this.vtable == null)

{\n   this.vtable = [];\n }\n this.vtable_in_use = numfields;\n for (var i = 0; i < numfields; i++) {\n   this.vtable[i] = 0; // This will push additional elements as needed\n }\n this.isNested = true;\n this.object_start = this.offset();\n};\n\n/**\n * Finish off writing the object that is under construction.\n *\n * @returns {flatbuffers.Offset} The offset to the object inside `dataBuffer`\n */\nflatbuffers.Builder.prototype.endObject = function() {\n if (this.vtable == null || !this.isNested) {\n   throw new Error('FlatBuffers: endObject called without startObject');\n }\n\n this.addInt32(0);\n var vtableloc = this.offset();\n\n // Trim trailing zeroes.\n var i = this.vtable_in_use - 1;\n for (; i >= 0 && this.vtable[i] == 0; i--) {}\n var trimmed_size = i + 1;\n\n // Write out the current vtable.\n for (; i >= 0; i--) {\n   // Offset relative to the start of the table.\n   this.addInt16(this.vtable[i] != 0 ? vtableloc - this.vtable[i] : 0);\n }\n\n var standard_fields = 2; // The fields below:\n this.addInt16(vtableloc - this.object_start);\n var len = (trimmed_size + standard_fields) * flatbuffers.SIZEOF_SHORT;\n this.addInt16(len);\n\n // Search for an existing vtable that matches the current one.\n var existing_vtable = 0;\n var vt1 = this.space;\nouter_loop:\n for (i = 0; i < this.vtables.length; i++) {\n   var vt2 = this.bb.capacity() - this.vtables[i];\n   if (len == this.bb.readInt16(vt2)) {\n   for (var j = flatbuffers.SIZEOF_SHORT; j < len; j += flatbuffers.SIZEOF_SHORT) {\n   if (this.bb.readInt16(vt1 + j) != this.bb.readInt16(vt2 + j)) {\n   continue outer_loop;\n   }\n   }\n   existing_vtable = this.vtables[i];\n   break;\n   }\n }\n\n if (existing_vtable) {\n   // Found a match:\n   // Remove the current vtable.\n   this.space = this.bb.capacity() - vtableloc;\n\n   // Point table to existing vtable.\n   this.bb.writeInt32(this.space, existing_vtable - vtableloc);\n } else {\n   // No match:\n   // Add the location of the current vtable to the list of vtables.\n   this.vtables.push(this.offset());\n\n   // Point table to current vtable.\n   this.bb.writeInt32(this.bb.capacity() - vtableloc, this.offset() - vtableloc);\n }\n\n this.isNested = false;\n return vtableloc;\n};\n/// @endcond\n\n/**\n * Finalize a buffer, poiting to the given `root_table`.\n *\n * @param {flatbuffers.Offset} root_table\n * @param {string=} opt_file_identifier\n * @param {boolean=} opt_size_prefix\n */\nflatbuffers.Builder.prototype.finish = function(root_table, opt_file_identifier, opt_size_prefix) {\n var size_prefix = opt_size_prefix ? flatbuffers.SIZE_PREFIX_LENGTH : 0;\n if (opt_file_identifier) {\n   var file_identifier = opt_file_identifier;\n   this.prep(this.minalign, flatbuffers.SIZEOF_INT +\n   flatbuffers.FILE_IDENTIFIER_LENGTH + size_prefix);\n   if (file_identifier.length != flatbuffers.FILE_IDENTIFIER_LENGTH) {\n   throw new Error('FlatBuffers: file identifier must be length ' +\n   flatbuffers.FILE_IDENTIFIER_LENGTH);\n   }\n   for (var i = flatbuffers.FILE_IDENTIFIER_LENGTH - 1; i >= 0; i--) {\n   this.writeInt8(file_identifier.charCodeAt(i));\n   }\n }\n this.prep(this.minalign, flatbuffers.SIZEOF_INT + size_prefix);\n this.addOffset(root_table);\n if (size_prefix) {\n   this.addInt32(this.bb.capacity() - this.space);\n }\n this.bb.setPosition(this.space);\n};\n\n/**\n * Finalize a size prefixed buffer, pointing to the given `root_table`.\n *\n * @param {flatbuffers.Offset} root_table\n * @param {string=} opt_file_identifier\n */\nflatbuffers.Builder.prototype.finishSizePrefixed = function (root_table, opt_file_identifier) {\n this.finish(root_table, opt_file_identifier, true);\n};\n\n/// @cond FLATBUFFERS_INTERNAL\n/**\n * This checks a required field has been set in a given table that has\n * just been constructed.\n *\n * @param {flatbuffers.Offset} table\n * @param {number} field\n */\nflatbuffers.Builder.prototype.requiredField = function(table, field) {\n var table_start = this.bb.capacity() - table;\n var vtable_start = table_start - this.bb.readInt32(table_start);\n var ok = this.bb.readInt16(vtable_start + field) != 0;\n\n // If this fails, the caller will show what field needs to be set.\n if (!ok) {\n   throw new Error('FlatBuffers: field ' + field + ' must be set');\n }\n};\n\n/**\n * Start a new array/vector of objects. Users usually will not call\n * this directly. The FlatBuffers compiler will create a start/end\n * method for vector types in generated code.\n *\n * @param {number} elem_size The size of each element in the array\n * @param {number} num_elems The number of elements in the array\n * @param {number} alignment The alignment of the array\n */\nflatbuffers.Builder.prototype.startVector = function(elem_size, num_elems, alignment) {\n this.notNested();\n this.vector_num_elems = num_elems;\n this.prep(flatbuffers.SIZEOF_INT, elem_size * num_elems);\n this.prep(alignment, elem_size * num_elems); // Just in case alignment > int.\n};\n\n/**\n * Finish off the creation of an array and all its elements. The array must be\n * created with `startVector`.\n *\n * @returns {flatbuffers.Offset} The offset at which the newly created array\n * starts.\n */\nflatbuffers.Builder.prototype.endVector = function() {\n this.writeInt32(this.vector_num_elems);\n return

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this.offset();\n};\n/// @endcond\n\n/**\n * Encode the string `s` in the buffer using UTF-8. If a Uint8Array is
passed\n * instead of a string, it is assumed to contain valid UTF-8 encoded data.\n *\n * @param
{string|Uint8Array} s The string to encode\n * @return {flatbuffers.Offset} The offset in the buffer where the
encoded string starts\n */\nflatbuffers.Builder.prototype.createString = function(s) {\n  if (s instanceof Uint8Array)
{\n    var utf8 = s;\n  } else {\n    var utf8 = [];\n    var i = 0;\n\n    while (i < s.length) {\n      var codePoint;\n\n      //
Decode UTF-16\n      var a = s.charCodeAt(i++);\n      if (a < 0xD800 || a >= 0xDC00) {\n        codePoint = a;\n      }
else {\n        var b = s.charCodeAt(i++);\n        codePoint = (a << 10) + b + (0x10000 - (0xD800 << 10) -
0xDC00);\n      }\n\n      // Encode UTF-8\n      if (codePoint < 0x80) {\n        utf8.push(codePoint);\n      } else {\n
  if (codePoint < 0x800) {\n          utf8.push(((codePoint >> 6) & 0x1F) | 0xC0);\n        } else {\n          if (codePoint
< 0x10000) {\n            utf8.push(((codePoint >> 12) & 0x0F) | 0xE0);\n          } else {\n            utf8.push(\n
((codePoint >> 18) & 0x07) | 0xF0,\n              ((codePoint >> 12) & 0x3F) | 0x80);\n          }\n
utf8.push(((codePoint >> 6) & 0x3F) | 0x80);\n        }\n        utf8.push((codePoint & 0x3F) | 0x80);\n      }\n    }\n
}\n\n  this.addInt8(0);\n  this.startVector(1, utf8.length, 1);\n  this.bb.setPosition(this.space -= utf8.length);\n  for
(var i = 0, offset = this.space, bytes = this.bb.bytes(); i < utf8.length; i++) {\n    bytes[offset++] = utf8[i];\n  }\n
return this.endVector();\n};\n\n/**\n * A helper function to avoid generated code depending on this file directly.\n
*\n * @param {number} low\n * @param {number} high\n * @returns {!flatbuffers.Long}\n
*/\nflatbuffers.Builder.prototype.createLong = function(low, high) {\n  return flatbuffers.Long.create(low,
high);\n};\n////////////////////////////////////////////////////////////////////////////////\n/// @cond
FLATBUFFERS_INTERNAL\n/**\n * Create a new ByteBuffer with a given array of bytes (`Uint8Array`).\n *\n *
@constructor\n * @param {Uint8Array} bytes\n */\nflatbuffers.ByteBuffer = function(bytes) {\n  /**\n   * @type
{Uint8Array}\n   * @private\n   */\n  this.bytes_ = bytes;\n\n  /**\n   * @type {number}\n   * @private\n   */\n
this.position_ = 0;\n};\n\n/**\n * Create and allocate a new ByteBuffer with a given size.\n *\n * @param {number}
byte_size\n * @returns {!flatbuffers.ByteBuffer}\n */\nflatbuffers.ByteBuffer.allocate = function(byte_size) {\n
return new flatbuffers.ByteBuffer(new Uint8Array(byte_size));\n};\n\nflatbuffers.ByteBuffer.prototype.clear =
function() {\n  this.position_ = 0;\n};\n\n/**\n * Get the underlying `Uint8Array`.\n *\n * @returns {Uint8Array}\n
*/\nflatbuffers.ByteBuffer.prototype.bytes = function() {\n  return this.bytes_;\n};\n\n/**\n * Get the buffer's
position.\n *\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.position = function() {\n  return
this.position_;\n};\n\n/**\n * Set the buffer's position.\n *\n * @param {number} position\n
*/\nflatbuffers.ByteBuffer.prototype.setPosition = function(position) {\n  this.position_ = position;\n};\n\n/**\n *
Get the buffer's capacity.\n *\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.capacity = function()
{\n  return this.bytes_.length;\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n
*/\nflatbuffers.ByteBuffer.prototype.readInt8 = function(offset) {\n  return this.readUint8(offset) << 24 >>
24;\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n
*/\nflatbuffers.ByteBuffer.prototype.readUint8 = function(offset) {\n  return this.bytes_[offset];\n};\n\n/**\n *
@param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readInt16 =
function(offset) {\n  return this.readUint16(offset) << 16 >> 16;\n};\n\n/**\n * @param {number} offset\n *
@returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readUint16 = function(offset) {\n  return
this.bytes_[offset] | this.bytes_[offset + 1] << 8;\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n
*/\nflatbuffers.ByteBuffer.prototype.readInt32 = function(offset) {\n  return this.bytes_[offset] | this.bytes_[offset +
1] << 8 | this.bytes_[offset + 2] << 16 | this.bytes_[offset + 3] << 24;\n};\n\n/**\n * @param {number} offset\n *
@returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readUint32 = function(offset) {\n  return
this.readInt32(offset) >>> 0;\n};\n\n/**\n * @param {number} offset\n * @returns {!flatbuffers.Long}\n
*/\nflatbuffers.ByteBuffer.prototype.readInt64 = function(offset) {\n  return new
flatbuffers.Long(this.readInt32(offset), this.readInt32(offset + 4));\n};\n\n/**\n * @param {number} offset\n *
@returns {!flatbuffers.Long}\n */\nflatbuffers.ByteBuffer.prototype.readUint64 = function(offset) {\n  return new
flatbuffers.Long(this.readUint32(offset), this.readUint32(offset + 4));\n};\n\n/**\n * @param {number} offset\n *
@returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readFloat32 = function(offset) {\n  flatbuffers.int32[0] =
this.readInt32(offset);\n  return flatbuffers.float32[0];\n};\n\n/**\n * @param {number} offset\n * @returns
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{number}\n */\nflatbuffers.ByteBuffer.prototype.readFloat64 = function(offset) {\n
flatbuffers.int32[flatbuffers.isLittleEndian ? 0 : 1] = this.readInt32(offset);\n
flatbuffers.int32[flatbuffers.isLittleEndian ? 1 : 0] = this.readInt32(offset + 4);\n  return
flatbuffers.float64[0];\n};\n\n/**\n * @param {number} offset\n * @param {number|boolean} value\n
*/\nflatbuffers.ByteBuffer.prototype.writeInt8 = function(offset, value) {\n  this.bytes_[offset] = /** @type
{number} */(value);\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n
*/\nflatbuffers.ByteBuffer.prototype.writeUint8 = function(offset, value) {\n  this.bytes_[offset] =
value;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n
*/\nflatbuffers.ByteBuffer.prototype.writeInt16 = function(offset, value) {\n  this.bytes_[offset] = value;\n
this.bytes_[offset + 1] = value >> 8;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n
*/\nflatbuffers.ByteBuffer.prototype.writeUint16 = function(offset, value) {\n    this.bytes_[offset] = value;\n
this.bytes_[offset + 1] = value >> 8;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n
*/\nflatbuffers.ByteBuffer.prototype.writeInt32 = function(offset, value) {\n  this.bytes_[offset] = value;\n
this.bytes_[offset + 1] = value >> 8;\n  this.bytes_[offset + 2] = value >> 16;\n  this.bytes_[offset + 3] = value >>
24;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n
*/\nflatbuffers.ByteBuffer.prototype.writeUint32 = function(offset, value) {\n    this.bytes_[offset] = value;\n
this.bytes_[offset + 1] = value >> 8;\n    this.bytes_[offset + 2] = value >> 16;\n    this.bytes_[offset + 3] = value >>
24;\n};\n\n/**\n * @param {number} offset\n * @param {flatbuffers.Long} value\n
*/\nflatbuffers.ByteBuffer.prototype.writeInt64 = function(offset, value) {\n  this.writeInt32(offset, value.low);\n
this.writeInt32(offset + 4, value.high);\n};\n\n/**\n * @param {number} offset\n * @param {flatbuffers.Long}
value\n */\nflatbuffers.ByteBuffer.prototype.writeUint64 = function(offset, value) {\n    this.writeUint32(offset,
value.low);\n    this.writeUint32(offset + 4, value.high);\n};\n\n/**\n * @param {number} offset\n * @param
{number} value\n */\nflatbuffers.ByteBuffer.prototype.writeFloat32 = function(offset, value) {\n
flatbuffers.float32[0] = value;\n  this.writeInt32(offset, flatbuffers.int32[0]);\n};\n\n/**\n * @param {number}
offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeFloat64 = function(offset, value) {\n
flatbuffers.float64[0] = value;\n  this.writeInt32(offset, flatbuffers.int32[flatbuffers.isLittleEndian ? 0 : 1]);\n
this.writeInt32(offset + 4, flatbuffers.int32[flatbuffers.isLittleEndian ? 1 : 0]);\n};\n\n/**\n * Return the file
identifier.   Behavior is undefined for FlatBuffers whose\n * schema does not include a file_identifier (likely points
at padding or the\n * start of a the root vtable).\n * @returns {string}\n
*/\nflatbuffers.ByteBuffer.prototype.getBufferIdentifier = function() {\n  if (this.bytes_.length < this.position_ +
flatbuffers.SIZEOF_INT +\n      flatbuffers.FILE_IDENTIFIER_LENGTH) {\n    throw new Error(\n
'FlatBuffers: ByteBuffer is too short to contain an identifier.');\n  }\n  var result = \"\";\n  for (var i = 0; i <
flatbuffers.FILE_IDENTIFIER_LENGTH; i++) {\n    result += String.fromCharCode(\n
this.readInt8(this.position_ + flatbuffers.SIZEOF_INT + i));\n  }\n  return result;\n};\n\n/**\n * Look up a field in
the vtable, return an offset into the object, or 0 if the\n * field is not present.\n *\n * @param {number} bb_pos\n *
@param {number} vtable_offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__offset =
function(bb_pos, vtable_offset) {\n  var vtable = bb_pos - this.readInt32(bb_pos);\n  return vtable_offset <
this.readInt16(vtable) ? this.readInt16(vtable + vtable_offset) : 0;\n};\n\n/**\n * Initialize any Table-derived type to
point to the union at the given offset.\n *\n * @param {flatbuffers.Table} t\n * @param {number} offset\n *
@returns {flatbuffers.Table}\n */\nflatbuffers.ByteBuffer.prototype.__union = function(t, offset) {\n  t.bb_pos =
offset + this.readInt32(offset);\n  t.bb = this;\n  return t;\n};\n\n/**\n * Create a JavaScript string from UTF-8 data
stored inside the FlatBuffer.\n * This allocates a new string and converts to wide chars upon each access.\n *\n * To
avoid the conversion to UTF-16, pass flatbuffers.Encoding.UTF8_BYTES as\n * the \"optionalEncoding\"
argument. This is useful for avoiding conversion to\n * and from UTF-16 when the data will just be packaged back
up in another\n * FlatBuffer later on.\n *\n * @param {number} offset\n * @param {flatbuffers.Encoding=}
opt_encoding Defaults to UTF16_STRING\n * @returns {string|!Uint8Array}\n
*/\nflatbuffers.ByteBuffer.prototype.__string = function(offset, opt_encoding) {\n  offset +=
this.readInt32(offset);\n\n  var length = this.readInt32(offset);\n  var result = '';\n  var i = 0;\n\n  offset +=
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flatbuffers.SIZEOF_INT;\n\n if (opt_encoding === flatbuffers.Encoding.UTF8_BYTES) {\n return this.bytes_.subarray(offset, offset + length);\n }\n\n while (i < length) {\n var codePoint;\n\n // Decode UTF-8\n var a = this.readUint8(offset + i++);\n if (a < 0xC0) {\n codePoint = a;\n } else {\n var b = this.readUint8(offset + i++);\n if (a < 0xE0) {\n codePoint =\n ((a & 0x1F) << 6) |\n (b & 0x3F);\n } else {\n var c = this.readUint8(offset + i++);\n if (a < 0xF0) {\n codePoint =\n ((a & 0x0F) << 12) |\n ((b & 0x3F) << 6) |\n (c & 0x3F);\n } else {\n var d = this.readUint8(offset + i++);\n codePoint =\n ((a & 0x07) << 18) |\n ((b & 0x3F) << 12) |\n ((c & 0x3F) << 6) |\n (d & 0x3F);\n }\n }\n }\n\n // Encode UTF-16\n if (codePoint < 0x10000) {\n result += String.fromCharCode(codePoint);\n } else {\n codePoint -= 0x10000;\n result += String.fromCharCode(\n (codePoint >> 10) + 0xD800,\n (codePoint & ((1 << 10) - 1)) + 0xDC00);\n }\n }\n\n return result;\n};\n\n/**\n * Retrieve the relative offset stored at \"offset\"\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__indirect = function(offset) {\n return offset + this.readInt32(offset);\n};\n\n/**\n * Get the start of data of a vector whose offset is stored at \"offset\" in this object.\n *\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__vector = function(offset) {\n return offset + this.readInt32(offset) + flatbuffers.SIZEOF_INT; // data starts after the length\n};\n\n/**\n * Get the length of a vector whose offset is stored at \"offset\" in this object.\n *\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__vector_len = function(offset) {\n return this.readInt32(offset + this.readInt32(offset));\n};\n\n/**\n * @param {string} ident\n * @returns {boolean}\n */\nflatbuffers.ByteBuffer.prototype.__has_identifier = function(ident) {\n if (ident.length != flatbuffers.FILE_IDENTIFIER_LENGTH) {\n throw new Error('FlatBuffers: file identifier must be length ' +\n flatbuffers.FILE_IDENTIFIER_LENGTH);\n }\n for (var i = 0; i < flatbuffers.FILE_IDENTIFIER_LENGTH; i++) {\n if (ident.charCodeAt(i) != this.readInt8(this.position_ + flatbuffers.SIZEOF_INT + i)) {\n return false;\n }\n }\n return true;\n};\n\n/**\n * A helper function to avoid generated code depending on this file directly.\n *\n * @param {number} low\n * @param {number} high\n * @returns {!flatbuffers.Long}\n */\nflatbuffers.ByteBuffer.prototype.createLong = function(low, high) {\n return flatbuffers.Long.create(low, high);\n};\n\n// Exports for Node.js and RequireJS\nexport { flatbuffers };\n\n/// @endcond\n/// @}\n","\"use strict\";\r\nexports.__esModule = true;\r\nvar Guid = /** @class */ (function () {\r\n function Guid(guid) {\r\n if (!guid) {\r\n throw new TypeError(\"Invalid argument; `value` has no value.\");\r\n }\r\n this.value = Guid.EMPTY;\r\n if (guid && Guid.isGuid(guid)) {\r\n this.value = guid;\r\n }\r\n }\r\n Guid.isGuid = function (guid) {\r\n var value = guid.toString();\r\n return guid && (guid instanceof Guid || Guid.validator.test(value));\r\n };\r\n Guid.create = function () {\r\n return new Guid([Guid.gen(2), Guid.gen(1), Guid.gen(1), Guid.gen(1), Guid.gen(3)].join(\"-\"));\r\n };\r\n Guid.createEmpty = function () {\r\n return new Guid(\"emptyguid\");\r\n };\r\n Guid.parse = function (guid) {\r\n return new Guid(guid);\r\n };\r\n Guid.raw = function () {\r\n return [Guid.gen(2), Guid.gen(1), Guid.gen(1), Guid.gen(1), Guid.gen(3)].join(\"-\");\r\n };\r\n Guid.gen = function (count) {\r\n var out = \"\";\r\n for (var i = 0; i < count; i++) {\r\n // tslint:disable-next-line:no-bitwise\r\n out += (((1 + Math.random()) * 0x10000) | 0).toString(16).substring(1);\r\n }\r\n return out;\r\n };\r\n Guid.prototype.equals = function (other) {\r\n // Comparing string `value` against provided `guid` will auto-call\r\n // toString on `guid` for comparison\r\n return Guid.isGuid(other) && this.value === other.toString();\r\n };\r\n Guid.prototype.isEmpty = function () {\r\n return this.value === Guid.EMPTY;\r\n };\r\n Guid.prototype.toString = function () {\r\n return this.value;\r\n };\r\n Guid.prototype.toJSON = function () {\r\n return {\r\n value: this.value\r\n };\r\n };\r\n Guid.validator = new RegExp(\"^[a-z0-9]{8}-[a-z0-9]{4}-[a-z0-9]{4}-[a-z0-9]{4}-[a-z0-9]{12}$\", \"i\");\r\n Guid.EMPTY = \"00000000-0000-0000-0000-000000000000\";\r\n return Guid;\r\n}());\r\nexports.Guid = Guid;\r\n","module.exports = Long;\r\n\r\n/**\r\n * wasm optimizations, to do native i64 multiplication and divide\r\n */\r\nvar wasm = null;\r\n\r\ntry {\r\n wasm = new WebAssembly.Instance(new WebAssembly.Module(new Uint8Array([\r\n 0, 97, 115, 109, 1, 0, 0, 0, 1, 13, 2, 96, 0, 1, 127, 96, 4, 127, 127, 127, 127, 1, 127, 3, 7, 6, 0, 1, 1, 1, 1, 1, 6, 6, 1, 127, 1, 65, 0, 11, 7, 50, 6, 3, 109, 117, 108, 0, 1, 5, 100, 105, 118, 95,

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115, 0, 2, 5, 100, 105, 118, 95, 117, 0, 3, 5, 114, 101, 109, 95, 115, 0, 4, 5, 114, 101, 109, 95, 117, 0, 5, 8, 103, 101,
116, 95, 104, 105, 103, 104, 0, 0, 10, 191, 1, 6, 4, 0, 35, 0, 11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132,
32, 2, 173, 32, 3, 173, 66, 32, 134, 132, 126, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167, 11, 36, 1, 1, 126, 32, 0, 173,
32, 1, 173, 66, 32, 134, 132, 32, 2, 173, 32, 3, 173, 66, 32, 134, 132, 127, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167,
11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132, 32, 2, 173, 32, 3, 173, 66, 32, 134, 132, 128, 34, 4, 66, 32,
135, 167, 36, 0, 32, 4, 167, 11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132, 32, 2, 173, 32, 3, 173, 66, 32,
134, 132, 129, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167, 11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132, 32,
2, 173, 32, 3, 173, 66, 32, 134, 132, 130, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167, 11\r\n  ])), {}).exports;\r\n} catch
(e) {\r\n  // no wasm support :(\r\n}\r\n\r\n/**\r\n * Constructs a 64 bit two's-complement integer, given its low and
high 32 bit values as *signed* integers.\r\n *  See the from* functions below for more convenient ways of
constructing Longs.\r\n * @exports Long\r\n * @class A Long class for representing a 64 bit two's-complement
integer value.\r\n * @param {number} low The low (signed) 32 bits of the long\r\n * @param {number} high The
high (signed) 32 bits of the long\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n
* @constructor\r\n */\r\nfunction Long(low, high, unsigned) {\r\n\r\n    /**\r\n     * The low 32 bits as a signed
value.\r\n     * @type {number}\r\n     */\r\n    this.low = low | 0;\r\n\r\n    /**\r\n     * The high 32 bits as a signed
value.\r\n     * @type {number}\r\n     */\r\n    this.high = high | 0;\r\n\r\n    /**\r\n     * Whether unsigned or not.\r\n
  * @type {boolean}\r\n     */\r\n    this.unsigned = !!unsigned;\r\n}\r\n\r\n// The internal representation of a long is
the two given signed, 32-bit values.\r\n// We use 32-bit pieces because these are the size of integers on which\r\n//
Javascript performs bit-operations.  For operations like addition and\r\n// multiplication, we split each number into
16 bit pieces, which can easily be\r\n// multiplied within Javascript's floating-point representation without
overflow\r\n// or change in sign.\r\n//\r\n// In the algorithms below, we frequently reduce the negative case to
the\r\n// positive case by negating the input(s) and then post-processing the result.\r\n// Note that we must ALWAYS
check specially whether those values are MIN_VALUE\r\n// (-2^63) because -MIN_VALUE == MIN_VALUE
(since 2^63 cannot be represented as\r\n// a positive number, it overflows back into a negative).  Not handling
this\r\n// case would often result in infinite recursion.\r\n//\r\n// Common constant values ZERO, ONE, NEG_ONE,
etc. are defined below the from*\r\n// methods on which they depend.\r\n\r\n/**\r\n * An indicator used to reliably
determine if an object is a Long or not.\r\n * @type {boolean}\r\n * @const\r\n * @private\r\n
*/\r\nLong.prototype.__isLong__;\r\n\r\nObject.defineProperty(Long.prototype, \"__isLong__\", { value: true
});\r\n\r\n/**\r\n * @function\r\n * @param {*} obj Object\r\n * @returns {boolean}\r\n * @inner\r\n */\r\nfunction
isLong(obj) {\r\n    return (obj && obj[\"__isLong__\"]) === true;\r\n}\r\n\r\n/**\r\n * Tests if the specified object
is a Long.\r\n * @function\r\n * @param {*} obj Object\r\n * @returns {boolean}\r\n */\r\nLong.isLong =
isLong;\r\n\r\n/**\r\n * A cache of the Long representations of small integer values.\r\n * @type {!Object}\r\n *
@inner\r\n */\r\nvar INT_CACHE = {};\r\n\r\n/**\r\n * A cache of the Long representations of small unsigned
integer values.\r\n * @type {!Object}\r\n * @inner\r\n */\r\nvar UINT_CACHE = {};\r\n\r\n/**\r\n * @param
{number} value\r\n * @param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction
fromInt(value, unsigned) {\r\n    var obj, cachedObj, cache;\r\n    if (unsigned) {\r\n        value >>>= 0;\r\n        if
(cache = (0 <= value && value < 256)) {\r\n            cachedObj = UINT_CACHE[value];\r\n            if
(cachedObj)\r\n                return cachedObj;\r\n        }\r\n        obj = fromBits(value, (value | 0) < 0 ? -1 : 0, true);\r\n
     if (cache)\r\n            UINT_CACHE[value] = obj;\r\n        return obj;\r\n    } else {\r\n        value |= 0;\r\n        if
(cache = (-128 <= value && value < 128)) {\r\n            cachedObj = INT_CACHE[value];\r\n            if
(cachedObj)\r\n                return cachedObj;\r\n        }\r\n        obj = fromBits(value, value < 0 ? -1 : 0, false);\r\n
if (cache)\r\n            INT_CACHE[value] = obj;\r\n        return obj;\r\n    }\r\n}\r\n\r\n/**\r\n * Returns a Long
representing the given 32 bit integer value.\r\n * @function\r\n * @param {number} value The 32 bit integer in
question\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long}
The corresponding Long value\r\n */\r\nLong.fromInt = fromInt;\r\n\r\n/**\r\n * @param {number} value\r\n *
@param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromNumber(value,
unsigned) {\r\n    if (isNaN(value))\r\n        return unsigned ? UZERO : ZERO;\r\n    if (unsigned) {\r\n        if (value
< 0)\r\n            return UZERO;\r\n        if (value >= TWO_PWR_64_DBL)\r\n            return
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MAX_UNSIGNED_VALUE;\r\n } else {\r\n if (value <= -TWO_PWR_63_DBL)\r\n return MIN_VALUE;\r\n if (value + 1 >= TWO_PWR_63_DBL)\r\n return MAX_VALUE;\r\n }\r\n if (value < 0)\r\n return fromNumber(-value, unsigned).neg();\r\n return fromBits((value % TWO_PWR_32_DBL) | 0, (value / TWO_PWR_32_DBL) | 0, unsigned);\r\n}\r\n\r\n/**\r\n * Returns a Long representing the given value, provided that it is a finite number. Otherwise, zero is returned.\r\n * @function\r\n * @param {number} value The number in question\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long} The corresponding Long value\r\n */\r\nLong.fromNumber = fromNumber;\r\n\r\n/**\r\n * @param {number} lowBits\r\n * @param {number} highBits\r\n * @param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromBits(lowBits, highBits, unsigned) {\r\n return new Long(lowBits, highBits, unsigned);\r\n}\r\n\r\n/**\r\n * Returns a Long representing the 64 bit integer that comes by concatenating the given low and high bits. Each is\r\n * assumed to use 32 bits.\r\n * @function\r\n * @param {number} lowBits The low 32 bits\r\n * @param {number} highBits The high 32 bits\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long} The corresponding Long value\r\n */\r\nLong.fromBits = fromBits;\r\n\r\n/**\r\n * @function\r\n * @param {number} base\r\n * @param {number} exponent\r\n * @returns {number}\r\n * @inner\r\n */\r\nvar pow_dbl = Math.pow; // Used 4 times (4*8 to 15+4)\r\n\r\n/**\r\n * @param {string} str\r\n * @param {(boolean|number)=} unsigned\r\n * @param {number=} radix\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromString(str, unsigned, radix) {\r\n if (str.length === 0)\r\n throw Error('empty string');\r\n if (str === \"NaN\" || str === \"Infinity\" || str === \"+Infinity\" || str === \"-Infinity\")\r\n return ZERO;\r\n if (typeof unsigned === 'number') {\r\n // For goog.math.long compatibility\r\n radix = unsigned,\r\n unsigned = false;\r\n } else {\r\n unsigned = !! unsigned;\r\n }\r\n radix = radix || 10;\r\n if (radix < 2 || 36 < radix)\r\n throw RangeError('radix');\r\n\r\n var p;\r\n if ((p = str.indexOf('-')) > 0)\r\n throw Error('interior hyphen');\r\n else if (p === 0) {\r\n return fromString(str.substring(1), unsigned, radix).neg();\r\n }\r\n\r\n // Do several (8) digits each time through the loop, so as to\r\n // minimize the calls to the very expensive emulated div.\r\n var radixToPower = fromNumber(pow_dbl(radix, 8));\r\n\r\n var result = ZERO;\r\n for (var i = 0; i < str.length; i += 8) {\r\n var size = Math.min(8, str.length - i),\r\n value = parseInt(str.substring(i, i + size), radix);\r\n if (size < 8) {\r\n var power = fromNumber(pow_dbl(radix, size));\r\n result = result.mul(power).add(fromNumber(value));\r\n } else {\r\n result = result.mul(radixToPower);\r\n result = result.add(fromNumber(value));\r\n }\r\n }\r\n result.unsigned = unsigned;\r\n return result;\r\n}\r\n\r\n/**\r\n * Returns a Long representation of the given string, written using the specified radix.\r\n * @function\r\n * @param {string} str The textual representation of the Long\r\n * @param {(boolean|number)=} unsigned Whether unsigned or not, defaults to signed\r\n * @param {number=} radix The radix in which the text is written (2-36), defaults to 10\r\n * @returns {!Long} The corresponding Long value\r\n */\r\nLong.fromString = fromString;\r\n\r\n/**\r\n * @function\r\n * @param {!Long|number|string|!{low: number, high: number, unsigned: boolean}} val\r\n * @param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromValue(val, unsigned) {\r\n if (typeof val === 'number')\r\n return fromNumber(val, unsigned);\r\n if (typeof val === 'string')\r\n return fromString(val, unsigned);\r\n // Throws for non-objects, converts non-instanceof Long:\r\n return fromBits(val.low, val.high, typeof unsigned === 'boolean' ? unsigned : val.unsigned);\r\n}\r\n\r\n/**\r\n * Converts the specified value to a Long using the appropriate from* function for its type.\r\n * @function\r\n * @param {!Long|number|string|!{low: number, high: number, unsigned: boolean}} val Value\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long}\r\n */\r\nLong.fromValue = fromValue;\r\n\r\n// NOTE: the compiler should inline these constant values below and then remove these variables, so there should be\r\n// no runtime penalty for these.\r\n\r\n/**\r\n * @type {number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_16_DBL = 1 << 16;\r\n\r\n/**\r\n * @type {number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_24_DBL = 1 << 24;\r\n\r\n/**\r\n * @type {number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_32_DBL = TWO_PWR_16_DBL * TWO_PWR_16_DBL;\r\n\r\n/**\r\n * @type {number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_64_DBL = TWO_PWR_32_DBL * TWO_PWR_32_DBL;\r\n\r\n/**\r\n * @type {number}\r\n *

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@const\r\n * @inner\r\n */\r\nvar TWO_PWR_63_DBL = TWO_PWR_64_DBL / 2;\r\n\r\n/**\r\n * @type
{!Long}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_24 = fromInt(TWO_PWR_24_DBL);\r\n\r\n/**\r\n *
@type {!Long}\r\n * @inner\r\n */\r\nvar ZERO = fromInt(0);\r\n\r\n/**\r\n * Signed zero.\r\n * @type {!Long}\r\n
*/\r\nLong.ZERO = ZERO;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar UZERO = fromInt(0,
true);\r\n\r\n/**\r\n * Unsigned zero.\r\n * @type {!Long}\r\n */\r\nLong.UZERO = UZERO;\r\n\r\n/**\r\n * @type
{!Long}\r\n * @inner\r\n */\r\nvar ONE = fromInt(1);\r\n\r\n/**\r\n * Signed one.\r\n * @type {!Long}\r\n
*/\r\nLong.ONE = ONE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar UONE = fromInt(1,
true);\r\n\r\n/**\r\n * Unsigned one.\r\n * @type {!Long}\r\n */\r\nLong.UONE = UONE;\r\n\r\n/**\r\n * @type
{!Long}\r\n * @inner\r\n */\r\nvar NEG_ONE = fromInt(-1);\r\n\r\n/**\r\n * Signed negative one.\r\n * @type
{!Long}\r\n */\r\nLong.NEG_ONE = NEG_ONE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar
MAX_VALUE = fromBits(0xFFFFFFFF|0, 0x7FFFFFFF|0, false);\r\n\r\n/**\r\n * Maximum signed value.\r\n *
@type {!Long}\r\n */\r\nLong.MAX_VALUE = MAX_VALUE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n
*/\r\nvar MAX_UNSIGNED_VALUE = fromBits(0xFFFFFFFF|0, 0xFFFFFFFF|0, true);\r\n\r\n/**\r\n * Maximum
unsigned value.\r\n * @type {!Long}\r\n */\r\nLong.MAX_UNSIGNED_VALUE =
MAX_UNSIGNED_VALUE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar MIN_VALUE =
fromBits(0, 0x80000000|0, false);\r\n\r\n/**\r\n * Minimum signed value.\r\n * @type {!Long}\r\n
*/\r\nLong.MIN_VALUE = MIN_VALUE;\r\n\r\n/**\r\n * @alias Long.prototype\r\n * @inner\r\n */\r\nvar
LongPrototype = Long.prototype;\r\n\r\n/**\r\n * Converts the Long to a 32 bit integer, assuming it is a 32 bit
integer.\r\n * @returns {number}\r\n */\r\nLongPrototype.toInt = function toInt() {\r\n    return this.unsigned ?
this.low >>> 0 : this.low;\r\n};\r\n\r\n/**\r\n * Converts the Long to a the nearest floating-point representation of
this value (double, 53 bit mantissa).\r\n * @returns {number}\r\n */\r\nLongPrototype.toNumber = function
toNumber() {\r\n    if (this.unsigned)\r\n        return ((this.high >>> 0) * TWO_PWR_32_DBL) + (this.low >>>
0);\r\n    return this.high * TWO_PWR_32_DBL + (this.low >>> 0);\r\n};\r\n\r\n/**\r\n * Converts the Long to a
string written in the specified radix.\r\n * @param {number=} radix Radix (2-36), defaults to 10\r\n * @returns
{string}\r\n * @override\r\n * @throws {RangeError} If `radix` is out of range\r\n */\r\nLongPrototype.toString =
function toString(radix) {\r\n    radix = radix || 10;\r\n    if (radix < 2 || 36 < radix)\r\n        throw
RangeError('radix');\r\n    if (this.isZero())\r\n        return '0';\r\n    if (this.isNegative()) { // Unsigned Longs are
never negative\r\n        if (this.eq(MIN_VALUE)) {\r\n            // We need to change the Long value before it can be
negated, so we remove\r\n            // the bottom-most digit in this base and then recurse to do the rest.\r\n            var
radixLong = fromNumber(radix),\r\n                div = this.div(radixLong),\r\n                rem1 =
div.mul(radixLong).sub(this);\r\n            return div.toString(radix) + rem1.toInt().toString(radix);\r\n        } else\r\n
            return '-' + this.neg().toString(radix);\r\n    }\r\n\r\n    // Do several (6) digits each time through the loop, so as
to\r\n    // minimize the calls to the very expensive emulated div.\r\n    var radixToPower =
fromNumber(pow_dbl(radix, 6), this.unsigned),\r\n        rem = this;\r\n    var result = '';\r\n    while (true) {\r\n
var remDiv = rem.div(radixToPower),\r\n            intval = rem.sub(remDiv.mul(radixToPower)).toInt() >>> 0,\r\n
    digits = intval.toString(radix);\r\n        rem = remDiv;\r\n        if (rem.isZero())\r\n            return digits + result;\r\n
    else {\r\n            while (digits.length < 6)\r\n                digits = '0' + digits;\r\n            result = '' + digits +
result;\r\n        }\r\n    }\r\n};\r\n\r\n/**\r\n * Gets the high 32 bits as a signed integer.\r\n * @returns {number}
Signed high bits\r\n */\r\nLongPrototype.getHighBits = function getHighBits() {\r\n    return
this.high;\r\n};\r\n\r\n/**\r\n * Gets the high 32 bits as an unsigned integer.\r\n * @returns {number} Unsigned high
bits\r\n */\r\nLongPrototype.getHighBitsUnsigned = function getHighBitsUnsigned() {\r\n    return this.high >>>
0;\r\n};\r\n\r\n/**\r\n * Gets the low 32 bits as a signed integer.\r\n * @returns {number} Signed low bits\r\n
*/\r\nLongPrototype.getLowBits = function getLowBits() {\r\n    return this.low;\r\n};\r\n\r\n/**\r\n * Gets the low
32 bits as an unsigned integer.\r\n * @returns {number} Unsigned low bits\r\n
*/\r\nLongPrototype.getLowBitsUnsigned = function getLowBitsUnsigned() {\r\n    return this.low >>>
0;\r\n};\r\n\r\n/**\r\n * Gets the number of bits needed to represent the absolute value of this Long.\r\n * @returns
{number}\r\n */\r\nLongPrototype.getNumBitsAbs = function getNumBitsAbs() {\r\n    if (this.isNegative()) //
Unsigned Longs are never negative\r\n        return this.eq(MIN_VALUE) ? 64 : this.neg().getNumBitsAbs();\r\n
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var val = this.high != 0 ? this.high : this.low;\r\n    for (var bit = 31; bit > 0; bit--)\r\n        if ((val & (1 << bit)) !=
0)\r\n            break;\r\n    return this.high != 0 ? bit + 33 : bit + 1;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value
equals zero.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isZero = function isZero() {\r\n    return this.high
=== 0 && this.low === 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value equals zero. This is an alias of {@link
Long#isZero}.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.eqz = LongPrototype.isZero;\r\n\r\n/**\r\n * Tests
if this Long's value is negative.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isNegative = function
isNegative() {\r\n    return !this.unsigned && this.high < 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is
positive.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isPositive = function isPositive() {\r\n    return
this.unsigned || this.high >= 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is odd.\r\n * @returns {boolean}\r\n
*/\r\nLongPrototype.isOdd = function isOdd() {\r\n    return (this.low & 1) === 1;\r\n};\r\n\r\n/**\r\n * Tests if this
Long's value is even.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isEven = function isEven() {\r\n    return
(this.low & 1) === 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value equals the specified's.\r\n * @param
{!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.equals = function
equals(other) {\r\n    if (!isLong(other))\r\n        other = fromValue(other);\r\n    if (this.unsigned !== other.unsigned
&& (this.high >>> 31) === 1 && (other.high >>> 31) === 1)\r\n        return false;\r\n    return this.high ===
other.high && this.low === other.low;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value equals the specified's. This is
an alias of {@link Long#equals}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n *
@returns {boolean}\r\n */\r\nLongPrototype.eq = LongPrototype.equals;\r\n\r\n/**\r\n * Tests if this Long's value
differs from the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n
*/\r\nLongPrototype.notEquals = function notEquals(other) {\r\n    return !this.eq(/* validates */
other);\r\n};\r\n\r\n/**\r\n * Tests if this Long's value differs from the specified's. This is an alias of {@link
Long#notEquals}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns
{boolean}\r\n */\r\nLongPrototype.neq = LongPrototype.notEquals;\r\n\r\n/**\r\n * Tests if this Long's value differs
from the specified's. This is an alias of {@link Long#notEquals}.\r\n * @function\r\n * @param
{!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.ne =
LongPrototype.notEquals;\r\n\r\n/**\r\n * Tests if this Long's value is less than the specified's.\r\n * @param
{!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.lessThan = function
lessThan(other) {\r\n    return this.comp(/* validates */ other) < 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is
less than the specified's. This is an alias of {@link Long#lessThan}.\r\n * @function\r\n * @param
{!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.lt =
LongPrototype.lessThan;\r\n\r\n/**\r\n * Tests if this Long's value is less than or equal the specified's.\r\n * @param
{!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.lessThanOrEqual =
function lessThanOrEqual(other) {\r\n    return this.comp(/* validates */ other) <= 0;\r\n};\r\n\r\n/**\r\n * Tests if
this Long's value is less than or equal the specified's. This is an alias of {@link Long#lessThanOrEqual}.\r\n *
@function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n
*/\r\nLongPrototype.lte = LongPrototype.lessThanOrEqual;\r\n\r\n/**\r\n * Tests if this Long's value is less than or
equal the specified's. This is an alias of {@link Long#lessThanOrEqual}.\r\n * @function\r\n * @param
{!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.le =
LongPrototype.lessThanOrEqual;\r\n\r\n/**\r\n * Tests if this Long's value is greater than the specified's.\r\n *
@param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.greaterThan =
function greaterThan(other) {\r\n    return this.comp(/* validates */ other) > 0;\r\n};\r\n\r\n/**\r\n * Tests if this
Long's value is greater than the specified's. This is an alias of {@link Long#greaterThan}.\r\n * @function\r\n *
@param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.gt =
LongPrototype.greaterThan;\r\n\r\n/**\r\n * Tests if this Long's value is greater than or equal the specified's.\r\n *
@param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n
*/\r\nLongPrototype.greaterThanOrEqual = function greaterThanOrEqual(other) {\r\n    return this.comp(/*
validates */ other) >= 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is greater than or equal the specified's. This is
an alias of {@link Long#greaterThanOrEqual}.\r\n * @function\r\n * @param {!Long|number|string} other Other
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value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.gte = LongPrototype.greaterThanOrEqual;\r\n\r\n/**\r\n * Tests if this Long's value is greater than or equal the specified's. This is an alias of {@link Long#greaterThanOrEqual}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.ge = LongPrototype.greaterThanOrEqual;\r\n\r\n/**\r\n * Compares this Long's value with the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {number} 0 if they are the same, 1 if the this is greater and -1\r\n * if the given one is greater\r\n */\r\nLongPrototype.compare = function compare(other) {\r\n   if (!isLong(other))\r\n   other = fromValue(other);\r\n   if (this.eq(other))\r\n   return 0;\r\n   var thisNeg = this.isNegative(),\r\n   otherNeg = other.isNegative();\r\n   if (thisNeg && !otherNeg)\r\n   return -1;\r\n   if (!thisNeg && otherNeg)\r\n   return 1;\r\n   // At this point the sign bits are the same\r\n   if (!this.unsigned)\r\n   return this.sub(other).isNegative() ? -1 : 1;\r\n   // Both are positive if at least one is unsigned\r\n   return (other.high >>> 0) > (this.high >>> 0) || (other.high === this.high && (other.low >>> 0) > (this.low >>> 0)) ? -1 : 1;\r\n};\r\n\r\n/**\r\n * Compares this Long's value with the specified's. This is an alias of {@link Long#compare}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {number} 0 if they are the same, 1 if the this is greater and -1\r\n * if the given one is greater\r\n */\r\nLongPrototype.comp = LongPrototype.compare;\r\n\r\n/**\r\n * Negates this Long's value.\r\n * @returns {!Long} Negated Long\r\n */\r\nLongPrototype.negate = function negate() {\r\n   if (!this.unsigned && this.eq(MIN_VALUE))\r\n   return MIN_VALUE;\r\n   return this.not().add(ONE);\r\n};\r\n\r\n/**\r\n * Negates this Long's value. This is an alias of {@link Long#negate}.\r\n * @function\r\n * @returns {!Long} Negated Long\r\n */\r\nLongPrototype.neg = LongPrototype.negate;\r\n\r\n/**\r\n * Returns the sum of this and the specified Long.\r\n * @param {!Long|number|string} addend Addend\r\n * @returns {!Long} Sum\r\n */\r\nLongPrototype.add = function add(addend) {\r\n   if (!isLong(addend))\r\n   addend = fromValue(addend);\r\n\r\n   // Divide each number into 4 chunks of 16 bits, and then sum the chunks.\r\n\r\n   var a48 = this.high >>> 16;\r\n   var a32 = this.high & 0xFFFF;\r\n   var a16 = this.low >>> 16;\r\n   var a00 = this.low & 0xFFFF;\r\n\r\n   var b48 = addend.high >>> 16;\r\n   var b32 = addend.high & 0xFFFF;\r\n   var b16 = addend.low >>> 16;\r\n   var b00 = addend.low & 0xFFFF;\r\n\r\n   var c48 = 0, c32 = 0, c16 = 0, c00 = 0;\r\n   c00 += a00 + b00;\r\n   c16 += c00 >>> 16;\r\n   c00 &= 0xFFFF;\r\n   c16 += a16 + b16;\r\n   c32 += c16 >>> 16;\r\n   c16 &= 0xFFFF;\r\n   c32 += a32 + b32;\r\n   c48 += c32 >>> 16;\r\n   c32 &= 0xFFFF;\r\n   c48 += a48 + b48;\r\n   c48 &= 0xFFFF;\r\n   return fromBits((c16 << 16) | c00, (c48 << 16) | c32, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the difference of this and the specified Long.\r\n * @param {!Long|number|string} subtrahend Subtrahend\r\n * @returns {!Long} Difference\r\n */\r\nLongPrototype.subtract = function subtract(subtrahend) {\r\n   if (!isLong(subtrahend))\r\n   subtrahend = fromValue(subtrahend);\r\n   return this.add(subtrahend.neg());\r\n};\r\n\r\n/**\r\n * Returns the difference of this and the specified Long. This is an alias of {@link Long#subtract}.\r\n * @function\r\n * @param {!Long|number|string} subtrahend Subtrahend\r\n * @returns {!Long} Difference\r\n */\r\nLongPrototype.sub = LongPrototype.subtract;\r\n\r\n/**\r\n * Returns the product of this and the specified Long.\r\n * @param {!Long|number|string} multiplier Multiplier\r\n * @returns {!Long} Product\r\n */\r\nLongPrototype.multiply = function multiply(multiplier) {\r\n   if (this.isZero())\r\n   return ZERO;\r\n   if (!isLong(multiplier))\r\n   multiplier = fromValue(multiplier);\r\n\r\n   // use wasm support if present\r\n   if (wasm) {\r\n   var low = wasm.mul(this.low,\r\n   this.high,\r\n   multiplier.low,\r\n   multiplier.high);\r\n   return fromBits(low, wasm.get_high(), this.unsigned);\r\n   }\r\n\r\n   if (multiplier.isZero())\r\n   return ZERO;\r\n   if (this.eq(MIN_VALUE))\r\n   return multiplier.isOdd() ? MIN_VALUE : ZERO;\r\n   if (multiplier.eq(MIN_VALUE))\r\n   return this.isOdd() ? MIN_VALUE : ZERO;\r\n\r\n   if (this.isNegative()) {\r\n   if (multiplier.isNegative())\r\n   return this.neg().mul(multiplier.neg());\r\n   else\r\n   return this.neg().mul(multiplier).neg();\r\n   } else if (multiplier.isNegative())\r\n   return this.mul(multiplier.neg()).neg();\r\n\r\n   // If both longs are small, use float multiplication\r\n   if (this.lt(TWO_PWR_24) && multiplier.lt(TWO_PWR_24))\r\n   return fromNumber(this.toNumber() * multiplier.toNumber(), this.unsigned);\r\n\r\n   // Divide each long into 4 chunks of 16 bits, and then add up 4x4 products.\r\n   // We can skip products that would overflow.\r\n\r\n   var a48 = this.high >>> 16;\r\n   var a32 = this.high & 0xFFFF;\r\n   var a16 = this.low >>> 16;\r\n   var a00 = this.low &

0xFFFF;\r\n\r\n   var b48 = multiplier.high >>> 16;\r\n   var b32 = multiplier.high & 0xFFFF;\r\n   var b16 = multiplier.low >>> 16;\r\n   var b00 = multiplier.low & 0xFFFF;\r\n\r\n   var c48 = 0, c32 = 0, c16 = 0, c00 = 0;\r\n   c00 += a00 * b00;\r\n   c16 += c00 >>> 16;\r\n   c00 &= 0xFFFF;\r\n   c16 += a16 * b00;\r\n   c32 += c16 >>> 16;\r\n   c16 &= 0xFFFF;\r\n   c16 += a00 * b16;\r\n   c32 += c16 >>> 16;\r\n   c16 &= 0xFFFF;\r\n   c32 += a32 * b00;\r\n   c48 += c32 >>> 16;\r\n   c32 &= 0xFFFF;\r\n   c32 += a16 * b16;\r\n   c48 += c32 >>> 16;\r\n   c32 &= 0xFFFF;\r\n   c32 += a00 * b32;\r\n   c48 += c32 >>> 16;\r\n   c32 &= 0xFFFF;\r\n   c48 += a48 * b00 + a32 * b16 + a16 * b32 + a00 * b48;\r\n   c48 &= 0xFFFF;\r\n   return fromBits((c16 << 16) | c00, (c48 << 16) | c32, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the product of this and the specified Long. This is an alias of {@link Long#multiply}.\r\n * @function\r\n * @param {!Long|number|string} multiplier Multiplier\r\n * @returns {!Long} Product\r\n */\r\nLongPrototype.mul = LongPrototype.multiply;\r\n\r\n/**\r\n * Returns this Long divided by the specified. The result is signed if this Long is signed or\r\n * unsigned if this Long is unsigned.\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Quotient\r\n */\r\nLongPrototype.divide = function divide(divisor) {\r\n   if (!isLong(divisor))\r\n   divisor = fromValue(divisor);\r\n   if (divisor.isZero())\r\n   throw Error('division by zero');\r\n\r\n   // use wasm support if present\r\n   if (wasm) {\r\n   // guard against signed division overflow: the largest\r\n   // negative number / -1 would be 1 larger than the largest\r\n   // positive number, due to two's complement.\r\n   if (!this.unsigned &&\r\n   this.high === -0x80000000 &&\r\n   divisor.low === -1 && divisor.high === -1) {\r\n   // be consistent with non-wasm code path\r\n   return this;\r\n   }\r\n   var low = (this.unsigned ? wasm.div_u : wasm.div_s)(\r\n   this.low,\r\n   this.high,\r\n   divisor.low,\r\n   divisor.high\r\n   );\r\n   return fromBits(low, wasm.get_high(), this.unsigned);\r\n   }\r\n\r\n   if (this.isZero())\r\n   return this.unsigned ? UZERO : ZERO;\r\n   var approx, rem, res;\r\n   if (!this.unsigned) {\r\n   // This section is only relevant for signed longs and is derived from the\r\n   // closure library as a whole.\r\n   if (this.eq(MIN_VALUE)) {\r\n   if (divisor.eq(ONE) || divisor.eq(NEG_ONE))\r\n   return MIN_VALUE; // recall that -MIN_VALUE == MIN_VALUE\r\n   else if (divisor.eq(MIN_VALUE))\r\n   return ONE;\r\n   else {\r\n   // At this point, we have |other| >= 2, so |this/other| < |MIN_VALUE|.\r\n   var halfThis = this.shr(1);\r\n   approx = halfThis.div(divisor).shl(1);\r\n   if (approx.eq(ZERO)) {\r\n   return divisor.isNegative() ? ONE : NEG_ONE;\r\n   } else {\r\n   rem = this.sub(divisor.mul(approx));\r\n   res = approx.add(rem.div(divisor));\r\n   return res;\r\n   }\r\n   }\r\n   } else if (divisor.eq(MIN_VALUE))\r\n   return this.unsigned ? UZERO : ZERO;\r\n   if (this.isNegative()) {\r\n   if (divisor.isNegative())\r\n   return this.neg().div(divisor.neg());\r\n   return this.neg().div(divisor).neg();\r\n   } else if (divisor.isNegative())\r\n   return this.div(divisor.neg()).neg();\r\n   res = ZERO;\r\n   } else {\r\n   // The algorithm below has not been made for unsigned longs. It's therefore\r\n   // required to take special care of the MSB prior to running it.\r\n   if (!divisor.unsigned)\r\n   divisor = divisor.toUnsigned();\r\n   if (divisor.gt(this))\r\n   return UZERO;\r\n   if (divisor.gt(this.shru(1))) // 15 >>> 1 = 7 ; with divisor = 8 ; true\r\n   return UONE;\r\n   res = UZERO;\r\n   }\r\n\r\n   // Repeat the following until the remainder is less than other: find a\r\n   // floating-point that approximates remainder / other *from below*, add this\r\n   // into the result, and subtract it from the remainder. It is critical that\r\n   // the approximate value is less than or equal to the real value so that the\r\n   // remainder never becomes negative.\r\n   rem = this;\r\n   while (rem.gte(divisor)) {\r\n   // Approximate the result of division. This may be a little greater or\r\n   // smaller than the actual value.\r\n   approx = Math.max(1, Math.floor(rem.toNumber() / divisor.toNumber()));\r\n\r\n   // We will tweak the approximate result by changing it in the 48-th digit or\r\n   // the smallest non-fractional digit, whichever is larger.\r\n   var log2 = Math.ceil(Math.log(approx) / Math.LN2),\r\n   delta = (log2 <= 48) ? 1 : pow_dbl(2, log2 - 48),\r\n\r\n   // Decrease the approximation until it is smaller than the remainder. Note\r\n   // that if it is too large, the product overflows and is negative.\r\n   approxRes = fromNumber(approx),\r\n   approxRem = approxRes.mul(divisor);\r\n   while (approxRem.isNegative() || approxRem.gt(rem)) {\r\n   approx -= delta;\r\n   approxRes = fromNumber(approx, this.unsigned);\r\n   approxRem = approxRes.mul(divisor);\r\n   }\r\n\r\n   // We know the answer can't be zero... and actually, zero would cause\r\n // infinite recursion since we would make no progress.\r\n if (approxRes.isZero())\r\n approxRes = ONE;\r\n\r\n res = res.add(approxRes);\r\n rem = rem.sub(approxRem);\r\n }\r\n return res;\r\n};\r\n\r\n/**\r\n * Returns this Long divided by the specified. This is an alias of {@link Long#divide}.\r\n * @function\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Quotient\r\n */\r\nLongPrototype.div = LongPrototype.divide;\r\n\r\n/**\r\n * Returns this Long modulo the specified.\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Remainder\r\n */\r\nLongPrototype.modulo = function modulo(divisor) {\r\n if (!isLong(divisor))\r\n divisor = fromValue(divisor);\r\n\r\n // use wasm support if present\r\n if (wasm) {\r\n var low = (this.unsigned ? wasm.rem_u : wasm.rem_s)(\r\n this.low,\r\n this.high,\r\n divisor.low,\r\n divisor.high\r\n);\r\n return fromBits(low, wasm.get_high(), this.unsigned);\r\n }\r\n\r\n return this.sub(this.div(divisor).mul(divisor));\r\n};\r\n\r\n/**\r\n * Returns this Long modulo the specified. This is an alias of {@link Long#modulo}.\r\n * @function\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Remainder\r\n */\r\nLongPrototype.mod = LongPrototype.modulo;\r\n\r\n/**\r\n * Returns this Long modulo the specified. This is an alias of {@link Long#modulo}.\r\n * @function\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Remainder\r\n */\r\nLongPrototype.rem = LongPrototype.modulo;\r\n\r\n/**\r\n * Returns the bitwise NOT of this Long.\r\n * @returns {!Long}\r\n */\r\nLongPrototype.not = function not() {\r\n return fromBits(~this.low, ~this.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the bitwise AND of this Long and the specified.\r\n * @param {!Long|number|string} other Other Long\r\n * @returns {!Long}\r\n */\r\nLongPrototype.and = function and(other) {\r\n if (!isLong(other))\r\n other = fromValue(other);\r\n return fromBits(this.low & other.low, this.high & other.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the bitwise OR of this Long and the specified.\r\n * @param {!Long|number|string} other Other Long\r\n * @returns {!Long}\r\n */\r\nLongPrototype.or = function or(other) {\r\n if (!isLong(other))\r\n other = fromValue(other);\r\n return fromBits(this.low | other.low, this.high | other.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the bitwise XOR of this Long and the given one.\r\n * @param {!Long|number|string} other Other Long\r\n * @returns {!Long}\r\n */\r\nLongPrototype.xor = function xor(other) {\r\n if (!isLong(other))\r\n other = fromValue(other);\r\n return fromBits(this.low ^ other.low, this.high ^ other.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns this Long with bits shifted to the left by the given amount.\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shiftLeft = function shiftLeft(numBits) {\r\n if (isLong(numBits))\r\n numBits = numBits.toInt();\r\n if ((numBits &= 63) === 0)\r\n return this;\r\n else if (numBits < 32)\r\n return fromBits(this.low << numBits, (this.high << numBits) | (this.low >>> (32 - numBits)), this.unsigned);\r\n else\r\n return fromBits(0, this.low << (numBits - 32), this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns this Long with bits shifted to the left by the given amount. This is an alias of {@link Long#shiftLeft}.\r\n * @function\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shl = LongPrototype.shiftLeft;\r\n\r\n/**\r\n * Returns this Long with bits arithmetically shifted to the right by the given amount.\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shiftRight = function shiftRight(numBits) {\r\n if (isLong(numBits))\r\n numBits = numBits.toInt();\r\n if ((numBits &= 63) === 0)\r\n return this;\r\n else if (numBits < 32)\r\n return fromBits((this.low >>> numBits) | (this.high << (32 - numBits)), this.high >> numBits, this.unsigned);\r\n else\r\n return fromBits(this.high >> (numBits - 32), this.high >= 0 ? 0 : -1, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns this Long with bits arithmetically shifted to the right by the given amount. This is an alias of {@link Long#shiftRight}.\r\n * @function\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shr = LongPrototype.shiftRight;\r\n\r\n/**\r\n * Returns this Long with bits logically shifted to the right by the given amount.\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shiftRightUnsigned = function shiftRightUnsigned(numBits) {\r\n if (isLong(numBits))\r\n numBits = numBits.toInt();\r\n numBits &= 63;\r\n if (numBits === 0)\r\n return this;\r\n else {\r\n var high = this.high;\r\n if (numBits < 32) {\r\n var low = this.low;\r\n return fromBits((low >>> numBits) | (high << (32 - numBits)), high >>> numBits, this.unsigned);\r\n } else if (numBits === 32)\r\n

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return fromBits(high, 0, this.unsigned);\r\n        else\r\n            return fromBits(high >>> (numBits - 32), 0,
this.unsigned);\r\n    }\r\n};\r\n\r\n/**\r\n * Returns this Long with bits logically shifted to the right by the given
amount. This is an alias of {@link Long#shiftRightUnsigned}.\r\n * @function\r\n * @param {number|!Long}
numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shru =
LongPrototype.shiftRightUnsigned;\r\n\r\n/**\r\n * Returns this Long with bits logically shifted to the right by the
given amount. This is an alias of {@link Long#shiftRightUnsigned}.\r\n * @function\r\n * @param
{number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shr_u =
LongPrototype.shiftRightUnsigned;\r\n\r\n/**\r\n * Converts this Long to signed.\r\n * @returns {!Long} Signed
long\r\n */\r\nLongPrototype.toSigned = function toSigned() {\r\n    if (!this.unsigned)\r\n        return this;\r\n
return fromBits(this.low, this.high, false);\r\n};\r\n\r\n/**\r\n * Converts this Long to unsigned.\r\n * @returns
{!Long} Unsigned long\r\n */\r\nLongPrototype.toUnsigned = function toUnsigned() {\r\n    if (this.unsigned)\r\n
 return this;\r\n    return fromBits(this.low, this.high, true);\r\n};\r\n\r\n/**\r\n * Converts this Long to its byte
representation.\r\n * @param {boolean=} le Whether little or big endian, defaults to big endian\r\n * @returns
{!Array.<number>} Byte representation\r\n */\r\nLongPrototype.toBytes = function toBytes(le) {\r\n    return le ?
this.toBytesLE() : this.toBytesBE();\r\n};\r\n\r\n/**\r\n * Converts this Long to its little endian byte
representation.\r\n * @returns {!Array.<number>} Little endian byte representation\r\n
*/\r\nLongPrototype.toBytesLE = function toBytesLE() {\r\n    var hi = this.high,\r\n        lo = this.low;\r\n    return
[\r\n        lo        & 0xff,\r\n        lo >>>  8 & 0xff,\r\n        lo >>> 16 & 0xff,\r\n        lo >>> 24       ,\r\n        hi        &
0xff,\r\n        hi >>>  8 & 0xff,\r\n        hi >>> 16 & 0xff,\r\n        hi >>> 24\r\n    ];\r\n};\r\n\r\n/**\r\n * Converts
this Long to its big endian byte representation.\r\n * @returns {!Array.<number>} Big endian byte
representation\r\n */\r\nLongPrototype.toBytesBE = function toBytesBE() {\r\n    var hi = this.high,\r\n        lo =
this.low;\r\n    return [\r\n        hi >>> 24       ,\r\n        hi >>> 16 & 0xff,\r\n        hi >>>  8 & 0xff,\r\n        hi        &
0xff,\r\n        lo >>> 24       ,\r\n        lo >>> 16 & 0xff,\r\n        lo >>>  8 & 0xff,\r\n        lo        & 0xff\r\n
];\r\n};\r\n\r\n/**\r\n * Creates a Long from its byte representation.\r\n * @param {!Array.<number>} bytes Byte
representation\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @param
{boolean=} le Whether little or big endian, defaults to big endian\r\n * @returns {Long} The corresponding Long
value\r\n */\r\nLong.fromBytes = function fromBytes(bytes, unsigned, le) {\r\n    return le ?
Long.fromBytesLE(bytes, unsigned) : Long.fromBytesBE(bytes, unsigned);\r\n};\r\n\r\n/**\r\n * Creates a Long
from its little endian byte representation.\r\n * @param {!Array.<number>} bytes Little endian byte
representation\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns
{Long} The corresponding Long value\r\n */\r\nLong.fromBytesLE = function fromBytesLE(bytes, unsigned) {\r\n
 return new Long(\r\n        bytes[0]       |\r\n        bytes[1] <<  8 |\r\n        bytes[2] << 16 |\r\n        bytes[3] << 24,\r\n
   bytes[4]       |\r\n        bytes[5] <<  8 |\r\n        bytes[6] << 16 |\r\n        bytes[7] << 24,\r\n        unsigned\r\n
);\r\n};\r\n\r\n/**\r\n * Creates a Long from its big endian byte representation.\r\n * @param {!Array.<number>}
bytes Big endian byte representation\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to
signed\r\n * @returns {Long} The corresponding Long value\r\n */\r\nLong.fromBytesBE = function
fromBytesBE(bytes, unsigned) {\r\n    return new Long(\r\n        bytes[4] << 24 |\r\n        bytes[5] << 16 |\r\n
bytes[6] <<  8 |\r\n        bytes[7],\r\n        bytes[0] << 24 |\r\n        bytes[1] << 16 |\r\n        bytes[2] <<  8 |\r\n
bytes[3],\r\n        unsigned\r\n    );\r\n};\r\n","/*eslint-disable block-scoped-var, id-length, no-control-regex, no-
magic-numbers, no-prototype-builtins, no-redeclare, no-shadow, no-var, sort-vars*/\n\"use strict\";\n\nvar $protobuf
= require(\"protobufjs/minimal\");\n\n// Common aliases\nvar $Reader = $protobuf.Reader, $Writer =
$protobuf.Writer, $util = $protobuf.util;\n\n// Exported root namespace\nvar $root = $protobuf.roots[\"default\"] ||
($protobuf.roots[\"default\"] = {});\n\n$root.onnx = (function() {\n\n    /**\n     * Namespace onnx.\n     * @exports
onnx\n     * @namespace\n     */\n    var onnx = {};\n\n    /**\n     * Version enum.\n     * @name onnx.Version\n
* @enum {string}\n     * @property {number} _START_VERSION=0 _START_VERSION value\n     * @property
{number} IR_VERSION_2017_10_10=1 IR_VERSION_2017_10_10 value\n     * @property {number}
IR_VERSION_2017_10_30=2 IR_VERSION_2017_10_30 value\n     * @property {number}
IR_VERSION_2017_11_3=3 IR_VERSION_2017_11_3 value\n     * @property {number}
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IR_VERSION_2019_1_22=4 IR_VERSION_2019_1_22 value\n     * @property {number} IR_VERSION=5
IR_VERSION value\n     */\n    onnx.Version = (function() {\n        var valuesById = {}, values =
Object.create(valuesById);\n        values[valuesById[0] = \"_START_VERSION\"] = 0;\n        values[valuesById[1]
= \"IR_VERSION_2017_10_10\"] = 1;\n        values[valuesById[2] = \"IR_VERSION_2017_10_30\"] = 2;\n
values[valuesById[3] = \"IR_VERSION_2017_11_3\"] = 3;\n        values[valuesById[4] =
\"IR_VERSION_2019_1_22\"] = 4;\n        values[valuesById[5] = \"IR_VERSION\"] = 5;\n        return values;\n
})();\n\n    onnx.AttributeProto = (function() {\n\n        /**\n         * Properties of an AttributeProto.\n         *
@memberof onnx\n         * @interface IAttributeProto\n         * @property {string|null} [name] AttributeProto
name\n         * @property {string|null} [refAttrName] AttributeProto refAttrName\n         * @property {string|null}
[docString] AttributeProto docString\n         * @property {onnx.AttributeProto.AttributeType|null} [type]
AttributeProto type\n         * @property {number|null} [f] AttributeProto f\n         * @property {number|Long|null}
[i] AttributeProto i\n         * @property {Uint8Array|null} [s] AttributeProto s\n         * @property
{onnx.ITensorProto|null} [t] AttributeProto t\n         * @property {onnx.IGraphProto|null} [g] AttributeProto g\n
 * @property {Array.<number>|null} [floats] AttributeProto floats\n         * @property
{Array.<number|Long>|null} [ints] AttributeProto ints\n         * @property {Array.<Uint8Array>|null} [strings]
AttributeProto strings\n         * @property {Array.<onnx.ITensorProto>|null} [tensors] AttributeProto tensors\n
* @property {Array.<onnx.IGraphProto>|null} [graphs] AttributeProto graphs\n         */\n\n        /**\n         *
Constructs a new AttributeProto.\n         * @memberof onnx\n         * @classdesc Represents an AttributeProto.\n
  * @implements IAttributeProto\n         * @constructor\n         * @param {onnx.IAttributeProto=} [properties]
Properties to set\n         */\n        function AttributeProto(properties) {\n            this.floats = [];\n            this.ints =
[];\n            this.strings = [];\n            this.tensors = [];\n            this.graphs = [];\n            if (properties)\n
for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n                    if (properties[keys[i]] != null)\n
              this[keys[i]] = properties[keys[i]];\n        }\n\n        /**\n         * AttributeProto name.\n         * @member
{string} name\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.name = \"\";\n\n        /**\n         * AttributeProto refAttrName.\n         * @member {string}
refAttrName\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.refAttrName = \"\";\n\n        /**\n         * AttributeProto docString.\n         * @member
{string} docString\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.docString = \"\";\n\n        /**\n         * AttributeProto type.\n         * @member
{onnx.AttributeProto.AttributeType} type\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
    AttributeProto.prototype.type = 0;\n\n        /**\n         * AttributeProto f.\n         * @member {number} f\n         *
@memberof onnx.AttributeProto\n         * @instance\n         */\n        AttributeProto.prototype.f = 0;\n\n        /**\n
   * AttributeProto i.\n         * @member {number|Long} i\n         * @memberof onnx.AttributeProto\n         *
@instance\n         */\n        AttributeProto.prototype.i = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n        /**\n
      * AttributeProto s.\n         * @member {Uint8Array} s\n         * @memberof onnx.AttributeProto\n         *
@instance\n         */\n        AttributeProto.prototype.s = $util.newBuffer([]);\n\n        /**\n         * AttributeProto t.\n
    * @member {onnx.ITensorProto|null|undefined} t\n         * @memberof onnx.AttributeProto\n         *
@instance\n         */\n        AttributeProto.prototype.t = null;\n\n        /**\n         * AttributeProto g.\n         *
@member {onnx.IGraphProto|null|undefined} g\n         * @memberof onnx.AttributeProto\n         * @instance\n
 */\n        AttributeProto.prototype.g = null;\n\n        /**\n         * AttributeProto floats.\n         * @member
{Array.<number>} floats\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.floats = $util.emptyArray;\n\n        /**\n         * AttributeProto ints.\n         * @member
{Array.<number|Long>} ints\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.ints = $util.emptyArray;\n\n        /**\n         * AttributeProto strings.\n         * @member
{Array.<Uint8Array>} strings\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.strings = $util.emptyArray;\n\n        /**\n         * AttributeProto tensors.\n         * @member
{Array.<onnx.ITensorProto>} tensors\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.tensors = $util.emptyArray;\n\n        /**\n         * AttributeProto graphs.\n         * @member
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{Array.<onnx.IGraphProto>} graphs\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.graphs = $util.emptyArray;\n\n        /**\n         * Creates a new AttributeProto instance
using the specified properties.\n         * @function create\n         * @memberof onnx.AttributeProto\n         *
@static\n         * @param {onnx.IAttributeProto=} [properties] Properties to set\n         * @returns
{onnx.AttributeProto} AttributeProto instance\n         */\n        AttributeProto.create = function create(properties) {\n
         return new AttributeProto(properties);\n        };\n\n        /**\n         * Encodes the specified AttributeProto
message. Does not implicitly {@link onnx.AttributeProto.verify|verify} messages.\n         * @function encode\n
* @memberof onnx.AttributeProto\n         * @static\n         * @param {onnx.IAttributeProto} message
AttributeProto message or plain object to encode\n         * @param {$protobuf.Writer} [writer] Writer to encode
to\n         * @returns {$protobuf.Writer} Writer\n         */\n        AttributeProto.encode = function encode(message,
writer) {\n            if (!writer)\n                writer = $Writer.create();\n            if (message.name != null &&
message.hasOwnProperty(\"name\"))\n                writer.uint32(/* id 1, wireType 2 =*/10).string(message.name);\n
       if (message.f != null && message.hasOwnProperty(\"f\"))\n                writer.uint32(/* id 2, wireType 5
=*/21).float(message.f);\n            if (message.i != null && message.hasOwnProperty(\"i\"))\n
writer.uint32(/* id 3, wireType 0 =*/24).int64(message.i);\n            if (message.s != null &&
message.hasOwnProperty(\"s\"))\n                writer.uint32(/* id 4, wireType 2 =*/34).bytes(message.s);\n            if
(message.t != null && message.hasOwnProperty(\"t\"))\n                $root.onnx.TensorProto.encode(message.t,
writer.uint32(/* id 5, wireType 2 =*/42).fork()).ldelim();\n            if (message.g != null &&
message.hasOwnProperty(\"g\"))\n                $root.onnx.GraphProto.encode(message.g, writer.uint32(/* id 6,
wireType 2 =*/50).fork()).ldelim();\n            if (message.floats != null && message.floats.length) {\n
writer.uint32(/* id 7, wireType 2 =*/58).fork();\n                for (var i = 0; i < message.floats.length; ++i)\n
 writer.float(message.floats[i]);\n                writer.ldelim();\n            }\n            if (message.ints != null &&
message.ints.length) {\n                writer.uint32(/* id 8, wireType 2 =*/66).fork();\n                for (var i = 0; i <
message.ints.length; ++i)\n                    writer.int64(message.ints[i]);\n                writer.ldelim();\n            }\n
if (message.strings != null && message.strings.length)\n                for (var i = 0; i < message.strings.length; ++i)\n
             writer.uint32(/* id 9, wireType 2 =*/74).bytes(message.strings[i]);\n            if (message.tensors != null &&
message.tensors.length)\n                for (var i = 0; i < message.tensors.length; ++i)\n
$root.onnx.TensorProto.encode(message.tensors[i], writer.uint32(/* id 10, wireType 2 =*/82).fork()).ldelim();\n
   if (message.graphs != null && message.graphs.length)\n                for (var i = 0; i < message.graphs.length; ++i)\n
                 $root.onnx.GraphProto.encode(message.graphs[i], writer.uint32(/* id 11, wireType 2
=*/90).fork()).ldelim();\n            if (message.docString != null && message.hasOwnProperty(\"docString\"))\n
    writer.uint32(/* id 13, wireType 2 =*/106).string(message.docString);\n            if (message.type != null &&
message.hasOwnProperty(\"type\"))\n                writer.uint32(/* id 20, wireType 0 =*/160).int32(message.type);\n
      if (message.refAttrName != null && message.hasOwnProperty(\"refAttrName\"))\n                writer.uint32(/* id
21, wireType 2 =*/170).string(message.refAttrName);\n            return writer;\n        };\n\n        /**\n         * Encodes
the specified AttributeProto message, length delimited. Does not implicitly {@link
onnx.AttributeProto.verify|verify} messages.\n         * @function encodeDelimited\n         * @memberof
onnx.AttributeProto\n         * @static\n         * @param {onnx.IAttributeProto} message AttributeProto message or
plain object to encode\n         * @param {$protobuf.Writer} [writer] Writer to encode to\n         * @returns
{$protobuf.Writer} Writer\n         */\n        AttributeProto.encodeDelimited = function encodeDelimited(message,
writer) {\n            return this.encode(message, writer).ldelim();\n        };\n\n        /**\n         * Decodes an
AttributeProto message from the specified reader or buffer.\n         * @function decode\n         * @memberof
onnx.AttributeProto\n         * @static\n         * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to
decode from\n         * @param {number} [length] Message length if known beforehand\n         * @returns
{onnx.AttributeProto} AttributeProto\n         * @throws {Error} If the payload is not a reader or valid buffer\n
* @throws {$protobuf.util.ProtocolError} If required fields are missing\n         */\n        AttributeProto.decode =
function decode(reader, length) {\n            if (!(reader instanceof $Reader))\n                reader =
$Reader.create(reader);\n            var end = length === undefined ? reader.len : reader.pos + length, message = new
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$root.onnx.AttributeProto();\n        while (reader.pos < end) {\n            var tag = reader.uint32();\n
switch (tag >>> 3) {\n            case 1:\n                message.name = reader.string();\n                break;\n
 case 21:\n                message.refAttrName = reader.string();\n                break;\n            case 13:\n
message.docString = reader.string();\n                break;\n            case 20:\n                message.type =
reader.int32();\n                break;\n            case 2:\n                message.f = reader.float();\n
break;\n            case 3:\n                message.i = reader.int64();\n                break;\n            case 4:\n
   message.s = reader.bytes();\n                break;\n            case 5:\n                message.t =
$root.onnx.TensorProto.decode(reader, reader.uint32());\n                break;\n            case 6:\n
message.g = $root.onnx.GraphProto.decode(reader, reader.uint32());\n                break;\n            case 7:\n
       if (!(message.floats && message.floats.length))\n                    message.floats = [];\n                if ((tag & 7)
=== 2) {\n                    var end2 = reader.uint32() + reader.pos;\n                    while (reader.pos < end2)\n
            message.floats.push(reader.float());\n                } else\n
message.floats.push(reader.float());\n                break;\n            case 8:\n                if (!(message.ints &&
message.ints.length))\n                    message.ints = [];\n                if ((tag & 7) === 2) {\n                    var
end2 = reader.uint32() + reader.pos;\n                    while (reader.pos < end2)\n
message.ints.push(reader.int64());\n                } else\n                    message.ints.push(reader.int64());\n
  break;\n            case 9:\n                if (!(message.strings && message.strings.length))\n
message.strings = [];\n                message.strings.push(reader.bytes());\n                break;\n            case 10:\n
            if (!(message.tensors && message.tensors.length))\n                    message.tensors = [];\n
message.tensors.push($root.onnx.TensorProto.decode(reader, reader.uint32()));\n                break;\n            case
11:\n                if (!(message.graphs && message.graphs.length))\n                    message.graphs = [];\n
  message.graphs.push($root.onnx.GraphProto.decode(reader, reader.uint32()));\n                break;\n
default:\n                reader.skipType(tag & 7);\n                break;\n            }\n        }\n        return
message;\n    };\n\n    /**\n     * Decodes an AttributeProto message from the specified reader or buffer,
length delimited.\n     * @function decodeDelimited\n     * @memberof onnx.AttributeProto\n     * @static\n
     * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n     * @returns
{onnx.AttributeProto} AttributeProto\n     * @throws {Error} If the payload is not a reader or valid buffer\n
* @throws {$protobuf.util.ProtocolError} If required fields are missing\n     */\n
AttributeProto.decodeDelimited = function decodeDelimited(reader) {\n        if (!(reader instanceof $Reader))\n
        reader = new $Reader(reader);\n        return this.decode(reader, reader.uint32());\n    };\n\n    /**\n
* Verifies an AttributeProto message.\n     * @function verify\n     * @memberof onnx.AttributeProto\n     *
@static\n     * @param {Object.<string,*>} message Plain object to verify\n     * @returns {string|null} `null`
if valid, otherwise the reason why it is not\n     */\n    AttributeProto.verify = function verify(message) {\n
 if (typeof message !== \"object\" || message === null)\n            return \"object expected\";\n        if
(message.name != null && message.hasOwnProperty(\"name\"))\n            if (!$util.isString(message.name))\n
          return \"name: string expected\";\n        if (message.refAttrName != null &&
message.hasOwnProperty(\"refAttrName\"))\n            if (!$util.isString(message.refAttrName))\n
return \"refAttrName: string expected\";\n        if (message.docString != null &&
message.hasOwnProperty(\"docString\"))\n            if (!$util.isString(message.docString))\n                return
\"docString: string expected\";\n        if (message.type != null && message.hasOwnProperty(\"type\"))\n
switch (message.type) {\n            default:\n                return \"type: enum value expected\";\n            case 0:\n
            case 1:\n            case 2:\n            case 3:\n            case 4:\n            case 5:\n            case 6:\n
     case 7:\n            case 8:\n            case 9:\n            case 10:\n                break;\n            }\n        if
(message.f != null && message.hasOwnProperty(\"f\"))\n            if (typeof message.f !== \"number\")\n
  return \"f: number expected\";\n        if (message.i != null && message.hasOwnProperty(\"i\"))\n            if
(!$util.isInteger(message.i) && !(message.i && $util.isInteger(message.i.low) &&
$util.isInteger(message.i.high)))\n                return \"i: integer|Long expected\";\n        if (message.s != null &&
message.hasOwnProperty(\"s\"))\n            if (!(message.s && typeof message.s.length === \"number\" ||
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$util.isString(message.s)))\n                    return \"s: buffer expected\";\n            if (message.t != null &&
message.hasOwnProperty(\"t\")) {\n                var error = $root.onnx.TensorProto.verify(message.t);\n                if
(error)\n                    return \"t.\" + error;\n            }\n            if (message.g != null &&
message.hasOwnProperty(\"g\")) {\n                var error = $root.onnx.GraphProto.verify(message.g);\n                if
(error)\n                    return \"g.\" + error;\n            }\n            if (message.floats != null &&
message.hasOwnProperty(\"floats\")) {\n                if (!Array.isArray(message.floats))\n                    return \"floats:
array expected\";\n                for (var i = 0; i < message.floats.length; ++i)\n                    if (typeof message.floats[i]
!== \"number\")\n                        return \"floats: number[] expected\";\n            }\n            if (message.ints != null
&& message.hasOwnProperty(\"ints\")) {\n                if (!Array.isArray(message.ints))\n                    return \"ints:
array expected\";\n                for (var i = 0; i < message.ints.length; ++i)\n                    if
(!$util.isInteger(message.ints[i]) && !(message.ints[i] && $util.isInteger(message.ints[i].low) &&
$util.isInteger(message.ints[i].high)))\n                        return \"ints: integer|Long[] expected\";\n            }\n            if
(message.strings != null && message.hasOwnProperty(\"strings\")) {\n                if
(!Array.isArray(message.strings))\n                    return \"strings: array expected\";\n                for (var i = 0; i <
message.strings.length; ++i)\n                    if (!(message.strings[i] && typeof message.strings[i].length ===
\"number\" || $util.isString(message.strings[i])))\n                        return \"strings: buffer[] expected\";\n            }\n
    if (message.tensors != null && message.hasOwnProperty(\"tensors\")) {\n                if
(!Array.isArray(message.tensors))\n                    return \"tensors: array expected\";\n                for (var i = 0; i <
message.tensors.length; ++i) {\n                    var error = $root.onnx.TensorProto.verify(message.tensors[i]);\n
      if (error)\n                        return \"tensors.\" + error;\n                }\n            }\n            if (message.graphs != null
&& message.hasOwnProperty(\"graphs\")) {\n                if (!Array.isArray(message.graphs))\n                    return
\"graphs: array expected\";\n                for (var i = 0; i < message.graphs.length; ++i) {\n                    var error =
$root.onnx.GraphProto.verify(message.graphs[i]);\n                    if (error)\n                        return \"graphs.\" +
error;\n                }\n            }\n            return null;\n        };\n\n        /**\n         * Creates an AttributeProto message
from a plain object. Also converts values to their respective internal types.\n         * @function fromObject\n         *
@memberof onnx.AttributeProto\n         * @static\n         * @param {Object.<string,*>} object Plain object\n
* @returns {onnx.AttributeProto} AttributeProto\n         */\n        AttributeProto.fromObject = function
fromObject(object) {\n            if (object instanceof $root.onnx.AttributeProto)\n                return object;\n            var
message = new $root.onnx.AttributeProto();\n            if (object.name != null)\n                message.name =
String(object.name);\n            if (object.refAttrName != null)\n                message.refAttrName =
String(object.refAttrName);\n            if (object.docString != null)\n                message.docString =
String(object.docString);\n            switch (object.type) {\n            case \"UNDEFINED\":\n            case 0:\n
message.type = 0;\n                break;\n            case \"FLOAT\":\n            case 1:\n                message.type = 1;\n
    break;\n            case \"INT\":\n            case 2:\n                message.type = 2;\n                break;\n            case
\"STRING\":\n            case 3:\n                message.type = 3;\n                break;\n            case \"TENSOR\":\n
case 4:\n                message.type = 4;\n                break;\n            case \"GRAPH\":\n            case 5:\n
message.type = 5;\n                break;\n            case \"FLOATS\":\n            case 6:\n                message.type = 6;\n
      break;\n            case \"INTS\":\n            case 7:\n                message.type = 7;\n                break;\n            case
\"STRINGS\":\n            case 8:\n                message.type = 8;\n                break;\n            case \"TENSORS\":\n
case 9:\n                message.type = 9;\n                break;\n            case \"GRAPHS\":\n            case 10:\n
message.type = 10;\n                break;\n            }\n            if (object.f != null)\n                message.f =
Number(object.f);\n            if (object.i != null)\n                if ($util.Long)\n                    (message.i =
$util.Long.fromValue(object.i)).unsigned = false;\n                else if (typeof object.i === \"string\")\n
message.i = parseInt(object.i, 10);\n                else if (typeof object.i === \"number\")\n                    message.i =
object.i;\n                else if (typeof object.i === \"object\")\n                    message.i = new $util.LongBits(object.i.low
>>> 0, object.i.high >>> 0).toNumber();\n            if (object.s != null)\n                if (typeof object.s === \"string\")\n
                $util.base64.decode(object.s, message.s = $util.newBuffer($util.base64.length(object.s)), 0);\n
else if (object.s.length)\n                    message.s = object.s;\n            if (object.t != null) {\n                if (typeof
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object.t !== \"object\")\n throw TypeError(\".onnx.AttributeProto.t: object expected\");\n message.t = $root.onnx.TensorProto.fromObject(object.t);\n }\n if (object.g != null) {\n if (typeof object.g !== \"object\")\n throw TypeError(\".onnx.AttributeProto.g: object expected\");\n message.g = $root.onnx.GraphProto.fromObject(object.g);\n }\n if (object.floats) {\n if (!Array.isArray(object.floats))\n throw TypeError(\".onnx.AttributeProto.floats: array expected\");\n message.floats = [];\n for (var i = 0; i < object.floats.length; ++i)\n message.floats[i] = Number(object.floats[i]);\n }\n if (object.ints) {\n if (!Array.isArray(object.ints))\n throw TypeError(\".onnx.AttributeProto.ints: array expected\");\n message.ints = [];\n for (var i = 0; i < object.ints.length; ++i)\n if ($util.Long)\n (message.ints[i] = $util.Long.fromValue(object.ints[i])).unsigned = false;\n else if (typeof object.ints[i] === \"string\")\n message.ints[i] = parseInt(object.ints[i], 10);\n else if (typeof object.ints[i] === \"number\")\n message.ints[i] = object.ints[i];\n else if (typeof object.ints[i] === \"object\")\n message.ints[i] = new $util.LongBits(object.ints[i].low >>> 0, object.ints[i].high >>> 0).toNumber();\n }\n if (object.strings) {\n if (!Array.isArray(object.strings))\n throw TypeError(\".onnx.AttributeProto.strings: array expected\");\n message.strings = [];\n for (var i = 0; i < object.strings.length; ++i)\n if (typeof object.strings[i] === \"string\")\n $util.base64.decode(object.strings[i], message.strings[i] = $util.newBuffer($util.base64.length(object.strings[i])), 0);\n else if (object.strings[i].length)\n message.strings[i] = object.strings[i];\n }\n if (object.tensors) {\n if (!Array.isArray(object.tensors))\n throw TypeError(\".onnx.AttributeProto.tensors: array expected\");\n message.tensors = [];\n for (var i = 0; i < object.tensors.length; ++i) {\n if (typeof object.tensors[i] !== \"object\")\n throw TypeError(\".onnx.AttributeProto.tensors: object expected\");\n message.tensors[i] = $root.onnx.TensorProto.fromObject(object.tensors[i]);\n }\n }\n if (object.graphs) {\n if (!Array.isArray(object.graphs))\n throw TypeError(\".onnx.AttributeProto.graphs: array expected\");\n message.graphs = [];\n for (var i = 0; i < object.graphs.length; ++i) {\n if (typeof object.graphs[i] !== \"object\")\n throw TypeError(\".onnx.AttributeProto.graphs: object expected\");\n message.graphs[i] = $root.onnx.GraphProto.fromObject(object.graphs[i]);\n }\n }\n return message;\n };\n\n /**\n * Creates a plain object from an AttributeProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.AttributeProto\n * @static\n * @param {onnx.AttributeProto} message AttributeProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n AttributeProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.arrays || options.defaults) {\n object.floats = [];\n object.ints = [];\n object.strings = [];\n object.tensors = [];\n object.graphs = [];\n }\n if (options.defaults) {\n object.name = \"\";\n object.f = 0;\n if ($util.Long) {\n var long = new $util.Long(0, 0, false);\n object.i = options.longs === String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n } else\n object.i = options.longs === String ? \"0\" : 0;\n if (options.bytes === String)\n object.s = \"\";\n else {\n object.s = [];\n if (options.bytes !== Array)\n object.s = $util.newBuffer(object.s);\n }\n object.t = null;\n object.g = null;\n object.docString = \"\";\n object.type = options.enums === String ? \"UNDEFINED\" : 0;\n object.refAttrName = \"\";\n }\n if (message.name != null && message.hasOwnProperty(\"name\"))\n object.name = message.name;\n if (message.f != null && message.hasOwnProperty(\"f\"))\n object.f = options.json && !isFinite(message.f) ? String(message.f) : message.f;\n if (message.i != null && message.hasOwnProperty(\"i\"))\n if (typeof message.i === \"number\")\n object.i = options.longs === String ? String(message.i) : message.i;\n else\n object.i = options.longs === String ? $util.Long.prototype.toString.call(message.i) : options.longs === Number ? new $util.LongBits(message.i.low >>> 0, message.i.high >>> 0).toNumber() : message.i;\n if (message.s != null

&& message.hasOwnProperty(\"s\"))\n object.s = options.bytes === String ? $util.base64.encode(message.s, 0, message.s.length) : options.bytes === Array ? Array.prototype.slice.call(message.s) : message.s;\n if (message.t != null && message.hasOwnProperty(\"t\"))\n object.t = $root.onnx.TensorProto.toObject(message.t, options);\n if (message.g != null && message.hasOwnProperty(\"g\"))\n object.g = $root.onnx.GraphProto.toObject(message.g, options);\n if (message.floats && message.floats.length) {\n object.floats = [];\n for (var j = 0; j < message.floats.length; ++j)\n object.floats[j] = options.json && !isFinite(message.floats[j]) ? String(message.floats[j]) : message.floats[j];\n }\n if (message.ints && message.ints.length) {\n object.ints = [];\n for (var j = 0; j < message.ints.length; ++j)\n if (typeof message.ints[j] === \"number\")\n object.ints[j] = options.longs === String ? String(message.ints[j]) : message.ints[j];\n else\n object.ints[j] = options.longs === String ? $util.Long.prototype.toString.call(message.ints[j]) : options.longs === Number ? new $util.LongBits(message.ints[j].low >>> 0, message.ints[j].high >>> 0).toNumber() : message.ints[j];\n }\n if (message.strings && message.strings.length) {\n object.strings = [];\n for (var j = 0; j < message.strings.length; ++j)\n object.strings[j] = options.bytes === String ? $util.base64.encode(message.strings[j], 0, message.strings[j].length) : options.bytes === Array ? Array.prototype.slice.call(message.strings[j]) : message.strings[j];\n }\n if (message.tensors && message.tensors.length) {\n object.tensors = [];\n for (var j = 0; j < message.tensors.length; ++j)\n object.tensors[j] = $root.onnx.TensorProto.toObject(message.tensors[j], options);\n }\n if (message.graphs && message.graphs.length) {\n object.graphs = [];\n for (var j = 0; j < message.graphs.length; ++j)\n object.graphs[j] = $root.onnx.GraphProto.toObject(message.graphs[j], options);\n }\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n object.docString = message.docString;\n if (message.type != null && message.hasOwnProperty(\"type\"))\n object.type = options.enums === String ? $root.onnx.AttributeProto.AttributeType[message.type] : message.type;\n if (message.refAttrName != null && message.hasOwnProperty(\"refAttrName\"))\n object.refAttrName = message.refAttrName;\n return object;\n };\n\n /**\n * Converts this AttributeProto to JSON.\n * @function toJSON\n * @memberof onnx.AttributeProto\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n AttributeProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n /**\n * AttributeType enum.\n * @name onnx.AttributeProto.AttributeType\n * @enum {string}\n * @property {number} UNDEFINED=0 UNDEFINED value\n * @property {number} FLOAT=1 FLOAT value\n * @property {number} INT=2 INT value\n * @property {number} STRING=3 STRING value\n * @property {number} TENSOR=4 TENSOR value\n * @property {number} GRAPH=5 GRAPH value\n * @property {number} FLOATS=6 FLOATS value\n * @property {number} INTS=7 INTS value\n * @property {number} STRINGS=8 STRINGS value\n * @property {number} TENSORS=9 TENSORS value\n * @property {number} GRAPHS=10 GRAPHS value\n */\n AttributeProto.AttributeType = (function() {\n var valuesById = {}, values = Object.create(valuesById);\n values[valuesById[0] = \"UNDEFINED\"] = 0;\n values[valuesById[1] = \"FLOAT\"] = 1;\n values[valuesById[2] = \"INT\"] = 2;\n values[valuesById[3] = \"STRING\"] = 3;\n values[valuesById[4] = \"TENSOR\"] = 4;\n values[valuesById[5] = \"GRAPH\"] = 5;\n values[valuesById[6] = \"FLOATS\"] = 6;\n values[valuesById[7] = \"INTS\"] = 7;\n values[valuesById[8] = \"STRINGS\"] = 8;\n values[valuesById[9] = \"TENSORS\"] = 9;\n values[valuesById[10] = \"GRAPHS\"] = 10;\n return values;\n })();\n\n return AttributeProto;\n })();\n\n onnx.ValueInfoProto = (function() {\n\n /**\n * Properties of a ValueInfoProto.\n * @memberof onnx\n * @interface IValueInfoProto\n * @property {string|null} [name] ValueInfoProto name\n * @property {onnx.ITypeProto|null} [type] ValueInfoProto type\n * @property {string|null} [docString] ValueInfoProto docString\n */\n\n /**\n * Constructs a new ValueInfoProto.\n * @memberof onnx\n * @classdesc Represents a ValueInfoProto.\n * @implements IValueInfoProto\n * @constructor\n * @param

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{onnx.IValueInfoProto=} [properties] Properties to set\n         */\n        function ValueInfoProto(properties) {\n
 if (properties)\n                for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n                    if
(properties[keys[i]] != null)\n                        this[keys[i]] = properties[keys[i]];\n        }\n\n        /**\n         *
ValueInfoProto name.\n         * @member {string} name\n         * @memberof onnx.ValueInfoProto\n         *
@instance\n         */\n        ValueInfoProto.prototype.name = \"\";\n\n        /**\n         * ValueInfoProto type.\n         *
@member {onnx.ITypeProto|null|undefined} type\n         * @memberof onnx.ValueInfoProto\n         * @instance\n
      */\n        ValueInfoProto.prototype.type = null;\n\n        /**\n         * ValueInfoProto docString.\n         *
@member {string} docString\n         * @memberof onnx.ValueInfoProto\n         * @instance\n         */\n
ValueInfoProto.prototype.docString = \"\";\n\n        /**\n         * Creates a new ValueInfoProto instance using the
specified properties.\n         * @function create\n         * @memberof onnx.ValueInfoProto\n         * @static\n         *
@param {onnx.IValueInfoProto=} [properties] Properties to set\n         * @returns {onnx.ValueInfoProto}
ValueInfoProto instance\n         */\n        ValueInfoProto.create = function create(properties) {\n            return new
ValueInfoProto(properties);\n        };\n\n        /**\n         * Encodes the specified ValueInfoProto message. Does not
implicitly {@link onnx.ValueInfoProto.verify|verify} messages.\n         * @function encode\n         * @memberof
onnx.ValueInfoProto\n         * @static\n         * @param {onnx.IValueInfoProto} message ValueInfoProto message
or plain object to encode\n         * @param {$protobuf.Writer} [writer] Writer to encode to\n         * @returns
{$protobuf.Writer} Writer\n         */\n        ValueInfoProto.encode = function encode(message, writer) {\n            if
(!writer)\n                writer = $Writer.create();\n            if (message.name != null &&
message.hasOwnProperty(\"name\"))\n                writer.uint32(/* id 1, wireType 2 =*/10).string(message.name);\n
       if (message.type != null && message.hasOwnProperty(\"type\"))\n
$root.onnx.TypeProto.encode(message.type, writer.uint32(/* id 2, wireType 2 =*/18).fork()).ldelim();\n            if
(message.docString != null && message.hasOwnProperty(\"docString\"))\n                writer.uint32(/* id 3, wireType
2 =*/26).string(message.docString);\n            return writer;\n        };\n\n        /**\n         * Encodes the specified
ValueInfoProto message, length delimited. Does not implicitly {@link onnx.ValueInfoProto.verify|verify}
messages.\n         * @function encodeDelimited\n         * @memberof onnx.ValueInfoProto\n         * @static\n
* @param {onnx.IValueInfoProto} message ValueInfoProto message or plain object to encode\n         * @param
{$protobuf.Writer} [writer] Writer to encode to\n         * @returns {$protobuf.Writer} Writer\n         */\n
ValueInfoProto.encodeDelimited = function encodeDelimited(message, writer) {\n            return
this.encode(message, writer).ldelim();\n        };\n\n        /**\n         * Decodes a ValueInfoProto message from the
specified reader or buffer.\n         * @function decode\n         * @memberof onnx.ValueInfoProto\n         * @static\n
       * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @param {number}
[length] Message length if known beforehand\n         * @returns {onnx.ValueInfoProto} ValueInfoProto\n         *
@throws {Error} If the payload is not a reader or valid buffer\n         * @throws {$protobuf.util.ProtocolError} If
required fields are missing\n         */\n        ValueInfoProto.decode = function decode(reader, length) {\n            if
(!(reader instanceof $Reader))\n                reader = $Reader.create(reader);\n            var end = length === undefined
? reader.len : reader.pos + length, message = new $root.onnx.ValueInfoProto();\n            while (reader.pos < end)
{\n                var tag = reader.uint32();\n                switch (tag >>> 3) {\n                case 1:\n
message.name = reader.string();\n                    break;\n                case 2:\n                    message.type =
$root.onnx.TypeProto.decode(reader, reader.uint32());\n                    break;\n                case 3:\n
message.docString = reader.string();\n                    break;\n                default:\n                    reader.skipType(tag &
7);\n                    break;\n                }\n            }\n            return message;\n        };\n\n        /**\n         * Decodes a
ValueInfoProto message from the specified reader or buffer, length delimited.\n         * @function
decodeDelimited\n         * @memberof onnx.ValueInfoProto\n         * @static\n         * @param
{$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @returns {onnx.ValueInfoProto}
ValueInfoProto\n         * @throws {Error} If the payload is not a reader or valid buffer\n         * @throws
{$protobuf.util.ProtocolError} If required fields are missing\n         */\n        ValueInfoProto.decodeDelimited =
function decodeDelimited(reader) {\n            if (!(reader instanceof $Reader))\n                reader = new
$Reader(reader);\n            return this.decode(reader, reader.uint32());\n        };\n\n        /**\n         * Verifies a
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ValueInfoProto message.\n * @function verify\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n ValueInfoProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.name != null && message.hasOwnProperty(\"name\"))\n if (!$util.isString(message.name))\n return \"name: string expected\";\n if (message.type != null && message.hasOwnProperty(\"type\")) {\n var error = $root.onnx.TypeProto.verify(message.type);\n if (error)\n return \"type.\" + error;\n }\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n if (!$util.isString(message.docString))\n return \"docString: string expected\";\n return null;\n };\n\n /**\n * Creates a ValueInfoProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.ValueInfoProto} ValueInfoProto\n */\n ValueInfoProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.ValueInfoProto)\n return object;\n var message = new $root.onnx.ValueInfoProto();\n if (object.name != null)\n message.name = String(object.name);\n if (object.type != null) {\n if (typeof object.type !== \"object\")\n throw TypeError(\".onnx.ValueInfoProto.type: object expected\");\n message.type = $root.onnx.TypeProto.fromObject(object.type);\n }\n if (object.docString != null)\n message.docString = String(object.docString);\n return message;\n };\n\n /**\n * Creates a plain object from a ValueInfoProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {onnx.ValueInfoProto} message ValueInfoProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n ValueInfoProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.defaults) {\n object.name = \"\";\n object.type = null;\n object.docString = \"\";\n }\n if (message.name != null && message.hasOwnProperty(\"name\"))\n object.name = message.name;\n if (message.type != null && message.hasOwnProperty(\"type\"))\n object.type = $root.onnx.TypeProto.toObject(message.type, options);\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n object.docString = message.docString;\n return object;\n };\n\n /**\n * Converts this ValueInfoProto to JSON.\n * @function toJSON\n * @memberof onnx.ValueInfoProto\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n ValueInfoProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return ValueInfoProto;\n })();\n\n onnx.NodeProto = (function() {\n\n /**\n * Properties of a NodeProto.\n * @memberof onnx\n * @interface INodeProto\n * @property {Array.<string>|null} [input] NodeProto input\n * @property {Array.<string>|null} [output] NodeProto output\n * @property {string|null} [name] NodeProto name\n * @property {string|null} [opType] NodeProto opType\n * @property {string|null} [domain] NodeProto domain\n * @property {Array.<onnx.IAttributeProto>|null} [attribute] NodeProto attribute\n * @property {string|null} [docString] NodeProto docString\n */\n\n /**\n * Constructs a new NodeProto.\n * @memberof onnx\n * @classdesc Represents a NodeProto.\n * @implements INodeProto\n * @constructor\n * @param {onnx.INodeProto=} [properties] Properties to set\n */\n function NodeProto(properties) {\n this.input = [];\n this.output = [];\n this.attribute = [];\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * NodeProto input.\n * @member {Array.<string>} input\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.input = $util.emptyArray;\n\n /**\n * NodeProto output.\n * @member {Array.<string>} output\n * @memberof onnx.NodeProto\n * @instance\n */\n NodeProto.prototype.output = $util.emptyArray;\n\n /**\n * NodeProto name.\n * @member {string}

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name\n         * @memberof onnx.NodeProto\n         * @instance\n         */\n         NodeProto.prototype.name =
\"\";\n\n         /**\n         * NodeProto opType.\n         * @member {string} opType\n         * @memberof
onnx.NodeProto\n         * @instance\n         */\n         NodeProto.prototype.opType = \"\";\n\n         /**\n         *
NodeProto domain.\n         * @member {string} domain\n         * @memberof onnx.NodeProto\n         *
@instance\n         */\n         NodeProto.prototype.domain = \"\";\n\n         /**\n         * NodeProto attribute.\n         *
@member {Array.<onnx.IAttributeProto>} attribute\n         * @memberof onnx.NodeProto\n         * @instance\n
  */\n         NodeProto.prototype.attribute = $util.emptyArray;\n\n         /**\n         * NodeProto docString.\n         *
@member {string} docString\n         * @memberof onnx.NodeProto\n         * @instance\n         */\n
NodeProto.prototype.docString = \"\";\n\n         /**\n         * Creates a new NodeProto instance using the specified
properties.\n         * @function create\n         * @memberof onnx.NodeProto\n         * @static\n         * @param
{onnx.INodeProto=} [properties] Properties to set\n         * @returns {onnx.NodeProto} NodeProto instance\n
*/\n         NodeProto.create = function create(properties) {\n             return new NodeProto(properties);\n         };\n\n
  /**\n         * Encodes the specified NodeProto message. Does not implicitly {@link onnx.NodeProto.verify|verify}
messages.\n         * @function encode\n         * @memberof onnx.NodeProto\n         * @static\n         * @param
{onnx.INodeProto} message NodeProto message or plain object to encode\n         * @param {$protobuf.Writer}
[writer] Writer to encode to\n         * @returns {$protobuf.Writer} Writer\n         */\n         NodeProto.encode =
function encode(message, writer) {\n             if (!writer)\n                 writer = $Writer.create();\n             if
(message.input != null && message.input.length)\n                 for (var i = 0; i < message.input.length; ++i)\n
   writer.uint32(/* id 1, wireType 2 =*/10).string(message.input[i]);\n             if (message.output != null &&
message.output.length)\n                 for (var i = 0; i < message.output.length; ++i)\n                 writer.uint32(/* id 2,
wireType 2 =*/18).string(message.output[i]);\n             if (message.name != null &&
message.hasOwnProperty(\"name\"))\n                 writer.uint32(/* id 3, wireType 2 =*/26).string(message.name);\n
      if (message.opType != null && message.hasOwnProperty(\"opType\"))\n                 writer.uint32(/* id 4,
wireType 2 =*/34).string(message.opType);\n             if (message.attribute != null && message.attribute.length)\n
        for (var i = 0; i < message.attribute.length; ++i)\n
$root.onnx.AttributeProto.encode(message.attribute[i], writer.uint32(/* id 5, wireType 2 =*/42).fork()).ldelim();\n
      if (message.docString != null && message.hasOwnProperty(\"docString\"))\n                 writer.uint32(/* id 6,
wireType 2 =*/50).string(message.docString);\n             if (message.domain != null &&
message.hasOwnProperty(\"domain\"))\n                 writer.uint32(/* id 7, wireType 2
=*/58).string(message.domain);\n             return writer;\n         };\n\n         /**\n         * Encodes the specified
NodeProto message, length delimited. Does not implicitly {@link onnx.NodeProto.verify|verify} messages.\n         *
@function encodeDelimited\n         * @memberof onnx.NodeProto\n         * @static\n         * @param
{onnx.INodeProto} message NodeProto message or plain object to encode\n         * @param {$protobuf.Writer}
[writer] Writer to encode to\n         * @returns {$protobuf.Writer} Writer\n         */\n
NodeProto.encodeDelimited = function encodeDelimited(message, writer) {\n             return this.encode(message,
writer).ldelim();\n         };\n\n         /**\n         * Decodes a NodeProto message from the specified reader or buffer.\n
    * @function decode\n         * @memberof onnx.NodeProto\n         * @static\n         * @param
{$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @param {number} [length]
Message length if known beforehand\n         * @returns {onnx.NodeProto} NodeProto\n         * @throws {Error} If
the payload is not a reader or valid buffer\n         * @throws {$protobuf.util.ProtocolError} If required fields are
missing\n         */\n         NodeProto.decode = function decode(reader, length) {\n             if (!(reader instanceof
$Reader))\n                 reader = $Reader.create(reader);\n             var end = length === undefined ? reader.len :
reader.pos + length, message = new $root.onnx.NodeProto();\n             while (reader.pos < end) {\n                 var tag
= reader.uint32();\n                 switch (tag >>> 3) {\n                 case 1:\n                     if (!(message.input &&
message.input.length))\n                         message.input = [];\n                     message.input.push(reader.string());\n
         break;\n                 case 2:\n                     if (!(message.output && message.output.length))\n
message.output = [];\n                     message.output.push(reader.string());\n                     break;\n                 case 3:\n
          message.name = reader.string();\n                     break;\n                 case 4:\n                     message.opType =
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reader.string();\n   break;\n   case 7:\n   message.domain = reader.string();\n   break;\n   case 5:\n   if (!(message.attribute && message.attribute.length))\n   message.attribute = [];\n   message.attribute.push($root.onnx.AttributeProto.decode(reader, reader.uint32()));\n   break;\n   case 6:\n   message.docString = reader.string();\n   break;\n   default:\n   reader.skipType(tag & 7);\n   break;\n   }\n   }\n   return message;\n   };\n\n   /**\n   * Decodes a NodeProto message from the specified reader or buffer, length delimited.\n   * @function decodeDelimited\n   * @memberof onnx.NodeProto\n   * @static\n   * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n   * @returns {onnx.NodeProto} NodeProto\n   * @throws {Error} If the payload is not a reader or valid buffer\n   * @throws {$protobuf.util.ProtocolError} If required fields are missing\n   */\n   NodeProto.decodeDelimited = function decodeDelimited(reader) {\n   if (!(reader instanceof $Reader))\n   reader = new $Reader(reader);\n   return this.decode(reader, reader.uint32());\n   };\n\n   /**\n   * Verifies a NodeProto message.\n   * @function verify\n   * @memberof onnx.NodeProto\n   * @static\n   * @param {Object.<string,*>} message Plain object to verify\n   * @returns {string|null} `null` if valid, otherwise the reason why it is not\n   */\n   NodeProto.verify = function verify(message) {\n   if (typeof message !== \"object\" || message === null)\n   return \"object expected\";\n   if (message.input != null && message.hasOwnProperty(\"input\")) {\n   if (!Array.isArray(message.input))\n   return \"input: array expected\";\n   for (var i = 0; i < message.input.length; ++i)\n   if (!$util.isString(message.input[i]))\n   return \"input: string[] expected\";\n   }\n   if (message.output != null && message.hasOwnProperty(\"output\")) {\n   if (!Array.isArray(message.output))\n   return \"output: array expected\";\n   for (var i = 0; i < message.output.length; ++i)\n   if (!$util.isString(message.output[i]))\n   return \"output: string[] expected\";\n   }\n   if (message.name != null && message.hasOwnProperty(\"name\"))\n   if (!$util.isString(message.name))\n   return \"name: string expected\";\n   if (message.opType != null && message.hasOwnProperty(\"opType\"))\n   if (!$util.isString(message.opType))\n   return \"opType: string expected\";\n   if (message.domain != null && message.hasOwnProperty(\"domain\"))\n   if (!$util.isString(message.domain))\n   return \"domain: string expected\";\n   if (message.attribute != null && message.hasOwnProperty(\"attribute\")) {\n   if (!Array.isArray(message.attribute))\n   return \"attribute: array expected\";\n   for (var i = 0; i < message.attribute.length; ++i) {\n   var error = $root.onnx.AttributeProto.verify(message.attribute[i]);\n   if (error)\n   return \"attribute.\" + error;\n   }\n   }\n   if (message.docString != null && message.hasOwnProperty(\"docString\"))\n   if (!$util.isString(message.docString))\n   return \"docString: string expected\";\n   return null;\n   };\n\n   /**\n   * Creates a NodeProto message from a plain object. Also converts values to their respective internal types.\n   * @function fromObject\n   * @memberof onnx.NodeProto\n   * @static\n   * @param {Object.<string,*>} object Plain object\n   * @returns {onnx.NodeProto} NodeProto\n   */\n   NodeProto.fromObject = function fromObject(object) {\n   if (object instanceof $root.onnx.NodeProto)\n   return object;\n   var message = new $root.onnx.NodeProto();\n   if (object.input) {\n   if (!Array.isArray(object.input))\n   throw TypeError(\".onnx.NodeProto.input: array expected\");\n   message.input = [];\n   for (var i = 0; i < object.input.length; ++i)\n   message.input[i] = String(object.input[i]);\n   }\n   if (object.output) {\n   if (!Array.isArray(object.output))\n   throw TypeError(\".onnx.NodeProto.output: array expected\");\n   message.output = [];\n   for (var i = 0; i < object.output.length; ++i)\n   message.output[i] = String(object.output[i]);\n   }\n   if (object.name != null)\n   message.name = String(object.name);\n   if (object.opType != null)\n   message.opType = String(object.opType);\n   if (object.domain != null)\n   message.domain = String(object.domain);\n   if (object.attribute) {\n   if (!Array.isArray(object.attribute))\n   throw TypeError(\".onnx.NodeProto.attribute: array expected\");\n   message.attribute = [];\n   for (var i = 0; i < object.attribute.length; ++i) {\n   if (typeof object.attribute[i] !== \"object\")\n throw TypeError(\".onnx.NodeProto.attribute: object expected\");\n message.attribute[i] = $root.onnx.AttributeProto.fromObject(object.attribute[i]);\n }\n }\n if (object.docString != null)\n message.docString = String(object.docString);\n return message;\n };\n\n /**\n * Creates a plain object from a NodeProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.NodeProto\n * @static\n * @param {onnx.NodeProto} message NodeProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n NodeProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.arrays || options.defaults) {\n object.input = [];\n object.output = [];\n object.attribute = [];\n }\n if (options.defaults) {\n object.name = \"\";\n object.opType = \"\";\n object.docString = \"\";\n object.domain = \"\";\n }\n if (message.input && message.input.length) {\n object.input = [];\n for (var j = 0; j < message.input.length; ++j)\n object.input[j] = message.input[j];\n }\n if (message.output && message.output.length) {\n object.output = [];\n for (var j = 0; j < message.output.length; ++j)\n object.output[j] = message.output[j];\n }\n if (message.name != null && message.hasOwnProperty(\"name\"))\n object.name = message.name;\n if (message.opType != null && message.hasOwnProperty(\"opType\"))\n object.opType = message.opType;\n if (message.attribute && message.attribute.length) {\n object.attribute = [];\n for (var j = 0; j < message.attribute.length; ++j)\n object.attribute[j] = $root.onnx.AttributeProto.toObject(message.attribute[j], options);\n }\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n object.docString = message.docString;\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n object.domain = message.domain;\n return object;\n };\n\n /**\n * Converts this NodeProto to JSON.\n * @function toJSON\n * @memberof onnx.NodeProto\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n NodeProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return NodeProto;\n })();\n\n onnx.ModelProto = (function() {\n\n /**\n * Properties of a ModelProto.\n * @memberof onnx\n * @interface IModelProto\n * @property {number|Long|null} [irVersion] ModelProto irVersion\n * @property {Array.<onnx.IOperatorSetIdProto>|null} [opsetImport] ModelProto opsetImport\n * @property {string|null} [producerName] ModelProto producerName\n * @property {string|null} [producerVersion] ModelProto producerVersion\n * @property {string|null} [domain] ModelProto domain\n * @property {number|Long|null} [modelVersion] ModelProto modelVersion\n * @property {string|null} [docString] ModelProto docString\n * @property {onnx.IGraphProto|null} [graph] ModelProto graph\n * @property {Array.<onnx.IStringStringEntryProto>|null} [metadataProps] ModelProto metadataProps\n */\n\n /**\n * Constructs a new ModelProto.\n * @memberof onnx\n * @classdesc Represents a ModelProto.\n * @implements IModelProto\n * @constructor\n * @param {onnx.IModelProto=} [properties] Properties to set\n */\n function ModelProto(properties) {\n this.opsetImport = [];\n this.metadataProps = [];\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * ModelProto irVersion.\n * @member {number|Long} irVersion\n * @memberof onnx.ModelProto\n * @instance\n */\n ModelProto.prototype.irVersion = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n /**\n * ModelProto opsetImport.\n * @member {Array.<onnx.IOperatorSetIdProto>} opsetImport\n * @memberof onnx.ModelProto\n * @instance\n */\n ModelProto.prototype.opsetImport = $util.emptyArray;\n\n /**\n * ModelProto producerName.\n * @member {string} producerName\n * @memberof onnx.ModelProto\n * @instance\n */\n ModelProto.prototype.producerName = \"\";\n\n /**\n * ModelProto producerVersion.\n * @member {string} producerVersion\n * @memberof onnx.ModelProto\n * @instance\n */\n ModelProto.prototype.producerVersion = \"\";\n\n /**\n * ModelProto domain.\n * @member {string} domain\n * @memberof onnx.ModelProto\n * @instance\n */\n

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ModelProto.prototype.domain = \"\";\n\n        /**\n         * ModelProto modelVersion.\n         * @member
{number|Long} modelVersion\n         * @memberof onnx.ModelProto\n         * @instance\n         */\n
ModelProto.prototype.modelVersion = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n        /**\n         *
ModelProto docString.\n         * @member {string} docString\n         * @memberof onnx.ModelProto\n         *
@instance\n         */\n        ModelProto.prototype.docString = \"\";\n\n        /**\n         * ModelProto graph.\n         *
@member {onnx.IGraphProto|null|undefined} graph\n         * @memberof onnx.ModelProto\n         * @instance\n
   */\n        ModelProto.prototype.graph = null;\n\n        /**\n         * ModelProto metadataProps.\n         * @member
{Array.<onnx.IStringStringEntryProto>} metadataProps\n         * @memberof onnx.ModelProto\n         *
@instance\n         */\n        ModelProto.prototype.metadataProps = $util.emptyArray;\n\n        /**\n         * Creates a
new ModelProto instance using the specified properties.\n         * @function create\n         * @memberof
onnx.ModelProto\n         * @static\n         * @param {onnx.IModelProto=} [properties] Properties to set\n         *
@returns {onnx.ModelProto} ModelProto instance\n         */\n        ModelProto.create = function create(properties)
{\n            return new ModelProto(properties);\n        };\n\n        /**\n         * Encodes the specified ModelProto
message. Does not implicitly {@link onnx.ModelProto.verify|verify} messages.\n         * @function encode\n         *
@memberof onnx.ModelProto\n         * @static\n         * @param {onnx.IModelProto} message ModelProto
message or plain object to encode\n         * @param {$protobuf.Writer} [writer] Writer to encode to\n         *
@returns {$protobuf.Writer} Writer\n         */\n        ModelProto.encode = function encode(message, writer) {\n
  if (!writer)\n                writer = $Writer.create();\n            if (message.irVersion != null &&
message.hasOwnProperty(\"irVersion\"))\n                writer.uint32(/* id 1, wireType 0
=*/8).int64(message.irVersion);\n            if (message.producerName != null &&
message.hasOwnProperty(\"producerName\"))\n                writer.uint32(/* id 2, wireType 2
=*/18).string(message.producerName);\n            if (message.producerVersion != null &&
message.hasOwnProperty(\"producerVersion\"))\n                writer.uint32(/* id 3, wireType 2
=*/26).string(message.producerVersion);\n            if (message.domain != null &&
message.hasOwnProperty(\"domain\"))\n                writer.uint32(/* id 4, wireType 2
=*/34).string(message.domain);\n            if (message.modelVersion != null &&
message.hasOwnProperty(\"modelVersion\"))\n                writer.uint32(/* id 5, wireType 0
=*/40).int64(message.modelVersion);\n            if (message.docString != null &&
message.hasOwnProperty(\"docString\"))\n                writer.uint32(/* id 6, wireType 2
=*/50).string(message.docString);\n            if (message.graph != null && message.hasOwnProperty(\"graph\"))\n
      $root.onnx.GraphProto.encode(message.graph, writer.uint32(/* id 7, wireType 2 =*/58).fork()).ldelim();\n
  if (message.opsetImport != null && message.opsetImport.length)\n                for (var i = 0; i <
message.opsetImport.length; ++i)\n                    $root.onnx.OperatorSetIdProto.encode(message.opsetImport[i],
writer.uint32(/* id 8, wireType 2 =*/66).fork()).ldelim();\n            if (message.metadataProps != null &&
message.metadataProps.length)\n                for (var i = 0; i < message.metadataProps.length; ++i)\n
$root.onnx.StringStringEntryProto.encode(message.metadataProps[i], writer.uint32(/* id 14, wireType 2
=*/114).fork()).ldelim();\n            return writer;\n        };\n\n        /**\n         * Encodes the specified ModelProto
message, length delimited. Does not implicitly {@link onnx.ModelProto.verify|verify} messages.\n         *
@function encodeDelimited\n         * @memberof onnx.ModelProto\n         * @static\n         * @param
{onnx.IModelProto} message ModelProto message or plain object to encode\n         * @param {$protobuf.Writer}
[writer] Writer to encode to\n         * @returns {$protobuf.Writer} Writer\n         */\n
ModelProto.encodeDelimited = function encodeDelimited(message, writer) {\n            return this.encode(message,
writer).ldelim();\n        };\n\n        /**\n         * Decodes a ModelProto message from the specified reader or buffer.\n
     * @function decode\n         * @memberof onnx.ModelProto\n         * @static\n         * @param
{$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @param {number} [length]
Message length if known beforehand\n         * @returns {onnx.ModelProto} ModelProto\n         * @throws {Error}
If the payload is not a reader or valid buffer\n         * @throws {$protobuf.util.ProtocolError} If required fields are
missing\n         */\n        ModelProto.decode = function decode(reader, length) {\n            if (!(reader instanceof
```

$Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.ModelProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.irVersion = reader.int64();\n break;\n case 8:\n if (!(message.opsetImport && message.opsetImport.length))\n message.opsetImport = [];\n message.opsetImport.push($root.onnx.OperatorSetIdProto.decode(reader, reader.uint32()));\n break;\n case 2:\n message.producerName = reader.string();\n break;\n case 3:\n message.producerVersion = reader.string();\n break;\n case 4:\n message.domain = reader.string();\n break;\n case 5:\n message.modelVersion = reader.int64();\n break;\n case 6:\n message.docString = reader.string();\n break;\n case 7:\n message.graph = $root.onnx.GraphProto.decode(reader, reader.uint32());\n break;\n case 14:\n if (!(message.metadataProps && message.metadataProps.length))\n message.metadataProps = [];\n message.metadataProps.push($root.onnx.StringStringEntryProto.decode(reader, reader.uint32()));\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a ModelProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.ModelProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.ModelProto} ModelProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n ModelProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a ModelProto message.\n * @function verify\n * @memberof onnx.ModelProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n ModelProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.irVersion != null && message.hasOwnProperty(\"irVersion\"))\n if (!$util.isInteger(message.irVersion) && !(message.irVersion && $util.isInteger(message.irVersion.low) && $util.isInteger(message.irVersion.high)))\n return \"irVersion: integer|Long expected\";\n if (message.opsetImport != null && message.hasOwnProperty(\"opsetImport\")) {\n if (!Array.isArray(message.opsetImport))\n return \"opsetImport: array expected\";\n for (var i = 0; i < message.opsetImport.length; ++i) {\n var error = $root.onnx.OperatorSetIdProto.verify(message.opsetImport[i]);\n if (error)\n return \"opsetImport.\" + error;\n }\n }\n if (message.producerName != null && message.hasOwnProperty(\"producerName\"))\n if (!$util.isString(message.producerName))\n return \"producerName: string expected\";\n if (message.producerVersion != null && message.hasOwnProperty(\"producerVersion\"))\n if (!$util.isString(message.producerVersion))\n return \"producerVersion: string expected\";\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n if (!$util.isString(message.domain))\n return \"domain: string expected\";\n if (message.modelVersion != null && message.hasOwnProperty(\"modelVersion\"))\n if (!$util.isInteger(message.modelVersion) && !(message.modelVersion && $util.isInteger(message.modelVersion.low) && $util.isInteger(message.modelVersion.high)))\n return \"modelVersion: integer|Long expected\";\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n if (!$util.isString(message.docString))\n return \"docString: string expected\";\n if (message.graph != null && message.hasOwnProperty(\"graph\")) {\n var error = $root.onnx.GraphProto.verify(message.graph);\n if (error)\n return \"graph.\" + error;\n }\n if (message.metadataProps != null && message.hasOwnProperty(\"metadataProps\")) {\n if (!Array.isArray(message.metadataProps))\n return \"metadataProps: array expected\";\n for (var i = 0; i < message.metadataProps.length; ++i) {\n var error = $root.onnx.StringStringEntryProto.verify(message.metadataProps[i]);\n if (error)\n return \"metadataProps.\" + error;\n }\n }\n return null;\n };\n\n /**\n * Creates a ModelProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.ModelProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.ModelProto} ModelProto\n */\n ModelProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.ModelProto)\n return object;\n var message = new $root.onnx.ModelProto();\n if (object.irVersion != null)\n if ($util.Long)\n (message.irVersion = $util.Long.fromValue(object.irVersion)).unsigned = false;\n else if (typeof object.irVersion === \"string\")\n message.irVersion = parseInt(object.irVersion, 10);\n else if (typeof object.irVersion === \"number\")\n message.irVersion = object.irVersion;\n else if (typeof object.irVersion === \"object\")\n message.irVersion = new $util.LongBits(object.irVersion.low >>> 0, object.irVersion.high >>> 0).toNumber();\n if (object.opsetImport) {\n if (!Array.isArray(object.opsetImport))\n throw TypeError(\".onnx.ModelProto.opsetImport: array expected\");\n message.opsetImport = [];\n for (var i = 0; i < object.opsetImport.length; ++i) {\n if (typeof object.opsetImport[i] !== \"object\")\n throw TypeError(\".onnx.ModelProto.opsetImport: object expected\");\n message.opsetImport[i] = $root.onnx.OperatorSetIdProto.fromObject(object.opsetImport[i]);\n }\n }\n if (object.producerName != null)\n message.producerName = String(object.producerName);\n if (object.producerVersion != null)\n message.producerVersion = String(object.producerVersion);\n if (object.domain != null)\n message.domain = String(object.domain);\n if (object.modelVersion != null)\n if ($util.Long)\n (message.modelVersion = $util.Long.fromValue(object.modelVersion)).unsigned = false;\n else if (typeof object.modelVersion === \"string\")\n message.modelVersion = parseInt(object.modelVersion, 10);\n else if (typeof object.modelVersion === \"number\")\n message.modelVersion = object.modelVersion;\n else if (typeof object.modelVersion === \"object\")\n message.modelVersion = new $util.LongBits(object.modelVersion.low >>> 0, object.modelVersion.high >>> 0).toNumber();\n if (object.docString != null)\n message.docString = String(object.docString);\n if (object.graph != null) {\n if (typeof object.graph !== \"object\")\n throw TypeError(\".onnx.ModelProto.graph: object expected\");\n message.graph = $root.onnx.GraphProto.fromObject(object.graph);\n }\n if (object.metadataProps) {\n if (!Array.isArray(object.metadataProps))\n throw TypeError(\".onnx.ModelProto.metadataProps: array expected\");\n message.metadataProps = [];\n for (var i = 0; i < object.metadataProps.length; ++i) {\n if (typeof object.metadataProps[i] !== \"object\")\n throw TypeError(\".onnx.ModelProto.metadataProps: object expected\");\n message.metadataProps[i] = $root.onnx.StringStringEntryProto.fromObject(object.metadataProps[i]);\n }\n }\n return message;\n };\n\n /**\n * Creates a plain object from a ModelProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.ModelProto\n * @static\n * @param {onnx.ModelProto} message ModelProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n ModelProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.arrays || options.defaults) {\n object.opsetImport = [];\n object.metadataProps = [];\n }\n if (options.defaults) {\n if ($util.Long) {\n var long = new $util.Long(0, 0, false);\n object.irVersion = options.longs === String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n } else\n object.irVersion = options.longs === String ? \"0\" : 0;\n object.producerName = \"\";\n object.producerVersion = \"\";\n object.domain = \"\";\n if ($util.Long) {\n var long = new $util.Long(0, 0, false);\n object.modelVersion = options.longs === String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n } else\n object.modelVersion = options.longs === String ? \"0\" :

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0;\n                object.docString = \"\";\n                object.graph = null;\n            }\n            if (message.irVersion !=
null && message.hasOwnProperty(\"irVersion\"))\n                if (typeof message.irVersion === \"number\")\n
       object.irVersion = options.longs === String ? String(message.irVersion) : message.irVersion;\n                else\n
                object.irVersion = options.longs === String ? $util.Long.prototype.toString.call(message.irVersion) :
options.longs === Number ? new $util.LongBits(message.irVersion.low >>> 0, message.irVersion.high >>>
0).toNumber() : message.irVersion;\n            if (message.producerName != null &&
message.hasOwnProperty(\"producerName\"))\n                object.producerName = message.producerName;\n
if (message.producerVersion != null && message.hasOwnProperty(\"producerVersion\"))\n
object.producerVersion = message.producerVersion;\n            if (message.domain != null &&
message.hasOwnProperty(\"domain\"))\n                object.domain = message.domain;\n            if
(message.modelVersion != null && message.hasOwnProperty(\"modelVersion\"))\n                if (typeof
message.modelVersion === \"number\")\n                    object.modelVersion = options.longs === String ?
String(message.modelVersion) : message.modelVersion;\n                else\n                    object.modelVersion =
options.longs === String ? $util.Long.prototype.toString.call(message.modelVersion) : options.longs === Number ?
new $util.LongBits(message.modelVersion.low >>> 0, message.modelVersion.high >>> 0).toNumber() :
message.modelVersion;\n            if (message.docString != null && message.hasOwnProperty(\"docString\"))\n
     object.docString = message.docString;\n            if (message.graph != null &&
message.hasOwnProperty(\"graph\"))\n                object.graph = $root.onnx.GraphProto.toObject(message.graph,
options);\n            if (message.opsetImport && message.opsetImport.length) {\n                object.opsetImport = [];\n
            for (var j = 0; j < message.opsetImport.length; ++j)\n                    object.opsetImport[j] =
$root.onnx.OperatorSetIdProto.toObject(message.opsetImport[j], options);\n            }\n            if
(message.metadataProps && message.metadataProps.length) {\n                object.metadataProps = [];\n                for
(var j = 0; j < message.metadataProps.length; ++j)\n                    object.metadataProps[j] =
$root.onnx.StringStringEntryProto.toObject(message.metadataProps[j], options);\n            }\n            return object;\n
       };\n\n        /**\n         * Converts this ModelProto to JSON.\n         * @function toJSON\n         * @memberof
onnx.ModelProto\n         * @instance\n         * @returns {Object.<string,*>} JSON object\n         */\n
ModelProto.prototype.toJSON = function toJSON() {\n            return this.constructor.toObject(this,
$protobuf.util.toJSONOptions);\n        };\n\n        return ModelProto;\n    })();\n\n    onnx.StringStringEntryProto =
(function() {\n\n        /**\n         * Properties of a StringStringEntryProto.\n         * @memberof onnx\n         *
@interface IStringStringEntryProto\n         * @property {string|null} [key] StringStringEntryProto key\n         *
@property {string|null} [value] StringStringEntryProto value\n         */\n\n        /**\n         * Constructs a new
StringStringEntryProto.\n         * @memberof onnx\n         * @classdesc Represents a StringStringEntryProto.\n
* @implements IStringStringEntryProto\n         * @constructor\n         * @param {onnx.IStringStringEntryProto=}
[properties] Properties to set\n         */\n        function StringStringEntryProto(properties) {\n            if (properties)\n
           for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n                    if (properties[keys[i]] !=
null)\n                        this[keys[i]] = properties[keys[i]];\n        }\n\n        /**\n         * StringStringEntryProto key.\n
     * @member {string} key\n         * @memberof onnx.StringStringEntryProto\n         * @instance\n         */\n
StringStringEntryProto.prototype.key = \"\";\n\n        /**\n         * StringStringEntryProto value.\n         * @member
{string} value\n         * @memberof onnx.StringStringEntryProto\n         * @instance\n         */\n
StringStringEntryProto.prototype.value = \"\";\n\n        /**\n         * Creates a new StringStringEntryProto instance
using the specified properties.\n         * @function create\n         * @memberof onnx.StringStringEntryProto\n         *
@static\n         * @param {onnx.IStringStringEntryProto=} [properties] Properties to set\n         * @returns
{onnx.StringStringEntryProto} StringStringEntryProto instance\n         */\n        StringStringEntryProto.create =
function create(properties) {\n            return new StringStringEntryProto(properties);\n        };\n\n        /**\n         *
Encodes the specified StringStringEntryProto message. Does not implicitly {@link
onnx.StringStringEntryProto.verify|verify} messages.\n         * @function encode\n         * @memberof
onnx.StringStringEntryProto\n         * @static\n         * @param {onnx.IStringStringEntryProto} message
StringStringEntryProto message or plain object to encode\n         * @param {$protobuf.Writer} [writer] Writer to
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encode to\n * @returns {$protobuf.Writer} Writer\n */\n StringStringEntryProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.key != null && message.hasOwnProperty(\"key\"))\n writer.uint32(/* id 1, wireType 2 =*/10).string(message.key);\n if (message.value != null && message.hasOwnProperty(\"value\"))\n writer.uint32(/* id 2, wireType 2 =*/18).string(message.value);\n return writer;\n };\n\n /**\n * Encodes the specified StringStringEntryProto message, length delimited. Does not implicitly {@link onnx.StringStringEntryProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {onnx.IStringStringEntryProto} message StringStringEntryProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n StringStringEntryProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a StringStringEntryProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.StringStringEntryProto} StringStringEntryProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n StringStringEntryProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.StringStringEntryProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.key = reader.string();\n break;\n case 2:\n message.value = reader.string();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a StringStringEntryProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.StringStringEntryProto} StringStringEntryProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n StringStringEntryProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a StringStringEntryProto message.\n * @function verify\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n StringStringEntryProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.key != null && message.hasOwnProperty(\"key\"))\n if (!$util.isString(message.key))\n return \"key: string expected\";\n if (message.value != null && message.hasOwnProperty(\"value\"))\n if (!$util.isString(message.value))\n return \"value: string expected\";\n return null;\n };\n\n /**\n * Creates a StringStringEntryProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.StringStringEntryProto} StringStringEntryProto\n */\n StringStringEntryProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.StringStringEntryProto)\n return object;\n var message = new $root.onnx.StringStringEntryProto();\n if (object.key != null)\n message.key = String(object.key);\n if (object.value != null)\n message.value = String(object.value);\n return message;\n };\n\n /**\n * Creates a plain object from a StringStringEntryProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {onnx.StringStringEntryProto} message StringStringEntryProto\n * @param

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{$protobuf.IConversionOptions} [options] Conversion options\n        * @returns {Object.<string,*>} Plain object\n
       */\n        StringStringEntryProto.toObject = function toObject(message, options) {\n            if (!options)\n
   options = {};\n            var object = {};\n            if (options.defaults) {\n                object.key = \"\";\n
object.value = \"\";\n            }\n            if (message.key != null && message.hasOwnProperty(\"key\"))\n
object.key = message.key;\n            if (message.value != null && message.hasOwnProperty(\"value\"))\n
object.value = message.value;\n            return object;\n        };\n\n        /**\n         * Converts this
StringStringEntryProto to JSON.\n         * @function toJSON\n         * @memberof onnx.StringStringEntryProto\n
    * @instance\n         * @returns {Object.<string,*>} JSON object\n         */\n
StringStringEntryProto.prototype.toJSON = function toJSON() {\n            return this.constructor.toObject(this,
$protobuf.util.toJSONOptions);\n        };\n\n        return StringStringEntryProto;\n    })();\n\n
onnx.TensorAnnotation = (function() {\n\n        /**\n         * Properties of a TensorAnnotation.\n         * @memberof
onnx\n         * @interface ITensorAnnotation\n         * @property {string|null} [tensorName] TensorAnnotation
tensorName\n         * @property {Array.<onnx.IStringStringEntryProto>|null} [quantParameterTensorNames]
TensorAnnotation quantParameterTensorNames\n         */\n\n        /**\n         * Constructs a new
TensorAnnotation.\n         * @memberof onnx\n         * @classdesc Represents a TensorAnnotation.\n         *
@implements ITensorAnnotation\n         * @constructor\n         * @param {onnx.ITensorAnnotation=} [properties]
Properties to set\n         */\n        function TensorAnnotation(properties) {\n            this.quantParameterTensorNames
= [];\n            if (properties)\n                for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n
    if (properties[keys[i]] != null)\n                        this[keys[i]] = properties[keys[i]];\n        }\n\n        /**\n         *
TensorAnnotation tensorName.\n         * @member {string} tensorName\n         * @memberof
onnx.TensorAnnotation\n         * @instance\n         */\n        TensorAnnotation.prototype.tensorName = \"\";\n\n
/**\n         * TensorAnnotation quantParameterTensorNames.\n         * @member
{Array.<onnx.IStringStringEntryProto>} quantParameterTensorNames\n         * @memberof
onnx.TensorAnnotation\n         * @instance\n         */\n
TensorAnnotation.prototype.quantParameterTensorNames = $util.emptyArray;\n\n        /**\n         * Creates a new
TensorAnnotation instance using the specified properties.\n         * @function create\n         * @memberof
onnx.TensorAnnotation\n         * @static\n         * @param {onnx.ITensorAnnotation=} [properties] Properties to
set\n         * @returns {onnx.TensorAnnotation} TensorAnnotation instance\n         */\n
TensorAnnotation.create = function create(properties) {\n            return new TensorAnnotation(properties);\n
};\n\n        /**\n         * Encodes the specified TensorAnnotation message. Does not implicitly {@link
onnx.TensorAnnotation.verify|verify} messages.\n         * @function encode\n         * @memberof
onnx.TensorAnnotation\n         * @static\n         * @param {onnx.ITensorAnnotation} message TensorAnnotation
message or plain object to encode\n         * @param {$protobuf.Writer} [writer] Writer to encode to\n         *
@returns {$protobuf.Writer} Writer\n         */\n        TensorAnnotation.encode = function encode(message, writer)
{\n            if (!writer)\n                writer = $Writer.create();\n            if (message.tensorName != null &&
message.hasOwnProperty(\"tensorName\"))\n                writer.uint32(/* id 1, wireType 2
=*/10).string(message.tensorName);\n            if (message.quantParameterTensorNames != null &&
message.quantParameterTensorNames.length)\n                for (var i = 0; i <
message.quantParameterTensorNames.length; ++i)\n
$root.onnx.StringStringEntryProto.encode(message.quantParameterTensorNames[i], writer.uint32(/* id 2, wireType
2 =*/18).fork()).ldelim();\n            return writer;\n        };\n\n        /**\n         * Encodes the specified
TensorAnnotation message, length delimited. Does not implicitly {@link onnx.TensorAnnotation.verify|verify}
messages.\n         * @function encodeDelimited\n         * @memberof onnx.TensorAnnotation\n         * @static\n
  * @param {onnx.ITensorAnnotation} message TensorAnnotation message or plain object to encode\n         *
@param {$protobuf.Writer} [writer] Writer to encode to\n         * @returns {$protobuf.Writer} Writer\n         */\n
  TensorAnnotation.encodeDelimited = function encodeDelimited(message, writer) {\n            return
this.encode(message, writer).ldelim();\n        };\n\n        /**\n         * Decodes a TensorAnnotation message from the
specified reader or buffer.\n         * @function decode\n         * @memberof onnx.TensorAnnotation\n         *
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@static\n         * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @param
{number} [length] Message length if known beforehand\n         * @returns {onnx.TensorAnnotation}
TensorAnnotation\n         * @throws {Error} If the payload is not a reader or valid buffer\n         * @throws
{$protobuf.util.ProtocolError} If required fields are missing\n         */\n        TensorAnnotation.decode = function
decode(reader, length) {\n            if (!(reader instanceof $Reader))\n                reader = $Reader.create(reader);\n
   var end = length === undefined ? reader.len : reader.pos + length, message = new
$root.onnx.TensorAnnotation();\n            while (reader.pos < end) {\n                var tag = reader.uint32();\n
switch (tag >>> 3) {\n                case 1:\n                    message.tensorName = reader.string();\n                    break;\n
          case 2:\n                    if (!(message.quantParameterTensorNames &&
message.quantParameterTensorNames.length))\n                        message.quantParameterTensorNames = [];\n
      message.quantParameterTensorNames.push($root.onnx.StringStringEntryProto.decode(reader,
reader.uint32()));\n                    break;\n                default:\n                    reader.skipType(tag & 7);\n
break;\n                }\n            }\n            return message;\n        };\n\n        /**\n         * Decodes a TensorAnnotation
message from the specified reader or buffer, length delimited.\n         * @function decodeDelimited\n         *
@memberof onnx.TensorAnnotation\n         * @static\n         * @param {$protobuf.Reader|Uint8Array} reader
Reader or buffer to decode from\n         * @returns {onnx.TensorAnnotation} TensorAnnotation\n         * @throws
{Error} If the payload is not a reader or valid buffer\n         * @throws {$protobuf.util.ProtocolError} If required
fields are missing\n         */\n        TensorAnnotation.decodeDelimited = function decodeDelimited(reader) {\n
if (!(reader instanceof $Reader))\n                reader = new $Reader(reader);\n            return this.decode(reader,
reader.uint32());\n        };\n\n        /**\n         * Verifies a TensorAnnotation message.\n         * @function verify\n
  * @memberof onnx.TensorAnnotation\n         * @static\n         * @param {Object.<string,*>} message Plain
object to verify\n         * @returns {string|null} `null` if valid, otherwise the reason why it is not\n         */\n
TensorAnnotation.verify = function verify(message) {\n            if (typeof message !== \"object\" || message ===
null)\n                return \"object expected\";\n            if (message.tensorName != null &&
message.hasOwnProperty(\"tensorName\"))\n                if (!$util.isString(message.tensorName))\n                    return
\"tensorName: string expected\";\n            if (message.quantParameterTensorNames != null &&
message.hasOwnProperty(\"quantParameterTensorNames\")) {\n                if
(!Array.isArray(message.quantParameterTensorNames))\n                    return \"quantParameterTensorNames: array
expected\";\n                for (var i = 0; i < message.quantParameterTensorNames.length; ++i) {\n                    var error
= $root.onnx.StringStringEntryProto.verify(message.quantParameterTensorNames[i]);\n                    if (error)\n
            return \"quantParameterTensorNames.\" + error;\n                }\n            }\n            return null;\n        };\n\n
  /**\n         * Creates a TensorAnnotation message from a plain object. Also converts values to their respective
internal types.\n         * @function fromObject\n         * @memberof onnx.TensorAnnotation\n         * @static\n
* @param {Object.<string,*>} object Plain object\n         * @returns {onnx.TensorAnnotation} TensorAnnotation\n
      */\n        TensorAnnotation.fromObject = function fromObject(object) {\n            if (object instanceof
$root.onnx.TensorAnnotation)\n                return object;\n            var message = new
$root.onnx.TensorAnnotation();\n            if (object.tensorName != null)\n                message.tensorName =
String(object.tensorName);\n            if (object.quantParameterTensorNames) {\n                if
(!Array.isArray(object.quantParameterTensorNames))\n                    throw
TypeError(\".onnx.TensorAnnotation.quantParameterTensorNames: array expected\");\n
message.quantParameterTensorNames = [];\n                for (var i = 0; i < object.quantParameterTensorNames.length;
++i) {\n                    if (typeof object.quantParameterTensorNames[i] !== \"object\")\n                        throw
TypeError(\".onnx.TensorAnnotation.quantParameterTensorNames: object expected\");\n
message.quantParameterTensorNames[i] =
$root.onnx.StringStringEntryProto.fromObject(object.quantParameterTensorNames[i]);\n                }\n            }\n
     return message;\n        };\n\n        /**\n         * Creates a plain object from a TensorAnnotation message. Also
converts values to other types if specified.\n         * @function toObject\n         * @memberof
onnx.TensorAnnotation\n         * @static\n         * @param {onnx.TensorAnnotation} message TensorAnnotation\n
```

```
    * @param {$protobuf.IConversionOptions} [options] Conversion options\n        * @returns {Object.<string,*>}
Plain object\n        */\n        TensorAnnotation.toObject = function toObject(message, options) {\n            if
(!options)\n                options = {};\n            var object = {};\n            if (options.arrays || options.defaults)\n
object.quantParameterTensorNames = [];\n            if (options.defaults)\n                object.tensorName = \"\";\n
if (message.tensorName != null && message.hasOwnProperty(\"tensorName\"))\n                object.tensorName =
message.tensorName;\n            if (message.quantParameterTensorNames &&
message.quantParameterTensorNames.length) {\n                object.quantParameterTensorNames = [];\n                for
(var j = 0; j < message.quantParameterTensorNames.length; ++j)\n
object.quantParameterTensorNames[j] =
$root.onnx.StringStringEntryProto.toObject(message.quantParameterTensorNames[j], options);\n            }\n
return object;\n        };\n\n        /**\n         * Converts this TensorAnnotation to JSON.\n         * @function toJSON\n
     * @memberof onnx.TensorAnnotation\n         * @instance\n         * @returns {Object.<string,*>} JSON
object\n         */\n        TensorAnnotation.prototype.toJSON = function toJSON() {\n            return
this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n        };\n\n        return TensorAnnotation;\n
})();\n\n    onnx.GraphProto = (function() {\n\n        /**\n         * Properties of a GraphProto.\n         * @memberof
onnx\n         * @interface IGraphProto\n         * @property {Array.<onnx.INodeProto>|null} [node] GraphProto
node\n         * @property {string|null} [name] GraphProto name\n         * @property
{Array.<onnx.ITensorProto>|null} [initializer] GraphProto initializer\n         * @property {string|null} [docString]
GraphProto docString\n         * @property {Array.<onnx.IValueInfoProto>|null} [input] GraphProto input\n         *
@property {Array.<onnx.IValueInfoProto>|null} [output] GraphProto output\n         * @property
{Array.<onnx.IValueInfoProto>|null} [valueInfo] GraphProto valueInfo\n         * @property
{Array.<onnx.ITensorAnnotation>|null} [quantizationAnnotation] GraphProto quantizationAnnotation\n         */\n\n
      /**\n         * Constructs a new GraphProto.\n         * @memberof onnx\n         * @classdesc Represents a
GraphProto.\n         * @implements IGraphProto\n         * @constructor\n         * @param {onnx.IGraphProto=}
[properties] Properties to set\n         */\n        function GraphProto(properties) {\n            this.node = [];\n
this.initializer = [];\n            this.input = [];\n            this.output = [];\n            this.valueInfo = [];\n
this.quantizationAnnotation = [];\n            if (properties)\n                for (var keys = Object.keys(properties), i = 0; i <
keys.length; ++i)\n                    if (properties[keys[i]] != null)\n                        this[keys[i]] = properties[keys[i]];\n
  }\n\n        /**\n         * GraphProto node.\n         * @member {Array.<onnx.INodeProto>} node\n         *
@memberof onnx.GraphProto\n         * @instance\n         */\n        GraphProto.prototype.node =
$util.emptyArray;\n\n        /**\n         * GraphProto name.\n         * @member {string} name\n         * @memberof
onnx.GraphProto\n         * @instance\n         */\n        GraphProto.prototype.name = \"\";\n\n        /**\n         *
GraphProto initializer.\n         * @member {Array.<onnx.ITensorProto>} initializer\n         * @memberof
onnx.GraphProto\n         * @instance\n         */\n        GraphProto.prototype.initializer = $util.emptyArray;\n\n
/**\n         * GraphProto docString.\n         * @member {string} docString\n         * @memberof onnx.GraphProto\n
     * @instance\n         */\n        GraphProto.prototype.docString = \"\";\n\n        /**\n         * GraphProto input.\n
 * @member {Array.<onnx.IValueInfoProto>} input\n         * @memberof onnx.GraphProto\n         * @instance\n
   */\n        GraphProto.prototype.input = $util.emptyArray;\n\n        /**\n         * GraphProto output.\n         *
@member {Array.<onnx.IValueInfoProto>} output\n         * @memberof onnx.GraphProto\n         * @instance\n
  */\n        GraphProto.prototype.output = $util.emptyArray;\n\n        /**\n         * GraphProto valueInfo.\n         *
@member {Array.<onnx.IValueInfoProto>} valueInfo\n         * @memberof onnx.GraphProto\n         * @instance\n
     */\n        GraphProto.prototype.valueInfo = $util.emptyArray;\n\n        /**\n         * GraphProto
quantizationAnnotation.\n         * @member {Array.<onnx.ITensorAnnotation>} quantizationAnnotation\n         *
@memberof onnx.GraphProto\n         * @instance\n         */\n        GraphProto.prototype.quantizationAnnotation =
$util.emptyArray;\n\n        /**\n         * Creates a new GraphProto instance using the specified properties.\n         *
@function create\n         * @memberof onnx.GraphProto\n         * @static\n         * @param {onnx.IGraphProto=}
[properties] Properties to set\n         * @returns {onnx.GraphProto} GraphProto instance\n         */\n
GraphProto.create = function create(properties) {\n            return new GraphProto(properties);\n        };\n\n
```

/**\n * Encodes the specified GraphProto message. Does not implicitly {@link onnx.GraphProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.GraphProto\n * @static\n * @param {onnx.IGraphProto} message GraphProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n GraphProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.node != null && message.node.length)\n for (var i = 0; i < message.node.length; ++i)\n $root.onnx.NodeProto.encode(message.node[i], writer.uint32(/* id 1, wireType 2 =*/10).fork()).ldelim();\n if (message.name != null && message.hasOwnProperty(\"name\"))\n writer.uint32(/* id 2, wireType 2 =*/18).string(message.name);\n if (message.initializer != null && message.initializer.length)\n for (var i = 0; i < message.initializer.length; ++i)\n $root.onnx.TensorProto.encode(message.initializer[i], writer.uint32(/* id 5, wireType 2 =*/42).fork()).ldelim();\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n writer.uint32(/* id 10, wireType 2 =*/82).string(message.docString);\n if (message.input != null && message.input.length)\n for (var i = 0; i < message.input.length; ++i)\n $root.onnx.ValueInfoProto.encode(message.input[i], writer.uint32(/* id 11, wireType 2 =*/90).fork()).ldelim();\n if (message.output != null && message.output.length)\n for (var i = 0; i < message.output.length; ++i)\n $root.onnx.ValueInfoProto.encode(message.output[i], writer.uint32(/* id 12, wireType 2 =*/98).fork()).ldelim();\n if (message.valueInfo != null && message.valueInfo.length)\n for (var i = 0; i < message.valueInfo.length; ++i)\n $root.onnx.ValueInfoProto.encode(message.valueInfo[i], writer.uint32(/* id 13, wireType 2 =*/106).fork()).ldelim();\n if (message.quantizationAnnotation != null && message.quantizationAnnotation.length)\n for (var i = 0; i < message.quantizationAnnotation.length; ++i)\n $root.onnx.TensorAnnotation.encode(message.quantizationAnnotation[i], writer.uint32(/* id 14, wireType 2 =*/114).fork()).ldelim();\n return writer;\n };\n\n /**\n * Encodes the specified GraphProto message, length delimited. Does not implicitly {@link onnx.GraphProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.GraphProto\n * @static\n * @param {onnx.IGraphProto} message GraphProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n GraphProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a GraphProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.GraphProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.GraphProto} GraphProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n GraphProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.GraphProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n if (!(message.node && message.node.length))\n message.node = [];\n message.node.push($root.onnx.NodeProto.decode(reader, reader.uint32()));\n break;\n case 2:\n message.name = reader.string();\n break;\n case 5:\n if (!(message.initializer && message.initializer.length))\n message.initializer = [];\n message.initializer.push($root.onnx.TensorProto.decode(reader, reader.uint32()));\n break;\n case 10:\n message.docString = reader.string();\n break;\n case 11:\n if (!(message.input && message.input.length))\n message.input = [];\n message.input.push($root.onnx.ValueInfoProto.decode(reader, reader.uint32()));\n break;\n case 12:\n if (!(message.output && message.output.length))\n message.output = [];\n message.output.push($root.onnx.ValueInfoProto.decode(reader, reader.uint32()));\n break;\n case 13:\n if (!(message.valueInfo && message.valueInfo.length))\n message.valueInfo

= [];\n   message.valueInfo.push($root.onnx.ValueInfoProto.decode(reader, reader.uint32()));\n break;\n   case 14:\n   if (!(message.quantizationAnnotation && message.quantizationAnnotation.length))\n   message.quantizationAnnotation = [];\n message.quantizationAnnotation.push($root.onnx.TensorAnnotation.decode(reader, reader.uint32()));\n break;\n   default:\n   reader.skipType(tag & 7);\n   break;\n   }\n   }\n   return message;\n   };\n\n   /**\n   * Decodes a GraphProto message from the specified reader or buffer, length delimited.\n   * @function decodeDelimited\n   * @memberof onnx.GraphProto\n   * @static\n   * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n   * @returns {onnx.GraphProto} GraphProto\n   * @throws {Error} If the payload is not a reader or valid buffer\n   * @throws {$protobuf.util.ProtocolError} If required fields are missing\n   */\n   GraphProto.decodeDelimited = function decodeDelimited(reader) {\n   if (!(reader instanceof $Reader))\n   reader = new $Reader(reader);\n   return this.decode(reader, reader.uint32());\n   };\n\n   /**\n   * Verifies a GraphProto message.\n   * @function verify\n   * @memberof onnx.GraphProto\n   * @static\n   * @param {Object.<string,*>} message Plain object to verify\n   * @returns {string|null} `null` if valid, otherwise the reason why it is not\n   */\n   GraphProto.verify = function verify(message) {\n   if (typeof message !== \"object\" || message === null)\n   return \"object expected\";\n   if (message.node != null && message.hasOwnProperty(\"node\")) {\n   if (!Array.isArray(message.node))\n   return \"node: array expected\";\n   for (var i = 0; i < message.node.length; ++i) {\n   var error = $root.onnx.NodeProto.verify(message.node[i]);\n   if (error)\n   return \"node.\" + error;\n   }\n   }\n   if (message.name != null && message.hasOwnProperty(\"name\"))\n   if (!$util.isString(message.name))\n   return \"name: string expected\";\n   if (message.initializer != null && message.hasOwnProperty(\"initializer\")) {\n   if (!Array.isArray(message.initializer))\n return \"initializer: array expected\";\n   for (var i = 0; i < message.initializer.length; ++i) {\n   var error = $root.onnx.TensorProto.verify(message.initializer[i]);\n   if (error)\n   return \"initializer.\" + error;\n   }\n   }\n   if (message.docString != null && message.hasOwnProperty(\"docString\"))\n   if (!$util.isString(message.docString))\n   return \"docString: string expected\";\n   if (message.input != null && message.hasOwnProperty(\"input\")) {\n   if (!Array.isArray(message.input))\n   return \"input: array expected\";\n   for (var i = 0; i < message.input.length; ++i) {\n   var error = $root.onnx.ValueInfoProto.verify(message.input[i]);\n   if (error)\n   return \"input.\" + error;\n   }\n   }\n   if (message.output != null && message.hasOwnProperty(\"output\")) {\n   if (!Array.isArray(message.output))\n   return \"output: array expected\";\n   for (var i = 0; i < message.output.length; ++i) {\n   var error = $root.onnx.ValueInfoProto.verify(message.output[i]);\n   if (error)\n   return \"output.\" + error;\n   }\n   }\n   if (message.valueInfo != null && message.hasOwnProperty(\"valueInfo\")) {\n   if (!Array.isArray(message.valueInfo))\n   return \"valueInfo: array expected\";\n for (var i = 0; i < message.valueInfo.length; ++i) {\n   var error = $root.onnx.ValueInfoProto.verify(message.valueInfo[i]);\n   if (error)\n   return \"valueInfo.\" + error;\n   }\n   }\n   if (message.quantizationAnnotation != null && message.hasOwnProperty(\"quantizationAnnotation\")) {\n   if (!Array.isArray(message.quantizationAnnotation))\n   return \"quantizationAnnotation: array expected\";\n   for (var i = 0; i < message.quantizationAnnotation.length; ++i) {\n   var error = $root.onnx.TensorAnnotation.verify(message.quantizationAnnotation[i]);\n   if (error)\n return \"quantizationAnnotation.\" + error;\n   }\n   }\n   return null;\n   };\n\n   /**\n   * Creates a GraphProto message from a plain object. Also converts values to their respective internal types.\n   * @function fromObject\n   * @memberof onnx.GraphProto\n   * @static\n   * @param {Object.<string,*>} object Plain object\n   * @returns {onnx.GraphProto} GraphProto\n   */\n GraphProto.fromObject = function fromObject(object) {\n   if (object instanceof $root.onnx.GraphProto)\n   return object;\n   var message = new $root.onnx.GraphProto();\n   if (object.node) {\n   if

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(!Array.isArray(object.node))\n                    throw TypeError(\".onnx.GraphProto.node: array expected\");\n
message.node = [];\n                for (var i = 0; i < object.node.length; ++i) {\n                    if (typeof object.node[i]
!== \"object\")\n                        throw TypeError(\".onnx.GraphProto.node: object expected\");\n
message.node[i] = $root.onnx.NodeProto.fromObject(object.node[i]);\n                }\n            }\n            if
(object.name != null)\n                message.name = String(object.name);\n            if (object.initializer) {\n                if
(!Array.isArray(object.initializer))\n                    throw TypeError(\".onnx.GraphProto.initializer: array
expected\");\n                message.initializer = [];\n                for (var i = 0; i < object.initializer.length; ++i) {\n
    if (typeof object.initializer[i] !== \"object\")\n                        throw TypeError(\".onnx.GraphProto.initializer:
object expected\");\n                    message.initializer[i] = $root.onnx.TensorProto.fromObject(object.initializer[i]);\n
            }\n            }\n            if (object.docString != null)\n                message.docString =
String(object.docString);\n            if (object.input) {\n                if (!Array.isArray(object.input))\n                    throw
TypeError(\".onnx.GraphProto.input: array expected\");\n                message.input = [];\n                for (var i = 0; i <
object.input.length; ++i) {\n                    if (typeof object.input[i] !== \"object\")\n                        throw
TypeError(\".onnx.GraphProto.input: object expected\");\n                    message.input[i] =
$root.onnx.ValueInfoProto.fromObject(object.input[i]);\n                }\n            }\n            if (object.output) {\n
  if (!Array.isArray(object.output))\n                    throw TypeError(\".onnx.GraphProto.output: array expected\");\n
          message.output = [];\n                for (var i = 0; i < object.output.length; ++i) {\n                    if (typeof
object.output[i] !== \"object\")\n                        throw TypeError(\".onnx.GraphProto.output: object expected\");\n
            message.output[i] = $root.onnx.ValueInfoProto.fromObject(object.output[i]);\n                }\n            }\n
  if (object.valueInfo) {\n                if (!Array.isArray(object.valueInfo))\n                    throw
TypeError(\".onnx.GraphProto.valueInfo: array expected\");\n                message.valueInfo = [];\n                for (var i
= 0; i < object.valueInfo.length; ++i) {\n                    if (typeof object.valueInfo[i] !== \"object\")\n
throw TypeError(\".onnx.GraphProto.valueInfo: object expected\");\n                    message.valueInfo[i] =
$root.onnx.ValueInfoProto.fromObject(object.valueInfo[i]);\n                }\n            }\n            if
(object.quantizationAnnotation) {\n                if (!Array.isArray(object.quantizationAnnotation))\n                    throw
TypeError(\".onnx.GraphProto.quantizationAnnotation: array expected\");\n
message.quantizationAnnotation = [];\n                for (var i = 0; i < object.quantizationAnnotation.length; ++i) {\n
            if (typeof object.quantizationAnnotation[i] !== \"object\")\n                        throw
TypeError(\".onnx.GraphProto.quantizationAnnotation: object expected\");\n
message.quantizationAnnotation[i] = $root.onnx.TensorAnnotation.fromObject(object.quantizationAnnotation[i]);\n
            }\n            }\n            return message;\n        };\n\n        /**\n         * Creates a plain object from a
GraphProto message. Also converts values to other types if specified.\n         * @function toObject\n         *
@memberof onnx.GraphProto\n         * @static\n         * @param {onnx.GraphProto} message GraphProto\n         *
@param {$protobuf.IConversionOptions} [options] Conversion options\n         * @returns {Object.<string,*>}
Plain object\n         */\n        GraphProto.toObject = function toObject(message, options) {\n            if (!options)\n
        options = {};\n            var object = {};\n            if (options.arrays || options.defaults) {\n                object.node =
[];\n                object.initializer = [];\n                object.input = [];\n                object.output = [];\n
object.valueInfo = [];\n                object.quantizationAnnotation = [];\n            }\n            if (options.defaults) {\n
      object.name = \"\";\n                object.docString = \"\";\n            }\n            if (message.node &&
message.node.length) {\n                object.node = [];\n                for (var j = 0; j < message.node.length; ++j)\n
      object.node[j] = $root.onnx.NodeProto.toObject(message.node[j], options);\n            }\n            if
(message.name != null && message.hasOwnProperty(\"name\"))\n                object.name = message.name;\n
if (message.initializer && message.initializer.length) {\n                object.initializer = [];\n                for (var j = 0; j
< message.initializer.length; ++j)\n                    object.initializer[j] =
$root.onnx.TensorProto.toObject(message.initializer[j], options);\n            }\n            if (message.docString != null
&& message.hasOwnProperty(\"docString\"))\n                object.docString = message.docString;\n            if
(message.input && message.input.length) {\n                object.input = [];\n                for (var j = 0; j <
message.input.length; ++j)\n                    object.input[j] = $root.onnx.ValueInfoProto.toObject(message.input[j],
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options);\n            }\n            if (message.output && message.output.length) {\n                object.output = [];\n
   for (var j = 0; j < message.output.length; ++j)\n                    object.output[j] =
$root.onnx.ValueInfoProto.toObject(message.output[j], options);\n            }\n            if (message.valueInfo &&
message.valueInfo.length) {\n                object.valueInfo = [];\n                for (var j = 0; j <
message.valueInfo.length; ++j)\n                    object.valueInfo[j] =
$root.onnx.ValueInfoProto.toObject(message.valueInfo[j], options);\n            }\n            if
(message.quantizationAnnotation && message.quantizationAnnotation.length) {\n
object.quantizationAnnotation = [];\n                for (var j = 0; j < message.quantizationAnnotation.length; ++j)\n
          object.quantizationAnnotation[j] =
$root.onnx.TensorAnnotation.toObject(message.quantizationAnnotation[j], options);\n            }\n            return
object;\n        };\n\n        /**\n         * Converts this GraphProto to JSON.\n         * @function toJSON\n         *
@memberof onnx.GraphProto\n         * @instance\n         * @returns {Object.<string,*>} JSON object\n         */\n
   GraphProto.prototype.toJSON = function toJSON() {\n            return this.constructor.toObject(this,
$protobuf.util.toJSONOptions);\n        };\n\n        return GraphProto;\n    })();\n\n    onnx.TensorProto = (function()
{\n\n        /**\n         * Properties of a TensorProto.\n         * @memberof onnx\n         * @interface ITensorProto\n
    * @property {Array.<number|Long>|null} [dims] TensorProto dims\n         * @property {number|null}
[dataType] TensorProto dataType\n         * @property {onnx.TensorProto.ISegment|null} [segment] TensorProto
segment\n         * @property {Array.<number>|null} [floatData] TensorProto floatData\n         * @property
{Array.<number>|null} [int32Data] TensorProto int32Data\n         * @property {Array.<Uint8Array>|null}
[stringData] TensorProto stringData\n         * @property {Array.<number|Long>|null} [int64Data] TensorProto
int64Data\n         * @property {string|null} [name] TensorProto name\n         * @property {string|null} [docString]
TensorProto docString\n         * @property {Uint8Array|null} [rawData] TensorProto rawData\n         * @property
{Array.<onnx.IStringStringEntryProto>|null} [externalData] TensorProto externalData\n         * @property
{onnx.TensorProto.DataLocation|null} [dataLocation] TensorProto dataLocation\n         * @property
{Array.<number>|null} [doubleData] TensorProto doubleData\n         * @property {Array.<number|Long>|null}
[uint64Data] TensorProto uint64Data\n         */\n\n        /**\n         * Constructs a new TensorProto.\n         *
@memberof onnx\n         * @classdesc Represents a TensorProto.\n         * @implements ITensorProto\n         *
@constructor\n         * @param {onnx.ITensorProto=} [properties] Properties to set\n         */\n        function
TensorProto(properties) {\n            this.dims = [];\n            this.floatData = [];\n            this.int32Data = [];\n
this.stringData = [];\n            this.int64Data = [];\n            this.externalData = [];\n            this.doubleData = [];\n
  this.uint64Data = [];\n            if (properties)\n                for (var keys = Object.keys(properties), i = 0; i <
keys.length; ++i)\n                    if (properties[keys[i]] != null)\n                        this[keys[i]] = properties[keys[i]];\n
  }\n\n        /**\n         * TensorProto dims.\n         * @member {Array.<number|Long>} dims\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.dims = $util.emptyArray;\n\n
/**\n         * TensorProto dataType.\n         * @member {number} dataType\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.dataType = 0;\n\n        /**\n         *
TensorProto segment.\n         * @member {onnx.TensorProto.ISegment|null|undefined} segment\n         *
@memberof onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.segment = null;\n\n
/**\n         * TensorProto floatData.\n         * @member {Array.<number>} floatData\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.floatData = $util.emptyArray;\n\n
/**\n         * TensorProto int32Data.\n         * @member {Array.<number>} int32Data\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.int32Data = $util.emptyArray;\n\n
/**\n         * TensorProto stringData.\n         * @member {Array.<Uint8Array>} stringData\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.stringData = $util.emptyArray;\n\n
/**\n         * TensorProto int64Data.\n         * @member {Array.<number|Long>} int64Data\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.int64Data = $util.emptyArray;\n\n
/**\n         * TensorProto name.\n         * @member {string} name\n         * @memberof onnx.TensorProto\n         *
@instance\n         */\n        TensorProto.prototype.name = \"\";\n\n        /**\n         * TensorProto docString.\n         *
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@member {string} docString\n         * @memberof onnx.TensorProto\n         * @instance\n         */\n
TensorProto.prototype.docString = \"\";\n\n        /**\n         * TensorProto rawData.\n         * @member
{Uint8Array} rawData\n         * @memberof onnx.TensorProto\n         * @instance\n         */\n
TensorProto.prototype.rawData = $util.newBuffer([]);\n\n        /**\n         * TensorProto externalData.\n         *
@member {Array.<onnx.IStringStringEntryProto>} externalData\n         * @memberof onnx.TensorProto\n         *
@instance\n         */\n        TensorProto.prototype.externalData = $util.emptyArray;\n\n        /**\n         *
TensorProto dataLocation.\n         * @member {onnx.TensorProto.DataLocation} dataLocation\n         *
@memberof onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.dataLocation = 0;\n\n
/**\n         * TensorProto doubleData.\n         * @member {Array.<number>} doubleData\n         * @memberof
onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.doubleData = $util.emptyArray;\n\n
 /**\n         * TensorProto uint64Data.\n         * @member {Array.<number|Long>} uint64Data\n         *
@memberof onnx.TensorProto\n         * @instance\n         */\n        TensorProto.prototype.uint64Data =
$util.emptyArray;\n\n        /**\n         * Creates a new TensorProto instance using the specified properties.\n         *
@function create\n         * @memberof onnx.TensorProto\n         * @static\n         * @param {onnx.ITensorProto=}
[properties] Properties to set\n         * @returns {onnx.TensorProto} TensorProto instance\n         */\n
TensorProto.create = function create(properties) {\n            return new TensorProto(properties);\n        };\n\n
/**\n         * Encodes the specified TensorProto message. Does not implicitly {@link
onnx.TensorProto.verify|verify} messages.\n         * @function encode\n         * @memberof onnx.TensorProto\n
  * @static\n         * @param {onnx.ITensorProto} message TensorProto message or plain object to encode\n         *
@param {$protobuf.Writer} [writer] Writer to encode to\n         * @returns {$protobuf.Writer} Writer\n         */\n
  TensorProto.encode = function encode(message, writer) {\n            if (!writer)\n                writer =
$Writer.create();\n            if (message.dims != null && message.dims.length) {\n                writer.uint32(/* id 1,
wireType 2 =*/10).fork();\n                for (var i = 0; i < message.dims.length; ++i)\n
writer.int64(message.dims[i]);\n                writer.ldelim();\n            }\n            if (message.dataType != null &&
message.hasOwnProperty(\"dataType\"))\n                writer.uint32(/* id 2, wireType 0
=*/16).int32(message.dataType);\n            if (message.segment != null &&
message.hasOwnProperty(\"segment\"))\n                $root.onnx.TensorProto.Segment.encode(message.segment,
writer.uint32(/* id 3, wireType 2 =*/26).fork()).ldelim();\n            if (message.floatData != null &&
message.floatData.length) {\n                writer.uint32(/* id 4, wireType 2 =*/34).fork();\n                for (var i = 0; i <
message.floatData.length; ++i)\n                    writer.float(message.floatData[i]);\n                writer.ldelim();\n
}\n            if (message.int32Data != null && message.int32Data.length) {\n                writer.uint32(/* id 5, wireType
2 =*/42).fork();\n                for (var i = 0; i < message.int32Data.length; ++i)\n
writer.int32(message.int32Data[i]);\n                writer.ldelim();\n            }\n            if (message.stringData != null
&& message.stringData.length)\n                for (var i = 0; i < message.stringData.length; ++i)\n
writer.uint32(/* id 6, wireType 2 =*/50).bytes(message.stringData[i]);\n            if (message.int64Data != null &&
message.int64Data.length) {\n                writer.uint32(/* id 7, wireType 2 =*/58).fork();\n                for (var i = 0; i <
message.int64Data.length; ++i)\n                    writer.int64(message.int64Data[i]);\n                writer.ldelim();\n
}\n            if (message.name != null && message.hasOwnProperty(\"name\"))\n                writer.uint32(/* id 8,
wireType 2 =*/66).string(message.name);\n            if (message.rawData != null &&
message.hasOwnProperty(\"rawData\"))\n                writer.uint32(/* id 9, wireType 2
=*/74).bytes(message.rawData);\n            if (message.doubleData != null && message.doubleData.length) {\n
   writer.uint32(/* id 10, wireType 2 =*/82).fork();\n                for (var i = 0; i < message.doubleData.length; ++i)\n
                writer.double(message.doubleData[i]);\n                writer.ldelim();\n            }\n            if
(message.uint64Data != null && message.uint64Data.length) {\n                writer.uint32(/* id 11, wireType 2
=*/90).fork();\n                for (var i = 0; i < message.uint64Data.length; ++i)\n
writer.uint64(message.uint64Data[i]);\n                writer.ldelim();\n            }\n            if (message.docString != null
&& message.hasOwnProperty(\"docString\"))\n                writer.uint32(/* id 12, wireType 2
=*/98).string(message.docString);\n            if (message.externalData != null && message.externalData.length)\n
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        for (var i = 0; i < message.externalData.length; ++i)\n
$root.onnx.StringStringEntryProto.encode(message.externalData[i], writer.uint32(/* id 13, wireType 2
=*/106).fork()).ldelim();\n            if (message.dataLocation != null &&
message.hasOwnProperty(\"dataLocation\"))\n                writer.uint32(/* id 14, wireType 0
=*/112).int32(message.dataLocation);\n            return writer;\n        };\n\n        /**\n         * Encodes the specified
TensorProto message, length delimited. Does not implicitly {@link onnx.TensorProto.verify|verify} messages.\n
 * @function encodeDelimited\n         * @memberof onnx.TensorProto\n         * @static\n         * @param
{onnx.ITensorProto} message TensorProto message or plain object to encode\n         * @param {$protobuf.Writer}
[writer] Writer to encode to\n         * @returns {$protobuf.Writer} Writer\n         */\n
TensorProto.encodeDelimited = function encodeDelimited(message, writer) {\n            return this.encode(message,
writer).ldelim();\n        };\n\n        /**\n         * Decodes a TensorProto message from the specified reader or buffer.\n
        * @function decode\n         * @memberof onnx.TensorProto\n         * @static\n         * @param
{$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @param {number} [length]
Message length if known beforehand\n         * @returns {onnx.TensorProto} TensorProto\n         * @throws {Error}
If the payload is not a reader or valid buffer\n         * @throws {$protobuf.util.ProtocolError} If required fields are
missing\n         */\n        TensorProto.decode = function decode(reader, length) {\n            if (!(reader instanceof
$Reader))\n                reader = $Reader.create(reader);\n            var end = length === undefined ? reader.len :
reader.pos + length, message = new $root.onnx.TensorProto();\n            while (reader.pos < end) {\n                var
tag = reader.uint32();\n                switch (tag >>> 3) {\n                case 1:\n                    if (!(message.dims &&
message.dims.length))\n                        message.dims = [];\n                    if ((tag & 7) === 2) {\n                        var
end2 = reader.uint32() + reader.pos;\n                        while (reader.pos < end2)\n
message.dims.push(reader.int64());\n                    } else\n                        message.dims.push(reader.int64());\n
        break;\n                case 2:\n                    message.dataType = reader.int32();\n                    break;\n                case
3:\n                    message.segment = $root.onnx.TensorProto.Segment.decode(reader, reader.uint32());\n
break;\n                case 4:\n                    if (!(message.floatData && message.floatData.length))\n
message.floatData = [];\n                    if ((tag & 7) === 2) {\n                        var end2 = reader.uint32() +
reader.pos;\n                        while (reader.pos < end2)\n                            message.floatData.push(reader.float());\n
            } else\n                        message.floatData.push(reader.float());\n                    break;\n                case 5:\n
          if (!(message.int32Data && message.int32Data.length))\n                        message.int32Data = [];\n
 if ((tag & 7) === 2) {\n                        var end2 = reader.uint32() + reader.pos;\n                        while (reader.pos <
end2)\n                            message.int32Data.push(reader.int32());\n                    } else\n
message.int32Data.push(reader.int32());\n                    break;\n                case 6:\n                    if
(!(message.stringData && message.stringData.length))\n                        message.stringData = [];\n
message.stringData.push(reader.bytes());\n                    break;\n                case 7:\n                    if
(!(message.int64Data && message.int64Data.length))\n                        message.int64Data = [];\n                    if ((tag
& 7) === 2) {\n                        var end2 = reader.uint32() + reader.pos;\n                        while (reader.pos < end2)\n
                        message.int64Data.push(reader.int64());\n                    } else\n
message.int64Data.push(reader.int64());\n                    break;\n                case 8:\n                    message.name =
reader.string();\n                    break;\n                case 12:\n                    message.docString = reader.string();\n
     break;\n                case 9:\n                    message.rawData = reader.bytes();\n                    break;\n                case
13:\n                    if (!(message.externalData && message.externalData.length))\n
message.externalData = [];\n
message.externalData.push($root.onnx.StringStringEntryProto.decode(reader, reader.uint32()));\n
break;\n                case 14:\n                    message.dataLocation = reader.int32();\n                    break;\n                case
10:\n                    if (!(message.doubleData && message.doubleData.length))\n                    message.doubleData =
[];\n                    if ((tag & 7) === 2) {\n                        var end2 = reader.uint32() + reader.pos;\n
while (reader.pos < end2)\n                            message.doubleData.push(reader.double());\n                    } else\n
           message.doubleData.push(reader.double());\n                    break;\n                case 11:\n                    if
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(!(message.uint64Data && message.uint64Data.length))\n                    message.uint64Data = [];\n                if
((tag & 7) === 2) {\n                    var end2 = reader.uint32() + reader.pos;\n                    while (reader.pos <
end2)\n                        message.uint64Data.push(reader.uint64());\n                } else\n
message.uint64Data.push(reader.uint64());\n                break;\n            default:\n
reader.skipType(tag & 7);\n                break;\n            }\n        }\n        return message;\n    };\n\n
/**\n     * Decodes a TensorProto message from the specified reader or buffer, length delimited.\n     *
@function decodeDelimited\n     * @memberof onnx.TensorProto\n     * @static\n     * @param
{$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n     * @returns {onnx.TensorProto}
TensorProto\n     * @throws {Error} If the payload is not a reader or valid buffer\n     * @throws
{$protobuf.util.ProtocolError} If required fields are missing\n     */\n    TensorProto.decodeDelimited =
function decodeDelimited(reader) {\n        if (!(reader instanceof $Reader))\n            reader = new
$Reader(reader);\n        return this.decode(reader, reader.uint32());\n    };\n\n    /**\n     * Verifies a
TensorProto message.\n     * @function verify\n     * @memberof onnx.TensorProto\n     * @static\n     *
@param {Object.<string,*>} message Plain object to verify\n     * @returns {string|null} `null` if valid, otherwise
the reason why it is not\n     */\n    TensorProto.verify = function verify(message) {\n        if (typeof message
!== \"object\" || message === null)\n            return \"object expected\";\n        if (message.dims != null &&
message.hasOwnProperty(\"dims\")) {\n            if (!Array.isArray(message.dims))\n                return \"dims:
array expected\";\n            for (var i = 0; i < message.dims.length; ++i)\n                if
(!$util.isInteger(message.dims[i]) && !(message.dims[i] && $util.isInteger(message.dims[i].low) &&
$util.isInteger(message.dims[i].high)))\n                    return \"dims: integer|Long[] expected\";\n        }\n
if (message.dataType != null && message.hasOwnProperty(\"dataType\"))\n            if
(!$util.isInteger(message.dataType))\n                return \"dataType: integer expected\";\n        if
(message.segment != null && message.hasOwnProperty(\"segment\")) {\n            var error =
$root.onnx.TensorProto.Segment.verify(message.segment);\n            if (error)\n                return \"segment.\" +
error;\n        }\n        if (message.floatData != null && message.hasOwnProperty(\"floatData\")) {\n            if
(!Array.isArray(message.floatData))\n                return \"floatData: array expected\";\n            for (var i = 0; i <
message.floatData.length; ++i)\n                if (typeof message.floatData[i] !== \"number\")\n                    return
\"floatData: number[] expected\";\n        }\n        if (message.int32Data != null &&
message.hasOwnProperty(\"int32Data\")) {\n            if (!Array.isArray(message.int32Data))\n                return
\"int32Data: array expected\";\n            for (var i = 0; i < message.int32Data.length; ++i)\n                if
(!$util.isInteger(message.int32Data[i]))\n                    return \"int32Data: integer[] expected\";\n        }\n
if (message.stringData != null && message.hasOwnProperty(\"stringData\")) {\n            if
(!Array.isArray(message.stringData))\n                return \"stringData: array expected\";\n            for (var i = 0; i
< message.stringData.length; ++i)\n                if (!(message.stringData[i] && typeof message.stringData[i].length
=== \"number\" || $util.isString(message.stringData[i])))\n                    return \"stringData: buffer[] expected\";\n
    }\n        if (message.int64Data != null && message.hasOwnProperty(\"int64Data\")) {\n            if
(!Array.isArray(message.int64Data))\n                return \"int64Data: array expected\";\n            for (var i = 0; i <
message.int64Data.length; ++i)\n                if (!$util.isInteger(message.int64Data[i]) && !(message.int64Data[i]
&& $util.isInteger(message.int64Data[i].low) && $util.isInteger(message.int64Data[i].high)))\n
return \"int64Data: integer|Long[] expected\";\n        }\n        if (message.name != null &&
message.hasOwnProperty(\"name\"))\n            if (!$util.isString(message.name))\n                return \"name:
string expected\";\n        if (message.docString != null && message.hasOwnProperty(\"docString\"))\n            if
(!$util.isString(message.docString))\n                return \"docString: string expected\";\n        if
(message.rawData != null && message.hasOwnProperty(\"rawData\"))\n            if (!(message.rawData && typeof
message.rawData.length === \"number\" || $util.isString(message.rawData)))\n                return \"rawData: buffer
expected\";\n        if (message.externalData != null && message.hasOwnProperty(\"externalData\")) {\n
if (!Array.isArray(message.externalData))\n                return \"externalData: array expected\";\n            for (var i
= 0; i < message.externalData.length; ++i) {\n                var error =
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$root.onnx.StringStringEntryProto.verify(message.externalData[i]);\n            if (error)\n                return
\"externalData.\" + error;\n        }\n    }\n    if (message.dataLocation != null &&
message.hasOwnProperty(\"dataLocation\"))\n        switch (message.dataLocation) {\n        default:\n
    return \"dataLocation: enum value expected\";\n        case 0:\n        case 1:\n            break;\n
   }\n    if (message.doubleData != null && message.hasOwnProperty(\"doubleData\")) {\n        if
(!Array.isArray(message.doubleData))\n            return \"doubleData: array expected\";\n        for (var i = 0;
i < message.doubleData.length; ++i)\n            if (typeof message.doubleData[i] !== \"number\")\n
return \"doubleData: number[] expected\";\n    }\n    if (message.uint64Data != null &&
message.hasOwnProperty(\"uint64Data\")) {\n        if (!Array.isArray(message.uint64Data))\n
return \"uint64Data: array expected\";\n        for (var i = 0; i < message.uint64Data.length; ++i)\n            if
(!$util.isInteger(message.uint64Data[i]) && !(message.uint64Data[i] && $util.isInteger(message.uint64Data[i].low)
&& $util.isInteger(message.uint64Data[i].high)))\n                return \"uint64Data: integer|Long[] expected\";\n
    }\n    return null;\n  };\n\n  /**\n   * Creates a TensorProto message from a plain object. Also
converts values to their respective internal types.\n   * @function fromObject\n   * @memberof
onnx.TensorProto\n   * @static\n   * @param {Object.<string,*>} object Plain object\n   * @returns
{onnx.TensorProto} TensorProto\n   */\n  TensorProto.fromObject = function fromObject(object) {\n
if (object instanceof $root.onnx.TensorProto)\n        return object;\n    var message = new
$root.onnx.TensorProto();\n    if (object.dims) {\n        if (!Array.isArray(object.dims))\n
throw TypeError(\".onnx.TensorProto.dims: array expected\");\n        message.dims = [];\n        for (var i =
0; i < object.dims.length; ++i)\n            if ($util.Long)\n                (message.dims[i] =
$util.Long.fromValue(object.dims[i])).unsigned = false;\n            else if (typeof object.dims[i] === \"string\")\n
                message.dims[i] = parseInt(object.dims[i], 10);\n            else if (typeof object.dims[i] ===
\"number\")\n                message.dims[i] = object.dims[i];\n            else if (typeof object.dims[i] ===
\"object\")\n                message.dims[i] = new $util.LongBits(object.dims[i].low >>> 0, object.dims[i].high >>>
0).toNumber();\n    }\n    if (object.dataType != null)\n        message.dataType = object.dataType |
0;\n    if (object.segment != null) {\n        if (typeof object.segment !== \"object\")\n            throw
TypeError(\".onnx.TensorProto.segment: object expected\");\n        message.segment =
$root.onnx.TensorProto.Segment.fromObject(object.segment);\n    }\n    if (object.floatData) {\n
if (!Array.isArray(object.floatData))\n            throw TypeError(\".onnx.TensorProto.floatData: array
expected\");\n        message.floatData = [];\n        for (var i = 0; i < object.floatData.length; ++i)\n
  message.floatData[i] = Number(object.floatData[i]);\n    }\n    if (object.int32Data) {\n        if
(!Array.isArray(object.int32Data))\n            throw TypeError(\".onnx.TensorProto.int32Data: array
expected\");\n        message.int32Data = [];\n        for (var i = 0; i < object.int32Data.length; ++i)\n
   message.int32Data[i] = object.int32Data[i] | 0;\n    }\n    if (object.stringData) {\n        if
(!Array.isArray(object.stringData))\n            throw TypeError(\".onnx.TensorProto.stringData: array
expected\");\n        message.stringData = [];\n        for (var i = 0; i < object.stringData.length; ++i)\n
      if (typeof object.stringData[i] === \"string\")\n                $util.base64.decode(object.stringData[i],
message.stringData[i] = $util.newBuffer($util.base64.length(object.stringData[i])), 0);\n            else if
(object.stringData[i].length)\n                message.stringData[i] = object.stringData[i];\n    }\n    if
(object.int64Data) {\n        if (!Array.isArray(object.int64Data))\n            throw
TypeError(\".onnx.TensorProto.int64Data: array expected\");\n        message.int64Data = [];\n        for (var
i = 0; i < object.int64Data.length; ++i)\n            if ($util.Long)\n                (message.int64Data[i] =
$util.Long.fromValue(object.int64Data[i])).unsigned = false;\n            else if (typeof object.int64Data[i] ===
\"string\")\n                message.int64Data[i] = parseInt(object.int64Data[i], 10);\n            else if (typeof
object.int64Data[i] === \"number\")\n                message.int64Data[i] = object.int64Data[i];\n            else
if (typeof object.int64Data[i] === \"object\")\n                message.int64Data[i] = new
$util.LongBits(object.int64Data[i].low >>> 0, object.int64Data[i].high >>> 0).toNumber();\n    }\n    if
(object.name != null)\n        message.name = String(object.name);\n    if (object.docString != null)\n
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  message.docString = String(object.docString);\n            if (object.rawData != null)\n                if (typeof
object.rawData === \"string\")\n                    $util.base64.decode(object.rawData, message.rawData =
$util.newBuffer($util.base64.length(object.rawData)), 0);\n                else if (object.rawData.length)\n
message.rawData = object.rawData;\n            if (object.externalData) {\n                if
(!Array.isArray(object.externalData))\n                    throw TypeError(\".onnx.TensorProto.externalData: array
expected\");\n                message.externalData = [];\n                for (var i = 0; i < object.externalData.length; ++i) {\n
            if (typeof object.externalData[i] !== \"object\")\n                        throw
TypeError(\".onnx.TensorProto.externalData: object expected\");\n                    message.externalData[i] =
$root.onnx.StringStringEntryProto.fromObject(object.externalData[i]);\n                }\n            }\n            switch
(object.dataLocation) {\n            case \"DEFAULT\":\n            case 0:\n                message.dataLocation = 0;\n
  break;\n            case \"EXTERNAL\":\n            case 1:\n                message.dataLocation = 1;\n                break;\n
      }\n            if (object.doubleData) {\n                if (!Array.isArray(object.doubleData))\n                    throw
TypeError(\".onnx.TensorProto.doubleData: array expected\");\n                message.doubleData = [];\n                for
(var i = 0; i < object.doubleData.length; ++i)\n                    message.doubleData[i] =
Number(object.doubleData[i]);\n            }\n            if (object.uint64Data) {\n                if
(!Array.isArray(object.uint64Data))\n                    throw TypeError(\".onnx.TensorProto.uint64Data: array
expected\");\n                message.uint64Data = [];\n                for (var i = 0; i < object.uint64Data.length; ++i)\n
        if ($util.Long)\n                        (message.uint64Data[i] =
$util.Long.fromValue(object.uint64Data[i])).unsigned = true;\n                    else if (typeof object.uint64Data[i] ===
\"string\")\n                        message.uint64Data[i] = parseInt(object.uint64Data[i], 10);\n                    else if (typeof
object.uint64Data[i] === \"number\")\n                        message.uint64Data[i] = object.uint64Data[i];\n
else if (typeof object.uint64Data[i] === \"object\")\n                        message.uint64Data[i] = new
$util.LongBits(object.uint64Data[i].low >>> 0, object.uint64Data[i].high >>> 0).toNumber(true);\n            }\n
return message;\n        };\n\n        /**\n         * Creates a plain object from a TensorProto message. Also converts
values to other types if specified.\n         * @function toObject\n         * @memberof onnx.TensorProto\n         *
@static\n         * @param {onnx.TensorProto} message TensorProto\n         * @param
{$protobuf.IConversionOptions} [options] Conversion options\n         * @returns {Object.<string,*>} Plain object\n
      */\n        TensorProto.toObject = function toObject(message, options) {\n            if (!options)\n                options
= {};\n            var object = {};\n            if (options.arrays || options.defaults) {\n                object.dims = [];\n
object.floatData = [];\n                object.int32Data = [];\n                object.stringData = [];\n
object.int64Data = [];\n                object.doubleData = [];\n                object.uint64Data = [];\n
object.externalData = [];\n            }\n            if (options.defaults) {\n                object.dataType = 0;\n
object.segment = null;\n                object.name = \"\";\n                if (options.bytes === String)\n
object.rawData = \"\";\n                else {\n                    object.rawData = [];\n                    if (options.bytes !==
Array)\n                        object.rawData = $util.newBuffer(object.rawData);\n                }\n                object.docString
= \"\";\n                object.dataLocation = options.enums === String ? \"DEFAULT\" : 0;\n            }\n            if
(message.dims && message.dims.length) {\n                object.dims = [];\n                for (var j = 0; j <
message.dims.length; ++j)\n                    if (typeof message.dims[j] === \"number\")\n                        object.dims[j]
= options.longs === String ? String(message.dims[j]) : message.dims[j];\n                    else\n
object.dims[j] = options.longs === String ? $util.Long.prototype.toString.call(message.dims[j]) : options.longs ===
Number ? new $util.LongBits(message.dims[j].low >>> 0, message.dims[j].high >>> 0).toNumber() :
message.dims[j];\n            }\n            if (message.dataType != null && message.hasOwnProperty(\"dataType\"))\n
        object.dataType = message.dataType;\n            if (message.segment != null &&
message.hasOwnProperty(\"segment\"))\n                object.segment =
$root.onnx.TensorProto.Segment.toObject(message.segment, options);\n            if (message.floatData &&
message.floatData.length) {\n                object.floatData = [];\n                for (var j = 0; j < message.floatData.length;
++j)\n                    object.floatData[j] = options.json && !isFinite(message.floatData[j]) ?
String(message.floatData[j]) : message.floatData[j];\n            }\n            if (message.int32Data &&
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message.int32Data.length) {\n            object.int32Data = [];\n            for (var j = 0; j <
message.int32Data.length; ++j)\n                object.int32Data[j] = message.int32Data[j];\n        }\n        if
(message.stringData && message.stringData.length) {\n            object.stringData = [];\n            for (var j = 0; j
< message.stringData.length; ++j)\n                object.stringData[j] = options.bytes === String ?
$util.base64.encode(message.stringData[j], 0, message.stringData[j].length) : options.bytes === Array ?
Array.prototype.slice.call(message.stringData[j]) : message.stringData[j];\n        }\n        if (message.int64Data
&& message.int64Data.length) {\n            object.int64Data = [];\n            for (var j = 0; j <
message.int64Data.length; ++j)\n                if (typeof message.int64Data[j] === \"number\")\n
object.int64Data[j] = options.longs === String ? String(message.int64Data[j]) : message.int64Data[j];\n
else\n                    object.int64Data[j] = options.longs === String ?
$util.Long.prototype.toString.call(message.int64Data[j]) : options.longs === Number ? new
$util.LongBits(message.int64Data[j].low >>> 0, message.int64Data[j].high >>> 0).toNumber() :
message.int64Data[j];\n        }\n        if (message.name != null && message.hasOwnProperty(\"name\"))\n
    object.name = message.name;\n        if (message.rawData != null &&
message.hasOwnProperty(\"rawData\"))\n            object.rawData = options.bytes === String ?
$util.base64.encode(message.rawData, 0, message.rawData.length) : options.bytes === Array ?
Array.prototype.slice.call(message.rawData) : message.rawData;\n        if (message.doubleData &&
message.doubleData.length) {\n            object.doubleData = [];\n            for (var j = 0; j <
message.doubleData.length; ++j)\n                object.doubleData[j] = options.json &&
!isFinite(message.doubleData[j]) ? String(message.doubleData[j]) : message.doubleData[j];\n        }\n        if
(message.uint64Data && message.uint64Data.length) {\n            object.uint64Data = [];\n            for (var j = 0;
j < message.uint64Data.length; ++j)\n                if (typeof message.uint64Data[j] === \"number\")\n
object.uint64Data[j] = options.longs === String ? String(message.uint64Data[j]) : message.uint64Data[j];\n
   else\n                    object.uint64Data[j] = options.longs === String ?
$util.Long.prototype.toString.call(message.uint64Data[j]) : options.longs === Number ? new
$util.LongBits(message.uint64Data[j].low >>> 0, message.uint64Data[j].high >>> 0).toNumber(true) :
message.uint64Data[j];\n        }\n        if (message.docString != null &&
message.hasOwnProperty(\"docString\"))\n            object.docString = message.docString;\n        if
(message.externalData && message.externalData.length) {\n            object.externalData = [];\n            for (var j
= 0; j < message.externalData.length; ++j)\n                object.externalData[j] =
$root.onnx.StringStringEntryProto.toObject(message.externalData[j], options);\n        }\n        if
(message.dataLocation != null && message.hasOwnProperty(\"dataLocation\"))\n            object.dataLocation =
options.enums === String ? $root.onnx.TensorProto.DataLocation[message.dataLocation] :
message.dataLocation;\n        return object;\n    };\n\n    /**\n     * Converts this TensorProto to JSON.\n
  * @function toJSON\n     * @memberof onnx.TensorProto\n     * @instance\n     * @returns
{Object.<string,*>} JSON object\n     */\n    TensorProto.prototype.toJSON = function toJSON() {\n
return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n    };\n\n    /**\n     * DataType
enum.\n     * @name onnx.TensorProto.DataType\n     * @enum {string}\n     * @property {number}
UNDEFINED=0 UNDEFINED value\n     * @property {number} FLOAT=1 FLOAT value\n     * @property
{number} UINT8=2 UINT8 value\n     * @property {number} INT8=3 INT8 value\n     * @property {number}
UINT16=4 UINT16 value\n     * @property {number} INT16=5 INT16 value\n     * @property {number}
INT32=6 INT32 value\n     * @property {number} INT64=7 INT64 value\n     * @property {number}
STRING=8 STRING value\n     * @property {number} BOOL=9 BOOL value\n     * @property {number}
FLOAT16=10 FLOAT16 value\n     * @property {number} DOUBLE=11 DOUBLE value\n     * @property
{number} UINT32=12 UINT32 value\n     * @property {number} UINT64=13 UINT64 value\n     *
@property {number} COMPLEX64=14 COMPLEX64 value\n     * @property {number} COMPLEX128=15
COMPLEX128 value\n     * @property {number} BFLOAT16=16 BFLOAT16 value\n     */\n
TensorProto.DataType = (function() {\n        var valuesById = {}, values = Object.create(valuesById);\n
```

```
values[valuesById[0] = \"UNDEFINED\"] = 0;\n            values[valuesById[1] = \"FLOAT\"] = 1;\n
values[valuesById[2] = \"UINT8\"] = 2;\n            values[valuesById[3] = \"INT8\"] = 3;\n
values[valuesById[4] = \"UINT16\"] = 4;\n            values[valuesById[5] = \"INT16\"] = 5;\n
values[valuesById[6] = \"INT32\"] = 6;\n            values[valuesById[7] = \"INT64\"] = 7;\n
values[valuesById[8] = \"STRING\"] = 8;\n            values[valuesById[9] = \"BOOL\"] = 9;\n
values[valuesById[10] = \"FLOAT16\"] = 10;\n            values[valuesById[11] = \"DOUBLE\"] = 11;\n
values[valuesById[12] = \"UINT32\"] = 12;\n            values[valuesById[13] = \"UINT64\"] = 13;\n
values[valuesById[14] = \"COMPLEX64\"] = 14;\n            values[valuesById[15] = \"COMPLEX128\"] = 15;\n
    values[valuesById[16] = \"BFLOAT16\"] = 16;\n            return values;\n        })();\n\n        TensorProto.Segment
= (function() {\n\n            /**\n             * Properties of a Segment.\n             * @memberof onnx.TensorProto\n
   * @interface ISegment\n             * @property {number|Long|null} [begin] Segment begin\n             * @property
{number|Long|null} [end] Segment end\n             */\n\n            /**\n             * Constructs a new Segment.\n             *
@memberof onnx.TensorProto\n             * @classdesc Represents a Segment.\n             * @implements ISegment\n
          * @constructor\n             * @param {onnx.TensorProto.ISegment=} [properties] Properties to set\n
*/\n            function Segment(properties) {\n                if (properties)\n                    for (var keys =
Object.keys(properties), i = 0; i < keys.length; ++i)\n                        if (properties[keys[i]] != null)\n
this[keys[i]] = properties[keys[i]];\n            }\n\n            /**\n             * Segment begin.\n             * @member
{number|Long} begin\n             * @memberof onnx.TensorProto.Segment\n             * @instance\n             */\n
 Segment.prototype.begin = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n            /**\n             * Segment
end.\n             * @member {number|Long} end\n             * @memberof onnx.TensorProto.Segment\n             *
@instance\n             */\n            Segment.prototype.end = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n
/**\n             * Creates a new Segment instance using the specified properties.\n             * @function create\n
* @memberof onnx.TensorProto.Segment\n             * @static\n             * @param {onnx.TensorProto.ISegment=}
[properties] Properties to set\n             * @returns {onnx.TensorProto.Segment} Segment instance\n             */\n
   Segment.create = function create(properties) {\n                return new Segment(properties);\n            };\n\n
/**\n             * Encodes the specified Segment message. Does not implicitly {@link
onnx.TensorProto.Segment.verify|verify} messages.\n             * @function encode\n             * @memberof
onnx.TensorProto.Segment\n             * @static\n             * @param {onnx.TensorProto.ISegment} message
Segment message or plain object to encode\n             * @param {$protobuf.Writer} [writer] Writer to encode to\n
      * @returns {$protobuf.Writer} Writer\n             */\n            Segment.encode = function encode(message, writer)
{\n                if (!writer)\n                    writer = $Writer.create();\n                if (message.begin != null &&
message.hasOwnProperty(\"begin\"))\n                    writer.uint32(/* id 1, wireType 0 =*/8).int64(message.begin);\n
            if (message.end != null && message.hasOwnProperty(\"end\"))\n                    writer.uint32(/* id 2, wireType
0 =*/16).int64(message.end);\n                return writer;\n            };\n\n            /**\n             * Encodes the specified
Segment message, length delimited. Does not implicitly {@link onnx.TensorProto.Segment.verify|verify}
messages.\n             * @function encodeDelimited\n             * @memberof onnx.TensorProto.Segment\n             *
@static\n             * @param {onnx.TensorProto.ISegment} message Segment message or plain object to encode\n
      * @param {$protobuf.Writer} [writer] Writer to encode to\n             * @returns {$protobuf.Writer} Writer\n
     */\n            Segment.encodeDelimited = function encodeDelimited(message, writer) {\n                return
this.encode(message, writer).ldelim();\n            };\n\n            /**\n             * Decodes a Segment message from the
specified reader or buffer.\n             * @function decode\n             * @memberof onnx.TensorProto.Segment\n
 * @static\n             * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n             *
@param {number} [length] Message length if known beforehand\n             * @returns
{onnx.TensorProto.Segment} Segment\n             * @throws {Error} If the payload is not a reader or valid buffer\n
       * @throws {$protobuf.util.ProtocolError} If required fields are missing\n             */\n            Segment.decode =
function decode(reader, length) {\n                if (!(reader instanceof $Reader))\n                    reader =
$Reader.create(reader);\n                var end = length === undefined ? reader.len : reader.pos + length, message =
new $root.onnx.TensorProto.Segment();\n                while (reader.pos < end) {\n                    var tag =
```

reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.begin = reader.int64();\n break;\n case 2:\n message.end = reader.int64();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a Segment message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TensorProto.Segment} Segment\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Segment.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a Segment message.\n * @function verify\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n Segment.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.begin != null && message.hasOwnProperty(\"begin\"))\n if (!$util.isInteger(message.begin) && !(message.begin && $util.isInteger(message.begin.low) && $util.isInteger(message.begin.high)))\n return \"begin: integer|Long expected\";\n if (message.end != null && message.hasOwnProperty(\"end\"))\n if (!$util.isInteger(message.end) && !(message.end && $util.isInteger(message.end.low) && $util.isInteger(message.end.high)))\n return \"end: integer|Long expected\";\n return null;\n };\n\n /**\n * Creates a Segment message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.TensorProto.Segment} Segment\n */\n Segment.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.TensorProto.Segment)\n return object;\n var message = new $root.onnx.TensorProto.Segment();\n if (object.begin != null)\n if ($util.Long)\n (message.begin = $util.Long.fromValue(object.begin)).unsigned = false;\n else if (typeof object.begin === \"string\")\n message.begin = parseInt(object.begin, 10);\n else if (typeof object.begin === \"number\")\n message.begin = object.begin;\n else if (typeof object.begin === \"object\")\n message.begin = new $util.LongBits(object.begin.low >>> 0, object.begin.high >>> 0).toNumber();\n if (object.end != null)\n if ($util.Long)\n (message.end = $util.Long.fromValue(object.end)).unsigned = false;\n else if (typeof object.end === \"string\")\n message.end = parseInt(object.end, 10);\n else if (typeof object.end === \"number\")\n message.end = object.end;\n else if (typeof object.end === \"object\")\n message.end = new $util.LongBits(object.end.low >>> 0, object.end.high >>> 0).toNumber();\n return message;\n };\n\n /**\n * Creates a plain object from a Segment message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {onnx.TensorProto.Segment} message Segment\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n Segment.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.defaults) {\n if ($util.Long) {\n var long = new $util.Long(0, 0, false);\n object.begin = options.longs === String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n } else\n object.begin = options.longs === String ? \"0\" : 0;\n if ($util.Long) {\n var long = new $util.Long(0, 0, false);\n object.end = options.longs === String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n } else\n object.end = options.longs === String ? \"0\" : 0;\n }\n if (message.begin != null && message.hasOwnProperty(\"begin\"))\n if (typeof message.begin === \"number\")\n object.begin = options.longs === String ?

String(message.begin) : message.begin;\n else\n object.begin = options.longs === String ? $util.Long.prototype.toString.call(message.begin) : options.longs === Number ? new $util.LongBits(message.begin.low >>> 0, message.begin.high >>> 0).toNumber() : message.begin;\n if (message.end != null && message.hasOwnProperty(\"end\"))\n if (typeof message.end === \"number\")\n object.end = options.longs === String ? String(message.end) : message.end;\n else\n object.end = options.longs === String ? $util.Long.prototype.toString.call(message.end) : options.longs === Number ? new $util.LongBits(message.end.low >>> 0, message.end.high >>> 0).toNumber() : message.end;\n return object;\n };\n\n /**\n * Converts this Segment to JSON.\n * @function toJSON\n * @memberof onnx.TensorProto.Segment\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n Segment.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return Segment;\n })();\n\n /**\n * DataLocation enum.\n * @name onnx.TensorProto.DataLocation\n * @enum {string}\n * @property {number} DEFAULT=0 DEFAULT value\n * @property {number} EXTERNAL=1 EXTERNAL value\n */\n TensorProto.DataLocation = (function() {\n var valuesById = {}, values = Object.create(valuesById);\n values[valuesById[0] = \"DEFAULT\"] = 0;\n values[valuesById[1] = \"EXTERNAL\"] = 1;\n return values;\n })();\n\n return TensorProto;\n })();\n\n onnx.TensorShapeProto = (function() {\n\n /**\n * Properties of a TensorShapeProto.\n * @memberof onnx\n * @interface ITensorShapeProto\n * @property {Array.<onnx.TensorShapeProto.IDimension>|null} [dim] TensorShapeProto dim\n */\n\n /**\n * Constructs a new TensorShapeProto.\n * @memberof onnx\n * @classdesc Represents a TensorShapeProto.\n * @implements ITensorShapeProto\n * @constructor\n * @param {onnx.ITensorShapeProto=} [properties] Properties to set\n */\n function TensorShapeProto(properties) {\n this.dim = [];\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * TensorShapeProto dim.\n * @member {Array.<onnx.TensorShapeProto.IDimension>} dim\n * @memberof onnx.TensorShapeProto\n * @instance\n */\n TensorShapeProto.prototype.dim = $util.emptyArray;\n\n /**\n * Creates a new TensorShapeProto instance using the specified properties.\n * @function create\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {onnx.ITensorShapeProto=} [properties] Properties to set\n * @returns {onnx.TensorShapeProto} TensorShapeProto instance\n */\n TensorShapeProto.create = function create(properties) {\n return new TensorShapeProto(properties);\n };\n\n /**\n * Encodes the specified TensorShapeProto message. Does not implicitly {@link onnx.TensorShapeProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {onnx.ITensorShapeProto} message TensorShapeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n TensorShapeProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.dim != null && message.dim.length)\n for (var i = 0; i < message.dim.length; ++i)\n $root.onnx.TensorShapeProto.Dimension.encode(message.dim[i], writer.uint32(/* id 1, wireType 2 =*/10).fork()).ldelim();\n return writer;\n };\n\n /**\n * Encodes the specified TensorShapeProto message, length delimited. Does not implicitly {@link onnx.TensorShapeProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {onnx.ITensorShapeProto} message TensorShapeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n TensorShapeProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a TensorShapeProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n *

@returns {onnx.TensorShapeProto} TensorShapeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n TensorShapeProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.TensorShapeProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n if (!(message.dim && message.dim.length))\n message.dim = [];\n message.dim.push($root.onnx.TensorShapeProto.Dimension.decode(reader, reader.uint32()));\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a TensorShapeProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TensorShapeProto} TensorShapeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n TensorShapeProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a TensorShapeProto message.\n * @function verify\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n TensorShapeProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.dim != null && message.hasOwnProperty(\"dim\")) {\n if (!Array.isArray(message.dim))\n return \"dim: array expected\";\n for (var i = 0; i < message.dim.length; ++i) {\n var error = $root.onnx.TensorShapeProto.Dimension.verify(message.dim[i]);\n if (error)\n return \"dim.\" + error;\n }\n }\n return null;\n };\n\n /**\n * Creates a TensorShapeProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.TensorShapeProto} TensorShapeProto\n */\n TensorShapeProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.TensorShapeProto)\n return object;\n var message = new $root.onnx.TensorShapeProto();\n if (object.dim) {\n if (!Array.isArray(object.dim))\n throw TypeError(\".onnx.TensorShapeProto.dim: array expected\");\n message.dim = [];\n for (var i = 0; i < object.dim.length; ++i) {\n if (typeof object.dim[i] !== \"object\")\n throw TypeError(\".onnx.TensorShapeProto.dim: object expected\");\n message.dim[i] = $root.onnx.TensorShapeProto.Dimension.fromObject(object.dim[i]);\n }\n }\n return message;\n };\n\n /**\n * Creates a plain object from a TensorShapeProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.TensorShapeProto\n * @static\n * @param {onnx.TensorShapeProto} message TensorShapeProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n TensorShapeProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.arrays || options.defaults)\n object.dim = [];\n if (message.dim && message.dim.length) {\n object.dim = [];\n for (var j = 0; j < message.dim.length; ++j)\n object.dim[j] = $root.onnx.TensorShapeProto.Dimension.toObject(message.dim[j], options);\n }\n return object;\n };\n\n /**\n * Converts this TensorShapeProto to JSON.\n * @function toJSON\n * @memberof onnx.TensorShapeProto\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n TensorShapeProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n TensorShapeProto.Dimension = (function() {\n\n /**\n * Properties of a Dimension.\n * @memberof onnx.TensorShapeProto\n * @interface

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IDimension\n            * @property {number|Long|null} [dimValue] Dimension dimValue\n            * @property
{string|null} [dimParam] Dimension dimParam\n            * @property {string|null} [denotation] Dimension
denotation\n            */\n\n            /**\n            * Constructs a new Dimension.\n            * @memberof
onnx.TensorShapeProto\n            * @classdesc Represents a Dimension.\n            * @implements IDimension\n
     * @constructor\n            * @param {onnx.TensorShapeProto.IDimension=} [properties] Properties to set\n
   */\n            function Dimension(properties) {\n                if (properties)\n                    for (var keys =
Object.keys(properties), i = 0; i < keys.length; ++i)\n                        if (properties[keys[i]] != null)\n
this[keys[i]] = properties[keys[i]];\n            }\n\n            /**\n            * Dimension dimValue.\n            * @member
{number|Long} dimValue\n            * @memberof onnx.TensorShapeProto.Dimension\n            * @instance\n
   */\n            Dimension.prototype.dimValue = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n            /**\n
  * Dimension dimParam.\n            * @member {string} dimParam\n            * @memberof
onnx.TensorShapeProto.Dimension\n            * @instance\n            */\n            Dimension.prototype.dimParam =
\"\";\n\n            /**\n            * Dimension denotation.\n            * @member {string} denotation\n            *
@memberof onnx.TensorShapeProto.Dimension\n            * @instance\n            */\n
Dimension.prototype.denotation = \"\";\n\n            // OneOf field names bound to virtual getters and setters\n
var $oneOfFields;\n\n            /**\n            * Dimension value.\n            * @member
{\"dimValue\"|\"dimParam\"|undefined} value\n            * @memberof onnx.TensorShapeProto.Dimension\n
* @instance\n            */\n            Object.defineProperty(Dimension.prototype, \"value\", {\n                get:
$util.oneOfGetter($oneOfFields = [\"dimValue\", \"dimParam\"]),\n                set: $util.oneOfSetter($oneOfFields)\n
        });\n\n            /**\n            * Creates a new Dimension instance using the specified properties.\n            *
@function create\n            * @memberof onnx.TensorShapeProto.Dimension\n            * @static\n            *
@param {onnx.TensorShapeProto.IDimension=} [properties] Properties to set\n            * @returns
{onnx.TensorShapeProto.Dimension} Dimension instance\n            */\n            Dimension.create = function
create(properties) {\n                return new Dimension(properties);\n            };\n\n            /**\n            * Encodes the
specified Dimension message. Does not implicitly {@link onnx.TensorShapeProto.Dimension.verify|verify}
messages.\n            * @function encode\n            * @memberof onnx.TensorShapeProto.Dimension\n            *
@static\n            * @param {onnx.TensorShapeProto.IDimension} message Dimension message or plain object to
encode\n            * @param {$protobuf.Writer} [writer] Writer to encode to\n            * @returns
{$protobuf.Writer} Writer\n            */\n            Dimension.encode = function encode(message, writer) {\n
if (!writer)\n                    writer = $Writer.create();\n                if (message.dimValue != null &&
message.hasOwnProperty(\"dimValue\"))\n                    writer.uint32(/* id 1, wireType 0
=*/8).int64(message.dimValue);\n                if (message.dimParam != null &&
message.hasOwnProperty(\"dimParam\"))\n                    writer.uint32(/* id 2, wireType 2
=*/18).string(message.dimParam);\n                if (message.denotation != null &&
message.hasOwnProperty(\"denotation\"))\n                    writer.uint32(/* id 3, wireType 2
=*/26).string(message.denotation);\n                return writer;\n            };\n\n            /**\n            * Encodes the
specified Dimension message, length delimited. Does not implicitly {@link
onnx.TensorShapeProto.Dimension.verify|verify} messages.\n            * @function encodeDelimited\n            *
@memberof onnx.TensorShapeProto.Dimension\n            * @static\n            * @param
{onnx.TensorShapeProto.IDimension} message Dimension message or plain object to encode\n            * @param
{$protobuf.Writer} [writer] Writer to encode to\n            * @returns {$protobuf.Writer} Writer\n            */\n
Dimension.encodeDelimited = function encodeDelimited(message, writer) {\n                return this.encode(message,
writer).ldelim();\n            };\n\n            /**\n            * Decodes a Dimension message from the specified reader or
buffer.\n            * @function decode\n            * @memberof onnx.TensorShapeProto.Dimension\n            *
@static\n            * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n            *
@param {number} [length] Message length if known beforehand\n            * @returns
{onnx.TensorShapeProto.Dimension} Dimension\n            * @throws {Error} If the payload is not a reader or valid
buffer\n            * @throws {$protobuf.util.ProtocolError} If required fields are missing\n            */\n
```

Dimension.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.TensorShapeProto.Dimension();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.dimValue = reader.int64();\n break;\n case 2:\n message.dimParam = reader.string();\n break;\n case 3:\n message.denotation = reader.string();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a Dimension message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TensorShapeProto.Dimension} Dimension\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Dimension.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a Dimension message.\n * @function verify\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n Dimension.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n var properties = {};\n if (message.dimValue != null && message.hasOwnProperty(\"dimValue\")) {\n properties.value = 1;\n if (!$util.isInteger(message.dimValue) && !(message.dimValue && $util.isInteger(message.dimValue.low) && $util.isInteger(message.dimValue.high)))\n return \"dimValue: integer|Long expected\";\n }\n if (message.dimParam != null && message.hasOwnProperty(\"dimParam\")) {\n if (properties.value === 1)\n return \"value: multiple values\";\n properties.value = 1;\n if (!$util.isString(message.dimParam))\n return \"dimParam: string expected\";\n }\n if (message.denotation != null && message.hasOwnProperty(\"denotation\"))\n if (!$util.isString(message.denotation))\n return \"denotation: string expected\";\n return null;\n };\n\n /**\n * Creates a Dimension message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.TensorShapeProto.Dimension} Dimension\n */\n Dimension.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.TensorShapeProto.Dimension)\n return object;\n var message = new $root.onnx.TensorShapeProto.Dimension();\n if (object.dimValue != null)\n if ($util.Long)\n (message.dimValue = $util.Long.fromValue(object.dimValue)).unsigned = false;\n else if (typeof object.dimValue === \"string\")\n message.dimValue = parseInt(object.dimValue, 10);\n else if (typeof object.dimValue === \"number\")\n message.dimValue = object.dimValue;\n else if (typeof object.dimValue === \"object\")\n message.dimValue = new $util.LongBits(object.dimValue.low >>> 0, object.dimValue.high >>> 0).toNumber();\n if (object.dimParam != null)\n message.dimParam = String(object.dimParam);\n if (object.denotation != null)\n message.denotation = String(object.denotation);\n return message;\n };\n\n /**\n * Creates a plain object from a Dimension message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.TensorShapeProto.Dimension\n * @static\n * @param {onnx.TensorShapeProto.Dimension} message Dimension\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n Dimension.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.defaults)\n object.denotation = \"\";\n if (message.dimValue != null &&

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message.hasOwnProperty(\"dimValue\")) {\n                    if (typeof message.dimValue === \"number\")\n
     object.dimValue = options.longs === String ? String(message.dimValue) : message.dimValue;\n
else\n                        object.dimValue = options.longs === String ?
$util.Long.prototype.toString.call(message.dimValue) : options.longs === Number ? new
$util.LongBits(message.dimValue.low >>> 0, message.dimValue.high >>> 0).toNumber() : message.dimValue;\n
              if (options.oneofs)\n                        object.value = \"dimValue\";\n                }\n                if
(message.dimParam != null && message.hasOwnProperty(\"dimParam\")) {\n                    object.dimParam =
message.dimParam;\n                    if (options.oneofs)\n                        object.value = \"dimParam\";\n                }\n
          if (message.denotation != null && message.hasOwnProperty(\"denotation\"))\n                    object.denotation
= message.denotation;\n                return object;\n            };\n\n            /**\n             * Converts this Dimension to
JSON.\n             * @function toJSON\n             * @memberof onnx.TensorShapeProto.Dimension\n             *
@instance\n             * @returns {Object.<string,*>} JSON object\n             */\n            Dimension.prototype.toJSON
= function toJSON() {\n                return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n
};\n\n            return Dimension;\n        })();\n\n        return TensorShapeProto;\n    })();\n\n    onnx.TypeProto =
(function() {\n\n        /**\n         * Properties of a TypeProto.\n         * @memberof onnx\n         * @interface
ITypeProto\n         * @property {onnx.TypeProto.ITensor|null} [tensorType] TypeProto tensorType\n         *
@property {string|null} [denotation] TypeProto denotation\n         */\n\n        /**\n         * Constructs a new
TypeProto.\n         * @memberof onnx\n         * @classdesc Represents a TypeProto.\n         * @implements
ITypeProto\n         * @constructor\n         * @param {onnx.ITypeProto=} [properties] Properties to set\n         */\n
  function TypeProto(properties) {\n            if (properties)\n                for (var keys = Object.keys(properties), i = 0; i
< keys.length; ++i)\n                    if (properties[keys[i]] != null)\n                        this[keys[i]] = properties[keys[i]];\n
      }\n\n        /**\n         * TypeProto tensorType.\n         * @member {onnx.TypeProto.ITensor|null|undefined}
tensorType\n         * @memberof onnx.TypeProto\n         * @instance\n         */\n
TypeProto.prototype.tensorType = null;\n\n        /**\n         * TypeProto denotation.\n         * @member {string}
denotation\n         * @memberof onnx.TypeProto\n         * @instance\n         */\n
TypeProto.prototype.denotation = \"\";\n\n        // OneOf field names bound to virtual getters and setters\n        var
$oneOfFields;\n\n        /**\n         * TypeProto value.\n         * @member {\"tensorType\"|undefined} value\n         *
@memberof onnx.TypeProto\n         * @instance\n         */\n        Object.defineProperty(TypeProto.prototype,
\"value\", {\n            get: $util.oneOfGetter($oneOfFields = [\"tensorType\"]),\n            set:
$util.oneOfSetter($oneOfFields)\n        });\n\n        /**\n         * Creates a new TypeProto instance using the
specified properties.\n         * @function create\n         * @memberof onnx.TypeProto\n         * @static\n         *
@param {onnx.ITypeProto=} [properties] Properties to set\n         * @returns {onnx.TypeProto} TypeProto
instance\n         */\n        TypeProto.create = function create(properties) {\n            return new
TypeProto(properties);\n        };\n\n        /**\n         * Encodes the specified TypeProto message. Does not implicitly
{@link onnx.TypeProto.verify|verify} messages.\n         * @function encode\n         * @memberof
onnx.TypeProto\n         * @static\n         * @param {onnx.ITypeProto} message TypeProto message or plain object
to encode\n         * @param {$protobuf.Writer} [writer] Writer to encode to\n         * @returns {$protobuf.Writer}
Writer\n         */\n        TypeProto.encode = function encode(message, writer) {\n            if (!writer)\n
writer = $Writer.create();\n            if (message.tensorType != null && message.hasOwnProperty(\"tensorType\"))\n
            $root.onnx.TypeProto.Tensor.encode(message.tensorType, writer.uint32(/* id 1, wireType 2
=*/10).fork()).ldelim();\n            if (message.denotation != null && message.hasOwnProperty(\"denotation\"))\n
       writer.uint32(/* id 6, wireType 2 =*/50).string(message.denotation);\n            return writer;\n        };\n\n
/**\n         * Encodes the specified TypeProto message, length delimited. Does not implicitly {@link
onnx.TypeProto.verify|verify} messages.\n         * @function encodeDelimited\n         * @memberof
onnx.TypeProto\n         * @static\n         * @param {onnx.ITypeProto} message TypeProto message or plain object
to encode\n         * @param {$protobuf.Writer} [writer] Writer to encode to\n         * @returns {$protobuf.Writer}
Writer\n         */\n        TypeProto.encodeDelimited = function encodeDelimited(message, writer) {\n            return
this.encode(message, writer).ldelim();\n        };\n\n        /**\n         * Decodes a TypeProto message from the
```

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specified reader or buffer.\n         * @function decode\n         * @memberof onnx.TypeProto\n         * @static\n
 * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @param {number}
[length] Message length if known beforehand\n         * @returns {onnx.TypeProto} TypeProto\n         * @throws
{Error} If the payload is not a reader or valid buffer\n         * @throws {$protobuf.util.ProtocolError} If required
fields are missing\n         */\n        TypeProto.decode = function decode(reader, length) {\n            if (!(reader
instanceof $Reader))\n                reader = $Reader.create(reader);\n            var end = length === undefined ?
reader.len : reader.pos + length, message = new $root.onnx.TypeProto();\n            while (reader.pos < end) {\n
    var tag = reader.uint32();\n                switch (tag >>> 3) {\n                case 1:\n                    message.tensorType =
$root.onnx.TypeProto.Tensor.decode(reader, reader.uint32());\n                    break;\n                case 6:\n
message.denotation = reader.string();\n                    break;\n                default:\n                    reader.skipType(tag &
7);\n                    break;\n                }\n            }\n            return message;\n        };\n\n        /**\n         * Decodes a
TypeProto message from the specified reader or buffer, length delimited.\n         * @function decodeDelimited\n
 * @memberof onnx.TypeProto\n         * @static\n         * @param {$protobuf.Reader|Uint8Array} reader Reader or
buffer to decode from\n         * @returns {onnx.TypeProto} TypeProto\n         * @throws {Error} If the payload is
not a reader or valid buffer\n         * @throws {$protobuf.util.ProtocolError} If required fields are missing\n
*/\n        TypeProto.decodeDelimited = function decodeDelimited(reader) {\n            if (!(reader instanceof
$Reader))\n                reader = new $Reader(reader);\n            return this.decode(reader, reader.uint32());\n
};\n\n        /**\n         * Verifies a TypeProto message.\n         * @function verify\n         * @memberof
onnx.TypeProto\n         * @static\n         * @param {Object.<string,*>} message Plain object to verify\n         *
@returns {string|null} `null` if valid, otherwise the reason why it is not\n         */\n        TypeProto.verify = function
verify(message) {\n            if (typeof message !== \"object\" || message === null)\n                return \"object
expected\";\n            var properties = {};\n            if (message.tensorType != null &&
message.hasOwnProperty(\"tensorType\")) {\n                properties.value = 1;\n                {\n                    var error =
$root.onnx.TypeProto.Tensor.verify(message.tensorType);\n                    if (error)\n                        return
\"tensorType.\" + error;\n                }\n            }\n            if (message.denotation != null &&
message.hasOwnProperty(\"denotation\"))\n                if (!$util.isString(message.denotation))\n                    return
\"denotation: string expected\";\n            return null;\n        };\n\n        /**\n         * Creates a TypeProto message
from a plain object. Also converts values to their respective internal types.\n         * @function fromObject\n         *
@memberof onnx.TypeProto\n         * @static\n         * @param {Object.<string,*>} object Plain object\n         *
@returns {onnx.TypeProto} TypeProto\n         */\n        TypeProto.fromObject = function fromObject(object) {\n
     if (object instanceof $root.onnx.TypeProto)\n                return object;\n            var message = new
$root.onnx.TypeProto();\n            if (object.tensorType != null) {\n                if (typeof object.tensorType !==
\"object\")\n                    throw TypeError(\".onnx.TypeProto.tensorType: object expected\");\n
message.tensorType = $root.onnx.TypeProto.Tensor.fromObject(object.tensorType);\n            }\n            if
(object.denotation != null)\n                message.denotation = String(object.denotation);\n            return message;\n
 };\n\n        /**\n         * Creates a plain object from a TypeProto message. Also converts values to other types if
specified.\n         * @function toObject\n         * @memberof onnx.TypeProto\n         * @static\n         * @param
{onnx.TypeProto} message TypeProto\n         * @param {$protobuf.IConversionOptions} [options] Conversion
options\n         * @returns {Object.<string,*>} Plain object\n         */\n        TypeProto.toObject = function
toObject(message, options) {\n            if (!options)\n                options = {};\n            var object = {};\n            if
(options.defaults)\n                object.denotation = \"\";\n            if (message.tensorType != null &&
message.hasOwnProperty(\"tensorType\")) {\n                object.tensorType =
$root.onnx.TypeProto.Tensor.toObject(message.tensorType, options);\n                if (options.oneofs)\n
object.value = \"tensorType\";\n            }\n            if (message.denotation != null &&
message.hasOwnProperty(\"denotation\"))\n                object.denotation = message.denotation;\n            return
object;\n        };\n\n        /**\n         * Converts this TypeProto to JSON.\n         * @function toJSON\n         *
@memberof onnx.TypeProto\n         * @instance\n         * @returns {Object.<string,*>} JSON object\n         */\n
 TypeProto.prototype.toJSON = function toJSON() {\n            return this.constructor.toObject(this,
```

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$protobuf.util.toJSONOptions);\n        };\n\n        TypeProto.Tensor = (function() {\n\n            /**\n             *
Properties of a Tensor.\n             * @memberof onnx.TypeProto\n             * @interface ITensor\n             *
@property {number|null} [elemType] Tensor elemType\n             * @property {onnx.ITensorShapeProto|null}
[shape] Tensor shape\n             */\n\n            /**\n             * Constructs a new Tensor.\n             * @memberof
onnx.TypeProto\n             * @classdesc Represents a Tensor.\n             * @implements ITensor\n             *
@constructor\n             * @param {onnx.TypeProto.ITensor=} [properties] Properties to set\n             */\n
function Tensor(properties) {\n                if (properties)\n                    for (var keys = Object.keys(properties), i = 0; i
< keys.length; ++i)\n                        if (properties[keys[i]] != null)\n                            this[keys[i]] =
properties[keys[i]];\n            }\n\n            /**\n             * Tensor elemType.\n             * @member {number}
elemType\n             * @memberof onnx.TypeProto.Tensor\n             * @instance\n             */\n
Tensor.prototype.elemType = 0;\n\n            /**\n             * Tensor shape.\n             * @member
{onnx.ITensorShapeProto|null|undefined} shape\n             * @memberof onnx.TypeProto.Tensor\n             *
@instance\n             */\n            Tensor.prototype.shape = null;\n\n            /**\n             * Creates a new Tensor
instance using the specified properties.\n             * @function create\n             * @memberof
onnx.TypeProto.Tensor\n             * @static\n             * @param {onnx.TypeProto.ITensor=} [properties] Properties
to set\n             * @returns {onnx.TypeProto.Tensor} Tensor instance\n             */\n            Tensor.create = function
create(properties) {\n                return new Tensor(properties);\n            };\n\n            /**\n             * Encodes the
specified Tensor message. Does not implicitly {@link onnx.TypeProto.Tensor.verify|verify} messages.\n             *
@function encode\n             * @memberof onnx.TypeProto.Tensor\n             * @static\n             * @param
{onnx.TypeProto.ITensor} message Tensor message or plain object to encode\n             * @param
{$protobuf.Writer} [writer] Writer to encode to\n             * @returns {$protobuf.Writer} Writer\n             */\n
Tensor.encode = function encode(message, writer) {\n                if (!writer)\n                    writer = $Writer.create();\n
                if (message.elemType != null && message.hasOwnProperty(\"elemType\"))\n                    writer.uint32(/*
id 1, wireType 0 =*/8).int32(message.elemType);\n                if (message.shape != null &&
message.hasOwnProperty(\"shape\"))\n                    $root.onnx.TensorShapeProto.encode(message.shape,
writer.uint32(/* id 2, wireType 2 =*/18).fork()).ldelim();\n                return writer;\n            };\n\n            /**\n
* Encodes the specified Tensor message, length delimited. Does not implicitly {@link
onnx.TypeProto.Tensor.verify|verify} messages.\n             * @function encodeDelimited\n             * @memberof
onnx.TypeProto.Tensor\n             * @static\n             * @param {onnx.TypeProto.ITensor} message Tensor
message or plain object to encode\n             * @param {$protobuf.Writer} [writer] Writer to encode to\n             *
@returns {$protobuf.Writer} Writer\n             */\n            Tensor.encodeDelimited = function
encodeDelimited(message, writer) {\n                return this.encode(message, writer).ldelim();\n            };\n\n
/**\n             * Decodes a Tensor message from the specified reader or buffer.\n             * @function decode\n
* @memberof onnx.TypeProto.Tensor\n             * @static\n             * @param {$protobuf.Reader|Uint8Array}
reader Reader or buffer to decode from\n             * @param {number} [length] Message length if known
beforehand\n             * @returns {onnx.TypeProto.Tensor} Tensor\n             * @throws {Error} If the payload is not
a reader or valid buffer\n             * @throws {$protobuf.util.ProtocolError} If required fields are missing\n
*/\n            Tensor.decode = function decode(reader, length) {\n                if (!(reader instanceof $Reader))\n
    reader = $Reader.create(reader);\n                var end = length === undefined ? reader.len : reader.pos + length,
message = new $root.onnx.TypeProto.Tensor();\n                while (reader.pos < end) {\n                    var tag =
reader.uint32();\n                    switch (tag >>> 3) {\n                    case 1:\n                        message.elemType =
reader.int32();\n                        break;\n                    case 2:\n                        message.shape =
$root.onnx.TensorShapeProto.decode(reader, reader.uint32());\n                        break;\n                    default:\n
        reader.skipType(tag & 7);\n                        break;\n                    }\n                }\n                return message;\n
      };\n\n            /**\n             * Decodes a Tensor message from the specified reader or buffer, length delimited.\n
       * @function decodeDelimited\n             * @memberof onnx.TypeProto.Tensor\n             * @static\n             *
@param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n             * @returns
{onnx.TypeProto.Tensor} Tensor\n             * @throws {Error} If the payload is not a reader or valid buffer\n
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* @throws {$protobuf.util.ProtocolError} If required fields are missing\n            */\n
Tensor.decodeDelimited = function decodeDelimited(reader) {\n                if (!(reader instanceof $Reader))\n
    reader = new $Reader(reader);\n                return this.decode(reader, reader.uint32());\n            };\n\n            /**\n
       * Verifies a Tensor message.\n            * @function verify\n            * @memberof onnx.TypeProto.Tensor\n
      * @static\n            * @param {Object.<string,*>} message Plain object to verify\n            * @returns
{string|null} `null` if valid, otherwise the reason why it is not\n            */\n            Tensor.verify = function
verify(message) {\n                if (typeof message !== \"object\" || message === null)\n                    return \"object
expected\";\n                if (message.elemType != null && message.hasOwnProperty(\"elemType\"))\n                    if
(!$util.isInteger(message.elemType))\n                        return \"elemType: integer expected\";\n                if
(message.shape != null && message.hasOwnProperty(\"shape\")) {\n                    var error =
$root.onnx.TensorShapeProto.verify(message.shape);\n                    if (error)\n                        return \"shape.\" +
error;\n                }\n                return null;\n            };\n\n            /**\n            * Creates a Tensor message from a
plain object. Also converts values to their respective internal types.\n            * @function fromObject\n            *
@memberof onnx.TypeProto.Tensor\n            * @static\n            * @param {Object.<string,*>} object Plain
object\n            * @returns {onnx.TypeProto.Tensor} Tensor\n            */\n            Tensor.fromObject = function
fromObject(object) {\n                if (object instanceof $root.onnx.TypeProto.Tensor)\n                    return object;\n
      var message = new $root.onnx.TypeProto.Tensor();\n                if (object.elemType != null)\n
message.elemType = object.elemType | 0;\n                if (object.shape != null) {\n                    if (typeof object.shape
!== \"object\")\n                        throw TypeError(\".onnx.TypeProto.Tensor.shape: object expected\");\n
message.shape = $root.onnx.TensorShapeProto.fromObject(object.shape);\n                }\n                return
message;\n            };\n\n            /**\n            * Creates a plain object from a Tensor message. Also converts values
to other types if specified.\n            * @function toObject\n            * @memberof onnx.TypeProto.Tensor\n
* @static\n            * @param {onnx.TypeProto.Tensor} message Tensor\n            * @param
{$protobuf.IConversionOptions} [options] Conversion options\n            * @returns {Object.<string,*>} Plain
object\n            */\n            Tensor.toObject = function toObject(message, options) {\n                if (!options)\n
    options = {};\n                var object = {};\n                if (options.defaults) {\n                    object.elemType = 0;\n
          object.shape = null;\n                }\n                if (message.elemType != null &&
message.hasOwnProperty(\"elemType\"))\n                    object.elemType = message.elemType;\n                if
(message.shape != null && message.hasOwnProperty(\"shape\"))\n                    object.shape =
$root.onnx.TensorShapeProto.toObject(message.shape, options);\n                return object;\n            };\n\n
/**\n            * Converts this Tensor to JSON.\n            * @function toJSON\n            * @memberof
onnx.TypeProto.Tensor\n            * @instance\n            * @returns {Object.<string,*>} JSON object\n            */\n
    Tensor.prototype.toJSON = function toJSON() {\n                return this.constructor.toObject(this,
$protobuf.util.toJSONOptions);\n            };\n\n            return Tensor;\n        })();\n\n        return TypeProto;\n
})();\n\n    onnx.OperatorSetIdProto = (function() {\n\n        /**\n         * Properties of an OperatorSetIdProto.\n
* @memberof onnx\n         * @interface IOperatorSetIdProto\n         * @property {string|null} [domain]
OperatorSetIdProto domain\n         * @property {number|Long|null} [version] OperatorSetIdProto version\n
*/\n\n        /**\n         * Constructs a new OperatorSetIdProto.\n         * @memberof onnx\n         * @classdesc
Represents an OperatorSetIdProto.\n         * @implements IOperatorSetIdProto\n         * @constructor\n         *
@param {onnx.IOperatorSetIdProto=} [properties] Properties to set\n         */\n        function
OperatorSetIdProto(properties) {\n            if (properties)\n                for (var keys = Object.keys(properties), i = 0; i
< keys.length; ++i)\n                    if (properties[keys[i]] != null)\n                        this[keys[i]] = properties[keys[i]];\n
    }\n\n        /**\n         * OperatorSetIdProto domain.\n         * @member {string} domain\n         * @memberof
onnx.OperatorSetIdProto\n         * @instance\n         */\n        OperatorSetIdProto.prototype.domain = \"\";\n\n
/**\n         * OperatorSetIdProto version.\n         * @member {number|Long} version\n         * @memberof
onnx.OperatorSetIdProto\n         * @instance\n         */\n        OperatorSetIdProto.prototype.version = $util.Long ?
$util.Long.fromBits(0,0,false) : 0;\n\n        /**\n         * Creates a new OperatorSetIdProto instance using the
specified properties.\n         * @function create\n         * @memberof onnx.OperatorSetIdProto\n         * @static\n
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 * @param {onnx.IOperatorSetIdProto=} [properties] Properties to set\n * @returns
{onnx.OperatorSetIdProto} OperatorSetIdProto instance\n */\n OperatorSetIdProto.create = function
create(properties) {\n return new OperatorSetIdProto(properties);\n };\n\n /**\n * Encodes the
specified OperatorSetIdProto message. Does not implicitly {@link onnx.OperatorSetIdProto.verify|verify}
messages.\n * @function encode\n * @memberof onnx.OperatorSetIdProto\n * @static\n *
@param {onnx.IOperatorSetIdProto} message OperatorSetIdProto message or plain object to encode\n *
@param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n
 OperatorSetIdProto.encode = function encode(message, writer) {\n if (!writer)\n writer =
$Writer.create();\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n
writer.uint32(/* id 1, wireType 2 =*/10).string(message.domain);\n if (message.version != null &&
message.hasOwnProperty(\"version\"))\n writer.uint32(/* id 2, wireType 0
=*/16).int64(message.version);\n return writer;\n };\n\n /**\n * Encodes the specified
OperatorSetIdProto message, length delimited. Does not implicitly {@link onnx.OperatorSetIdProto.verify|verify}
messages.\n * @function encodeDelimited\n * @memberof onnx.OperatorSetIdProto\n * @static\n
 * @param {onnx.IOperatorSetIdProto} message OperatorSetIdProto message or plain object to encode\n *
@param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n
 OperatorSetIdProto.encodeDelimited = function encodeDelimited(message, writer) {\n return
this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes an OperatorSetIdProto message from
the specified reader or buffer.\n * @function decode\n * @memberof onnx.OperatorSetIdProto\n *
@static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param
{number} [length] Message length if known beforehand\n * @returns {onnx.OperatorSetIdProto}
OperatorSetIdProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws
{$protobuf.util.ProtocolError} If required fields are missing\n */\n OperatorSetIdProto.decode = function
decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n
 var end = length === undefined ? reader.len : reader.pos + length, message = new
$root.onnx.OperatorSetIdProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n
switch (tag >>> 3) {\n case 1:\n message.domain = reader.string();\n break;\n
 case 2:\n message.version = reader.int64();\n break;\n default:\n
reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n
/**\n * Decodes an OperatorSetIdProto message from the specified reader or buffer, length delimited.\n *
@function decodeDelimited\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param
{$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns
{onnx.OperatorSetIdProto} OperatorSetIdProto\n * @throws {Error} If the payload is not a reader or valid
buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n
OperatorSetIdProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof
$Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n
};\n\n /**\n * Verifies an OperatorSetIdProto message.\n * @function verify\n * @memberof
onnx.OperatorSetIdProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n
 * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n OperatorSetIdProto.verify
= function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return
\"object expected\";\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n if
(!$util.isString(message.domain))\n return \"domain: string expected\";\n if (message.version !=
null && message.hasOwnProperty(\"version\"))\n if (!$util.isInteger(message.version) &&
!(message.version && $util.isInteger(message.version.low) && $util.isInteger(message.version.high)))\n
return \"version: integer|Long expected\";\n return null;\n };\n\n /**\n * Creates an
OperatorSetIdProto message from a plain object. Also converts values to their respective internal types.\n *
@function fromObject\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param
{Object.<string,*>} object Plain object\n * @returns {onnx.OperatorSetIdProto} OperatorSetIdProto\n
```

*/\n OperatorSetIdProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.OperatorSetIdProto)\n return object;\n var message = new $root.onnx.OperatorSetIdProto();\n if (object.domain != null)\n message.domain = String(object.domain);\n if (object.version != null)\n if ($util.Long)\n (message.version = $util.Long.fromValue(object.version)).unsigned = false;\n else if (typeof object.version === \"string\")\n message.version = parseInt(object.version, 10);\n else if (typeof object.version === \"number\")\n message.version = object.version;\n else if (typeof object.version === \"object\")\n message.version = new $util.LongBits(object.version.low >>> 0, object.version.high >>> 0).toNumber();\n return message;\n };\n\n /**\n * Creates a plain object from an OperatorSetIdProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {onnx.OperatorSetIdProto} message OperatorSetIdProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n OperatorSetIdProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.defaults) {\n object.domain = \"\";\n if ($util.Long) {\n var long = new $util.Long(0, 0, false);\n object.version = options.longs === String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n } else\n object.version = options.longs === String ? \"0\" : 0;\n }\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n object.domain = message.domain;\n if (message.version != null && message.hasOwnProperty(\"version\"))\n if (typeof message.version === \"number\")\n object.version = options.longs === String ? String(message.version) : message.version;\n else\n object.version = options.longs === String ? $util.Long.prototype.toString.call(message.version) : options.longs === Number ? new $util.LongBits(message.version.low >>> 0, message.version.high >>> 0).toNumber() : message.version;\n return object;\n };\n\n /**\n * Converts this OperatorSetIdProto to JSON.\n * @function toJSON\n * @memberof onnx.OperatorSetIdProto\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n OperatorSetIdProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return OperatorSetIdProto;\n })();\n\n return onnx;\n})();\n\nmodule.exports = $root;\n","// minimal library entry point.\n\n\"use strict\";\nmodule.exports = require(\"./src/index-minimal\");\n","\"use strict\";\nvar protobuf = exports;\n\n/**\n * Build type, one of `\"full\"`, `\"light\"` or `\"minimal\"`.\n * @name build\n * @type {string}\n * @const\n */\nprotobuf.build = \"minimal\";\n\n// Serialization\nprotobuf.Writer = require(\"./writer\");\nprotobuf.BufferWriter = require(\"./writer_buffer\");\nprotobuf.Reader = require(\"./reader\");\nprotobuf.BufferReader = require(\"./reader_buffer\");\n\n// Utility\nprotobuf.util = require(\"./util/minimal\");\nprotobuf.rpc = require(\"./rpc\");\nprotobuf.roots = require(\"./roots\");\nprotobuf.configure = configure;\n\n/* istanbul ignore next */\n/**\n * Reconfigures the library according to the environment.\n * @returns {undefined}\n */\nfunction configure() {\n protobuf.util._configure();\n protobuf.Writer._configure(protobuf.BufferWriter);\n protobuf.Reader._configure(protobuf.BufferReader);\n}\n\n// Set up buffer utility according to the environment\nconfigure();\n","\"use strict\";\nmodule.exports = Reader;\n\nvar util = require(\"./util/minimal\");\n\nvar BufferReader; // cyclic\n\nvar LongBits = util.LongBits,\n utf8 = util.utf8;\n\n/* istanbul ignore next */\nfunction indexOutOfRange(reader, writeLength) {\n return RangeError(\"index out of range: \" + reader.pos + \" + \" + (writeLength || 1) + \" > \" + reader.len);\n}\n\n/**\n * Constructs a new reader instance using the specified buffer.\n * @classdesc Wire format reader using `Uint8Array` if available, otherwise `Array`.\n * @constructor\n * @param {Uint8Array} buffer Buffer to read from\n */\nfunction Reader(buffer) {\n\n /**\n * Read buffer.\n * @type {Uint8Array}\n */\n this.buf = buffer;\n\n /**\n * Read buffer position.\n * @type {number}\n */\n this.pos = 0;\n\n /**\n * Read buffer length.\n * @type {number}\n */\n this.len = buffer.length;\n}\n\nvar create_array = typeof Uint8Array !== \"undefined\"\n ? function create_typed_array(buffer) {\n if (buffer instanceof Uint8Array ||

Array.isArray(buffer))\n   return new Reader(buffer);\n   throw Error(\"illegal buffer\");\n   }\n   /* istanbul ignore next */\n   : function create_array(buffer) {\n   if (Array.isArray(buffer))\n   return new Reader(buffer);\n   throw Error(\"illegal buffer\");\n   };\n\nvar create = function create() {\n   return util.Buffer\n   ? function create_buffer_setup(buffer) {\n   return (Reader.create = function create_buffer(buffer) {\n   return util.Buffer.isBuffer(buffer)\n   ? new BufferReader(buffer)\n   /* istanbul ignore next */\n   : create_array(buffer);\n   })(buffer);\n   }\n   /* istanbul ignore next */\n   : create_array;\n};\n\n/**\n * Creates a new reader using the specified buffer.\n * @function\n * @param {Uint8Array|Buffer} buffer Buffer to read from\n * @returns {Reader|BufferReader} A {@link BufferReader} if `buffer` is a Buffer, otherwise a {@link Reader}\n * @throws {Error} If `buffer` is not a valid buffer\n */\nReader.create = create();\n\nReader.prototype._slice = util.Array.prototype.subarray || /* istanbul ignore next */ util.Array.prototype.slice;\n\n/**\n * Reads a varint as an unsigned 32 bit value.\n * @function\n * @returns {number} Value read\n */\nReader.prototype.uint32 = (function read_uint32_setup() {\n   var value = 4294967295; // optimizer type-hint, tends to deopt otherwise (?!)\n   return function read_uint32() {\n   value = (this.buf[this.pos] & 127   ) >>> 0; if (this.buf[this.pos++] < 128) return value;\n   value = (value | (this.buf[this.pos] & 127) << 7) >>> 0; if (this.buf[this.pos++] < 128) return value;\n   value = (value | (this.buf[this.pos] & 127) << 14) >>> 0; if (this.buf[this.pos++] < 128) return value;\n   value = (value | (this.buf[this.pos] & 127) << 21) >>> 0; if (this.buf[this.pos++] < 128) return value;\n   value = (value | (this.buf[this.pos] & 15) << 28) >>> 0; if (this.buf[this.pos++] < 128) return value;\n\n   /* istanbul ignore if */\n   if ((this.pos += 5) > this.len) {\n   this.pos = this.len;\n   throw indexOutOfRange(this, 10);\n   }\n   return value;\n   };\n})();\n\n/**\n * Reads a varint as a signed 32 bit value.\n * @returns {number} Value read\n */\nReader.prototype.int32 = function read_int32() {\n   return this.uint32() | 0;\n};\n\n/**\n * Reads a zig-zag encoded varint as a signed 32 bit value.\n * @returns {number} Value read\n */\nReader.prototype.sint32 = function read_sint32() {\n   var value = this.uint32();\n   return value >>> 1 ^ -(value & 1) | 0;\n};\n\n/* eslint-disable no-invalid-this */\n\nfunction readLongVarint() {\n   // tends to deopt with local vars for octet etc.\n   var bits = new LongBits(0, 0);\n   var i = 0;\n   if (this.len - this.pos > 4) { // fast route (lo)\n   for (; i < 4; ++i) {\n   // 1st..4th\n   bits.lo = (bits.lo | (this.buf[this.pos] & 127) << i * 7) >>> 0;\n   if (this.buf[this.pos++] < 128)\n   return bits;\n   }\n   // 5th\n   bits.lo = (bits.lo | (this.buf[this.pos] & 127) << 28) >>> 0;\n   bits.hi = (bits.hi | (this.buf[this.pos] & 127) >> 4) >>> 0;\n   if (this.buf[this.pos++] < 128)\n   return bits;\n   i = 0;\n   } else {\n   for (; i < 3; ++i) {\n   /* istanbul ignore if */\n   if (this.pos >= this.len)\n   throw indexOutOfRange(this);\n   // 1st..3th\n   bits.lo = (bits.lo | (this.buf[this.pos] & 127) << i * 7) >>> 0;\n   if (this.buf[this.pos++] < 128)\n   return bits;\n   }\n   // 4th\n   bits.lo = (bits.lo | (this.buf[this.pos++] & 127) << i * 7) >>> 0;\n   return bits;\n   }\n   if (this.len - this.pos > 4) { // fast route (hi)\n   for (; i < 5; ++i) {\n   // 6th..10th\n   bits.hi = (bits.hi | (this.buf[this.pos] & 127) << i * 7 + 3) >>> 0;\n   if (this.buf[this.pos++] < 128)\n   return bits;\n   }\n   } else {\n   for (; i < 5; ++i) {\n   /* istanbul ignore if */\n   if (this.pos >= this.len)\n   throw indexOutOfRange(this);\n   // 6th..10th\n   bits.hi = (bits.hi | (this.buf[this.pos] & 127) << i * 7 + 3) >>> 0;\n   if (this.buf[this.pos++] < 128)\n   return bits;\n   }\n   }\n   /* istanbul ignore next */\n   throw Error(\"invalid varint encoding\");\n}\n\n/* eslint-enable no-invalid-this */\n\n/**\n * Reads a varint as a signed 64 bit value.\n * @name Reader#int64\n * @function\n * @returns {Long} Value read\n */\n\n/**\n * Reads a varint as an unsigned 64 bit value.\n * @name Reader#uint64\n * @function\n * @returns {Long} Value read\n */\n\n/**\n * Reads a zig-zag encoded varint as a signed 64 bit value.\n * @name Reader#sint64\n * @function\n * @returns {Long} Value read\n */\n\n/**\n * Reads a varint as a boolean.\n * @returns {boolean} Value read\n */\nReader.prototype.bool = function read_bool() {\n   return this.uint32() !== 0;\n};\n\nfunction readFixed32_end(buf, end) { // note that this uses `end`, not `pos`\n   return (buf[end - 4]\n | buf[end - 3] << 8\n | buf[end - 2] << 16\n | buf[end - 1] << 24) >>> 0;\n}\n\n/**\n * Reads fixed 32 bits as an unsigned 32 bit integer.\n * @returns {number} Value read\n */\nReader.prototype.fixed32 = function read_fixed32() {\n\n   /* istanbul ignore if */\n   if (this.pos + 4 > this.len)\n   throw indexOutOfRange(this, 4);\n\n   return readFixed32_end(this.buf, this.pos += 4);\n};\n\n/**\n * Reads fixed 32 bits as a signed 32 bit integer.\n * @returns

{number} Value read\n */\nReader.prototype.sfixed32 = function read_sfixed32() {\n\n   /* istanbul ignore if */\n   if (this.pos + 4 > this.len)\n   throw indexOutOfRange(this, 4);\n\n   return readFixed32_end(this.buf, this.pos += 4) | 0;\n};\n\n/* eslint-disable no-invalid-this */\n\nfunction readFixed64(/* this: Reader */) {\n\n   /* istanbul ignore if */\n   if (this.pos + 8 > this.len)\n   throw indexOutOfRange(this, 8);\n\n   return new LongBits(readFixed32_end(this.buf, this.pos += 4), readFixed32_end(this.buf, this.pos += 4));\n}\n\n/* eslint-enable no-invalid-this */\n\n/**\n * Reads fixed 64 bits.\n * @name Reader#fixed64\n * @function\n * @returns {Long} Value read\n */\n\n/**\n * Reads zig-zag encoded fixed 64 bits.\n * @name Reader#sfixed64\n * @function\n * @returns {Long} Value read\n */\n\n/**\n * Reads a float (32 bit) as a number.\n * @function\n * @returns {number} Value read\n */\nReader.prototype.float = function read_float() {\n\n   /* istanbul ignore if */\n   if (this.pos + 4 > this.len)\n   throw indexOutOfRange(this, 4);\n\n   var value = util.float.readFloatLE(this.buf, this.pos);\n   this.pos += 4;\n   return value;\n};\n\n/**\n * Reads a double (64 bit float) as a number.\n * @function\n * @returns {number} Value read\n */\nReader.prototype.double = function read_double() {\n\n   /* istanbul ignore if */\n   if (this.pos + 8 > this.len)\n   throw indexOutOfRange(this, 4);\n\n   var value = util.float.readDoubleLE(this.buf, this.pos);\n   this.pos += 8;\n   return value;\n};\n\n/**\n * Reads a sequence of bytes preceeded by its length as a varint.\n * @returns {Uint8Array} Value read\n */\nReader.prototype.bytes = function read_bytes() {\n   var length = this.uint32(),\n   start = this.pos,\n   end   = this.pos + length;\n\n   /* istanbul ignore if */\n   if (end > this.len)\n   throw indexOutOfRange(this, length);\n\n   this.pos += length;\n   if (Array.isArray(this.buf)) // plain array\n   return this.buf.slice(start, end);\n   return start === end // fix for IE 10/Win8 and others' subarray returning array of size 1\n   ? new this.buf.constructor(0)\n   : this._slice.call(this.buf, start, end);\n};\n\n/**\n * Reads a string preceeded by its byte length as a varint.\n * @returns {string} Value read\n */\nReader.prototype.string = function read_string() {\n   var bytes = this.bytes();\n   return utf8.read(bytes, 0, bytes.length);\n};\n\n/**\n * Skips the specified number of bytes if specified, otherwise skips a varint.\n * @param {number} [length] Length if known, otherwise a varint is assumed\n * @returns {Reader} `this`\n */\nReader.prototype.skip = function skip(length) {\n   if (typeof length === \"number\") {\n   /* istanbul ignore if */\n   if (this.pos + length > this.len)\n   throw indexOutOfRange(this, length);\n   this.pos += length;\n   } else {\n   do {\n   /* istanbul ignore if */\n   if (this.pos >= this.len)\n   throw indexOutOfRange(this);\n   } while (this.buf[this.pos++] & 128);\n   }\n   return this;\n};\n\n/**\n * Skips the next element of the specified wire type.\n * @param {number} wireType Wire type received\n * @returns {Reader} `this`\n */\nReader.prototype.skipType = function(wireType) {\n   switch (wireType) {\n   case 0:\n   this.skip();\n   break;\n   case 1:\n   this.skip(8);\n   break;\n   case 2:\n   this.skip(this.uint32());\n   break;\n   case 3:\n   while ((wireType = this.uint32() & 7) !== 4) {\n   this.skipType(wireType);\n   }\n   break;\n   case 5:\n   this.skip(4);\n   break;\n\n   /* istanbul ignore next */\n   default:\n   throw Error(\"invalid wire type \" + wireType + \" at offset \" + this.pos);\n   }\n   return this;\n};\n\nReader._configure = function(BufferReader_) {\n   BufferReader = BufferReader_;\n   Reader.create = create();\n   BufferReader._configure();\n\n   var fn = util.Long ? \"toLong\" : /* istanbul ignore next */ \"toNumber\";\n   util.merge(Reader.prototype, {\n\n   int64: function read_int64() {\n   return readLongVarint.call(this)[fn](false);\n   },\n\n   uint64: function read_uint64() {\n   return readLongVarint.call(this)[fn](true);\n   },\n\n   sint64: function read_sint64() {\n   return readLongVarint.call(this).zzDecode()[fn](false);\n   },\n\n   fixed64: function read_fixed64() {\n   return readFixed64.call(this)[fn](true);\n   },\n\n   sfixed64: function read_sfixed64() {\n   return readFixed64.call(this)[fn](false);\n   }\n\n   });\n};\n","\"use strict\";\nmodule.exports = BufferReader;\n\n// extends Reader\nvar Reader = require(\"./reader\");\n(BufferReader.prototype = Object.create(Reader.prototype)).constructor = BufferReader;\n\nvar util = require(\"./util/minimal\");\n\n/**\n * Constructs a new buffer reader instance.\n * @classdesc Wire format reader using node buffers.\n * @extends Reader\n * @constructor\n * @param {Buffer} buffer Buffer to read from\n */\nfunction BufferReader(buffer) {\n   Reader.call(this, buffer);\n\n   /**\n   * Read buffer.\n   * @name BufferReader#buf\n   * @type {Buffer}\n   */\n}\n\nBufferReader._configure = function () {\n   /* istanbul ignore else */\n   if (util.Buffer)\n   BufferReader.prototype._slice = util.Buffer.prototype.slice;\n};\n\n\n/**\n * @override\n

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*/\nBufferReader.prototype.string = function read_string_buffer() {\n    var len = this.uint32(); // modifies pos\n
return this.buf.utf8Slice\n        ? this.buf.utf8Slice(this.pos, this.pos = Math.min(this.pos + len, this.len))\n        :
this.buf.toString(\"utf-8\", this.pos, this.pos = Math.min(this.pos + len, this.len));\n};\n\n/**\n * Reads a sequence of
bytes preceeded by its length as a varint.\n * @name BufferReader#bytes\n * @function\n * @returns {Buffer}
Value read\n */\n\nBufferReader._configure();\n","\"use strict\";\nmodule.exports = {};\n\n/**\n * Named roots.\n *
This is where pbjs stores generated structures (the option `-r, --root` specifies a name).\n * Can also be used
manually to make roots available accross modules.\n * @name roots\n * @type {Object.<string,Root>}\n *
@example\n * // pbjs -r myroot -o compiled.js ...\n *\n * // in another module:\n * require(\"./compiled.js\");\n *\n *
// in any subsequent module:\n * var root = protobuf.roots[\"myroot\"];\n */\n","\"use strict\";\n\n/**\n * Streaming
RPC helpers.\n * @namespace\n */\nvar rpc = exports;\n\n/**\n * RPC implementation passed to {@link
Service#create} performing a service request on network level, i.e. by utilizing http requests or websockets.\n *
@typedef RPCImpl\n * @type {function}\n * @param
{Method|rpc.ServiceMethod<Message<{}>,Message<{}>>} method Reflected or static method being called\n *
@param {Uint8Array} requestData Request data\n * @param {RPCImplCallback} callback Callback function\n *
@returns {undefined}\n * @example\n * function rpcImpl(method, requestData, callback) {\n *     if
(protobuf.util.lcFirst(method.name) !== \"myMethod\") // compatible with static code\n *         throw Error(\"no
such method\");\n *     asynchronouslyObtainAResponse(requestData, function(err, responseData) {\n *
callback(err, responseData);\n *     });\n * }\n */\n\n/**\n * Node-style callback as used by {@link RPCImpl}.\n *
@typedef RPCImplCallback\n * @type {function}\n * @param {Error|null} error Error, if any, otherwise `null`\n *
@param {Uint8Array|null} [response] Response data or `null` to signal end of stream, if there hasn't been an error\n
* @returns {undefined}\n */\n\nrpc.Service = require(\"./rpc/service\");\n","\"use strict\";\nmodule.exports =
Service;\n\nvar util = require(\"../util/minimal\");\n\n// Extends EventEmitter\n(Service.prototype =
Object.create(util.EventEmitter.prototype)).constructor = Service;\n\n/**\n * A service method callback as used by
{@link rpc.ServiceMethod|ServiceMethod}.\n *\n * Differs from {@link RPCImplCallback} in that it is an actual
callback of a service method which may not return `response = null`.\n * @typedef rpc.ServiceMethodCallback\n *
@template TRes extends Message<TRes>\n * @type {function}\n * @param {Error|null} error Error, if any\n *
@param {TRes} [response] Response message\n * @returns {undefined}\n */\n\n/**\n * A service method part of a
{@link rpc.Service} as created by {@link Service.create}.\n * @typedef rpc.ServiceMethod\n * @template TReq
extends Message<TReq>\n * @template TRes extends Message<TRes>\n * @type {function}\n * @param
{TReq|Properties<TReq>} request Request message or plain object\n * @param
{rpc.ServiceMethodCallback<TRes>} [callback] Node-style callback called with the error, if any, and the response
message\n * @returns {Promise<Message<TRes>>} Promise if `callback` has been omitted, otherwise
`undefined`\n */\n\n/**\n * Constructs a new RPC service instance.\n * @classdesc An RPC service as returned by
{@link Service#create}.\n * @exports rpc.Service\n * @extends util.EventEmitter\n * @constructor\n * @param
{RPCImpl} rpcImpl RPC implementation\n * @param {boolean} [requestDelimited=false] Whether requests are
length-delimited\n * @param {boolean} [responseDelimited=false] Whether responses are length-delimited\n
*/\nfunction Service(rpcImpl, requestDelimited, responseDelimited) {\n\n    if (typeof rpcImpl !== \"function\")\n
  throw TypeError(\"rpcImpl must be a function\");\n\n    util.EventEmitter.call(this);\n\n    /**\n     * RPC
implementation. Becomes `null` once the service is ended.\n     * @type {RPCImpl|null}\n     */\n    this.rpcImpl =
rpcImpl;\n\n    /**\n     * Whether requests are length-delimited.\n     * @type {boolean}\n     */\n
this.requestDelimited = Boolean(requestDelimited);\n\n    /**\n     * Whether responses are length-delimited.\n     *
@type {boolean}\n     */\n    this.responseDelimited = Boolean(responseDelimited);\n}\n\n/**\n * Calls a service
method through {@link rpc.Service#rpcImpl|rpcImpl}.\n * @param {Method|rpc.ServiceMethod<TReq,TRes>}
method Reflected or static method\n * @param {Constructor<TReq>} requestCtor Request constructor\n * @param
{Constructor<TRes>} responseCtor Response constructor\n * @param {TReq|Properties<TReq>} request Request
message or plain object\n * @param {rpc.ServiceMethodCallback<TRes>} callback Service callback\n * @returns
{undefined}\n * @template TReq extends Message<TReq>\n * @template TRes extends Message<TRes>\n
*/\nService.prototype.rpcCall = function rpcCall(method, requestCtor, responseCtor, request, callback) {\n\n    if
```

(!request)\n throw TypeError(\"request must be specified\");\n\n var self = this;\n if (!callback)\n return util.asPromise(rpcCall, self, method, requestCtor, responseCtor, request);\n\n if (!self.rpcImpl) {\n setTimeout(function() { callback(Error(\"already ended\")); }, 0);\n return undefined;\n }\n\n try {\n return self.rpcImpl(\n method,\n requestCtor[self.requestDelimited ? \"encodeDelimited\" : \"encode\"](request).finish(),\n function rpcCallback(err, response) {\n\n if (err) {\n self.emit(\"error\", err, method);\n return callback(err);\n }\n\n if (response === null) {\n self.end(/* endedByRPC */ true);\n return undefined;\n }\n\n if (!(response instanceof responseCtor)) {\n try {\n response = responseCtor[self.responseDelimited ? \"decodeDelimited\" : \"decode\"](response);\n } catch (err) {\n self.emit(\"error\", err, method);\n return callback(err);\n }\n }\n\n self.emit(\"data\", response, method);\n return callback(null, response);\n }\n);\n } catch (err) {\n self.emit(\"error\", err, method);\n setTimeout(function() { callback(err); }, 0);\n return undefined;\n }\n};\n\n/**\n * Ends this service and emits the `end` event.\n * @param {boolean} [endedByRPC=false] Whether the service has been ended by the RPC implementation.\n * @returns {rpc.Service} `this`\n */\nService.prototype.end = function end(endedByRPC) {\n if (this.rpcImpl) {\n if (!endedByRPC) // signal end to rpcImpl\n this.rpcImpl(null, null, null);\n this.rpcImpl = null;\n this.emit(\"end\").off();\n }\n return this;\n};\n","\"use strict\";\nmodule.exports = LongBits;\n\nvar util = require(\"../util/minimal\");\n\n/**\n * Constructs new long bits.\n * @classdesc Helper class for working with the low and high bits of a 64 bit value.\n * @memberof util\n * @constructor\n * @param {number} lo Low 32 bits, unsigned\n * @param {number} hi High 32 bits, unsigned\n */\nfunction LongBits(lo, hi) {\n\n // note that the casts below are theoretically unnecessary as of today, but older statically\n // generated converter code might still call the ctor with signed 32bits. kept for compat.\n\n /**\n * Low bits.\n * @type {number}\n */\n this.lo = lo >>> 0;\n\n /**\n * High bits.\n * @type {number}\n */\n this.hi = hi >>> 0;\n}\n\n/**\n * Zero bits.\n * @memberof util.LongBits\n * @type {util.LongBits}\n */\nvar zero = LongBits.zero = new LongBits(0, 0);\n\nzero.toNumber = function() { return 0; };\nzero.zzEncode = zero.zzDecode = function() { return this; };\nzero.length = function() { return 1; };\n\n/**\n * Zero hash.\n * @memberof util.LongBits\n * @type {string}\n */\nvar zeroHash = LongBits.zeroHash = \"\\0\\0\\0\\0\\0\\0\\0\\0\";\n\n/**\n * Constructs new long bits from the specified number.\n * @param {number} value Value\n * @returns {util.LongBits} Instance\n */\nLongBits.fromNumber = function fromNumber(value) {\n if (value === 0)\n return zero;\n var sign = value < 0;\n if (sign)\n value = -value;\n var lo = value >>> 0,\n hi = (value - lo) / 4294967296 >>> 0;\n if (sign) {\n hi = ~hi >>> 0;\n lo = ~lo >>> 0;\n if (++lo > 4294967295) {\n lo = 0;\n if (++hi > 4294967295)\n hi = 0;\n }\n }\n return new LongBits(lo, hi);\n};\n\n/**\n * Constructs new long bits from a number, long or string.\n * @param {Long|number|string} value Value\n * @returns {util.LongBits} Instance\n */\nLongBits.from = function from(value) {\n if (typeof value === \"number\")\n return LongBits.fromNumber(value);\n if (util.isString(value)) {\n /* istanbul ignore else */\n if (util.Long)\n value = util.Long.fromString(value);\n else\n return LongBits.fromNumber(parseInt(value, 10));\n }\n return value.low || value.high ? new LongBits(value.low >>> 0, value.high >>> 0) : zero;\n};\n\n/**\n * Converts this long bits to a possibly unsafe JavaScript number.\n * @param {boolean} [unsigned=false] Whether unsigned or not\n * @returns {number} Possibly unsafe number\n */\nLongBits.prototype.toNumber = function toNumber(unsigned) {\n if (!unsigned && this.hi >>> 31) {\n var lo = ~this.lo + 1 >>> 0,\n hi = ~this.hi >>> 0;\n if (!lo)\n hi = hi + 1 >>> 0;\n return -(lo + hi * 4294967296);\n }\n return this.lo + this.hi * 4294967296;\n};\n\n/**\n * Converts this long bits to a long.\n * @param {boolean} [unsigned=false] Whether unsigned or not\n * @returns {Long} Long\n */\nLongBits.prototype.toLong = function toLong(unsigned) {\n return util.Long\n ? new util.Long(this.lo | 0, this.hi | 0, Boolean(unsigned))\n /* istanbul ignore next */\n : { low: this.lo | 0, high: this.hi | 0, unsigned: Boolean(unsigned) };\n};\n\nvar charCodeAt = String.prototype.charCodeAt;\n\n/**\n * Constructs new long bits from the specified 8 characters long hash.\n * @param {string} hash Hash\n * @returns {util.LongBits} Bits\n */\nLongBits.fromHash = function fromHash(hash) {\n if (hash === zeroHash)\n return zero;\n return new

```
LongBits(\n        ( charCodeAt.call(hash, 0)\n        | charCodeAt.call(hash, 1) << 8\n        | charCodeAt.call(hash, 2)
<< 16\n        | charCodeAt.call(hash, 3) << 24) >>> 0\n    ,\n        ( charCodeAt.call(hash, 4)\n        |
charCodeAt.call(hash, 5) << 8\n        | charCodeAt.call(hash, 6) << 16\n        | charCodeAt.call(hash, 7) << 24) >>>
0\n    );\n};\n\n/**\n * Converts this long bits to a 8 characters long hash.\n * @returns {string} Hash\n
*/\nLongBits.prototype.toHash = function toHash() {\n    return String.fromCharCode(\n        this.lo        & 255,\n
  this.lo >>> 8  & 255,\n        this.lo >>> 16 & 255,\n        this.lo >>> 24      ,\n        this.hi        & 255,\n        this.hi
>>> 8  & 255,\n        this.hi >>> 16 & 255,\n        this.hi >>> 24\n    );\n};\n\n/**\n * Zig-zag encodes this long
bits.\n * @returns {util.LongBits} `this`\n */\nLongBits.prototype.zzEncode = function zzEncode() {\n    var mask =
 this.hi >> 31;\n    this.hi  = ((this.hi << 1 | this.lo >>> 31) ^ mask) >>> 0;\n    this.lo  = ( this.lo << 1                   ^
mask) >>> 0;\n    return this;\n};\n\n/**\n * Zig-zag decodes this long bits.\n * @returns {util.LongBits} `this`\n
*/\nLongBits.prototype.zzDecode = function zzDecode() {\n    var mask = -(this.lo & 1);\n    this.lo  = ((this.lo >>>
1 | this.hi << 31) ^ mask) >>> 0;\n    this.hi  = ( this.hi >>> 1                   ^ mask) >>> 0;\n    return this;\n};\n\n/**\n
* Calculates the length of this longbits when encoded as a varint.\n * @returns {number} Length\n
*/\nLongBits.prototype.length = function length() {\n    var part0 =  this.lo,\n        part1 = (this.lo >>> 28 | this.hi <<
4) >>> 0,\n        part2 =  this.hi >>> 24;\n    return part2 === 0\n         ? part1 === 0\n           ? part0 < 16384\n
 ? part0 < 128 ? 1 : 2\n             : part0 < 2097152 ? 3 : 4\n           : part1 < 16384\n             ? part1 < 128 ? 5 : 6\n
   : part1 < 2097152 ? 7 : 8\n         : part2 < 128 ? 9 : 10;\n};\n","\"use strict\";\nvar util = exports;\n\n// used to return
a Promise where callback is omitted\nutil.asPromise = require(\"@protobufjs/aspromise\");\n\n// converts to / from
base64 encoded strings\nutil.base64 = require(\"@protobufjs/base64\");\n\n// base class of
rpc.Service\nutil.EventEmitter = require(\"@protobufjs/eventemitter\");\n\n// float handling accross
browsers\nutil.float = require(\"@protobufjs/float\");\n\n// requires modules optionally and hides the call from
bundlers\nutil.inquire = require(\"@protobufjs/inquire\");\n\n// converts to / from utf8 encoded strings\nutil.utf8 =
require(\"@protobufjs/utf8\");\n\n// provides a node-like buffer pool in the browser\nutil.pool =
require(\"@protobufjs/pool\");\n\n// utility to work with the low and high bits of a 64 bit value\nutil.LongBits =
require(\"./longbits\");\n\n/**\n * Whether running within node or not.\n * @memberof util\n * @type {boolean}\n
*/\nutil.isNode = Boolean(typeof global !== \"undefined\"\n                   && global\n                   &&
global.process\n                   && global.process.versions\n                   && global.process.versions.node);\n\n/**\n *
Global object reference.\n * @memberof util\n * @type {Object}\n */\nutil.global = util.isNode && global\n
|| typeof window !== \"undefined\" && window\n           || typeof self   !== \"undefined\" && self\n           || this; //
eslint-disable-line no-invalid-this\n\n/**\n * An immuable empty array.\n * @memberof util\n * @type
{Array.<*>}\n * @const\n */\nutil.emptyArray = Object.freeze ? Object.freeze([]) : /* istanbul ignore next */ []; //
used on prototypes\n\n/**\n * An immutable empty object.\n * @type {Object}\n * @const\n */\nutil.emptyObject
= Object.freeze ? Object.freeze({}) : /* istanbul ignore next */ {}; // used on prototypes\n\n/**\n * Tests if the
specified value is an integer.\n * @function\n * @param {*} value Value to test\n * @returns {boolean} `true` if the
value is an integer\n */\nutil.isInteger = Number.isInteger || /* istanbul ignore next */ function isInteger(value) {\n
return typeof value === \"number\" && isFinite(value) && Math.floor(value) === value;\n};\n\n/**\n * Tests if the
specified value is a string.\n * @param {*} value Value to test\n * @returns {boolean} `true` if the value is a
string\n */\nutil.isString = function isString(value) {\n    return typeof value === \"string\" || value instanceof
String;\n};\n\n/**\n * Tests if the specified value is a non-null object.\n * @param {*} value Value to test\n *
@returns {boolean} `true` if the value is a non-null object\n */\nutil.isObject = function isObject(value) {\n    return
value && typeof value === \"object\";\n};\n\n/**\n * Checks if a property on a message is considered to be
present.\n * This is an alias of {@link util.isSet}.\n * @function\n * @param {Object} obj Plain object or message
instance\n * @param {string} prop Property name\n * @returns {boolean} `true` if considered to be present,
otherwise `false`\n */\nutil.isset =\n\n/**\n * Checks if a property on a message is considered to be present.\n *
@param {Object} obj Plain object or message instance\n * @param {string} prop Property name\n * @returns
{boolean} `true` if considered to be present, otherwise `false`\n */\nutil.isSet = function isSet(obj, prop) {\n    var
value = obj[prop];\n    if (value != null && obj.hasOwnProperty(prop)) // eslint-disable-line eqeqeq, no-prototype-
builtins\n        return typeof value !== \"object\" || (Array.isArray(value) ? value.length : Object.keys(value).length)
```

> 0;\n   return false;\n};\n\n/**\n * Any compatible Buffer instance.\n * This is a minimal stand-alone definition of a Buffer instance. The actual type is that exported by node's typings.\n * @interface Buffer\n * @extends Uint8Array\n */\n\n/**\n * Node's Buffer class if available.\n * @type {Constructor<Buffer>}\n */\nutil.Buffer = (function() {\n   try {\n   var Buffer = util.inquire(\"buffer\").Buffer;\n   // refuse to use non-node buffers if not explicitly assigned (perf reasons):\n   return Buffer.prototype.utf8Write ? Buffer : /* istanbul ignore next */ null;\n   } catch (e) {\n   /* istanbul ignore next */\n   return null;\n   }\n})();\n\n// Internal alias of or polyfull for Buffer.from.\nutil._Buffer_from = null;\n\n// Internal alias of or polyfill for Buffer.allocUnsafe.\nutil._Buffer_allocUnsafe = null;\n\n/**\n * Creates a new buffer of whatever type supported by the environment.\n * @param {number|number[]} [sizeOrArray=0] Buffer size or number array\n * @returns {Uint8Array|Buffer} Buffer\n */\nutil.newBuffer = function newBuffer(sizeOrArray) {\n   /* istanbul ignore next */\n   return typeof sizeOrArray === \"number\"\n   ? util.Buffer\n   ? util._Buffer_allocUnsafe(sizeOrArray)\n   : new util.Array(sizeOrArray)\n   : util.Buffer\n   ? util._Buffer_from(sizeOrArray)\n   : typeof Uint8Array === \"undefined\"\n   ? sizeOrArray\n   : new Uint8Array(sizeOrArray);\n};\n\n/**\n * Array implementation used in the browser. `Uint8Array` if supported, otherwise `Array`.\n * @type {Constructor<Uint8Array>}\n */\nutil.Array = typeof Uint8Array !== \"undefined\" ? Uint8Array /* istanbul ignore next */ : Array;\n\n/**\n * Any compatible Long instance.\n * This is a minimal stand-alone definition of a Long instance. The actual type is that exported by long.js.\n * @interface Long\n * @property {number} low Low bits\n * @property {number} high High bits\n * @property {boolean} unsigned Whether unsigned or not\n */\n\n/**\n * Long.js's Long class if available.\n * @type {Constructor<Long>}\n */\nutil.Long = /* istanbul ignore next */ util.global.dcodeIO && /* istanbul ignore next */ util.global.dcodeIO.Long\n || /* istanbul ignore next */ util.global.Long\n || util.inquire(\"long\");\n\n/**\n * Regular expression used to verify 2 bit (`bool`) map keys.\n * @type {RegExp}\n * @const\n */\nutil.key2Re = /^true|false|0|1$/;\n\n/**\n * Regular expression used to verify 32 bit (`int32` etc.) map keys.\n * @type {RegExp}\n * @const\n */\nutil.key32Re = /^-?(?:0|[1-9][0-9]*)$/;\n\n/**\n * Regular expression used to verify 64 bit (`int64` etc.) map keys.\n * @type {RegExp}\n * @const\n */\nutil.key64Re = /^(?:[\\\\x00-\\\\xff]{8}|-?(?:0|[1-9][0-9]*))$/;\n\n/**\n * Converts a number or long to an 8 characters long hash string.\n * @param {Long|number} value Value to convert\n * @returns {string} Hash\n */\nutil.longToHash = function longToHash(value) {\n   return value\n   ? util.LongBits.from(value).toHash()\n   : util.LongBits.zeroHash;\n};\n\n/**\n * Converts an 8 characters long hash string to a long or number.\n * @param {string} hash Hash\n * @param {boolean} [unsigned=false] Whether unsigned or not\n * @returns {Long|number} Original value\n */\nutil.longFromHash = function longFromHash(hash, unsigned) {\n   var bits = util.LongBits.fromHash(hash);\n   if (util.Long)\n   return util.Long.fromBits(bits.lo, bits.hi, unsigned);\n   return bits.toNumber(Boolean(unsigned));\n};\n\n/**\n * Merges the properties of the source object into the destination object.\n * @memberof util\n * @param {Object.<string,*>} dst Destination object\n * @param {Object.<string,*>} src Source object\n * @param {boolean} [ifNotSet=false] Merges only if the key is not already set\n * @returns {Object.<string,*>} Destination object\n */\nfunction merge(dst, src, ifNotSet) { // used by converters\n   for (var keys = Object.keys(src), i = 0; i < keys.length; ++i)\n   if (dst[keys[i]] === undefined || !ifNotSet)\n   dst[keys[i]] = src[keys[i]];\n   return dst;\n}\n\nutil.merge = merge;\n\n/**\n * Converts the first character of a string to lower case.\n * @param {string} str String to convert\n * @returns {string} Converted string\n */\nutil.lcFirst = function lcFirst(str) {\n   return str.charAt(0).toLowerCase() + str.substring(1);\n};\n\n/**\n * Creates a custom error constructor.\n * @memberof util\n * @param {string} name Error name\n * @returns {Constructor<Error>} Custom error constructor\n */\nfunction newError(name) {\n\n   function CustomError(message, properties) {\n\n   if (!(this instanceof CustomError))\n   return new CustomError(message, properties);\n\n   // Error.call(this, message);\n   // ^ just returns a new error instance because the ctor can be called as a function\n\n   Object.defineProperty(this, \"message\", { get: function() { return message; } });\n\n   /* istanbul ignore next */\n   if (Error.captureStackTrace) // node\n   Error.captureStackTrace(this, CustomError);\n   else\n   Object.defineProperty(this, \"stack\", { value: new Error().stack || \"\" });\n\n   if (properties)\n   merge(this, properties);\n   }\n\n   (CustomError.prototype = Object.create(Error.prototype)).constructor = CustomError;\n\n

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Object.defineProperty(CustomError.prototype, \"name\", { get: function() { return name; } });\n\n
CustomError.prototype.toString = function toString() {\n        return this.name + \": \" + this.message;\n    };\n\n
return CustomError;\n}\n\nutil.newError = newError;\n\n/**\n * Constructs a new protocol error.\n * @classdesc
Error subclass indicating a protocol specifc error.\n * @memberof util\n * @extends Error\n * @template T extends
Message<T>\n * @constructor\n * @param {string} message Error message\n * @param {Object.<string,*>}
[properties] Additional properties\n * @example\n * try {\n *     MyMessage.decode(someBuffer); // throws if
required fields are missing\n * } catch (e) {\n *     if (e instanceof ProtocolError && e.instance)\n *
console.log(\"decoded so far: \" + JSON.stringify(e.instance));\n * }\n */\nutil.ProtocolError =
newError(\"ProtocolError\");\n\n/**\n * So far decoded message instance.\n * @name util.ProtocolError#instance\n
* @type {Message<T>}\n */\n\n/**\n * A OneOf getter as returned by {@link util.oneOfGetter}.\n * @typedef
OneOfGetter\n * @type {function}\n * @returns {string|undefined} Set field name, if any\n */\n\n/**\n * Builds a
getter for a oneof's present field name.\n * @param {string[]} fieldNames Field names\n * @returns {OneOfGetter}
Unbound getter\n */\nutil.oneOfGetter = function getOneOf(fieldNames) {\n    var fieldMap = {};\n    for (var i = 0;
i < fieldNames.length; ++i)\n        fieldMap[fieldNames[i]] = 1;\n\n    /**\n     * @returns {string|undefined} Set
field name, if any\n     * @this Object\n     * @ignore\n     */\n    return function() { // eslint-disable-line consistent-
return\n        for (var keys = Object.keys(this), i = keys.length - 1; i > -1; --i)\n            if (fieldMap[keys[i]] === 1
&& this[keys[i]] !== undefined && this[keys[i]] !== null)\n                return keys[i];\n    };\n};\n\n/**\n * A OneOf
setter as returned by {@link util.oneOfSetter}.\n * @typedef OneOfSetter\n * @type {function}\n * @param
{string|undefined} value Field name\n * @returns {undefined}\n */\n\n/**\n * Builds a setter for a oneof's present
field name.\n * @param {string[]} fieldNames Field names\n * @returns {OneOfSetter} Unbound setter\n
*/\nutil.oneOfSetter = function setOneOf(fieldNames) {\n\n    /**\n     * @param {string} name Field name\n     *
@returns {undefined}\n     * @this Object\n     * @ignore\n     */\n    return function(name) {\n        for (var i = 0; i
< fieldNames.length; ++i)\n            if (fieldNames[i] !== name)\n                delete this[fieldNames[i]];\n
};\n};\n\n/**\n * Default conversion options used for {@link Message#toJSON} implementations.\n *\n * These
options are close to proto3's JSON mapping with the exception that internal types like Any are handled just like
messages. More precisely:\n *\n * - Longs become strings\n * - Enums become string keys\n * - Bytes become
base64 encoded strings\n * - (Sub-)Messages become plain objects\n * - Maps become plain objects with all string
keys\n * - Repeated fields become arrays\n * - NaN and Infinity for float and double fields become strings\n *\n *
@type {IConversionOptions}\n * @see https://developers.google.com/protocol-buffers/docs/proto3?hl=en#json\n
*/\nutil.toJSONOptions = {\n    longs: String,\n    enums: String,\n    bytes: String,\n    json: true\n};\n\n// Sets up
buffer utility according to the environment (called in index-minimal)\nutil._configure = function() {\n    var Buffer =
util.Buffer;\n    /* istanbul ignore if */\n    if (!Buffer) {\n        util._Buffer_from = util._Buffer_allocUnsafe = null;\n
        return;\n    }\n    // because node 4.x buffers are incompatible & immutable\n    // see:
https://github.com/dcodeIO/protobuf.js/pull/665\n    util._Buffer_from = Buffer.from !== Uint8Array.from &&
Buffer.from ||\n        /* istanbul ignore next */\n        function Buffer_from(value, encoding) {\n            return new
Buffer(value, encoding);\n        };\n    util._Buffer_allocUnsafe = Buffer.allocUnsafe ||\n        /* istanbul ignore next
*/\n        function Buffer_allocUnsafe(size) {\n            return new Buffer(size);\n        };\n};\n","\"use
strict\";\nmodule.exports = Writer;\n\nvar util      = require(\"./util/minimal\");\n\nvar BufferWriter; // cyclic\n\nvar
LongBits  = util.LongBits,\n    base64    = util.base64,\n    utf8      = util.utf8;\n\n/**\n * Constructs a new writer
operation instance.\n * @classdesc Scheduled writer operation.\n * @constructor\n * @param {function(*,
Uint8Array, number)} fn Function to call\n * @param {number} len Value byte length\n * @param {*} val Value
to write\n * @ignore\n */\nfunction Op(fn, len, val) {\n\n    /**\n     * Function to call.\n     * @type
{function(Uint8Array, number, *)}\n     */\n    this.fn = fn;\n\n    /**\n     * Value byte length.\n     * @type
{number}\n     */\n    this.len = len;\n\n    /**\n     * Next operation.\n     * @type {Writer.Op|undefined}\n     */\n
this.next = undefined;\n\n    /**\n     * Value to write.\n     * @type {*}\n     */\n    this.val = val; // type
varies\n}\n\n/* istanbul ignore next */\nfunction noop() {} // eslint-disable-line no-empty-function\n\n/**\n *
Constructs a new writer state instance.\n * @classdesc Copied writer state.\n * @memberof Writer\n *
@constructor\n * @param {Writer} writer Writer to copy state from\n * @ignore\n */\nfunction State(writer) {\n\n
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/**\n   * Current head.\n   * @type {Writer.Op}\n   */\n   this.head = writer.head;\n\n   /**\n   * Current tail.\n   * @type {Writer.Op}\n   */\n   this.tail = writer.tail;\n\n   /**\n   * Current buffer length.\n   * @type {number}\n   */\n   this.len = writer.len;\n\n   /**\n   * Next state.\n   * @type {State|null}\n   */\n   this.next = writer.states;\n}\n\n/**\n * Constructs a new writer instance.\n * @classdesc Wire format writer using `Uint8Array` if available, otherwise `Array`.\n * @constructor\n */\nfunction Writer() {\n\n   /**\n   * Current length.\n   * @type {number}\n   */\n   this.len = 0;\n\n   /**\n   * Operations head.\n   * @type {Object}\n   */\n   this.head = new Op(noop, 0, 0);\n\n   /**\n   * Operations tail\n   * @type {Object}\n   */\n   this.tail = this.head;\n\n   /**\n   * Linked forked states.\n   * @type {Object|null}\n   */\n   this.states = null;\n\n   // When a value is written, the writer calculates its byte length and puts it into a linked\n   // list of operations to perform when finish() is called. This both allows us to allocate\n   // buffers of the exact required size and reduces the amount of work we have to do compared\n   // to first calculating over objects and then encoding over objects. In our case, the encoding\n   // part is just a linked list walk calling operations with already prepared values.\n}\n\nvar create = function create() {\n   return util.Buffer\n   ? function create_buffer_setup() {\n   return (Writer.create = function create_buffer() {\n   return new BufferWriter();\n   })();\n   }\n   /* istanbul ignore next */\n   : function create_array() {\n   return new Writer();\n   };\n};\n\n/**\n * Creates a new writer.\n * @function\n * @returns {BufferWriter|Writer} A {@link BufferWriter} when Buffers are supported, otherwise a {@link Writer}\n */\nWriter.create = create();\n\n/**\n * Allocates a buffer of the specified size.\n * @param {number} size Buffer size\n * @returns {Uint8Array} Buffer\n */\nWriter.alloc = function alloc(size) {\n   return new util.Array(size);\n};\n\n// Use Uint8Array buffer pool in the browser, just like node does with buffers\n/* istanbul ignore else */\nif (util.Array !== Array)\n   Writer.alloc = util.pool(Writer.alloc, util.Array.prototype.subarray);\n\n/**\n * Pushes a new operation to the queue.\n * @param {function(Uint8Array, number, *)} fn Function to call\n * @param {number} len Value byte length\n * @param {number} val Value to write\n * @returns {Writer} `this`\n * @private\n */\nWriter.prototype._push = function push(fn, len, val) {\n   this.tail = this.tail.next = new Op(fn, len, val);\n   this.len += len;\n   return this;\n};\n\nfunction writeByte(val, buf, pos) {\n   buf[pos] = val & 255;\n}\n\nfunction writeVarint32(val, buf, pos) {\n   while (val > 127) {\n   buf[pos++] = val & 127 | 128;\n   val >>>= 7;\n   }\n   buf[pos] = val;\n}\n\n/**\n * Constructs a new varint writer operation instance.\n * @classdesc Scheduled varint writer operation.\n * @extends Op\n * @constructor\n * @param {number} len Value byte length\n * @param {number} val Value to write\n * @ignore\n */\nfunction VarintOp(len, val) {\n   this.len = len;\n   this.next = undefined;\n   this.val = val;\n}\n\nVarintOp.prototype = Object.create(Op.prototype);\nVarintOp.prototype.fn = writeVarint32;\n\n/**\n * Writes an unsigned 32 bit value as a varint.\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.uint32 = function write_uint32(value) {\n   // here, the call to this.push has been inlined and a varint specific Op subclass is used.\n   // uint32 is by far the most frequently used operation and benefits significantly from this.\n   this.len += (this.tail = this.tail.next = new VarintOp(\n   (value = value >>> 0)\n   < 128   ? 1\n   : value < 16384   ? 2\n   : value < 2097152   ? 3\n   : value < 268435456 ? 4\n   :   5,\n   value)).len;\n   return this;\n};\n\n/**\n * Writes a signed 32 bit value as a varint.\n * @function\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.int32 = function write_int32(value) {\n   return value < 0\n   ? this._push(writeVarint64, 10, LongBits.fromNumber(value)) // 10 bytes per spec\n   : this.uint32(value);\n};\n\n/**\n * Writes a 32 bit value as a varint, zig-zag encoded.\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.sint32 = function write_sint32(value) {\n   return this.uint32((value << 1 ^ value >> 31) >>> 0);\n};\n\nfunction writeVarint64(val, buf, pos) {\n   while (val.hi) {\n   buf[pos++] = val.lo & 127 | 128;\n   val.lo = (val.lo >>> 7 | val.hi << 25) >>> 0;\n   val.hi >>>= 7;\n   }\n   while (val.lo > 127) {\n   buf[pos++] = val.lo & 127 | 128;\n   val.lo = val.lo >>> 7;\n   }\n   buf[pos++] = val.lo;\n}\n\n/**\n * Writes an unsigned 64 bit value as a varint.\n * @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n */\nWriter.prototype.uint64 = function write_uint64(value) {\n   var bits = LongBits.from(value);\n   return this._push(writeVarint64, bits.length(), bits);\n};\n\n/**\n * Writes a signed 64 bit value as a varint.\n * @function\n * @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n */\nWriter.prototype.int64 = Writer.prototype.uint64;\n\n/**\n * Writes a signed 64 bit value as a varint, zig-zag encoded.\n * @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n */\nWriter.prototype.sint64 = function write_sint64(value) {\n   var bits = LongBits.from(value).zzEncode();\n return this._push(writeVarint64, bits.length(), bits);\n};\n\n/**\n * Writes a boolish value as a varint.\n * @param {boolean} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.bool = function write_bool(value) {\n   return this._push(writeByte, 1, value ? 1 : 0);\n};\n\nfunction writeFixed32(val, buf, pos) {\n   buf[pos   ] = val   & 255;\n   buf[pos + 1] = val >>> 8   & 255;\n   buf[pos + 2] = val >>> 16 & 255;\n buf[pos + 3] = val >>> 24;\n}\n\n/**\n * Writes an unsigned 32 bit value as fixed 32 bits.\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.fixed32 = function write_fixed32(value) {\n   return this._push(writeFixed32, 4, value >>> 0);\n};\n\n/**\n * Writes a signed 32 bit value as fixed 32 bits.\n * @function\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.sfixed32 = Writer.prototype.fixed32;\n\n/**\n * Writes an unsigned 64 bit value as fixed 64 bits.\n * @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n */\nWriter.prototype.fixed64 = function write_fixed64(value) {\n   var bits = LongBits.from(value);\n   return this._push(writeFixed32, 4, bits.lo)._push(writeFixed32, 4, bits.hi);\n};\n\n/**\n * Writes a signed 64 bit value as fixed 64 bits.\n * @function\n * @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n */\nWriter.prototype.sfixed64 = Writer.prototype.fixed64;\n\n/**\n * Writes a float (32 bit).\n * @function\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.float = function write_float(value) {\n   return this._push(util.float.writeFloatLE, 4, value);\n};\n\n/**\n * Writes a double (64 bit float).\n * @function\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.double = function write_double(value) {\n   return this._push(util.float.writeDoubleLE, 8, value);\n};\n\nvar writeBytes = util.Array.prototype.set\n   ? function writeBytes_set(val, buf, pos) {\n   buf.set(val, pos); // also works for plain array values\n   }\n   /* istanbul ignore next */\n   : function writeBytes_for(val, buf, pos) {\n   for (var i = 0; i < val.length; ++i)\n   buf[pos + i] = val[i];\n   };\n\n/**\n * Writes a sequence of bytes.\n * @param {Uint8Array|string} value Buffer or base64 encoded string to write\n * @returns {Writer} `this`\n */\nWriter.prototype.bytes = function write_bytes(value) {\n var len = value.length >>> 0;\n   if (!len)\n   return this._push(writeByte, 1, 0);\n   if (util.isString(value)) {\n var buf = Writer.alloc(len = base64.length(value));\n   base64.decode(value, buf, 0);\n   value = buf;\n   }\n return this.uint32(len)._push(writeBytes, len, value);\n};\n\n/**\n * Writes a string.\n * @param {string} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.string = function write_string(value) {\n   var len = utf8.length(value);\n   return len\n   ? this.uint32(len)._push(utf8.write, len, value)\n   : this._push(writeByte, 1, 0);\n};\n\n/**\n * Forks this writer's state by pushing it to a stack.\n * Calling {@link Writer#reset|reset} or {@link Writer#ldelim|ldelim} resets the writer to the previous state.\n * @returns {Writer} `this`\n */\nWriter.prototype.fork = function fork() {\n   this.states = new State(this);\n   this.head = this.tail = new Op(noop, 0, 0);\n   this.len = 0;\n   return this;\n};\n\n/**\n * Resets this instance to the last state.\n * @returns {Writer} `this`\n */\nWriter.prototype.reset = function reset() {\n   if (this.states) {\n   this.head   = this.states.head;\n   this.tail   = this.states.tail;\n   this.len   = this.states.len;\n   this.states = this.states.next;\n   } else {\n   this.head = this.tail = new Op(noop, 0, 0);\n   this.len = 0;\n   }\n   return this;\n};\n\n/**\n * Resets to the last state and appends the fork state's current write length as a varint followed by its operations.\n * @returns {Writer} `this`\n */\nWriter.prototype.ldelim = function ldelim() {\n   var head = this.head,\n   tail = this.tail,\n   len = this.len;\n   this.reset().uint32(len);\n   if (len) {\n   this.tail.next = head.next; // skip noop\n   this.tail = tail;\n   this.len += len;\n   }\n   return this;\n};\n\n/**\n * Finishes the write operation.\n * @returns {Uint8Array} Finished buffer\n */\nWriter.prototype.finish = function finish() {\n var head = this.head.next, // skip noop\n   buf = this.constructor.alloc(this.len),\n   pos = 0;\n   while (head) {\n   head.fn(head.val, buf, pos);\n   pos += head.len;\n   head = head.next;\n   }\n   // this.head = this.tail = null;\n   return buf;\n};\n\nWriter._configure = function(BufferWriter_) {\n   BufferWriter = BufferWriter_;\n

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Writer.create = create();\n    BufferWriter._configure();\n};\n","\"use strict\";\nmodule.exports = BufferWriter;\n\n//
extends Writer\nvar Writer = require(\"./writer\");\n(BufferWriter.prototype =
Object.create(Writer.prototype)).constructor = BufferWriter;\n\nvar util = require(\"./util/minimal\");\n\n/**\n *
Constructs a new buffer writer instance.\n * @classdesc Wire format writer using node buffers.\n * @extends
Writer\n * @constructor\n */\nfunction BufferWriter() {\n    Writer.call(this);\n}\n\nBufferWriter._configure =
function () {\n    /**\n     * Allocates a buffer of the specified size.\n     * @function\n     * @param {number} size
Buffer size\n     * @returns {Buffer} Buffer\n     */\n    BufferWriter.alloc = util._Buffer_allocUnsafe;\n\n
BufferWriter.writeBytesBuffer = util.Buffer && util.Buffer.prototype instanceof Uint8Array &&
util.Buffer.prototype.set.name === \"set\"\n        ? function writeBytesBuffer_set(val, buf, pos) {\n          buf.set(val,
pos); // faster than copy (requires node >= 4 where Buffers extend Uint8Array and set is properly inherited)\n
// also works for plain array values\n        }\n        /* istanbul ignore next */\n        : function
writeBytesBuffer_copy(val, buf, pos) {\n          if (val.copy) // Buffer values\n            val.copy(buf, pos, 0,
val.length);\n          else for (var i = 0; i < val.length;) // plain array values\n            buf[pos++] = val[i++];\n
};\n};\n\n\n/**\n * @override\n */\nBufferWriter.prototype.bytes = function write_bytes_buffer(value) {\n    if
(util.isString(value))\n        value = util._Buffer_from(value, \"base64\");\n    var len = value.length >>> 0;\n
this.uint32(len);\n    if (len)\n        this._push(BufferWriter.writeBytesBuffer, len, value);\n    return
this;\n};\n\nfunction writeStringBuffer(val, buf, pos) {\n    if (val.length < 40) // plain js is faster for short strings
(probably due to redundant assertions)\n        util.utf8.write(val, buf, pos);\n    else if (buf.utf8Write)\n
buf.utf8Write(val, pos);\n    else\n        buf.write(val, pos);\n}\n\n/**\n * @override\n
*/\nBufferWriter.prototype.string = function write_string_buffer(value) {\n    var len =
util.Buffer.byteLength(value);\n    this.uint32(len);\n    if (len)\n        this._push(writeStringBuffer, len, value);\n
return this;\n};\n\n\n/**\n * Finishes the write operation.\n * @name BufferWriter#finish\n * @function\n *
@returns {Buffer} Finished buffer\n */\n\nBufferWriter._configure();\n","// Copyright (c) Microsoft Corporation.
All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\n/* eslint-disable import/no-internal-modules
*/\r\nimport {Backend, InferenceSession, SessionHandler} from 'onnxruntime-common';\r\nimport {Session} from
'./onnxjs/session';\r\nimport {OnnxjsSessionHandler} from './onnxjs/session-handler';\r\n\r\nclass OnnxjsBackend
implements Backend {\r\n  // eslint-disable-next-line @typescript-eslint/no-empty-function\r\n  async init():
Promise<void> {}\r\n\r\n  async createSessionHandler(pathOrBuffer: string|Uint8Array, options?:
InferenceSession.SessionOptions):\r\n      Promise<SessionHandler> {\r\n    // NOTE: Session.Config(from onnx.js)
is not compatible with InferenceSession.SessionOptions(from\r\n    // onnxruntime-common).\r\n    //       In future
we should remove Session.Config and use InferenceSession.SessionOptions.\r\n    //       Currently we allow this to
happen to make test runner work.\r\n    const session = new Session(options as unknown as Session.Config);\r\n\r\n
// typescript cannot merge method override correctly (so far in 4.2.3). need if-else to call the method.\r\n    if (typeof
pathOrBuffer === 'string') {\r\n      await session.loadModel(pathOrBuffer);\r\n    } else {\r\n      await
session.loadModel(pathOrBuffer);\r\n    }\r\n\r\n    return new OnnxjsSessionHandler(session);\r\n
}\r\n}\r\n\r\nexport const onnxjsBackend = new OnnxjsBackend();\r\n","// Copyright (c) Microsoft Corporation. All
rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {readFile} from 'fs';\r\nimport {Backend, env,
InferenceSession, SessionHandler} from 'onnxruntime-common';\r\nimport {cpus} from 'os';\r\nimport {promisify}
from 'util';\r\nimport {initWasm} from './wasm/proxy-wrapper';\r\n\r\nimport
{OnnxruntimeWebAssemblySessionHandler} from './wasm/session-handler';\r\n\r\n/**\r\n * This function
initializes all flags for WebAssembly.\r\n *\r\n * Those flags are accessible from `ort.env.wasm`. Users are allow to
set those flags before the first inference session\r\n * being created, to override default value.\r\n */\r\nexport const
initializeFlags = (): void => {\r\n  if (typeof env.wasm.initTimeout !== 'number' || env.wasm.initTimeout < 0) {\r\n
env.wasm.initTimeout = 0;\r\n  }\r\n\r\n  if (typeof env.wasm.simd !== 'boolean') {\r\n    env.wasm.simd = true;\r\n
}\r\n\r\n  if (typeof env.wasm.proxy !== 'boolean') {\r\n    env.wasm.proxy = false;\r\n  }\r\n\r\n  if (typeof
env.wasm.numThreads !== 'number' || !Number.isInteger(env.wasm.numThreads) || env.wasm.numThreads <= 0)
{\r\n    const numCpuLogicalCores = typeof navigator === 'undefined' ? cpus().length :
navigator.hardwareConcurrency;\r\n    env.wasm.numThreads = Math.min(4, Math.ceil((numCpuLogicalCores || 1) /
```

2));\r\n }\r\n};\r\n\r\nclass OnnxruntimeWebAssemblyBackend implements Backend {\r\n async init(): Promise<void> {\r\n   // populate wasm flags\r\n   initializeFlags();\r\n\r\n   // init wasm\r\n   await initWasm();\r\n }\r\n createSessionHandler(path: string, options?: InferenceSession.SessionOptions): Promise<SessionHandler>;\r\n createSessionHandler(buffer: Uint8Array, options?: InferenceSession.SessionOptions): Promise<SessionHandler>;\r\n async createSessionHandler(pathOrBuffer: string|Uint8Array, options?: InferenceSession.SessionOptions):\r\n   Promise<SessionHandler> {\r\n   let buffer: Uint8Array;\r\n   if (typeof pathOrBuffer === 'string') {\r\n   if (typeof fetch === 'undefined') {\r\n   // node\r\n   buffer = await promisify(readFile)(pathOrBuffer);\r\n   } else {\r\n   // browser\r\n   const response = await fetch(pathOrBuffer);\r\n   const arrayBuffer = await response.arrayBuffer();\r\n   buffer = new Uint8Array(arrayBuffer);\r\n   }\r\n   } else {\r\n   buffer = pathOrBuffer;\r\n   }\r\n\r\n   const handler = new OnnxruntimeWebAssemblySessionHandler();\r\n   await handler.loadModel(buffer, options);\r\n   return Promise.resolve(handler);\r\n }\r\n}\r\n\r\nexport const wasmBackend = new OnnxruntimeWebAssemblyBackend();\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nexport * from 'onnxruntime-common';\r\nimport {registerBackend} from 'onnxruntime-common';\r\nimport {onnxjsBackend} from './backend-onnxjs';\r\nimport {wasmBackend} from './backend-wasm';\r\n\r\nregisterBackend('webgl', onnxjsBackend, 1);\r\nregisterBackend('wasm', wasmBackend, 2);\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nclass AttributeWithCacheKeyImpl {\r\n constructor(attribute: Record<string, unknown>) {\r\n   Object.assign(this, attribute);\r\n }\r\n\r\n private _cacheKey: string;\r\n public get cacheKey(): string {\r\n   if (!this._cacheKey) {\r\n   this._cacheKey =\r\n   Object.getOwnPropertyNames(this).sort().map(name => `${(this as Record<string, unknown>)[name]}`).join(';');\r\n   }\r\n   return this._cacheKey;\r\n }\r\n}\r\n\r\nexport interface AttributeWithCacheKey {\r\n readonly cacheKey: string;\r\n}\r\n\r\nexport const createAttributeWithCacheKey = <T extends Record<string, unknown>>(attribute: T): T&AttributeWithCacheKey =>\r\n   new AttributeWithCacheKeyImpl(attribute) as unknown as T & AttributeWithCacheKey;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport Long from 'long';\r\nimport {onnx} from 'onnx-proto';\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\n\r\nimport {Tensor} from './tensor';\r\nimport {LongUtil} from './util';\r\n\r\nexport declare namespace Attribute {\r\n export interface DataTypeMap {\r\n   float: number;\r\n   int: number;\r\n   string: string;\r\n   tensor: Tensor;\r\n   floats: number[];\r\n   ints: number[];\r\n   strings: string[];\r\n   tensors: Tensor[];\r\n }\r\n\r\n export type DataType = keyof DataTypeMap;\r\n}\r\n\r\ntype ValueTypes = Attribute.DataTypeMap[Attribute.DataType];\r\n\r\ntype Value = [ValueTypes, Attribute.DataType];\r\n\r\nexport class Attribute {\r\n constructor(attributes: onnx.IAttributeProto[]|ortFbs.Attribute[]|null|undefined) {\r\n   this._attributes = new Map();\r\n   if (attributes !== null && attributes !== undefined) {\r\n   for (const attr of attributes) {\r\n   if (attr instanceof onnx.AttributeProto) {\r\n   this._attributes.set(attr.name, [Attribute.getValue(attr), Attribute.getType(attr)]);\r\n   } else if (attr instanceof ortFbs.Attribute) {\r\n   this._attributes.set(attr.name()!, [Attribute.getValue(attr), Attribute.getType(attr)]);\r\n   }\r\n   }\r\n   if (this._attributes.size < attributes.length) {\r\n   throw new Error('duplicated attribute names');\r\n   }\r\n   }\r\n }\r\n\r\n set(key: string, type: Attribute.DataType, value: ValueTypes): void {\r\n   this._attributes.set(key, [value, type]);\r\n }\r\n delete(key: string): void {\r\n   this._attributes.delete(key);\r\n }\r\n getFloat(key: string, defaultValue?: Attribute.DataTypeMap['float']) {\r\n   return this.get(key, 'float', defaultValue);\r\n }\r\n\r\n getInt(key: string, defaultValue?: Attribute.DataTypeMap['int']) {\r\n   return this.get(key, 'int', defaultValue);\r\n }\r\n\r\n getString(key: string, defaultValue?: Attribute.DataTypeMap['string']) {\r\n   return this.get(key, 'string', defaultValue);\r\n }\r\n\r\n getTensor(key: string, defaultValue?: Attribute.DataTypeMap['tensor']) {\r\n   return this.get(key, 'tensor', defaultValue);\r\n }\r\n\r\n getFloats(key: string, defaultValue?: Attribute.DataTypeMap['floats']) {\r\n   return this.get(key, 'floats', defaultValue);\r\n }\r\n\r\n getInts(key: string, defaultValue?: Attribute.DataTypeMap['ints']) {\r\n   return this.get(key, 'ints', defaultValue);\r\n }\r\n\r\n getStrings(key: string, defaultValue?: Attribute.DataTypeMap['strings']) {\r\n   return this.get(key, 'strings', defaultValue);\r\n }\r\n\r\n getTensors(key:

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string, defaultValue?: Attribute.DataTypeMap['tensors']) {\r\n    return this.get(key, 'tensors', defaultValue);\r\n
}\r\n\r\n  private get<V extends Attribute.DataTypeMap[Attribute.DataType]>(\r\n      key: string, type:
Attribute.DataType, defaultValue?: V): V {\r\n    const valueAndType = this._attributes.get(key);\r\n    if
(valueAndType === undefined) {\r\n      if (defaultValue !== undefined) {\r\n        return defaultValue;\r\n      }\r\n
 throw new Error(`required attribute not found: ${key}`);\r\n    }\r\n    if (valueAndType[1] !== type) {\r\n      throw
new Error(`type mismatch: expected ${type} but got ${valueAndType[1]}`);\r\n    }\r\n    return valueAndType[0]
as V;\r\n  }\r\n\r\n  private static getType(attr: onnx.IAttributeProto|ortFbs.Attribute): Attribute.DataType {\r\n
const type = attr instanceof onnx.AttributeProto ? (attr).type : (attr as ortFbs.Attribute).type();\r\n    switch (type)
{\r\n      case onnx.AttributeProto.AttributeType.FLOAT:\r\n        return 'float';\r\n      case
onnx.AttributeProto.AttributeType.INT:\r\n        return 'int';\r\n      case
onnx.AttributeProto.AttributeType.STRING:\r\n        return 'string';\r\n      case
onnx.AttributeProto.AttributeType.TENSOR:\r\n        return 'tensor';\r\n      case
onnx.AttributeProto.AttributeType.FLOATS:\r\n        return 'floats';\r\n      case
onnx.AttributeProto.AttributeType.INTS:\r\n        return 'ints';\r\n      case
onnx.AttributeProto.AttributeType.STRINGS:\r\n        return 'strings';\r\n      case
onnx.AttributeProto.AttributeType.TENSORS:\r\n        return 'tensors';\r\n      default:\r\n        throw new
Error(`attribute type is not supported yet: ${onnx.AttributeProto.AttributeType[type]}`);\r\n    }\r\n  }\r\n\r\n  private
static getValue(attr: onnx.IAttributeProto|ortFbs.Attribute) {\r\n    const attrType = attr instanceof
onnx.AttributeProto ? attr.type : (attr as ortFbs.Attribute).type();\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.GRAPH || attrType === onnx.AttributeProto.AttributeType.GRAPHS) {\r\n
throw new Error('graph attribute is not supported yet');\r\n    }\r\n\r\n    const value =
this.getValueNoCheck(attr);\r\n\r\n    // cast LONG to number\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.INT && LongUtil.isLong(value)) {\r\n      return LongUtil.longToNumber(value
as Long | flatbuffers.Long);\r\n    }\r\n\r\n    // cast LONG[] to number[]\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.INTS) {\r\n      const arr = (value as Array<number|Long|flatbuffers.Long>);\r\n
  const numberValue: number[] = new Array<number>(arr.length);\r\n\r\n      for (let i = 0; i < arr.length; i++) {\r\n
    const maybeLong = arr[i];\r\n        numberValue[i] = LongUtil.longToNumber(maybeLong);\r\n      }\r\n\r\n
return numberValue;\r\n    }\r\n\r\n    // cast onnx.TensorProto to onnxjs.Tensor\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.TENSOR) {\r\n      return attr instanceof onnx.AttributeProto ?
Tensor.fromProto(value as onnx.ITensorProto) :\r\n                                                  Tensor.fromOrtTensor(value as
ortFbs.Tensor);\r\n    }\r\n\r\n    // cast onnx.TensorProto[] to onnxjs.Tensor[]\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.TENSORS) {\r\n      if (attr instanceof onnx.AttributeProto) {\r\n        const
tensorProtos = value as onnx.ITensorProto[];\r\n        return tensorProtos.map(value =>
Tensor.fromProto(value));\r\n      } else if (attr instanceof ortFbs.Attribute) {\r\n        const tensorProtos = value as
ortFbs.Tensor[];\r\n        return tensorProtos.map(value => Tensor.fromOrtTensor(value));\r\n      }\r\n    }\r\n\r\n    //
cast Uint8Array to string\r\n    if (attrType === onnx.AttributeProto.AttributeType.STRING) {\r\n      // string in
onnx attribute is of uint8array type, so we need to convert it to string below. While in ort format,\r\n      // string
attributes are returned as string, so no conversion is needed.\r\n      if (attr instanceof onnx.AttributeProto) {\r\n
const utf8String = value as Uint8Array;\r\n        return Buffer.from(utf8String.buffer, utf8String.byteOffset,
utf8String.byteLength).toString();\r\n      }\r\n    }\r\n\r\n    // cast Uint8Array[] to string[]\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.STRINGS) {\r\n      // strings in onnx attribute is returned as uint8array[], so we
need to convert it to string[] below. While in ort\r\n      // format strings attributes are returned as string[], so no
conversion is needed.\r\n      if (attr instanceof onnx.AttributeProto) {\r\n        const utf8Strings = value as
Uint8Array[];\r\n        return utf8Strings.map(\r\n            utf8String => Buffer.from(utf8String.buffer,
utf8String.byteOffset, utf8String.byteLength).toString());\r\n      }\r\n    }\r\n\r\n    return value as ValueTypes;\r\n
}\r\n\r\n  private static getValueNoCheck(attr: onnx.IAttributeProto|ortFbs.Attribute) {\r\n    return attr instanceof
(onnx.AttributeProto) ? this.getValueNoCheckFromOnnxFormat(attr) :\r\n
this.getValueNoCheckFromOrtFormat(attr as ortFbs.Attribute);\r\n  }\r\n\r\n  private static
```

getValueNoCheckFromOnnxFormat(attr: onnx.IAttributeProto) {\r\n   switch (attr.type!) {\r\n   case onnx.AttributeProto.AttributeType.FLOAT:\r\n   return attr.f;\r\n   case onnx.AttributeProto.AttributeType.INT:\r\n   return attr.i;\r\n   case onnx.AttributeProto.AttributeType.STRING:\r\n   return attr.s;\r\n   case onnx.AttributeProto.AttributeType.TENSOR:\r\n   return attr.t;\r\n   case onnx.AttributeProto.AttributeType.GRAPH:\r\n   return attr.g;\r\n   case onnx.AttributeProto.AttributeType.FLOATS:\r\n   return attr.floats;\r\n   case onnx.AttributeProto.AttributeType.INTS:\r\n   return attr.ints;\r\n   case onnx.AttributeProto.AttributeType.STRINGS:\r\n   return attr.strings;\r\n   case onnx.AttributeProto.AttributeType.TENSORS:\r\n   return attr.tensors;\r\n   case onnx.AttributeProto.AttributeType.GRAPHS:\r\n   return attr.graphs;\r\n   default:\r\n   throw new Error(`unsupported attribute type: ${onnx.AttributeProto.AttributeType[attr.type!]}`);\r\n   }\r\n }\r\n\r\n private static getValueNoCheckFromOrtFormat(attr: ortFbs.Attribute) {\r\n   switch (attr.type()) {\r\n   case ortFbs.AttributeType.FLOAT:\r\n   return attr.f();\r\n   case ortFbs.AttributeType.INT:\r\n   return attr.i();\r\n   case ortFbs.AttributeType.STRING:\r\n   return attr.s();\r\n   case ortFbs.AttributeType.TENSOR:\r\n   return attr.t();\r\n   case ortFbs.AttributeType.GRAPH:\r\n   return attr.g();\r\n   case ortFbs.AttributeType.FLOATS:\r\n   return attr.floatsArray();\r\n   case ortFbs.AttributeType.INTS: {\r\n   const ints = [];\r\n   for (let i = 0; i < attr.intsLength(); i++) {\r\n   ints.push(attr.ints(i)!);\r\n   }\r\n   return ints;\r\n   }\r\n   case ortFbs.AttributeType.STRINGS: {\r\n   const strings = [];\r\n   for (let i = 0; i < attr.stringsLength(); i++) {\r\n   strings.push(attr.strings(i));\r\n   }\r\n   return strings;\r\n   }\r\n   case ortFbs.AttributeType.TENSORS: {\r\n   const tensors = [];\r\n   for (let i = 0; i < attr.tensorsLength(); i++) {\r\n   tensors.push(attr.tensors(i)!);\r\n   }\r\n   return tensors;\r\n   }\r\n   // case ortFbs.AttributeType.GRAPHS:\r\n   // TODO: Subgraph not supported yet.\r\n   // const graphs = [];\r\n   // for (let i = 0; i < attr.graphsLength(); i++) {\r\n   //   graphs.push(attr.graphs(i)!);\r\n   // }\r\n   // return graphs;\r\n   default:\r\n   throw new Error(`unsupported attribute type: ${ortFbs.AttributeType[attr.type()]}`);\r\n   }\r\n }\r\n\r\n protected _attributes: Map<string, Value>;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {WebGLBackend} from './backends/backend-webgl';\r\nimport {Graph} from './graph';\r\nimport {Operator} from './operators';\r\nimport {OpSet} from './opset';\r\nimport {Session} from './session';\r\n\r\nexport interface InferenceHandler {\r\n /**\r\n   * dispose the inference handler. it will be called as the last step in Session.run()\r\n   */\r\n dispose(): void;\r\n}\r\n\r\nexport interface SessionHandler {\r\n /**\r\n   * transform the graph at initialization time\r\n   * @param graphTransformer the graph transformer to manipulate the model graph\r\n   */\r\n transformGraph?(graphTransformer: Graph.Transformer): void;\r\n\r\n /**\r\n   * create an instance of InferenceHandler to use in a Session.run() call\r\n   */\r\n createInferenceHandler(): InferenceHandler;\r\n\r\n /**\r\n   * dispose the session handler. it will be called when a session is being disposed explicitly\r\n   */\r\n dispose(): void;\r\n\r\n /**\r\n   * Resolves the operator from the name and opset version; backend specific\r\n   * @param node the node to resolve\r\n   * @param opsets a list of opsets that exported from the model\r\n   * @param graph the completely initialized graph\r\n   */\r\n resolve(node: Graph.Node, opsets: readonly OpSet[], graph: Graph): Operator;\r\n\r\n /**\r\n   * This method let's the sessionHandler know that the graph initialization is complete\r\n   * @param graph the completely initialized graph\r\n   */\r\n onGraphInitialized?(graph: Graph): void;\r\n\r\n /**\r\n   * a reference to the corresponding backend\r\n   */\r\n readonly backend: Backend;\r\n\r\n /**\r\n   * a reference to the session context\r\n   */\r\n readonly context: Session.Context;\r\n}\r\n\r\nexport interface Backend {\r\n /**\r\n   * initialize the backend. will be called only once, when the first time the\r\n   * backend it to be used\r\n   */\r\n initialize(): boolean|Promise<boolean>;\r\n\r\n /**\r\n   * create an instance of SessionHandler to use in a Session object's lifecycle\r\n   */\r\n createSessionHandler(context: Session.Context): SessionHandler;\r\n\r\n /**\r\n   * dispose the backend. currently this will not be called\r\n   */\r\n dispose(): void;\r\n}\r\n\r\n// caches all initialized backend instances\r\nconst backendsCache: Map<string, Backend> = new Map();\r\n\r\nexport const backend: {[name: string]: Backend} = {\r\n webgl: new

WebGLBackend(),\r\n};\r\n\r\n/**\r\n * Resolve a reference to the backend. If a hint is specified, the corresponding\r\n * backend will be used.\r\n */\r\nexport async function resolveBackend(hint?: string|readonly string[]): Promise<Backend> {\r\n if (!hint) {\r\n   return resolveBackend(['webgl']);\r\n } else {\r\n   const hints = typeof hint === 'string' ? [hint] : hint;\r\n\r\n   for (const backendHint of hints) {\r\n   const cache = backendsCache.get(backendHint);\r\n   if (cache) {\r\n   return cache;\r\n   }\r\n\r\n   const backend = await tryLoadBackend(backendHint);\r\n   if (backend) {\r\n   return backend;\r\n   }\r\n   }\r\n }\r\n\r\n throw new Error('no available backend to use');\r\n}\r\n\r\nasync function tryLoadBackend(backendHint: string): Promise<Backend|undefined> {\r\n const backendObj = backend;\r\n\r\n if (typeof backendObj[backendHint] !== 'undefined' && isBackend(backendObj[backendHint])) {\r\n   const backend = backendObj[backendHint];\r\n   let init = backend.initialize();\r\n   if (typeof init === 'object' && 'then' in init) {\r\n   init = await init;\r\n   }\r\n   if (init) {\r\n   backendsCache.set(backendHint, backend);\r\n   return backend;\r\n   }\r\n }\r\n\r\n return undefined;\r\n}\r\n\r\nfunction isBackend(obj: unknown) {\r\n // eslint-disable-next-line @typescript-eslint/no-explicit-any\r\n const o = obj as any;\r\n\r\n // check if an object is a Backend instance\r\n if (\r\n   'initialize' in o && typeof o.initialize === 'function' &&   // initialize()\r\n   'createSessionHandler' in o && typeof o.createSessionHandler === 'function' && // createSessionHandler()\r\n   'dispose' in o && typeof o.dispose === 'function'   // dispose()\r\n) {\r\n   return true;\r\n }\r\n\r\n return false;\r\n}\r\n\r\nexport type BackendType = Backend;\r\nexport type SessionHandlerType = ReturnType<BackendType['createSessionHandler']>;\r\nexport type InferenceHandlerType = ReturnType<SessionHandlerType['createInferenceHandler']>;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env} from 'onnxruntime-common';\r\nimport {Backend, SessionHandler} from '../backend';\r\nimport {Logger} from '../instrument';\r\nimport {Session} from '../session';\r\n\r\nimport {WebGLSessionHandler} from './webgl/session-handler';\r\nimport {WebGLContext} from './webgl/webgl-context';\r\nimport {createWebGLContext} from './webgl/webgl-context-factory';\r\n\r\n/**\r\n * WebGLBackend is the entry point for all WebGL opeartions\r\n * When it starts it created the WebGLRenderingContext\r\n * and other main framework components such as Program and Texture Managers\r\n */\r\nexport class WebGLBackend implements Backend {\r\n glContext: WebGLContext;\r\n\r\n get contextId(): 'webgl'|'webgl2'|undefined {\r\n   return env.webgl.contextId;\r\n }\r\n set contextId(value: 'webgl'|'webgl2'|undefined) {\r\n   env.webgl.contextId = value;\r\n }\r\n\r\n get matmulMaxBatchSize(): number|undefined {\r\n   return env.webgl.matmulMaxBatchSize;\r\n }\r\n set matmulMaxBatchSize(value: number|undefined) {\r\n   env.webgl.matmulMaxBatchSize = value;\r\n }\r\n\r\n get textureCacheMode(): 'initializerOnly'|'full'|undefined {\r\n   return env.webgl.textureCacheMode;\r\n }\r\n set textureCacheMode(value: 'initializerOnly'|'full'|undefined) {\r\n   env.webgl.textureCacheMode = value;\r\n }\r\n\r\n get pack(): boolean|undefined {\r\n   return env.webgl.pack;\r\n }\r\n set pack(value: boolean|undefined) {\r\n   env.webgl.pack = value;\r\n }\r\n\r\n get async(): boolean|undefined {\r\n   return env.webgl.async;\r\n }\r\n set async(value: boolean|undefined) {\r\n   env.webgl.async = value;\r\n }\r\n\r\n initialize(): boolean {\r\n   try {\r\n   this.glContext = createWebGLContext(this.contextId);\r\n   if (typeof this.matmulMaxBatchSize !== 'number') {\r\n   this.matmulMaxBatchSize = 16;\r\n   }\r\n   if (typeof this.textureCacheMode !== 'string') {\r\n   this.textureCacheMode = 'full';\r\n   }\r\n   if (typeof this.pack !== 'boolean') {\r\n   this.pack = false;\r\n   }\r\n   if (typeof this.async !== 'boolean') {\r\n   this.async = false;\r\n   }\r\n\r\n   Logger.setWithEnv(env);\r\n\r\n   Logger.verbose(\r\n   'WebGLBackend',\r\n   `Created WebGLContext: ${typeof this.glContext} with matmulMaxBatchSize: ${\r\n              this.matmulMaxBatchSize}; textureCacheMode: ${this.textureCacheMode}; pack: ${this.pack}; async: ${\r\n              this.async}.`);\r\n   return true;\r\n   } catch (e) {\r\n   Logger.warning('WebGLBackend', `Unable to initialize WebGLBackend. ${e}`);\r\n   return false;\r\n   }\r\n }\r\n createSessionHandler(context: Session.Context): SessionHandler {\r\n   return new WebGLSessionHandler(this, context);\r\n }\r\n dispose(): void {\r\n   this.glContext.dispose();\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {ArrayUtil, BroadcastUtil, ShapeUtil} from '../../util';\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\nimport {getGlsl} from './glsl-source';\r\nimport {squeezeShape} from

'./texture-layout-strategy';\r\nimport {TextureLayout} from './types';\r\nimport {generateShaderFuncNameFromInputSamplerName, generateShaderFuncNameFromInputSamplerNameAtOutCoords, getCoordsDataType, getGlChannels, getSqueezedParams, squeezeInputShape} from './utils';\r\n\r\n/**\r\n * GLSL Library responsible for data types and routines for manipulating\r\n * coordinates and mapping to/from tensor indices\r\n */\r\nexport class CoordsGlslLib extends GlslLib {\r\n returnType: string;\r\n\r\n constructor(context: GlslContext) {\r\n super(context);\r\n }\r\n getFunctions(): {[name: string]: GlslLibRoutine} {\r\n return {\r\n ...this.offsetToCoords(),\r\n ...this.coordsToOffset(),\r\n ...this.toVec(),\r\n ...this.valueFrom(),\r\n // TODO return these only when packing is enabled.\r\n ...this.getCommonUtilFuncs(),\r\n ...this.getInputsSamplingSnippets(),\r\n ...this.getOutputSamplingSnippet()\r\n };\r\n }\r\n getCustomTypes() {\r\n return {};\r\n }\r\n /**\r\n * Produces a function that can map from\r\n * 2D normalzied coordinates (s,t) to a flat offset\r\n */\r\n protected offsetToCoords(): {[name: string]: GlslLibRoutine} {\r\n const funcName = 'offsetToCoords';\r\n return {\r\n offsetToCoords: new GlslLibRoutine(`\r\n vec2 ${funcName}(int offset, int width, int height) {\r\n int t = offset / width;\r\n int s = offset - t*width;\r\n vec2 coords = (vec2(s,t) + vec2(0.5,0.5)) / vec2(width, height);\r\n return coords;\r\n }\r\n `)\r\n };\r\n }\r\n\r\n /**\r\n * Produces a function that can map from\r\n * 2D normalzied coordinates (s,t) to a flat offset\r\n */\r\n protected coordsToOffset(): {[name: string]: GlslLibRoutine} {\r\n const funcName = 'coordsToOffset';\r\n return {\r\n coordsToOffset: new GlslLibRoutine(`\r\n int ${funcName}(vec2 coords, int width, int height) {\r\n float s = coords.s * float(width);\r\n float t = coords.t * float(height);\r\n int offset = int(t) * width + int(s);\r\n return offset;\r\n }\r\n `)\r\n };\r\n }\r\n\r\n /**\r\n * Generates code for output sampler.\r\n */\r\n\r\n protected getOutputSamplingSnippet(): {[name: string]: GlslLibRoutine} {\r\n const outputLayout = this.context.outputTextureLayout;\r\n if (outputLayout.isPacked) {\r\n return this.getPackedOutputSamplingSnippet(outputLayout);\r\n } else {\r\n return this.getUnpackedOutputSamplingSnippet(outputLayout);\r\n }\r\n }\r\n\r\n /**\r\n * Generates code for packed output sampler.\r\n */\r\n protected getPackedOutputSamplingSnippet(outputLayout: TextureLayout): {[name: string]: GlslLibRoutine} {\r\n const outShape = outputLayout.unpackedShape;\r\n const outTexShape = [outputLayout.width, outputLayout.height];\r\n const result: {[name: string]: GlslLibRoutine} = {};\r\n const funcName = 'getOutputCoords';\r\n switch (outShape.length) {\r\n case 0:\r\n result[funcName] = this.getOutputScalarCoords();\r\n break;\r\n case 1:\r\n result[funcName] = this.getOutputPacked1DCoords(outShape as [number], outTexShape as [number, number]);\r\n break;\r\n case 2:\r\n result[funcName] = this.getOutputPacked2DCoords(outShape as [number, number], outTexShape as [number, number]);\r\n break;\r\n case 3:\r\n result[funcName] =\r\n this.getOutputPacked3DCoords(outShape as [number, number, number], outTexShape as [number, number]);\r\n break;\r\n default:\r\n result[funcName] = this.getOutputPackedNDCoords(outShape, outTexShape as [number, number]);\r\n }\r\n const glsl = getGlsl(this.context.glContext.version);\r\n // TODO we need this to properly return a packed vec4 from kernels.\r\n // Replace all '{glsl.output} = result' with 'setOutput(result)' in all kernels.\r\n const floatTextureSetRGBASource = `\r\n void setOutput(vec4 val) {\r\n ${glsl.output} = val;\r\n }\r\n `;\r\n const floatTextureSetRGBAFuncName = 'floatTextureSetRGBA';\r\n result[floatTextureSetRGBAFuncName] = new GlslLibRoutine(floatTextureSetRGBASource);\r\n return result;\r\n }\r\n\r\n /**\r\n * Generates code for unpacked output sampler.\r\n */\r\n protected getUnpackedOutputSamplingSnippet(outputLayout: TextureLayout): {[name: string]: GlslLibRoutine} {\r\n const outShape = outputLayout.unpackedShape;\r\n const outTexShape = [outputLayout.width, outputLayout.height];\r\n const result: {[name: string]: GlslLibRoutine} = {};\r\n const funcName = 'getOutputCoords';\r\n switch (outShape.length) {\r\n case 0:\r\n result[funcName] = this.getOutputScalarCoords();\r\n break;\r\n case 1:\r\n result[funcName] = this.getOutputUnpacked1DCoords(outShape as [number], outTexShape as [number, number]);\r\n break;\r\n case 2:\r\n result[funcName] =\r\n this.getOutputUnpacked2DCoords(outShape as [number, number], outTexShape as [number, number]);\r\n break;\r\n case 3:\r\n result[funcName] =\r\n

```
this.getOutputUnpacked3DCoords(outShape as [number, number, number], outTexShape as [number, number]);\r\n
    break;\r\n      case 4:\r\n        result[funcName] = this.getOutputUnpacked4DCoords(\r\n            outShape as
[number, number, number, number], outTexShape as [number, number]);\r\n        break;\r\n      case 5:\r\n
result[funcName] = this.getOutputUnpacked5DCoords(\r\n            outShape as [number, number, number, number,
number], outTexShape as [number, number]);\r\n        break;\r\n      case 6:\r\n        result[funcName] =
this.getOutputUnpacked6DCoords(\r\n            outShape as [number, number, number, number, number, number],
outTexShape as [number, number]);\r\n        break;\r\n      default:\r\n        throw new Error(`Unsupported output
dimensionality: ${outShape.length}`);\r\n    }\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n    //
TODO we need this to properly return a packed vec4 from kernels.\r\n    // Replace all '{glsl.output} = result' with
'setOutput(result)' in all kernels.\r\n    const floatTextureSetRSource = `\r\n        void setOutput(float val) {\r\n
${glsl.output} = vec4(val, 0, 0, 0);\r\n        }\r\n    `;\r\n    const floatTextureSetRFuncName = 'floatTextureSetR';\r\n
  result[floatTextureSetRFuncName] = new GlslLibRoutine(floatTextureSetRSource);\r\n    return result;\r\n
}\r\n\r\n  /**\r\n   * Scalar output coordinates.\r\n   */\r\n  protected getOutputScalarCoords(): GlslLibRoutine {\r\n
return new GlslLibRoutine(`\r\n      int getOutputCoords() {\r\n        return 0;\r\n      }\r\n    `);\r\n  }\r\n\r\n  /**\r\n
* 1D packed output coordinates.\r\n   */\r\n  protected getOutputPacked1DCoords(shape: [number], texShape:
[number, number]): GlslLibRoutine {\r\n    const packedTexShape = texShape;\r\n    let source = '';\r\n    if
(packedTexShape[0] === 1) {\r\n      source = `\r\n          int getOutputCoords() {\r\n            return 2 *
int(TexCoords.y * ${packedTexShape[1]}.0);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source);\r\n
}\r\n\r\n    if (packedTexShape[1] === 1) {\r\n      source = `\r\n          int getOutputCoords() {\r\n            return 2 *
int(TexCoords.x * ${packedTexShape[0]}.0);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source);\r\n
}\r\n\r\n    source = `\r\n        int getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
               vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n          return 2 * (resTexRC.y *
${packedTexShape[0]} + resTexRC.x);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n
/**\r\n   * 2D packed output coordinates.\r\n   */\r\n  protected getOutputPacked2DCoords(shape: [number,
number], texShape: [number, number]): GlslLibRoutine {\r\n    let source = '';\r\n    if (ArrayUtil.arraysEqual(shape,
texShape)) {\r\n      source = `\r\n        ivec2 getOutputCoords() {\r\n          return 2 * ivec2(TexCoords.xy *
vec2(${texShape[0]}, ${texShape[1]}));\r\n        }\r\n      `;\r\n      return new GlslLibRoutine(source);\r\n    }\r\n\r\n
 const packedTexShape = texShape;\r\n    // texels needed to accommodate a logical row\r\n    const
texelsInLogicalRow = Math.ceil(shape[1] / 2);\r\n\r\n    /**\r\n     * getOutputCoords\r\n     *\r\n     * resTexRC: The
rows and columns of the texels. If you move over one\r\n     * texel to the right in the packed texture, you are
moving over one column\r\n     * (not two).\r\n     *\r\n     * index: The texel index\r\n     */\r\n    source = `\r\n
ivec2 getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n\r\n          int index = resTexRC.y *
${packedTexShape[0]} + resTexRC.x;\r\n\r\n          // reverse r and c order for packed texture\r\n          int r =
imod(index, ${texelsInLogicalRow}) * 2;\r\n          int c = 2 * (index / ${texelsInLogicalRow});\r\n\r\n          return
ivec2(r, c);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * 3D packed output
coordinates.\r\n   */\r\n  protected getOutputPacked3DCoords(shape: [number, number, number], texShape:
[number, number]): GlslLibRoutine {\r\n    const packedTexShape = [texShape[0], texShape[1]];\r\n    const
texelsInLogicalRow = Math.ceil(shape[2] / 2);\r\n    const texelsInBatch = texelsInLogicalRow * Math.ceil(shape[1]
/ 2);\r\n    const source = `\r\n        ivec3 getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                      vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n          int index = resTexRC.y *
${packedTexShape[0]} + resTexRC.x;\r\n\r\n          int b = index / ${texelsInBatch};\r\n          index -= b *
${texelsInBatch};\r\n\r\n          // reverse r and c order for packed texture\r\n          int r = imod(index,
${texelsInLogicalRow}) * 2;\r\n          int c = 2 * (index / ${texelsInLogicalRow});\r\n\r\n          return ivec3(b, r,
c);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * ND packed output
coordinates.\r\n   */\r\n  protected getOutputPackedNDCoords(shape: readonly number[], texShape: [number,
number]): GlslLibRoutine {\r\n    const packedTexShape = [texShape[0], texShape[1]];\r\n\r\n    const
texelsInLogicalRow = Math.ceil(shape[shape.length - 1] / 2);\r\n    const texelsInBatch = texelsInLogicalRow *
```

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Math.ceil(shape[shape.length - 2] / 2);\r\n    let texelsInBatchN = texelsInBatch;\r\n    let batches = '';\r\n    let coords
= 'b, r, c';\r\n\r\n    for (let b = 2; b < shape.length - 1; b++) {\r\n      texelsInBatchN *= shape[shape.length - b -
1];\r\n      batches = `\r\n      int b${b} = index / ${texelsInBatchN};\r\n      index -= b${b} * ${texelsInBatchN};\r\n
  ` + batches;\r\n      coords = `b${b}, ` + coords;\r\n    }\r\n    const source = `\r\n      ivec${shape.length}
getOutputCoords() {\r\n        ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n        int index = resTexRC.y * ${packedTexShape[0]} +
resTexRC.x;\r\n\r\n        ${batches}\r\n\r\n        int b = index / ${texelsInBatch};\r\n        index -= b *
${texelsInBatch};\r\n\r\n        // reverse r and c order for packed texture\r\n        int r = imod(index,
${texelsInLogicalRow}) * 2;\r\n        int c = 2 * (index / ${texelsInLogicalRow});\r\n\r\n        return
ivec${shape.length}(${coords});\r\n      }\r\n    `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   *
Unpacked 1D output coordinates.\r\n   */\r\n  protected getOutputUnpacked1DCoords(shape: [number], texShape:
[number, number]): GlslLibRoutine {\r\n    const source = `\r\n        int getOutputCoords() {\r\n          ivec2
resTexRC = ivec2(TexCoords.xy *\r\n                              vec2(${texShape[0]}, ${texShape[1]}));\r\n          return
resTexRC.y * ${texShape[0]} + resTexRC.x;\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n
}\r\n\r\n  /**\r\n   * Unpacked 2D output coordinates.\r\n   */\r\n  protected getOutputUnpacked2DCoords(shape:
[number, number], texShape: [number, number]): GlslLibRoutine {\r\n    const source = `\r\n        ivec2
getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
vec2(${texShape[0]}, ${texShape[1]}));\r\n          int index = resTexRC.y * ${texShape[0]} + resTexRC.x;\r\n
int r = index / ${shape[1]};\r\n          int c = index - r * ${shape[1]};\r\n          return ivec2(r, c);\r\n        }\r\n
`;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 3D output coordinates.\r\n   */\r\n
protected getOutputUnpacked3DCoords(shape: [number, number, number], texShape: [number, number]):
GlslLibRoutine {\r\n    let source = '';\r\n    const rank = shape.length;\r\n\r\n    let strides = null;\r\n    if (rank < 2)
{\r\n      strides = [];\r\n    }\r\n\r\n    strides = new Array(rank - 1);\r\n    strides[rank - 2] = shape[rank - 1];\r\n    for
(let i = rank - 3; i >= 0; --i) {\r\n      strides[i] = strides[i + 1] * shape[i + 1];\r\n    }\r\n    const coordsToCompute =
['r', 'c', 'd'];\r\n    const coordsFromIndexSnippet =\r\n        strides\r\n            .map((stride, i) => {\r\n              const
line1 = `int ${coordsToCompute[i]} = index / ${stride}`;\r\n              const line2 = i === strides.length - 1 ?\r\n
      `int ${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} * ${stride}` :\r\n                  `index -=
${coordsToCompute[i]} * ${stride}`;\r\n              return `${line1}; ${line2};`;\r\n            })\r\n
.join('');\r\n\r\n    source = `\r\n        ivec3 getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                          vec2(${texShape[0]}, ${texShape[1]}));\r\n          int index = resTexRC.y * ${texShape[0]} +
resTexRC.x;\r\n          ${coordsFromIndexSnippet}\r\n          return ivec3(r, c, d);\r\n        }\r\n      `;\r\n    return new
GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 4D output coordinates.\r\n   */\r\n  protected
getOutputUnpacked4DCoords(shape: [number, number, number, number], texShape: [number, number]):\r\n
GlslLibRoutine {\r\n    let source = '';\r\n    const rank = shape.length;\r\n\r\n    let strides = null;\r\n    if (rank < 2)
{\r\n      strides = [];\r\n    }\r\n\r\n    strides = new Array(rank - 1);\r\n    strides[rank - 2] = shape[rank - 1];\r\n    for
(let i = rank - 3; i >= 0; --i) {\r\n      strides[i] = strides[i + 1] * shape[i + 1];\r\n    }\r\n    const coordsToCompute =
['r', 'c', 'd', 'd2'];\r\n    const coordsFromIndexSnippet =\r\n        strides\r\n            .map((stride, i) => {\r\n
const line1 = `int ${coordsToCompute[i]} = index / ${stride}`;\r\n              const line2 = i === strides.length - 1
?\r\n                  `int ${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} * ${stride}` :\r\n
`index -= ${coordsToCompute[i]} * ${stride}`;\r\n              return `${line1}; ${line2};`;\r\n            })\r\n
.join('');\r\n\r\n    source = `\r\n      ivec4 getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                          vec2(${texShape[0]}, ${texShape[1]}));\r\n          int index = resTexRC.y * ${texShape[0]} +
resTexRC.x;\r\n          ${coordsFromIndexSnippet}\r\n          return ivec4(r, c, d, d2);\r\n        }\r\n      `;\r\n    return
new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 5D output coordinates.\r\n   */\r\n  protected
getOutputUnpacked5DCoords(shape: [number, number, number, number, number], texShape: [number,
number]):\r\n      GlslLibRoutine {\r\n    let source = '';\r\n    const rank = shape.length;\r\n\r\n    let strides = null;\r\n
  if (rank < 2) {\r\n      strides = [];\r\n    }\r\n\r\n    strides = new Array(rank - 1);\r\n    strides[rank - 2] = shape[rank
- 1];\r\n    for (let i = rank - 3; i >= 0; --i) {\r\n      strides[i] = strides[i + 1] * shape[i + 1];\r\n    }\r\n    const
```

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coordsToCompute = ['r', 'c', 'd', 'd2', 'd3'];\r\n    const coordsFromIndexSnippet =\r\n        strides\r\n
.map((stride, i) => {\r\n              const line1 = `int ${coordsToCompute[i]} = index / ${stride}`;\r\n              const
line2 = i === strides.length - 1 ?\r\n                 `int ${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} *
${stride}` :\r\n                 `index -= ${coordsToCompute[i]} * ${stride}`;\r\n              return `${line1};
${line2};`;\r\n            })\r\n            .join('');\r\n\r\n    source = `\r\n      ivec5 getOutputCoords() {\r\n          ivec2
resTexRC = ivec2(TexCoords.xy *\r\n                              vec2(${texShape[0]}, ${texShape[1]}));\r\n          int
index = resTexRC.y * ${texShape[0]} + resTexRC.x;\r\n          ${coordsFromIndexSnippet}\r\n          return ivec5(r,
c, d, d2, d3);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 6D
output coordinates.\r\n   */\r\n  protected getOutputUnpacked6DCoords(shape: [number, number, number, number,
number, number], texShape: [\r\n    number, number\r\n  ]): GlslLibRoutine {\r\n    let source = '';\r\n    const rank =
shape.length;\r\n\r\n    let strides = null;\r\n    if (rank < 2) {\r\n      strides = [];\r\n    }\r\n\r\n    strides = new
Array(rank - 1);\r\n    strides[rank - 2] = shape[rank - 1];\r\n    for (let i = rank - 3; i >= 0; --i) {\r\n      strides[i] =
strides[i + 1] * shape[i + 1];\r\n    }\r\n    const coordsToCompute = ['r', 'c', 'd', 'd2', 'd3', 'd4'];\r\n    const
coordsFromIndexSnippet =\r\n        strides\r\n            .map((stride, i) => {\r\n              const line1 = `int
${coordsToCompute[i]} = index / ${stride}`;\r\n              const line2 = i === strides.length - 1 ?\r\n                 `int
${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} * ${stride}` :\r\n                 `index -=
${coordsToCompute[i]} * ${stride}`;\r\n              return `${line1}; ${line2};`;\r\n            })\r\n
.join('');\r\n\r\n    source = `\r\n     ivec6 getOutputCoords() {\r\n         ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                         vec2(${texShape[0]}, ${texShape[1]}));\r\n         int index = resTexRC.y * ${texShape[0]} +
resTexRC.x;\r\n         ${coordsFromIndexSnippet}\r\n         return ivec6(r, c, d, d2, d3, d4);\r\n       }\r\n     `;\r\n
return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Generates code for common UV coords computation
utility functions.\r\n   */\r\n  protected getCommonUtilFuncs(): {[name: string]: GlslLibRoutine} {\r\n    const
result: {[name: string]: GlslLibRoutine} = {};\r\n    let funcName = 'uvFromFlat';\r\n    result[funcName] = new
GlslLibRoutine(`\r\n    vec2 uvFromFlat(int texNumR, int texNumC, int index) {\r\n      int texC = index /
texNumR;\r\n      int texR = index - texC * texNumR;\r\n      // TODO: swap texR, texC order in following function
so row is corresponding to u and column is corresponding to\r\n      //       v.\r\n      return (vec2(texR, texC) +
halfCR) / vec2(texNumR, texNumC);\r\n    }\r\n    `);\r\n    funcName = 'packedUVfrom1D';\r\n    result[funcName]
= new GlslLibRoutine(`\r\n      vec2 packedUVfrom1D(int texNumR, int texNumC, int index) {\r\n        int
texelIndex = index / 2;\r\n        int texR = texelIndex / texNumC;\r\n        int texC = texelIndex - texR *
texNumC;\r\n        return (vec2(texC, texR) + halfCR) / vec2(texNumC, texNumR);\r\n      }\r\n      `);\r\n
funcName = 'packedUVfrom2D';\r\n    result[funcName] = new GlslLibRoutine(`\r\n      vec2 packedUVfrom2D(int
texNumR, int texNumC, int texelsInLogicalRow, int row, int col) {\r\n        int texelIndex = (row / 2) *
texelsInLogicalRow + (col / 2);\r\n        int texR = texelIndex / texNumC;\r\n        int texC = texelIndex - texR *
texNumC;\r\n        return (vec2(texC, texR) + halfCR) / vec2(texNumC, texNumR);\r\n      }\r\n      `);\r\n
funcName = 'packedUVfrom3D';\r\n    result[funcName] = new GlslLibRoutine(`\r\n      vec2 packedUVfrom3D(int
texNumR, int texNumC,\r\n          int texelsInBatch, int texelsInLogicalRow, int b,\r\n          int row, int col) {\r\n
int index = b * texelsInBatch + (row / 2) * texelsInLogicalRow + (col / 2);\r\n        int texR = index / texNumC;\r\n
  int texC = index - texR * texNumC;\r\n        return (vec2(texC, texR) + halfCR) / vec2(texNumC, texNumR);\r\n
 }\r\n      `);\r\n    funcName = 'sampleTexture';\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n
result[funcName] = new GlslLibRoutine(`\r\n        float sampleTexture(sampler2D textureSampler, vec2 uv) {\r\n
    return ${glsl.texture2D}(textureSampler, uv).r;\r\n        }`);\r\n    return result;\r\n  }\r\n\r\n  /**\r\n   *
Constructing snippets for inputs\r\n   */\r\n  protected getInputsSamplingSnippets(): {[name: string]:
GlslLibRoutine} {\r\n    const result: {[name: string]: GlslLibRoutine} = {};\r\n    const outputLayout =
this.context.outputTextureLayout;\r\n    this.context.programInfo.inputNames.forEach((samplerName, i) => {\r\n
const inputLayout = this.context.inputTextureLayouts[i];\r\n      const funcName =
generateShaderFuncNameFromInputSamplerName(samplerName);\r\n      if (inputLayout.isPacked) {\r\n
result[funcName] = this.getPackedSamplerFromInput(funcName, samplerName, inputLayout);\r\n      } else {\r\n
 result[funcName] = this.getUnpackedSamplerFromInput(funcName, samplerName, inputLayout);\r\n      }\r\n\r\n
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const outCoordFuncName = generateShaderFuncNameFromInputSamplerNameAtOutCoords(samplerName);\r\n
if (inputLayout.unpackedShape.length <= outputLayout.unpackedShape.length) {\r\n        if (inputLayout.isPacked)
{\r\n          result[outCoordFuncName] =\r\n              this.getPackedSamplerAtOutputCoords(outCoordFuncName,
inputLayout, outputLayout, samplerName);\r\n        } else {\r\n          result[outCoordFuncName] =\r\n
this.getUnpackedSamplerAtOutputCoords(outCoordFuncName, inputLayout, outputLayout, samplerName);\r\n
}\r\n      }\r\n    });\r\n\r\n    return result;\r\n  }\r\n\r\n  /**\r\n   * Constructing snippets for output coordinates of
samplers\r\n   */\r\n  protected getPackedSamplerAtOutputCoords(\r\n      funcName: string, inputLayout:
TextureLayout, outputLayout: TextureLayout, name: string): GlslLibRoutine {\r\n    const inShape =
inputLayout.unpackedShape;\r\n    const outShape = outputLayout.unpackedShape;\r\n    const texName = name;\r\n
  const texFuncSnippet = generateShaderFuncNameFromInputSamplerName(texName);\r\n\r\n    const inRank =
inShape.length;\r\n    const outRank = outShape.length;\r\n\r\n    const broadcastDims =
BroadcastUtil.getBroadcastDims(inShape, outShape);\r\n\r\n    const type = getCoordsDataType(outRank);\r\n
const rankDiff = outRank - inRank;\r\n    let coordsSnippet: string;\r\n    const fields = getGlChannels();\r\n\r\n    if
(inRank === 0) {\r\n      coordsSnippet = '';\r\n    } else if (outRank < 2 && broadcastDims.length >= 1) {\r\n
coordsSnippet = 'coords = 0;';\r\n    } else {\r\n      coordsSnippet = broadcastDims.map(d => `coords.${fields[d +
rankDiff]} = 0;`).join('\\n');\r\n    }\r\n    let unpackedCoordsSnippet = '';\r\n    if (outRank < 2 && inRank > 0) {\r\n
   unpackedCoordsSnippet = 'coords';\r\n    } else {\r\n      unpackedCoordsSnippet = inShape.map((s, i) =>
`coords.${fields[i + rankDiff]}`).join(', ');\r\n    }\r\n\r\n    let output = 'return outputValue;';\r\n    const inSize =
ShapeUtil.size(inShape);\r\n    const isInputScalar = inSize === 1;\r\n    const outSize =
ShapeUtil.size(outShape);\r\n    const isOutputScalar = outSize === 1;\r\n\r\n    if (inRank === 1 && !isInputScalar
&& !isOutputScalar) {\r\n      output = `\r\n        return vec4(outputValue.xy, outputValue.xy);\r\n      `;\r\n    } else if
(isInputScalar && !isOutputScalar) {\r\n      if (outRank === 1) {\r\n        output = `\r\n          return
vec4(outputValue.x, outputValue.x, 0., 0.);\r\n        `;\r\n      } else {\r\n        output = `\r\n          return
vec4(outputValue.x);\r\n        `;\r\n      }\r\n    } else if (broadcastDims.length) {\r\n      const rows = inRank - 2;\r\n
 const cols = inRank - 1;\r\n\r\n      if (broadcastDims.indexOf(rows) > -1 && broadcastDims.indexOf(cols) > -1)
{\r\n        output = 'return vec4(outputValue.x);';\r\n      } else if (broadcastDims.indexOf(rows) > -1) {\r\n
output = 'return vec4(outputValue.x, outputValue.y, ' +\r\n            'outputValue.x, outputValue.y);';\r\n      } else if
(broadcastDims.indexOf(cols) > -1) {\r\n        output = 'return vec4(outputValue.xx, outputValue.zz);';\r\n      }\r\n
}\r\n\r\n    const swapLastDimsSnippet = `\r\n        int lastDim = coords.${fields[outRank - 1]};\r\n
coords.${fields[outRank - 1]} = coords.${fields[outRank - 2]};\r\n        coords.${fields[outRank - 2]} = lastDim;\r\n
    `;\r\n    const source = `\r\n      vec4 ${funcName}() {\r\n        ${type} coords = getOutputCoords();\r\n
${swapLastDimsSnippet}\r\n        ${coordsSnippet}\r\n        vec4 outputValue =
${texFuncSnippet}(${unpackedCoordsSnippet});\r\n        ${output}\r\n      }\r\n    `;\r\n    return new
GlslLibRoutine(source, ['coordinates.getOutputCoords']);\r\n  }\r\n\r\n  /**\r\n   * Constructing snippets for
unpacked output coordinates of samplers\r\n   */\r\n  protected getUnpackedSamplerAtOutputCoords(\r\n
funcName: string, inputLayout: TextureLayout, outputLayout: TextureLayout, name: string): GlslLibRoutine {\r\n
const outTexShape = [outputLayout.width, outputLayout.height];\r\n    const inTexShape = [inputLayout.width,
inputLayout.height];\r\n    const inRank = inputLayout.unpackedShape.length;\r\n    const outRank =
outputLayout.unpackedShape.length;\r\n    const inShape = inputLayout.unpackedShape;\r\n    const outShape =
outputLayout.unpackedShape;\r\n    const texFuncSnippet =
generateShaderFuncNameFromInputSamplerName(name);\r\n\r\n    if (inRank === outRank &&
ArrayUtil.arraysEqual(inTexShape, outTexShape)) {\r\n      const source = `\r\n          float ${funcName}() {\r\n
   return sampleTexture(${name}, TexCoords);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source,
['coordinates.sampleTexture']);\r\n    }\r\n\r\n    const type = getCoordsDataType(outRank);\r\n    const
broadcastDims = BroadcastUtil.getBroadcastDims(inShape, outShape);\r\n    const rankDiff = outRank - inRank;\r\n
  let coordsSnippet: string;\r\n    const fields = getGlChannels();\r\n\r\n    if (inRank === 0) {\r\n      coordsSnippet =
'';\r\n    } else if (outRank < 2 && broadcastDims.length >= 1) {\r\n      coordsSnippet = 'coords = 0;';\r\n    } else
{\r\n      coordsSnippet = broadcastDims.map(d => `coords.${fields[d + rankDiff]} = 0;`).join('\\n');\r\n    }\r\n    let
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unpackedCoordsSnippet = '';\r\n    if (outRank < 2 && inRank > 0) {\r\n      unpackedCoordsSnippet = 'coords';\r\n
} else {\r\n      unpackedCoordsSnippet = inputLayout.unpackedShape.map((s, i) => `coords.${fields[i +
rankDiff]}`).join(', ');\r\n    }\r\n    const source = `\r\n        float ${funcName}() {\r\n          ${type} coords =
getOutputCoords();\r\n          ${coordsSnippet}\r\n          return ${texFuncSnippet}(${unpackedCoordsSnippet});\r\n
      }\r\n      `;\r\n    return new GlslLibRoutine(source, ['coordinates.getOutputCoords']);\r\n  }\r\n\r\n  /**\r\n   *
Constructing snippets for packed operations.\r\n   */\r\n  protected getPackedSamplerFromInput(funcName: string,
name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    switch (inputLayout.unpackedShape.length)
{\r\n      case 0:\r\n        return this.getPackedSamplerScalar(funcName, name);\r\n      case 1:\r\n        return
this.getPackedSampler1D(funcName, name, inputLayout);\r\n      case 2:\r\n        return
this.getPackedSampler2D(funcName, name, inputLayout);\r\n      case 3:\r\n        return
this.getPackedSampler3D(funcName, name, inputLayout);\r\n      default:\r\n        return
this.getPackedSamplerND(funcName, name, inputLayout);\r\n    }\r\n  }\r\n\r\n  /**\r\n   * Constructing snippets for
unpacked operations.\r\n   */\r\n  protected getUnpackedSamplerFromInput(funcName: string, name: string,
inputLayout: TextureLayout): GlslLibRoutine {\r\n    const shape = inputLayout.unpackedShape;\r\n    switch
(shape.length) {\r\n      case 0:\r\n        return this.getUnpackedSamplerScalar(funcName, name, inputLayout);\r\n
case 1:\r\n        return this.getUnpackedSampler1D(funcName, name, inputLayout);\r\n      case 2:\r\n        return
this.getUnpackedSampler2D(funcName, name, inputLayout);\r\n      case 3:\r\n        return
this.getUnpackedSampler3D(funcName, name, inputLayout);\r\n      case 4:\r\n        return
this.getUnpackedSampler4D(funcName, name, inputLayout);\r\n      case 5:\r\n        return
this.getUnpackedSampler5D(funcName, name, inputLayout);\r\n      case 6:\r\n        return
this.getUnpackedSampler6D(funcName, name, inputLayout);\r\n      default:\r\n        // TODO support more
dimensionalities\r\n        throw new Error(`Unsupported dimension ${shape.length}-D`);\r\n    }\r\n  }\r\n\r\n  /**\r\n
 * Packed scalar snippet.\r\n   */\r\n  protected getPackedSamplerScalar(funcName: string, name: string):
GlslLibRoutine {\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n    const source = `\r\n          vec4
${funcName}() {\r\n            return ${glsl.texture2D}(${name}, halfCR);\r\n          }\r\n        `;\r\n    return new
GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Packed 1D snippet.\r\n   */\r\n  protected
getPackedSampler1D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    const
texShape = [inputLayout.width, inputLayout.height];\r\n    const packedTexShape = [texShape[1], texShape[0]];\r\n
 const glsl = getGlsl(this.context.glContext.version);\r\n\r\n    const packedSampler = `vec4 ${funcName}(int index)
{\r\n      vec2 uv = packedUVfrom1D(\r\n      ${packedTexShape[0]}, ${packedTexShape[1]}, index);\r\n      return
${glsl.texture2D}(${name}, uv);\r\n    }`;\r\n    const source = packedSampler;\r\n    return new
GlslLibRoutine(source, ['coordinates.packedUVfrom1D']);\r\n  }\r\n\r\n  /**\r\n   * Packed 2D snippet.\r\n   */\r\n
protected getPackedSampler2D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n
 const shape = inputLayout.unpackedShape;\r\n    const texShape = [inputLayout.width, inputLayout.height];\r\n
const glsl = getGlsl(this.context.glContext.version);\r\n    const texNumR = texShape[0];\r\n    const texNumC =
texShape[1];\r\n\r\n    if (texShape != null && ArrayUtil.arraysEqual(shape, texShape)) {\r\n      const
packedSampler = `vec4 ${funcName}(int row, int col) {\r\n        vec2 uv = (vec2(col, row) + halfCR) /
vec2(${texNumC}.0, ${texNumR}.0);\r\n        return ${glsl.texture2D}(${name}, uv);\r\n      }`;\r\n\r\n      return
new GlslLibRoutine(packedSampler);\r\n    }\r\n    const packedTexShape = texShape;\r\n    const valuesPerRow =
Math.ceil(shape[1] / 2);\r\n    const packedSampler = `vec4 ${funcName}(int row, int col) {\r\n      vec2 uv =
packedUVfrom2D(${packedTexShape[1]}, ${packedTexShape[0]}, ${valuesPerRow}, row, col);\r\n      return
${glsl.texture2D}(${name}, uv);\r\n    }`;\r\n    const source = packedSampler;\r\n    return new
GlslLibRoutine(source, ['coordinates.packedUVfrom2D']);\r\n  }\r\n\r\n  /**\r\n   * Packed 3D snippet.\r\n   */\r\n
protected getPackedSampler3D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n
 const shape = inputLayout.unpackedShape;\r\n    const texShape = [inputLayout.width, inputLayout.height];\r\n
const packedTexShape = [texShape[0], texShape[1]];\r\n    const glsl =
getGlsl(this.context.glContext.version);\r\n\r\n    if (shape[0] === 1) {\r\n      const squeezedShape =
shape.slice(1);\r\n      const keptDims = [1, 2];\r\n      const newInputShape = squeezeInputShape(shape,
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squeezedShape);\r\n      const params = ['b', 'row', 'col'];\r\n      // Deep copy of input texture layout.\r\n      const
newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
newInputLayout.unpackedShape = newInputShape;\r\n      const samplerRoutine =
this.getPackedSamplerFromInput(funcName, name, newInputLayout);\r\n      const packedSampler =
`${samplerRoutine.routineBody}\r\n      vec4 ${funcName}(int b, int row, int col) {\r\n        return
${funcName}(${getSqueezedParams(params, keptDims)});\r\n      } `;\r\n      const source = packedSampler;\r\n
return new GlslLibRoutine(source, samplerRoutine.dependencies);\r\n    }\r\n    const texNumR =
packedTexShape[0];\r\n    const texNumC = packedTexShape[1];\r\n\r\n    const valuesPerRow =
Math.ceil(shape[2] / 2);\r\n    const texelsInBatch = valuesPerRow * Math.ceil(shape[1] / 2);\r\n\r\n    const
packedSampler = `vec4 ${funcName}(int b, int row, int col) {\r\n      vec2 uv = packedUVfrom3D(\r\n
${texNumC}, ${texNumR}, ${texelsInBatch}, ${valuesPerRow}, b, row, col);\r\n      return
${glsl.texture2D}(${name}, uv);}`;\r\n    const source = packedSampler;\r\n    return new GlslLibRoutine(source,
['coordinates.packedUVfrom3D']);\r\n  }\r\n  /*\r\n   * Packed ND snippet.\r\n   */\r\n  protected
getPackedSamplerND(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    const
shape = inputLayout.unpackedShape;\r\n    const rank = shape.length;\r\n    const texShape = [inputLayout.width,
inputLayout.height];\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n\r\n    const packedTexShape =
[texShape[0], texShape[1]];\r\n    const texNumR = packedTexShape[1];\r\n    const texNumC =
packedTexShape[0];\r\n    const valuesPerRow = Math.ceil(shape[rank - 1] / 2);\r\n    let texelsInBatch =
valuesPerRow * Math.ceil(shape[rank - 2] / 2);\r\n    let params = 'int b, int row, int col';\r\n    let index = `b *
${texelsInBatch} + (row / 2) * ${valuesPerRow} + (col / 2)`;\r\n    for (let b = 2; b < rank - 1; b++) {\r\n      params
= `int b${b}, ` + params;\r\n      texelsInBatch *= shape[rank - b - 1];\r\n      index = `b${b} * ${texelsInBatch} + ` +
index;\r\n    }\r\n    const packedSampler = `vec4 ${funcName}(${params}) {\r\n      int index = ${index};\r\n      int
texR = index / ${texNumC};\r\n      int texC = index - texR * ${texNumC};\r\n      vec2 uv = (vec2(texC, texR) +
halfCR) / vec2(${texNumC}, ${texNumR});\r\n      return ${glsl.texture2D}(${name}, uv);\r\n    }`;\r\n    const
source = packedSampler;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked scalar
snippet.\r\n   */\r\n  protected getUnpackedSamplerScalar(funcName: string, name: string, inputLayout:
TextureLayout): GlslLibRoutine {\r\n    const [texNumR, texNumC] = [inputLayout.width, inputLayout.height];\r\n
 if (texNumR === 1 && texNumC === 1) {\r\n      const source = `\r\n          float ${funcName}() {\r\n            return
sampleTexture(${name}, halfCR);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source,
['coordinates.sampleTexture']);\r\n    }\r\n\r\n    const source = `\r\n        float ${funcName}() {\r\n          int
offset_${name} = coordsToOffset(TexCoords, ${texNumR}, ${texNumC});\r\n          vec2 uv =
uvFromFlat(${texNumR}, ${texNumC}, offset_${name});\r\n          return sampleTexture(${name}, uv);\r\n
}\r\n      `;\r\n    return new GlslLibRoutine(\r\n        source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture',
'coordinates.coordsToOffset']);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 1D snippet.\r\n   */\r\n  protected
getUnpackedSampler1D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    const
tNumR = inputLayout.width;\r\n    const tNumC = inputLayout.height;\r\n\r\n    if (tNumC === 1 && tNumR ===
1) {\r\n      const source = `\r\n        float ${funcName}(int index) {\r\n          return sampleTexture(${name},
halfCR);\r\n        }\r\n      `;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n\r\n
if (tNumC === 1) {\r\n      const source = `\r\n          float ${funcName}(int index) {\r\n            vec2 uv =
vec2((float(index) + 0.5) / ${tNumR}.0, 0.5);\r\n            return sampleTexture(${name}, uv);\r\n          }\r\n
`;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n    if (tNumR === 1) {\r\n
const source = `\r\n          float ${funcName}(int index) {\r\n            vec2 uv = vec2(0.5, (float(index) + 0.5) /
${tNumC}.0);\r\n            return sampleTexture(${name}, uv);\r\n          }\r\n        `;\r\n      return new
GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n    const source = `\r\n        float ${funcName}(int
index) {\r\n          vec2 uv = uvFromFlat(${tNumR}, ${tNumC}, index);\r\n          return sampleTexture(${name},
uv);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source, ['coordinates.uvFromFlat',
'coordinates.sampleTexture']);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 2D snippet.\r\n   */\r\n\r\n  protected
getUnpackedSampler2D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    const
```

```
shape = inputLayout.unpackedShape;\r\n\r\n    // TODO: modify row/col order for other dimensions.\r\n    const
texShape = [inputLayout.height, inputLayout.width];\r\n\r\n    if (texShape != null && ArrayUtil.arraysEqual(shape,
texShape)) {\r\n      const texNumR = texShape[1];\r\n      const texNumC = texShape[0];\r\n      const source = `\r\n
       float ${funcName}(int row, int col) {\r\n          vec2 uv = (vec2(row, col) + halfCR) / vec2(${texNumR}.0,
${texNumC}.0);\r\n          return sampleTexture(${name}, uv);\r\n        }\r\n      `;\r\n      return new
GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n\r\n    const {newShape, keptDims} =
squeezeShape(shape as number[]);\r\n    const squeezedShape = newShape;\r\n    if (squeezedShape.length <
shape.length) {\r\n      const newInputShape = squeezeInputShape(shape, squeezedShape);\r\n      // Deep copy of
input texture layout.\r\n      const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
  newInputLayout.unpackedShape = newInputShape;\r\n\r\n      const params = ['col', 'row'];\r\n      const source =
`\r\n          ${this.getUnpackedSamplerFromInput(funcName, name, newInputLayout).routineBody}\r\n          float
${funcName}(int row, int col) {\r\n            return ${funcName}(${getSqueezedParams(params, keptDims)});\r\n
  }\r\n        `;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n\r\n    const
texNumR = texShape[1];\r\n    const texNumC = texShape[0];\r\n    if (texNumC === 1) {\r\n      const source = `\r\n
        float ${funcName}(int row, int col) {\r\n            int offset_${name} = coordsToOffset(TexCoords,
${texNumR}, ${texNumC});\r\n            float index = dot(vec3(row, col, offset_${name}), vec3(${shape[1]}, 1,
1));\r\n            vec2 uv = vec2(0.5, (index + 0.5) / ${texNumR}.0);\r\n            return sampleTexture(${name},
uv);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture',
'coordinates.coordsToOffset']);\r\n    }\r\n\r\n    if (texNumR === 1) {\r\n      const source = `\r\n          float
${funcName}(int row, int col) {\r\n            int offset_${name} = coordsToOffset(TexCoords, ${texNumR},
${texNumC});\r\n            float index = dot(vec3(row, col, offset_${name}), vec3(${shape[1]}, 1, 1));\r\n
vec2 uv = vec2((index + 0.5) / ${texNumC}.0, 0.5);\r\n            return sampleTexture(${name}, uv);\r\n          }\r\n
  `;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n
}\r\n\r\n    const source = `\r\n        float ${funcName}(int row, int col) {\r\n          int index = col * ${shape[1]} +
row;\r\n          vec2 uv = uvFromFlat(${texNumR}, ${texNumC}, index);\r\n          return sampleTexture(${name},
uv);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(\r\n        source, ['coordinates.uvFromFlat',
'coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 3D snippet.\r\n
*/\r\n\r\n  protected getUnpackedSampler3D(funcName: string, name: string, inputLayout: TextureLayout):
GlslLibRoutine {\r\n    const shape = inputLayout.unpackedShape;\r\n    const stride0 = shape[1] * shape[2];\r\n
const stride1 = shape[2];\r\n\r\n    const {newShape, keptDims} = squeezeShape(shape as number[]);\r\n    const
squeezedShape = newShape;\r\n    if (squeezedShape.length < shape.length) {\r\n      const newInputShape =
squeezeInputShape(shape, squeezedShape);\r\n      const params = ['batch', 'col', 'row'];\r\n      // Deep copy of input
texture layout.\r\n      const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
newInputLayout.unpackedShape = newInputShape;\r\n      const routine =
this.getUnpackedSamplerFromInput(funcName, name, newInputLayout);\r\n      // TODO: revisit the logic here to
make it simpler\r\n      const revDims = keptDims.reverse();\r\n      const source = `\r\n
${routine.routineBody}\r\n          float ${funcName}(int batch, int row, int col) {\r\n            return
${funcName}(${getSqueezedParams(params, revDims)});\r\n          }\r\n        `;\r\n      return new
GlslLibRoutine(source, routine.dependencies);\r\n    }\r\n\r\n    const texNumR = inputLayout.width;\r\n    const
texNumC = inputLayout.height;\r\n    const source = `\r\n          float ${funcName}(int depth, int row, int col) {\r\n
      // Explicitly use integer operations as dot() only works on floats.\r\n            int index = depth * ${stride0} + col
* ${stride1} + row;\r\n            vec2 uv = uvFromFlat(${texNumR}, ${texNumC}, index);\r\n            return
sampleTexture(${name}, uv);\r\n          }\r\n      `;\r\n    return new GlslLibRoutine(\r\n        source,
['coordinates.uvFromFlat', 'coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n  }\r\n\r\n  /**\r\n   *
Unpacked 4D snippet.\r\n   */\r\n\r\n  protected getUnpackedSampler4D(funcName: string, name: string,
inputLayout: TextureLayout): GlslLibRoutine {\r\n    const shape = inputLayout.unpackedShape;\r\n    const stride2
= shape[3];\r\n    const stride1 = shape[2] * stride2;\r\n    const stride0 = shape[1] * stride1;\r\n\r\n    //\r\n    //
TODO: re-enable this shortcut once the index calculation bug is fixed.\r\n    //\r\n    // const {newShape, keptDims}
```

```
= squeezeShape(shape as number[]);\r\n    // if (newShape.length < shape.length) {\r\n    //   const newInputShape =
squeezeInputShape(shape, newShape);\r\n    //   const params = ['row', 'col', 'depth', 'depth2'];\r\n    //   // Deep copy
of input texture layout.\r\n    //   const newInputLayout: TextureLayout =
JSON.parse(JSON.stringify(inputLayout));\r\n    //   newInputLayout.unpackedShape = newInputShape;\r\n    //
const source = `\r\n    //       ${this.getUnpackedSamplerFromInput(funcName, name,
newInputLayout).routineBody}\r\n    //       float ${funcName}(int row, int col, int depth, int depth2) {\r\n    //
return ${funcName}(${getSqueezedParams(params, keptDims)});\r\n    //       }\r\n    //     `;\r\n    //   return new
GlslLibRoutine(\r\n    //       source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture',
'coordinates.coordsToOffset']);\r\n    // }\r\n\r\n    const texNumR = inputLayout.width;\r\n    const texNumC =
inputLayout.height;\r\n    const source = `\r\n        float ${funcName}(int row, int col, int depth, int depth2) {\r\n
 int index = row * ${stride0} + col * ${stride1} +\r\n              depth2 * ${stride2} + depth;\r\n          vec2 uv =
uvFromFlat(${texNumR}, ${texNumC}, index);\r\n          return sampleTexture(${name}, uv);\r\n        }\r\n
`;\r\n    return new GlslLibRoutine(source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture']);\r\n  }\r\n\r\n
/**\r\n   * Unpacked 5D snippet.\r\n   */\r\n  protected getUnpackedSampler5D(funcName: string, name: string,
inputLayout: TextureLayout): GlslLibRoutine {\r\n    const shape = inputLayout.unpackedShape;\r\n    const stride3
= shape[4];\r\n    const stride2 = shape[3] * stride3;\r\n    const stride1 = shape[2] * stride2;\r\n    const stride0 =
shape[1] * stride1;\r\n\r\n    const {newShape, keptDims} = squeezeShape(shape as number[]);\r\n    if
(newShape.length < shape.length) {\r\n      const newInputShape = squeezeInputShape(shape, newShape);\r\n
const params = ['row', 'col', 'depth', 'depth2', 'depth3'];\r\n      // Deep copy of input texture layout.\r\n      const
newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
newInputLayout.unpackedShape = newInputShape;\r\n\r\n      const source = `\r\n
${this.getUnpackedSamplerFromInput(funcName, name, newInputLayout).routineBody}\r\n          float
${funcName}(int row, int col, int depth, int depth2, int depth3) {\r\n            return
${funcName}(${getSqueezedParams(params, keptDims)});\r\n          }\r\n        `;\r\n      return new
GlslLibRoutine(source, ['coordinates.sampleTexture', 'coordinates.uvFromFlat']);\r\n    }\r\n\r\n    const texNumR =
inputLayout.width;\r\n    const texNumC = inputLayout.height;\r\n    const source = `\r\n        float ${funcName}(int
row, int col, int depth, int depth2, int depth3) {\r\n          int index = row * ${stride0} + col * ${stride1} + depth *
${stride2} +\r\n          depth3 * ${stride3} + depth2;\r\n          vec2 uv = uvFromFlat(${texNumR}, ${texNumC},
index);\r\n          return sampleTexture(${name}, uv);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source,
['coordinates.sampleTexture', 'coordinates.uvFromFlat']);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 6D snippet.\r\n   */\r\n
protected getUnpackedSampler6D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine
{\r\n    const shape = inputLayout.unpackedShape;\r\n    const stride4 = shape[5];\r\n    const stride3 = shape[4] *
stride4;\r\n    const stride2 = shape[3] * stride3;\r\n    const stride1 = shape[2] * stride2;\r\n    const stride0 =
shape[1] * stride1;\r\n\r\n    const {newShape, keptDims} = squeezeShape(shape as number[]);\r\n    if
(newShape.length < shape.length) {\r\n      const newInputShape = squeezeInputShape(shape, newShape);\r\n
const params = ['row', 'col', 'depth', 'depth2', 'depth3', 'depth4'];\r\n      // Deep copy of input texture layout.\r\n
const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
newInputLayout.unpackedShape = newInputShape;\r\n\r\n      const source = `\r\n
${this.getUnpackedSamplerFromInput(funcName, name, newInputLayout).routineBody}\r\n            float
${funcName}(int row, int col, int depth,\r\n              int depth2, int depth3, int depth4) {\r\n              return
${funcName}(${getSqueezedParams(params, keptDims)});\r\n            }\r\n          `;\r\n      return new
GlslLibRoutine(source, ['coordinates.sampleTexture', 'coordinates.uvFromFlat']);\r\n    }\r\n\r\n    const texNumR =
inputLayout.width;\r\n    const texNumC = inputLayout.height;\r\n    const source = `\r\n          float
${funcName}(int row, int col, int depth,\r\n            int depth2, int depth3, int depth4) {\r\n            int index = row *
${stride0} + col * ${stride1} + depth * ${stride2} +\r\n            depth2 * ${stride3} + depth3 * ${stride4} +
depth4;\r\n            vec2 uv = uvFromFlat(${texNumR}, ${texNumC}, index);\r\n            return
sampleTexture(${name}, uv);\r\n          }\r\n        `;\r\n    return new GlslLibRoutine(\r\n        source,
['coordinates.uvFromFlat', 'coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n  }\r\n\r\n  /**\r\n   * This
```

is the main function to map from the given texture coordiantes (s,t)\r\n   * to logical indices for the output\r\n   * There will only be one single variation of this\r\n   * Also see coordsToOffset and offsetToIndices for input-specific versions\r\n   */\r\n protected toVec(): {[name: string]: GlslLibRoutine} {\r\n   const output = this.context.outputTextureLayout;\r\n   const rank = output.shape.length;\r\n   const strides = output.strides;\r\n   const xScale = output.width;\r\n   const yScale = output.height;\r\n\r\n   const stridesBlock = [];\r\n   for (let i = 0; i < rank - 1; ++i) {\r\n   stridesBlock.push(`\r\n        c[${i}] = offset / ${strides[i]};`);\r\n   stridesBlock.push(`\r\n        offset -= c[${i}] * ${strides[i]};`);\r\n   }\r\n   stridesBlock.push(`\r\n        c[${rank - 1}] = offset;`);\r\n   const body = `\r\n      void toVec(vec2 texCoords, out int c[${rank}]) {\r\n        int offset = coordsToOffset(texCoords, ${xScale}, ${yScale});\r\n        ${stridesBlock.join('')}\r\n      }\r\n      void toVec(int offset, out int c[${rank}]) {\r\n        ${stridesBlock.join('')}\r\n      }\r\n    `;\r\n   return {toVec: new GlslLibRoutine(body, ['coordinates.coordsToOffset'])};\r\n }\r\n /**\r\n   * These are value getter functions generated for each input\r\n   * Each function is hardwired to the name and dimensions of the input\r\n   * An '_T' variation is also produced which accesses values as if the\r\n   * input was transposed\r\n   */\r\n protected valueFrom(): {[name: string]: GlslLibRoutine} {\r\n   const result: {[name: string]: GlslLibRoutine} = {};\r\n   this.context.programInfo.inputNames.forEach((name, i) => {\r\n   const layout = this.context.inputTextureLayouts[i];\r\n   const shape = layout.unpackedShape.length > 0 ? layout.unpackedShape : layout.shape;\r\n   const rank = shape.length;\r\n   let funcName = `_${name}`;\r\n   result[funcName] = new GlslLibRoutine(\r\n   this.getValueFromSingle(name, rank, layout.width, layout.height, false),\r\n   [`shapeUtils.indicesToOffset${funcName}`, 'coordinates.offsetToCoords', 'fragcolor.getColorAsFloat']);\r\n   funcName = funcName + '_T';\r\n   result[funcName] = new GlslLibRoutine(\r\n   this.getValueFromSingle(name, rank, layout.width, layout.height, true),\r\n   [`shapeUtils.indicesToOffset${funcName}`, 'coordinates.offsetToCoords', 'fragcolor.getColorAsFloat']);\r\n   });\r\n   return result;\r\n }\r\n /**\r\n   * Produces one value getter function for the name and rank given\r\n   * If a transpose is set proper offsetToCoords mapping will be used\r\n   * @param name name of the function\r\n   * @param rank rank of the input\r\n   * @param transpose whether or not should generate a transpose variation\r\n   */\r\n protected getValueFromSingle(varName: string, rank: number, width: number, height: number, transpose: boolean):\r\n   string {\r\n   let name = `_${varName}`;\r\n   if (transpose) {\r\n   name = name + '_T';\r\n   }\r\n   const glsl = getGlsl(this.context.glContext.version);\r\n   return `\r\n   float ${name}(int m[${rank}]) {\r\n   int offset = indicesToOffset${name}(m);\r\n   vec2 coords = offsetToCoords(offset, ${width}, ${height});\r\n   float value = getColorAsFloat(${glsl.texture2D}(${varName}, coords));\r\n   return value;\r\n   }\r\n   `;\r\n }\r\n\r\n /**\r\n   * Produces a packed value getter function for the name and rank given\r\n   * If a transpose is set proper offsetToCoords mapping will be used\r\n   * @param name name of the function\r\n   * @param rank rank of the input\r\n   * @param transpose whether or not should generate a transpose variation\r\n   */\r\n protected getPackedValueFrom(varName: string, rank: number, width: number, height: number, transpose: boolean):\r\n   string {\r\n   let name = `_${varName}_Pack`;\r\n   if (transpose) {\r\n   name = name + '_T';\r\n   }\r\n   const glsl = getGlsl(this.context.glContext.version);\r\n   return `\r\n        vec4 ${name}(int m[${rank}]) {\r\n          int offset = indicesToOffset_${varName}(m);\r\n          vec2 coords = offsetToCoords(offset, ${width}, ${height});\r\n          return ${glsl.texture2D}(${varName}, coords);\r\n        }\r\n        `;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {ProgramInfo, TextureLayout} from './types';\r\nimport {WebGLContext} from './webgl-context';\r\n\r\n/* eslint-disable @typescript-eslint/naming-convention */\r\nexport enum FunctionType {\r\n ValueBased,\r\n Positional\r\n}\r\nexport interface GlslFunction<T extends FunctionType> {\r\n body: string;\r\n name: string;\r\n type: T;\r\n}\r\nexport type GlslValueFunction = GlslFunction<FunctionType.ValueBased>;\r\nexport interface GlslPositionalFunction extends GlslFunction<FunctionType.Positional> {\r\n inputShape: readonly number[];\r\n outputShape: readonly number[];\r\n}\r\n\r\nexport class GlslContext {\r\n constructor(\r\n   public glContext: WebGLContext, public programInfo: ProgramInfo, public inputTextureLayouts: TextureLayout[],\r\n   public outputTextureLayout: TextureLayout) {}\r\n}\r\nexport abstract class GlslLib {\r\n constructor(public context: GlslContext) {}\r\n abstract getFunctions(): {[name: string]: GlslLibRoutine};\r\n abstract getCustomTypes(): {[name: string]: string};\r\n}\r\n\r\n// abstraction to represent a GLSL library routine and it's dependencies\r\nexport class GlslLibRoutine {\r\n constructor(public routineBody: string, public dependencies?: string[]) {}\r\n}\r\n\r\n// abstraction to represent a GLSL library routine and it's dependencies AS GRAPH Nodes\r\n// this level of abstraction is used to topologically sort routines before fragment shade inclusion\r\nexport class GlslLibRoutineNode {\r\n dependencies: GlslLibRoutineNode[];\r\n routineBody: string;\r\n constructor(public name: string, routineBody?: string, dependencies?: GlslLibRoutineNode[]) {\r\n   if (dependencies) {\r\n   this.dependencies = dependencies;\r\n   } else {\r\n   this.dependencies = [];\r\n   }\r\n\r\n   if (routineBody) {\r\n   this.routineBody = routineBody;\r\n   }\r\n }\r\n addDependency(node: GlslLibRoutineNode) {\r\n   if (node) {\r\n   this.dependencies.push(node);\r\n   }\r\n }\r\n}\r\n\r\n// topologically sort GLSL library routines (graph nodes abstraction) before shader script inclusion\r\nexport class TopologicalSortGlslRoutines {\r\n static returnOrderedNodes(nodes: GlslLibRoutineNode[]): GlslLibRoutineNode[] {\r\n   if (!nodes || nodes.length === 0) {\r\n   return [];\r\n   }\r\n\r\n   if (nodes.length === 1) {\r\n   return nodes;\r\n   }\r\n\r\n   const cycleCheck = new Set<string>();\r\n   const alreadyTraversed = new Set<string>();\r\n   const result = new Array<GlslLibRoutineNode>();\r\n\r\n   this.createOrderedNodes(nodes, cycleCheck, alreadyTraversed, result);\r\n   return result;\r\n }\r\n\r\n private static createOrderedNodes(\r\n   graphNodes: GlslLibRoutineNode[], cycleCheck: Set<string>, alreadyTraversed: Set<string>,\r\n   result: GlslLibRoutineNode[]) {\r\n   for (let i = 0; i < graphNodes.length; ++i) {\r\n   this.dfsTraverse(graphNodes[i], cycleCheck, alreadyTraversed, result);\r\n   }\r\n }\r\n\r\n private static dfsTraverse(\r\n   root: GlslLibRoutineNode, cycleCheck: Set<string>, alreadyTraversed: Set<string>, result: GlslLibRoutineNode[]) {\r\n   // if this root has already been traversed return\r\n   if (!root || alreadyTraversed.has(root.name)) {\r\n   return;\r\n   }\r\n\r\n   // cyclic dependency has been detected\r\n   if (cycleCheck.has(root.name)) {\r\n   throw new Error('Cyclic dependency detected. Can\\'t topologically sort routines needed for shader.');\r\n   }\r\n\r\n   // hold this node to detect cycles if any\r\n   cycleCheck.add(root.name);\r\n\r\n   // traverse children in a dfs fashion\r\n   const dependencies = root.dependencies;\r\n   if (dependencies && dependencies.length > 0) {\r\n   for (let i = 0; i < dependencies.length; ++i) {\r\n   this.dfsTraverse(dependencies[i], cycleCheck, alreadyTraversed, result);\r\n   }\r\n   }\r\n\r\n   // add to result holder\r\n   result.push(root);\r\n\r\n   // mark this node as traversed so that we don't traverse from this again\r\n   alreadyTraversed.add(root.name);\r\n\r\n   // release the hold\r\n   cycleCheck.delete(root.name);\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\n\r\n/**\r\n * This GLSL library handles routines converting\r\n * float32 to/from Unsigned byte or float 16\r\n */\r\nexport class EncodingGlslLib extends GlslLib {\r\n constructor(context: GlslContext) {\r\n   super(context);\r\n }\r\n getFunctions(): {[name: string]: GlslLibRoutine} {\r\n   return {...this.encodeFloat32(), ...this.decodeFloat32()};\r\n }\r\n getCustomTypes(): {[name: string]: string} {\r\n   return {};\r\n }\r\n protected encodeFloat32(): {[name: string]: GlslLibRoutine} {\r\n   return {\r\n   encode: new GlslLibRoutine(`highp vec4 encode(highp float f) {\r\n        return vec4(f, 0.0, 0.0, 0.0);\r\n      }\r\n        `)\r\n   };\r\n }\r\n protected decodeFloat32(): {[name: string]: GlslLibRoutine} {\r\n   return {\r\n   decode: new GlslLibRoutine(`highp float decode(highp vec4 rgba) {\r\n        return rgba.r;\r\n      }\r\n        `)\r\n   };\r\n }\r\n /**\r\n   * returns the routine to encode encode a 32bit float to a vec4 (of unsigned bytes)\r\n   * @credit: https://stackoverflow.com/questions/7059962/how-do-i-convert-a-vec4-rgba-value-to-a-float\r\n   */\r\n protected encodeUint8(): {[name: string]: GlslLibRoutine} {\r\n   const endianness = EncodingGlslLib.isLittleEndian() ? 'rgba.rgba=rgba.abgr;' : '';\r\n   return {\r\n   encode: new GlslLibRoutine(`\r\n   highp vec4 encode(highp float f) {\r\n   highp float F = abs(f);\r\n   highp float Sign = step(0.0,-f);\r\n   highp float Exponent = floor(log2(F));\r\n   highp float Mantissa = (exp2(- Exponent) * F);\r\n   Exponent = floor(log2(F) + 127.0) + floor(log2(Mantissa));\r\n   highp vec4 rgba;\r\n   rgba[0] = 128.0 * Sign + floor(Exponent*exp2(-1.0));\r\n   rgba[1] = 128.0 * mod(Exponent,2.0) + mod(floor(Mantissa*128.0),128.0);\r\n   rgba[2] = floor(mod(floor(Mantissa*exp2(23.0 -8.0)),exp2(8.0)));\r\n   rgba[3] = floor(exp2(23.0)*mod(Mantissa,exp2(-15.0)));\r\n ${endianness}\r\n   rgba = rgba / 255.0; // values need to be normalized to [0,1]\r\n   return

```
rgba;\r\n    }\r\n        `)\r\n    };\r\n  }\r\n  /**\r\n   * returns the routine to encode a vec4 of unsigned bytes to
float32\r\n   * @credit: https://stackoverflow.com/questions/7059962/how-do-i-convert-a-vec4-rgba-value-to-a-
float\r\n   */\r\n  protected decodeUint8(): {[name: string]: GlslLibRoutine} {\r\n    const endianness =
EncodingGlslLib.isLittleEndian() ? 'rgba.rgba=rgba.abgr;' : ";\r\n    return {\r\n      decode: new GlslLibRoutine(`\r\n
      highp float decode(highp vec4 rgba) {\r\n          rgba = rgba * 255.0; // values need to be de-normalized from
[0,1] to [0,255]\r\n          ${endianness}\r\n          highp float Sign = 1.0 - step(128.0,rgba[0])*2.0;\r\n          highp
float Exponent = 2.0 * mod(rgba[0],128.0) + step(128.0,rgba[1]) - 127.0;\r\n          highp float Mantissa =
mod(rgba[1],128.0)*65536.0 + rgba[2]*256.0 +rgba[3] + float(0x800000);\r\n          highp float Result =  Sign *
exp2(Exponent) * (Mantissa * exp2(-23.0 ));\r\n          return Result;\r\n      }\r\n        `)\r\n    };\r\n  }\r\n  /**\r\n   *
Determines if the machine is little endian or not\r\n   * @credit: https://gist.github.com/TooTallNate/4750953\r\n
*/\r\n  static isLittleEndian(): boolean {\r\n    const b = new ArrayBuffer(4);\r\n    const a = new Uint32Array(b);\r\n
 const c = new Uint8Array(b);\r\n    a[0] = 0xdeadbeef;\r\n    if (c[0] === 0xef) {\r\n      return true;\r\n    }\r\n    if
(c[0] === 0xde) {\r\n      return false;\r\n    }\r\n    throw new Error('unknown endianness');\r\n  }\r\n}\r\n","//
Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\nimport {getGlsl} from './glsl-
source';\r\n\r\n/**\r\n * This GLSL library handles routines around reading a texlet and writing to it\r\n * Reading
and writing could be more than just dealing with one channel\r\n * It may require encoding/decoding to/from 4
channels into one\r\n */\r\nexport class FragColorGlslLib extends GlslLib {\r\n  constructor(context: GlslContext)
{\r\n    super(context);\r\n  }\r\n  getFunctions(): {[name: string]: GlslLibRoutine} {\r\n    return
{...this.setFragColor(), ...this.getColorAsFloat()};\r\n  }\r\n  getCustomTypes(): {[name: string]: string} {\r\n
return {};\r\n  }\r\n  protected setFragColor(): {[name: string]: GlslLibRoutine} {\r\n    const glsl =
getGlsl(this.context.glContext.version);\r\n    return {\r\n      setFragColor: new GlslLibRoutine(\r\n          `\r\n
void setFragColor(float value) {\r\n            ${glsl.output} = encode(value);\r\n        }\r\n        `,\r\n
['encoding.encode'])\r\n    };\r\n  }\r\n  protected getColorAsFloat(): {[name: string]: GlslLibRoutine} {\r\n    return
{\r\n      getColorAsFloat: new GlslLibRoutine(\r\n          `\r\n        float getColorAsFloat(vec4 color) {\r\n
return decode(color);\r\n        }\r\n        `,\r\n          ['encoding.decode'])\r\n    };\r\n  }\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nconst
INLINE_FUNC_DEF_REGEX = /@inline[\\s\\n\\r]+(\\w+)[\\s\\n\\r]+([0-9a-zA-
Z_]+)\\s*\\(([^)]*)\\)\\s*{(([^}]|[\\n\\r])*)}/gm;\r\nconst FUNC_CALL_REGEX = '(\\\\w+)?\\\\s+([_0-9a-zA-
Z]+)\\\\s+=\\\\s+__FUNC__\\\\((.*)\\\\)\\\\s*;';\r\n/**\r\n * GLSL preprocessor responsible for resolving @inline
directives\r\n */\r\nexport function replaceInlines(script: string): string {\r\n  const inlineDefs: {[name: string]:
{params: Array<{type: string; name: string}|null>; body: string}} = {};\r\n  let match;\r\n  while ((match =
INLINE_FUNC_DEF_REGEX.exec(script)) !== null) {\r\n    const params = match[3]\r\n                     .split(',')\r\n
                     .map(s => {\r\n                       const tokens = s.trim().split(' ');\r\n                       if (tokens &&
tokens.length === 2) {\r\n                         return {type: tokens[0], name: tokens[1]};\r\n                       }\r\n
          return null;\r\n                     })\r\n                     .filter(v => v !== null);\r\n    inlineDefs[match[2]] =
{params, body: match[4]};\r\n  }\r\n  for (const name in inlineDefs) {\r\n    const regexString =
FUNC_CALL_REGEX.replace('__FUNC__', name);\r\n    const regex = new RegExp(regexString, 'gm');\r\n
while ((match = regex.exec(script)) !== null) {\r\n      const type = match[1];\r\n      const variable = match[2];\r\n
const params = match[3].split(',');\r\n      const declLine = (type) ? `${type} ${variable};` : ";\r\n      let newBody:
string = inlineDefs[name].body;\r\n      let paramRedecLine = ";\r\n      inlineDefs[name].params.forEach((v, i) =>
{\r\n        if (v) {\r\n          paramRedecLine += `${v.type} ${v.name} = ${params[i]};\\n`;\r\n        }\r\n      });\r\n
newBody = `${paramRedecLine}\\n ${newBody}`;\r\n      newBody = newBody.replace('return', `${variable} =
`);\r\n      const replacement = `\r\n      ${declLine}\r\n      {\r\n        ${newBody}\r\n      }\r\n      `;\r\n      script =
script.replace(match[0], replacement);\r\n    }\r\n  }\r\n  script = script.replace(INLINE_FUNC_DEF_REGEX,
");\r\n  return script;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the
MIT License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutineNode, TopologicalSortGlslRoutines} from './glsl-
definitions';\r\nimport {replaceInlines} from './glsl-function-inliner';\r\nimport {glslRegistry} from './glsl-registered-
```

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libs';\r\nimport {getDefaultFragShaderMain, getFragShaderPreamble} from './glsl-source';\r\nimport {ProgramInfo,
TextureLayout, VariableInfo} from './types';\r\nimport {WebGLContext} from './webgl-context';\r\n\r\n/**\r\n *
Preprocessor for the additions to the GLSL language\r\n * It deals with:\r\n *  @include directives\r\n *  @inline\r\n
*  Loop unrolling (not implemented)\r\n *  Macro resolution (not implemented)\r\n */\r\nexport class
GlslPreprocessor {\r\n  readonly context: GlslContext;\r\n  readonly libs: {[name: string]: GlslLib} = {};\r\n
readonly glslLibRoutineDependencyGraph: {[routineName: string]: GlslLibRoutineNode} = {};\r\n\r\n
constructor(\r\n      glContext: WebGLContext, programInfo: ProgramInfo, inputTextureLayouts:
TextureLayout[],\r\n      outputTextureLayout: TextureLayout) {\r\n    this.context = new GlslContext(glContext,
programInfo, inputTextureLayouts, outputTextureLayout);\r\n\r\n    // construct GlslLibs\r\n
Object.keys(glslRegistry).forEach((name: string) => {\r\n      const lib = new glslRegistry[name](this.context);\r\n
this.libs[name] = lib;\r\n    });\r\n\r\n    // construct GlslRoutineDependencyGraph\r\n    const map =
this.glslLibRoutineDependencyGraph;\r\n    for (const libName in this.libs) {\r\n      const lib =
this.libs[libName];\r\n      const routinesInLib = lib.getFunctions();\r\n      for (const routine in routinesInLib) {\r\n
  const key = libName + '.' + routine;\r\n        let currentNode: GlslLibRoutineNode;\r\n        if (map[key]) {\r\n
currentNode = map[key];\r\n          currentNode.routineBody = routinesInLib[routine].routineBody;\r\n        } else
{\r\n          currentNode = new GlslLibRoutineNode(key, routinesInLib[routine].routineBody);\r\n          map[key] =
currentNode;\r\n        }\r\n        const dependencies = routinesInLib[routine].dependencies;\r\n        if (dependencies)
{\r\n          for (let i = 0; i < dependencies.length; ++i) {\r\n            if (!map[dependencies[i]]) {\r\n              const
node = new GlslLibRoutineNode(dependencies[i]);\r\n              map[dependencies[i]] = node;\r\n
currentNode.addDependency(node);\r\n            } else {\r\n
currentNode.addDependency(map[dependencies[i]]);\r\n            }\r\n          }\r\n        }\r\n      }\r\n    }\r\n  }\r\n\r\n
preprocess(): string {\r\n    const programInfo = this.context.programInfo;\r\n    let source =
programInfo.shaderSource;\r\n\r\n    // append main() function\r\n    if (!this.context.programInfo.hasMain) {\r\n
source = `${source}\r\n      ${getDefaultFragShaderMain(this.context.glContext.version,
this.context.outputTextureLayout.shape.length)}`;\r\n    }\r\n    // replace inlines\r\n    source =
replaceInlines(source);\r\n\r\n    // concat final source string\r\n    return
`${getFragShaderPreamble(this.context.glContext.version)}\r\n    ${this.getUniforms(programInfo.inputNames,
programInfo.variables)}\r\n    ${this.getImports(source)}\r\n    ${source}`;\r\n  }\r\n\r\n  protected getImports(script:
string): string {\r\n    const routinesIncluded = this.selectGlslLibRoutinesToBeIncluded(script);\r\n\r\n    if
(routinesIncluded.length === 0) {\r\n      return '';\r\n    }\r\n\r\n    let routines = '';\r\n    for (let i = 0; i <
routinesIncluded.length; ++i) {\r\n      if (routinesIncluded[i].routineBody) {\r\n        routines +=
routinesIncluded[i].routineBody + '\\n';\r\n      } else {\r\n        throw new Error(`Missing body for the Glsl Library
routine: ${routinesIncluded[i].name}`);\r\n      }\r\n    }\r\n\r\n    return routines;\r\n  }\r\n  private
selectGlslLibRoutinesToBeIncluded(script: string): GlslLibRoutineNode[] {\r\n    const nodes:
GlslLibRoutineNode[] = [];\r\n\r\n    Object.keys(this.glslLibRoutineDependencyGraph).forEach(classAndRoutine
=> {\r\n      const routine = classAndRoutine.split('.')[1];\r\n      if (script.indexOf(routine) !== -1) {\r\n
nodes.push(this.glslLibRoutineDependencyGraph[classAndRoutine]);\r\n      }\r\n    });\r\n\r\n    return
TopologicalSortGlslRoutines.returnOrderedNodes(nodes);\r\n  }\r\n\r\n  protected getUniforms(samplers?: string[],
variables?: VariableInfo[]): string {\r\n    const uniformLines: string[] = [];\r\n    if (samplers) {\r\n      for (const
sampler of samplers) {\r\n        uniformLines.push(`uniform sampler2D ${sampler};`);\r\n      }\r\n    }\r\n    if
(variables) {\r\n      for (const variable of variables) {\r\n        uniformLines.push(\r\n            `uniform
${variable.type} ${variable.name}${variable.arrayLength ? `[${variable.arrayLength}]` : ''};`);\r\n      }\r\n    }\r\n
return uniformLines.join('\\n');\r\n  }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n//
Licensed under the MIT License.\r\n\r\nimport {CoordsGlslLib} from './glsl-coordinate-lib';\r\nimport {GlslContext,
GlslLib} from './glsl-definitions';\r\nimport {EncodingGlslLib} from './glsl-encoding-lib';\r\nimport
{FragColorGlslLib} from './glsl-fragcolor-lib';\r\nimport {ShapeUtilsGlslLib} from './glsl-shape-utils-lib';\r\nimport
{VecGlslLib} from './glsl-vec-lib';\r\n\r\nexport const glslRegistry: {[name: string]: new (context: GlslContext) =>
GlslLib} = {\r\n  'encoding': EncodingGlslLib,\r\n  'fragcolor': FragColorGlslLib,\r\n  'vec': VecGlslLib,\r\n
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'shapeUtils': ShapeUtilsGlslLib,\r\n  'coordinates': CoordsGlslLib,\r\n  //  'arrays': ArrayGlslSLib\r\n};\r\n","//
Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\n\r\n/**\r\n * GLSL Library responsible for data
types and routines for manipulating\r\n * coordinates and mapping to/from tensor indices\r\n */\r\nexport class
ShapeUtilsGlslLib extends GlslLib {\r\n  constructor(context: GlslContext) {\r\n    super(context);\r\n  }\r\n
getFunctions(): {[name: string]: GlslLibRoutine} {\r\n    return {\r\n      ...this.bcastIndex(),\r\n
...this.bcastMatmulIndex(),\r\n      ...this.offsetToIndices(),\r\n      ...this.indicesToOffset(),\r\n
...this.incrementIndices()\r\n    };\r\n  }\r\n  getCustomTypes() {\r\n    return {};\r\n  }\r\n  protected bcastIndex():
{[name: string]: GlslLibRoutine} {\r\n    const outputRank = this.context.outputTextureLayout.shape.length;\r\n
const result: {[name: string]: GlslLibRoutine} = {};\r\n    this.context.programInfo.inputNames.forEach((name, i)
=> {\r\n      const shape = this.context.inputTextureLayouts[i].unpackedShape;\r\n      if (shape.length <=
outputRank) {\r\n        const rank = shape.length;\r\n        const dimOffset = outputRank - rank;\r\n        const
funcName = `bcastIndices_${name}`;\r\n        let block = '';\r\n        for (let i = 0; i < rank; ++i) {\r\n          block +=
`\r\n          realIndices[${i}] = int( mod(float(bcastedIndices[${dimOffset + i}]), ${shape[i]}.0) );\r\n          `;\r\n
}\r\n        const body = `\r\n        void ${funcName} (int bcastedIndices[${outputRank}], out int
realIndices[${rank}]) {\r\n          ${block}\r\n        }\r\n        `;\r\n        result[funcName] = new
GlslLibRoutine(body);\r\n      }\r\n    });\r\n    return result;\r\n  }\r\n  protected bcastMatmulIndex(): {[name:
string]: GlslLibRoutine} {\r\n    const outputRank = this.context.outputTextureLayout.shape.length;\r\n    const
result: {[name: string]: GlslLibRoutine} = {};\r\n    this.context.programInfo.inputNames.forEach((name, i) => {\r\n
    const shape = this.context.inputTextureLayouts[i].shape;\r\n      if (!(shape.length < 2 || shape.length >
outputRank)) {\r\n        const rank = shape.length;\r\n        const dimOffset = outputRank - rank;\r\n        const
funcName = `bcastMatmulIndices_${name}`;\r\n        let block = '';\r\n        for (let i = 0; i < rank - 2; ++i) {\r\n
block += `\r\n          realIndices[${i}] = int( mod(float(bcastedIndices[${dimOffset + i}]), ${shape[i]}.0) );\r\n
`;\r\n        }\r\n        const body = `\r\n        void ${funcName}(int bcastedIndices[${outputRank}], out int
realIndices[${rank}]) {\r\n          ${block}\r\n          realIndices[${rank - 1}] = bcastedIndices[${outputRank -
1}];\r\n          realIndices[${rank - 2}] = bcastedIndices[${outputRank - 2}];\r\n        }\r\n        `;\r\n
result[funcName] = new GlslLibRoutine(body);\r\n      }\r\n    });\r\n    return result;\r\n  }\r\n  protected
indicesToOffset(): {[name: string]: GlslLibRoutine} {\r\n    const result: {[name: string]: GlslLibRoutine} = {};\r\n
this.context.programInfo.inputNames.forEach((name, i) => {\r\n      const shape =
this.context.inputTextureLayouts[i].shape;\r\n      const strides = this.context.inputTextureLayouts[i].strides;\r\n
const rank = shape.length;\r\n      let funcName = `indicesToOffset_${name}`;\r\n      result[funcName] = new
GlslLibRoutine(ShapeUtilsGlslLib.indexToOffsetSingle(funcName, rank, strides));\r\n      funcName =
`indicesToOffset_${name}_T`;\r\n      result[funcName] =\r\n          new
GlslLibRoutine(ShapeUtilsGlslLib.indexToOffsetSingle(funcName, rank, strides.slice().reverse()));\r\n    });\r\n
return result;\r\n  }\r\n  static indexToOffsetSingle(name: string, rank: number, strides: readonly number[]): string
{\r\n    let block = '';\r\n    for (let i = rank - 1; i >= 0; --i) {\r\n      block += `\r\n        offset += indices[${i}] *
${strides[i]};\r\n        `;\r\n    }\r\n    return `\r\n      int ${name}(int indices[${rank}]) {\r\n        int offset = 0;\r\n
${block}\r\n        return offset;\r\n      }\r\n      `;\r\n  }\r\n  protected offsetToIndices(): {[name: string]:
GlslLibRoutine} {\r\n    const result: {[name: string]: GlslLibRoutine} = {};\r\n
this.context.programInfo.inputNames.forEach((name, i) => {\r\n      const shape =
this.context.inputTextureLayouts[i].shape;\r\n      const strides = this.context.inputTextureLayouts[i].strides;\r\n
const rank = shape.length;\r\n      let funcName = `offsetToIndices_${name}`;\r\n      result[funcName] = new
GlslLibRoutine(ShapeUtilsGlslLib.offsetToIndicesSingle(funcName, rank, strides));\r\n      funcName =
`offsetToIndices_${name}_T`;\r\n      result[funcName] =\r\n          new
GlslLibRoutine(ShapeUtilsGlslLib.offsetToIndicesSingle(funcName, rank, strides.slice().reverse()));\r\n    });\r\n
return result;\r\n  }\r\n  static offsetToIndicesSingle(name: string, rank: number, strides: readonly number[]): string
{\r\n    const stridesBlock = [];\r\n    for (let i = 0; i < rank - 1; ++i) {\r\n      stridesBlock.push(`\r\n      indices[${i}]
= offset / ${strides[i]};`);\r\n      stridesBlock.push(`\r\n        offset -= indices[${i}] * ${strides[i]};`);\r\n    }\r\n
```

stridesBlock.push(`\r\n indices[${rank - 1}] = offset;`);\r\n return `\r\n void ${name}(int offset, out int indices[${rank}]) {\r\n ${stridesBlock.join(")}\r\n }\r\n `;\r\n }\r\n protected incrementIndices(): {[name: string]: GlslLibRoutine} {\r\n const result: {[name: string]: GlslLibRoutine} = {};\r\n this.context.programInfo.inputNames.forEach((name, i) => {\r\n const shape = this.context.inputTextureLayouts[i].shape;\r\n const rank = shape.length;\r\n const funcName = `incrementIndices_${name}`;\r\n let shapeInit = ";\r\n for (let i = 0; i < rank; ++i) {\r\n shapeInit += `\r\n shape[${i}] = ${shape[i]};`;\r\n }\r\n const body = `\r\n void ${funcName}(int axis, out int indices[${rank}]) {\r\n int shape[${rank}];\r\n ${shapeInit};\r\n for(int i = ${rank} -1 ; i >= 0; --i) {\r\n if(i > axis) continue;\r\n indices[i] += 1;\r\n if(indices[i] < shape[i]) {\r\n break;\r\n }\r\n indices[i] = 0;\r\n }\r\n }\r\n `;\r\n result[funcName] = new GlslLibRoutine(body);\r\n });\r\n return result;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\n/**\r\n * represent a version irrelevant abstraction of for GLSL source code\r\n */\r\nexport interface Glsl {\r\n readonly version: string;\r\n readonly attribute: string;\r\n readonly varyingVertex: string;\r\n readonly varyingFrag: string;\r\n readonly texture2D: string;\r\n readonly output: string;\r\n readonly outputDeclaration: string;\r\n}\r\n\r\nconst GLSL_ES_2_0: Glsl = {\r\n version: ",\r\n attribute: 'attribute',\r\n varyingVertex: 'varying',\r\n varyingFrag: 'varying',\r\n texture2D: 'texture2D',\r\n output: 'gl_FragColor',\r\n outputDeclaration: ",\r\n};\r\nconst GLSL_ES_3_0: Glsl = {\r\n version: '#version 300 es',\r\n attribute: 'in',\r\n varyingVertex: 'out',\r\n varyingFrag: 'in',\r\n texture2D: 'texture',\r\n output: 'outputColor',\r\n outputDeclaration: 'out vec4 outputColor;',\r\n};\r\n\r\nexport function getGlsl(version: 1|2) {\r\n return version === 1 ? GLSL_ES_2_0 : GLSL_ES_3_0;\r\n}\r\n\r\nexport function getVertexShaderSource(version: 1|2): string {\r\n const glsl = getGlsl(version);\r\n return `${glsl.version}\r\n precision highp float;\r\n ${glsl.attribute} vec3 position;\r\n ${glsl.attribute} vec2 textureCoord;\r\n\r\n ${glsl.varyingVertex} vec2 TexCoords;\r\n\r\n void main()\r\n {\r\n gl_Position = vec4(position, 1.0);\r\n TexCoords = textureCoord;\r\n }`;\r\n}\r\n\r\nexport function getFragShaderPreamble(version: 1|2): string {\r\n const glsl = getGlsl(version);\r\n return `${glsl.version}\r\n precision highp float;\r\n precision highp int;\r\n precision highp sampler2D;\r\n ${glsl.varyingFrag} vec2 TexCoords;\r\n ${glsl.outputDeclaration}\r\n const vec2 halfCR = vec2(0.5, 0.5);\r\n\r\n // Custom vector types to handle higher dimenalities.\r\n struct ivec5\r\n {\r\n int x;\r\n int y;\r\n int z;\r\n int w;\r\n int u;\r\n };\r\n\r\n struct ivec6\r\n {\r\n int x;\r\n int y;\r\n int z;\r\n int w;\r\n int u;\r\n int v;\r\n };\r\n\r\n int imod(int x, int y) {\r\n return x - y * (x / y);\r\n }\r\n\r\n `;\r\n}\r\n\r\nexport function getDefaultFragShaderMain(version: 1|2, outputShapeLength: number): string {\r\n const glsl = getGlsl(version);\r\n return `\r\n void main() {\r\n int indices[${outputShapeLength}];\r\n toVec(TexCoords, indices);\r\n vec4 result = vec4(process(indices));\r\n ${glsl.output} = result;\r\n }\r\n `;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\n\r\n/**\r\n * GLSL Library responsible for vec routines\r\n * Vec is an varible length int array. The length is fixed at the time of\r\n * generating the library functions from the dimensions of the output.\r\n */\r\nexport class VecGlslLib extends GlslLib {\r\n constructor(context: GlslContext) {\r\n super(context);\r\n }\r\n getCustomTypes(): {[name: string]: string} {\r\n return {};\r\n }\r\n getFunctions(): {[name: string]: GlslLibRoutine} {\r\n return {...this.binaryVecFunctions(), ...this.copyVec(), ...this.setVecItem(), ...this.getVecItem()};\r\n }\r\n protected binaryVecFunctions(): {[name: string]: GlslLibRoutine} {\r\n const outputLayout = this.context.outputTextureLayout;\r\n const rank = outputLayout.shape.length;\r\n const nameOp: {[name: string]: string} = {add: '+=', sub: '-=', mul: '*=', div: '/='};\r\n const result: {[name: string]: GlslLibRoutine} = {};\r\n for (const name in nameOp) {\r\n const fname = `${name}Vec`;\r\n let assignmentBlock = ";\r\n for (let i = 0; i < rank; ++i) {\r\n assignmentBlock += `\r\n dest[${i}] ${nameOp[name]} src[${i}];\r\n `;\r\n }\r\n const body = `\r\n void ${fname}(int src[${rank}], out int dest[${rank}]) {\r\n ${assignmentBlock}\r\n }\r\n `;\r\n result[fname] = new GlslLibRoutine(body);\r\n }\r\n\r\n return result;\r\n }\r\n protected copyVec(): {[name: string]: GlslLibRoutine} {\r\n const outputLayout = this.context.outputTextureLayout;\r\n const rank = outputLayout.shape.length;\r\n let assignmentBlock = ";\r\n

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for (let i = 0; i < rank; ++i) {\r\n      assignmentBlock += `\r\n        dest[${i}] = src[${i}];\r\n        `;\r\n    }\r\n
const body = `\r\n      void copyVec(int src[${rank}], out int dest[${rank}]) {\r\n        ${assignmentBlock}\r\n
}\r\n      `;\r\n    return {copyVec: new GlslLibRoutine(body)};\r\n  }\r\n\r\n  protected setVecItem(): {[name:
string]: GlslLibRoutine} {\r\n    const outputLayout = this.context.outputTextureLayout;\r\n    const rank =
outputLayout.shape.length;\r\n    let block = `\r\n        if(index < 0)\r\n            index =${rank} + index;\r\n        if
(index == 0)\r\n            m[0] = value;\r\n        `;\r\n    for (let i = 1; i < rank - 1; ++i) {\r\n      block += `\r\n        else
if (index == ${i})\r\n            m[${i}] = value;\r\n            `;\r\n    }\r\n    block += `\r\n        else\r\n            m[${rank -
1}] = value;\r\n        `;\r\n    const body = `\r\n      void setVecItem(out int m[${rank}], int index, int value) {\r\n
${block}\r\n      }\r\n        `;\r\n    return {setVecItem: new GlslLibRoutine(body)};\r\n  }\r\n  protected
getVecItem(): {[name: string]: GlslLibRoutine} {\r\n    const outputLayout = this.context.outputTextureLayout;\r\n
const rank = outputLayout.shape.length;\r\n    let block = `\r\n        if(index < 0)\r\n            index = ${rank} +
index;\r\n        if (index == 0)\r\n            return m[0];\r\n      `;\r\n    for (let i = 1; i < rank - 1; ++i) {\r\n      block +=
`\r\n        else if (index == ${i})\r\n            return m[${i}];\r\n      `;\r\n    }\r\n    block += `\r\n        else\r\n
return m[${rank - 1}];\r\n        `;\r\n    const body = `\r\n      int getVecItem(int m[${rank}], int index) {\r\n
${block}\r\n      }\r\n    `;\r\n    return {getVecItem: new GlslLibRoutine(body)};\r\n  }\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceHandler}
from '../../backend';\r\nimport {Logger} from '../../instrument';\r\nimport {Tensor} from '../../tensor';\r\nimport
{ShapeUtil} from '../../util';\r\nimport {createPackProgramInfoLoader} from './ops/pack';\r\nimport
{createPackedReshape3DProgramInfoLoader, isReshapeCheap, processDims3D} from './ops/reshape-
packed';\r\n\r\nimport {encodeAsUint8} from './ops/uint8-encode';\r\nimport {createUnpackProgramInfoLoader}
from './ops/unpack';\r\nimport {WebGLSessionHandler} from './session-handler';\r\nimport {Encoder} from
'./texture-data-encoder';\r\nimport {calculateTextureWidthAndHeight, createTextureLayoutFromShape,
createTextureLayoutFromTextureType} from './texture-layout';\r\nimport {Artifact, ProgramInfo,
ProgramInfoLoader, TextureData, TextureLayout, TextureType} from './types';\r\n\r\nconst
getProgramInfoUniqueKey =\r\n    (programInfo: ProgramInfo|ProgramInfoLoader, inputTextureDatas:
TextureData[]): string => {\r\n      const inputs =\r\n          inputTextureDatas.map(texture =>
`${texture.unpackedShape.join(',')};${texture.width}x${texture.height}`)\r\n              .join('_');\r\n      let key =
programInfo.name;\r\n      if (programInfo.cacheHint) {\r\n        key += '[' + programInfo.cacheHint + ']';\r\n      }\r\n
    key += ':' + inputs;\r\n      return key;\r\n    };\r\n\r\nexport class WebGLInferenceHandler implements
InferenceHandler {\r\n  private packedTextureDataCache: Map<Tensor.Id, TextureData>;\r\n  private
unpackedTextureDataCache: Map<Tensor.Id, TextureData>;\r\n  constructor(public session:
WebGLSessionHandler) {\r\n    this.packedTextureDataCache = new Map();\r\n    this.unpackedTextureDataCache
= new Map();\r\n  }\r\n\r\n  /**\r\n   * @returns [width, height]\r\n   */\r\n  calculateTextureWidthAndHeight(shape:
readonly number[], textureType: TextureType): [number, number] {\r\n    return
calculateTextureWidthAndHeight(this.session.layoutStrategy, shape, textureType);\r\n  }\r\n\r\n
executeProgram(program: ProgramInfo|ProgramInfoLoader, inputs: readonly Tensor[]): TextureData {\r\n    if
(inputs.length < program.inputNames.length) {\r\n      throw new Error(`Input size mustn't be less than
${program.inputNames.length}.`);\r\n    }\r\n    if (program.inputNames.length !== program.inputTypes.length)
{\r\n      throw new Error('input names size does not match input types');\r\n    }\r\n\r\n    // create texture info for
input\r\n    const inputTextureDatas: TextureData[] = [];\r\n    for (let i = 0; i < program.inputNames.length; ++i)
{\r\n      inputTextureDatas[i] = this.getOrCreateTextureData(inputs[i], program.inputTypes[i]);\r\n    }\r\n\r\n
const key = getProgramInfoUniqueKey(program, inputTextureDatas);\r\n    let artifact =
this.session.programManager.getArtifact(key);\r\n    const programInfo = artifact ?\r\n        artifact.programInfo :\r\n
      (typeof (program as ProgramInfoLoader).get === 'function' ? (program as ProgramInfoLoader).get() :\r\n
                                         (program as ProgramInfo));\r\n\r\n    // create texture info for output\r\n    const
outputTextureLayout = createTextureLayoutFromTextureType(\r\n        this.session.layoutStrategy,
programInfo.output.dims, programInfo.output.textureType);\r\n    const outputTextureData =
this.createTextureData(outputTextureLayout, programInfo.output.type);\r\n\r\n    if (!artifact) {\r\n      artifact =
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this.session.programManager.build(programInfo, inputTextureDatas, outputTextureData);\r\n this.session.programManager.setArtifact(key, artifact);\r\n }\r\n\r\n this.runProgram(artifact, inputTextureDatas, outputTextureData);\r\n return outputTextureData;\r\n }\r\n\r\n run(program: ProgramInfoLoader, inputs: readonly Tensor[]): Tensor {\r\n const outputTextureData = this.executeProgram(program, inputs);\r\n return outputTextureData.tensor;\r\n }\r\n\r\n private runProgram(artifact: Artifact, inputs: TextureData[], output: TextureData): void {\r\n // input should match\r\n for (let i = 0; i < inputs.length; ++i) {\r\n if (!!inputs[i].isPacked !== (artifact.programInfo.inputTypes[i] === TextureType.packed)) {\r\n throw new Error(`input[${i}] property packed inconsistent`);\r\n }\r\n }\r\n\r\n // output should match\r\n if (!!output.isPacked !== (artifact.programInfo.output.textureType === TextureType.packed)) {\r\n throw new Error('output property packed inconsistent');\r\n }\r\n\r\n this.session.programManager.run(artifact, inputs, output);\r\n }\r\n\r\n /**\r\n * Create a TextureData object from a tensor.\r\n * Usage = Encoder.Usage.UploadOnly.\r\n * If a related texture data is found in cache, returns it;\r\n * Otherwise:\r\n * Creates a new texture layout if not provided;\r\n * Creates WebGLTexture with the layout;\r\n * Upload tensor data to the texture;\r\n * Creates a texture data object associated with the given tensor.\r\n * @param tensor the tensor with data to upload\r\n */\r\n private getOrCreateTextureData(tensor: Tensor, textureType: TextureType) {\r\n let td = this.getTextureData(tensor.dataId, textureType === TextureType.packed);\r\n\r\n if (!td) {\r\n // check if we have texture data in different type\r\n td = this.getTextureData(tensor.dataId, textureType !== TextureType.packed);\r\n if (td) {\r\n if (textureType === TextureType.packed) {\r\n return this.pack(td);\r\n } else {\r\n return this.unpack(td);\r\n }\r\n }\r\n }\r\n\r\n if (!td) {\r\n const layout = createTextureLayoutFromTextureType(this.session.layoutStrategy, tensor.dims, textureType);\r\n\r\n if (textureType === TextureType.packedLastDimension) {\r\n const group = 1;\r\n const channels = 4;\r\n const shape = tensor.dims;\r\n if (shape.length === 4) {\r\n // pre-processing for kernel data of Conv.\r\n //\r\n // TODO: currently this is a hacking to overwrite Conv's weight. The correct way to do this should be:\r\n // 1. implement texture based const-folding\r\n // 2. create a WebGL program \"preprocessConvWeight\" to do the same work as below\r\n // 3. run the program before dotProduct.\r\n //\r\n const adjustedKernelShape = [shape[0], Math.ceil((shape[1] * shape[2] * shape[3]) / channels)];\r\n const adjustedLayout =\r\n createTextureLayoutFromTextureType(this.session.layoutStrategy, adjustedKernelShape, textureType);\r\n let buffer = tensor.numberData;\r\n if (shape[1] * shape[2] * shape[3] % channels !== 0) {\r\n const numFeatureMaps = shape[0];\r\n const oldRowSize = shape[1] * shape[2] * shape[3];\r\n const newRowSize = Math.ceil(oldRowSize * group / channels) * channels;\r\n const newSize = numFeatureMaps * newRowSize;\r\n buffer = new Float32Array(newSize);\r\n for (let f = 0; f < numFeatureMaps; ++f) {\r\n const oldOffset = f * oldRowSize;\r\n const newOffset = f * newRowSize + f % group * oldRowSize;\r\n buffer.set(tensor.numberData.subarray(oldOffset, oldOffset + oldRowSize), newOffset);\r\n }\r\n }\r\n return this.createTextureData(adjustedLayout, tensor.type, buffer, tensor, Encoder.Usage.UploadOnly);\r\n }\r\n }\r\n\r\n if (textureType === TextureType.packed) {\r\n const unpackedTextureLayout =\r\n createTextureLayoutFromShape(this.session.layoutStrategy, tensor.dims, 1, [], {reverseWH: true});\r\n const unpackedTextureData = this.createTextureData(\r\n unpackedTextureLayout, tensor.type, tensor.numberData, tensor, Encoder.Usage.UploadOnly);\r\n td = this.pack(unpackedTextureData);\r\n } else {\r\n td = this.createTextureData(layout, tensor.type, tensor.numberData, tensor, Encoder.Usage.UploadOnly);\r\n }\r\n }\r\n return td;\r\n }\r\n\r\n /**\r\n * Create a TextureData object using the given data and bind to the given tensor.\r\n * Usage = Encoder.Usage.UploadOnly.\r\n * NOTE: this function is a hack for Conv implementation. should remove this function, after rewriting Conv\r\n * implementation by Graph.Transformer\r\n * @param dataType the tensor data type\r\n * @param data the actual data to upload\r\n * @param tensor the tensor to bind. tensor's data is ignored.\r\n */\r\n createTextureDataFromLayoutBindTensor(\r\n layout: TextureLayout, dataType: Tensor.DataType, data: Tensor.NumberType, tensor: Tensor): TextureData {\r\n return this.createTextureData(layout, dataType, data, tensor, Encoder.Usage.UploadOnly);\r\n }\r\n\r\n private createTextureData(\r\n layout: TextureLayout, dataType: Tensor.DataType, data?: Tensor.NumberType, tensor?:

Tensor,\r\n   usage?: Encoder.Usage): TextureData {\r\n   Logger.verbose('InferenceHandler', `Creating TextureData: layout:[${JSON.stringify(layout)}]`);\r\n   const texture = this.session.textureManager.createTextureFromLayout(dataType, layout, data, usage);\r\n   return this.createTextureDataFromTexture(layout, dataType, texture, tensor);\r\n }\r\n\r\n reshapeUnpacked(input: Tensor, reshapedDims: readonly number[]): Tensor {\r\n   const inputTD = this.getOrCreateTextureData(input, TextureType.unpacked);\r\n   const newTextureLayout: TextureLayout = {\r\n   channels: inputTD.channels,\r\n   height: inputTD.height,\r\n   width: inputTD.width,\r\n   // handle reshaping into scalar Tensors\r\n   shape: reshapedDims.length !== 0 ? reshapedDims : [1],\r\n   strides: ShapeUtil.computeStrides(reshapedDims),\r\n   unpackedShape: reshapedDims,\r\n   };\r\n   const newTextureData = this.createTextureDataFromTexture(newTextureLayout, input.type, inputTD.texture);\r\n   return newTextureData.tensor;\r\n }\r\n\r\n reshapePacked(input: Tensor, reshapedDims: readonly number[]): Tensor {\r\n   const inputTD = this.getOrCreateTextureData(input, TextureType.packed);\r\n\r\n   // check if the reshape is 'cheap'\r\n   if (isReshapeCheap(input.dims, reshapedDims)) {\r\n   const newTextureLayout: TextureLayout = {\r\n   channels: inputTD.channels,\r\n   height: inputTD.height,\r\n   width: inputTD.width,\r\n   // handle reshaping into scalar Tensors\r\n   shape: reshapedDims.length !== 0 ? reshapedDims : [1],\r\n   strides: ShapeUtil.computeStrides(reshapedDims),\r\n   unpackedShape: reshapedDims,\r\n   isPacked: true\r\n   };\r\n   const newTextureData = this.createTextureDataFromTexture(newTextureLayout, input.type, inputTD.texture);\r\n   return newTextureData.tensor;\r\n   }\r\n\r\n   const squeezedInputShape = processDims3D(input.dims);\r\n   const squeezedOutputShape = processDims3D(reshapedDims);\r\n\r\n   const squeezedInputTensor = this.reshapePacked(input, squeezedInputShape);\r\n   const squeezedOutputTensor = this.run(\r\n   createPackedReshape3DProgramInfoLoader(this, squeezedInputTensor, squeezedOutputShape), [squeezedInputTensor]);\r\n   const outputTensor = this.reshapePacked(squeezedOutputTensor, reshapedDims);\r\n   return outputTensor;\r\n }\r\n\r\n private createTextureDataFromTexture(\r\n   layout: TextureLayout, dataType: Tensor.DataType, texture: WebGLTexture, tensor?: Tensor, tensorId?: Tensor.Id) {\r\n   const textureData: TextureData = {\r\n   ...layout,\r\n   tensor: tensor ||\r\n   new Tensor(\r\n   layout.unpackedShape, dataType, (_id: Tensor.Id) => this.readTexture(textureData),\r\n   async (_id: Tensor.Id) => this.readTextureAsync(textureData), undefined, tensorId),\r\n   texture\r\n   };\r\n   this.setTextureData(textureData.tensor.dataId, textureData, layout.isPacked);\r\n   return textureData;\r\n }\r\n\r\n private getTextureData(tensorId: Tensor.Id, isPacked = false): TextureData|undefined {\r\n   return this.session.isInitializer(tensorId) ?\r\n   this.session.getTextureData(tensorId, isPacked) :\r\n   isPacked ? this.packedTextureDataCache.get(tensorId) : this.unpackedTextureDataCache.get(tensorId);\r\n }\r\n setTextureData(tensorId: Tensor.Id, td: TextureData, isPacked = false): void {\r\n   if (this.session.isInitializer(tensorId)) {\r\n   this.session.setTextureData(tensorId, td, isPacked);\r\n   } else {\r\n   (isPacked ? this.packedTextureDataCache : this.unpackedTextureDataCache).set(tensorId, td);\r\n   }\r\n }\r\n isTextureLayoutCached(tensor: Tensor, isPacked = false): boolean {\r\n   return !!this.getTextureData(tensor.dataId, isPacked);\r\n }\r\n\r\n dispose(): void {\r\n   this.session.textureManager.clearActiveTextures();\r\n   this.packedTextureDataCache.forEach(td => this.session.textureManager.releaseTexture(td));\r\n   this.packedTextureDataCache = new Map();\r\n   this.unpackedTextureDataCache.forEach(td => this.session.textureManager.releaseTexture(td));\r\n   this.unpackedTextureDataCache = new Map();\r\n }\r\n\r\n readTexture(textureData: TextureData): Tensor.NumberType {\r\n   if (textureData.isPacked) {\r\n   return this.readTexture(this.unpack(textureData));\r\n   }\r\n   if (!this.session.backend.glContext.isFloat32DownloadSupported) {\r\n   return this.session.textureManager.readUint8TextureAsFloat(encodeAsUint8(this, textureData));\r\n   }\r\n   return this.session.textureManager.readTexture(textureData, textureData.tensor.type, textureData.channels);\r\n }\r\n\r\n async readTextureAsync(textureData: TextureData): Promise<Tensor.NumberType> {\r\n   if (textureData.isPacked) {\r\n   return this.readTextureAsync(this.unpack(textureData));\r\n   }\r\n   if (!this.session.backend.glContext.isFloat32DownloadSupported) {\r\n   return this.session.textureManager.readUint8TextureAsFloat(encodeAsUint8(this, textureData));\r\n   }\r\n   return this.session.textureManager.readTextureAsync(textureData, textureData.tensor.type, textureData.channels);\r\n }\r\n\r\n pack(input: TextureData): TextureData {\r\n   const outputTextureData = this.executeProgram(createPackProgramInfoLoader(this, input.tensor), [input.tensor]);\r\n   return outputTextureData;\r\n }\r\n\r\n unpack(input: TextureData): TextureData {\r\n   const outputTextureData = this.executeProgram(createUnpackProgramInfoLoader(this, input.tensor), [input.tensor]);\r\n   return outputTextureData;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {OpSet} from '../../opset';\r\n\r\nimport {batchNormalization, parseBatchNormalizationAttributes} from './ops/batch-normalization';\r\nimport * as binaryOps from './ops/binary-op';\r\nimport {concat, parseConcatAttributes} from './ops/concat';\r\nimport {conv, parseConvAttributes} from './ops/conv';\r\nimport {depthToSpace, parseDepthToSpaceAttributes} from './ops/depth-to-space';\r\nimport {flatten, parseFlattenAttributes} from './ops/flatten';\r\nimport {gather, parseGatherAttributes} from './ops/gather';\r\nimport {gemm, parseGemmAttributesV11, parseGemmAttributesV7} from './ops/gemm';\r\nimport {imageScaler, parseImageScalerAttributes} from './ops/image-scaler';\r\nimport {instanceNormalization, parseInstanceNormalizationAttributes} from './ops/instance-normalization';\r\nimport {matMul, parseMatMulAttributes} from './ops/matmul';\r\nimport {pad, parsePadAttributes} from './ops/pad';\r\nimport {averagePool, parseAveragePoolAttributes} from './ops/pool';\r\nimport {globalAveragePool, parseGlobalAveragePoolAttributes} from './ops/pool';\r\nimport {maxPool, parseMaxPoolAttributes} from './ops/pool';\r\nimport {globalMaxPool} from './ops/pool';\r\nimport {reduceLogSum, reduceLogSumSquare, reduceMax, reduceMean, reduceMin, reduceProd, reduceSum} from './ops/reduce';\r\nimport {parseReduceAttributes} from './ops/reduce';\r\nimport {reshape} from './ops/reshape';\r\nimport {parseResizeAttributesV10, parseResizeAttributesV11, resize} from './ops/resize-packed';\r\nimport {shape} from './ops/shape';\r\nimport {parseSliceAttributes, slice, sliceV10} from './ops/slice';\r\nimport {parseSoftmaxAttributes, softmax} from './ops/softmax';\r\nimport {parseSplitAttributes, split} from './ops/split';\r\nimport {parseSqueezeAttributes, squeeze} from './ops/squeeze';\r\nimport {sum} from './ops/sum';\r\nimport {tile} from './ops/tile';\r\nimport {parseTransposeAttributes, transpose} from './ops/transpose';\r\nimport * as unaryOps from './ops/unary-op';\r\nimport {parseUnsqueezeAttributes, unsqueeze} from './ops/unsqueeze';\r\nimport {parseUpsampleAttributesV7, parseUpsampleAttributesV9, upsample} from './ops/upsample';\r\n\r\nexport const WEBGL_OP_RESOLVE_RULES: readonly OpSet.ResolveRule[] = [\r\n ['Abs', '', '6+', unaryOps.abs],\r\n ['Acos', '', '7+', unaryOps.acos],\r\n ['Add', '', '7+', binaryOps.add],\r\n ['And', '', '7+', binaryOps.and],\r\n ['Asin', '', '7+', unaryOps.asin],\r\n ['Atan', '', '7+', unaryOps.atan],\r\n // TODO: support new attributes for AveragePool-10\r\n ['AveragePool', '', '7-10', averagePool, parseAveragePoolAttributes],\r\n ['BatchNormalization', '', '7+', batchNormalization, parseBatchNormalizationAttributes],\r\n ['Ceil', '', '6+', unaryOps.ceil],\r\n ['Clip', '', '6-10', unaryOps.clip, unaryOps.parseClipAttributes],\r\n ['Concat', '', '4+', concat, parseConcatAttributes],\r\n ['Conv', '', '1+', conv, parseConvAttributes],\r\n ['Cos', '', '7+', unaryOps.cos],\r\n ['Div', '', '7+', binaryOps.div],\r\n ['Dropout', '', '7+', unaryOps.identity],\r\n ['DepthToSpace', '', '1+', depthToSpace, parseDepthToSpaceAttributes],\r\n ['Equal', '', '7+', binaryOps.equal],\r\n ['Elu', '', '6+', unaryOps.elu, unaryOps.parseEluAttributes],\r\n ['Exp', '', '6+', unaryOps.exp],\r\n ['Flatten', '', '1+', flatten, parseFlattenAttributes],\r\n ['Floor', '', '6+', unaryOps.floor],\r\n ['Gather', '', '1+', gather, parseGatherAttributes],\r\n ['Gemm', '', '7-10', gemm, parseGemmAttributesV7],\r\n ['Gemm', '', '11+', gemm, parseGemmAttributesV11],\r\n ['GlobalAveragePool', '', '1+', globalAveragePool, parseGlobalAveragePoolAttributes],\r\n ['GlobalMaxPool', '', '1+', globalMaxPool],\r\n ['Greater', '', '7+', binaryOps.greater],\r\n ['Identity', '', '1+', unaryOps.identity],\r\n ['ImageScaler', '', '1+', imageScaler, parseImageScalerAttributes],\r\n ['InstanceNormalization', '', '6+', instanceNormalization, parseInstanceNormalizationAttributes],\r\n ['LeakyRelu', '', '6+', unaryOps.leakyRelu, unaryOps.parseLeakyReluAttributes],\r\n ['Less', '', '7+', binaryOps.less],\r\n ['Log', '', '6+', unaryOps.log],\r\n ['MatMul', '', '1+', matMul, parseMatMulAttributes],\r\n // TODO: support new attributes for MaxPool-8 and MaxPool-10\r\n ['MaxPool', '', '1-9', maxPool, parseMaxPoolAttributes],\r\n ['Mul', '', '7+', binaryOps.mul],\r\n ['Neg', '', '6+', unaryOps.neg],\r\n ['Not', '', '1+', unaryOps.not],\r\n ['Or', '', '7+', binaryOps.or],\r\n ['Pad', '', '2-10', pad, parsePadAttributes],\r\n ['Pow', '', '7+', binaryOps.pow],\r\n ['PRelu', '', '7+', binaryOps.pRelu],\r\n

['ReduceLogSum', '', '1+', reduceLogSum, parseReduceAttributes],\r\n ['ReduceMax', '', '1+', reduceMax, parseReduceAttributes],\r\n ['ReduceMean', '', '1+', reduceMean, parseReduceAttributes],\r\n ['ReduceMin', '', '1+', reduceMin, parseReduceAttributes],\r\n ['ReduceProd', '', '1+', reduceProd, parseReduceAttributes],\r\n ['ReduceSum', '', '1+', reduceSum, parseReduceAttributes],\r\n ['ReduceSumSquare', '', '1+', reduceLogSumSquare, parseReduceAttributes],\r\n ['Relu', '', '6+', unaryOps.relu],\r\n ['Reshape', '', '5+', reshape],\r\n ['Resize', '', '10', resize, parseResizeAttributesV10],\r\n ['Resize', '', '11+', resize, parseResizeAttributesV11],\r\n ['Shape', '', '1+', shape],\r\n ['Sigmoid', '', '6+', unaryOps.sigmoid],\r\n ['Sin', '', '7+', unaryOps.sin],\r\n ['Slice', '', '10+', sliceV10], // TODO: support 'steps' for Slice-10\r\n ['Slice', '', '1-9', slice, parseSliceAttributes],\r\n ['Softmax', '', '1+', softmax, parseSoftmaxAttributes],\r\n // 'Split' operator has an optional attribute 'split'\r\n // this attribute determines how the specified axis of input data is split.\r\n // When the attribute is missing, we need the count of number of outputs\r\n // so that we can determine the 'split' attribute from the runtime input to the Operator\r\n ['Split', '', '2+', split, parseSplitAttributes],\r\n ['Sqrt', '', '6+', unaryOps.sqrt],\r\n ['Squeeze', '', '1+', squeeze, parseSqueezeAttributes],\r\n ['Sub', '', '7+', binaryOps.sub],\r\n ['Sum', '', '6+', sum],\r\n ['Tan', '', '7+', unaryOps.tan],\r\n ['Tanh', '', '6+', unaryOps.tanh],\r\n ['Tile', '', '6+', tile],\r\n ['Transpose', '', '1+', transpose, parseTransposeAttributes],\r\n ['Upsample', '', '7-8', upsample, parseUpsampleAttributesV7],\r\n ['Upsample', '', '9', upsample, parseUpsampleAttributesV9],\r\n ['Unsqueeze', '', '1+', unsqueeze, parseUnsqueezeAttributes],\r\n ['Xor', '', '7+', binaryOps.xor],\r\n];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface BatchNormalizationAttributes extends AttributeWithCacheKey {\r\n epsilon: number;\r\n momentum: number;\r\n spatial: number;\r\n}\r\n\r\nconst batchNormalizationProgramMetadata = {\r\n name: 'BatchNormalization',\r\n inputNames: ['A', 'Scale', 'B', 'Mean', 'Variance'],\r\n inputTypes:\r\n [TextureType.unpacked, TextureType.unpacked, TextureType.unpacked, TextureType.unpacked, TextureType.unpacked]\r\n};\r\n\r\nexport const batchNormalization: OperatorImplementation<BatchNormalizationAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: BatchNormalizationAttributes): Tensor[] => {\r\n validateInputs(inputs);\r\n const output = inferenceHandler.run(\r\n {\r\n ...batchNormalizationProgramMetadata,\r\n cacheHint: attributes.cacheKey,\r\n get: () => createBatchNormalizationProgramInfo(inferenceHandler, inputs, attributes)\r\n },\r\n inputs);\r\n return [output];\r\n };\r\n\r\nexport const parseBatchNormalizationAttributes: OperatorInitialization<BatchNormalizationAttributes> =\r\n (node: Graph.Node): BatchNormalizationAttributes => {\r\n const epsilon = node.attributes.getFloat('epsilon', 1e-5);\r\n const momentum = node.attributes.getFloat('momentum', 0.9);\r\n const spatial = node.attributes.getInt('spatial', 1);\r\n return createAttributeWithCacheKey({epsilon, momentum, spatial});\r\n };\r\n\r\nconst createBatchNormalizationProgramInfo =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: BatchNormalizationAttributes):\r\n ProgramInfo => {\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n const rank = inputs[0].dims.length;\r\n const [scaleWidth, scaleHeight] =\r\n inferenceHandler.calculateTextureWidthAndHeight(inputs[1].dims, TextureType.unpacked);\r\n const shaderSource = `\r\n float process(int[${rank}] indices) {\r\n vec2 position = offsetToCoords(indices[1], ${scaleWidth}, ${scaleHeight});\r\n float scale = getColorAsFloat(${glsl.texture2D}(Scale, position));\r\n float mean = getColorAsFloat(${glsl.texture2D}(Mean, position));\r\n float variance = getColorAsFloat(${glsl.texture2D}(Variance, position));\r\n float b = getColorAsFloat(${glsl.texture2D}(B, position));\r\n\r\n return scale * ((_A(indices) - mean) / sqrt(variance + float(${attributes.epsilon}))) + b;\r\n }`;\r\n return {\r\n ...batchNormalizationProgramMetadata,\r\n output: {dims: inputs[0].dims, type: inputs[0].type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 5) {\r\n throw new Error('BatchNormalization requires 5 inputs.');\r\n }\r\n\r\n const X =

inputs[0];\r\n const scale = inputs[1];\r\n const B = inputs[2];\r\n const mean = inputs[3];\r\n const var_ = inputs[4];\r\n\r\n // input should atleast have three dimensions - N,C,dim1,...,dimn\r\n // other inputs can have only one dimensions\r\n if (X.dims.length < 3 || scale.dims.length !== 1 || B.dims.length !== 1 || mean.dims.length !== 1 ||\r\n var_.dims.length !== 1) {\r\n throw new Error('invalid input shape.');\r\n }\r\n if (scale.dims[0] !== X.dims[1] || B.dims[0] !== X.dims[1] || mean.dims[0] !== X.dims[1] ||\r\n var_.dims[0] !== X.dims[1]) {\r\n throw new Error('invalid input shape.');\r\n }\r\n if ((X.type !== 'float32' && X.type !== 'float64') || (scale.type !== 'float32' && scale.type !== 'float64') ||\r\n (B.type !== 'float32' && B.type !== 'float64') || (mean.type !== 'float32' && mean.type !== 'float64') ||\r\n (var_.type !== 'float32' && var_.type !== 'float64')) {\r\n throw new Error('invalid input tensor types.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {BroadcastUtil, ShapeUtil} from '../../../util';\r\nimport {FunctionType, GlslValueFunction} from '../glsl-definitions';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, TextureType} from '../types';\r\n\r\nexport function glslAdd(): GlslValueFunction {\r\n const name = 'add_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return a + b;\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n return v1 + v2;\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslDiv(): GlslValueFunction {\r\n const name = 'div_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return a / b;\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n return v1 / v2;\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslMul(): GlslValueFunction {\r\n const name = 'mul_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return a * b;\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n return v1 * v2;\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslSub(): GlslValueFunction {\r\n const name = 'sub_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return a - b;\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n return v1 - v2;\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslEqual(): GlslValueFunction {\r\n const name = 'equal_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return float(a == b);\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n return vec4(equal(v1, v2));\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslGreater(): GlslValueFunction {\r\n const name = 'greater_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return float(a > b);\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n return vec4( v1.r > v2.r ,\r\n v1.g > v2.g,\r\n v1.b > v2.b,\r\n v1.a > v2.a );\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslLess(): GlslValueFunction {\r\n const name = 'less_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return float(a < b);\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n return vec4( v1.r < v2.r ,\r\n v1.g < v2.g,\r\n v1.b < v2.b,\r\n v1.a < v2.a );\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslAnd(): GlslValueFunction {\r\n const name = 'and_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return float( bool(a) && bool(b) );\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n bvec4 b1 = bvec4(v1);\r\n bvec4 b2 = bvec4(v2);\r\n return vec4( b1.r && b2.r ,\r\n b1.g && b2.g,\r\n b1.b && b2.b,\r\n b1.a && b2.a );\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslOr(): GlslValueFunction {\r\n const name = 'or_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return float( bool(a) || bool(b) );\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n bvec4 b1 = bvec4(v1);\r\n bvec4 b2 = bvec4(v2);\r\n return vec4( b1.r || b2.r ,\r\n b1.g || b2.g,\r\n b1.b || b2.b,\r\n b1.a || b2.a );\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslXor(): GlslValueFunction {\r\n const name = 'xor_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return float( bool(a) ^^ bool(b) );\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n bvec4 b1 = bvec4(v1);\r\n bvec4 b2 = bvec4(v2);\r\n return vec4( b1.r ^^ b2.r ,\r\n b1.g ^^ b2.g,\r\n b1.b ^^ b2.b,\r\n b1.a ^^ b2.a );\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslPow(): GlslValueFunction {\r\n return glslBuiltinBinary('pow');\r\n}\r\nexport function glslPRelu(): GlslValueFunction {\r\n const name = 'prelu_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n return a < 0.0 ? a * b: a;\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n   return vec4(\r\n   v1.r < 0.0 ? v1.r * v2.r: v1.r,\r\n   v1.g < 0.0 ? v1.g * v2.g: v1.g,\r\n   v1.b < 0.0 ? v1.b * v2.b: v1.b,\r\n   v1.a < 0.0 ? v1.a * v2.a: v1.a\r\n   );\r\n }\r\n `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\n\r\nfunction glslBuiltinBinary(fname: string): GlslValueFunction {\r\n  const name = `${fname}_`;\r\n  const body = `\r\n float ${name}(float a, float b) {\r\n   return ${fname}(a, b);\r\n }\r\n vec4 ${name}(vec4 v1, vec4 v2) {\r\n   return ${fname}(v1, v2);\r\n }\r\n `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\n\r\nconst createBinaryProgramInfoLoader =\r\n   (handler: WebGLInferenceHandler, inputs: Tensor[], glslFunc: GlslValueFunction,\r\n   outputTensorType: Tensor.DataType = inputs[0].type, cacheKey?: string): ProgramInfoLoader => {\r\n   const textureType = handler.session.pack ? TextureType.packed : TextureType.unpacked;\r\n   return {\r\n   name: glslFunc.name,\r\n   inputNames: ['A', 'B'],\r\n   inputTypes: [textureType, textureType],\r\n   cacheHint: cacheKey,\r\n   get: () => createBinaryProgramInfo(handler, inputs, glslFunc, outputTensorType)\r\n   };\r\n   };\r\n\r\nconst createBinaryProgramInfo =\r\n   (handler: WebGLInferenceHandler, inputs: Tensor[], glslFunc: GlslValueFunction,\r\n   outputTensorType: Tensor.DataType = inputs[0].type): ProgramInfo => {\r\n   const textureType = handler.session.pack ? TextureType.packed : TextureType.unpacked;\r\n   const isBroadcast = !ShapeUtil.areEqual(inputs[0].dims, inputs[1].dims);\r\n   let outputShape = inputs[0].dims;\r\n\r\n   const usePackedTexture = handler.session.pack;\r\n\r\n   if (isBroadcast) {\r\n   const calculatedShape = BroadcastUtil.calcShape(inputs[0].dims, inputs[1].dims, false);\r\n   if (!calculatedShape) {\r\n   throw new Error('Can\\'t perform binary op on the given tensors');\r\n   }\r\n   outputShape = calculatedShape;\r\n   const outputRank = outputShape.length;\r\n   const aRank = inputs[0].dims.length !== 0 ? inputs[0].dims.length : 1;\r\n   const bRank = inputs[1].dims.length !== 0 ? inputs[1].dims.length : 1;\r\n   const aBcast = inputs[0].dims.length !== 0 ? 'bcastIndices_A(indices, aindices);' : 'aindices[0] = 0;';\r\n   const bBcast = inputs[1].dims.length !== 0 ? 'bcastIndices_B(indices, bindices);' : 'bindices[0] = 0;';\r\n\r\n   const glsl = getGlsl(handler.session.backend.glContext.version);\r\n   const shaderSource = usePackedTexture ? `\r\n      ${glslFunc.body}\r\n      void main() {\r\n        vec4 a = getAAtOutCoords();\r\n        vec4 b = getBAtOutCoords();\r\n        vec4 result = ${glslFunc.name}(a, b);\r\n        ${glsl.output} = result;\r\n      }` :\r\n   `\r\n      ${glslFunc.body}\r\n      float process(int indices[${outputRank}]) {\r\n        int aindices[${aRank}];\r\n        int bindices[${bRank}];\r\n        ${aBcast}\r\n        ${bBcast}\r\n        return ${glslFunc.name}(_A(aindices), _B(bindices));\r\n      }`;\r\n\r\n   return {\r\n   name: glslFunc.name,\r\n   inputNames: ['A', 'B'],\r\n   inputTypes: [textureType, textureType],\r\n   output: {dims: outputShape, type: outputTensorType, textureType},\r\n   shaderSource,\r\n   hasMain: usePackedTexture\r\n   };\r\n   }\r\n   const glsl = getGlsl(handler.session.backend.glContext.version);\r\n   const shaderSource = `\r\n    ${glslFunc.body}\r\n    void main() {\r\n      vec4 v1 = ${glsl.texture2D}(A, TexCoords);\r\n      vec4 v2 = ${glsl.texture2D}(B, TexCoords);\r\n      vec4 result = ${glslFunc.name}(v1, v2);\r\n      ${glsl.output} = result;\r\n    }\r\n    `;\r\n\r\n   return {\r\n   name: glslFunc.name,\r\n   inputNames: ['A', 'B'],\r\n   inputTypes: [textureType, textureType],\r\n   output: {dims: inputs[0].dims, type: outputTensorType, textureType},\r\n   shaderSource,\r\n   hasMain: true\r\n   };\r\n   };\r\n\r\nexport const add = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslAdd()), inputs)];\r\n\r\nexport const and = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslAnd(), 'bool'), inputs)];\r\n\r\nexport const div = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslDiv()), inputs)];\r\n\r\nexport const equal = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslEqual(), 'bool'), inputs)];\r\n\r\nexport const greater = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslGreater(), 'bool'), inputs)];\r\n\r\nexport const less = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslLess(), 'bool'), inputs)];\r\n\r\nexport const mul = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] =>

[handler.run(createBinaryProgramInfoLoader(handler, inputs, glslMul()), inputs)];\r\n\r\nexport const or = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslOr(), 'bool'), inputs)];\r\n\r\nexport const pow = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslPow()), inputs)];\r\n\r\nexport const pRelu = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslPRelu()), inputs)];\r\n\r\nexport const sub = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslSub()), inputs)];\r\n\r\nexport const xor = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslXor(), 'bool'), inputs)];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport {getCoordsDataType, getGlChannels} from '../utils';\r\nimport {ConcatAttributes} from './concat';\r\n\r\nimport {getChannels, unpackFromChannel} from './packing-utils';\r\n\r\nconst createPackedConcatProgramMetadata = (inputCount: number, cacheHint: string) => ({\r\n name: 'Concat (packed)',\r\n inputNames: Array.from({length: inputCount}, (v, i) => `X${i}`),\r\n inputTypes: Array(inputCount).fill(TextureType.packed),\r\n cacheHint\r\n});\r\n\r\nconst createPackedConcatProgramInfo =\r\n   (handler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: Tensor[], axis: number): ProgramInfo => {\r\n   const inputShape = inputs[0].dims.slice();\r\n   if (axis >= inputShape.length || axis < (-1 * inputShape.length)) {\r\n   throw new Error('axis specified for concat doesn\\'t match input dimensionality');\r\n   }\r\n   if (axis < 0) {\r\n   axis = inputShape.length + axis;\r\n   }\r\n   // ensure all of the non-concatenated axes match each other\r\n   // calculate the shape of the output tensor while we do that\r\n   const outputShape = inputShape.slice(0);\r\n   for (let i = 1; i < inputs.length; i++) {\r\n   const dataNShape = inputs[i].dims.slice();\r\n   for (let axisIndex = 0; axisIndex < inputShape.length; axisIndex++) {\r\n   // add to the placeholder for computing output shape\r\n   if (axisIndex === axis) {\r\n   outputShape[axis] += dataNShape[axisIndex];\r\n   }\r\n   // ensure all non-cancatenated axes match each other\r\n   else if (inputShape[axisIndex] !== dataNShape[axisIndex]) {\r\n   throw new Error('non concat dimensions must match');\r\n   }\r\n   }\r\n   }\r\n\r\n   const rank = outputShape.length;\r\n   const coords = getChannels('coords', rank);\r\n   const dtype = getCoordsDataType(rank);\r\n   const unpackChannel = unpackFromChannel();\r\n\r\n   const shapes = inputs.map(i => i.dims);\r\n   const channels = getGlChannels(rank);\r\n   const offsets: number[] = new Array(shapes.length - 1);\r\n\r\n   offsets[0] = shapes[0][axis];\r\n   for (let i = 1; i < offsets.length; i++) {\r\n   offsets[i] = offsets[i - 1] + shapes[i][axis];\r\n   }\r\n\r\n   const channel = channels[axis];\r\n   const lastChannels = channels.slice(-2);\r\n   const allChannels = channels.join();\r\n\r\n   let getValueSnippet = `if (${channel} < ${offsets[0]}) {\r\n        return getChannel(\r\n            getX0(${allChannels}), vec2(${lastChannels.join()}));\r\n        }`;\r\n   for (let i = 1; i < offsets.length; i++) {\r\n   const shift = offsets[i - 1];\r\n   getValueSnippet += `\r\n   if (${channel} < ${offsets[i]} && ${channel} >= ${offsets[i - 1]}) {\r\n   return getChannel(\r\n   getX${i}(${getShiftedChannelsSnippet(channels, channel, shift)}),\r\n   vec2(${getShiftedChannelsSnippet(lastChannels, channel, shift)}));\r\n   }`;\r\n      }\r\n      const lastIndex = offsets.length;\r\n      const shift = offsets[offsets.length - 1];\r\n      getValueSnippet += `\r\n   return getChannel(\r\n   getX${lastIndex}(${getShiftedChannelsSnippet(channels, channel, shift)}),\r\n   vec2(${getShiftedChannelsSnippet(lastChannels, channel, shift)}));`;\r\n\r\n      const glsl = getGlsl(handler.session.backend.glContext.version);\r\n\r\n      const shaderSource = `\r\n ${unpackChannel}\r\n   float getValue(${channels.map(x => 'int ' + x)}) {\r\n ${getValueSnippet}\r\n   }\r\n\r\n   void main() {\r\n ${dtype} coords = getOutputCoords();\r\n   int lastDim = coords.${channels[rank - 1]};\r\n   coords.${channels[rank - 1]} = coords.${channels[rank - 2]};\r\n   coords.${channels[rank - 2]} = lastDim;\r\n\r\n   vec4 result = vec4(getValue(${coords}), 0., 0., 0.);\r\n\r\n

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  ${coords[rank - 1]} = ${coords[rank - 1]} + 1;\r\n          if (${coords[rank - 1]} < ${outputShape[rank - 1]})
{\r\n            result.g = getValue(${coords});\r\n          }\r\n\r\n          ${coords[rank - 2]} = ${coords[rank - 2]} +
1;\r\n          if (${coords[rank - 2]} < ${outputShape[rank - 2]}) {\r\n            result.a = getValue(${coords});\r\n
    }\r\n\r\n          ${coords[rank - 1]} = ${coords[rank - 1]} - 1;\r\n          if (${coords[rank - 2]} <
${outputShape[rank - 2]} &&\r\n              ${coords[rank - 1]} < ${outputShape[rank - 1]}) {\r\n            result.b =
getValue(${coords});\r\n          }\r\n          ${glsl.output} = result;\r\n        }\r\n      `;\r\n\r\n    return {\r\n
...metadata,\r\n      output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.packed},\r\n
shaderSource,\r\n      hasMain: true,\r\n    };\r\n  };\r\n\r\nexport const createPackedConcatProgramInfoLoader
=\r\n   (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: ConcatAttributes): ProgramInfoLoader =>
{\r\n     const metadata = createPackedConcatProgramMetadata(inputs.length, attributes.cacheKey);\r\n     return
{...metadata, get: () => createPackedConcatProgramInfo(handler, metadata, inputs, attributes.axis)};\r\n
};\r\n\r\n\r\nconst getShiftedChannelsSnippet = (channels: string[], channel: string, shift: number): string => {\r\n  const
channelIdx = channels.indexOf(channel);\r\n  const res = channels.map((c, idx) => {\r\n    if (idx === channelIdx)
{\r\n      return `${c} - ${shift}`;\r\n    } else {\r\n      return c;\r\n    }\r\n  });\r\n  return res.join();\r\n};\r\n","//
Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph}
from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport
{Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport
{ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nimport
{createPackedConcatProgramInfoLoader} from './concat-packed';\r\n\r\nexport interface ConcatAttributes extends
AttributeWithCacheKey {\r\n  readonly axis: number;\r\n}\r\n\r\nexport const concat:
OperatorImplementation<ConcatAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: ConcatAttributes): Tensor[] => {\r\n      validateInputs(inputs);\r\n      if (inferenceHandler.session.pack
&& inputs[0].dims.length > 1) {\r\n        const output =\r\n
inferenceHandler.run(createPackedConcatProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n
return [output];\r\n      } else {\r\n        const output =\r\n
inferenceHandler.run(createUnpackedConcatProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n
  return [output];\r\n      }\r\n    };\r\n\r\nconst createUnpackedConcatProgramMetadata = (inputCount: number,
cacheHint: string) => ({\r\n  name: 'Concat',\r\n  inputNames: Array.from({length: inputCount}, (v, i) =>
`X${i}`),\r\n  inputTypes: Array(inputCount).fill(TextureType.unpacked),\r\n  cacheHint\r\n});\r\n\r\nconst
createUnpackedConcatProgramInfo =\r\n    (handler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs:
Tensor[], axis: number): ProgramInfo => {\r\n      const inputShape = inputs[0].dims.slice();\r\n      if (axis >=
inputShape.length || axis < (-1 * inputShape.length)) {\r\n        throw new Error('axis specified for concat doesn\\'t
match input dimensionality');\r\n      }\r\n      if (axis < 0) {\r\n        axis = inputShape.length + axis;\r\n      }\r\n      //
ensure all of the non-concatenated axes match each other\r\n      // calculate the shape of the output tensor while we
do that\r\n      const outputShape = inputShape.slice(0);\r\n      for (let i = 1; i < inputs.length; i++) {\r\n        const
dataNShape = inputs[i].dims.slice();\r\n        for (let axisIndex = 0; axisIndex < inputShape.length; axisIndex++)
{\r\n          // add to the placeholder for computing output shape\r\n          if (axisIndex === axis) {\r\n
outputShape[axis] += dataNShape[axisIndex];\r\n          }\r\n          // ensure all non-cancatenated axes match each
other\r\n          else if (inputShape[axisIndex] !== dataNShape[axisIndex]) {\r\n            throw new Error('non concat
dimensions must match');\r\n          }\r\n        }\r\n      }\r\n\r\n      const rank = outputShape.length;\r\n\r\n      const
sizeInConcatAxis = new Array<number>(inputs.length);\r\n      let previousSum = 0;\r\n      for (let i = 0; i <
sizeInConcatAxis.length; ++i) {\r\n        previousSum += inputs[i].dims[axis];\r\n        sizeInConcatAxis[i] =
previousSum;\r\n      }\r\n\r\n      let getTextureIndexWhereDataResidesMethod = '';\r\n      // in most cases linear
search is sufficient, as in most scenarios, only 2 tensors are concatenated\r\n      if (inputs.length < 5) {\r\n
getTextureIndexWhereDataResidesMethod =
getTextureIndexWhereDataResidesLinearSearch(sizeInConcatAxis);\r\n      } else {\r\n
getTextureIndexWhereDataResidesMethod =
```

getTextureIndexWhereDataResidesBinarySearch(sizeInConcatAxis);\r\n }\r\n\r\n const fetchDataFromCorrectTextureMethod = getFetchDataFromCorrectTextureMethod(inputs.length, rank);\r\n const getSizeInConcatAxisValueFromIndexMethod = getGetSizeInConcatAxisValueFromIndexMethod(sizeInConcatAxis);\r\n const shaderSource = `\r\n ${fetchDataFromCorrectTextureMethod}\r\n ${getSizeInConcatAxisValueFromIndexMethod}\r\n ${getTextureIndexWhereDataResidesMethod}\r\n float process(int indices[${rank}]) {\r\n int textureIndex = getTextureWhereDataResides (indices[${axis}]);\r\n\r\n if(textureIndex != 0) {\r\n indices[${axis}] = indices[${axis}] - int(getSizeInConcatAxisValueFromIndex(textureIndex-int(1)));\r\n }\r\n\r\n return fetchDataFromCorrectTexture(textureIndex, indices);\r\n }`;\r\n return {\r\n ...metadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n shaderSource,\r\n };\r\n };\r\n\r\nconst createUnpackedConcatProgramInfoLoader =\r\n (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: ConcatAttributes): ProgramInfoLoader => {\r\n const metadata = createUnpackedConcatProgramMetadata(inputs.length, attributes.cacheKey);\r\n return {...metadata, get: () => createUnpackedConcatProgramInfo(handler, metadata, inputs, attributes.axis)};\r\n };\r\n\r\nconst getTextureIndexWhereDataResidesLinearSearch = (sizeInConcatAxis: number[]): string => {\r\n const searchAxis = sizeInConcatAxis.map((size, i) => `if(index<${size}) {return ${i};}\r\n`);\r\n return `int getTextureWhereDataResides(int index) {\r\n ${searchAxis.join('')}\r\n }`;\r\n};\r\n\r\n// TODO: Implement BinarySearch in GLSL\r\nconst getTextureIndexWhereDataResidesBinarySearch = (sizeInConcatAxis: number[]): string =>\r\n getTextureIndexWhereDataResidesLinearSearch(sizeInConcatAxis);\r\n\r\nconst getFetchDataFromCorrectTextureMethod = (numberOfTensors: number, tensorRank: number) => {\r\n const codeLines: string[] = [`float fetchDataFromCorrectTexture(int textureIndex, int indices[${tensorRank}]) {`];\r\n for (let i = 0; i < numberOfTensors; ++i) {\r\n if (i === 0) {\r\n codeLines.push(\r\n '\\t' +\r\n `if (textureIndex == ${i}) { return _X${i}(indices); }`);\r\n } else if (i === numberOfTensors - 1) {\r\n codeLines.push(\r\n '\\t' +\r\n `else { return _X${i}(indices); }`);\r\n } else {\r\n codeLines.push(\r\n '\\t' +\r\n `else if (textureIndex == ${i}) { return _X${i}(indices); }`);\r\n }\r\n }\r\n codeLines.push(\r\n '\\t' +\r\n '}');\r\n return codeLines.join('\\n');\r\n};\r\n\r\nconst getGetSizeInConcatAxisValueFromIndexMethod = (sizeInConcatAxis: number[]): string => {\r\n const codeLines: string[] = ['int getSizeInConcatAxisValueFromIndex(int index) {'];\r\n for (let i = 0; i < sizeInConcatAxis.length; ++i) {\r\n if (i === 0) {\r\n codeLines.push(\r\n '\\t' +\r\n `if (index == ${i}) { return ${sizeInConcatAxis[i]}; }`);\r\n } else if (i === sizeInConcatAxis.length - 1) {\r\n codeLines.push(\r\n '\\t' +\r\n `else { return ${sizeInConcatAxis[i]}; }`);\r\n } else {\r\n codeLines.push(\r\n '\\t' +\r\n `else if (index == ${i}) { return ${sizeInConcatAxis[i]}; }`);\r\n }\r\n }\r\n codeLines.push(\r\n '\\t' +\r\n '}');\r\n\r\n return codeLines.join('\\n');\r\n};\r\n\r\nexport const parseConcatAttributes: OperatorInitialization<ConcatAttributes> = (node: Graph.Node): ConcatAttributes =>\r\n createAttributeWithCacheKey({axis: node.attributes.getInt('axis')});\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length < 1) {\r\n throw new Error('too few inputs');\r\n }\r\n\r\n const inputType = inputs[0].type;\r\n const inputDimensionality = inputs[0].dims.length;\r\n\r\n // TODO: Support string concat\r\n if (inputType === 'string') {\r\n throw new Error('string tensor is not supported yet');\r\n }\r\n\r\n for (const input of inputs) {\r\n // make sure types of all inputs match\r\n if (input.type !== inputType) {\r\n throw new Error('input tensors should be one type');\r\n }\r\n\r\n // make sure the dimensionality of all inputs are the same\r\n if (input.dims.length !== inputDimensionality) {\r\n throw new Error('input tensors should have the same shape');\r\n }\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Logger} from '../../../instrument';\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nimport {calculateOutputShape, ConvAttributes} from './conv';\r\nimport {getActicationSnippet} from './fuse-utils';\r\n\r\nconst createUnpackedGroupedConvProgramMetadata = (hasBias: boolean, cacheHint: string): ProgramMetadata => ({\r\n name: 'GroupedConv',\r\n inputNames: hasBias ? ['X', 'W', 'Bias'] : ['X',

'W'],\r\n inputTypes: hasBias ? [TextureType.unpacked, TextureType.unpacked, TextureType.unpacked] :\r\n   [TextureType.unpacked, TextureType.unpacked],\r\n cacheHint\r\n});\r\n\r\nconst createUnpackedGroupedConvProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], metadata: ProgramMetadata,\r\n   attributes: ConvAttributes): ProgramInfo => {\r\n   const hasBias = inputs.length > 2;\r\n   const processBias = hasBias ? 'value += getBias(output_channel);' : '';\r\n   const xShape = inputs[0].dims.slice();\r\n   const wShape = inputs[1].dims.slice();\r\n   const outputChannelsPerGroup = wShape[0] / attributes.group;\r\n   Logger.verbose(\r\n   'GroupedConv',\r\n `autpPad:${attributes.autoPad}, dilations:${attributes.dilations}, group:${attributes.group}, kernelShape:${\r\n    attributes.kernelShape}, pads:${attributes.pads}, strides:${attributes.strides}`);\r\n   const outputShape =\r\n calculateOutputShape(xShape, wShape, attributes.dilations, attributes.pads, attributes.strides);\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const {activationFunction, applyActivation} = getActicationSnippet(attributes);\r\n\r\n   const shaderSource = `\r\n const ivec2 strides = ivec2(${attributes.strides[0]}, ${attributes.strides[1]});\r\n const ivec2 pads = ivec2(${attributes.pads[0]}, ${attributes.pads[1]});\r\n ${activationFunction}\r\n void main() {\r\n   ivec4 coords = getOutputCoords();\r\n   int batch = coords.x;\r\n   int output_channel = coords.y;\r\n   ivec2 xRCCorner = coords.zw * strides - pads;\r\n   int group_id = output_channel / ${outputChannelsPerGroup};\r\n\r\n   float value = 0.0;\r\n   for (int wInChannel = 0; wInChannel < ${wShape[1]}; wInChannel++) {\r\n   int input_channel = group_id * ${wShape[1]} + wInChannel;\r\n   for (int wHeight = 0; wHeight < ${wShape[2]}; wHeight++) {\r\n   int xHeight = xRCCorner.x + wHeight * ${attributes.dilations[0]};\r\n\r\n   if (xHeight < 0 || xHeight >= ${xShape[2]}) {\r\n   continue;\r\n   }\r\n\r\n   for (int wWidth = 0; wWidth < ${wShape[3]}; wWidth++) {\r\n   int xWidth = xRCCorner.y + wWidth * ${attributes.dilations[1]};\r\n   if (xWidth < 0 || xWidth >= ${xShape[3]}) {\r\n continue;\r\n   }\r\n\r\n   float xVal = getX(batch, input_channel, xWidth, xHeight);\r\n   float wVal = getW(output_channel, wInChannel, wWidth, wHeight);\r\n   value += xVal*wVal;\r\n   }\r\n   }\r\n   }\r\n ${processBias}\r\n ${applyActivation}\r\n ${glsl.output} = vec4(value, .0, .0, .0);\r\n }\r\n`;\r\n   return {\r\n   ...metadata,\r\n   output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n   shaderSource,\r\n   hasMain: true,\r\n   };\r\n   };\r\n\r\nexport const createUnpackedGroupedConvProgramInfoLoader =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes):\r\n   ProgramInfoLoader => {\r\n   const metadata = createUnpackedGroupedConvProgramMetadata(inputs.length > 2, attributes.cacheKey);\r\n   return {\r\n ...metadata,\r\n   get: () => createUnpackedGroupedConvProgramInfo(inferenceHandler, inputs, metadata, attributes)\r\n   };\r\n   };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {calculateOutputShape, ConvAttributes} from './conv';\r\nimport {createPackedIm2ColProgramInfoLoader} from './im2col-pack';\r\nimport {createPackedMatmulProgramInfoLoader} from './matmul-pack';\r\n\r\nexport const conv2DPackedPointwise =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes): Tensor => {\r\n   const xshape = inputs[0].dims;\r\n   const kshape = inputs[1].dims;\r\n   const outputShape =\r\n calculateOutputShape(xshape, kshape, attributes.dilations, attributes.pads, attributes.strides);\r\n   const reshapedX = inferenceHandler.reshapePacked(inputs[0], [xshape[1], xshape[2] * xshape[3]]);\r\n   const reshapedK = inferenceHandler.reshapePacked(inputs[1], [kshape[0], kshape[1]]);\r\n\r\n   const matmulInputs = inputs.length > 2 ? [reshapedK, reshapedX, inputs[2]] : [reshapedK, reshapedX];\r\n   const matmulOutput = inferenceHandler.run(\r\n   createPackedMatmulProgramInfoLoader(inferenceHandler, matmulInputs, attributes), matmulInputs);\r\n   return inferenceHandler.reshapePacked(matmulOutput, outputShape);\r\n };\r\n\r\nexport const conv2DPacked =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes): Tensor => {\r\n   const xshape = inputs[0].dims;\r\n   const kshape = inputs[1].dims;\r\n   const outputShape =\r\n   calculateOutputShape(xshape, kshape, attributes.dilations, attributes.pads, attributes.strides);\r\n\r\n   // run im2col\r\n   const im2colOutput = inferenceHandler.run(\r\n createPackedIm2ColProgramInfoLoader(inferenceHandler, inputs[0], inputs[1], outputShape, attributes),\r\n [inputs[0]]);\r\n\r\n // reshape kernel\r\n const kernelReshaped = inferenceHandler.reshapePacked(inputs[1], [kshape[0], kshape[1] * kshape[2] * kshape[3]]);\r\n\r\n // run matmul\r\n const matmulInputs =\r\n (inputs.length === 3) ? [kernelReshaped, im2colOutput, inputs[2]] : [kernelReshaped, im2colOutput];\r\n const matmulOutput = inferenceHandler.run(\r\n createPackedMatmulProgramInfoLoader(inferenceHandler, matmulInputs, attributes), matmulInputs);\r\n\r\n // reshape output\r\n const outputReshaped = inferenceHandler.reshapePacked(matmulOutput, outputShape);\r\n return outputReshaped;\r\n };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {InferenceHandler} from '../../../backend';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {PoolConvUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nimport {createUnpackedGroupedConvProgramInfoLoader} from './conv-grouped';\r\nimport {conv2DPacked} from './conv-pack';\r\nimport {createDotProductProgramInfoLoader} from './dot-product';\r\nimport {InternalActivationAttributes, parseInternalActivationAttributes} from './fuse-utils';\r\nimport {createIm2ColProgramInfoLoader} from './im2col';\r\nimport {createMatmulProgramInfoLoader} from './matmul';\r\n\r\n\r\nexport const calculateOutputShape =\r\n (inputShape: readonly number[], kernelShape: readonly number[], dilations: readonly number[],\r\n adjustPads: readonly number[], strides: readonly number[]): number[] => {\r\n const batchSize = inputShape[0];\r\n const inputSpatialShape = inputShape.slice(2);\r\n const spatialRank = inputSpatialShape.length;\r\n const outChannels = kernelShape[0];\r\n const kernelSpatialShape = kernelShape.slice(2);\r\n const dilatedKernelShape = kernelSpatialShape.map((v, i) => v + (v - 1) * (dilations[i] - 1));\r\n const inputSpatialShapeWithPad = inputSpatialShape.map((v, i) => v + adjustPads[i] + adjustPads[i + spatialRank]);\r\n const outputSpatialShape =\r\n inputSpatialShapeWithPad.map((v, i) => Math.floor((v - dilatedKernelShape[i] + strides[i]) / strides[i]));\r\n const outputShape = [batchSize, outChannels].concat(...outputSpatialShape);\r\n return outputShape;\r\n };\r\n\r\nexport interface ConvAttributes extends InternalActivationAttributes, AttributeWithCacheKey {\r\n readonly autoPad: string;\r\n readonly dilations: readonly number[];\r\n readonly group: number;\r\n readonly kernelShape: readonly number[];\r\n readonly pads: readonly number[];\r\n readonly strides: readonly number[];\r\n}\r\n\r\nexport const conv: OperatorImplementation<ConvAttributes> =\r\n (inferenceHandler: InferenceHandler, inputs: Tensor[], attributes: ConvAttributes): Tensor[] => {\r\n validateInputs(inputs, attributes); // currently will fail if not conv2D\r\n return conv2d(inferenceHandler, inputs, attributes);\r\n };\r\n\r\nconst conv2d: OperatorImplementation<ConvAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ConvAttributes): Tensor[] => {\r\n const adjustedAttributes = getAdjustedConvAttributes(attributes, inputs);\r\n const packMode = inferenceHandler.session.pack;\r\n const isPointwise = adjustedAttributes.kernelShape[0] === 1 && adjustedAttributes.kernelShape[1] === 1;\r\n if (adjustedAttributes.group > 1) {\r\n const result = inferenceHandler.run(\r\n createUnpackedGroupedConvProgramInfoLoader(inferenceHandler, inputs, adjustedAttributes), inputs);\r\n return [result];\r\n } else if (isPointwise && packMode) {\r\n return [conv2DUnpackedPointwise(inferenceHandler, inputs, adjustedAttributes)];\r\n } else if (packMode && inputs[0].dims.length === 4 && inputs[0].dims[0] === 1 && !isPointwise) {\r\n return [conv2DPacked(inferenceHandler, inputs, adjustedAttributes)];\r\n } else {\r\n return [conv2DUnpacked(inferenceHandler, inputs, adjustedAttributes)];\r\n }\r\n };\r\n\r\nconst conv2DUnpackedPointwise =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes): Tensor => {\r\n const xshape = inputs[0].dims;\r\n const kshape = inputs[1].dims;\r\n const outputShape =\r\n calculateOutputShape(xshape, kshape, attributes.dilations, attributes.pads, attributes.strides);\r\n const reshapedX = inferenceHandler.reshapeUnpacked(inputs[0], [xshape[1], xshape[2] * xshape[3]]);\r\n const reshapedK = inferenceHandler.reshapeUnpacked(inputs[1], [kshape[0], kshape[1]]);\r\n\r\n const matmulInputs = inputs.length > 2 ? [reshapedK, reshapedX, inputs[2]] : [reshapedK, reshapedX];\r\n const matmulOutput =

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inferenceHandler.run(createMatmulProgramInfoLoader(matmulInputs, attributes), matmulInputs);\r\n      return
inferenceHandler.reshapeUnpacked(matmulOutput, outputShape);\r\n    };\r\n\r\nconst conv2DUnpacked =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes): Tensor => {\r\n
    const xshape = inputs[0].dims;\r\n      const kshape = inputs[1].dims;\r\n      const outputShape =\r\n
calculateOutputShape(xshape, kshape, attributes.dilations, attributes.pads, attributes.strides);\r\n      const xIm2Col =
inferenceHandler.run(\r\n          createIm2ColProgramInfoLoader(inferenceHandler, inputs[0], inputs[1],
outputShape, attributes), [inputs[0]]);\r\n\r\n      const dotProductInputs = inputs.length === 3 ? [xIm2Col, inputs[1],
inputs[2]] : [xIm2Col, inputs[1]];\r\n      const output = inferenceHandler.run(\r\n
createDotProductProgramInfoLoader(inferenceHandler, inputs, outputShape, attributes), dotProductInputs);\r\n
return output;\r\n    };\r\n\r\nconst getAdjustedConvAttributes = <T extends ConvAttributes>(attributes: T, inputs:
Tensor[]): T => {\r\n  const kernelShape = attributes.kernelShape.slice();\r\n  // if kernelShape is not specified in the
attributes of this op, infer it from the weight tensor dims\r\n  if (attributes.kernelShape.length === 0) {\r\n    for (let i
= 2; i < inputs[1].dims.length; ++i) {\r\n      kernelShape.push(inputs[1].dims[i]);\r\n    }\r\n  }\r\n  const pads =
attributes.pads.slice();\r\n  PoolConvUtil.adjustPadsBasedOnAutoPad(\r\n      inputs[0].dims, attributes.strides,
attributes.dilations, kernelShape, pads, attributes.autoPad);\r\n\r\n  // always return a new object so does not modify
the original attributes\r\n  const newAttributes: T = Object.assign({}, attributes);\r\n  Object.assign(newAttributes,
{kernelShape, pads, cacheKey: attributes.cacheKey});\r\n  return newAttributes;\r\n};\r\n\r\nexport const
parseConvAttributes: OperatorInitialization<ConvAttributes> = (node: Graph.Node): ConvAttributes => {\r\n  const
attributes = node.attributes;\r\n  const activationAttributes = parseInternalActivationAttributes(attributes);\r\n  //
TODO : Make this generic enough to compute default attributes for multi-dimensional conv\r\n  const autoPad =
attributes.getString('auto_pad', 'NOTSET');\r\n  const dilations = attributes.getInts('dilations', [1, 1]);\r\n  const group
= attributes.getInt('group', 1);\r\n  const kernelShape = attributes.getInts('kernel_shape', []);\r\n  const pads =
attributes.getInts('pads', [0, 0, 0, 0]);\r\n  const strides = attributes.getInts('strides', [1, 1]);\r\n\r\n  return
createAttributeWithCacheKey({autoPad, dilations, group, kernelShape, pads, strides,
...activationAttributes});\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[], attributes: ConvAttributes): void =>
{\r\n  // Refer to the below link for all input checks\r\n  //
https://github.com/onnx/onnx/blob/master/docs/Operators.md#Conv\r\n  if (!inputs || (inputs.length !== 2 &&
inputs.length !== 3)) {\r\n    throw new Error('Conv requires 2 or 3 inputs');\r\n  }\r\n\r\n  // TODO : Need to add
support for multi-dimensional conv\r\n  if (inputs[0].dims.length !== 4 || inputs[1].dims.length !== 4) {\r\n    throw
new Error('currently only support 2-dimensional conv');\r\n  }\r\n\r\n  // FILTER_IN_CHANNEL should be equal to
DATA_CHANNEL\r\n  const dataChannel = inputs[0].dims[1];\r\n  const filterInChannel = inputs[1].dims[1] *
attributes.group;\r\n  if (dataChannel !== filterInChannel) {\r\n    throw new Error('FILTER_IN_CHANNEL should
be equal to DATA_CHANNEL');\r\n  }\r\n\r\n  // if bias is provided it should be 1D and the number of elements
should be equal to the number of feature maps\r\n  if (inputs.length === 3 && (inputs[2].dims.length !== 1 ||
inputs[1].dims[0] !== inputs[2].dims[0])) {\r\n    throw new Error('invalid bias');\r\n  }\r\n\r\n  const spatialRank =
inputs[0].dims.length - 2;\r\n  // wrong dilations dimension\r\n  if (attributes.dilations.length !== spatialRank) {\r\n
throw new Error(`dilations should be ${spatialRank}D`);\r\n  }\r\n\r\n  // Wrong strides dimension\r\n  if
(attributes.strides.length !== spatialRank) {\r\n    throw new Error(`strides should be ${spatialRank}D`);\r\n
}\r\n\r\n  // Wrong pads dimension\r\n  if (attributes.pads.length !== spatialRank * 2) {\r\n    throw new Error(`pads
should be ${spatialRank * 2}D`);\r\n  }\r\n\r\n  // if kernelShape is specified, it's data length must be 2 less than
dims length of the weights tensor\r\n  // (the first 2 dims are batch_size and channels)\r\n  if
(attributes.kernelShape.length !== 0 && attributes.kernelShape.length !== inputs[1].dims.length - 2) {\r\n    throw
new Error('invalid kernel shape');\r\n  }\r\n\r\n  // TODO : Need to add support for float64\r\n  if (inputs[0].type !==
'float32' || inputs[1].type !== 'float32') {\r\n    throw new Error('Conv input(X,W) should be float tensor');\r\n
}\r\n\r\n  if (inputs.length === 3 && inputs[2].type !== 'float32') {\r\n    throw new Error('Conv input(bias) should
be float tensor');\r\n  }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under
the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation,
OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport
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{WebGLInferenceHandler} from '../inference-handler';\r\n\r\nimport {transpose, TransposeAttributes} from
'./transpose';\r\n\r\nexport interface DepthToSpaceAttributes {\r\n  mode: 'DCR'|'CRD';\r\n  blocksize:
number;\r\n}\r\n\r\nexport const depthToSpace: OperatorImplementation<DepthToSpaceAttributes> =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: DepthToSpaceAttributes): Tensor[] =>
{\r\n      validateInputs(inputs);\r\n      const blocksize = attributes.blocksize;\r\n      const blocksizeSqr = blocksize *
blocksize;\r\n      const transposePerm = attributes.mode === 'DCR' ? [0, 3, 4, 1, 5, 2] : [0, 1, 4, 2, 5, 3];\r\n      const
firstReshapeShape = attributes.mode === 'DCR' ?\r\n          [\r\n            inputs[0].dims[0], blocksize, blocksize,
inputs[0].dims[1] / blocksizeSqr, inputs[0].dims[2],\r\n            inputs[0].dims[3]\r\n          ] :\r\n          [\r\n
inputs[0].dims[0], inputs[0].dims[1] / blocksizeSqr, blocksize, blocksize, inputs[0].dims[2],\r\n
inputs[0].dims[3]\r\n          ];\r\n\r\n      // const transpose = new WebGLTranspose();\r\n      // const attributes = new
Attribute(undefined);\r\n      // attributes.set('perm', 'ints', transposePerm);\r\n      //
transpose.initialize(attributes);\r\n\r\n      // First reshape\r\n      const firstReshapedTensor =
inferenceHandler.reshapeUnpacked(inputs[0], firstReshapeShape);\r\n\r\n      // transpose\r\n      const
transposeAttributes: TransposeAttributes = {perm: transposePerm, cacheKey: `${transposePerm}`};\r\n      const
[transposeOutput] = transpose(inferenceHandler, [firstReshapedTensor], transposeAttributes);\r\n\r\n      // Second
reshape\r\n      const secondReshapeShape = [\r\n        inputs[0].dims[0], inputs[0].dims[1] / blocksizeSqr,
inputs[0].dims[2] * blocksize,\r\n        inputs[0].dims[3] * blocksize\r\n      ];\r\n      const result =
inferenceHandler.reshapeUnpacked(transposeOutput, secondReshapeShape);\r\n      return [result];\r\n
};\r\n\r\nexport const parseDepthToSpaceAttributes: OperatorInitialization<DepthToSpaceAttributes> =\r\n    (node:
Graph.Node): DepthToSpaceAttributes => {\r\n      // processing node attributes\r\n      const blocksize =
node.attributes.getInt('blocksize');\r\n      if (blocksize < 1) {\r\n        throw new Error(`blocksize must be >= 1, but
got : ${blocksize} for DepthToSpace`);\r\n      }\r\n      const mode = node.attributes.getString('mode', 'DCR');\r\n
if (mode !== 'DCR' && mode !== 'CRD') {\r\n        throw new Error(`unrecognized mode: ${mode} for
DepthToSpace`);\r\n      }\r\n      return {mode, blocksize};\r\n    };\r\n\r\nconst validateInputs = (inputs: Tensor[]):
void => {\r\n  if (inputs.length !== 1) {\r\n    throw new Error(`DepthToSpace expect 1 inputs, but got
${inputs.length}`);\r\n  }\r\n\r\n  // Input has to be a 4-D tensor\r\n  // TODO: Support string depth-to-space.\r\n  if
(inputs[0].type === 'string' || inputs[0].dims.length !== 4) {\r\n    throw new TypeError('DepthToSpace input should
be a 4-D numeric tensor');\r\n  }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n//
Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from
'../../../util';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-
handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport
{getActicationSnippet, InternalActivationAttributes} from './fuse-utils';\r\nimport {calculateIm2ColDims} from
'./im2col';\r\n\r\nconst createDotProductProgramMetadata = (hasBias: boolean, attributes:
InternalActivationAttributes) => ({\r\n  name: 'ConvDotProduct',\r\n  inputNames: hasBias ? ['Im2Col', 'K', 'B'] :
['Im2Col', 'K'],\r\n  inputTypes: hasBias ? [TextureType.unpacked, TextureType.packedLastDimension,
TextureType.unpacked] :\r\n                        [TextureType.unpacked, TextureType.packedLastDimension],\r\n
cacheKey: attributes.activationCacheKey\r\n});\r\n\r\nconst createDotProductProgramInfo =\r\n
(inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: readonly Tensor[],\r\n
outputShape: number[], attributes: InternalActivationAttributes): ProgramInfo => {\r\n      const xshape =
inputs[0].dims;\r\n      const kshape = inputs[1].dims;\r\n      const adjustedKernelShape = [kshape[0],
Math.ceil((xshape[1] * kshape[2] * kshape[3]) / 4)];\r\n      const im2colShape = calculateIm2ColDims(xshape,
kshape, outputShape);\r\n      const [kWidth, kHeight] =\r\n
inferenceHandler.calculateTextureWidthAndHeight(adjustedKernelShape,
TextureType.packedLastDimension);\r\n\r\n      const im2colStrides = ShapeUtil.computeStrides(im2colShape);\r\n
  const [im2colWidth, im2colHeight] =\r\n          inferenceHandler.calculateTextureWidthAndHeight(im2colShape,
TextureType.packedLastDimension);\r\n      const rank = outputShape.length;\r\n\r\n      const initValue =
(inputs.length < 3) ? '0.0' : '_B(b)';\r\n      const sharedDim = Math.ceil(xshape[1] * kshape[2] * kshape[3] / 4);\r\n
const {activationFunction, applyActivation} = getActicationSnippet(attributes);\r\n      const glsl =
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getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const shaderSource = `\r\n${activationFunction}\r\nfloat process(int indices[${rank}]) {\r\n int b[1];\r\n b[0] = indices[1];\r\n int im2col[4];\r\n im2col[0] = indices[0];\r\n im2col[1] = indices[2];\r\n im2col[2] = indices[3];\r\n int im2colOffset = im2col[0] * ${im2colStrides[0]} + im2col[1] * ${im2colStrides[1]} + im2col[2] * ${\r\n im2colStrides[2]};\r\n int kernelOffset = indices[1] * ${adjustedKernelShape[1]};\r\n float value = ${initValue};\r\n for (int i = 0; i < ${sharedDim}; ++i) {\r\n   vec2 im2colCoords = offsetToCoords(im2colOffset, ${im2colWidth}, ${im2colHeight});\r\n   vec2 kernelCoords = offsetToCoords(kernelOffset, ${kWidth}, ${kHeight});\r\n   value += dot(${glsl.texture2D}(Im2Col, im2colCoords), ${glsl.texture2D}(K, kernelCoords));\r\n   ++im2colOffset;\r\n   ++kernelOffset;\r\n }\r\n ${applyActivation}\r\n return value;\r\n}`;\r\n   return {\r\n   ...metadata,\r\n   output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nexport const createDotProductProgramInfoLoader =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], outputShape: number[],\r\n   attributes: InternalActivationAttributes): ProgramInfoLoader => {\r\n   const metadata = createDotProductProgramMetadata(inputs.length > 2, attributes);\r\n   return {\r\n   ...metadata,\r\n   get: () => createDotProductProgramInfo(inferenceHandler, metadata, inputs, outputShape, attributes)\r\n   };\r\n   };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const flatten: OperatorImplementation<number> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axis: number): Tensor[] => {\r\n   validateInputs(inputs, axis);\r\n\r\n   const outputDims = ShapeUtil.flattenShape(inputs[0].dims, axis);\r\n   return [inferenceHandler.reshapeUnpacked(inputs[0], outputDims)];\r\n   };\r\n\r\nexport const parseFlattenAttributes: OperatorInitialization<number> = (node: Graph.Node): number =>\r\n   node.attributes.getInt('axis', 1); // default axis is 1\r\n\r\nconst validateInputs = (inputs: Tensor[], axis: number): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Flatten requires 1 input.');\r\n }\r\n\r\n const r = inputs[0].dims.length;\r\n if (r === 0) {\r\n   throw new Error('scalar tensor is not supported.');\r\n }\r\n\r\n if (axis < -r || axis > r) {\r\n   throw new Error('Invalid axis');\r\n }\r\n\r\n // TODO: Support string type\r\n if (inputs[0].type === 'string') {\r\n   throw new Error('string tensor is not supported.');\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Attribute} from '../../../attribute';\r\nimport {GlslValueFunction} from '../glsl-definitions';\r\nimport {glslClip, glslRelu, glslSigmoid} from './unary-op';\r\n\r\nexport interface InternalActivationAttributes {\r\n readonly activation: string;\r\n readonly clipMin?: number;\r\n readonly clipMax?: number;\r\n readonly activationCacheKey: string;\r\n}\r\n\r\nexport function getActicationSnippet(attributes: InternalActivationAttributes) {\r\n let func: GlslValueFunction;\r\n switch (attributes.activation) {\r\n   case 'Relu':\r\n   func = glslRelu();\r\n   break;\r\n   case 'Sigmoid':\r\n   func = glslSigmoid();\r\n   break;\r\n   case 'Clip':\r\n   func = glslClip(attributes.clipMin!, attributes.clipMax!);\r\n   break;\r\n   // TODO: adding other activations that can be fused.\r\n   default:\r\n   return {activationFunction: '', applyActivation: ''};\r\n }\r\n\r\n const activationName = func.name;\r\n const activationFunction = func.body;\r\n const applyActivation = `value = ${activationName}_(value);`;\r\n return {activationFunction, applyActivation};\r\n}\r\n\r\nexport const parseInternalActivationAttributes = (attributes: Attribute): InternalActivationAttributes => {\r\n const activation = attributes.getString('__internal_activation', '');\r\n\r\n if (activation === 'Clip') {\r\n   const clipMax = attributes.getFloat('__clip_max', 3.402823e+38);\r\n   const clipMin = attributes.getFloat('__clip_min', -3.402823e+38);\r\n   return {activation, clipMax, clipMin, activationCacheKey: `${activation}:${clipMin},${clipMax}`};\r\n }\r\n return {activation, activationCacheKey: activation};\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {NUMBER_TYPES, OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from

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'../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo,
ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\ninterface GatherAttributes extends
AttributeWithCacheKey {\r\n  readonly axis: number;\r\n}\r\n\r\nexport const gather:
OperatorImplementation<GatherAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: GatherAttributes): Tensor[] => {\r\n      validateInputs(inputs, attributes.axis);\r\n      const output =
inferenceHandler.run(createGatherProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n      return
[output];\r\n    };\r\n\r\nexport const parseGatherAttributes: OperatorInitialization<GatherAttributes> = (node:
Graph.Node): GatherAttributes =>\r\n    createAttributeWithCacheKey({axis: node.attributes.getInt('axis',
0)});\r\n\r\nconst gatherProgramMetadata = {\r\n  name: 'Gather',\r\n  inputNames: ['A', 'B'],\r\n  inputTypes:
[TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nconst createGatherProgramInfo =\r\n    (handler:
WebGLInferenceHandler, metadata: ProgramMetadata, inputs: Tensor[], axis: number): ProgramInfo => {\r\n
const inputShape = inputs[0].dims.slice();\r\n      const indexDataShape = inputs[1].dims.slice();\r\n      const
outputShape = new Array(inputShape.length + indexDataShape.length - 1);\r\n\r\n      axis =
ShapeUtil.normalizeAxis(axis, inputShape.length);\r\n      const indexCopyOps: string[] = [];\r\n      for (let i = 0; i <
outputShape.length; i++) {\r\n        // outputShape is divided into three parts: A, B, C\r\n        // |0        axis|  axis +
indexDataShape.length |          end|\r\n        // |     A       |             B                 |      C      |\r\n        //\r\n        // inputIdx:
[A, inputs[1][B], C]\r\n        if (i < axis) {  // A\r\n          outputShape[i] = inputShape[i];\r\n
indexCopyOps.push(`inputIdx[${i}] = outputIdx[${i}];`);\r\n        } else {\r\n          if (i < axis +
indexDataShape.length) {  // B\r\n            outputShape[i] = indexDataShape[i - axis];\r\n
indexCopyOps.push(`indexDataIdx[${i - axis}] = outputIdx[${i}];`);\r\n          } else {
    // C\r\n            outputShape[i] = inputShape[i - indexDataShape.length + 1];  // skip 1 for axis\r\n
indexCopyOps.push(`inputIdx[${i - indexDataShape.length + 1}] = outputIdx[${i}];`);\r\n          }\r\n        }\r\n
}\r\n\r\n      const orank = outputShape.length || 1;\r\n      const irank = inputShape.length;\r\n      const iDrank =
indexDataShape.length || 1;\r\n      const shaderSource = `\r\n      float process(int outputIdx[${orank}]) {\r\n        int
inputIdx[${irank}];\r\n        int indexDataIdx[${iDrank}];\r\n        indexDataIdx[0] = 0;\r\n
${indexCopyOps.join('\\n        ')}\r\n        int idx = int(_B(indexDataIdx));\r\n        inputIdx[${axis}] = idx < 0 ? idx
+ ${inputShape[axis]} : idx;\r\n        return _A(inputIdx);\r\n      }`;\r\n      return {\r\n        ...metadata,\r\n
output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n        shaderSource\r\n
};\r\n    };\r\n\r\nconst createGatherProgramInfoLoader =\r\n    (handler: WebGLInferenceHandler, inputs: Tensor[],
attributes: GatherAttributes): ProgramInfoLoader => {\r\n      const metadata = {...gatherProgramMetadata,
cacheHint: attributes.cacheKey};\r\n      return {...metadata, get: () => createGatherProgramInfo(handler, metadata,
inputs, attributes.axis)};\r\n    };\r\n\r\nconst validateInputs = (inputs: Tensor[], axis: number): void => {\r\n  if
(!inputs || inputs.length !== 2) {\r\n    throw new Error('Gather requires 2 inputs.');\r\n  }\r\n  const tensorRank =
inputs[0].dims.length;\r\n  if (tensorRank < 1) {\r\n    throw new Error('Invalid input shape.');\r\n  }\r\n  if (axis < -
tensorRank || axis > tensorRank - 1) {\r\n    throw new Error('Invalid axis.');\r\n  }\r\n  if
(NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n    throw new Error('Invaid input type.');\r\n  }\r\n  if
(inputs[1].type !== 'int32' && inputs[1].type !== 'int16') {\r\n    throw new Error('Invaid input type.');\r\n
}\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-
key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from
'../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {GemmUtil} from '../../../util';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader,
ProgramMetadata, TextureType} from '../types';\r\n\r\nexport interface GemmAttributes extends
AttributeWithCacheKey {\r\n  transA: boolean;\r\n  transB: boolean;\r\n  alpha: number;\r\n  beta: number;\r\n
isOptionalC: boolean;  // in opset 11, C becomes optional\r\n}\r\n\r\nexport const gemm:
OperatorImplementation<GemmAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: GemmAttributes): Tensor[] => {\r\n      validateInputs(inputs, attributes);\r\n      const output =
inferenceHandler.run(createGemmProgramInfoLoader(inputs, attributes), inputs);\r\n      return [output];\r\n
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};\r\n\r\nconst parseGemmAttributes = (node: Graph.Node, isOptionalC: boolean): GemmAttributes => {\r\n const transA = node.attributes.getInt('transA', 0) !== 0;\r\n const transB = node.attributes.getInt('transB', 0) !== 0;\r\n const alpha = node.attributes.getFloat('alpha', 1.0);\r\n const beta = node.attributes.getFloat('beta', 1.0);\r\n return createAttributeWithCacheKey({transA, transB, alpha, beta, isOptionalC});\r\n};\r\n\r\nexport const parseGemmAttributesV7: OperatorInitialization<GemmAttributes> = (node: Graph.Node): GemmAttributes =>\r\n parseGemmAttributes(node, false);\r\n\r\nexport const parseGemmAttributesV11: OperatorInitialization<GemmAttributes> = (node: Graph.Node): GemmAttributes =>\r\n parseGemmAttributes(node, true);\r\n\r\nconst createGemmProgramInfoLoader = (inputs: Tensor[], attributes: GemmAttributes): ProgramInfoLoader => {\r\n const metadata = {\r\n name: 'Gemm',\r\n inputNames: inputs.length === 3 ? ['A', 'B', 'C'] : ['A', 'B'],\r\n inputTypes: inputs.length === 3 ? [TextureType.unpacked, TextureType.unpacked, TextureType.unpacked] :\r\n [TextureType.unpacked, TextureType.unpacked],\r\n key: attributes.cacheKey\r\n };\r\n\r\n return {...metadata, get: () => createGemmProgramInfo(metadata, inputs, attributes)};\r\n};\r\n\r\nconst createGemmProgramInfo =\r\n (metadata: ProgramMetadata, inputs: Tensor[], attributes: GemmAttributes): ProgramInfo => {\r\n const aShape = inputs[0].dims.slice();\r\n const bShape = inputs[1].dims.slice();\r\n const [M, N] = GemmUtil.getShapeOfGemmResult(\r\n aShape, attributes.transA, bShape, attributes.transB, inputs.length === 3 ? inputs[2].dims : undefined);\r\n const outputShape = [M, N];\r\n if (!outputShape) {\r\n throw new Error('Can\\'t use gemm on the given tensors');\r\n }\r\n let sharedDim = aShape[aShape.length - 1];\r\n let line = ";\r\n if (attributes.transA) {\r\n sharedDim = aShape[0];\r\n }\r\n if (attributes.transA && attributes.transB) {\r\n line = 'value += _A_T(a) * _B_T(b);';\r\n } else if (attributes.transA && !attributes.transB) {\r\n line = 'value += _A_T(a) * _B(b);';\r\n } else if (!attributes.transA && attributes.transB) {\r\n line = 'value += _A(a) * _B_T(b);';\r\n } else if (!attributes.transA && !attributes.transB) {\r\n line = 'value += _A(a) * _B(b);';\r\n }\r\n const rank = outputShape.length;\r\n const declareC = inputs.length === 3 ? `int c[${inputs[2].dims.length}];` : ";\r\n const broadcastC = inputs.length === 3 ? 'bcastIndices_C(indices, c);' : ";\r\n const calculateC = inputs.length === 3 ? 'value += beta * _C(c);' : ";\r\n const shaderSource = `\r\n float process(int indices[${rank}]) {\r\n int a[${rank}];\r\n int b[${rank}];\r\n ${declareC}\r\n\r\n copyVec(indices, a);\r\n copyVec(indices, b);\r\n ${broadcastC}\r\n\r\n float value = 0.0;\r\n for (int k=0; k<${sharedDim}; ++k) {\r\n a[${rank - 1}] = k;\r\n b[${rank - 2}] = k;\r\n ${line}\r\n }\r\n\r\n value = value * alpha;\r\n ${calculateC}\r\n return value;\r\n }`;\r\n return {\r\n ...metadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n variables: [\r\n {name: 'alpha', type: 'float', data: attributes.alpha}, {name: 'beta', type: 'float', data: attributes.beta}\r\n],\r\n shaderSource\r\n };\r\n };\r\n\r\nconst validateInputs = (inputs: Tensor[], attributes: GemmAttributes): void => {\r\n if (!inputs) {\r\n throw new Error('Input is missing');\r\n }\r\n if (attributes.isOptionalC && (inputs.length < 2 || inputs.length > 3)) {\r\n throw new Error('Invaid input shape.');\r\n }\r\n if (!attributes.isOptionalC && inputs.length !== 3) {\r\n throw new Error('Gemm requires 3 inputs');\r\n }\r\n\r\n // 'C' can be of dimensionality 1 or 2 only\r\n if (inputs.length === 3 && inputs[2].dims.length !== 1 && inputs[2].dims.length !== 2) {\r\n throw new Error('Invalid input shape of C');\r\n }\r\n\r\n if ((inputs[0].type !== 'float32' && inputs[0].type !== 'float64') ||\r\n (inputs[1].type !== 'float32' && inputs[1].type !== 'float64') ||\r\n (inputs.length === 3 && inputs[2].type !== 'float32' && inputs[2].type !== 'float64')) {\r\n throw new Error('Invalid input type.');\r\n }\r\n\r\n if ((inputs[0].type !== inputs[1].type) || (inputs.length === 3 && inputs[0].type !== inputs[2].type)) {\r\n throw new Error('Input types are mismatched');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport {ConvAttributes} from './conv';\r\nimport {unpackFromChannel} from './packing-utils';\r\n\r\nconst createPackedIm2ColProgramMetadata = (cacheHint: string) => ({\r\n name: 'Im2Col (packed)',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.packed],\r\n cacheHint,\r\n});\r\n\r\nconst createPackedIm2ColProgramInfo =\r\n

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(inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, x: Tensor, w: Tensor,\r\n
outputShape: readonly number[], attributes: ConvAttributes): ProgramInfo => {\r\n      const xshape = x.dims;\r\n
const wshape = w.dims;\r\n      const rowDim = 2;\r\n      const colDim = 3;\r\n      const rank =
outputShape.length;\r\n      const im2colShape = [wshape[1] * wshape[2] * wshape[3], outputShape[2] *
outputShape[3]];\r\n      const kernelSize = wshape[2] * wshape[3];\r\n      const unpackChannel =
unpackFromChannel();\r\n      const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n      let
unrolled = '';\r\n\r\n      for (let row = 0; row <= 1; row++) {\r\n        for (let col = 0; col <= 1; col++) {\r\n
unrolled += `\r\n            blockIndex = rc.x + ${col};\r\n            pos = rc.y + ${row};\r\n\r\n            if(blockIndex <
${im2colShape[1]} && pos < ${im2colShape[0]}) {\r\n              offsetY = int(blockIndex / (${outputShape[rank -
1]})) * ${attributes.strides[0]} - ${\r\n              attributes.pads[0]};\r\n              d0 = offsetY +
${attributes.dilations[0]} * (imod(pos, ${kernelSize}) / ${wshape[2]});\r\n\r\n              if(d0 < ${xshape[rowDim]}
&& d0 >= 0) {\r\n                offsetX = imod(blockIndex, ${outputShape[rank - 1]}) * ${attributes.strides[1]} -
${\r\n              attributes.pads[1]};\r\n                d1 = offsetX + ${attributes.dilations[1]} * imod(imod(pos,
${kernelSize}), ${wshape[2]});\r\n\r\n                if(d1 < ${xshape[colDim]} && d1 >= 0) {\r\n\r\n                  ch =
int(float(pos)/ ${kernelSize}.);\r\n                    innerDims = vec2(d0, d1);\r\n                    result[${row * 2 + col}] =
getChannel(\r\n                      getA(0, ch, int(innerDims.x),\r\n                      int(innerDims.y)), innerDims);\r\n
    }\r\n              }\r\n            }\r\n\r\n          `;\r\n        }\r\n      }\r\n\r\n      const shaderSource = `\r\n
${unpackChannel}\r\n\r\n      void main() {\r\n        ivec2 rc = getOutputCoords();\r\n          vec4 result =
vec4(0.0);\r\n          int blockIndex, pos, offsetY, d0, offsetX, d1, ch;\r\n          vec2 innerDims;\r\n
${unrolled}\r\n          ${glsl.output} = result;\r\n      }\r\n            `;\r\n      return {\r\n        ...metadata,\r\n        output:
{dims: im2colShape, type: x.type, textureType: TextureType.packed},\r\n        shaderSource,\r\n        hasMain:
true\r\n      };\r\n    };\r\n\r\nexport const createPackedIm2ColProgramInfoLoader =\r\n    (inferenceHandler:
WebGLInferenceHandler, x: Tensor, w: Tensor, outputShape: readonly number[],\r\n     attributes: ConvAttributes):
ProgramInfoLoader => {\r\n      const metadata = createPackedIm2ColProgramMetadata(attributes.cacheKey);\r\n
return {\r\n        ...metadata,\r\n        get: () => createPackedIm2ColProgramInfo(inferenceHandler, metadata, x, w,
outputShape, attributes)\r\n      };\r\n    };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n//
Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler}
from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from
'../types';\r\nimport {ConvAttributes} from './conv';\r\n\r\nconst createIm2ColProgramMetadata = (cacheHint:
string) => ({\r\n  name: 'Im2Col',\r\n  inputNames: ['X'],\r\n  inputTypes: [TextureType.unpacked],\r\n
cacheHint,\r\n});\r\n\r\nconst createIm2ColProgramInfo =\r\n    (inferenceHandler: WebGLInferenceHandler,
metadata: ProgramMetadata, x: Tensor, w: Tensor,\r\n     outputShape: readonly number[], attributes:
ConvAttributes): ProgramInfo => {\r\n      const xshape = x.dims;\r\n      const wshape = w.dims;\r\n\r\n      const
rank = outputShape.length;\r\n      const im2colDims = calculateIm2ColDims(xshape, wshape, outputShape,
4);\r\n\r\n      const shaderSource = `\r\n        const int XC = ${xshape[1]};\r\n        const int XH = ${xshape[2]};\r\n
     const int XW = ${xshape[3]};\r\n        const int KH = ${attributes.kernelShape[0]};\r\n        const int KW =
${attributes.kernelShape[1]};\r\n        const int dilationH = ${attributes.dilations[0]};\r\n        const int dilationW =
${attributes.dilations[1]};\r\n        const int strideH = ${attributes.strides[0]};\r\n        const int strideW =
${attributes.strides[1]};\r\n        const int padH = ${attributes.pads[0]};\r\n        const int padW =
${attributes.pads[1]};\r\n        const int KHKW = KH*KW;\r\n        const int XCKHKW = XC * KHKW;\r\n
const int outputChannels = 4;\r\n        vec4 process(int indices[${rank}]) {\r\n          int b  = indices[0]; // batch
size\r\n          int oh = indices[1] * strideH - padH; //output height\r\n          int ow = indices[2] * strideW - padW;
//output width\r\n          int p = indices[3] * outputChannels; //patch\r\n          vec4 value = vec4(0.0);\r\n          for(int
i=0; i < outputChannels; ++i) {\r\n            if(p < XCKHKW) {\r\n              int patchC = p / KHKW;\r\n              int
patchH = (p - patchC*KHKW) / KW;\r\n              int patchW = (p - patchC*KHKW) - patchH * KW;\r\n              int
xh2 = oh + patchH * dilationH;\r\n              int xw2 = ow + patchW * dilationW;\r\n              int
x[${xshape.length}];\r\n              x[0] = b;\r\n              x[1] = patchC;\r\n              x[2] = xh2;\r\n              x[3] =
xw2;\r\n              if(xh2 >= 0 &&\r\n                  xh2 < XH &&\r\n                  xw2 >= 0 &&\r\n                  xw2 <
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XW) {\r\n              value[i] = _X(x);\r\n            }\r\n          }\r\n          ++p;\r\n        }\r\n        return value;\r\n
    }\r\n      `;\r\n      return {\r\n        ...metadata,\r\n        output: {dims: im2colDims, type: x.type, textureType:
TextureType.packedLastDimension},\r\n        shaderSource\r\n      };\r\n    };\r\n\r\nexport const
createIm2ColProgramInfoLoader =\r\n    (inferenceHandler: WebGLInferenceHandler, x: Tensor, w: Tensor,
outputShape: readonly number[],\r\n     attributes: ConvAttributes): ProgramInfoLoader => {\r\n      const metadata
= createIm2ColProgramMetadata(attributes.cacheKey);\r\n      return {\r\n        ...metadata,\r\n        get: () =>
createIm2ColProgramInfo(inferenceHandler, metadata, x, w, outputShape, attributes)\r\n      };\r\n
};\r\n\r\n\r\n\r\nexport const calculateIm2ColDims =\r\n    (inputShape: readonly number[], kernelShape: readonly
number[], outputShape: readonly number[], channels = 4):\r\n        number[] =>\r\n            [outputShape[0],
outputShape[2], outputShape[3],\r\n             Math.ceil(inputShape[1] * kernelShape[2] * kernelShape[3] /
channels)];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-
key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from
'../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-
handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from
'../types';\r\n\r\nexport interface ImageScalerAttributes extends AttributeWithCacheKey {\r\n  scale: number;\r\n
bias: number[];\r\n}\r\n\r\nexport const imageScaler: OperatorImplementation<ImageScalerAttributes> =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ImageScalerAttributes): Tensor[] => {\r\n
   validateInputs(inputs);\r\n      const output =\r\n
inferenceHandler.run(createImageScalerProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n
return [output];\r\n    };\r\n\r\nexport const parseImageScalerAttributes:
OperatorInitialization<ImageScalerAttributes> =\r\n    (node: Graph.Node): ImageScalerAttributes => {\r\n      const
scale = node.attributes.getFloat('scale');\r\n      const bias = node.attributes.getFloats('bias');\r\n      return
createAttributeWithCacheKey({scale, bias});\r\n    };\r\n\r\nconst imageScalerProgramMetadata = {\r\n  name:
'ImageScaler',\r\n  inputNames: ['X'],\r\n  inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nconst
createImageScalerProgramInfo =\r\n    (handler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs:
Tensor[], attributes: ImageScalerAttributes):\r\n        ProgramInfo => {\r\n          const outputShape =
inputs[0].dims.slice();\r\n          const rank = outputShape.length;\r\n          const getBiasMethod =
createGetBiasMethod(attributes.bias.length);\r\n          const shaderSource = `\r\n      ${getBiasMethod}\r\n      float
process(int indices[${rank}]) {\r\n        return _X(indices) * scale + getBias(bias, indices[1]);\r\n      }`;\r\n
return {\r\n            ...metadata,\r\n            output: {dims: outputShape, type: inputs[0].type, textureType:
TextureType.unpacked},\r\n            variables: [\r\n              {name: 'bias', type: 'float', arrayLength:
attributes.bias.length, data: attributes.bias},\r\n              {name: 'scale', type: 'float', data: attributes.scale}\r\n
],\r\n            shaderSource\r\n          };\r\n        };\r\n\r\nconst createImageScalerProgramInfoLoader =\r\n    (handler:
WebGLInferenceHandler, inputs: Tensor[], attributes: ImageScalerAttributes): ProgramInfoLoader => {\r\n      const
metadata = {...imageScalerProgramMetadata, cacheHint: attributes.cacheKey};\r\n      return {...metadata, get: () =>
createImageScalerProgramInfo(handler, metadata, inputs, attributes)};\r\n    };\r\n\r\nconst createGetBiasMethod =
(numChannels: number): string => {\r\n  const codeLines: string[] = [`float getBias(float bias[${numChannels}], int
channel) {`];\r\n  for (let i = 0; i < numChannels; ++i) {\r\n    if (i === 0) {\r\n      codeLines.push(\r\n          '\\t' +\r\n
        `if (channel == ${i}) { return bias[${i}]; }`);\r\n    } else if (i === numChannels - 1) {\r\n
codeLines.push(\r\n          '\\t' +\r\n          `else { return bias[${i}]; }`);\r\n    } else {\r\n      codeLines.push(\r\n
'\\t' +\r\n          `else if (channel == ${i}) { return bias[${i}]; }`);\r\n    }\r\n  }\r\n  codeLines.push(\r\n      '\\t' +\r\n
'}');\r\n  return codeLines.join('\\n');\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs ||
inputs.length !== 1) {\r\n    throw new Error('ImageScaler requires 1 input.');\r\n  }\r\n  if (inputs[0].dims.length !==
4) {\r\n    throw new Error('Invalid input shape.');\r\n  }\r\n  if (inputs[0].type !== 'float32' && inputs[0].type !==
'float64') {\r\n    throw new Error('Invalid input type.');\r\n  }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All
rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport
{OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from
```

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'../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-
handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from
'../types';\r\n\r\nexport const instanceNormalization: OperatorImplementation<number> =\r\n    (inferenceHandler:
WebGLInferenceHandler, inputs: Tensor[], epsilon: number): Tensor[] => {\r\n      validateInputs(inputs);\r\n\r\n
const meanAndVariance = inferenceHandler.run(createMeanAndVarianceProgramInfoLoader(inputs[0]),
inputs);\r\n      const output = inferenceHandler.run(\r\n
createComputeOutputProgramInfoLoader(inferenceHandler, inputs[0], epsilon, meanAndVariance.dims),\r\n
[inputs[0], meanAndVariance, inputs[1], inputs[2]]);\r\n      return [output];\r\n    };\r\n\r\nexport const
parseInstanceNormalizationAttributes: OperatorInitialization<number> = (node: Graph.Node): number =>\r\n
node.attributes.getFloat('epsilon', 1e-5);\r\n\r\nconst meanAndVarianceProgramMetadata = {\r\n  name:
'InstanceNormalization_MeanAndVariance',\r\n  inputNames: ['X'],\r\n  inputTypes:
[TextureType.unpacked],\r\n};\r\n\r\nconst createMeanAndVarianceProgramInfo = (metadata: ProgramMetadata,
input: Tensor): ProgramInfo => {\r\n  const xDims = input.dims.slice();\r\n  const channel = xDims[1];\r\n  const
channelSize = xDims[2] * xDims[3];\r\n  const outputShape = [xDims[0], channel];\r\n\r\n  const shaderSource =
`\r\n      vec4 process(int[2] indices) {\r\n        vec4 v = vec4(0.0);\r\n        int a[4];\r\n        a[0] = indices[0];\r\n
a[1] = indices[1];\r\n        float temp = 0.0;\r\n        for(int a2=0; a2<${xDims[2]}; a2++) {\r\n          a[2] = a2;\r\n
   for(int a3=0; a3<${xDims[3]}; a3++) {\r\n            a[3] = a3;\r\n            float x = _X(a);\r\n            temp += x;\r\n
    }\r\n        }\r\n        float mean = temp / float(${channelSize});\r\n        temp = 0.0;\r\n        for(int a2=0;
a2<${xDims[2]}; a2++) {\r\n          a[2] = a2;\r\n          for(int a3=0; a3<${xDims[3]}; a3++) {\r\n            a[3] =
a3;\r\n            float x = _X(a);\r\n            temp += (x - mean) * (x - mean);\r\n          }\r\n        }\r\n        v.r =
mean;\r\n        v.g = temp / float(${channelSize});\r\n\r\n        return v;\r\n      }`;\r\n  return {\r\n    ...metadata,\r\n
output: {dims: outputShape, type: input.type, textureType: TextureType.packedLastDimension},\r\n
shaderSource\r\n  };\r\n};\r\n\r\nconst createMeanAndVarianceProgramInfoLoader = (input: Tensor):
ProgramInfoLoader => ({\r\n  ...meanAndVarianceProgramMetadata,\r\n  get: () =>
createMeanAndVarianceProgramInfo(meanAndVarianceProgramMetadata, input)\r\n});\r\n\r\nconst
computeOutputProgramMetadata = {\r\n  name: 'InstanceNormalization_ComputeOutput',\r\n  inputNames: ['X',
'MeanAndVariance', 'Scale', 'B'],\r\n  inputTypes: [TextureType.unpacked, TextureType.packedLastDimension,
TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nconst createComputeOutputProgramInfo =\r\n
(inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, input: Tensor, epsilon: number,\r\n
meanAndVarianceShape: readonly number[]): ProgramInfo => {\r\n      const glsl =
getGlsl(inferenceHandler.session.backend.glContext.version);\r\n      const [textureWidth, textureHeight] =\r\n
inferenceHandler.calculateTextureWidthAndHeight(meanAndVarianceShape,
TextureType.packedLastDimension);\r\n      const [meanAndVarianceWidth, meanAndVarianceHeight] =
[textureWidth / 4, textureHeight];\r\n      const shaderSource = `\r\n      vec4 get_MeanAndVariance(int[2] mv) {\r\n
     int offset = indicesToOffset_MeanAndVariance(mv);\r\n        vec2 coords = offsetToCoords(offset,
${meanAndVarianceWidth}, ${meanAndVarianceHeight});\r\n        return ${glsl.texture2D}(MeanAndVariance,
coords);\r\n      }\r\n\r\n      float process(int[4] indices) {\r\n        int mv[2];\r\n        mv[0] = indices[0];\r\n
mv[1] = indices[1];\r\n        vec4 mean_and_variance = get_MeanAndVariance(mv);\r\n        float mean =
mean_and_variance.r;\r\n        float variance = mean_and_variance.g;\r\n\r\n        int sb[1];\r\n        sb[0] =
indices[1];\r\n        float scale = _Scale(sb);\r\n        float b = _B(sb);\r\n\r\n        return scale * (_X(indices) - mean) /
sqrt(variance + epsilon) + b;\r\n      }`;\r\n      return {\r\n        ...metadata,\r\n        output: {dims: input.dims, type:
input.type, textureType: TextureType.unpacked},\r\n        variables: [{name: 'epsilon', type: 'float', data:
epsilon}],\r\n        shaderSource\r\n      };\r\n    };\r\n\r\nconst createComputeOutputProgramInfoLoader =\r\n
(inferenceHandler: WebGLInferenceHandler, input: Tensor, epsilon: number, meanAndVarianceShape: readonly
number[]):\r\n        ProgramInfoLoader => {\r\n          const metadata = {...computeOutputProgramMetadata,
cacheHint: `${epsilon}`};\r\n          return {\r\n            ...metadata,\r\n            get: () =>
createComputeOutputProgramInfo(inferenceHandler, metadata, input, epsilon, meanAndVarianceShape)\r\n
};\r\n        };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length !== 3) {\r\n
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throw new Error('InstanceNormalization requires 3 inputs.');\r\n }\r\n\r\n const X = inputs[0];\r\n const scale = inputs[1];\r\n const B = inputs[2];\r\n\r\n // input should at least have three dimensions - N,C,dim1,...,dimn\r\n // other inputs can have only one dimensions\r\n if (X.dims.length < 3 || scale.dims.length !== 1 || B.dims.length !== 1) {\r\n   throw new Error('Invalid input shape.');\r\n }\r\n if (scale.dims[0] !== X.dims[1] || B.dims[0] !== X.dims[1]) {\r\n   throw new Error('Input shapes are mismatched.');\r\n }\r\n if ((X.type !== 'float32' && X.type !== 'float64') || (scale.type !== 'float32' && scale.type !== 'float64') ||\r\n   (B.type !== 'float32' && B.type !== 'float64')) {\r\n   throw new Error('Invalid input type.');\r\n }\r\n if (inputs[0].dims.length !== 4) {\r\n   throw new Error('Only support 4-D input shape.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {BroadcastUtil} from '../../../util';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport {getCoordsDataType, getGlChannels} from '../utils';\r\n\r\nimport {getActicationSnippet, InternalActivationAttributes} from './fuse-utils';\r\nimport {getBiasForMatmul} from './matmul';\r\n\r\nconst createPackedMatmulProgramMetadata = (hasBias: boolean, cacheHint: string) => ({\r\n name: 'MatMul (packed)',\r\n inputNames: hasBias ? ['A', 'B', 'Bias'] : ['A', 'B'],\r\n inputTypes: hasBias ? [TextureType.packed, TextureType.packed, TextureType.packed] :\r\n   [TextureType.packed, TextureType.packed],\r\n cacheHint\r\n});\r\n\r\nconst createPackedMatmulProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: Tensor[],\r\n   activationAttributes: InternalActivationAttributes): ProgramInfo => {\r\n const hasBias = inputs.length > 2;\r\n   const processBias = hasBias ? 'value += getBiasForMatmul();' : '';\r\n   const aShape = inputs[0].dims;\r\n   const bShape = inputs[1].dims;\r\n   const outputShape = BroadcastUtil.calcShape(aShape, bShape, true);\r\n   const isBroadcast = !ShapeUtil.areEqual(inputs[0].dims, inputs[1].dims);\r\n\r\n   if (!outputShape) {\r\n   throw new Error('Can\\'t use matmul on the given tensors');\r\n   }\r\n   const sharedDim = aShape[aShape.length - 1];\r\n   const sharedDimIndex = Math.ceil(sharedDim / 2);\r\n   const aRank = aShape.length;\r\n   const bRank = bShape.length;\r\n\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const coordsDataType = getCoordsDataType(outputShape.length);\r\n   const outRank = outputShape.length;\r\n   const allGlChannels = getGlChannels();\r\n   const {activationFunction, applyActivation} = getActicationSnippet(activationAttributes);\r\n\r\n   const getBiasForMatmulSnippet =\r\n   hasBias ? `${getBiasForMatmul(coordsDataType, allGlChannels, inputs[2].dims, outputShape, true)}` : '';\r\n\r\n   const getBcastedSamplerForMatmulSnippet =\r\n   isBroadcast ? `${getBcastSamplerForMatmul(coordsDataType, allGlChannels, inputs, outputShape)}` : '';\r\n\r\n   const getSamplerAInLoopSnippet = isBroadcast ? 'getAAtOutCoordsMatmul(i)' : `getA(${getA(allGlChannels, aRank)})`;\r\n   const getSamplerBInLoopSnippet = isBroadcast ? 'getBAtOutCoordsMatmul(i)' : `getB(${getB(allGlChannels, bRank)})`;\r\n   const getOutputCoordsSnippet = isBroadcast ? '' : `${coordsDataType} rc =\r\n          getOutputCoords(); int lastDim = rc.${allGlChannels[outRank - 1]}; rc.${allGlChannels[outRank - 1]} =\r\n          rc.${allGlChannels[outRank - 2]}; rc.${allGlChannels[outRank - 2]} = lastDim;\r\n      `;\r\n   const shaderSource = `\r\n ${getBcastedSamplerForMatmulSnippet}\r\n ${getBiasForMatmulSnippet}\r\n ${activationFunction}\r\n   void main() {\r\n ${getOutputCoordsSnippet}\r\n\r\n   vec4 value = vec4(0);\r\n   for (int i = 0; i < ${sharedDimIndex}; i++) {\r\n   vec4 a = ${getSamplerAInLoopSnippet};\r\n   vec4 b = ${getSamplerBInLoopSnippet};\r\n\r\n   value += (a.rrbb * b.rgrg);\r\n   value += (a.ggaa * b.baba);\r\n   }\r\n ${processBias}\r\n ${applyActivation}\r\n ${glsl.output} = value;\r\n   }`;\r\n   return {\r\n   ...metadata,\r\n   output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.packed},\r\n   shaderSource,\r\n   hasMain: true\r\n   };\r\n   };\r\n\r\nexport const createPackedMatmulProgramInfoLoader =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],\r\n   activationAttributes: InternalActivationAttributes): ProgramInfoLoader => {\r\n   const metadata = createPackedMatmulProgramMetadata(inputs.length > 2, activationAttributes.activationCacheKey);\r\n   return

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{\r\n        ...metadata,\r\n        get: () => createPackedMatmulProgramInfo(inferenceHandler, metadata, inputs,
activationAttributes)\r\n      };\r\n    };\r\n\r\nfunction getBcastSamplerForMatmul(\r\n    coordsDataType: string,
allGlChannels: readonly string[], inputs: Tensor[], outShape: readonly number[]): string {\r\n  let
unpackedACoordsSnippet = [];\r\n  let unpackedBCoordsSnippet = [];\r\n\r\n  const inAShape = inputs[0].dims;\r\n
const inBShape = inputs[1].dims;\r\n\r\n  const inARank = inAShape.length;\r\n  const inBRank =
inBShape.length;\r\n\r\n  const outRank = outShape.length;\r\n  const rankADiff = outRank - inARank;\r\n  const
rankBDiff = outRank - inBRank;\r\n\r\n  unpackedACoordsSnippet = inAShape.map((s, i) =>
`coords.${allGlChannels[i + rankADiff]}`);\r\n  unpackedACoordsSnippet[inARank - 1] = 'i*2';\r\n
unpackedACoordsSnippet.join(', ');\r\n  unpackedBCoordsSnippet = inBShape.map((s, i) =>
`coords.${allGlChannels[i + rankBDiff]}`);\r\n  unpackedBCoordsSnippet[inBRank - 2] = 'i*2';\r\n
unpackedBCoordsSnippet.join(', ');\r\n\r\n  const broadcastADims = BroadcastUtil.getBroadcastDims(inAShape,
outShape);\r\n  const broadcastBDims = BroadcastUtil.getBroadcastDims(inBShape, outShape);\r\n\r\n  const
coordsASnippet = broadcastADims.map(d => `coords.${allGlChannels[d + rankADiff]} = 0;`).join('\\n');\r\n  const
coordsBSnippet = broadcastBDims.map(d => `coords.${allGlChannels[d + rankBDiff]} = 0;`).join('\\n');\r\n  const
swapDimSnippet = `int lastDim = coords.${allGlChannels[outRank - 1]};\r\n  coords.${allGlChannels[outRank -
1]} = coords.${allGlChannels[outRank - 2]};\r\n  coords.${allGlChannels[outRank - 2]} = lastDim;`;\r\n\r\n  const
getBcastSamplerMatmulSource = `\r\nvec4 getAAtOutCoordsMatmul(int i) {\r\n  ${coordsDataType} coords =
getOutputCoords();\r\n  ${swapDimSnippet}\r\n  ${coordsASnippet}\r\n  vec4 outputValue =
getA(${unpackedACoordsSnippet});\r\n  return outputValue;\r\n}\r\n\r\nvec4 getBAtOutCoordsMatmul(int i) {\r\n
${coordsDataType} coords = getOutputCoords();\r\n  ${swapDimSnippet}\r\n  ${coordsBSnippet}\r\n  vec4
outputValue = getB(${unpackedBCoordsSnippet});\r\n  return outputValue;\r\n}`;\r\n\r\n  return
getBcastSamplerMatmulSource;\r\n}\r\n\r\nfunction getA(allGlChannels: string[], rank: number): string {\r\n  let res
= '';\r\n  for (let i = 0; i < rank - 2; i++) {\r\n    res += `rc.${allGlChannels[i]}, `;\r\n  }\r\n  res +=
`rc.${allGlChannels[rank - 2]}, ` +\r\n      'i*2';\r\n  return res;\r\n}\r\n\r\nfunction getB(allGlChannels: string[],
rank: number): string {\r\n  let res = '';\r\n  for (let i = 0; i < rank - 2; i++) {\r\n    res += `rc.${allGlChannels[i]},
`;\r\n  }\r\n  res += 'i*2, ' +\r\n      `rc.${allGlChannels[rank - 1]}`;\r\n  return res;\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from
'../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor}
from '../../../tensor';\r\nimport {BroadcastUtil, ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler}
from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from
'../types';\r\nimport {getCoordsDataType, getGlChannels} from '../utils';\r\nimport {getActicationSnippet,
InternalActivationAttributes, parseInternalActivationAttributes} from './fuse-utils';\r\nimport
{createPackedMatmulProgramInfoLoader} from './matmul-pack';\r\n\r\nexport const matMul:
OperatorImplementation<InternalActivationAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs:
Tensor[], attributes: InternalActivationAttributes): Tensor[] => {\r\n      validateInputs(inputs);\r\n\r\n      if
(inferenceHandler.session.pack) {\r\n        return [inferenceHandler.run(\r\n
createPackedMatmulProgramInfoLoader(inferenceHandler, inputs, attributes), inputs)];\r\n      } else {\r\n        return
[inferenceHandler.run(createMatmulProgramInfoLoader(inputs, attributes), inputs)];\r\n      }\r\n    };\r\n\r\nexport
const parseMatMulAttributes: OperatorInitialization<InternalActivationAttributes> =\r\n    (node: Graph.Node):
InternalActivationAttributes => parseInternalActivationAttributes(node.attributes);\r\n\r\nconst
createMatmulProgramMetadata = (hasBias: boolean, cacheHint: string) => ({\r\n  name: 'MatMul',\r\n  inputNames:
hasBias ? ['A', 'B', 'Bias'] : ['A', 'B'],\r\n  inputTypes: hasBias ? [TextureType.unpacked, TextureType.unpacked,
TextureType.unpacked] :\r\n                         [TextureType.unpacked, TextureType.unpacked],\r\n
cacheHint\r\n});\r\n\r\nfunction createMatmulProgramInfo(\r\n    metadata: ProgramMetadata, inputs: Tensor[],
activationAttributes: InternalActivationAttributes): ProgramInfo {\r\n  const aShape = inputs[0].dims;\r\n  const
bShape = inputs[1].dims;\r\n  const outputShape = BroadcastUtil.calcShape(aShape, bShape, true);\r\n  if
(!outputShape) {\r\n    throw new Error('Can\\'t use matmul on the given tensors');\r\n  }\r\n  const coordsDataType
= getCoordsDataType(outputShape.length);\r\n  const allGlChannels = getGlChannels();\r\n  const
```

{activationFunction, applyActivation} = getActicationSnippet(activationAttributes);\r\n\r\n const hasBias = inputs.length > 2;\r\n const processBias = hasBias ? 'value += getBiasForMatmul();' : '';\r\n const getBiasForMatmulSnippet =\r\n hasBias ? `${getBiasForMatmul(coordsDataType, allGlChannels, inputs[2].dims, outputShape, false)}` : '';\r\n\r\n const rank = outputShape.length;\r\n const arank = aShape.length;\r\n const brank = bShape.length;\r\n const sharedDim = aShape[aShape.length - 1];\r\n const shaderSource = `\r\n ${activationFunction}\r\n ${getBiasForMatmulSnippet}\r\n float process(int indices[${rank}]) {\r\n int a[${arank}];\r\n int b[${brank}];\r\n bcastMatmulIndices_A(indices, a);\r\n bcastMatmulIndices_B(indices, b);\r\n\r\n float value;\r\n for (int k=0; k<${sharedDim}; ++k) {\r\n a[${arank - 1}] = k;\r\n b[${brank - 2}] = k;\r\n value += _A(a) * _B(b);\r\n }\r\n ${processBias}\r\n ${applyActivation}\r\n return value;\r\n }`;\r\n return {\r\n ...metadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n shaderSource,\r\n };\r\n}\r\n\r\nexport function createMatmulProgramInfoLoader(\r\n inputs: Tensor[], activationAttributes: InternalActivationAttributes): ProgramInfoLoader {\r\n const metadata = createMatmulProgramMetadata(inputs.length > 2, activationAttributes.activationCacheKey);\r\n return {...metadata, get: () => createMatmulProgramInfo(metadata, inputs, activationAttributes)};\r\n}\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 2) {\r\n throw new Error('MatMul requires 2 inputs.');\r\n }\r\n\r\n if (inputs[0].dims[inputs[0].dims.length - 1] !== inputs[1].dims[inputs[1].dims.length - 2]) {\r\n throw new Error('shared dimension does not match.');\r\n }\r\n\r\n if ((inputs[0].type !== 'float32' && inputs[0].type !== 'float64') ||\r\n (inputs[1].type !== 'float32' && inputs[1].type !== 'float64')) {\r\n throw new Error('inputs should be float type');\r\n }\r\n\r\n if (inputs[0].type !== inputs[1].type) {\r\n throw new Error('inputs types should match');\r\n }\r\n};\r\n\r\nexport function getBiasForMatmul(\r\n coordsDataType: string, allGlChannels: readonly string[], inShape: readonly number[], outShape: readonly number[],\r\n isPacked: boolean): string {\r\n let unpackedCoordsSnippet = '';\r\n const inRank = inShape.length;\r\n const outRank = outShape.length;\r\n const rankDiff = outRank - inRank;\r\n if (outRank < 2 && inRank > 0) {\r\n unpackedCoordsSnippet = 'coords';\r\n } else {\r\n unpackedCoordsSnippet = inShape.map((s, i) => `coords.${allGlChannels[i + rankDiff]}`).join(', ');\r\n }\r\n const broadcastDims = BroadcastUtil.getBroadcastDims(inShape, outShape);\r\n const coordsSnippet = broadcastDims.map(d => `coords.${allGlChannels[d + rankDiff]} = 0;`).join('\\n');\r\n const inSize = ShapeUtil.size(inShape);\r\n const isInputScalar = inSize === 1;\r\n let output = 'vec4(outputValue.xx, outputValue.yy)';\r\n if (isInputScalar) {\r\n output = 'vec4(outputValue.x)';\r\n }\r\n const getBiasForMatmulSource = isPacked ? `\r\nvec4 getBiasForMatmul() {\r\n ${coordsDataType} coords = getOutputCoords();\r\n ${coordsSnippet}\r\n vec4 outputValue = getBias(${unpackedCoordsSnippet});\r\n return ${output};\r\n}` :\r\n `\r\nfloat getBiasForMatmul() {\r\n ${coordsDataType} coords = getOutputCoords();\r\n ${coordsSnippet}\r\n return getBias(coords.x);\r\n}`;\r\n\r\n return getBiasForMatmulSource;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, TextureType} from '../types';\r\nimport {getCoordsDataType} from '../utils';\r\n\r\nimport {getChannels} from './packing-utils';\r\n\r\nconst packProgramMetadata = {\r\n name: 'pack',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpackedReversed]\r\n};\r\n\r\nconst createPackProgramInfo = (handler: WebGLInferenceHandler, input: Tensor): ProgramInfo => {\r\n const glsl = getGlsl(handler.session.backend.glContext.version);\r\n const inputShape = input.dims;\r\n\r\n const inputRank = inputShape.length;\r\n // createTextureLayoutFromShape won't change output rank. Need to verify by running tests\r\n const outputRank = input.dims.length;\r\n\r\n const coordsDataType = getCoordsDataType(outputRank);\r\n const channels = getChannels('rc', outputRank);\r\n const setup = getSetup(outputRank, channels, inputShape[inputShape.length - 2], inputShape[inputShape.length - 1]);\r\n\r\n let reversedInputWH;\r\n if (inputRank === 0) {\r\n reversedInputWH = [1, 1];\r\n } else if (inputRank === 1) {\r\n reversedInputWH = [inputShape[0], 1];\r\n } else {\r\n reversedInputWH = [inputShape[outputRank - 1], inputShape[outputRank - 2]];\r\n }\r\n const outOfBoundsCondition =

```
getOutOfBoundsCondition(outputRank, reversedInputWH, channels);\r\n  const output = getOutput(inputShape,
channels);\r\n\r\n  const shaderSource = `\r\n      void main() {\r\n        ${coordsDataType} rc =
getOutputCoords();\r\n\r\n        if(${outOfBoundsCondition}) {\r\n          ${glsl.output} = vec4(0);\r\n        } else
{\r\n          ${setup}\r\n\r\n          ${glsl.output} = vec4(${output});\r\n        }\r\n      }\r\n    `;\r\n  return {\r\n
...packProgramMetadata,\r\n    hasMain: true,\r\n    output: {dims: input.dims, type: input.type, textureType:
TextureType.packed},\r\n    shaderSource\r\n  };\r\n};\r\n\r\nexport const createPackProgramInfoLoader = (handler:
WebGLInferenceHandler, input: Tensor): ProgramInfoLoader =>\r\n    ({...packProgramMetadata, get: () =>
createPackProgramInfo(handler, input)});\r\n\r\n/**\r\n * check output coordinate location and return false if it is
outside input's width/height boundary\r\n */\r\nfunction getOutOfBoundsCondition(rank: number, shape: readonly
number[], dims: string[]): string {\r\n  if (rank === 0) {\r\n    return 'false';\r\n  }\r\n  if (rank === 1) {\r\n    return `rc
> ${shape[0]}`;\r\n  }\r\n\r\n  let cond = '';\r\n  for (let i = rank - 2; i < rank; i++) {\r\n    cond += `${dims[i]} >=
${shape[i - rank + 2]}`;\r\n    if (i < rank - 1) {\r\n      cond += '||';\r\n    }\r\n  }\r\n\r\n  return cond;\r\n}\r\n\r\n/**\r\n
* code snippet to sample input texture with output coordiantes\r\n */\r\nfunction getOutput(shape: readonly
number[], dims: string[]): string {\r\n  const rank = shape.length;\r\n\r\n  if (rank === 0) {\r\n    return 'getA(), 0, 0,
0';\r\n  }\r\n\r\n  if (rank === 1) {\r\n    return `getA(rc),\r\n            rc + 1 >= ${shape[0]} ? 0. : getA(rc + 1),\r\n
  0, 0`;\r\n  }\r\n\r\n  const coord00 = 'r, c';\r\n  const coord01 = 'r, cp1';\r\n  const coord10 = 'rp1, c';\r\n  const
coord11 = 'rp1, cp1';\r\n  let D = '';\r\n  if (rank > 2) {\r\n    for (let i = 0; i < rank - 2; ++i) {\r\n      D = D +
`${dims[i]},`;\r\n    }\r\n  }\r\n  return `getA(${D}${coord00}),\r\n          rEdge ? 0. : getA(${D}${coord10}),\r\n
   cEdge ? 0. : getA(${D}${coord01}),\r\n          rEdge || cEdge ? 0. : getA(${D}${coord11})`;\r\n}\r\n\r\n/**\r\n *
code snippet to setup 4 coordinates and edge conditions\r\n */\r\nfunction getSetup(rank: number, dims: string[],
rows: number, cols: number): string {\r\n  if (rank === 0 || rank === 1) {\r\n    return '';\r\n  }\r\n  // rank >= 2 for
width+height pack.\r\n  else {\r\n    const setup = `\r\n    int r = ${dims[rank - 2]};\r\n    int c = ${dims[rank - 1]};\r\n
  int rp1 = ${dims[rank - 2]} + 1;\r\n    int cp1 = ${dims[rank - 1]} + 1;\r\n    bool rEdge = rp1 >= ${cols};\r\n    bool
cEdge = cp1 >= ${rows};\r\n    `;\r\n    return setup;\r\n  }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All
rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {getGlChannels} from '../utils';\r\n\r\nexport
function getVecChannels(name: string, rank: number): string[] {\r\n  return getGlChannels(rank).map(d =>
`${name}.${d}`);\r\n}\r\n\r\nexport function getChannels(name: string, rank: number): string[] {\r\n  if (rank === 1)
{\r\n    return [name];\r\n  }\r\n  return getVecChannels(name, rank);\r\n}\r\n\r\nexport function
unpackFromChannel(): string {\r\n  return `\r\n    float getChannel(vec4 frag, int dim) {\r\n      int modCoord =
imod(dim, 2);\r\n      return modCoord == 0 ? frag.r : frag.g;\r\n    }\r\n\r\n    float getChannel(vec4 frag, vec2
innerDims) {\r\n      vec2 modCoord = mod(innerDims, 2.);\r\n      return modCoord.x == 0. ?\r\n        (modCoord.y
== 0. ? frag.r : frag.g) :\r\n        (modCoord.y == 0. ? frag.b : frag.a);\r\n    }\r\n  `;\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph}
from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport
{Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl, Glsl} from '../glsl-
source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType}
from '../types';\r\n\r\nexport interface PadAttributes extends AttributeWithCacheKey {\r\n  readonly mode:
string;\r\n  readonly pads: number[];\r\n  readonly value: number;\r\n}\r\n\r\nconst padProgramMetadata = {\r\n
name: 'Pad',\r\n  inputNames: ['A'],\r\n  inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nexport const pad:
OperatorImplementation<PadAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: PadAttributes): Tensor[] => {\r\n      validateInputs(inputs);\r\n      const output =
inferenceHandler.run(\r\n          {\r\n            ...padProgramMetadata,\r\n            cacheHint: attributes.cacheKey,\r\n
      get: () => createPadProgramInfo(inferenceHandler, inputs, attributes)\r\n          },\r\n          inputs);\r\n      return
[output];\r\n    };\r\n\r\nexport const parsePadAttributes: OperatorInitialization<PadAttributes> = (node:
Graph.Node): PadAttributes => {\r\n  const mode = node.attributes.getString('mode', 'constant');\r\n  const value =
node.attributes.getFloat('value', 0.0);\r\n  const pads = node.attributes.getInts('pads');\r\n  return
createAttributeWithCacheKey({mode, value, pads});\r\n};\r\n\r\nconst createPadProgramInfo =\r\n
```

(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: PadAttributes): ProgramInfo => {\r\n const outputShape = ShapeUtil.padShape(inputs[0].dims.slice(), attributes.pads);\r\n const rank = outputShape.length;\r\n const padFunction = getPadFunction(inferenceHandler, inputs[0], attributes);\r\n const shaderSource = `\r\n ${padFunction}\r\n float process(int[${rank}] indices) {\r\n return padA(indices);\r\n }`;\r\n return {\r\n name: 'Pad',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked],\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n throw new Error('Pad requires 1 input');\r\n }\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n throw new Error('Invalid input type.');\r\n }\r\n};\r\n\r\nconst getPadFunction = (inferenceHandler: WebGLInferenceHandler, input: Tensor, attributes: PadAttributes): string => {\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n const [width, height] = inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n const strides = ShapeUtil.computeStrides(input.dims);\r\n\r\n switch (attributes.mode) {\r\n case 'constant':\r\n return getPadConstant(glsl, input.dims, strides, width, height, attributes.pads, attributes.value);\r\n case 'reflect':\r\n return getPadReflect(glsl, input.dims, strides, width, height, attributes.pads);\r\n case 'edge':\r\n return getPadEdge(glsl, input.dims, strides, width, height, attributes.pads);\r\n default:\r\n throw new Error('Invalid mode');\r\n }\r\n};\r\n\r\nconst getPadConstant =\r\n (glsl: Glsl, shape: readonly number[], strides: readonly number[], width: number, height: number, pads: number[],\r\n value: number): string => {\r\n const rank = shape.length;\r\n let block = '';\r\n for (let i = rank - 1; i >= 0; --i) {\r\n block += `\r\n k = m[${i}] - ${pads[i]};\r\n if (k < 0) return constant;\r\n if (k >= ${shape[i]}) return constant;\r\n offset += k * ${strides[i]};\r\n `;\r\n }\r\n return `\r\n float padA(int m[${rank}]) {\r\n const float constant = float(${value});\r\n int offset = 0;\r\n int k = 0;\r\n ${block}\r\n vec2 coords = offsetToCoords(offset, ${width}, ${height});\r\n float value = getColorAsFloat(${glsl.texture2D}(A, coords));\r\n return value;\r\n }\r\n `;\r\n };\r\n\r\nconst getPadReflect =\r\n (glsl: Glsl, shape: readonly number[], strides: readonly number[], width: number, height: number, pads: number[]):\r\n string => {\r\n const rank = shape.length;\r\n\r\n let block = '';\r\n for (let i = rank - 1; i >= 0; --i) {\r\n block += `\r\n k = m[${i}] - ${pads[i]};\r\n if (k < 0) { k = -k; }\r\n {\r\n const int _2n_1 = ${2 * (shape[i] - 1)};\r\n k = int( mod( float(k), float(_2n_1) ) ) ;\r\n if(k >= ${shape[i]}) { k = _2n_1 - k; }\r\n }\r\n offset += k * ${strides[i]};\r\n `;\r\n }\r\n return `\r\n float padA(int m[${rank}]) {\r\n int offset = 0;\r\n int k = 0;\r\n ${block}\r\n vec2 coords = offsetToCoords(offset, ${width}, ${height});\r\n float value = getColorAsFloat(${glsl.texture2D}(A, coords));\r\n return value;\r\n }\r\n `;\r\n };\r\n\r\nconst getPadEdge =\r\n (glsl: Glsl, shape: readonly number[], strides: readonly number[], width: number, height: number, pads: number[]):\r\n string => {\r\n const rank = shape.length;\r\n\r\n let block = '';\r\n for (let i = rank - 1; i >= 0; --i) {\r\n block += `\r\n k = m[${i}] - ${pads[i]};\r\n if (k < 0) k = 0;\r\n if (k >= ${shape[i]}) k = ${shape[i] - 1};\r\n offset += k * ${strides[i]};\r\n `;\r\n }\r\n return `\r\n float padA(int m[${rank}]) {\r\n int offset = 0;\r\n int k = 0;\r\n ${block}\r\n vec2 coords = offsetToCoords(offset, ${width}, ${height});\r\n float value = getColorAsFloat(${glsl.texture2D}(A, coords));\r\n return value;\r\n }\r\n `;\r\n };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {PoolConvUtil, ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport interface AveragePoolAttributes extends AttributeWithCacheKey {\r\n readonly autoPad: string;\r\n readonly ceilMode: number;\r\n readonly countIncludePad: boolean;\r\n readonly kernelShape: number[];\r\n readonly strides: number[];\r\n readonly pads: number[];\r\n}\r\n\r\nexport const averagePool: OperatorImplementation<AveragePoolAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: AveragePoolAttributes): Tensor[] => {\r\n validateInputs(inputs);\r\n const metadata

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=\r\n        {name: 'AveragePool', inputNames: ['X'], inputTypes: [TextureType.unpacked], cacheHint:
attributes.cacheKey};\r\n    const output = inferenceHandler.run(\r\n        {...metadata, get: () =>
createAveragePoolProgramInfo(inputs, metadata, false, attributes)}, inputs);\r\n    return [output];\r\n
};\r\n\r\nexport const parseAveragePoolAttributes: OperatorInitialization<AveragePoolAttributes> =\r\n  (node:
Graph.Node): AveragePoolAttributes => {\r\n    const autoPad = node.attributes.getString('auto_pad',
'NOTSET');\r\n    const ceilMode = node.attributes.getInt('ceil_mode', 0);\r\n    const countIncludePad =
(node.attributes.getInt('count_include_pad', 0) === 0 ? false : true);\r\n    const kernelShape =
node.attributes.getInts('kernel_shape');\r\n    const strides = node.attributes.getInts('strides', []);\r\n    const pads =
node.attributes.getInts('pads', []);\r\n\r\n    // TODO: support attribute 'ceil_mode'\r\n    if (ceilMode !== 0) {\r\n
  throw new Error('using ceil() in shape computation is not yet supported for AveragePool');\r\n    }\r\n\r\n    return
createAttributeWithCacheKey({autoPad, ceilMode, countIncludePad, kernelShape, strides, pads});\r\n
};\r\n\r\nconst createAveragePoolProgramInfo =\r\n  (inputs: Tensor[], metadata: ProgramMetadata,
isGlobalOperator: boolean, attributes: AveragePoolAttributes):\r\n      ProgramInfo => {\r\n        const inputShape
= inputs[0].dims.slice();\r\n        PoolConvUtil.adjustPoolAttributes(\r\n            isGlobalOperator, inputShape,
attributes.kernelShape, attributes.strides, attributes.pads);\r\n        const outputShape =
PoolConvUtil.computePoolOutputShape(\r\n            isGlobalOperator, inputShape, attributes.strides,
attributes.kernelShape, attributes.pads,\r\n            attributes.autoPad);\r\n        const kernelSize =
ShapeUtil.size(attributes.kernelShape);\r\n        const op1 = 'value += _X(x);';\r\n        let op2 = '';\r\n        if
(attributes.countIncludePad) {\r\n          op2 += `value /= float(${kernelSize});`;\r\n        } else {\r\n          op2 +=
`value /= float(${kernelSize} - pad);`;\r\n        }\r\n        const poolingCode =
generatePoolingCode(inputs[0].dims, attributes, op1, op2, '0.0');\r\n        const shaderSource = `\r\n
${poolingCode}\r\n      `;\r\n        return {\r\n          ...metadata,\r\n          output: {dims: outputShape, type:
inputs[0].type, textureType: TextureType.unpacked},\r\n          shaderSource\r\n        };\r\n      };\r\n\r\nexport
const globalAveragePool: OperatorImplementation<AveragePoolAttributes> =\r\n  (inferenceHandler:
WebGLInferenceHandler, inputs: Tensor[], attributes: AveragePoolAttributes): Tensor[] => {\r\n
validateInputs(inputs);\r\n    const metadata = {\r\n      name: 'GlobalAveragePool',\r\n      inputNames: ['X'],\r\n
   inputTypes: [TextureType.unpacked],\r\n      cacheHint: `${attributes.countIncludePad}`\r\n    };\r\n    const
output = inferenceHandler.run(\r\n        {...metadata, get: () => createAveragePoolProgramInfo(inputs, metadata,
true, attributes)}, inputs);\r\n    return [output];\r\n  };\r\n\r\nexport const parseGlobalAveragePoolAttributes:
OperatorInitialization<AveragePoolAttributes> =\r\n  (node: Graph.Node): AveragePoolAttributes => {\r\n
const countIncludePad = (node.attributes.getInt('count_include_pad', 0) === 0 ? false : true);\r\n    return
createAttributeWithCacheKey(\r\n        {autoPad: '', ceilMode: 0, countIncludePad, kernelShape: [], strides: [],
pads: []});\r\n  };\r\n\r\nexport interface MaxPoolAttributes extends AveragePoolAttributes {\r\n  readonly
storageOrder: number;\r\n}\r\n\r\nexport const maxPool: OperatorImplementation<MaxPoolAttributes> =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: MaxPoolAttributes): Tensor[] => {\r\n
validateInputs(inputs);\r\n    const metadata =\r\n        {name: 'MaxPool', inputNames: ['X'], inputTypes:
[TextureType.unpacked], cacheHint: attributes.cacheKey};\r\n    const output = inferenceHandler.run(\r\n
{...metadata, get: () => createMaxPoolProgramInfo(inputs, metadata, false, attributes)}, inputs);\r\n    return
[output];\r\n  };\r\n\r\nexport const parseMaxPoolAttributes: OperatorInitialization<MaxPoolAttributes> =\r\n
(node: Graph.Node): MaxPoolAttributes => {\r\n    const autoPad = node.attributes.getString('auto_pad',
'NOTSET');\r\n    const ceilMode = node.attributes.getInt('ceil_mode', 0);\r\n    const kernelShape =
node.attributes.getInts('kernel_shape');\r\n    const strides = node.attributes.getInts('strides', []);\r\n    const pads =
node.attributes.getInts('pads', []);\r\n    const storageOrder = node.attributes.getInt('storage_order', 0);\r\n\r\n    //
TODO: support attribute 'ceil_mode' and 'storage_order'\r\n    if (storageOrder !== 0) {\r\n      throw new
Error('column major storage order is not yet supported for MaxPool');\r\n    }\r\n    if (ceilMode !== 0) {\r\n
throw new Error('using ceil() in shape computation is not yet supported for MaxPool');\r\n    }\r\n\r\n    return
createAttributeWithCacheKey(\r\n        {autoPad, ceilMode, countIncludePad: false, kernelShape, strides, pads,
storageOrder});\r\n  };\r\n\r\nconst createMaxPoolProgramInfo =\r\n  (inputs: Tensor[], metadata:
```

ProgramMetadata, isGlobalOperator: boolean, attributes: MaxPoolAttributes):\r\n ProgramInfo => {\r\n const inputShape = inputs[0].dims.slice();\r\n PoolConvUtil.adjustPoolAttributes(\r\n isGlobalOperator, inputShape, attributes.kernelShape, attributes.strides, attributes.pads);\r\n const outputShape = PoolConvUtil.computePoolOutputShape(\r\n isGlobalOperator, inputShape, attributes.strides, attributes.kernelShape, attributes.pads,\r\n attributes.autoPad);\r\n const op1 = `\r\n value = max(_X(x), value);\r\n `;\r\n const op2 = '';\r\n const poolingCode = generatePoolingCode(inputShape, attributes, op1, op2, '-1e5');\r\n const shaderSource = `\r\n ${poolingCode}\r\n `;\r\n return {\r\n ...metadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\nconst globalMaxPoolAttributes = {\r\n autoPad: '',\r\n ceilMode: 0,\r\n countIncludePad: false,\r\n kernelShape: [],\r\n strides: [],\r\n pads: [],\r\n storageOrder: 0,\r\n cacheKey: ''\r\n};\r\n\r\nconst globalMaxPoolMetadata = {\r\n name: 'GlobalMaxPool',\r\n inputNames: ['X'],\r\n inputTypes: [TextureType.unpacked]\r\n};\r\n\r\nexport const globalMaxPool = (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n validateInputs(inputs);\r\n const output = inferenceHandler.run(\r\n {\r\n ...globalMaxPoolMetadata,\r\n get: () => createMaxPoolProgramInfo(inputs, globalMaxPoolMetadata, true, globalMaxPoolAttributes)\r\n },\r\n inputs);\r\n return [output];\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n throw new Error('Pool ops requires 1 input.');\r\n }\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n throw new Error('Invalid input type.');\r\n }\r\n};\r\n\r\nconst generatePoolingCode =\r\n (inputDims: readonly number[], attributes: AveragePoolAttributes, op1: string, op2: string, start: string):\r\n string => {\r\n const rank = inputDims.length;\r\n if (attributes.kernelShape.length <= 2) {\r\n const kw = attributes.kernelShape[attributes.kernelShape.length - 1];\r\n const sw = attributes.strides[attributes.strides.length - 1];\r\n const pwStart = attributes.pads[attributes.pads.length / 2 - 1];\r\n const pwEnd = attributes.pads[attributes.pads.length - 1];\r\n const dimW = inputDims[rank - 1];\r\n let codeW = '';\r\n let codeH = '';\r\n let codeHEnd = '';\r\n if (pwStart + pwEnd !== 0) {\r\n codeW = `\r\n for (int i = 0; i < ${kw}; i++) {\r\n x[${rank} - 1] = indices[${rank} - 1] * ${sw} - ${pwStart} + i;\r\n if (x[${rank} - 1] < 0 || x[${rank} - 1] >= ${dimW}) {\r\n pad++;\r\n continue;\r\n }\r\n ${op1}\r\n }`;\r\n } else {\r\n codeW = `\r\n for (int i = 0; i < ${kw}; i++) {\r\n x[${rank} - 1] = indices[${rank} - 1] * ${sw} - ${pwStart} + i;\r\n ${op1}\r\n }`;\r\n }\r\n\r\n if (attributes.kernelShape.length === 2) {\r\n const kh = attributes.kernelShape[attributes.kernelShape.length - 2];\r\n const sh = attributes.strides[attributes.strides.length - 2];\r\n const phStart = attributes.pads[attributes.pads.length / 2 - 2];\r\n const phEnd = attributes.pads[attributes.pads.length - 2];\r\n const dimH = inputDims[rank - 2];\r\n if (phStart + phEnd !== 0) {\r\n codeH = `\r\n for (int j = 0; j < ${kh}; j++) {\r\n x[${rank} - 2] = indices[${rank} - 2] * ${sh} - ${phStart} + j;\r\n if (x[${rank} - 2] < 0 || x[${rank} - 2] >= ${dimH}) {\r\n pad+= ${kw};\r\n continue;\r\n }\r\n `;\r\n } else {\r\n codeH = `\r\n for (int j = 0; j < ${kh}; j++) {\r\n x[${rank} - 2] = indices[${rank} - 2] * ${sh} - ${phStart} + j;\r\n `;\r\n }\r\n codeHEnd = `\r\n }\r\n `;\r\n }\r\n\r\n const poolingCode = `\r\n float process(int indices[${rank}]) {\r\n int x[${rank}];\r\n copyVec(indices, x);\r\n\r\n float value = ${start};\r\n int pad = 0;\r\n ${codeH}\r\n ${codeW}\r\n ${codeHEnd}\r\n ${op2}\r\n return value;\r\n }\r\n `;\r\n return poolingCode;\r\n } else {\r\n const kernelSize = ShapeUtil.size(attributes.kernelShape);\r\n const kernelStrides = ShapeUtil.computeStrides(attributes.kernelShape);\r\n const stridesRank = kernelStrides.length;\r\n const padsRank = attributes.pads.length;\r\n const offsetToIndicesFunction = offsetToIndices(stridesRank);\r\n const copyInputDims = copyArray(inputDims, 'inputDims');\r\n const copyPads = copyArray(attributes.pads, 'pads');\r\n const copyKernelStrides = copyArray(kernelStrides, 'kernelStrides');\r\n const copyStrides = copyArray(attributes.strides, 'strides');\r\n const hasPads = attributes.pads.reduce((sum, cur) => sum + cur);\r\n let padCode = '';\r\n if (hasPads) {\r\n padCode = `\r\n if (x[j] >= inputDims[j] || x[j] < 0) {\r\n pad++;\r\n isPad = true;\r\n

break;\r\n }\r\n }\r\n if (!isPad) {\r\n ${op1}\r\n }`;\r\n } else {\r\n
padCode = `\r\n }\r\n ${op1}\r\n `;\r\n }\r\n const poolingCode = `\r\n
${offsetToIndicesFunction}\r\n float process(int indices[${rank}]) {\r\n int x[${rank}];\r\n
copyVec(indices, x);\r\n int offset[${stridesRank}];\r\n int pads[${padsRank}];\r\n int
inputDims[${rank}];\r\n int kernelStrides[${stridesRank}];\r\n int strides[${stridesRank}];\r\n
${copyPads}\r\n ${copyInputDims}\r\n ${copyStrides}\r\n ${copyKernelStrides}\r\n\r\n
float value = ${start};\r\n int pad = 0;\r\n bool isPad = false;\r\n for (int i = 0; i < ${kernelSize};
i++) {\r\n offsetToIndices(i, kernelStrides, offset);\r\n isPad = false;\r\n for (int j = ${rank} -
${stridesRank}; j < ${rank}; j++) {\r\n x[j] = indices[j] * strides[j - ${rank} + ${stridesRank}]\r\n
+ offset[j - ${rank} + ${stridesRank}] - pads[j - 2];\r\n ${padCode}\r\n }\r\n ${op2}\r\n\r\n
return value;\r\n }\r\n `;\r\n return poolingCode;\r\n }\r\n };\r\n\r\nconst copyArray = (array:
readonly number[], arrayName: string): string => {\r\n let block = '';\r\n for (let i = 0; i < array.length; i++) {\r\n
block += `\r\n ${arrayName}[${i}] = ${array[i]};\r\n `;\r\n }\r\n return block;\r\n};\r\n\r\nconst
offsetToIndices = (rank: number): string => `\r\n void offsetToIndices(int offset, int[${rank}] strides, out
int[${rank}] indices) {\r\n if (${rank} == 0) {\r\n return;\r\n }\r\n for (int i = 0; i < ${rank} - 1; ++i) {\r\n
indices[i] = offset / strides[i];\r\n offset -= indices[i] * strides[i];\r\n }\r\n indices[${rank} - 1] = offset;\r\n
}`;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-
key';\r\nimport {Graph} from '../../../graph';\r\nimport {NUMBER_TYPES, OperatorImplementation,
OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from
'../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo,
ProgramMetadata, TextureType} from '../types';\r\n\r\nexport interface ReduceAttributes extends
AttributeWithCacheKey {\r\n readonly axes: number[];\r\n readonly keepDims: boolean;\r\n}\r\n\r\n// return [init
ops, reduce ops, final ops]\r\ntype ReduceOp = (inputs: Tensor[], axes: number[]) => string[];\r\n\r\nconst reduce
=\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes, name: string,\r\n
reduceOp: ReduceOp): Tensor[] => {\r\n validateInputs(inputs);\r\n\r\n const reduceProgramMetadata =
{\r\n name,\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked],\r\n };\r\n\r\n const
output = inferenceHandler.run(\r\n {\r\n ...reduceProgramMetadata,\r\n cacheHint:
attributes.cacheKey,\r\n get: () =>\r\n createReduceProgramInfo(inferenceHandler, inputs,
attributes, name, reduceOp, reduceProgramMetadata)\r\n },\r\n inputs);\r\n return [output];\r\n
};\r\n\r\nexport const parseReduceAttributes: OperatorInitialization<ReduceAttributes> = (node: Graph.Node):
ReduceAttributes => {\r\n const axes = node.attributes.getInts('axes', []);\r\n const keepDims =
node.attributes.getInt('keepdims', 1) === 1;\r\n return createAttributeWithCacheKey({axes,
keepDims});\r\n};\r\n\r\nconst createReduceProgramInfo =\r\n (handler: WebGLInferenceHandler, inputs:
Tensor[], attributes: ReduceAttributes, name: string, reduceOp: ReduceOp,\r\n reduceProgramMetadata:
ProgramMetadata): ProgramInfo => {\r\n const outputShape: number[] = [];\r\n const iRank =
inputs[0].dims.length || 1;\r\n\r\n const idxCopy = []; // copy output indexes to input indexes\r\n\r\n const axes
= ShapeUtil.normalizeAxes(attributes.axes, inputs[0].dims.length);\r\n const ops = reduceOp(inputs, axes);\r\n
let reduceOps = ops[1];\r\n\r\n for (let k = 0; k < inputs[0].dims.length; k++) {\r\n // if this axis is reduced\r\n
if (axes.indexOf(k) >= 0 || axes.length === 0) {\r\n if (attributes.keepDims) {\r\n
outputShape.push(1);\r\n } // else { remove the axis from outputShape; }\r\n\r\n // loop over the d-th
axis\r\n reduceOps = `\r\n for(int j${k} = 0; j${k} < ${inputs[0].dims[k]}; j${k}++) {\r\n
inputIdx[${k}] = j${k};\r\n ${reduceOps}\r\n }`;\r\n } else {\r\n
idxCopy.push(`inputIdx[${k}] = outputIdx[${outputShape.length}];`);\r\n\r\n
outputShape.push(inputs[0].dims[k]);\r\n }\r\n }\r\n\r\n const oRank = outputShape.length || 1;\r\n\r\n
const shaderSource = `\r\n float process(int outputIdx[${oRank}]) {\r\n float value; // final
result\r\n int inputIdx[${iRank}]; // addressing input data\r\n ${idxCopy.join('\\n')}\r\n ${ops[0]}
// init ops for reduce max/min\r\n ${reduceOps}\r\n ${ops[2]} // final computation for reduce mean\r\n

return value;\r\n }`;\r\n\r\n return {\r\n ...reduceProgramMetadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n throw new Error('Reduce op requires 1 input.');\r\n }\r\n\r\n if (NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n throw new Error('Invalid input type.');\r\n }\r\n};\r\n\r\nexport const reduceSum: OperatorImplementation<ReduceAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n const reduceOp: ReduceOp = (): string[] => ['value = 0.0;', 'value += _A(inputIdx);', ''];\r\n return reduce(inferenceHandler, inputs, attributes, 'ReduceSum', reduceOp);\r\n };\r\n\r\nexport const reduceMean: OperatorImplementation<ReduceAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n const reduceOp: ReduceOp = (inputs: Tensor[], axes: number[]): string[] => {\r\n let size = 1.0;\r\n for (let k = 0; k < inputs[0].dims.length; k++) {\r\n if (axes.indexOf(k) >= 0 || axes.length === 0) {\r\n size *= inputs[0].dims[k];\r\n }\r\n }\r\n\r\n return ['value = 0.0;', 'value += _A(inputIdx);', `value /= ${size}.;`]; // ensure real number with `.`\r\n };\r\n return reduce(inferenceHandler, inputs, attributes, 'ReduceMean', reduceOp);\r\n };\r\n\r\nexport const reduceMax: OperatorImplementation<ReduceAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n const reduceOp: ReduceOp = (inputs: Tensor[], axes: number[]): string[] => {\r\n const idxZero = [];\r\n for (let k = 0; k < inputs[0].dims.length; k++) {\r\n if (axes.indexOf(k) >= 0 || axes.length === 0) {\r\n idxZero.push(`inputIdx[${k}] = 0;`); // first element\r\n }\r\n }\r\n\r\n return [`${idxZero.join('\\n')}\\nvalue = _A(inputIdx);`, 'value = max(value, _A(inputIdx));', ''];\r\n };\r\n return reduce(inferenceHandler, inputs, attributes, 'ReduceMax', reduceOp);\r\n };\r\n\r\nexport const reduceMin: OperatorImplementation<ReduceAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n const reduceOp: ReduceOp = (inputs: Tensor[], axes: number[]): string[] => {\r\n const idxZero = [];\r\n for (let k = 0; k < inputs[0].dims.length; k++) {\r\n if (axes.indexOf(k) >= 0 || axes.length === 0) {\r\n idxZero.push(`inputIdx[${k}] = 0;`); // first element\r\n }\r\n }\r\n\r\n return [`${idxZero.join('\\n')}\\nvalue = _A(inputIdx);`, 'value = min(value, _A(inputIdx));', ''];\r\n };\r\n return reduce(inferenceHandler, inputs, attributes, 'ReduceMin', reduceOp);\r\n };\r\n\r\nexport const reduceProd: OperatorImplementation<ReduceAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n const reduceOp: ReduceOp = (): string[] => ['value = 1.0;', 'value *= _A(inputIdx);', ''];\r\n return reduce(inferenceHandler, inputs, attributes, 'ReduceProd', reduceOp);\r\n };\r\n\r\nexport const reduceLogSum: OperatorImplementation<ReduceAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n const reduceOp: ReduceOp = (): string[] => ['value = 0.0;', 'value += _A(inputIdx);', 'value = log(value);'];\r\n return reduce(inferenceHandler, inputs, attributes, 'ReduceLogSum', reduceOp);\r\n };\r\n\r\nexport const reduceLogSumSquare: OperatorImplementation<ReduceAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n const reduceOp: ReduceOp = (): string[] => ['float t; value = 0.0;', 't = _A(inputIdx); value += t * t;', ''];\r\n return reduce(inferenceHandler, inputs, attributes, 'ReduceLogSumSquare', reduceOp);\r\n };","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nimport {unpackFromChannel} from './packing-utils';\r\n\r\nconst createPackedReshape3DProgramMetadata = (outputShape3D: readonly number[]) =>\r\n ({name: 'Reshape (packed)', inputTypes: [TextureType.packed], inputNames: ['A'], cacheHint: `${outputShape3D}`});\r\n\r\nconst createPackedReshape3DProgramInfo =\r\n (handler: WebGLInferenceHandler, input3D: Tensor, metadata: ProgramMetadata, outputShape3D: readonly number[]):\r\n ProgramInfo => {\r\n const inputShape3D = input3D.dims as [number, number, number];\r\n const squeezedOutputShape = outputShape3D as [number, number, number];\r\n\r\n let mainLoop = '';\r\n for (let i = 0; i < 4; i++) {\r\n let outputCoords = '';\r\n switch (i) {\r\n case 0:\r\n outputCoords = 'outputCoords = rc;';\r\n break;\r\n case 1:\r\n outputCoords = 'outputCoords = ivec3(rc.x, rc.y+1, rc.z);';\r\n break;\r\n case 2:\r\n outputCoords = 'outputCoords = ivec3(rc.x, rc.y, rc.z+1);';\r\n break;\r\n case 3:\r\n outputCoords = 'outputCoords = ivec3(rc.x, rc.y+1, rc.z+1);';\r\n break;\r\n default:\r\n throw new Error();\r\n }\r\n\r\n mainLoop += `\r\n ${outputCoords}\r\n ${i > 0 ? 'if(outputCoords.y < rows && outputCoords.z < cols){' : "}\r\n int flattenedIndex = getFlattenedIndex(outputCoords);\r\n\r\n ivec3 inputRC = inputCoordsFromReshapedOutCoords(flattenedIndex);\r\n vec2 innerDims = vec2(float(inputRC.y),float(inputRC.z));\r\n\r\n result[${i}] = getChannel(getA(inputRC.x, inputRC.y, inputRC.z), innerDims);\r\n\r\n ${i > 0 ? '}' : "}\r\n `;\r\n }\r\n const glsl = getGlsl(handler.session.backend.glContext.version);\r\n\r\n const shaderSource = `\r\n ${getReshapedInputCoords(inputShape3D)}\r\n ${getFlattenedIndexFrom3D(squeezedOutputShape)}\r\n ${unpackFromChannel()}\r\n\r\n void main() {\r\n ivec3 rc = getOutputCoords();\r\n\r\n vec4 result = vec4(0.0);\r\n\r\n ivec3 outputCoords;\r\n int rows = ${squeezedOutputShape[2]};\r\n int cols = ${squeezedOutputShape[1]};\r\n\r\n ${mainLoop}\r\n ${glsl.output} = result;\r\n }\r\n `;\r\n\r\n return {\r\n ...metadata,\r\n output: {dims: squeezedOutputShape, type: input3D.type, textureType: TextureType.packed},\r\n shaderSource,\r\n hasMain: true\r\n };\r\n };\r\n\r\nexport const createPackedReshape3DProgramInfoLoader =\r\n (handler: WebGLInferenceHandler, input3D: Tensor, outputShape3D: readonly number[]): ProgramInfoLoader => {\r\n const metadata = createPackedReshape3DProgramMetadata(outputShape3D);\r\n return {...metadata, get: () => createPackedReshape3DProgramInfo(handler, input3D, metadata, outputShape3D)};\r\n };\r\n\r\nexport function processDims3D(shape: ArrayLike<number>): [number, number, number] {\r\n if (shape.length === 0) {\r\n return [1, 1, 1];\r\n }\r\n // TODO: squeeze other shapes to 2D case\r\n let batch = 1;\r\n for (let i = 0; i < shape.length - 2; ++i) {\r\n batch *= shape[i];\r\n }\r\n return [batch, shape.length > 1 ? shape[shape.length - 2] : 1, shape[shape.length - 1]];\r\n}\r\n\r\n// For packed reshape, we need to re-arrange texel data for output shape.\r\n// Our pack is designed to pack a 2x2 tile in last h and w dimension, so\r\n// for the reshaped new tensor, we just need to re-arrange the last h and\r\n// w dimension. For any shape that is not in 3D, i.e. [batch, W, H], we\r\n// first convert it to 3D by collapsing other dimension to batch dim, then\r\n// process with the last two dimensions.\r\n// Note: we only need the shape tensor to calculate output shape, so the\r\n// content in shape tensor is never uploaded to GPU. It is always kept in CPU.\r\n// TODO: optimize the algorithm -- in some cases, if the last two dims are\r\n// the same between input shape and output shape, the packed reshape can be\r\n// treated as no-op.\r\nexport function isReshapeCheap(dims: readonly number[], reshapedDims: readonly number[]) {\r\n let isCheapReshape = false;\r\n if (dims.length === 0 || reshapedDims.length === 0) { // scalar\r\n isCheapReshape = true;\r\n } else if (dims.length < 2 || reshapedDims.length < 2) { // 1D\r\n isCheapReshape = dims[dims.length - 1] === reshapedDims[reshapedDims.length - 1];\r\n } else { // 2D +\r\n isCheapReshape = dims[dims.length - 1] === reshapedDims[reshapedDims.length - 1] &&\r\n dims[dims.length - 2] === reshapedDims[reshapedDims.length - 2];\r\n }\r\n\r\n return isCheapReshape;\r\n}\r\n\r\nfunction getReshapedInputCoords(shape: [number, number, number]): string {\r\n const strides = ShapeUtil.computeStrides(shape);\r\n const coords = ['b', 'r', 'c'];\r\n const index = 'index';\r\n const coordsFromIndexSnippet = strides\r\n .map((stride, i) => {\r\n const line1 = `int ${coords[i]} = ${index} / ${stride}`;\r\n const line2 = i === strides.length - 1 ?\r\n `int ${coords[i + 1]} = ${index} - ${coords[i]} * ${stride}` :\r\n `index -= ${coords[i]} * ${stride}`;\r\n return `${line1}; ${line2};`;\r\n })\r\n .join(");\r\n\r\n return `\r\n ivec3 inputCoordsFromReshapedOutCoords(int index) {\r\n ${coordsFromIndexSnippet}\r\n return ivec3(b, r, c);\r\n }\r\n `;\r\n}\r\n\r\nfunction getFlattenedIndexFrom3D(shape: [number, number, number]): string {\r\n const strides = ShapeUtil.computeStrides(shape);\r\n\r\n return `\r\n int getFlattenedIndex(ivec3 coords) {\r\n // reverse y, z order\r\n return coords.x * ${strides[0]} + coords.z * ${strides[1]} + coords.y;\r\n }\r\n`;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from

'../inference-handler';\r\n\r\nexport const reshape = (handler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n const reshapedDims = ShapeUtil.calculateReshapedDims(inputs[0].dims, inputs[1].integerData);\r\n if (handler.session.pack) {\r\n return [handler.reshapePacked(inputs[0], reshapedDims)];\r\n } else {\r\n return [handler.reshapeUnpacked(inputs[0], reshapedDims)];\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\nimport {getCoordsDataType} from '../utils';\r\n\r\nimport {unpackFromChannel} from './packing-utils';\r\nimport {parseUpsampleAttributes, scalesValidation, UpsampleAttributes, validateInputs} from './upsample';\r\n\r\nconst resizeProgramMetadata = {\r\n name: 'Resize',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.packed]\r\n};\r\n\r\nexport const resize: OperatorImplementation<UpsampleAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: UpsampleAttributes): Tensor[] => {\r\n validateInputs(inputs, attributes);\r\n const output = inferenceHandler.run(\r\n {\r\n ...resizeProgramMetadata,\r\n cacheHint: attributes.cacheKey,\r\n get: () => createPackedResizeProgramInfo(inferenceHandler, inputs, attributes)\r\n },\r\n inputs);\r\n return [output];\r\n };\r\n\r\nexport const parseResizeAttributesV10: OperatorInitialization<UpsampleAttributes> =\r\n (node: Graph.Node): UpsampleAttributes => parseUpsampleAttributes(node, 10);\r\n\r\nexport const parseResizeAttributesV11: OperatorInitialization<UpsampleAttributes> =\r\n (node: Graph.Node): UpsampleAttributes => parseUpsampleAttributes(node, 11);\r\n\r\nconst createPackedResizeProgramInfo =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: UpsampleAttributes): ProgramInfo => {\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n const [scales, outputShape] = prepareInputs(inputs, attributes);\r\n\r\n const isSame =\r\n scales.every((s: number) => s === 1) && attributes.coordinateTransformMode !== 'tf_crop_and_resize';\r\n if (isSame) {\r\n return {\r\n ...resizeProgramMetadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.packed},\r\n hasMain: true,\r\n shaderSource: `void main() {\r\n vec4 v = ${glsl.texture2D}(X, TexCoords);\r\n ${glsl.output} = v;\r\n }`\r\n };\r\n }\r\n\r\n const dim = outputShape.length;\r\n if (dim < 2) {\r\n throw new Error(`output dimension should be at least 2, but got ${dim}`);\r\n }\r\n\r\n const outputHeight = outputShape[dim - 2];\r\n const outputWidth = outputShape[dim - 1];\r\n\r\n const inputShape = inputs[0].dims;\r\n if (dim !== inputShape.length) {\r\n throw new Error(`output dimension should match input ${inputShape.length}, but got ${dim}`);\r\n }\r\n const inputHeight = inputShape[dim - 2];\r\n const inputWidth = inputShape[dim - 1];\r\n\r\n const scalesHeight = scales[dim - 2];\r\n const scalesWidth = scales[dim - 1];\r\n\r\n let getSourceFracIndex = '';\r\n\r\n if (attributes.mode !== 'linear') {\r\n // TODO: support other modes\r\n throw new Error(`resize (packed) does not support mode: '${attributes.mode}'`);\r\n }\r\n switch (attributes.coordinateTransformMode) {\r\n case 'asymmetric':\r\n getSourceFracIndex = `\r\n vec4 getSourceFracIndex(ivec4 coords) {\r\n return vec4(coords) / scaleWHWH;\r\n }\r\n `;\r\n break;\r\n case 'half_pixel':\r\n getSourceFracIndex = `\r\n vec4 getSourceFracIndex(ivec4 coords) {\r\n return (vec4(coords) + 0.5) / scaleWHWH - 0.5;\r\n }\r\n `;\r\n break;\r\n case 'align_corners':\r\n getSourceFracIndex = `\r\n vec4 getSourceFracIndex(ivec4 coords) {\r\n vec4 resized = vec4(${outputWidth}.0 - 1.0, ${outputHeight}.0 - 1.0, ${outputWidth}.0 - 1.0,\r\n ${outputHeight}.0 - 1.0);\r\n vec4 original = vec4(${inputWidth}.0 - 1.0, ${inputHeight}.0 - 1.0, ${inputWidth}.0 - 1.0,\r\n ${inputHeight}.0 - 1.0);\r\n vec4 new_scale = original / resized;\r\n return vec4(coords) * new_scale;\r\n }\r\n `;\r\n break;\r\n default:\r\n // TODO:supporting other coordinateTransformModes\r\n throw new Error(`resize (packed) does not support coordinateTransformMode: \\\r\n '${attributes.coordinateTransformMode}'`);\r\n }\r\n\r\n const coordsDataType = getCoordsDataType(dim);\r\n const unpackChannel = unpackFromChannel();\r\n const shaderSource = `\r\n

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      const vec2 inputWH = vec2(${inputHeight}.0, ${inputWidth}.0);\r\n          const vec4 scaleWHWH =
vec4(${scalesHeight}.0, ${scalesWidth}.0, ${scalesHeight}.0, ${scalesWidth}.0);\r\n          ${unpackChannel}\r\n
        ${getSourceFracIndex}\r\n          float getAValue(int x10, int r, int c, int d) {\r\n              return
getChannel(getA(x10, r, c, d), vec2(c, d));\r\n          }\r\n          void main() {\r\n              ${coordsDataType} rc
= getOutputCoords();\r\n\r\n              int batch = rc[0];\r\n              int depth = rc[1];\r\n\r\n              // retrieve the
4 coordinates that is used in the 4 packed output values.\r\n              ivec4 coords = ivec4(rc.wz, rc.w + 1, rc.z +
1);\r\n\r\n              // calculate the source index in fraction\r\n              vec4 sourceFrac =
getSourceFracIndex(coords);\r\n\r\n              // get the lower and upper bound of the 4 values that will be packed
into one texel.\r\n              ivec4 x00 = ivec4(max(sourceFrac.xy, vec2(0.0)), min(inputWH - 1.0,
ceil(sourceFrac.xy)));\r\n              ivec4 x01 = ivec4(max(sourceFrac.xw, vec2(0.0)), min(inputWH - 1.0,
ceil(sourceFrac.xw)));\r\n              ivec4 x10 = ivec4(max(sourceFrac.zy, vec2(0.0)), min(inputWH - 1.0,
ceil(sourceFrac.zy)));\r\n              ivec4 x11 = ivec4(max(sourceFrac.zw, vec2(0.0)), min(inputWH - 1.0,
ceil(sourceFrac.zw)));\r\n\r\n              bool hasNextRow = rc.w < ${outputHeight - 1};\r\n              bool
hasNextCol = rc.z < ${outputWidth - 1};\r\n\r\n              // pack x00, x01, x10, x11's top-left corner into one vec4
structure\r\n              vec4 topLeft = vec4(\r\n                  getAValue(batch, depth, x00.x, x00.y),\r\n
hasNextCol ? getAValue(batch, depth, x01.x, x01.y) : 0.0,\r\n                  hasNextRow ? getAValue(batch, depth,
x10.x, x10.y) : 0.0,\r\n                  (hasNextRow && hasNextCol) ? getAValue(batch, depth, x11.x, x11.y) :
0.0);\r\n\r\n              // pack x00, x01, x10, x11's top-right corner into one vec4 structure\r\n              vec4 topRight
= vec4(\r\n                  getAValue(batch, depth, x00.x, x00.w),\r\n                  hasNextCol ? getAValue(batch,
depth, x01.x, x01.w) : 0.0,\r\n                  hasNextRow ? getAValue(batch, depth, x10.x, x10.w) : 0.0,\r\n
 (hasNextRow && hasNextCol) ? getAValue(batch, depth, x11.x, x11.w) : 0.0);\r\n\r\n              // pack x00, x01,
x10, x11's bottom-left corner into one vec4 structure\r\n              vec4 bottomLeft = vec4(\r\n
getAValue(batch, depth, x00.z, x00.y),\r\n                  hasNextCol ? getAValue(batch, depth, x01.z, x01.y) : 0.0,\r\n
                  hasNextRow ? getAValue(batch, depth, x10.z, x10.y) : 0.0,\r\n                  (hasNextRow &&
hasNextCol) ? getAValue(batch, depth, x11.z, x11.y) : 0.0);\r\n\r\n              // pack x00, x01, x10, x11's bottom-
right corner into one vec4 structure\r\n              vec4 bottomRight = vec4(\r\n                  getAValue(batch, depth,
x00.z, x00.w),\r\n                  hasNextCol ? getAValue(batch, depth, x01.z, x01.w) : 0.0,\r\n
hasNextRow ? getAValue(batch, depth, x10.z, x10.w) : 0.0,\r\n                  (hasNextRow && hasNextCol) ?
getAValue(batch, depth, x11.z, x11.w) : 0.0);\r\n\r\n              // calculate the interpolation fraction on u and v
direction\r\n              vec4 frac = vec4(sourceFrac) - floor(sourceFrac);\r\n              vec4 clampFrac = clamp(frac,
vec4(0.0), vec4(1.0));\r\n\r\n              vec4 top = mix(topLeft, topRight, clampFrac.ywyw);\r\n              vec4
bottom = mix(bottomLeft, bottomRight, clampFrac.ywyw);\r\n              vec4 newValue = mix(top, bottom,
clampFrac.xxzz);\r\n\r\n              ${glsl.output} = vec4(newValue);\r\n          }\r\n        `;\r\n      return {\r\n
...resizeProgramMetadata,\r\n        output: {dims: outputShape, type: inputs[0].type, textureType:
TextureType.packed},\r\n        hasMain: true,\r\n        shaderSource\r\n      };\r\n    };\r\n\r\n\r\nconst prepareInputs =
(inputs: Tensor[], attributes: UpsampleAttributes): [readonly number[], readonly number[]] => {\r\n  const x =
inputs[0];\r\n  const xDims = x.dims;\r\n\r\n  let scales = attributes.scales;\r\n  let outputSizes:
number[]|undefined;\r\n  if (scales.length === 0) {\r\n    const scalesTensor = inputs[attributes.scalesInputIdx];\r\n
if (scalesTensor && scalesTensor.size !== 0) {\r\n      if (inputs[attributes.sizesInputIdx]) {\r\n        throw new
Error('Only one of scales or sizes must be provided as input.');\r\n      }\r\n      scales =
parseScalesData(scalesTensor, attributes.mode, attributes.isResize);\r\n    } else {\r\n      const sizesTensor =
inputs[attributes.sizesInputIdx];\r\n      if (!sizesTensor || sizesTensor.size === 0) {\r\n        throw new Error('Either
scales or sizes MUST be provided as input.');\r\n      }\r\n\r\n      outputSizes =
Array.from(sizesTensor.integerData);\r\n      scales = parseScalesDataFromOutputSize(outputSizes, xDims,
attributes.mode, attributes.isResize);\r\n    }\r\n  } else {\r\n    if (inputs[attributes.sizesInputIdx]) {\r\n      throw new
Error('Only one of scales or sizes must be provided as input.');\r\n    }\r\n  }\r\n\r\n  const yDims = outputSizes ||
(xDims.map((dim, i) => Math.floor(dim * scales[i])));\r\n\r\n  return [scales, yDims];\r\n};\r\n\r\nconst
parseScalesData = (scale: Tensor, mode: string, isResize: boolean): number[] => {\r\n  const scales =
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Array.from(scale.floatData);\r\n scalesValidation(scales, mode, isResize);\r\n return scales;\r\n};\r\n\r\nconst parseScalesDataFromOutputSize =\r\n   (yDims: readonly number[], xDims: readonly number[], mode: string, isResize: boolean): number[] => {\r\n   const length = xDims.length;\r\n   const scales = new Array<number>(length);\r\n\r\n   for (let i = 0, end = length; i < end; i++) {\r\n   if (xDims[i] === 0) {\r\n   if (yDims[i] !== 0) {\r\n   throw new Error('Input dim is zero but required output dim is non-zero.');\r\n   }\r\n   scales[i] = 1;\r\n   } else {\r\n   scales[i] = yDims[i] / xDims[i];\r\n   }\r\n   }\r\n   scalesValidation(scales, mode, isResize);\r\n   return scales;\r\n   };\r\n\r\n// roi data is not used yet. but leave here for future usage.\r\n// const getRoi = (inputs: Tensor[], attributes: UpsampleAttributes) : number[] => {\r\n//   let roi: number[] = [];\r\n//   if (attributes.needRoiInput) {\r\n//   if (attributes.roiInputIdx <= 0) {\r\n//   throw new Error('Invalid roi input index.');\r\n//   }\r\n//   const roiTensor = inputs[attributes.roiInputIdx];\r\n//   roi = roiTensor.size > 0 ? Array.from(roiTensor.floatData) : [];\r\n//   } else {\r\n//   roi = new Array(inputs[0].dims.length * 2).fill(0);\r\n//   }\r\n//   return roi;\r\n// };","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const shape = (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n validateInputs(inputs);\r\n return [new Tensor([inputs[0].dims.length], 'int32', undefined, undefined, new Int32Array(inputs[0].dims))];\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Shape requires 1 input.');\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {NUMBER_TYPES, OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface SliceAttributes extends AttributeWithCacheKey {\r\n readonly axes: number[];\r\n readonly ends: number[];\r\n readonly starts: number[];\r\n}\r\n\r\nconst sliceProgramMetadata = {\r\n name: 'Slice',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked]\r\n};\r\n\r\nexport const slice: OperatorImplementation<SliceAttributes> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: SliceAttributes): Tensor[] => {\r\n   validateInputs(inputs);\r\n   const output = inferenceHandler.run(\r\n   {\r\n   ...sliceProgramMetadata,\r\n   cacheHint: attributes.cacheKey,\r\n   get: () => createSliceProgramInfo(inferenceHandler, inputs[0], attributes)\r\n   },\r\n   inputs);\r\n   return [output];\r\n   };\r\n\r\nexport const parseSliceAttributes: OperatorInitialization<SliceAttributes> = (node: Graph.Node): SliceAttributes => {\r\n const starts = node.attributes.getInts('starts');\r\n const ends = node.attributes.getInts('ends');\r\n const axes = node.attributes.getInts('axes', []);\r\n return createAttributeWithCacheKey({starts, ends, axes});\r\n};\r\n\r\nconst createSliceProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, input: Tensor, attributes: SliceAttributes): ProgramInfo => {\r\n   const axes = (attributes.axes.length === 0) ? input.dims.slice(0).map((val, i) => i) : attributes.axes;\r\n   const normalizedAxes = ShapeUtil.normalizeAxes(axes, input.dims.length);\r\n   const starts = attributes.starts.map((start, i) => {\r\n   if (start > input.dims[normalizedAxes[i]] - 1) {\r\n   return input.dims[normalizedAxes[i]];\r\n   }\r\n   return ShapeUtil.normalizeAxis(start, input.dims[normalizedAxes[i]]);\r\n   });\r\n   const ends = attributes.ends.map((end, i) => {\r\n   if (end > input.dims[normalizedAxes[i]] - 1) {\r\n   return input.dims[normalizedAxes[i]];\r\n   }\r\n   return ShapeUtil.normalizeAxis(end, input.dims[normalizedAxes[i]]);\r\n   });\r\n\r\n   const outputShape = input.dims.slice();\r\n\r\n   const sliceOps: string[] = [];\r\n   for (let i = 0; i < normalizedAxes.length; i++) {\r\n   outputShape[normalizedAxes[i]] = ends[i] - starts[i];\r\n   if (starts[i] > 0) {\r\n   sliceOps.push(`outputIdx[${normalizedAxes[i]}] += ${starts[i]};`);\r\n   } // else { sliceOps.push(`outputIdx[${normalizedAxes[i]}] += 0;`); }\r\n   }\r\n\r\n   const rank = outputShape.length;\r\n   const shaderSource = `\r\n      float process(int outputIdx[${rank}]) {\r\n        ${sliceOps.join('\\n      ')}\r\n        return _A(outputIdx);\r\n      }`;\r\n   return {\r\n   ...sliceProgramMetadata,\r\n   output: {dims: outputShape, type: input.type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Slice requires 1 input.');\r\n }\r\n if (NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n   throw new Error('Invalid input type.');\r\n }\r\n};\r\n\r\nexport const sliceV10 = (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n validateInputsV10(inputs);\r\n const attributes = generateSliceAttributesFromInputs(inferenceHandler, inputs);\r\n const output = inferenceHandler.run(\r\n   {\r\n   ...sliceProgramMetadata,\r\n   cacheHint: attributes.cacheKey,\r\n   get: () => createSliceProgramInfo(inferenceHandler, inputs[0], attributes)\r\n   },\r\n   [inputs[0]]);\r\n return [output];\r\n};\r\n\r\nconst generateSliceAttributesFromInputs =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): SliceAttributes => {\r\n   if (!inferenceHandler.session.isInitializer(inputs[1].dataId) ||\r\n   !inferenceHandler.session.isInitializer(inputs[2].dataId) ||\r\n   (inputs.length >= 4 && !inferenceHandler.session.isInitializer(inputs[3].dataId)) ||\r\n   (inputs.length >= 5 && !inferenceHandler.session.isInitializer(inputs[4].dataId))) {\r\n   throw new Error('dynamic slice attributes are not allowed');\r\n   }\r\n\r\n   if (inputs.length >= 5 && inputs[4].integerData.some((i: number) => i !== 1)) {\r\n   throw new Error('currently non-1 steps is not supported for Slice');\r\n   }\r\n\r\n   const starts = Array.from(inputs[1].integerData);\r\n   const ends = Array.from(inputs[2].integerData);\r\n   const axes = inputs.length >= 4 ? Array.from(inputs[3].integerData) : [];\r\n   const cacheKey = `${axes};${starts};${ends}`;\r\n   return {starts, ends, axes, cacheKey};\r\n   };\r\n\r\nconst validateInputsV10 = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length < 3 || inputs.length > 5) {\r\n   throw new Error('Invalid input number.');\r\n }\r\n if (inputs[1].type !== 'int32' || inputs[1].dims.length !== 1) {\r\n   throw new Error('Invalid input type.');\r\n }\r\n if (inputs[2].type !== 'int32' || inputs[2].dims.length !== 1) {\r\n   throw new Error('Invalid input type.');\r\n }\r\n if (inputs.length >= 4 && (inputs[3].type !== 'int32' || inputs[3].dims.length !== 1)) {\r\n   throw new Error('Invalid input type.');\r\n }\r\n if (inputs.length >= 5 && (inputs[4].type !== 'int32' || inputs[4].dims.length !== 1)) {\r\n   throw new Error('Invalid input type.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface SoftmaxAttributes extends AttributeWithCacheKey {\r\n readonly axis: number;\r\n}\r\n\r\nconst softmaxComputeMaxProgramMetadata = {\r\n name: 'SoftmaxComputeMax',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nconst softmaxComputeScaleProgramMetadata = {\r\n name: 'SoftmaxComputeScale',\r\n inputNames: ['A', 'Max'],\r\n inputTypes: [TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nconst softmaxProgramMetadata = {\r\n name: 'SoftMax',\r\n inputNames: ['A', 'Max', 'Norm'],\r\n inputTypes: [TextureType.unpacked, TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nexport const softmax: OperatorImplementation<SoftmaxAttributes> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: SoftmaxAttributes): Tensor[] => {\r\n   validateInputs(inputs);\r\n\r\n   const inputShape = inputs[0].dims.slice();\r\n   const axis = ShapeUtil.normalizeAxis(attributes.axis, inputShape.length);\r\n   const N = ShapeUtil.sizeToDimension(inputShape, axis);\r\n   const D = ShapeUtil.sizeFromDimension(inputShape, axis);\r\n\r\n   const computeMaxProgramInfo = createComputeMaxProgramInfo(inferenceHandler, inputs[0], N, D, [N]);\r\n   const max = inferenceHandler.run(\r\n   {...softmaxComputeMaxProgramMetadata, cacheHint: attributes.cacheKey, get: () => computeMaxProgramInfo},\r\n   inputs);\r\n\r\n   const computeScaleProgramInfo =\r\n   createComputScaleProgramInfo(inferenceHandler, inputs[0], N, D, computeMaxProgramInfo.output.dims, [N]);\r\n   const scale = inferenceHandler.run(\r\n   {...softmaxComputeScaleProgramMetadata, cacheHint: attributes.cacheKey, get: () => computeScaleProgramInfo},\r\n   [inputs[0], max]);\r\n\r\n   const softMaxProgramInfo = createSoftMaxProgramInfo(\r\n   inferenceHandler, inputs[0], N, D, computeMaxProgramInfo.output.dims,

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computeScaleProgramInfo.output.dims);\r\n      const output = inferenceHandler.run(\r\n
{...softmaxProgramMetadata, cacheHint: attributes.cacheKey, get: () => softMaxProgramInfo},\r\n          [inputs[0],
max, scale]);\r\n      return [output];\r\n    };\r\n\r\nexport const parseSoftmaxAttributes:
OperatorInitialization<SoftmaxAttributes> =\r\n    (node: Graph.Node): SoftmaxAttributes =>
createAttributeWithCacheKey({axis: node.attributes.getInt('axis', 1)});\r\n\r\n/**\r\n * Create a texture that contains
the maximum value of each of the 'N' rows\r\n */\r\nconst createComputeMaxProgramInfo =\r\n    // eslint-disable-
next-line @typescript-eslint/naming-convention\r\n    (inferenceHandler: WebGLInferenceHandler, input: Tensor,
N: number, D: number, outputShape: number[]):\r\n        ProgramInfo => {\r\n          const [textureWidth,
textureHeight] =\r\n              inferenceHandler.calculateTextureWidthAndHeight(input.dims,
TextureType.unpacked);\r\n          const rank = outputShape.length;\r\n\r\n          if (N < 1 || D < 1) {\r\n            throw
new Error('Logical row count N and feature count D must be greater than or equal to 1');\r\n          }\r\n\r\n          if
(outputShape.length !== 1) {\r\n            throw new Error('Dimensionality of the output should be 1');\r\n
}\r\n\r\n          if (outputShape[0] !== N) {\r\n            throw new Error('Shape of the output should be equal to logical
row count');\r\n          }\r\n\r\n          const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n
    const shaderSource = `\r\n      float process(int[${rank}] indices) {\r\n        int logical_row_start_offset =
indices[0] * ${D};\r\n\r\n        float max = getColorAsFloat(${glsl.texture2D}(A,
offsetToCoords(logical_row_start_offset, ${textureWidth},\r\n        ${textureHeight} )));\r\n        for(int i=1;
i<${D}; ++i)\r\n        {\r\n          float current = getColorAsFloat(${glsl.texture2D}(A,
offsetToCoords(logical_row_start_offset + i,\r\n            ${textureWidth}, ${textureHeight})));\r\n          if(current >
max)\r\n          max = current;\r\n        }\r\n\r\n        return max;\r\n      }`;\r\n          return {\r\n
...softmaxComputeMaxProgramMetadata,\r\n            output: {dims: outputShape, type: input.type, textureType:
TextureType.unpacked},\r\n            shaderSource\r\n          };\r\n        };\r\n\r\n/**\r\n * Create a texture that contains
the normalization factor for each of the 'N' rows\r\n */\r\nconst createComputScaleProgramInfo =\r\n    // eslint-
disable-next-line @typescript-eslint/naming-convention\r\n    (inferenceHandler: WebGLInferenceHandler, input:
Tensor, N: number, D: number,\r\n     maxElementPerLogicalRow: readonly number[], outputShape: number[]):
ProgramInfo => {\r\n      const [textureWidth, textureHeight] =\r\n
inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n      const rank =
outputShape.length;\r\n\r\n      if (N < 1 || D < 1) {\r\n        throw new Error('Logical row count N and feature count
D must be greater than or equal to 1');\r\n      }\r\n\r\n      if (outputShape.length !== 1) {\r\n        throw new
Error('Dimensionality of the output should be 1');\r\n      }\r\n\r\n      if (outputShape[0] !== N) {\r\n        throw new
Error('Shape of the output should be equal to logical row count');\r\n      }\r\n\r\n      if
(maxElementPerLogicalRow.length !== 1) {\r\n        throw new Error('Dimensionality of the intermediate results
should be 1');\r\n      }\r\n\r\n      if (maxElementPerLogicalRow[0] !== N) {\r\n        throw new Error('Shape of the
intermediate results should be equal to logical row count');\r\n      }\r\n\r\n      const glsl =
getGlsl(inferenceHandler.session.backend.glContext.version);\r\n      const shaderSource = `\r\n      float
process(int[${rank}] indices) {\r\n        int logical_row_start_offset = indices[0] * ${D};\r\n\r\n        float
norm_factor = 0.0;\r\n        float max = _Max(indices);\r\n        for(int i=0; i<${D}; ++i)\r\n        {\r\n
norm_factor += exp(getColorAsFloat(${glsl.texture2D}(A, offsetToCoords(logical_row_start_offset + i,\r\n
${textureWidth}, ${textureHeight}))) - max);\r\n        }\r\n\r\n        return norm_factor;\r\n      }`;\r\n      return {\r\n
    ...softmaxComputeScaleProgramMetadata,\r\n        output: {dims: outputShape, type: input.type, textureType:
TextureType.unpacked},\r\n        shaderSource\r\n      };\r\n    };\r\n\r\nconst createSoftMaxProgramInfo =\r\n    //
eslint-disable-next-line @typescript-eslint/naming-convention\r\n    (inferenceHandler: WebGLInferenceHandler,
input: Tensor, N: number, D: number,\r\n     maxElementPerLogicalRow: readonly number[],
normalizationPerLogicalRow: readonly number[]): ProgramInfo => {\r\n      const [textureWidth, textureHeight]
=\r\n          inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n      const
rank = input.dims.length;\r\n\r\n      if (N < 1 || D < 1) {\r\n        throw new Error('Logical row count N and feature
count D must be greater than or equal to 1');\r\n      }\r\n\r\n      if (maxElementPerLogicalRow.length !== 1 ||
normalizationPerLogicalRow.length !== 1) {\r\n        throw new Error('Dimensionality of the intermediate results
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should be 1');\r\n      }\r\n\r\n      if (maxElementPerLogicalRow[0] !== N || normalizationPerLogicalRow[0] !== N)
{\r\n        throw new Error('Shape of the intermediate results should be equal to logical row count');\r\n      }\r\n\r\n
 const shaderSource = `\r\n      float process(int[${rank}] indices) {\r\n\r\n      // get offset of current logical tensor
index from the 2-D texture coordinates (TexCoords)\r\n      int offset = coordsToOffset(TexCoords,
${textureWidth}, ${textureHeight});\r\n\r\n      //determine the logical row for this index\r\n      int
logical_row_index[1];\r\n      logical_row_index[0] = offset / ${D};\r\n\r\n      float norm_factor =
_Norm(logical_row_index);\r\n\r\n      // avoid possible division by 0\r\n      // if norm_facor is 0, all elements are
zero\r\n      // if so, return 0\r\n      if(norm_factor == 0.0)\r\n        return 0.0;\r\n\r\n      return exp(_A(indices) -
_Max(logical_row_index)) / norm_factor;\r\n    }`;\r\n      return {\r\n        ...softmaxProgramMetadata,\r\n
output: {dims: input.dims, type: input.type, textureType: TextureType.unpacked},\r\n        shaderSource\r\n      };\r\n
  };\r\n\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length !== 1) {\r\n    throw new
Error('Softmax requires 1 input.');\r\n  }\r\n\r\n  if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n
 throw new Error('Invalid input type');\r\n  }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n//
Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from
'../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation,
OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil,
SplitUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport
{ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface SplitAttributes extends AttributeWithCacheKey
{\r\n  readonly axis: number;\r\n  readonly split: number[];\r\n  readonly numOutputs: number;\r\n}\r\n\r\nconst
splitProgramMetadata = {\r\n  name: 'Split',\r\n  inputNames: ['A'],\r\n  inputTypes:
[TextureType.unpacked],\r\n};\r\n\r\nexport const split: OperatorImplementation<SplitAttributes> =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: SplitAttributes): Tensor[] => {\r\n
validateInputs(inputs);\r\n\r\n      const axis = ShapeUtil.normalizeAxis(attributes.axis, inputs[0].dims.length);\r\n
const count = getProgramCount(inferenceHandler, inputs, axis, attributes);\r\n      const output: Tensor[] = [];\r\n
for (let i = 0; i < count; ++i) {\r\n        output.push(inferenceHandler.run(\r\n            {\r\n
...splitProgramMetadata,\r\n              cacheHint: `${attributes.cacheKey};${i}`,\r\n              get: () =>
createSplitProgramInfo(inferenceHandler, inputs[0], attributes, axis, i)\r\n            },\r\n            inputs));\r\n
}\r\n\r\n      return output;\r\n    };\r\n\r\nexport const parseSplitAttributes: OperatorInitialization<SplitAttributes> =
(node: Graph.Node): SplitAttributes => {\r\n  const axis = node.attributes.getInt('axis', 0);\r\n  const split =
node.attributes.getInts('split', []);\r\n  const numOutputs = node.outputs.length;\r\n  return
createAttributeWithCacheKey({axis, split, numOutputs});\r\n};\r\n\r\nconst getProgramCount =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axis: number, attributes: SplitAttributes): number =>
{\r\n      const [, offsets] = SplitUtil.splitShape(inputs[0].dims, axis, attributes.split, attributes.numOutputs);\r\n
return offsets.length;\r\n    };\r\n\r\nconst createSplitProgramInfo =\r\n    (inferenceHandler:
WebGLInferenceHandler, input: Tensor, attributes: SplitAttributes, axis: number, index: number):\r\n
ProgramInfo => {\r\n          const [shapes, offsets] = SplitUtil.splitShape(input.dims, axis, attributes.split,
attributes.numOutputs);\r\n          const offset = offsets[index];\r\n          const outputShape = shapes[index];\r\n
const rank = outputShape.length;\r\n          const shaderSource = `\r\n      float process(int indices[${rank}]) {\r\n
indices[${axis}] += ${offset};\r\n        return _A(indices);\r\n      }\r\n    `;\r\n          return {\r\n
...splitProgramMetadata,\r\n            cacheHint: `${attributes.cacheKey}:${index}`,\r\n            output: {dims:
outputShape, type: input.type, textureType: TextureType.unpacked},\r\n            shaderSource\r\n          };\r\n
};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length !== 1) {\r\n    throw new
Error('Split requires one input.');\r\n  }\r\n\r\n  if (inputs[0].type !== 'int8' && inputs[0].type !== 'uint8' &&
inputs[0].type !== 'int16' &&\r\n      inputs[0].type !== 'uint16' && inputs[0].type !== 'int32' && inputs[0].type !==
'uint32' &&\r\n      inputs[0].type !== 'float32' && inputs[0].type !== 'float64' && inputs[0].type !== 'bool') {\r\n
throw new Error('Invalid input type.');\r\n  }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights
reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport
{OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from
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'../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const squeeze: OperatorImplementation<number[]> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axes: number[]): Tensor[] => {\r\n   validateInputs(inputs);\r\n   const outputShape = ShapeUtil.squeezeShape(inputs[0].dims, axes);\r\n   const output = inferenceHandler.reshapeUnpacked(inputs[0], outputShape);\r\n   return [output];\r\n   };\r\n\r\nexport const parseSqueezeAttributes: OperatorInitialization<number[]> = (node: Graph.Node): number[] =>\r\n   node.attributes.getInts('axes');\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Squeeze requires 1 input.');\r\n }\r\n\r\n if (inputs[0].type === 'string') {\r\n   throw new Error('invalid input tensor types.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport const sum = (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n validateInputs(inputs);\r\n\r\n const sumProgramMetadata = {\r\n   name: 'Sum',\r\n   inputNames: inputs.map((v, i) => `X${i}`),\r\n   inputTypes: new Array(inputs.length).fill(TextureType.unpacked)\r\n };\r\n\r\n const output = inferenceHandler.run(\r\n   {...sumProgramMetadata, get: () => createSumProgramInfo(inferenceHandler, inputs, sumProgramMetadata)}, inputs);\r\n return [output];\r\n};\r\n\r\nconst createSumProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], sumProgramMetadata: ProgramMetadata): ProgramInfo => {\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const outputShape = inputs[0].dims.slice();\r\n   const sumLine = inputs.map((v, i) => `${glsl.texture2D}(X${i},TexCoords)`).join(' + ');\r\n   const shaderSource = `\r\n      void main() {\r\n        vec4 result = ${sumLine};\r\n        ${glsl.output} = result;\r\n      }\r\n    `;\r\n   return {\r\n   ...sumProgramMetadata,\r\n   output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n   hasMain: true,\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length === 0) {\r\n   throw new Error('Sum requires inputs.');\r\n }\r\n\r\n const length = inputs[0].dims.length;\r\n for (let i = 1; i < inputs.length; i++) {\r\n   if (length !== inputs[i].dims.length) {\r\n   throw new Error('Input shapes are mismatched.');\r\n   }\r\n\r\n   for (let j = 0; j < length; j++) {\r\n   if (inputs[0].dims[j] !== inputs[i].dims[j]) {\r\n   throw new Error('Input shapes are not matched.');\r\n   }\r\n   }\r\n }\r\n\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n   throw new Error('Invalid input type.');\r\n }\r\n for (let i = 1; i < inputs.length; i++) {\r\n   if (inputs[0].type !== inputs[i].type) {\r\n   throw new Error('Input types are not matched.');\r\n   }\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {NUMBER_TYPES} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport const tile = (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n validateInputs(inputs);\r\n\r\n const tileProgramMetadata = {\r\n   name: 'Tile',\r\n   inputNames: ['A'],\r\n   inputTypes: [TextureType.unpacked],\r\n };\r\n\r\n const output = inferenceHandler.run(\r\n   {...tileProgramMetadata, get: () => createTileProgramInfo(inferenceHandler, inputs, tileProgramMetadata)},\r\n   inputs);\r\n return [output];\r\n};\r\n\r\nconst createTileProgramInfo =\r\n   (handler: WebGLInferenceHandler, inputs: Tensor[], tileProgramMetadata: ProgramMetadata): ProgramInfo => {\r\n   const inputShape = inputs[0].dims.slice();\r\n   const outputShape = new Array(inputShape.length);\r\n\r\n   const tileOps: string[] = [];\r\n   for (let i = 0; i < inputShape.length; i++) {\r\n   outputShape[i] = inputShape[i] * inputs[1].numberData[i];\r\n   tileOps.push(`inputIdx[${i}] = int(mod(float(outputIdx[${i}]), ${inputShape[i]}.));`);\r\n   }\r\n\r\n   const rank = outputShape.length;\r\n   const shaderSource = `\r\n      float process(int outputIdx[${rank}]) {\r\n        int inputIdx[${rank}];\r\n        ${tileOps.join('\\n')}\r\n        return _A(inputIdx);\r\n      }\r\n    `;\r\n   return {\r\n   ...tileProgramMetadata,\r\n   output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 2) {\r\n   throw new Error('Tile requires 2 input.');\r\n }\r\n if (inputs[1].dims.length !== 1) {\r\n   throw new Error('The second input shape must 1 dimension.');\r\n }\r\n if (inputs[1].dims[0] !== inputs[0].dims.length) {\r\n   throw new Error('Invalid input shape.');\r\n }\r\n if (NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n   throw new Error('Invalid input type.');\r\n }\r\n if (inputs[1].type !== 'int32' && inputs[1].type !== 'int16') {\r\n   throw new Error('Invalid repeat type.');\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface TransposeAttributes extends AttributeWithCacheKey {\r\n readonly perm: number[];\r\n}\r\n\r\nconst transposeProgramMetadata = {\r\n name: 'Transpose',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked]\r\n};\r\n\r\nexport const transpose: OperatorImplementation<TransposeAttributes> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: TransposeAttributes): Tensor[] => {\r\n   validateInputs(inputs);\r\n   const output = inferenceHandler.run(\r\n   {\r\n   ...transposeProgramMetadata,\r\n   cacheHint: attributes.cacheKey,\r\n   get: () => createTransposeProgramInfo(inferenceHandler, inputs[0], attributes.perm)\r\n   },\r\n   inputs);\r\n   return [output];\r\n   };\r\n\r\nexport const parseTransposeAttributes: OperatorInitialization<TransposeAttributes> =\r\n   (node: Graph.Node): TransposeAttributes => createAttributeWithCacheKey({perm: node.attributes.getInts('perm', [])});\r\n\r\nconst createTransposeProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, input: Tensor, perm: number[]): ProgramInfo => {\r\n   const inputShape = input.dims;\r\n   perm = getAdjustedPerm(inputShape, perm);\r\n   const unpackedOutputShape = getOutputShape(inputShape, perm);\r\n   const rank = inputShape.length;\r\n   // A dims=[${inputs[0].dims.toString()}]\r\n   // out Dims=[${unpackedOutputShape.toString()}]\r\n   // based on perm=[${perm.toString()}]\r\n   const shaderSource = `\r\n      ${getPermFunctionBody('perm', perm, rank)}\r\n      float process(int indices[${rank}]) {\r\n        int a[${rank}];\r\n        perm(a, indices);\r\n        return _A(a);\r\n      }`;\r\n   return {\r\n   ...transposeProgramMetadata,\r\n   output: {dims: unpackedOutputShape, type: input.type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst getAdjustedPerm = (inputShape: readonly number[], perm: number[]): number[] => {\r\n if (perm && perm.length !== inputShape.length) {\r\n   perm = [...(inputShape.keys())].reverse();\r\n }\r\n return perm;\r\n};\r\n\r\nconst getOutputShape = (inputShape: readonly number[], perm: number[]): readonly number[] => {\r\n perm = getAdjustedPerm(inputShape, perm);\r\n return ShapeUtil.sortBasedOnPerm(inputShape, perm);\r\n};\r\n\r\nconst getPermFunctionBody = (name: string, perm: number[], rank: number): string => {\r\n const reverseFunc = [];\r\n reverseFunc.push(`void ${name}(out int a[${rank}], int src[${rank}]) {`);\r\n for (let i = 0; i < rank; ++i) {\r\n   reverseFunc.push(`\\ta[${perm[i]}]=src[${i}];`);\r\n }\r\n reverseFunc.push('\\t}');\r\n return reverseFunc.join('\\n');\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Transpose requires 1 input.');\r\n }\r\n\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n   throw new Error('input should be float tensor');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {TextureData, TextureType} from '../types';\r\n\r\nexport const encodeAsUint8 = (inferenceHandler: WebGLInferenceHandler, input: TextureData): TextureData => {\r\n const outputShape = input.shape;\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n /**\r\n   * https://github.com/tensorflow/tfjs-core/blob/master/src/kernels/webgl/encode_float_gpu.ts\r\n   */\r\n const shaderSource = `\r\n   const float FLOAT_MAX = 1.70141184e38;\r\n   const float FLOAT_MIN = 1.17549435e-38;\r\n\r\n   bool isNaN(float val) {\r\n   return (val < 1.0 || 0.0 < val || val == 0.0) ? false : true;\r\n   }\r\n\r\n   highp vec4 encodeAsUint8(highp float v) {\r\n   if (isNaN(v)) {\r\n   return vec4(255, 255, 255, 255);\r\n   }\r\n\r\n   highp float av = abs(v);\r\n\r\n   if(av < FLOAT_MIN) {\r\n   return vec4(0.0, 0.0, 0.0, 0.0);\r\n   } else if(v > FLOAT_MAX) {\r\n   return vec4(0.0, 0.0, 128.0, 127.0) / 255.0;\r\n   } else if(v < -FLOAT_MAX) {\r\n   return vec4(0.0, 0.0, 128.0, 255.0) / 255.0;\r\n   }\r\n\r\n   highp vec4 c = vec4(0,0,0,0);\r\n\r\n   highp float e =

floor(log2(av));\r\n   highp float m = exp2(fract(log2(av))) - 1.0;\r\n\r\n   c[2] = floor(128.0 * m);\r\n   m -= c[2] / 128.0;\r\n   c[1] = floor(32768.0 * m);\r\n   m -= c[1] / 32768.0;\r\n   c[0] = floor(8388608.0 * m);\r\n\r\n   highp float ebias = e + 127.0;\r\n   c[3] = floor(ebias / 2.0);\r\n   ebias -= c[3] * 2.0;\r\n   c[2] += floor(ebias) * 128.0;\r\n\r\n   c[3] += 128.0 * step(0.0, -v);\r\n\r\n   return c / 255.0;\r\n   }\r\n\r\n   void main() {\r\n   float value = ${glsl.texture2D}(X,TexCoords).r;\r\n ${glsl.output} = encodeAsUint8(value);\r\n   }`;\r\n const programInfo = {\r\n   name: 'Uint8Encode',\r\n   inputTypes: [TextureType.unpacked],\r\n   inputNames: ['X'],\r\n   output: {dims: outputShape, type: input.tensor.type, textureType: TextureType.downloadUint8AsFloat},\r\n   shaderSource,\r\n   hasMain: true\r\n };\r\n return inferenceHandler.executeProgram(programInfo, [input.tensor]);\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {Tensor} from '../../../tensor';\r\nimport {FunctionType, GlslValueFunction} from '../glsl-definitions';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport function glslAbs(): GlslValueFunction {\r\n return glslBuiltinUnary('abs');\r\n}\r\nexport function glslAcos(): GlslValueFunction {\r\n return glslBuiltinUnary('acos');\r\n}\r\nexport function glslAsin(): GlslValueFunction {\r\n return glslBuiltinUnary('asin');\r\n}\r\nexport function glslAtan(): GlslValueFunction {\r\n return glslBuiltinUnary('atan');\r\n}\r\nexport function glslCeil(): GlslValueFunction {\r\n return glslBuiltinUnary('ceil');\r\n}\r\nexport function glslCos(): GlslValueFunction {\r\n return glslBuiltinUnary('cos');\r\n}\r\nexport function glslElu(alpha: number): GlslValueFunction {\r\n const name = 'elu';\r\n const body = `\r\n  const float alpha = float(${alpha});\r\n\r\n  float ${name}_(float a) {\r\n    return a >= 0.0 ? a: (exp(a) - 1.0) * alpha;\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n    return vec4(${name}_(v.x), ${name}_(v.y), ${name}_(v.z), ${name}_(v.w));\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslExp(): GlslValueFunction {\r\n return glslBuiltinUnary('exp');\r\n}\r\nexport function glslFloor(): GlslValueFunction {\r\n return glslBuiltinUnary('floor');\r\n}\r\nexport function glslClip(min: number, max: number): GlslValueFunction {\r\n const name = 'clip';\r\n const body = `\r\n  const float min = float(${min});\r\n  const float max = float(${max});\r\n\r\n  float ${name}_(float a) {\r\n    return clamp(a, min, max);\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n    return clamp(v, min, max);\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslIdentity(): GlslValueFunction {\r\n const name = 'indentity';\r\n const body = `\r\n  float ${name}_(float a) {\r\n    return a;\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n    return v;\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslLeakyRelu(alpha: number): GlslValueFunction {\r\n const name = 'leakyRelu';\r\n const body = `\r\n  const float alpha = float(${alpha});\r\n\r\n  float ${name}_(float a) {\r\n    return a < 0.0 ? a * alpha : a;\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n    return vec4(${name}_(v.x), ${name}_(v.y), ${name}_(v.z), ${name}_(v.w));\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslLog(): GlslValueFunction {\r\n return glslBuiltinUnary('log');\r\n}\r\nexport function glslNeg(): GlslValueFunction {\r\n const name = 'neg';\r\n const body = `\r\n  float ${name}_(float a) {\r\n    return -a;\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n    return -v;\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslNot(): GlslValueFunction {\r\n const name = 'not';\r\n const body = `\r\n float ${name}_(float a) {\r\n   return float(! bool(a));\r\n }\r\n bool ${name}_(bool a) {\r\n   return !a;\r\n }\r\n vec4 ${name}_(vec4 v) {\r\n   return vec4(!bool(v.x), !bool(v.y), !bool(v.z), !bool(v.w));\r\n }\r\n bvec4 ${name}_(bvec4 v) {\r\n   return bvec4(!v.x, !v.y, !v.z, !v.w);\r\n }\r\n `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslSin(): GlslValueFunction {\r\n  return glslBuiltinUnary('sin');\r\n}\r\nexport function glslRelu(): GlslValueFunction {\r\n  const name = 'relu';\r\n  const body = `\r\n float ${name}_(float a) {\r\n   return max(a, 0.0);\r\n }\r\n vec4 ${name}_(vec4 v) {\r\n   return max(v, 0.0);\r\n }\r\n `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslSigmoid(): GlslValueFunction {\r\n  const name = 'sigmoid';\r\n  const body = `\r\n float ${name}_(float a) {\r\n   return 1.0 / (1.0 + exp(-a));\r\n }\r\n vec4

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${name}_(vec4 v) {\r\n    return 1.0 / (1.0 + exp(-v));\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\nexport function glslSqrt(): GlslValueFunction {\r\n  return
glslBuiltinUnary('sqrt');\r\n}\r\nexport function glslTan(): GlslValueFunction {\r\n  return
glslBuiltinUnary('tan');\r\n}\r\nexport function glslTanh(): GlslValueFunction {\r\n  const name = 'tanh';\r\n  const
body = `\r\n  float ${name}_(float a) {\r\n    a = clamp(a, -10., 10.);\r\n    a = exp(2.*a);\r\n    return (a - 1.) / (a +
1.);\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n    v = clamp(v, -10., 10.);\r\n    v = exp(2.*v);\r\n    return (v - 1.) / (v +
1.);\r\n  }\r\n  `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nfunction glslBuiltinUnary(name:
string): GlslValueFunction {\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return ${name}(a);\r\n  }\r\n
vec4 ${name}_(vec4 v) {\r\n    return ${name}(v);\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\n\r\n/////\r\n/////\r\n/////\r\n\r\nconst createElementwiseProgramInfo =\r\n
(handler: WebGLInferenceHandler, metadata: ProgramMetadata, input: Tensor, glslFunc: GlslValueFunction):\r\n
    ProgramInfo => {\r\n          const textureType = handler.session.pack ? TextureType.packed :
TextureType.unpacked;\r\n          const glsl = getGlsl(handler.session.backend.glContext.version);\r\n          return
{\r\n            ...metadata,\r\n            output: {dims: input.dims, type: input.type, textureType},\r\n
shaderSource: `\r\n     ${glslFunc.body}\r\n     void main() {\r\n       vec4 v = ${glsl.texture2D}(A, TexCoords);\r\n
    v = ${glslFunc.name}_(v);\r\n       ${glsl.output} = v;\r\n     }\r\n     `,\r\n            hasMain: true\r\n          };\r\n
};\r\n\r\nconst createElementwiseProgramInfoLoader =\r\n    (handler: WebGLInferenceHandler, input: Tensor,
glslFunc: GlslValueFunction, cacheKey?: string):\r\n        ProgramInfoLoader => {\r\n          const textureType =
handler.session.pack ? TextureType.packed : TextureType.unpacked;\r\n          const metadata = {name:
glslFunc.name, inputTypes: [textureType], inputNames: ['A'], cacheHint: cacheKey};\r\n          return {...metadata,
get: () => createElementwiseProgramInfo(handler, metadata, input, glslFunc)};\r\n        };\r\n\r\nexport const abs =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAbs()), inputs)];\r\n\r\nexport const acos
= (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAcos()), inputs)];\r\n\r\nexport const asin
= (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAsin()), inputs)];\r\n\r\nexport const atan
= (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAtan()), inputs)];\r\n\r\nexport interface
ClipAttributes extends AttributeWithCacheKey {\r\n  readonly min: number;\r\n  readonly max:
number;\r\n}\r\n\r\nexport const clip =\r\n    (handler: WebGLInferenceHandler, inputs: Tensor[], attributes:
ClipAttributes): Tensor[] => [handler.run(\r\n        createElementwiseProgramInfoLoader(\r\n            handler,
inputs[0], glslClip(attributes.min, attributes.max), attributes.cacheKey),\r\n        inputs)];\r\n\r\nexport const
parseClipAttributes = (node: Graph.Node): ClipAttributes => createAttributeWithCacheKey({\r\n  min:
node.attributes.getFloat('min', -3.4028234663852886e+38),\r\n  max: node.attributes.getFloat('max',
3.4028234663852886e+38)\r\n});\r\n\r\nexport const ceil = (handler: WebGLInferenceHandler, inputs:
Tensor[]):\r\n    Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslCeil()),
inputs)];\r\n\r\nexport const cos = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslCos()), inputs)];\r\n\r\nexport interface
EluAttributes extends AttributeWithCacheKey {\r\n  readonly alpha: number;\r\n}\r\n\r\nexport const elu =\r\n
(handler: WebGLInferenceHandler, inputs: Tensor[], attributes: EluAttributes): Tensor[] => [handler.run(\r\n
createElementwiseProgramInfoLoader(handler, inputs[0], glslElu(attributes.alpha), attributes.cacheKey),\r\n
inputs)];\r\n\r\nexport const parseEluAttributes = (node: Graph.Node): EluAttributes =>\r\n
createAttributeWithCacheKey({alpha: node.attributes.getFloat('alpha', 1.0)});\r\n\r\nexport const exp = (handler:
WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslExp()), inputs)];\r\n\r\nexport const floor
= (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslFloor()), inputs)];\r\n\r\nexport const
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identity = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslIdentity()), inputs)];\r\n\r\nexport interface LeakyReluAttributes extends AttributeWithCacheKey {\r\n readonly alpha: number;\r\n}\r\n\r\nexport const leakyRelu =\r\n   (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: LeakyReluAttributes): Tensor[] => [handler.run(\r\n   createElementwiseProgramInfoLoader(handler, inputs[0], glslLeakyRelu(attributes.alpha), attributes.cacheKey),\r\n   inputs)];\r\n\r\nexport const parseLeakyReluAttributes = (node: Graph.Node): LeakyReluAttributes =>\r\n createAttributeWithCacheKey({alpha: node.attributes.getFloat('alpha', 0.01)});\r\n\r\nexport const log = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslLog()), inputs)];\r\n\r\nexport const neg = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslNeg()), inputs)];\r\n\r\nexport const not = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslNot()), inputs)];\r\n\r\nexport const relu = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslRelu()), inputs)];\r\n\r\nexport const sigmoid = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslSigmoid()), inputs)];\r\n\r\nexport const sin = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslSin()), inputs)];\r\n\r\nexport const sqrt = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslSqrt()), inputs)];\r\n\r\nexport const tan = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslTan()), inputs)];\r\n\r\nexport const tanh = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslTanh()), inputs)];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, TextureType} from '../types';\r\nimport {getCoordsDataType} from '../utils';\r\nimport {getChannels, unpackFromChannel} from './packing-utils';\r\n\r\nconst unpackProgramMetadata = {\r\n name: 'unpack',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.packed]\r\n};\r\n\r\nexport const createUnpackProgramInfo = (handler: WebGLInferenceHandler, input: Tensor): ProgramInfo => {\r\n const rank = input.dims.length;\r\n\r\n const channels = getChannels('rc', rank);\r\n const innerDims = channels.slice(-2);\r\n const coordsDataType = getCoordsDataType(rank);\r\n const unpackChannel = unpackFromChannel();\r\n const isScalar = (input.dims.length === 0);\r\n const sourceCoords = isScalar ? " : getSourceCoords(rank, channels);\r\n const coords = rank <= 1 ? 'rc' : `vec2(${innerDims.join(',')})`;\r\n const glsl = getGlsl(handler.session.backend.glContext.version);\r\n const shaderSource = `\r\n ${unpackChannel}\r\n   void main() {\r\n ${coordsDataType} rc = getOutputCoords();\r\n\r\n   // Sample the texture with the coords to get the rgba channel value.\r\n   vec4 packedInput = getA(${sourceCoords});\r\n\r\n ${glsl.output} = vec4(getChannel(packedInput, ${coords}), 0, 0, 0);\r\n   }\r\n   `;\r\n\r\n return {\r\n   ...unpackProgramMetadata,\r\n   hasMain: true,\r\n   output: {dims: input.dims, type: input.type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n };\r\n};\r\n\r\nexport const createUnpackProgramInfoLoader = (handler: WebGLInferenceHandler, input: Tensor): ProgramInfoLoader =>\r\n   ({...unpackProgramMetadata, get: () => createUnpackProgramInfo(handler, input)});\r\n\r\nfunction getSourceCoords(rank: number, dims: string[]): string {\r\n if (rank === 1) {\r\n   return 'rc';\r\n }\r\n\r\n let coords = ";\r\n for (let i = 0; i < rank; i++) {\r\n   coords += dims[i];\r\n   if (i < rank - 1) {\r\n   coords += ',';\r\n   }\r\n }\r\n return coords;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation,

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OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from
'../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const unsqueeze:
OperatorImplementation<number[]> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axes:
number[]): Tensor[] => {\r\n      validateInputs(inputs);\r\n      const outputShape =
ShapeUtil.unsqueezeShape(inputs[0].dims, axes);\r\n      const output =
inferenceHandler.reshapeUnpacked(inputs[0], outputShape);\r\n      return [output];\r\n    };\r\n\r\nexport const
parseUnsqueezeAttributes: OperatorInitialization<number[]> = (node: Graph.Node): number[] =>\r\n
node.attributes.getInts('axes');\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs ||
inputs.length !== 1) {\r\n    throw new Error('Unsqueeze requires 1 input.');\r\n  }\r\n\r\n  if (inputs[0].type ===
'string') {\r\n    throw new Error('invalid input tensor types.');\r\n  }\r\n};","// Copyright (c) Microsoft Corporation.
All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey,
createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from
'../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor}
from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from
'../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface
UpsampleAttributes extends AttributeWithCacheKey {\r\n  readonly opset: number;\r\n  readonly isResize:
boolean;\r\n  readonly mode: string;\r\n  readonly scales: number[];\r\n  readonly extrapolationValue: number;\r\n
readonly coordinateTransformMode: string;\r\n  readonly useExtrapolation: boolean;\r\n  readonly needRoiInput:
boolean;\r\n  readonly nearestMode: string;\r\n  readonly cubicCoefficientA: number;\r\n  readonly excludeOutside:
boolean;\r\n  readonly useNearest2xOptimization: boolean;\r\n  readonly roiInputIdx: number;\r\n  readonly
scalesInputIdx: number;\r\n  readonly sizesInputIdx: number;\r\n}\r\n\r\nconst upsampleProgramMetadata = {\r\n
name: 'Upsample',\r\n  inputNames: ['X'],\r\n  inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nexport const
upsample: OperatorImplementation<UpsampleAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler,
inputs: Tensor[], attributes: UpsampleAttributes): Tensor[] => {\r\n      validateInputs(inputs, attributes);\r\n      const
output = inferenceHandler.run(\r\n          {\r\n            ...upsampleProgramMetadata,\r\n            cacheHint:
attributes.cacheKey,\r\n            get: () => createUpsampleProgramInfo(inferenceHandler, inputs, attributes)\r\n
},\r\n          inputs);\r\n      return [output];\r\n    };\r\n\r\nexport const parseUpsampleAttributesV7:
OperatorInitialization<UpsampleAttributes> =\r\n    (node: Graph.Node): UpsampleAttributes =>
parseUpsampleAttributes(node, 7);\r\n\r\nexport const parseUpsampleAttributesV9:
OperatorInitialization<UpsampleAttributes> =\r\n    (node: Graph.Node): UpsampleAttributes =>
parseUpsampleAttributes(node, 9);\r\n\r\nexport const parseUpsampleAttributes = (node: Graph.Node, opset:
number): UpsampleAttributes => {\r\n  const isResize = (opset >= 10);\r\n\r\n  // processing node attributes\r\n
const mode = node.attributes.getString('mode', 'nearest');\r\n  if (mode !== 'nearest' && mode !== 'linear' && (opset
< 11 || mode !== 'cubic')) {\r\n    throw new Error(`unrecognized mode: ${mode}`);\r\n  }\r\n\r\n  let scales:
number[] = [];\r\n  if (opset < 9) {\r\n    scales = node.attributes.getFloats('scales');\r\n    scalesValidation(scales,
mode, isResize);\r\n  }\r\n\r\n  const extrapolationValue = node.attributes.getFloat('extrapolation_value', 0.0);\r\n\r\n
const coordinateTransformMode =\r\n      opset > 10 ? node.attributes.getString('coordinate_transformation_mode',
'half_pixel') : 'asymmetric';\r\n  if ([\r\n        'asymmetric', 'pytorch_half_pixel', 'tf_half_pixel_for_nn',
'align_corners', 'tf_crop_and_resize', 'half_pixel'\r\n      ].indexOf(coordinateTransformMode) === -1) {\r\n    throw
new Error(`coordinate_transform_mode '${coordinateTransformMode}' is not supported`);\r\n  }\r\n  const
needRoiInput = (coordinateTransformMode === 'tf_crop_and_resize');\r\n  const useExtrapolation =
needRoiInput;\r\n\r\n  const nearestMode =\r\n      (mode === 'nearest' && opset >= 11) ?
node.attributes.getString('nearest_mode', 'round_prefer_floor') : '';\r\n  if (['round_prefer_floor', 'round_prefer_ceil',
'floor', 'ceil', ''].indexOf(nearestMode) === -1) {\r\n    throw new Error(`nearest_mode '${nearestMode}' is not
supported`);\r\n  }\r\n\r\n  const cubicCoefficientA = node.attributes.getFloat('cubic_coeff_a', -0.75);\r\n  const
excludeOutside = node.attributes.getInt('exclude_outside', 0) !== 0;\r\n  if (excludeOutside && mode !== 'cubic')
{\r\n    throw new Error('exclude_outside can be set to 1 only when mode is CUBIC.');\r\n  }\r\n\r\n  const
useNearest2xOptimization =\r\n      (opset < 11) ? true : (mode === 'nearest' && coordinateTransformMode ===
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'asymmetric' && nearestMode === 'floor');\r\n\r\n  let roiInputIdx = 0;\r\n  let scalesInputIdx = 0;\r\n  let
sizesInputIdx = 0;\r\n\r\n  if (opset > 10) {\r\n    roiInputIdx = 1;\r\n    scalesInputIdx = 2;\r\n    sizesInputIdx = 3;\r\n
} else if (opset === 9) {\r\n    scalesInputIdx = 1;\r\n  }\r\n\r\n  return createAttributeWithCacheKey({\r\n
opset,\r\n    isResize,\r\n    mode,\r\n    scales,\r\n    extrapolationValue,\r\n    coordinateTransformMode,\r\n
useExtrapolation,\r\n    needRoiInput,\r\n    nearestMode,\r\n    cubicCoefficientA,\r\n    excludeOutside,\r\n
useNearest2xOptimization,\r\n    roiInputIdx,\r\n    scalesInputIdx,\r\n    sizesInputIdx\r\n  });\r\n};\r\n\r\nconst
createUpsampleProgramInfo =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes:
UpsampleAttributes): ProgramInfo => {\r\n      const glsl =
getGlsl(inferenceHandler.session.backend.glContext.version);\r\n      const [inputWidth, inputHeight] =\r\n
inferenceHandler.calculateTextureWidthAndHeight(inputs[0].dims, TextureType.unpacked);\r\n\r\n      const
outputShape = inputs[0].dims.map((dim, i) => Math.floor(dim * attributes.scales[i]));\r\n      const [outputWidth,
outputHeight] =\r\n          inferenceHandler.calculateTextureWidthAndHeight(outputShape,
TextureType.unpacked);\r\n      const dim = outputShape.length;\r\n\r\n      const outputPitches = new
Array<number>(dim);\r\n      const inputPitches = new Array<number>(dim);\r\n      let precalculatedPitches = `\r\n
   int output_pitches[${dim}];\r\n      int input_pitches[${dim}];\r\n      `;\r\n      for (let d = dim - 1; d >= 0; d--) {\r\n
      outputPitches[d] = (d === dim - 1) ? 1 : outputPitches[d + 1] * outputShape[d + 1];\r\n        inputPitches[d] = (d
=== dim - 1) ? 1 : inputPitches[d + 1] * inputs[0].dims[d + 1];\r\n\r\n        precalculatedPitches += `\r\n
output_pitches[${d}] = ${outputPitches[d]};\r\n        input_pitches[${d}] = ${inputPitches[d]};\r\n        `;\r\n
}\r\n      const getInputFloatFunction = `\r\n      float getInputFloat(int index) {\r\n        vec2 coords =
offsetToCoords(index, ${inputWidth}, ${inputHeight});\r\n        float value =
getColorAsFloat(${glsl.texture2D}(X, coords));\r\n        return value;\r\n      }\r\n      `;\r\n\r\n      const shaderSource
= attributes.mode === 'nearest' ?\r\n          // nearest\r\n          `\r\n    ${getInputFloatFunction}\r\n    float process(int
indices[${dim}]) {\r\n      int input_index = 0;\r\n      int output_index = coordsToOffset(TexCoords,
${outputWidth}, ${outputHeight});\r\n\r\n      ${precalculatedPitches}\r\n\r\n      int d, m;\r\n      for (int dim = 0;
dim < ${dim}; ++dim) {\r\n        d = output_index / output_pitches[dim];\r\n        m = output_index - d *
output_pitches[dim];\r\n        output_index = m;\r\n\r\n        if (scales[dim] != 1 && d > 0) {\r\n          int d2 = d /
scales[dim];\r\n          m = d - d2 * scales[dim];\r\n          d = d2;\r\n        }\r\n        input_index +=
input_pitches[dim] * d;\r\n      }\r\n\r\n      return getInputFloat(input_index);\r\n    }` :\r\n          dim === 4 ?\r\n
// bilinear 4D\r\n              `\r\n    ${getInputFloatFunction}\r\n    float process(int indices[4]) {\r\n      int input_index
= 0;\r\n      int output_index = coordsToOffset(TexCoords, ${outputWidth}, ${outputHeight});\r\n\r\n
${precalculatedPitches}\r\n\r\n      int m;\r\n      int index_of_dim0, index_of_dim1, index_of_dim2,
index_of_dim3;\r\n      index_of_dim0 = output_index / output_pitches[0];\r\n      m = output_index - index_of_dim0
* output_pitches[0];\r\n      index_of_dim1 = m / output_pitches[1];\r\n      m = m - index_of_dim1 *
output_pitches[1];\r\n      index_of_dim2 = m / output_pitches[2];\r\n      m = m - index_of_dim2 *
output_pitches[2];\r\n      index_of_dim3 = m;\r\n\r\n      int index_of_input_dim2, index_of_input_dim3, x_offset,
y_offset;\r\n      index_of_input_dim2 = index_of_dim2 / scales[2];\r\n      y_offset = index_of_dim2 -
index_of_input_dim2 * scales[2];\r\n      index_of_input_dim3 = index_of_dim3 / scales[3];\r\n      x_offset =
index_of_dim3 - index_of_input_dim3 * scales[3];\r\n\r\n      input_index = index_of_dim0 * input_pitches[0] +\r\n
        index_of_dim1 * input_pitches[1] +\r\n            index_of_input_dim2 * input_pitches[2] +\r\n
index_of_input_dim3;\r\n\r\n      float x00 = getInputFloat(input_index);\r\n      float x10, x01, x11;\r\n\r\n      bool
end_of_dim2 = false;\r\n      if (index_of_input_dim2 == (${inputs[0].dims[2]} - 1)) {\r\n        // It's the end in
dimension 2\r\n        x01 = x00;\r\n        end_of_dim2 = true;\r\n      } else {\r\n        x01 = getInputFloat(input_index
+ input_pitches[2]);\r\n      }\r\n\r\n      if (index_of_input_dim3 == (input_pitches[2] - 1)) {\r\n        // It's the end in
dimension 3\r\n        x10 = x00;\r\n        x11 = x01;\r\n        }\r\n      else {\r\n        x10 = getInputFloat(input_index +
1);\r\n        x11 = end_of_dim2 ? x10 : getInputFloat(input_index + input_pitches[2] + 1);\r\n      }\r\n\r\n      float y0
= x00 + float(y_offset) * (x01 - x00) / float(scales[2]);\r\n      float y1 = x10 + float(y_offset) * (x11 - x10) /
float(scales[2]);\r\n      return y0 + float(x_offset) * (y1 - y0) / float(scales[3]);\r\n    }` :\r\n              // bilinear 2D\r\n
          `\r\n    ${getInputFloatFunction}\r\n    float process(int indices[2]) {\r\n      int input_index = 0;\r\n      int
```

output_index = coordsToOffset(TexCoords, ${outputWidth}, ${outputHeight});\r\n\r\n ${precalculatedPitches}\r\n\r\n int m;\r\n int index_of_dim0, index_of_dim1;\r\n index_of_dim0 = output_index / output_pitches[0];\r\n m = output_index - index_of_dim0 * output_pitches[0];\r\n index_of_dim1 = m;\r\n\r\n int index_of_input_dim0, index_of_input_dim1, x_offset, y_offset;\r\n index_of_input_dim0 = index_of_dim0 / scales[0];\r\n y_offset = index_of_dim0 - index_of_input_dim0 * scales[0];\r\n index_of_input_dim1 = index_of_dim1 / scales[1];\r\n x_offset = index_of_dim1 - index_of_input_dim1 * scales[1];\r\n\r\n input_index = index_of_input_dim0 * input_pitches[0] + index_of_input_dim1;\r\n\r\n float x00 = getInputFloat(input_index);\r\n float x10, x01, x11;\r\n\r\n bool end_of_dim0 = false;\r\n if (index_of_input_dim0 == (${inputs[0].dims[0]} - 1)) {\r\n // It's the end in dimension 0\r\n x01 = x00;\r\n end_of_dim0 = true;\r\n } else {\r\n x01 = getInputFloat(input_index + input_pitches[0]);\r\n }\r\n\r\n if (index_of_input_dim1 == (input_pitches[0] - 1)) {\r\n // It's the end in dimension 1\r\n x10 = x00;\r\n x11 = x01;\r\n }\r\n else {\r\n x10 = getInputFloat(input_index + 1);\r\n x11 = end_of_dim0 ? x10 : getInputFloat(input_index + input_pitches[0] + 1);\r\n }\r\n\r\n float y0 = x00 + float(y_offset) * (x01 - x00) / float(scales[0]);\r\n float y1 = x10 + float(y_offset) * (x11 - x10) / float(scales[0]);\r\n return y0 + float(x_offset) * (y1 - y0) / float(scales[1]);\r\n }`;\r\n return {\r\n ...upsampleProgramMetadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n shaderSource,\r\n variables: [{\r\n name: 'scales',\r\n type: 'int',\r\n arrayLength: attributes.scales.length,\r\n data: attributes.scales.map(x => Math.ceil(x))\r\n }]\r\n };\r\n };\r\n\r\nexport const validateInputs = (inputs: Tensor[], attribute: UpsampleAttributes): void => {\r\n if (!inputs || (attribute.opset < 9 && inputs.length !== 1) ||\r\n (attribute.opset >= 9 && attribute.opset < 11 && inputs.length !== 2) ||\r\n (attribute.opset >= 11 && inputs.length !== 3 && inputs.length !== 4)) {\r\n throw new Error('invalid inputs.');\r\n }\r\n\r\n if (attribute.scales.length > 0 && inputs[0].dims.length !== attribute.scales.length) {\r\n throw new Error('Invalid input shape.');\r\n }\r\n\r\n if (inputs[0].type === 'string') {\r\n throw new Error('Invalid input tensor types.');\r\n }\r\n};\r\n\r\nexport const scalesValidation = (scales: number[], mode: string, isResize: boolean): void => {\r\n if (!isResize) {\r\n for (const scale of scales) {\r\n if (scale < 1) {\r\n throw new Error('Scale value should be greater than or equal to 1.');\r\n }\r\n }\r\n } else {\r\n for (const scale of scales) {\r\n if (scale <= 0) {\r\n throw new Error('Scale value should be greater than 0.');\r\n }\r\n }\r\n }\r\n if (mode === 'linear' || mode === 'cubic') {\r\n if (scales.length !== 2 && (scales.length !== 4 || scales[0] !== 1 || scales[1] !== 1)) {\r\n throw new Error(`'Linear' mode and 'Cubic' mode only support 2-D inputs ('Bilinear', 'Bicubic') \\\r\n or 4-D inputs with the corresponding outermost 2 scale values being 1 \\\r\n in the ${isResize ? 'Resize' : 'Upsample'} opeartor.`);\r\n }\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env} from 'onnxruntime-common';\r\nimport {Logger, Profiler} from '../../instrument';\r\n\r\nimport {GlslPreprocessor} from './glsl-preprocessor';\r\nimport {getVertexShaderSource} from './glsl-source';\r\nimport {TextureLayoutStrategy} from './texture-layout-strategy';\r\nimport {Artifact, ProgramInfo, ProgramVariable, TextureData, TextureLayout, VariableInfo} from './types';\r\nimport {WebGLContext} from './webgl-context';\r\n\r\n/**\r\n * ProgramManager is the main class behind running computations\r\n * It builds ProgramInfo's into Artifacts\r\n * It compiles given ProgramInfo's into WebGL Prorams (cached as Artifacts)\r\n * Uses the artifact to run the computation by calling Draw on\r\n * the WebGL drawing buffer\r\n * ProgramManager automatically maps (binds) input variables to their\r\n * corresponding Location's in the binary program\r\n */\r\nexport class ProgramManager {\r\n repo: Map<unknown, Artifact>; // this should be per-session object\r\n vertexShader: WebGLShader;\r\n attributesBound: boolean;\r\n\r\n constructor(\r\n public profiler: Readonly<Profiler>, public glContext: WebGLContext,\r\n public textureLayoutStrategy: TextureLayoutStrategy) {\r\n this.repo = new Map();\r\n this.attributesBound = false;\r\n }\r\n getArtifact(key: unknown): Artifact|undefined {\r\n return this.repo.get(key);\r\n }\r\n setArtifact(key: unknown, artifact: Artifact): void {\r\n this.repo.set(key, artifact);\r\n }\r\n run(buildArtifact: Artifact, inputs: TextureData[], output: TextureData): void {\r\n this.profiler.event('op', `ProgramManager.run ${buildArtifact.programInfo.name ?? 'unknown kernel'}`, () => {\r\n const gl = this.glContext.gl;\r\n const program = buildArtifact.program;\r\n gl.useProgram(program);\r\n try {\r\n this.bindOutput(output);\r\n   if (!this.attributesBound) {\r\n   this.bindAttributes(buildArtifact.attribLocations);\r\n   }\r\n   this.bindUniforms(buildArtifact.uniformLocations, buildArtifact.programInfo.variables ?? [], inputs);\r\n   } catch (err) {\r\n   Logger.error('ProgramManager', buildArtifact.programInfo.shaderSource);\r\n   throw err;\r\n   }\r\n   this.profiler.event('backend', 'GlContext.draw()', () => {\r\n   this.glContext.draw();\r\n   });\r\n   }, this.glContext);\r\n }\r\n dispose(): void {\r\n   if (this.vertexShader) {\r\n   this.glContext.deleteShader(this.vertexShader);\r\n   }\r\n   this.repo.forEach(a => this.glContext.deleteProgram(a.program));\r\n }\r\n build(programInfo: ProgramInfo, inputTextureLayouts: TextureLayout[], outputTextureLayout: TextureLayout): Artifact {\r\n   return this.profiler.event('backend', 'ProgramManager.build', () => {\r\n   const preprocessor = new GlslPreprocessor(this.glContext, programInfo, inputTextureLayouts, outputTextureLayout);\r\n   const fragScript = preprocessor.preprocess();\r\n   const program = this.compile(fragScript);\r\n   const artifact = {\r\n   programInfo,\r\n   program,\r\n   uniformLocations: this.getUniformLocations(\r\n   program, preprocessor.context.programInfo.inputNames, preprocessor.context.programInfo.variables),\r\n   attribLocations: this.getAttribLocations(program)\r\n   };\r\n   return artifact;\r\n   });\r\n }\r\n protected compile(fragShaderScript: string): WebGLProgram {\r\n   if (!this.vertexShader) {\r\n   Logger.verbose('ProrgramManager', 'Compiling and caching Vertex shader for the first time');\r\n   const vertexShaderScript = getVertexShaderSource(this.glContext.version);\r\n   this.vertexShader = this.glContext.compileShader(vertexShaderScript, this.glContext.gl.VERTEX_SHADER);\r\n   }\r\n   if (env.debug) {\r\n   Logger.verbose('ProrgramManager', `FragShader:\r\n${fragShaderScript}\r\n`);\r\n   }\r\n   const fragShader = this.glContext.compileShader(fragShaderScript, this.glContext.gl.FRAGMENT_SHADER);\r\n   const program = this.glContext.createProgram(this.vertexShader, fragShader);\r\n   this.glContext.deleteShader(fragShader);\r\n   return program;\r\n }\r\n bindOutput(td: TextureData): void {\r\n   const width = td.width;\r\n   const height = td.height;\r\n   Logger.verbose(\r\n   'ProrgramManager',\r\n   `Binding output texture to Framebuffer: w/h=${width}/${height}, shape=${td.shape}, type=${td.tensor.type}`);\r\n   this.glContext.attachFramebuffer(td.texture, width, height);\r\n }\r\n bindAttributes(attribLocations: Artifact.AttribLocations): void {\r\n   const positionHandle = attribLocations.position;\r\n   const textureCoordHandle = attribLocations.textureCoord;\r\n   this.glContext.setVertexAttributes(positionHandle, textureCoordHandle);\r\n   this.attributesBound = true;\r\n }\r\n bindUniforms(uniformLocations: Artifact.UniformLocations, variables: ProgramVariable[], textures: TextureData[]):\r\n   void {\r\n   const gl = this.glContext.gl;\r\n   let texturePosition = 0;\r\n   for (const {name, type, location, arrayLength} of uniformLocations) {\r\n   const value = variables.find(v => v.name === name)?.data;\r\n   if (type !== 'sampler2D' && !value) {\r\n   throw new Error(`variable '${name}' does not have data defined in program info`);\r\n   }\r\n   switch (type) {\r\n   case 'sampler2D':\r\n   this.bindTexture(textures[texturePosition], location, texturePosition);\r\n   texturePosition++;\r\n   break;\r\n   case 'float':\r\n   if (arrayLength) {\r\n   gl.uniform1fv(location, value as number[]);\r\n   } else {\r\n   gl.uniform1f(location, value as number);\r\n   }\r\n   break;\r\n   case 'int':\r\n   if (arrayLength) {\r\n   gl.uniform1iv(location, value as number[]);\r\n   } else {\r\n   gl.uniform1i(location, value as number);\r\n   }\r\n   break;\r\n   default:\r\n   throw new Error(`Uniform not implemented: ${type}`);\r\n   }\r\n   }\r\n }\r\n bindTexture(td: TextureData, uniformHandle: WebGLUniformLocation, position: number): void {\r\n   this.glContext.bindTextureToUniform(td.texture, position, uniformHandle);\r\n }\r\n getAttribLocations(program: WebGLProgram): Artifact.AttribLocations {\r\n   return {\r\n   position: this.getAttribLocation(program, 'position'),\r\n   textureCoord: this.getAttribLocation(program, 'textureCoord')\r\n   };\r\n }\r\n getUniformLocations(program: WebGLProgram, samplers?: string[], variables?: VariableInfo[]):\r\n   Artifact.UniformLocations {\r\n   const uniformLocations: Artifact.UniformLocations = [];\r\n   if (samplers) {\r\n   for (const sampler of samplers) {\r\n   uniformLocations.push({name: sampler, type: 'sampler2D', location: this.getUniformLocation(program, sampler)});\r\n   }\r\n   }\r\n   if (variables) {\r\n   for (const variable of variables) {\r\n   uniformLocations.push({...variable, location: this.getUniformLocation(program, variable.name)});\r\n   }\r\n   }\r\n   return uniformLocations;\r\n }\r\n getUniformLocation(program:

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WebGLProgram, name: string): WebGLUniformLocation {\r\n    const gl = this.glContext.gl;\r\n    const reference =
gl.getUniformLocation(program, name);\r\n    if (reference === null) {\r\n      throw new Error(`Uniform ${name}
not found.`);\r\n    }\r\n    return reference;\r\n  }\r\n  getAttribLocation(program: WebGLProgram, name: string):
number {\r\n    const gl = this.glContext.gl;\r\n    const attributeLocation: number = gl.getAttribLocation(program,
name);\r\n    return attributeLocation;\r\n  }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights
reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {SessionHandler} from '../../backend';\r\nimport
{Graph} from '../../graph';\r\nimport {Logger} from '../../instrument';\r\nimport {Operator} from
'../../operators';\r\nimport {OpSet, resolveOperator} from '../../opset';\r\nimport {Session} from
'../../session';\r\nimport {Tensor} from '../../tensor';\r\nimport {WebGLBackend} from '../backend-
webgl';\r\n\r\nimport {WebGLInferenceHandler} from './inference-handler';\r\nimport
{WEBGL_OP_RESOLVE_RULES} from './op-resolve-rules';\r\nimport {ProgramManager} from './program-
manager';\r\nimport {PreferLogicalStrategy, TextureLayoutStrategy} from './texture-layout-strategy';\r\nimport
{TextureManager} from './texture-manager';\r\nimport {TextureData} from './types';\r\n\r\nexport class
WebGLSessionHandler implements SessionHandler {\r\n  programManager: ProgramManager;\r\n
textureManager: TextureManager;\r\n  layoutStrategy: TextureLayoutStrategy;\r\n  packedTextureDataCache:
Map<Tensor.Id, TextureData>;\r\n  unpackedTextureDataCache: Map<Tensor.Id, TextureData>;\r\n
pack2unpackMap: Map<Tensor.Id, Tensor.Id>;\r\n  unpack2packMap: Map<Tensor.Id, Tensor.Id>;\r\n  initializers:
Set<Tensor.Id>;\r\n  pack?: boolean;\r\n\r\n  constructor(public readonly backend: WebGLBackend, public readonly
context: Session.Context) {\r\n    this.layoutStrategy = new
PreferLogicalStrategy(backend.glContext.maxTextureSize);\r\n    this.programManager = new
ProgramManager(this.context.profiler, backend.glContext, this.layoutStrategy);\r\n    this.textureManager = new
TextureManager(\r\n        backend.glContext, this.layoutStrategy, this.context.profiler,\r\n        {reuseTextures:
backend.textureCacheMode === 'full'});\r\n    this.packedTextureDataCache = new Map();\r\n
this.unpackedTextureDataCache = new Map();\r\n    this.pack = backend.pack;\r\n    this.pack2unpackMap = new
Map();\r\n    this.unpack2packMap = new Map();\r\n  }\r\n\r\n  createInferenceHandler() {\r\n    return new
WebGLInferenceHandler(this);\r\n  }\r\n  onGraphInitialized(graph: Graph): void {\r\n    const initializers =
graph.getValues().filter(v => v.from === -1 && v.tensor).map(v => v.tensor!.dataId);\r\n    this.initializers = new
Set(initializers);\r\n  }\r\n  isInitializer(tensorId: Tensor.Id): boolean {\r\n    return this.initializers ?
this.initializers.has(tensorId) : false;\r\n  }\r\n  addInitializer(tensorId: Tensor.Id): void {\r\n
this.initializers.add(tensorId);\r\n  }\r\n  getTextureData(tensorId: Tensor.Id, isPacked: boolean):
TextureData|undefined {\r\n    if (isPacked) {\r\n      return this.packedTextureDataCache.get(tensorId);\r\n    } else
{\r\n      return this.unpackedTextureDataCache.get(tensorId);\r\n    }\r\n  }\r\n  setTextureData(tensorId: Tensor.Id,
textureData: TextureData, isPacked = false): void {\r\n    Logger.verbose('WebGLSessionHandler', 'Storing Texture
data in cache');\r\n    if (isPacked) {\r\n      this.packedTextureDataCache.set(tensorId, textureData);\r\n    } else {\r\n
    this.unpackedTextureDataCache.set(tensorId, textureData);\r\n    }\r\n  }\r\n  dispose(): void {\r\n
this.programManager.dispose();\r\n    this.textureManager.clearActiveTextures();\r\n
this.packedTextureDataCache.forEach(td => this.textureManager.releaseTexture(td, true));\r\n
this.packedTextureDataCache = new Map();\r\n    this.unpackedTextureDataCache.forEach(td =>
this.textureManager.releaseTexture(td, true));\r\n    this.unpackedTextureDataCache = new Map();\r\n  }\r\n
resolve(node: Graph.Node, opsets: readonly OpSet[], graph: Graph): Operator {\r\n    const op =
resolveOperator(node, opsets, WEBGL_OP_RESOLVE_RULES);\r\n    return {impl: op.opImpl, context: op.opInit
? op.opInit(node, graph) : node};\r\n  }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n//
Licensed under the MIT License.\r\n\r\nimport {Logger} from '../../instrument';\r\n\r\nexport declare namespace
Encoder {\r\n  export interface DataTypeMap {\r\n    float: Float32Array;\r\n    byte: Uint8Array;\r\n    int:
Uint32Array;\r\n  }\r\n  export type DataType = keyof DataTypeMap;\r\n  type DataArrayType =
DataTypeMap[DataType];\r\n\r\n  /* eslint-disable @typescript-eslint/naming-convention */\r\n  export const enum
Usage {\r\n    Default = 0,\r\n    UploadOnly,\r\n    Download4BytesAsFloat32,\r\n  }\r\n}\r\n\r\n/**\r\n *
Abstraction for mapping data types to texture texlets\r\n * Encoding means how a Float32 is mapped to 1 or 4
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channels for each texlet\r\n * Decoding means how a texlet's channels are mapped to a resulting Float32\r\n */\r\nexport interface DataEncoder {\r\n internalFormat: number;\r\n format: number;\r\n textureType: number;\r\n channelSize: number;\r\n encode(src: Encoder.DataArrayType, textureSize: number): Encoder.DataArrayType;\r\n allocate(size: number): Encoder.DataArrayType;\r\n decode(buffer: Encoder.DataArrayType, dataSize: number): Encoder.DataArrayType;\r\n}\r\n/**\r\n * WebGL2 data encoder\r\n * Uses R32F as the format for texlet\r\n */\r\nexport class RedFloat32DataEncoder implements DataEncoder {\r\n internalFormat: number;\r\n format: number;\r\n textureType: number;\r\n channelSize: number;\r\n constructor(gl: WebGL2RenderingContext, channels = 1) {\r\n   if (channels === 1) {\r\n   this.internalFormat = gl.R32F;\r\n   this.format = gl.RED;\r\n   this.textureType = gl.FLOAT;\r\n   this.channelSize = channels;\r\n   } else if (channels === 4) {\r\n   this.internalFormat = gl.RGBA32F;\r\n   this.format = gl.RGBA;\r\n   this.textureType = gl.FLOAT;\r\n   this.channelSize = channels;\r\n   } else {\r\n   throw new Error(`Invalid number of channels: ${channels}`);\r\n   }\r\n }\r\n encode(src: Encoder.DataArrayType, textureSize: number): Encoder.DataArrayType {\r\n   let result: Float32Array;\r\n   let source: Float32Array;\r\n   if (src.constructor !== Float32Array) {\r\n   Logger.warning('Encoder', 'data was not of type Float32; creating new Float32Array');\r\n   source = new Float32Array(src);\r\n   }\r\n   if (textureSize * this.channelSize > src.length) {\r\n   Logger.warning('Encoder', 'Source data too small. Allocating larger array');\r\n   source = src as Float32Array;\r\n   result = this.allocate(textureSize * this.channelSize) as Float32Array;\r\n   source.forEach((v, i) => result[i] = v);\r\n   } else {\r\n   source = src as Float32Array;\r\n   result = source;\r\n   }\r\n   return result;\r\n }\r\n allocate(size: number): Encoder.DataArrayType {\r\n   return new Float32Array(size * 4);\r\n }\r\n decode(buffer: Encoder.DataArrayType, dataSize: number): Float32Array {\r\n   if (this.channelSize === 1) {\r\n   const filteredData = (buffer as Float32Array).filter((value, index) => index % 4 === 0).subarray(0, dataSize);\r\n   return filteredData;\r\n   }\r\n   return buffer.subarray(0, dataSize) as Float32Array;\r\n }\r\n}\r\n/**\r\n * Data encoder for WebGL 1 with support for floating point texture\r\n */\r\nexport class RGBAFloatDataEncoder implements DataEncoder {\r\n internalFormat: number;\r\n format: number;\r\n textureType: number;\r\n channelSize: number;\r\n constructor(gl: WebGLRenderingContext, channels = 1, textureType?: number) {\r\n   if (channels !== 1 && channels !== 4) {\r\n   throw new Error(`Invalid number of channels: ${channels}`);\r\n   }\r\n   this.internalFormat = gl.RGBA;\r\n   this.format = gl.RGBA;\r\n   this.channelSize = channels;\r\n   this.textureType = textureType || gl.FLOAT;\r\n }\r\n encode(src: Float32Array, textureSize: number): Encoder.DataArrayType {\r\n   let dest = src;\r\n   if (this.channelSize === 1) {\r\n   Logger.verbose('Encoder', 'Exploding into a larger array');\r\n   dest = this.allocate(textureSize) as Float32Array;\r\n   src.forEach((v, i) => dest[i * 4] = v);\r\n   }\r\n   return dest;\r\n }\r\n allocate(size: number): Encoder.DataArrayType {\r\n   return new Float32Array(size * 4);\r\n }\r\n decode(buffer: Encoder.DataArrayType, dataSize: number): Float32Array {\r\n   if (this.channelSize === 1) {\r\n   const filteredData = (buffer as Float32Array).filter((value, index) => index % 4 === 0).subarray(0, dataSize);\r\n   return filteredData;\r\n   }\r\n   return buffer.subarray(0, dataSize) as Float32Array;\r\n }\r\n}\r\n\r\nexport class Uint8DataEncoder implements DataEncoder {\r\n internalFormat: number;\r\n format: number;\r\n textureType: number;\r\n channelSize = 4;\r\n constructor(gl: WebGLRenderingContext, channels = 1) {\r\n   if (channels === 1) {\r\n   this.internalFormat = gl.ALPHA;\r\n   this.format = gl.ALPHA; // not tested\r\n   this.textureType = gl.UNSIGNED_BYTE;\r\n   this.channelSize = channels;\r\n   } else if (channels === 4) {\r\n   this.internalFormat = gl.RGBA;\r\n   this.format = gl.RGBA;\r\n   this.textureType = gl.UNSIGNED_BYTE;\r\n   this.channelSize = channels;\r\n   } else {\r\n   throw new Error(`Invalid number of channels: ${channels}`);\r\n   }\r\n }\r\n encode(src: Uint8Array, _textureSize: number): Encoder.DataArrayType {\r\n   return new Uint8Array(src.buffer, src.byteOffset, src.byteLength);\r\n }\r\n allocate(size: number): Encoder.DataArrayType {\r\n   return new Uint8Array(size * this.channelSize);\r\n }\r\n decode(buffer: Encoder.DataArrayType, dataSize: number): Uint8Array {\r\n   if (buffer instanceof Uint8Array) {\r\n   return buffer.subarray(0, dataSize);\r\n   }\r\n   throw new Error(`Invalid array type: ${buffer.constructor}`);\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Logger} from '../../instrument';\r\nimport {assert} from '../../util';\r\n/** Layout preferences */\r\nexport interface WidthHeightPrefs {\r\n breakAxis?: number;\r\n isPacked?: boolean;\r\n

reverseWH?: boolean;\r\n}\r\n/**\r\n * TextureLayoutStrategy is an abstraction for different plans\r\n * for mapping n-dimensional arrays to 2D textures (and back)\r\n */\r\nexport interface TextureLayoutStrategy {\r\n computeTextureWH(shape: readonly number[], prefs?: WidthHeightPrefs): [number, number];\r\n}\r\n\r\n/**\r\n * This strategy try to find the minimal max(W,H) that fulfills (W * H == totalSize)\r\n */\r\nexport class AlwaysKeepOriginalSizeStrategy implements TextureLayoutStrategy {\r\n constructor(public maxTextureSize: number) {}\r\n computeTextureWH(shape: readonly number[], prefs?: WidthHeightPrefs): [number, number] {\r\n   // scalar tensor\r\n   if (shape.length === 0) {\r\n   return [1, 1];\r\n   }\r\n   const maxTextureSize = this.maxTextureSize;\r\n   if (prefs && prefs.breakAxis !== undefined) {\r\n   // check to see if dims fit\r\n   const wsize = prefs.breakAxis >= shape.length ? 1 : shape.slice(prefs.breakAxis).reduce((a, b) => a * b);\r\n   const hsize = prefs.breakAxis <= 0 ? 1 : shape.slice(0, prefs.breakAxis).reduce((a, b) => a * b);\r\n   if (wsize > maxTextureSize || hsize > maxTextureSize) {\r\n   // ignore preferences\r\n   // continue with default layout\r\n   Logger.verbose(\r\n   'TextureLayout',\r\n   `Given width/height preferences were unattainable: shape:${shape}, breakAxis:${prefs.breakAxis}`);\r\n   } else {\r\n   return [wsize, hsize];\r\n   }\r\n   }\r\n   const totalSize = shape.reduce((a, b) => a * b);\r\n\r\n   let width = Math.floor(Math.sqrt(totalSize));\r\n\r\n   for (; width < maxTextureSize && width < totalSize; width++) {\r\n   if (totalSize % width === 0) {\r\n   break;\r\n   }\r\n   }\r\n\r\n   if (width >= maxTextureSize || totalSize % width !== 0) {\r\n   throw new Error(`The given dimensions are outside this GPU's boundaries: ${shape}`);\r\n   }\r\n   return [width, totalSize / width];\r\n }\r\n}\r\n\r\nexport class PreferLogicalStrategy implements TextureLayoutStrategy {\r\n constructor(public maxTextureSize: number) {}\r\n computeTextureWH(shape: readonly number[], prefs?: WidthHeightPrefs): [number, number] {\r\n   const wh = this.computeTexture(shape, prefs);\r\n   if (prefs && prefs.isPacked) {\r\n   wh[0] /= 2;\r\n   wh[1] /= 2;\r\n   }\r\n   if (prefs && prefs.reverseWH) {\r\n   return [wh[1], wh[0]];\r\n   }\r\n   return wh;\r\n }\r\n\r\n computeTexture(shape: readonly number[], prefs?: WidthHeightPrefs): [number, number] {\r\n   const isPacked = prefs && prefs.isPacked;\r\n   // scalar tensor\r\n   if (shape.length === 0) {\r\n   return isPacked ? [2, 2] : [1, 1];\r\n   }\r\n   let maxTextureSize = this.maxTextureSize;\r\n   if (prefs && prefs.breakAxis !== undefined) {\r\n   // check to see if dims fit\r\n   const wsize = prefs.breakAxis >= shape.length ? 1 : shape.slice(prefs.breakAxis).reduce((a, b) => a * b);\r\n   const hsize = prefs.breakAxis <= 0 ? 1 : shape.slice(0, prefs.breakAxis).reduce((a, b) => a * b);\r\n   if (wsize > maxTextureSize || hsize > maxTextureSize) {\r\n   // ignore preferences\r\n   // continue with default layout\r\n   Logger.verbose(\r\n   'TextureLayout',\r\n   `Given width/height preferences were unattainable: shape:${shape}, breakAxis:${prefs.breakAxis}`);\r\n   } else {\r\n   return [wsize, hsize];\r\n   }\r\n   }\r\n   let logShape = shape.slice(0);\r\n   if (isPacked) {\r\n   maxTextureSize = maxTextureSize * 2;\r\n\r\n   // This logic ensures we accurately count the number of packed texels needed\r\n   // to accommodate the tensor. We can only pack values in the same texel if\r\n   // they are from adjacent pairs of rows/cols within the same batch. So if a\r\n   // tensor has 3 rows, we pretend it has 4 rows in order to account for the\r\n   // fact that the texels containing the third row are half empty.\r\n   logShape = logShape.map(\r\n   (d, i) => i >= logShape.length - 2 ? (logShape[i] % 2 === 0 ? logShape[i] : logShape[i] + 1) : logShape[i]);\r\n\r\n   // Packed texture height is at least 2 (the channel height of a single\r\n   // texel).\r\n   if (logShape.length === 1) {\r\n   logShape = [2, logShape[0]];\r\n   }\r\n   }\r\n\r\n   // If logical shape is 2, we don't squeeze, since we want to match physical.\r\n   if (logShape.length !== 2) {\r\n   const squeezeResult = squeezeShape(logShape);\r\n   logShape = squeezeResult.newShape;\r\n   }\r\n\r\n   const size = sizeFromShape(logShape);\r\n   if (logShape.length <= 1 && size <= maxTextureSize) {\r\n   return [1, size];\r\n   } else if (logShape.length === 2 && logShape[0] <= maxTextureSize && logShape[1] <= maxTextureSize) {\r\n   return logShape as [number, number];\r\n   } else if (logShape.length === 3 && logShape[0] * logShape[1] <= maxTextureSize && logShape[2] <= maxTextureSize) {\r\n   return [logShape[0] * logShape[1], logShape[2]];\r\n   } else if (logShape.length === 3 && logShape[0] <= maxTextureSize && logShape[1] * logShape[2] <= maxTextureSize) {\r\n   return [logShape[0], logShape[1] * logShape[2]];\r\n   } else if (\r\n   logShape.length === 4 && logShape[0] * logShape[1] * logShape[2] <= maxTextureSize &&\r\n   logShape[3] <= maxTextureSize) {\r\n   return [logShape[0] * logShape[1] * logShape[2], logShape[3]];\r\n   } else if (\r\n   logShape.length === 4 && logShape[0] <= maxTextureSize &&\r\n   logShape[1] * logShape[2] * logShape[3]

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<= maxTextureSize) {\r\n      return [logShape[0], logShape[1] * logShape[2] * logShape[3]];\r\n    } else {\r\n      if
(isPacked) {\r\n        // For packed textures size equals the number of channels required to\r\n        // accommodate
the texture data. However in order to squarify such that\r\n        // inner dimensions stay even, we rewrite size to
equal the number of\r\n        // texels. Then in the return statement we rehydrate the squarified\r\n        // dimensions
to channel units.\r\n        return sizeToSquarishShape(size / 4).map(d => d * 2) as [number, number];\r\n      }\r\n
return sizeToSquarishShape(size);\r\n    }\r\n  }\r\n}\r\n\r\nexport function squeezeShape(shape: number[], axis?:
number[]): {newShape: number[]; keptDims: number[]} {\r\n  const newShape: number[] = [];\r\n  const keptDims:
number[] = [];\r\n  const isEmptyArray = axis != null && Array.isArray(axis) && axis.length === 0;\r\n  const axes
= (axis == null || isEmptyArray) ? null : parseAxisParam(axis, shape).sort();\r\n  let j = 0;\r\n  for (let i = 0; i <
shape.length; ++i) {\r\n    if (axes != null) {\r\n      if (axes[j] === i && shape[i] !== 1) {\r\n        throw new
Error(`Can't squeeze axis ${i} since its dim '${shape[i]}' is not 1`);\r\n      }\r\n      if ((axes[j] == null || axes[j] > i)
&& shape[i] === 1) {\r\n        newShape.push(shape[i]);\r\n        keptDims.push(i);\r\n      }\r\n      if (axes[j] <= i)
{\r\n        j++;\r\n      }\r\n    }\r\n    if (shape[i] !== 1) {\r\n      newShape.push(shape[i]);\r\n
keptDims.push(i);\r\n    }\r\n  }\r\n  return {newShape, keptDims};\r\n}\r\n\r\nexport function parseAxisParam(axis:
number|number[], shape: number[]): number[] {\r\n  const rank = shape.length;\r\n\r\n  // Normalize input\r\n  axis =
axis == null ? shape.map((s, i) => i) : ([] as number[]).concat(axis);\r\n\r\n  // Check for valid range\r\n  assert(\r\n
axis.every(ax => ax >= -rank && ax < rank),\r\n      () => `All values in axis param must be in range [-${rank},
${rank}) but ` +\r\n          `got axis ${axis}`);\r\n\r\n  // Check for only integers\r\n  assert(\r\n
axis.every(isInt),\r\n      () => 'All values in axis param must be integers but ' +\r\n          `got axis ${axis}`);\r\n\r\n
// Handle negative axis.\r\n  return axis.map(a => a < 0 ? rank + a : a);\r\n}\r\nexport function isInt(a: number):
boolean {\r\n  return a % 1 === 0;\r\n}\r\nexport function sizeFromShape(shape: number[]): number {\r\n  if
(shape.length === 0) {\r\n    // Scalar.\r\n    return 1;\r\n  }\r\n  let size = shape[0];\r\n  for (let i = 1; i < shape.length;
i++) {\r\n    size *= shape[i];\r\n  }\r\n  return size;\r\n}\r\nexport function getRowsCols(shape: number[]): [number,
number] {\r\n  if (shape.length === 0) {\r\n    throw Error('Cannot get rows and columns of an empty shape
array.');\r\n  }\r\n\r\n  return [shape.length > 1 ? shape[shape.length - 2] : 1, shape[shape.length - 1]];\r\n}\r\nexport
function sizeToSquarishShape(size: number): [number, number] {\r\n  const width = Math.ceil(Math.sqrt(size));\r\n
return [width, Math.ceil(size / width)];\r\n}\r\nexport function getBatchDim(shape: number[], dimsToSkip = 2):
number {\r\n  return sizeFromShape(shape.slice(0, shape.length - dimsToSkip));\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {ShapeUtil} from
'../../util';\r\nimport {TextureLayoutStrategy, WidthHeightPrefs} from './texture-layout-strategy';\r\nimport
{TextureLayout, TextureType} from './types';\r\n\r\nexport const createTextureLayoutFromTextureType =\r\n
(textureLayoutStrategy: TextureLayoutStrategy, shape: readonly number[],\r\n     textureType: TextureType):
TextureLayout => {\r\n      const channel = (textureType === TextureType.unpacked || textureType ===
TextureType.unpackedReversed) ? 1 : 4;\r\n      const isPacked = textureType === TextureType.packed;\r\n      const
reverseWH = (textureType === TextureType.unpackedReversed || textureType === TextureType.packed);\r\n
const breakAxis = textureType === TextureType.packedLastDimension ? shape.length - 1 : undefined;\r\n      const
unpackedShape = textureType === TextureType.packedLastDimension ?\r\n          shape.map((d, i) => i ===
shape.length - 1 ? d * 4 : d) :\r\n          undefined;\r\n      return createTextureLayoutFromShape(\r\n
textureLayoutStrategy, shape, channel, unpackedShape, {isPacked, reverseWH, breakAxis});\r\n    };\r\n\r\nexport
const calculateTextureWidthAndHeight =\r\n    (textureLayoutStrategy: TextureLayoutStrategy, shape: readonly
number[], textureType: TextureType):\r\n        [number, number] => {\r\n          const layout =
createTextureLayoutFromTextureType(textureLayoutStrategy, shape, textureType);\r\n          return [layout.width,
layout.height];\r\n        };\r\n\r\n/**\r\n * Create a TextureLayout object from shape.\r\n */\r\nexport const
createTextureLayoutFromShape =\r\n    (textureLayoutStrategy: TextureLayoutStrategy, shape: readonly number[],
channels: 1|4 = 1,\r\n     unpackedShape?: readonly number[], prefs?: WidthHeightPrefs): TextureLayout => {\r\n
const isPacked = !!(prefs && prefs.isPacked);\r\n      const [width, height] =
textureLayoutStrategy.computeTextureWH(isPacked ? unpackedShape || shape : shape, prefs);\r\n      const rank =
shape.length;\r\n      let inferredDims = shape.slice(0);\r\n      if (rank === 0) {\r\n        inferredDims = [1];\r\n
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}\r\n    if (channels === 1) {\r\n      // unpackedShape will take `shape` and not `inferredDims` so as to create a
scalar Tensor if need be\r\n      unpackedShape = shape;\r\n    } else if (isPacked) {\r\n      if (channels !== 4)
{\r\n        throw new Error('a packed texture must be 4-channel');\r\n      }\r\n      unpackedShape = shape;\r\n
if (rank > 0) {\r\n        inferredDims[rank - 1] = Math.ceil(inferredDims[rank - 1] / 2);\r\n      }\r\n      if (rank >
1) {\r\n        inferredDims[rank - 2] = Math.ceil(inferredDims[rank - 2] / 2);\r\n      }\r\n    } else if
(!unpackedShape) {\r\n      throw new Error('Unpacked shape is needed when using channels > 1');\r\n    }\r\n
return {\r\n      width,\r\n      height,\r\n      channels,\r\n      isPacked,\r\n      shape: inferredDims,\r\n
strides: ShapeUtil.computeStrides(inferredDims),\r\n      unpackedShape,\r\n      reversedWH: (prefs &&
prefs.reverseWH)\r\n    };\r\n  };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed
under the MIT License.\r\n\r\nimport {Logger, Profiler} from '../../instrument';\r\nimport {Tensor} from
'../../tensor';\r\n\r\nimport {Encoder} from './texture-data-encoder';\r\nimport {TextureLayoutStrategy} from
'./texture-layout-strategy';\r\nimport {TextureData, TextureLayout} from './types';\r\nimport {WebGLContext} from
'./webgl-context';\r\n\r\nexport interface TextureManagerConfig {\r\n  reuseTextures?: boolean;\r\n}\r\n\r\n/**\r\n *
TextureManager is the mainly responsible for caching Textures\r\n * Textures are cached in 2 levels:\r\n *   1. the
texures which are associated with a dataId (from Tensor)\r\n *    Caching these is crucial to performance. These are
In-use Textures\r\n *   2. textures which are not in use by any current ProgramInfo/Tensor\r\n *     These are called
Free Textures\r\n * TextureManager is also used to help creating textures. For this it\r\n * uses WebGLContext and
TextureLayoutStrategy\r\n */\r\nexport class TextureManager {\r\n  private readonly inUseTextures: Map<string,
WebGLTexture[]>;\r\n  private readonly idleTextures: Map<string, WebGLTexture[]>;\r\n  private readonly
textureLookup: Map<WebGLTexture, string>;\r\n  private readonly pendingRead: Map<Tensor.Id, Array<(arr:
Tensor.NumberType) => void>> = new Map();\r\n\r\n  constructor(\r\n      public glContext: WebGLContext, public
layoutStrategy: TextureLayoutStrategy, public profiler: Readonly<Profiler>,\r\n      private config:
TextureManagerConfig) {\r\n    if (config.reuseTextures) {\r\n      this.inUseTextures = new Map();\r\n
this.idleTextures = new Map();\r\n      this.textureLookup = new Map();\r\n    }\r\n  }\r\n
createTextureFromLayout(\r\n      dataType: Tensor.DataType, layout: TextureLayout, data?: Tensor.NumberType,
usage?: Encoder.Usage) {\r\n    const textureDataType = this.toEncoderType(dataType);\r\n\r\n    const encoder =
this.glContext.getEncoder(textureDataType, layout.channels || 1, usage);\r\n    if (layout.isPacked && usage ===
Encoder.Usage.UploadOnly) {\r\n      throw new Error('not implemented');\r\n    }\r\n    const width =
layout.width;\r\n    const height = layout.height;\r\n\r\n    let key: string|undefined;\r\n    let inUseTextures:
WebGLTexture[]|undefined;\r\n    if (this.config.reuseTextures) {\r\n      key =
`${width}x${height}_${encoder.format}_${encoder.internalFormat}_${encoder.textureType}`;\r\n
inUseTextures = this.inUseTextures.get(key);\r\n      if (!inUseTextures) {\r\n        inUseTextures = [];\r\n
this.inUseTextures.set(key, inUseTextures);\r\n      }\r\n\r\n      const idleTextures = this.idleTextures.get(key);\r\n
if (idleTextures && idleTextures.length > 0) {\r\n        const texture = idleTextures.pop()!;\r\n
inUseTextures.push(texture);\r\n        if (usage === Encoder.Usage.UploadOnly) {\r\n
this.glContext.updateTexture(texture, width, height, encoder, this.toTextureData(dataType, data)!);\r\n        }\r\n
return texture;\r\n      }\r\n    }\r\n\r\n    Logger.verbose('TextureManager', `Creating new texture of size
${layout.width}x${layout.height}`);\r\n    const texture = this.glContext.allocateTexture(width, height, encoder,
this.toTextureData(dataType, data));\r\n\r\n    if (this.config.reuseTextures) {\r\n
inUseTextures!.push(texture);\r\n      this.textureLookup.set(texture, key!);\r\n    }\r\n    return texture;\r\n  }\r\n
readTexture(td: TextureData, dataType: Tensor.DataType, channels?: number): Tensor.NumberType {\r\n    if
(!channels) {\r\n      channels = 1;\r\n    }\r\n    return this.profiler.event('backend', 'TextureManager.readTexture', ()
=> {\r\n      const dataSize = td.shape.reduce((a, b) => a * b) * channels!;\r\n      const data =
this.glContext.readTexture(\r\n          td.texture, td.width, td.height, dataSize, this.toEncoderType(dataType),
channels!);\r\n      return this.toTensorData(dataType, data);\r\n    });\r\n  }\r\n  async readTextureAsync(td:
TextureData, dataType: Tensor.DataType, channels?: number): Promise<Tensor.NumberType> {\r\n    const dataId
= td.tensor.dataId;\r\n    if (!channels) {\r\n      channels = 1;\r\n    }\r\n    if (this.pendingRead.has(dataId)) {\r\n
const subscribers = this.pendingRead.get(dataId);\r\n      return new Promise<Tensor.NumberType>(resolve =>
```

subscribers?.push(resolve));\r\n   }\r\n   return this.profiler.event('backend', 'TextureManager.readTextureAsync', async () => {\r\n   this.pendingRead.set(dataId, []);\r\n   const dataSize = td.shape.reduce((a, b) => a * b) * channels!;\r\n   // add a fence waiting for the data to be ready\r\n   await this.glContext.createAndWaitForFence();\r\n   const data = this.glContext.readTexture(\r\n   td.texture, td.width, td.height, dataSize, this.toEncoderType(dataType), channels!);\r\n   const tensorData = this.toTensorData(dataType, data);\r\n   const subscribers = this.pendingRead.get(dataId);\r\n   this.pendingRead.delete(dataId);\r\n   subscribers?.forEach(resolve => resolve(tensorData));\r\n   return tensorData;\r\n   });\r\n }\r\n readUint8TextureAsFloat(td: TextureData): Float32Array {\r\n   return this.profiler.event('backend', 'TextureManager.readUint8TextureAsFloat', () => {\r\n   const dataSize = td.shape.reduce((a, b) => a * b);\r\n   const data = this.glContext.readTexture(td.texture, td.width, td.height, dataSize * 4, 'byte', 4);\r\n   return new Float32Array(data.buffer, data.byteOffset, dataSize);\r\n   });\r\n }\r\n releaseTexture(textureData: TextureData, deleteTexture?: boolean): void {\r\n   let key: string|undefined;\r\n   if (this.config.reuseTextures) {\r\n   key = this.textureLookup.get(textureData.texture);\r\n   if (key) {\r\n   if (deleteTexture) {\r\n   this.textureLookup.delete(key);\r\n   }\r\n   const inUseTextures = this.inUseTextures.get(key);\r\n   if (inUseTextures) {\r\n   const index = inUseTextures.indexOf(textureData.texture);\r\n   if (index !== -1) {\r\n   inUseTextures.splice(index, 1);\r\n   let idleTextures = this.idleTextures.get(key);\r\n   if (!idleTextures) {\r\n   idleTextures = [];\r\n   this.idleTextures.set(key, idleTextures);\r\n   }\r\n   idleTextures.push(textureData.texture);\r\n   }\r\n   }\r\n   }\r\n   }\r\n\r\n   if (!key || deleteTexture) {\r\n   Logger.verbose('TextureManager', `Deleting texture of size ${textureData.width}x${textureData.height}`);\r\n   this.glContext.deleteTexture(textureData.texture);\r\n   }\r\n }\r\n toTensorData(dataType: Tensor.DataType, data: Encoder.DataArrayType): Tensor.NumberType {\r\n   switch (dataType) {\r\n   case 'int16':\r\n   return data instanceof Int16Array ? data : Int16Array.from(data);\r\n   case 'int32':\r\n   return data instanceof Int32Array ? data : Int32Array.from(data);\r\n   case 'int8':\r\n   return data instanceof Int8Array ? data : Int8Array.from(data);\r\n   case 'uint16':\r\n   return data instanceof Uint16Array ? data : Uint16Array.from(data);\r\n   case 'uint32':\r\n   return data instanceof Uint32Array ? data : Uint32Array.from(data);\r\n   case 'uint8':\r\n   case 'bool':\r\n   return data instanceof Uint8Array ? data : Uint8Array.from(data);\r\n   case 'float32':\r\n   return data instanceof Float32Array ? data : Float32Array.from(data);\r\n   case 'float64':\r\n   return data instanceof Float64Array ? data : Float64Array.from(data);\r\n   default:\r\n   throw new Error(`TensorData type ${dataType} is not supported`);\r\n   }\r\n }\r\n toTextureData(dataType: Tensor.DataType, data: Tensor.NumberType|undefined): Encoder.DataArrayType|undefined {\r\n   if (!data) {\r\n   return undefined;\r\n   }\r\n   return (data instanceof Float32Array) ? data : new Float32Array(data);\r\n   /*\r\n   switch (dataType) {\r\n   case 'int16':\r\n   case 'int32':\r\n   case 'uint16':\r\n   case 'uint32':\r\n   return (data.constructor === Uint32Array) ? data as Uint32Array : new Uint32Array(data);\r\n   case 'int8':\r\n   case 'uint8':\r\n   case 'bool':\r\n   return (data.constructor === Uint8Array) ? data as Uint8Array : new Uint8Array(data);\r\n   case 'float32':\r\n   case 'float64':\r\n   return (data.constructor === Float32Array) ? data as Float32Array : new Float32Array(data);\r\n   default:\r\n   throw new Error(`TensorData type ${dataType} is not supported`);\r\n   }\r\n   */\r\n }\r\n toEncoderType(_dataType: Tensor.DataType): Encoder.DataType {\r\n   return 'float';\r\n   // switch (dataType) {\r\n   //   case 'int16':\r\n   //   case 'int32':\r\n   //   case 'uint16':\r\n   //   case 'uint32':\r\n   //   return 'int';\r\n   //   case 'uint8':\r\n   //   case 'bool':\r\n   //   return 'byte';\r\n   //   case 'float32':\r\n   //   case 'float64':\r\n   //   return 'float';\r\n   //   default:\r\n   //   throw new Error(`TensorData type ${dataType} is not supported`);\r\n   // }\r\n }\r\n clearActiveTextures(): void {\r\n   this.glContext.clearActiveTextures();\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../tensor';\r\n\r\n/**\r\n * Layout info is used for mapping n-dimensional array to 2D textures\r\n * The layout is created by the TextureLayoutStrategy based on\r\n * the Tensor's dimensions and strides\r\n */\r\nexport interface TextureLayout {\r\n width: number;\r\n height: number;\r\n /**\r\n   * specify the number of value that encoded in a single pixel\r\n   */\r\n channels: 1|2|3|4;\r\n /**\r\n   * whether in packed mode or not\r\n   */\r\n isPacked?:

boolean;\r\n /**\r\n   * the normalized shape\r\n   */\r\n shape: readonly number[];\r\n /**\r\n   * the stride of each dimensions, calculated according to shape\r\n   */\r\n strides: readonly number[];\r\n /**\r\n   * the original shape(dims) of the corresponding tensor\r\n   */\r\n unpackedShape: readonly number[];\r\n\r\n reversedWH?: boolean;\r\n}\r\nexport interface TextureData extends TextureLayout {\r\n tensor: Tensor;\r\n texture: WebGLTexture;\r\n}\r\n\r\nexport enum TextureType {\r\n unpacked,   // <-- normal unpacked texture\r\n unpackedReversed,   // <-- unpacked texture used in old ONNX.js implementation (deprecated)\r\n packed,   // <-- normal packed texture\r\n downloadUint8AsFloat, // <-- ONLY used in texture downloading for iOS devices\r\n packedLastDimension   // <-- ONLY used in old ONNX.js Conv implementation for input W (deprecated)\r\n}\r\n\r\nexport interface TensorInfo {\r\n id?: Tensor.Id;\r\n dims: readonly number[];\r\n type: Tensor.DataType;\r\n textureType: TextureType;\r\n}\r\n\r\nexport interface ProgramVariable {\r\n type: 'float'|'int';\r\n name: string;\r\n arrayLength?: number;\r\n data: number|number[];\r\n}\r\n\r\n/**\r\n * A set of metadata of a shader program.\r\n */\r\nexport interface ProgramMetadata {\r\n /**\r\n   * the name of the program. used for debugging and profiling\r\n   */\r\n name: string;\r\n /**\r\n   * texture types for each input\r\n   */\r\n inputTypes: TextureType[];\r\n /**\r\n   * names of each input\r\n   */\r\n inputNames: string[];\r\n /**\r\n   * an optional string as a cache hint in the artifact cache\r\n   */\r\n cacheHint?: string;\r\n}\r\n\r\n/**\r\n * A ProgramInfoLoader allows\r\n */\r\nexport interface ProgramInfoLoader extends ProgramMetadata {\r\n /**\r\n   * a function to get the program info\r\n   */\r\n get(): ProgramInfo;\r\n}\r\n\r\n/**\r\n * A set of data that represent a shader program\r\n */\r\nexport interface ProgramInfo extends ProgramMetadata {\r\n /**\r\n   * information of uniform variables\r\n   */\r\n variables?: ProgramVariable[];\r\n /**\r\n   * tensor info for output\r\n   */\r\n output: TensorInfo;\r\n /**\r\n   * the shader's processing source code\r\n   */\r\n shaderSource: string;\r\n /**\r\n   * whether the shader source contains a customized main function implementation\r\n   */\r\n hasMain?: boolean;\r\n}\r\n\r\nexport interface VariableInfo {\r\n type: 'float'|'int';\r\n name: string;\r\n arrayLength?: number;\r\n}\r\n\r\nexport interface ProgramVariable {\r\n type: 'float'|'int';\r\n name: string;\r\n arrayLength?: number;\r\n data: number|number[];\r\n}\r\n\r\n/**\r\n * Information of uniforms that shader uses\r\n */\r\nexport interface UniformInfo {\r\n type: 'sampler2D'|VariableInfo['type'];\r\n name: string;\r\n arrayLength?: number;\r\n}\r\n\r\nexport interface UniformLocation extends UniformInfo {\r\n location: WebGLUniformLocation;\r\n}\r\n\r\n/**\r\n * Artifact is the result of compilation\r\n * It does not contain input of output data\r\n * However anything that could be run as a \"program\"\r\n */\r\nexport interface Artifact {\r\n programInfo: ProgramInfo;\r\n program: WebGLProgram;\r\n uniformLocations: UniformLocation[];\r\n attribLocations: {position: number; textureCoord: number};\r\n}\r\nexport declare namespace Artifact {\r\n type UniformLocations = Artifact['uniformLocations'];\r\n type AttribLocations = Artifact['attribLocations'];\r\n}\r\n\r\nexport interface UniformData {\r\n [name: string]: number|number[];\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {assert} from '../../util';\r\n/**\r\n * Given a non RGBA shape calculate the R version\r\n * It is assumed that the dimensions are multiples of given channels\r\n * NOTE: it is always the last dim that gets packed.\r\n * @param unpackedShape original shape to create a packed version from\r\n */\r\nexport function getPackedShape(unpackedShape: readonly number[]): readonly number[] {\r\n const len = unpackedShape.length;\r\n return unpackedShape.slice(0, len - 1).concat(unpackedShape[len - 1] / 4);\r\n}\r\n\r\nexport async function repeatedTry(\r\n   checkFn: () => boolean, delayFn = (_counter: number) => 0, maxCounter?: number): Promise<void> {\r\n return new Promise<void>((resolve, reject) => {\r\n   let tryCount = 0;\r\n\r\n   const tryFn = () => {\r\n   if (checkFn()) {\r\n   resolve();\r\n   return;\r\n   }\r\n\r\n   tryCount++;\r\n\r\n   const nextBackoff = delayFn(tryCount);\r\n\r\n   if (maxCounter != null && tryCount >= maxCounter) {\r\n   reject();\r\n   return;\r\n   }\r\n   setTimeout(tryFn, nextBackoff);\r\n   };\r\n\r\n   tryFn();\r\n });\r\n}\r\n\r\n/**\r\n * Generates the function name from an input sampler name.\r\n * @param samplerName Name of the sampler.\r\n */\r\nexport function generateShaderFuncNameFromInputSamplerName(samplerName: string): string {\r\n assert(typeof samplerName !== 'undefined' && samplerName.length !== 0, () => 'empty string found for sampler name');\r\n return 'get' + samplerName.charAt(0).toUpperCase() + samplerName.slice(1);\r\n}\r\n\r\n/**\r\n * Generates the function name from an input sampler name at output coordinates.\r\n * @param samplerName Name of the sampler.\r\n */\r\nexport function generateShaderFuncNameFromInputSamplerNameAtOutCoords(samplerName: string): string {\r\n assert(typeof samplerName !== 'undefined' && samplerName.length !== 0, () => 'empty string found for sampler name');\r\n return 'get' + samplerName.charAt(0).toUpperCase() + samplerName.slice(1) + 'AtOutCoords';\r\n}\r\n\r\n/** Returns a new input shape (a copy) that has a squeezed logical shape. */\r\nexport function squeezeInputShape(inputShape: readonly number[], squeezedShape: number[]): number[] {\r\n // Deep copy.\r\n let newInputShape: number[] = JSON.parse(JSON.stringify(inputShape));\r\n newInputShape = squeezedShape;\r\n return newInputShape;\r\n}\r\n\r\n/** Returns a list of squeezed parameters for shader functions */\r\nexport function getSqueezedParams(params: string[], keptDims: number[]): string {\r\n return keptDims.map(d => params[d]).join(', ');\r\n}\r\n\r\n/** Returns the data type for different ranks. */\r\nexport function getCoordsDataType(rank: number): string {\r\n if (rank <= 1) {\r\n   return 'int';\r\n } else if (rank === 2) {\r\n   return 'ivec2';\r\n } else if (rank === 3) {\r\n   return 'ivec3';\r\n } else if (rank === 4) {\r\n   return 'ivec4';\r\n } else if (rank === 5) {\r\n   return 'ivec5';\r\n } else if (rank === 6) {\r\n   return 'ivec6';\r\n } else {\r\n   throw Error(`GPU for rank ${rank} is not yet supported`);\r\n }\r\n}\r\n\r\nexport function getGlChannels(rank = 6): string[] {\r\n return ['x', 'y', 'z', 'w', 'u', 'v'].slice(0, rank);\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Logger} from '../../instrument';\r\n\r\nimport {WebGLContext} from './webgl-context';\r\n\r\nconst cache: {[contextId: string]: WebGLContext} = {};\r\n\r\n/**\r\n * This factory function creates proper WebGLRenderingContext based on\r\n * the current browsers capabilities\r\n * The order is from higher/most recent versions to most basic\r\n */\r\nexport function createWebGLContext(contextId?: 'webgl'|'webgl2'): WebGLContext {\r\n let context: WebGLContext|undefined;\r\n if ((!contextId || contextId === 'webgl2') && 'webgl2' in cache) {\r\n   context = cache.webgl2;\r\n } else if ((!contextId || contextId === 'webgl') && 'webgl' in cache) {\r\n   context = cache.webgl;\r\n }\r\n\r\n context = context || createNewWebGLContext(contextId);\r\n contextId = contextId || context.version === 1 ? 'webgl' : 'webgl2';\r\n const gl = context.gl;\r\n\r\n cache[contextId] = context;\r\n\r\n if (gl.isContextLost()) {\r\n   delete cache[contextId];\r\n   return createWebGLContext(contextId);\r\n }\r\n\r\n gl.disable(gl.DEPTH_TEST);\r\n gl.disable(gl.STENCIL_TEST);\r\n gl.disable(gl.BLEND);\r\n gl.disable(gl.DITHER);\r\n gl.disable(gl.POLYGON_OFFSET_FILL);\r\n gl.disable(gl.SAMPLE_COVERAGE);\r\n gl.enable(gl.SCISSOR_TEST);\r\n gl.enable(gl.CULL_FACE);\r\n gl.cullFace(gl.BACK);\r\n\r\n return context;\r\n}\r\n\r\nexport function createNewWebGLContext(contextId?: 'webgl'|'webgl2'): WebGLContext {\r\n const canvas = createCanvas();\r\n const contextAttributes: WebGLContextAttributes = {\r\n   alpha: false,\r\n   depth: false,\r\n   antialias: false,\r\n   stencil: false,\r\n   preserveDrawingBuffer: false,\r\n   premultipliedAlpha: false,\r\n   failIfMajorPerformanceCaveat: false\r\n };\r\n let gl: WebGLRenderingContext|null;\r\n const ca = contextAttributes;\r\n if (!contextId || contextId === 'webgl2') {\r\n   gl = canvas.getContext('webgl2', ca);\r\n   if (gl) {\r\n   try {\r\n   return new WebGLContext(gl, 2);\r\n   } catch (err) {\r\n   Logger.warning('GlContextFactory', `failed to create WebGLContext using contextId 'webgl2'. Error: ${err}`);\r\n   }\r\n   }\r\n }\r\n if (!contextId || contextId === 'webgl') {\r\n   gl = canvas.getContext('webgl', ca) || canvas.getContext('experimental-webgl', ca) as WebGLRenderingContext;\r\n   if (gl) {\r\n   try {\r\n   return new WebGLContext(gl, 1);\r\n   } catch (err) {\r\n   Logger.warning(\r\n   'GlContextFactory',\r\n   `failed to create WebGLContext using contextId 'webgl' or 'experimental-webgl'. Error: ${err}`);\r\n   }\r\n   }\r\n }\r\n\r\n throw new Error('WebGL is not supported');\r\n}\r\n\r\nfunction createCanvas(): HTMLCanvasElement {\r\n const canvas: HTMLCanvasElement = document.createElement('canvas');\r\n canvas.width = 1;\r\n canvas.height = 1;\r\n return canvas;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env} from 'onnxruntime-common';\r\n\r\nimport * as DataEncoders from './texture-data-encoder';\r\nimport {DataEncoder, Encoder} from './texture-data-encoder';\r\nimport {repeatedTry} from './utils';\r\n\r\nexport interface FenceContext {\r\n query: WebGLSync|null;\r\n isFencePassed(): boolean;\r\n}\r\n\r\ntype PollItem = {\r\n isDoneFn: () => boolean; resolveFn: () => void;\r\n};\r\n\r\nexport function linearSearchLastTrue(arr: Array<() => boolean>): number {\r\n let i = 0;\r\n for (; i < arr.length; ++i) {\r\n   const isDone = arr[i]();\r\n   if (!isDone)

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{\r\n      break;\r\n    }\r\n  }\r\n  return i - 1;\r\n}\r\n\r\n/**\r\n * Abstraction and wrapper around
WebGLRenderingContext and its operations\r\n */\r\nexport class WebGLContext {\r\n  gl:
WebGLRenderingContext;\r\n  version: 1|2;\r\n\r\n  private vertexbuffer: WebGLBuffer;\r\n  private framebuffer:
WebGLFramebuffer;\r\n\r\n  // WebGL flags and vital parameters\r\n  private
isFloatTextureAttachableToFrameBuffer: boolean;\r\n  isFloat32DownloadSupported: boolean;\r\n
isRenderFloat32Supported: boolean;\r\n  isBlendSupported: boolean;\r\n  maxTextureSize: number;\r\n  // private
maxCombinedTextureImageUnits: number;\r\n  private maxTextureImageUnits: number;\r\n  // private
maxCubeMapTextureSize: number;\r\n  // private shadingLanguageVersion: string;\r\n  // private webglVendor:
string;\r\n  // private webglVersion: string;\r\n\r\n  // WebGL2 flags and vital parameters\r\n  // private
max3DTextureSize: number;\r\n  // private maxArrayTextureLayers: number;\r\n  // private maxColorAttachments:
number;\r\n  // private maxDrawBuffers: number;\r\n\r\n  // WebGL extensions\r\n  // eslint-disable-next-line
camelcase\r\n  textureFloatExtension: OES_texture_float|null;\r\n  // eslint-disable-next-line camelcase\r\n
textureHalfFloatExtension: OES_texture_half_float|null;\r\n\r\n  // WebGL2 extensions\r\n
colorBufferFloatExtension: unknown|null;\r\n  // eslint-disable-next-line @typescript-eslint/naming-convention\r\n
disjointTimerQueryWebgl2Extension: {TIME_ELAPSED_EXT: GLenum; GPU_DISJOINT_EXT:
GLenum}|null;\r\n\r\n  private disposed: boolean;\r\n  private frameBufferBound = false;\r\n\r\n  constructor(gl:
WebGLRenderingContext, version: 1|2) {\r\n    this.gl = gl;\r\n    this.version = version;\r\n\r\n
this.getExtensions();\r\n    this.vertexbuffer = this.createVertexbuffer();\r\n    this.framebuffer =
this.createFramebuffer();\r\n    this.queryVitalParameters();\r\n  }\r\n\r\n  allocateTexture(width: number, height:
number, encoder: DataEncoder, data?: Encoder.DataArrayType): WebGLTexture {\r\n    const gl = this.gl;\r\n    //
create the texture\r\n    const texture = gl.createTexture();\r\n    // bind the texture so the following methods effect
this texture.\r\n    gl.bindTexture(gl.TEXTURE_2D, texture);\r\n    gl.texParameteri(gl.TEXTURE_2D,
gl.TEXTURE_MIN_FILTER, gl.NEAREST);\r\n    gl.texParameteri(gl.TEXTURE_2D,
gl.TEXTURE_MAG_FILTER, gl.NEAREST);\r\n    gl.texParameteri(gl.TEXTURE_2D, gl.TEXTURE_WRAP_S,
gl.CLAMP_TO_EDGE);\r\n    gl.texParameteri(gl.TEXTURE_2D, gl.TEXTURE_WRAP_T,
gl.CLAMP_TO_EDGE);\r\n    const buffer = data ? encoder.encode(data, width * height) : null;\r\n
gl.texImage2D(\r\n        gl.TEXTURE_2D,\r\n        0,  // Level of detail.\r\n        encoder.internalFormat, width,
height,\r\n        0,  // Always 0 in OpenGL ES.\r\n        encoder.format, encoder.textureType, buffer);\r\n
this.checkError();\r\n    return texture as WebGLTexture;\r\n  }\r\n  updateTexture(\r\n      texture: WebGLTexture,
width: number, height: number, encoder: DataEncoder, data: Encoder.DataArrayType): void {\r\n    const gl =
this.gl;\r\n    gl.bindTexture(gl.TEXTURE_2D, texture);\r\n    const buffer = encoder.encode(data, width *
height);\r\n    gl.texSubImage2D(\r\n        gl.TEXTURE_2D,\r\n        0,  // level\r\n        0,  // xoffset\r\n        0,  //
yoffset\r\n        width, height, encoder.format, encoder.textureType, buffer);\r\n    this.checkError();\r\n  }\r\n
attachFramebuffer(texture: WebGLTexture, width: number, height: number): void {\r\n    const gl = this.gl;\r\n    //
Make it the target for framebuffer operations - including rendering.\r\n    gl.bindTexture(gl.TEXTURE_2D,
texture);\r\n    gl.bindFramebuffer(gl.FRAMEBUFFER, this.framebuffer);\r\n    gl.framebufferTexture2D(\r\n
gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0, gl.TEXTURE_2D, texture,\r\n        0);  // 0, we aren't using
MIPMAPs\r\n    this.checkError();\r\n    gl.viewport(0, 0, width, height);\r\n    gl.scissor(0, 0, width, height);\r\n
}\r\n  readTexture(\r\n      texture: WebGLTexture, width: number, height: number, dataSize: number, dataType:
Encoder.DataType,\r\n      channels: number): Encoder.DataArrayType {\r\n    const gl = this.gl;\r\n    if (!channels)
{\r\n      channels = 1;\r\n    }\r\n    if (!this.frameBufferBound) {\r\n      this.attachFramebuffer(texture, width,
height);\r\n    }\r\n    const encoder = this.getEncoder(dataType, channels);\r\n    const buffer =
encoder.allocate(width * height);\r\n    // bind texture to framebuffer\r\n    gl.bindTexture(gl.TEXTURE_2D,
texture);\r\n    gl.framebufferTexture2D(\r\n        gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0,
gl.TEXTURE_2D, texture,\r\n        0);  // 0, we aren't using MIPMAPs\r\n    // TODO: Check if framebuffer is
ready\r\n    gl.readPixels(0, 0, width, height, gl.RGBA, encoder.textureType, buffer);\r\n    this.checkError();\r\n    //
unbind FB\r\n    return encoder.decode(buffer, dataSize);\r\n  }\r\n\r\n  isFramebufferReady(): boolean {\r\n    //
TODO: Implement logic to check if the framebuffer is ready\r\n    return true;\r\n  }\r\n  getActiveTexture(): string
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{\r\n    const gl = this.gl;\r\n    const n = gl.getParameter(this.gl.ACTIVE_TEXTURE);\r\n    return `TEXTURE${(n
- gl.TEXTURE0)}`;\r\n  }\r\n  getTextureBinding(): WebGLTexture {\r\n    return
this.gl.getParameter(this.gl.TEXTURE_BINDING_2D);\r\n  }\r\n  getFramebufferBinding(): WebGLFramebuffer
{\r\n    return this.gl.getParameter(this.gl.FRAMEBUFFER_BINDING);\r\n  }\r\n
setVertexAttributes(positionHandle: number, textureCoordHandle: number): void {\r\n    const gl = this.gl;\r\n
gl.vertexAttribPointer(positionHandle, 3, gl.FLOAT, false, 20, 0);\r\n
gl.enableVertexAttribArray(positionHandle);\r\n    if (textureCoordHandle !== -1) {\r\n
gl.vertexAttribPointer(textureCoordHandle, 2, gl.FLOAT, false, 20, 12);\r\n
gl.enableVertexAttribArray(textureCoordHandle);\r\n    }\r\n    this.checkError();\r\n  }\r\n  createProgram(\r\n
vertexShader: WebGLShader,\r\n      fragShader: WebGLShader,\r\n      ): WebGLProgram {\r\n    const gl =
this.gl;\r\n    const program = gl.createProgram()!;\r\n\r\n    // the program consists of our shaders\r\n
gl.attachShader(program, vertexShader);\r\n    gl.attachShader(program, fragShader);\r\n
gl.linkProgram(program);\r\n    return program;\r\n  }\r\n  compileShader(shaderSource: string, shaderType:
number): WebGLShader {\r\n    const gl = this.gl;\r\n    const shader = gl.createShader(shaderType);\r\n    if
(!shader) {\r\n      throw new Error(`createShader() returned null with type ${shaderType}`);\r\n    }\r\n\r\n
gl.shaderSource(shader, shaderSource);\r\n    gl.compileShader(shader);\r\n    if (gl.getShaderParameter(shader,
gl.COMPILE_STATUS) === false) {\r\n      throw new Error(`Failed to compile shader:
${gl.getShaderInfoLog(shader)}\r\nShader source:\r\n${shaderSource}`);\r\n    }\r\n    return shader;\r\n  }\r\n
deleteShader(shader: WebGLShader): void {\r\n    this.gl.deleteShader(shader);\r\n  }\r\n
bindTextureToUniform(texture: WebGLTexture, position: number, uniformHandle: WebGLUniformLocation): void
{\r\n    const gl = this.gl;\r\n    gl.activeTexture(gl.TEXTURE0 + position);\r\n    this.checkError();\r\n
gl.bindTexture(gl.TEXTURE_2D, texture);\r\n    this.checkError();\r\n    gl.uniform1i(uniformHandle, position);\r\n
 this.checkError();\r\n  }\r\n  draw(): void {\r\n    this.gl.drawArrays(this.gl.TRIANGLE_STRIP, 0, 4);\r\n
this.checkError();\r\n  }\r\n  checkError(): void {\r\n    if (env.debug) {\r\n      const gl = this.gl;\r\n      const error =
gl.getError();\r\n      let label = '';\r\n      switch (error) {\r\n        case (gl.NO_ERROR):\r\n          return;\r\n        case
(gl.INVALID_ENUM):\r\n          label = 'INVALID_ENUM';\r\n          break;\r\n        case
(gl.INVALID_VALUE):\r\n          label = 'INVALID_VALUE';\r\n          break;\r\n        case
(gl.INVALID_OPERATION):\r\n          label = 'INVALID_OPERATION';\r\n          break;\r\n        case
(gl.INVALID_FRAMEBUFFER_OPERATION):\r\n          label =
'INVALID_FRAMEBUFFER_OPERATION';\r\n          break;\r\n        case (gl.OUT_OF_MEMORY):\r\n
label = 'OUT_OF_MEMORY';\r\n          break;\r\n        case (gl.CONTEXT_LOST_WEBGL):\r\n          label =
'CONTEXT_LOST_WEBGL';\r\n          break;\r\n        default:\r\n          label = `Unknown WebGL Error:
${error.toString(16)}`;\r\n      }\r\n      throw new Error(label);\r\n    }\r\n  }\r\n  deleteTexture(texture:
WebGLTexture): void {\r\n    this.gl.deleteTexture(texture);\r\n  }\r\n  deleteProgram(program: WebGLProgram):
void {\r\n    this.gl.deleteProgram(program);\r\n  }\r\n  getEncoder(dataType: Encoder.DataType, channels: number,
usage: Encoder.Usage = Encoder.Usage.Default): DataEncoder {\r\n    if (this.version === 2) {\r\n      return new
DataEncoders.RedFloat32DataEncoder(this.gl as WebGL2RenderingContext, channels);\r\n    }\r\n\r\n    switch
(dataType) {\r\n      case 'float':\r\n        if (usage === Encoder.Usage.UploadOnly || this.isRenderFloat32Supported)
{\r\n          return new DataEncoders.RGBAFloatDataEncoder(this.gl, channels);\r\n        } else {\r\n          return
new DataEncoders.RGBAFloatDataEncoder(\r\n              this.gl, channels,
this.textureHalfFloatExtension!.HALF_FLOAT_OES);\r\n        }\r\n      case 'int':\r\n        throw new Error('not
implemented');\r\n      case 'byte':\r\n        return new DataEncoders.Uint8DataEncoder(this.gl, channels);\r\n
default:\r\n        throw new Error(`Invalid dataType: ${dataType}`);\r\n    }\r\n  }\r\n  clearActiveTextures(): void
{\r\n    const gl = this.gl;\r\n    for (let unit = 0; unit < this.maxTextureImageUnits; ++unit) {\r\n
gl.activeTexture(gl.TEXTURE0 + unit);\r\n      gl.bindTexture(gl.TEXTURE_2D, null);\r\n    }\r\n  }\r\n  dispose():
void {\r\n    if (this.disposed) {\r\n      return;\r\n    }\r\n    const gl = this.gl;\r\n
gl.bindFramebuffer(gl.FRAMEBUFFER, null);\r\n    gl.deleteFramebuffer(this.framebuffer);\r\n
gl.bindBuffer(gl.ARRAY_BUFFER, null);\r\n    gl.deleteBuffer(this.vertexbuffer);\r\n
```

gl.bindBuffer(gl.ELEMENT_ARRAY_BUFFER, null);\r\n   gl.finish();\r\n   this.disposed = true;\r\n }\r\n\r\n private createDefaultGeometry(): Float32Array {\r\n   // Sets of x,y,z(=0),s,t coordinates.\r\n   return new Float32Array([\r\n   -1.0, 1.0, 0.0, 0.0, 1.0, // upper left\r\n   -1.0, -1.0, 0.0, 0.0, 0.0, // lower left\r\n   1.0, 1.0, 0.0, 1.0, 1.0, // upper right\r\n   1.0, -1.0, 0.0, 1.0, 0.0   // lower right\r\n   ]);\r\n }\r\n private createVertexbuffer(): WebGLBuffer {\r\n   const gl = this.gl;\r\n   const buffer = gl.createBuffer();\r\n   if (!buffer) {\r\n   throw new Error('createBuffer() returned null');\r\n   }\r\n   const geometry = this.createDefaultGeometry();\r\n   gl.bindBuffer(gl.ARRAY_BUFFER, buffer);\r\n   gl.bufferData(gl.ARRAY_BUFFER, geometry, gl.STATIC_DRAW);\r\n   this.checkError();\r\n   return buffer;\r\n }\r\n private createFramebuffer(): WebGLFramebuffer {\r\n   const fb = this.gl.createFramebuffer();\r\n   if (!fb) {\r\n   throw new Error('createFramebuffer returned null');\r\n   }\r\n   return fb;\r\n }\r\n\r\n private queryVitalParameters(): void {\r\n   const gl = this.gl;\r\n\r\n   this.isFloatTextureAttachableToFrameBuffer = this.checkFloatTextureAttachableToFrameBuffer();\r\n   this.isRenderFloat32Supported = this.checkRenderFloat32();\r\n   this.isFloat32DownloadSupported = this.checkFloat32Download();\r\n\r\n   if (this.version === 1 && !this.textureHalfFloatExtension && !this.isRenderFloat32Supported) {\r\n   throw new Error('both float32 and float16 TextureType are not supported');\r\n   }\r\n\r\n   this.isBlendSupported = !this.isRenderFloat32Supported || this.checkFloat32Blend();\r\n\r\n   // this.maxCombinedTextureImageUnits = gl.getParameter(gl.MAX_COMBINED_TEXTURE_IMAGE_UNITS);\r\n   this.maxTextureSize = gl.getParameter(gl.MAX_TEXTURE_SIZE);\r\n   this.maxTextureImageUnits = gl.getParameter(gl.MAX_TEXTURE_IMAGE_UNITS);\r\n   // this.maxCubeMapTextureSize = gl.getParameter(gl.MAX_CUBE_MAP_TEXTURE_SIZE);\r\n   // this.shadingLanguageVersion = gl.getParameter(gl.SHADING_LANGUAGE_VERSION);\r\n   // this.webglVendor = gl.getParameter(gl.VENDOR);\r\n   // this.webglVersion = gl.getParameter(gl.VERSION);\r\n\r\n   if (this.version === 2) {\r\n   // this.max3DTextureSize = gl.getParameter(WebGL2RenderingContext.MAX_3D_TEXTURE_SIZE);\r\n   // this.maxArrayTextureLayers = gl.getParameter(WebGL2RenderingContext.MAX_ARRAY_TEXTURE_LAYERS);\r\n   // this.maxColorAttachments = gl.getParameter(WebGL2RenderingContext.MAX_COLOR_ATTACHMENTS);\r\n   // this.maxDrawBuffers = gl.getParameter(WebGL2RenderingContext.MAX_DRAW_BUFFERS);\r\n   }\r\n }\r\n private getExtensions(): void {\r\n   if (this.version === 2) {\r\n   this.colorBufferFloatExtension = this.gl.getExtension('EXT_color_buffer_float');\r\n   this.disjointTimerQueryWebgl2Extension = this.gl.getExtension('EXT_disjoint_timer_query_webgl2');\r\n   } else {\r\n   this.textureFloatExtension = this.gl.getExtension('OES_texture_float');\r\n   this.textureHalfFloatExtension = this.gl.getExtension('OES_texture_half_float');\r\n   }\r\n }\r\n\r\n private checkFloatTextureAttachableToFrameBuffer(): boolean {\r\n   // test whether Float32 texture is supported:\r\n   // STEP.1 create a float texture\r\n   const gl = this.gl;\r\n   const texture = gl.createTexture();\r\n   gl.bindTexture(gl.TEXTURE_2D, texture);\r\n   // eslint-disable-next-line @typescript-eslint/naming-convention\r\n   const internalFormat = this.version === 2 ? (gl as unknown as {RGBA32F: number}).RGBA32F : gl.RGBA;\r\n   gl.texImage2D(gl.TEXTURE_2D, 0, internalFormat, 1, 1, 0, gl.RGBA, gl.FLOAT, null);\r\n   // STEP.2 bind a frame buffer\r\n   const frameBuffer = gl.createFramebuffer();\r\n   gl.bindFramebuffer(gl.FRAMEBUFFER, frameBuffer);\r\n   // STEP.3 attach texture to framebuffer\r\n   gl.framebufferTexture2D(gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0, gl.TEXTURE_2D, texture, 0);\r\n   // STEP.4 test whether framebuffer is complete\r\n   const isComplete = gl.checkFramebufferStatus(gl.FRAMEBUFFER) === gl.FRAMEBUFFER_COMPLETE;\r\n   gl.bindTexture(gl.TEXTURE_2D, null);\r\n   gl.bindFramebuffer(gl.FRAMEBUFFER, null);\r\n   gl.deleteTexture(texture);\r\n   gl.deleteFramebuffer(frameBuffer);\r\n   return isComplete;\r\n }\r\n\r\n private checkRenderFloat32(): boolean {\r\n   if (this.version === 2) {\r\n   if (!this.colorBufferFloatExtension) {\r\n   return false;\r\n   }\r\n   } else {\r\n   if (!this.textureFloatExtension) {\r\n   return false;\r\n   }\r\n   }\r\n   return this.isFloatTextureAttachableToFrameBuffer;\r\n }\r\n\r\n private checkFloat32Download(): boolean {\r\n   if (this.version === 2) {\r\n   if (!this.colorBufferFloatExtension) {\r\n   return false;\r\n   }\r\n   } else {\r\n if (!this.textureFloatExtension) {\r\n return false;\r\n }\r\n if (!this.gl.getExtension('WEBGL_color_buffer_float')) {\r\n return false;\r\n }\r\n }\r\n return this.isFloatTextureAttachableToFrameBuffer;\r\n }\r\n\r\n /**\r\n * Check whether GL_BLEND is supported\r\n */\r\n private checkFloat32Blend(): boolean {\r\n // it looks like currently (2019-05-08) there is no easy way to detect whether BLEND is supported\r\n // https://github.com/microsoft/onnxjs/issues/145\r\n\r\n const gl = this.gl;\r\n\r\n let texture: WebGLTexture|null|undefined;\r\n let frameBuffer: WebGLFramebuffer|null|undefined;\r\n let vertexShader: WebGLShader|null|undefined;\r\n let fragmentShader: WebGLShader|null|undefined;\r\n let program: WebGLProgram|null|undefined;\r\n\r\n try {\r\n texture = gl.createTexture();\r\n frameBuffer = gl.createFramebuffer();\r\n gl.bindTexture(gl.TEXTURE_2D, texture);\r\n\r\n // eslint-disable-next-line @typescript-eslint/naming-convention\r\n const internalFormat = this.version === 2 ? (gl as unknown as {RGBA32F: number}).RGBA32F : gl.RGBA;\r\n gl.texImage2D(gl.TEXTURE_2D, 0, internalFormat, 1, 1, 0, gl.RGBA, gl.FLOAT, null);\r\n\r\n gl.bindFramebuffer(gl.FRAMEBUFFER, frameBuffer);\r\n gl.framebufferTexture2D(gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0, gl.TEXTURE_2D, texture, 0);\r\n\r\n gl.enable(gl.BLEND);\r\n\r\n vertexShader = gl.createShader(gl.VERTEX_SHADER);\r\n if (!vertexShader) {\r\n return false;\r\n }\r\n gl.shaderSource(vertexShader, 'void main(){}');\r\n gl.compileShader(vertexShader);\r\n\r\n fragmentShader = gl.createShader(gl.FRAGMENT_SHADER);\r\n if (!fragmentShader) {\r\n return false;\r\n }\r\n gl.shaderSource(fragmentShader, 'precision highp float;void main(){gl_FragColor=vec4(0.5);}');\r\n gl.compileShader(fragmentShader);\r\n\r\n program = gl.createProgram();\r\n if (!program) {\r\n return false;\r\n }\r\n gl.attachShader(program, vertexShader);\r\n gl.attachShader(program, fragmentShader);\r\n gl.linkProgram(program);\r\n gl.useProgram(program);\r\n\r\n gl.drawArrays(gl.POINTS, 0, 1);\r\n return gl.getError() === gl.NO_ERROR;\r\n\r\n } finally {\r\n gl.disable(gl.BLEND);\r\n\r\n if (program) {\r\n gl.deleteProgram(program);\r\n }\r\n if (vertexShader) {\r\n gl.deleteShader(vertexShader);\r\n }\r\n if (fragmentShader) {\r\n gl.deleteShader(fragmentShader);\r\n }\r\n if (frameBuffer) {\r\n gl.bindFramebuffer(gl.FRAMEBUFFER, null);\r\n gl.deleteFramebuffer(frameBuffer);\r\n }\r\n if (texture) {\r\n gl.bindTexture(gl.TEXTURE_2D, null);\r\n gl.deleteTexture(texture);\r\n }\r\n }\r\n }\r\n\r\n beginTimer(): WebGLQuery {\r\n if (this.version === 2 && this.disjointTimerQueryWebgl2Extension) {\r\n const gl2 = this.gl as WebGL2RenderingContext;\r\n const ext = this.disjointTimerQueryWebgl2Extension;\r\n\r\n const query = gl2.createQuery() as WebGLQuery;\r\n gl2.beginQuery(ext.TIME_ELAPSED_EXT, query);\r\n return query;\r\n } else {\r\n // TODO: add webgl 1 handling.\r\n throw new Error('WebGL1 profiling currently not supported.');\r\n }\r\n }\r\n\r\n endTimer() {\r\n if (this.version === 2 && this.disjointTimerQueryWebgl2Extension) {\r\n const gl2 = this.gl as WebGL2RenderingContext;\r\n const ext = this.disjointTimerQueryWebgl2Extension;\r\n gl2.endQuery(ext.TIME_ELAPSED_EXT);\r\n return;\r\n } else {\r\n // TODO: add webgl 1 handling.\r\n throw new Error('WebGL1 profiling currently not supported');\r\n }\r\n }\r\n\r\n isTimerResultAvailable(query: WebGLQuery): boolean {\r\n let available = false, disjoint = false;\r\n if (this.version === 2 && this.disjointTimerQueryWebgl2Extension) {\r\n const gl2 = this.gl as WebGL2RenderingContext;\r\n const ext = this.disjointTimerQueryWebgl2Extension;\r\n\r\n available = gl2.getQueryParameter(query, gl2.QUERY_RESULT_AVAILABLE);\r\n disjoint = gl2.getParameter(ext.GPU_DISJOINT_EXT);\r\n } else {\r\n // TODO: add webgl 1 handling.\r\n throw new Error('WebGL1 profiling currently not supported');\r\n }\r\n\r\n return available && !disjoint;\r\n }\r\n\r\n getTimerResult(query: WebGLQuery): number {\r\n let timeElapsed = 0;\r\n if (this.version === 2) {\r\n const gl2 = this.gl as WebGL2RenderingContext;\r\n timeElapsed = gl2.getQueryParameter(query, gl2.QUERY_RESULT);\r\n gl2.deleteQuery(query);\r\n } else {\r\n // TODO: add webgl 1 handling.\r\n throw new Error('WebGL1 profiling currently not supported');\r\n }\r\n // return miliseconds\r\n return timeElapsed / 1000000;\r\n }\r\n\r\n async waitForQueryAndGetTime(query: WebGLQuery): Promise<number> {\r\n await repeatedTry(() => this.isTimerResultAvailable(query));\r\n return this.getTimerResult(query);\r\n }\r\n\r\n public async

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createAndWaitForFence(): Promise<void> {\r\n    const fenceContext = this.createFence(this.gl);\r\n    return
this.pollFence(fenceContext);\r\n  }\r\n\r\n  private createFence(gl: WebGLRenderingContext): FenceContext {\r\n
let isFencePassed: () => boolean;\r\n    const gl2 = gl as WebGL2RenderingContext;\r\n    const query =
gl2.fenceSync(gl2.SYNC_GPU_COMMANDS_COMPLETE, 0);\r\n    gl.flush();\r\n    if (query === null) {\r\n
isFencePassed = () => true;\r\n    } else {\r\n      isFencePassed = () => {\r\n        const status =
gl2.clientWaitSync(query, 0, 0);\r\n        return status === gl2.ALREADY_SIGNALED || status ===
gl2.CONDITION_SATISFIED;\r\n      };\r\n    }\r\n    return {query, isFencePassed};\r\n  }\r\n\r\n  async
pollFence(fenceContext: FenceContext) {\r\n    return new Promise<void>(resolve => {\r\n      void
this.addItemToPoll(() => fenceContext.isFencePassed(), () => resolve());\r\n    });\r\n  }\r\n\r\n  private itemsToPoll:
PollItem[] = [];\r\n\r\n  pollItems(): void {\r\n    // Find the last query that has finished.\r\n    const index =
linearSearchLastTrue(this.itemsToPoll.map(x => x.isDoneFn));\r\n    for (let i = 0; i <= index; ++i) {\r\n      const
{resolveFn} = this.itemsToPoll[i];\r\n      resolveFn();\r\n    }\r\n    this.itemsToPoll = this.itemsToPoll.slice(index +
1);\r\n  }\r\n\r\n  private async addItemToPoll(isDoneFn: () => boolean, resolveFn: () => void) {\r\n
this.itemsToPoll.push({isDoneFn, resolveFn});\r\n    if (this.itemsToPoll.length > 1) {\r\n      // We already have a
running loop that polls.\r\n      return;\r\n    }\r\n    // Start a new loop that polls.\r\n    await repeatedTry(() => {\r\n
 this.pollItems();\r\n      // End the loop if no more items to poll.\r\n      return this.itemsToPoll.length === 0;\r\n
});\r\n  }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {SessionHandler} from './backend';\r\nimport {Graph} from './graph';\r\nimport {Logger,
Profiler} from './instrument';\r\nimport {Operator} from './operators';\r\nimport {Tensor} from './tensor';\r\n\r\nclass
KernelOp {\r\n  constructor(public op: Operator, public node: Graph.Node) {}\r\n}\r\n\r\nexport class
ExecutionPlan {\r\n  constructor(private graph: Graph, ops: Operator[], private profiler: Readonly<Profiler>) {\r\n
this.initialize(ops);\r\n  }\r\n\r\n  initialize(ops: Operator[]) {\r\n    this.profiler.event('session',
'ExecutionPlan.initialize', () => {\r\n      const graphNodes = this.graph.getNodes();\r\n      if (graphNodes.length !==
ops.length) {\r\n        throw new Error('The size of nodes and OPs do not match.');\r\n      }\r\n\r\n      this._ops =
ops.map((op, i) => new KernelOp(op, graphNodes[i]));\r\n      this.reset();\r\n\r\n      // look for starter node(s)\r\n
this._starter = [];\r\n      this._ops.forEach((op, i) => {\r\n        let resolved = true;\r\n        for (const input of
op.node.inputs) {\r\n          if (\r\n              !this._values[input]                              // not an initialized input\r\n
    && this.graph.getInputIndices().indexOf(input) === -1  // not model input\r\n          ) {\r\n            resolved =
false;\r\n            break;\r\n          }\r\n        }\r\n        if (resolved) {\r\n          this._starter.push(i);\r\n        }\r\n
});\r\n    });\r\n  }\r\n\r\n  reset() {\r\n    this._values = this.graph.getValues().map(i => i.tensor);\r\n  }\r\n\r\n  async
execute(sessionHandler: SessionHandler, modelInputs: Tensor[]): Promise<Tensor[]> {\r\n    return
this.profiler.event('session', 'ExecutionPlan.execute', async () => {\r\n      // reset mediem result\r\n
this.reset();\r\n\r\n      // create inference handler\r\n      const inferenceHandler =
sessionHandler.createInferenceHandler();\r\n\r\n      // populate inputs value\r\n      const graphInputs =
this.graph.getInputIndices();\r\n      if (modelInputs.length !== graphInputs.length) {\r\n        throw new
Error(`number of input tensors don't match the number of inputs to the model: actual: ${\r\n
modelInputs.length} expected: ${graphInputs.length}`);\r\n      }\r\n\r\n      modelInputs.forEach((input, i) => {\r\n
   const index = graphInputs[i];\r\n        this._values[index] = input;\r\n      });\r\n\r\n      // prepare running
sequence\r\n      const sequence: number[] = this._starter.slice(0);\r\n\r\n      // execution iterations\r\n      const
graphValues = this.graph.getValues();\r\n      const graphNodes = this.graph.getNodes();\r\n\r\n      let rear = 0;\r\n
while (rear < sequence.length) {\r\n        const thisOpIndex = sequence[rear++];\r\n        const thisOp =
this._ops[thisOpIndex];\r\n\r\n        // check input\r\n        const inputList = thisOp.node.inputs.map(i =>
this._values[i]);\r\n        if (inputList.indexOf(undefined) !== -1) {\r\n          throw new Error(`unresolved input
detected: op: ${thisOp.node}`);\r\n        }\r\n\r\n        // run\r\n        const inputTensors = inputList as Tensor[];\r\n
 Logger.verbose(\r\n            'ExecPlan',\r\n            `Runing op:${thisOp.node.name} (${\r\n
inputTensors.map((t, i) => `'${thisOp.node.inputs[i]}': ${t.type}[${t.dims.join(',')}]`).join(', ')})`);\r\n\r\n        const
outputList = await this.profiler.event(\r\n            'node', thisOp.node.name, async () =>
thisOp.op.impl(inferenceHandler, inputTensors, thisOp.op.context));\r\n\r\n        // check output\r\n        if
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(outputList.length !== thisOp.node.outputs.length) {\r\n          throw new Error('the size of output does not match
model definition.');\r\n        }\r\n\r\n        // fill value\r\n        outputList.forEach((output, i) => {\r\n          const j =
thisOp.node.outputs[i];\r\n          if (this._values[j]) {\r\n            throw new Error(`output [${j}] already has value:
op:${thisOp.node.name}`);\r\n          }\r\n          this._values[j] = output;\r\n        });\r\n\r\n        // resolve
downstream nodes\r\n        const downstreamNodes = new Set<number>();\r\n        outputList.forEach((output, i) =>
{\r\n          const j = thisOp.node.outputs[i];\r\n          for (const currentDownstreamNodeIndex of graphValues[j].to)
{\r\n            const currentDownstreamNode = graphNodes[currentDownstreamNodeIndex];\r\n            let resolved =
true;\r\n            for (const k of currentDownstreamNode.inputs) {\r\n              if (!this._values[k]) {\r\n
resolved = false;\r\n                break;\r\n              }\r\n            }\r\n            if (resolved) {\r\n
downstreamNodes.add(currentDownstreamNodeIndex);\r\n            }\r\n          }\r\n        });\r\n
sequence.push(...downstreamNodes);\r\n      }\r\n\r\n      const output: Tensor[] = [];\r\n      for (let i = 0; i <
this.graph.getOutputIndices().length; i++) {\r\n        const outputIndex = this.graph.getOutputIndices()[i];\r\n
const outputTensor = this._values[outputIndex];\r\n        if (outputTensor === undefined) {\r\n          throw new
Error(`required output [${outputIndex}] does not have value`);\r\n        }\r\n        if (outputIndex === 0) {\r\n
await outputTensor.getData();\r\n        } else {\r\n          // eslint-disable-next-line no-unused-expressions\r\n
outputTensor.data;\r\n        }\r\n        output.push(outputTensor);\r\n      }\r\n      Logger.verbose('ExecPlan',
'disposing of inferenceHandler');\r\n      inferenceHandler.dispose();\r\n      return output;\r\n    });\r\n  }\r\n\r\n
_values: Array<Tensor|undefined>;\r\n  _ops: KernelOp[];\r\n  _starter: number[];\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {onnx} from 'onnx-
proto';\r\n\r\nimport {Attribute} from './attribute';\r\nimport {onnxruntime} from './ort-schema/ort-
generated';\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\nimport {Tensor} from './tensor';\r\nimport
{LongUtil, ProtoUtil} from './util';\r\n\r\nexport declare namespace Graph {\r\n  export interface Shape {\r\n
readonly dims: readonly number[];\r\n  }\r\n  export interface ValueType {\r\n    readonly tensorType:
Tensor.DataType;\r\n    readonly shape: Shape;\r\n  }\r\n  export interface Value {\r\n    // the tensor data. empty for
non-initialized inputs\r\n    readonly tensor?: Tensor;\r\n\r\n    // index to the Node where the value comes from. -1
for initializer.\r\n    readonly from: number;\r\n\r\n    // indices to the Nodes where the values go to.\r\n    readonly
to: readonly number[];\r\n\r\n    // value type specification. empty for non-input values.\r\n    readonly type?:
ValueType;\r\n  }\r\n  export interface Node {\r\n    // name of the node\r\n    readonly name: string;\r\n\r\n    // the
operator type\r\n    readonly opType: string;\r\n\r\n    // indices to the Values where the inputs come from.\r\n
readonly inputs: readonly number[];\r\n\r\n    // indices to the Values where the outpus go to.\r\n    readonly outputs:
readonly number[];\r\n\r\n    // the attributes that used by the operator\r\n    readonly attributes: Attribute;\r\n
}\r\n\r\n  /**\r\n   * a Transformer is an instance that allows all possible transformation operations that applied to a
graph\r\n   */\r\n  export interface Transformer {\r\n    removeAllIdentityNodes(): void;\r\n
removeAllDropoutNodes(): void;\r\n    fuseConvActivationNodes(): void;\r\n    // TODO: add generic functions to
manipulate the graph\r\n  }\r\n\r\n  // an initializer can use transformer to transform the graph\r\n  export interface
Initializer {\r\n    transformGraph(transformer: Transformer): void;\r\n  }\r\n}\r\n\r\n// eslint-disable-next-line
@typescript-eslint/no-redeclare\r\nexport interface Graph {\r\n  getInputIndices(): readonly number[];\r\n
getInputNames(): readonly string[];\r\n  getOutputIndices(): readonly number[];\r\n  getOutputNames(): readonly
string[];\r\n  getValues(): readonly Graph.Value[];\r\n  getNodes(): readonly Graph.Node[];\r\n}\r\n\r\n// eslint-
disable-next-line @typescript-eslint/naming-convention, @typescript-eslint/no-redeclare\r\nexport const Graph =
{\r\n  /**\r\n   * construct a graph from a graph protobuf type\r\n   */\r\n  from: (graphProto:
onnx.IGraphProto|ortFbs.Graph, initializer?: Graph.Initializer) =>\r\n      new GraphImpl(graphProto,
initializer),\r\n};\r\n\r\nclass Value implements Graph.Value {\r\n  constructor(valueInfo?: onnx.IValueInfoProto)
{\r\n    this._from = undefined;\r\n    this._to = [];\r\n    this.tensor = undefined;\r\n    this.type = undefined;\r\n\r\n
if (valueInfo) {\r\n      this.type = ProtoUtil.tensorValueTypeFromProto(valueInfo.type!.tensorType!);\r\n    }\r\n
}\r\n\r\n  _from?: number;  // -1 represent from initializer\r\n  get from() {\r\n    return this._from!;\r\n  }\r\n  _to:
number[];\r\n  get to() {\r\n    return this._to;\r\n  }\r\n  type?: Graph.ValueType;\r\n  tensor?:
Tensor;\r\n}\r\n\r\nclass Node implements Graph.Node {\r\n  constructor(_nodeProto:
```

```
onnx.INodeProto|ortFbs.Node, name?: string) {\r\n    if (_nodeProto instanceof onnx.NodeProto) {\r\n      this.name
= _nodeProto.name;\r\n      this.opType = _nodeProto.opType;\r\n      this.attributes = new
Attribute(_nodeProto.attribute);\r\n    } else if (_nodeProto instanceof ortFbs.Node) {\r\n      this.name = name ??
_nodeProto.name()!;\r\n      this.opType = _nodeProto.opType()!;\r\n      this.attributes = new
Attribute(ProtoUtil.tensorAttributesFromORTFormat(_nodeProto));\r\n    }\r\n\r\n    this.inputs = [];\r\n
this.outputs = [];\r\n    this.executeNode = true;\r\n  }\r\n\r\n  name: string;\r\n  opType: string;\r\n  inputs:
number[];\r\n  outputs: number[];\r\n  attributes: Attribute;\r\n  executeNode: boolean;\r\n}\r\n\r\nclass GraphImpl
implements Graph, Graph.Transformer {\r\n  private _allData: Value[];\r\n\r\n  private _allInputIndices:
number[];\r\n  private _allInputNames: string[];\r\n\r\n  private _allOutputIndices: number[];\r\n  private
_allOutputNames: string[];\r\n\r\n  private _nodes: Node[];\r\n\r\n  constructor(graph:
onnx.IGraphProto|ortFbs.Graph, graphInitializer?: Graph.Initializer) {\r\n    if (!graph) {\r\n      throw new
TypeError('graph is empty');\r\n    }\r\n\r\n    // build the graph - will throw exceptions if something fatal is
detected\r\n    this.buildGraph(graph);\r\n\r\n    // execute any transformation logic for the graph (if applicable)\r\n
this.transformGraph(graphInitializer);\r\n\r\n    // check for cycles and other inconsistencies - will throw exceptions
if something fatal is detected\r\n    this.checkIsAcyclic();\r\n  }\r\n\r\n  getInputIndices(): readonly number[] {\r\n
return this._allInputIndices;\r\n  }\r\n\r\n  getInputNames(): readonly string[] {\r\n    return this._allInputNames;\r\n
}\r\n\r\n  getOutputIndices(): readonly number[] {\r\n    return this._allOutputIndices;\r\n  }\r\n\r\n
getOutputNames(): readonly string[] {\r\n    return this._allOutputNames;\r\n  }\r\n\r\n  getValues(): readonly
Graph.Value[] {\r\n    return this._allData;\r\n  }\r\n\r\n  getNodes(): readonly Graph.Node[] {\r\n    return
this._nodes;\r\n  }\r\n\r\n  private buildGraph(graph: onnx.IGraphProto|ortFbs.Graph) {\r\n    // build the graph - will
throw exceptions if something fatal is detected\r\n    if (graph instanceof onnx.GraphProto) {\r\n
this.buildGraphFromOnnxFormat(graph);\r\n    } else if (graph instanceof ortFbs.Graph) {\r\n
this.buildGraphFromOrtFormat(graph);\r\n    } else {\r\n      throw new TypeError('Graph type is not
supported.');\r\n    }\r\n  }\r\n  private buildGraphFromOnnxFormat(graph: onnx.IGraphProto) {\r\n    const
dataIndices = new Map<string, number>();\r\n    this._allData = [];\r\n\r\n    this._allInputIndices = [];\r\n
this._allInputNames = [];\r\n\r\n    this._allOutputIndices = [];\r\n    this._allOutputNames = [];\r\n\r\n    this._nodes
= [];\r\n\r\n    const nodesIndices = new Map<string, number>();\r\n\r\n    // scan all inputs\r\n    if (!graph.input)
{\r\n      throw new Error('missing information in graph: input');\r\n    }\r\n    const inputValueNames = [];\r\n    for
(const i of graph.input) {\r\n      if (dataIndices.has(i.name!)) {\r\n        throw new Error(`duplicated input name:
${i.name}`);\r\n      }\r\n      const currentIndex = this._allData.push(new Value(i)) - 1;\r\n
dataIndices.set(i.name!, currentIndex);\r\n      inputValueNames.push(i.name!);\r\n    }\r\n\r\n    // scan all
initializers\r\n    if (!graph.initializer) {\r\n      throw new Error('missing information in graph: initializer');\r\n    }\r\n
  for (const i of graph.initializer) {\r\n      let index = dataIndices.get(i.name!);\r\n      if (index === undefined) {\r\n
   const value = new Value();\r\n        value.type = {\r\n          shape: {dims:
ProtoUtil.tensorDimsFromProto(i.dims!)},\r\n          tensorType:
ProtoUtil.tensorDataTypeFromProto(i.dataType!)\r\n        };\r\n        index = this._allData.push(value) - 1;\r\n
dataIndices.set(i.name!, index);\r\n      }\r\n      this._allData[index]._from = -1;\r\n      this._allData[index].tensor =
Tensor.fromProto(i);\r\n    }\r\n\r\n    // filter out input indices\r\n    for (let i = 0; i < this._allData.length; i++) {\r\n
 if (!this._allData[i].tensor) {\r\n        this._allInputIndices.push(i);\r\n
this._allInputNames.push(inputValueNames[i]);\r\n      }\r\n    }\r\n\r\n    // scan all outputs\r\n    if (!graph.output)
{\r\n      throw new Error('missing information in graph: output');\r\n    }\r\n    for (const i of graph.output) {\r\n      if
(dataIndices.has(i.name!)) {\r\n        throw new Error(`duplicated output name: ${i.name}`);\r\n      }\r\n      const
currentIndex = this._allData.push(new Value(i)) - 1;\r\n      dataIndices.set(i.name!, currentIndex);\r\n
this._allOutputIndices.push(currentIndex);\r\n      this._allOutputNames.push(i.name!);\r\n    }\r\n\r\n    // scan all
nodes\r\n    if (!graph.node) {\r\n      throw new Error('missing information in graph: node');\r\n    }\r\n    for (const
nodeProto of graph.node) {\r\n      if (!nodeProto.name) {\r\n        // assign a name to the node if it doesn't have
one\r\n        for (let pick = 0;; pick++) {\r\n          const name = `unnamed_${nodeProto.opType}_${pick}`;\r\n
if (!nodesIndices.has(name)) {\r\n            nodeProto.name = name;\r\n            break;\r\n          }\r\n        }\r\n
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```
}\r\n\r\n      if (nodesIndices.has(nodeProto.name)) {\r\n        throw new Error(`duplicated node name:
${nodeProto.name}`);\r\n      }\r\n      const currentIndex = this._nodes.push(new Node(nodeProto)) - 1;\r\n
nodesIndices.set(nodeProto.name, currentIndex);\r\n    }\r\n\r\n    // scan node's outputs\r\n    for (let i = 0; i <
this._nodes.length; i++) {\r\n      const node = this._nodes[i];\r\n      const nodeProto = graph.node[i];\r\n      if
(!nodeProto.output) {\r\n        throw new Error(`missing output for node: ${nodeProto.name}`);\r\n      }\r\n      for
(const output of nodeProto.output) {\r\n        let dataIndex = dataIndices.get(output);\r\n        if (typeof dataIndex
=== 'undefined') {\r\n          dataIndex = this._allData.push(new Value()) - 1;\r\n          dataIndices.set(output,
dataIndex);\r\n        }\r\n        node.outputs.push(dataIndex);\r\n\r\n        if (this._allData[dataIndex]._from !==
undefined) {\r\n          throw new Error(`multiple nodes output to one data value: ${dataIndex}`);\r\n        }\r\n
this._allData[dataIndex]._from = i;\r\n\r\n        // for the 'Constant' operator, just create a new edge in the graph
corresponding to the 'output' of the\r\n        // operator and ignore the node from the graph\r\n        if
(nodeProto.opType === 'Constant') {\r\n          if (!nodeProto.attribute || nodeProto.attribute.length !== 1 ||
!nodeProto.attribute[0].t) {\r\n            throw new Error('missing attributes or missing tensor value in attributes for
this Constant operator');\r\n          }\r\n          if (!nodeProto.output || nodeProto.output.length !== 1) {\r\n
throw new Error('missing output or incorrect number of outputs for this Constant operator');\r\n          }\r\n
node.outputs.pop();\r\n          node.executeNode = false;\r\n\r\n          this._allData[dataIndex]._from = -1;\r\n
this._allData[dataIndex].tensor = Tensor.fromProto(nodeProto.attribute[0].t);\r\n        }\r\n      }\r\n    }\r\n\r\n    //
scan node's inputs\r\n    for (let i = 0; i < this._nodes.length; i++) {\r\n      const node = this._nodes[i];\r\n      const
nodeProto = graph.node[i];\r\n\r\n      if (!nodeProto.input) {\r\n        throw new Error(`missing input for node:
${nodeProto.name}`);\r\n      }\r\n      for (const input of nodeProto.input) {\r\n        const dataIndex =
dataIndices.get(input);\r\n        if (typeof dataIndex === 'undefined') {\r\n          throw new Error(`unrecognized
input '${input}' for node: ${nodeProto.name}`);\r\n        }\r\n        node.inputs.push(dataIndex);\r\n\r\n
this._allData[dataIndex]._to.push(i);\r\n      }\r\n    }\r\n\r\n    return true;\r\n  }\r\n\r\n  private
buildGraphFromOrtFormat(graph: ortFbs.Graph) {\r\n    const dataIndices = new Map<string, number>();\r\n
this._allData = [];\r\n\r\n    this._allInputIndices = [];\r\n    this._allInputNames = [];\r\n\r\n    this._allOutputIndices
= [];\r\n    this._allOutputNames = [];\r\n\r\n    this._nodes = [];\r\n\r\n    const nodesIndices = new Map<string,
number>();\r\n\r\n    // scan all inputs\r\n    const inputValueNames = [];\r\n    for (let i = 0; i < graph.inputsLength();
i++) {\r\n      const inputName = graph.inputs(i);\r\n      if (dataIndices.has(inputName)) {\r\n        throw new
Error(`duplicated input name: ${inputName}`);\r\n      }\r\n      // Find the input typeInfo from nodeargs\r\n      for
(let j = 0; j < graph.nodeArgsLength(); j++) {\r\n        if (graph.nodeArgs(j)?.name() === inputName) {\r\n
const value = new Value();\r\n          const valueType = graph.nodeArgs(j)?.type()?.valueType();\r\n          if
(valueType !== ortFbs.TypeInfoValue.tensor_type) {\r\n            throw new Error('Unexpected value type for the
nodeArg.');\r\n          }\r\n          const valueInfo = graph.nodeArgs(j)!.type()!.value(new
ortFbs.TensorTypeAndShape())!;\r\n          const type =
ProtoUtil.tensorDataTypeFromProto(valueInfo.elemType());\r\n          const shape = valueInfo.shape()!;\r\n
const dims = [];\r\n          for (let k = 0; k < shape.dimLength()!; k++) {\r\n
dims.push(LongUtil.longToNumber(shape.dim(k)!.value()!.dimValue()!));\r\n          }\r\n          value.type = {shape:
{dims}, tensorType: type};\r\n          const currentIndex = this._allData.push(value) - 1;\r\n
dataIndices.set(inputName, currentIndex);\r\n          inputValueNames.push(inputName);\r\n        }\r\n      }\r\n
}\r\n    // check initializers\r\n    for (let i = 0; i < graph.initializersLength(); i++) {\r\n      const initializer =
graph.initializers(i)!;\r\n      let index = dataIndices.get(initializer.name()!);\r\n      if (index === undefined) {\r\n
const value = new Value();\r\n        const dims = ProtoUtil.tensorDimsFromORTFormat(initializer);\r\n        const
type = ProtoUtil.tensorDataTypeFromProto(initializer.dataType());\r\n        value.type = {shape: {dims},
tensorType: type};\r\n        index = this._allData.push(value) - 1;\r\n        dataIndices.set(initializer.name()!,
index);\r\n      }\r\n      this._allData[index]._from = -1;\r\n      this._allData[index].tensor =
Tensor.fromOrtTensor(initializer);\r\n    }\r\n\r\n    // filter out input indices\r\n    for (let i = 0; i <
this._allData.length; i++) {\r\n      if (!this._allData[i].tensor) {\r\n        this._allInputIndices.push(i);\r\n
this._allInputNames.push(inputValueNames[i]);\r\n      }\r\n    }\r\n\r\n    // scan all outputs\r\n    for (let i = 0; i <
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graph.outputsLength(); i++) {\r\n      const outputName = graph.outputs(i);\r\n      if (dataIndices.has(outputName))
{\r\n        throw new Error(`duplicated output name: ${outputName}`);\r\n      }\r\n      const currentIndex =
this._allData.push(new Value()) - 1;\r\n      dataIndices.set(outputName, currentIndex);\r\n
this._allOutputIndices.push(currentIndex);\r\n      this._allOutputNames.push(outputName);\r\n    }\r\n\r\n    // scan
all nodes\r\n    if (!graph.nodes) {\r\n      throw new Error('missing information in graph: node');\r\n    }\r\n    for (let
i = 0; i < graph.nodesLength(); i++) {\r\n      const nodeProto = graph.nodes(i);\r\n      let name =
nodeProto!.name();\r\n      if (!name) {\r\n        // assign a name to the node if it doesn't have one\r\n        for (let pick
= 0;; pick++) {\r\n          name = `unnamed_${nodeProto!.opType()}_${pick}`;\r\n          if
(!nodesIndices.has(name)) {\r\n            // an unique name is found. break.\r\n            break;\r\n          }\r\n        }\r\n
 }\r\n\r\n      if (nodesIndices.has(name)) {\r\n        throw new Error(`duplicated node name: ${name}`);\r\n      }\r\n
  const currentIndex = this._nodes.push(new Node(nodeProto!, name)) - 1;\r\n      nodesIndices.set(name,
currentIndex);\r\n    }\r\n\r\n    // scan node's outputs\r\n    for (let i = 0; i < this._nodes.length; i++) {\r\n      const
node = this._nodes[i];\r\n      const nodeProto = graph.nodes(i);\r\n      if (nodeProto == null) {\r\n        throw new
Error(`No node exists at index ${i}`);\r\n      }\r\n      if (nodeProto?.outputsLength() === 0) {\r\n        throw new
Error(`missing output for node: ${nodeProto.name}`);\r\n      }\r\n      for (let j = 0; j < nodeProto?.outputsLength();
j++) {\r\n        const output = nodeProto?.outputs(j);\r\n        let dataIndex = dataIndices.get(output);\r\n        if
(typeof dataIndex === 'undefined') {\r\n          dataIndex = this._allData.push(new Value()) - 1;\r\n
dataIndices.set(output, dataIndex);\r\n        }\r\n        node.outputs.push(dataIndex);\r\n\r\n        if
(this._allData[dataIndex]._from !== undefined) {\r\n          throw new Error(`multiple nodes output to one data
value: ${dataIndex}`);\r\n        }\r\n        this._allData[dataIndex]._from = i;\r\n\r\n        // for the 'Constant' operator,
just create a new edge in the graph corresponding to the 'output' of the\r\n        // operator and ignore the node from
the graph\r\n        if (nodeProto.opType() === 'Constant') {\r\n          if (nodeProto.attributesLength() !== 1 ||
!nodeProto.attributes(0)!.t()) {\r\n            throw new Error('missing attributes or missing tensor value in attributes for
this Constant operator');\r\n          }\r\n          if (nodeProto.outputsLength() !== 1) {\r\n            throw new
Error('missing output or incorrect number of outputs for this Constant operator');\r\n          }\r\n
node.outputs.pop();\r\n          node.executeNode = false;\r\n\r\n          this._allData[dataIndex]._from = -1;\r\n
this._allData[dataIndex].tensor = Tensor.fromOrtTensor(nodeProto.attributes(0)!.t()!);\r\n        }\r\n      }\r\n
}\r\n\r\n    // scan node's inputs\r\n    for (let i = 0; i < this._nodes.length; i++) {\r\n      const node =
this._nodes[i];\r\n      const nodeProto = graph.nodes(i)!;\r\n\r\n      if (nodeProto.inputsLength() === 0) {\r\n
throw new Error(`missing input for node: ${nodeProto.name}`);\r\n      }\r\n      for (let j = 0; j <
nodeProto.inputsLength()!; j++) {\r\n        const input = nodeProto.inputs(j)!;\r\n        const dataIndex =
dataIndices.get(input);\r\n        if (typeof dataIndex === 'undefined') {\r\n          throw new Error(`unrecognized
input '${input}' for node: ${nodeProto!.name()}`);\r\n        }\r\n        node.inputs.push(dataIndex);\r\n\r\n
this._allData[dataIndex]._to.push(i);\r\n      }\r\n    }\r\n  }\r\n\r\n  private checkIsAcyclic() {\r\n    // go through the
graph and check for cycles or other fatal inconsistencies\r\n    const starters: Set<number> = new
Set<number>();\r\n    this._allInputIndices.forEach(i => {\r\n      const data = this._allData[i];\r\n
data._to.forEach(j => {\r\n        starters.add(j);\r\n      });\r\n    });\r\n\r\n    // Iterative DFS to check for cycles\r\n
const nodesStack = Array.from(starters);\r\n    const nodesState = new
Array<string>(this._nodes.length).fill('white');\r\n\r\n    while (nodesStack.length > 0) {\r\n      const nodeIndex =
nodesStack.pop()!;\r\n      // this node has now been processed completely. Mark this node 'black' to denote this.\r\n
  if (nodesState[nodeIndex] === 'gray') {\r\n        nodesState[nodeIndex] = 'black';\r\n      } else {\r\n        // this node
is under processing stage. mark this node 'gray' to denote this.\r\n        nodesStack.push(nodeIndex);\r\n
nodesState[nodeIndex] = 'gray';\r\n\r\n        this._nodes[nodeIndex].outputs.forEach((outgoingEdgeIndex) => {\r\n
     const data = this._allData[outgoingEdgeIndex];\r\n          if (typeof data.tensor !== 'undefined') {\r\n            throw
new Error('node outputs should not be initialized');\r\n          }\r\n          if (data._from !== nodeIndex) {\r\n
throw new Error('from property of the Value object doesn\\'t match index of Node being processed');\r\n          }\r\n
      data._to.forEach((downstreamNodeIndex) => {\r\n            // back edge found - cyclic\r\n            if
(nodesState[downstreamNodeIndex] === 'gray') {\r\n              throw new Error('model graph is cyclic');\r\n
```

}\r\n // tree edge found - continue processing by adding it to stack\r\n else if (nodesState[downstreamNodeIndex] === 'white') {\r\n nodesStack.push(downstreamNodeIndex);\r\n }\r\n });\r\n });\r\n }\r\n }\r\n }\r\n\r\n private transformGraph(graphInitializer?: Graph.Initializer): void {\r\n // apply common transform\r\n this.removeAllIdentityNodes();\r\n this.removeAllDropoutNodes();\r\n this.fuseConvActivationNodes();\r\n // apply initializer specific transform\r\n if (graphInitializer) {\r\n graphInitializer.transformGraph(this);\r\n }\r\n\r\n // finalize graph\r\n this.finalizeGraph();\r\n }\r\n\r\n /**\r\n * finalize the graph.\r\n *\r\n * this function should be called after all the transformation completed.\r\n * this function removes all unnecessary nodes and values from the graph\r\n */\r\n finalizeGraph() {\r\n let offset = 0;\r\n // delete all nodes that are not being executed\r\n for (let i = 0; i < this._nodes.length; i++) {\r\n if (!this._nodes[i].executeNode) {\r\n // delete this node and shift all subsequent nodes up\r\n offset++;\r\n // delete all output values\r\n this._nodes[i].outputs.forEach(ind => {\r\n this._allData[ind]._from = -2;\r\n });\r\n this._nodes.splice(i, 1);\r\n i--;\r\n continue;\r\n }\r\n if (offset > 0) {\r\n // update the value table\r\n this._nodes[i].inputs.forEach(value => {\r\n const ind = this._allData[value]._to.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._allData[value]._to[ind] = i;\r\n }\r\n });\r\n this._nodes[i].outputs.forEach(value => {\r\n if (this._allData[value]._from && this._allData[value]._from! === i + offset) {\r\n this._allData[value]._from! = i;\r\n }\r\n });\r\n }\r\n }\r\n offset = 0;\r\n // delete all values that are not being referenced\r\n for (let i = 0; i < this._allData.length; i++) {\r\n // if current value is neither linked to next node, nor an output value, remove it.\r\n if (this._allData[i].from === -2 && this._allOutputIndices.indexOf(i + offset) === -1) {\r\n offset++;\r\n this._allData.splice(i, 1);\r\n i--;\r\n continue;\r\n }\r\n if (offset > 0) {\r\n let ind = -1;\r\n // if current value is neither an input value nor an initializer, find the node it's\r\n // coming from and update the corresponding node output\r\n if (this._allData[i].from !== undefined && this._allData[i].from !== -1) {\r\n ind = this._nodes[this._allData[i].from].outputs.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._nodes[this._allData[i].from].outputs[ind] = i;\r\n }\r\n } else {\r\n // if current value is an input value, update its reference in inputIndices\r\n ind = this._allInputIndices.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._allInputIndices[ind] = i;\r\n }\r\n }\r\n\r\n // find the node that the current value is linking to and update its input reference\r\n this._allData[i].to.forEach(node => {\r\n ind = this._nodes[node].inputs.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._nodes[node].inputs[ind] = i;\r\n }\r\n });\r\n if (this._allData[i].to.length === 0) {\r\n // if current value is a graph output, update its reference in outputIndices\r\n ind = this._allOutputIndices.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._allOutputIndices[ind] = i;\r\n }\r\n }\r\n }\r\n }\r\n }\r\n\r\n /**\r\n * Delete the specifed node. Assume the node has only one input and the first output connected to other nodes\r\n * @param nodeIndex The index of node to be deleted\r\n */\r\n private deleteNode(nodeIndex: number) {\r\n const node = this._nodes[nodeIndex];\r\n if (node.inputs.length > 1) {\r\n throw new Error('Node deletion with multiple inputs is not supported. ');\r\n }\r\n if (node.outputs.length > 1) {\r\n for (let i = 1; i < node.outputs.length; i++) {\r\n if (this._allData[node.outputs[i]].to.length > 0) {\r\n throw new Error('Node deletion with more than one output connected to other nodes is not supported. ');\r\n }\r\n }\r\n }\r\n\r\n // this node wil not be executed\r\n node.executeNode = false;\r\n const inputValueIndex = node.inputs[0];\r\n const outputValueIndex = node.outputs[0];\r\n const nodesConsumingOutput = this._allData[outputValueIndex].to;\r\n\r\n // remove this node from the to property of the input Value\r\n const delIndex = this._allData[inputValueIndex].to.indexOf(nodeIndex);\r\n // should not happen\r\n if (delIndex === -1) {\r\n throw new Error('The Value object doesn\\'t have the current Node in it\\'s \\'to\\' property ');\r\n }\r\n this._allData[inputValueIndex].to.splice(delIndex, 1);\r\n\r\n // clear node indices consuming this output Value\r\n this._allData[outputValueIndex]._to = [];\r\n\r\n // if the output of this node is a graph output, adjust the index appropriately\r\n const index = this._allOutputIndices.indexOf(outputValueIndex);\r\n if (index !== -1) {\r\n this._allOutputIndices[index] = inputValueIndex;\r\n }\r\n\r\n // override the inputs for nodes consuming this node's output with the input to this node\r\n if (nodesConsumingOutput && nodesConsumingOutput.length > 0)

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{\r\n      for (const nodeIndex of nodesConsumingOutput) {\r\n        const replaceIndex =
this._nodes[nodeIndex].inputs.indexOf(outputValueIndex);\r\n        // should not happen\r\n        if (replaceIndex
=== -1) {\r\n          throw new Error('The Node object doesn\\'t have the output Value in it\\'s \\'inputs\\' property
');\r\n        }\r\n        this._nodes[nodeIndex].inputs[replaceIndex] = inputValueIndex;\r\n
this._allData[inputValueIndex].to.push(nodeIndex);\r\n      }\r\n    }\r\n  }\r\n\r\n  removeAllDropoutNodes() {\r\n
let nodeIndex = 0;\r\n    for (const node of this._nodes) {\r\n      // weed out 'Dropout' nodes so that no time is wasted
in execution\r\n      if (node.opType === 'Dropout') {\r\n        // the node should have exactly 1 input and 1 or 2
outputs\r\n        if (node.inputs.length !== 1) {\r\n          throw new Error('Dropout nodes should only contain one
input. ');\r\n        }\r\n        if (node.outputs.length !== 1 && node.outputs.length !== 2) {\r\n          throw new
Error('Dropout nodes should contain either 1 or 2 output(s)');\r\n        }\r\n        // the second output should not be
referenced by any other node\r\n        if (node.outputs.length === 2 && this._allData[node.outputs[1]]._to.length
!== 0) {\r\n          throw new Error('Dropout nodes\\'s second output should not be referenced by other nodes');\r\n
  }\r\n        this.deleteNode(nodeIndex);\r\n      }\r\n      nodeIndex++;\r\n    }\r\n  }\r\n\r\n  removeAllIdentityNodes()
{\r\n    let nodeIndex = 0;\r\n    for (const node of this._nodes) {\r\n      // weed out 'Identity' nodes so that no time is
wasted in execution\r\n      if (node.opType === 'Identity') {\r\n        this.deleteNode(nodeIndex);\r\n      }\r\n
nodeIndex++;\r\n    }\r\n  }\r\n\r\n  isActivation(n: Node): boolean {\r\n    switch (n.opType) {\r\n      // TODO: add
other activation methods\r\n      case 'Relu':\r\n      case 'Sigmoid':\r\n      case 'Clip':\r\n        return true;\r\n
default:\r\n        return false;\r\n    }\r\n  }\r\n\r\n  fuseConvActivationNodes() {\r\n    for (const node of this._nodes)
{\r\n      if (node.opType === 'Conv') {\r\n        const next = this._allData[node.outputs[0]]._to;\r\n        if
(next.length === 1 && this.isActivation(this._nodes[next[0]])) {\r\n          const child = this._nodes[next[0]];\r\n
 node.attributes.set('__internal_activation', 'string', (child.opType));\r\n          // TODO: need add support for Clip
after opset 11, which has min/max as inputs\r\n          if (child.opType === 'Clip') {\r\n
node.attributes.set('__clip_min', 'float', child.attributes.getFloat('min'));\r\n            node.attributes.set('__clip_max',
'float', child.attributes.getFloat('max'));\r\n          }\r\n          this.deleteNode(next[0]);\r\n        }\r\n      }\r\n    }\r\n
}\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {Env} from 'onnxruntime-common';\r\n\r\nimport {WebGLContext} from
'./backends/webgl/webgl-context';\r\n\r\nexport declare namespace Logger {\r\n  export interface SeverityTypeMap
{\r\n    verbose: 'v';\r\n    info: 'i';\r\n    warning: 'w';\r\n    error: 'e';\r\n    fatal: 'f';\r\n  }\r\n\r\n  export type Severity
= keyof SeverityTypeMap;\r\n\r\n  export type Provider = 'none'|'console';\r\n\r\n  /**\r\n   * Logging config that
used to control the behavior of logger\r\n   */\r\n  export interface Config {\r\n    /**\r\n     * Specify the logging
provider. 'console' by default\r\n     */\r\n    provider?: Provider;\r\n    /**\r\n     * Specify the minimal logger
serverity. 'warning' by default\r\n     */\r\n    minimalSeverity?: Logger.Severity;\r\n    /**\r\n     * Whether to output
date time in log. true by default\r\n     */\r\n    logDateTime?: boolean;\r\n    /**\r\n     * Whether to output source
information (Not yet supported). false by default\r\n     */\r\n    logSourceLocation?: boolean;\r\n  }\r\n\r\n  export
interface CategorizedLogger {\r\n    verbose(content: string): void;\r\n    info(content: string): void;\r\n
warning(content: string): void;\r\n    error(content: string): void;\r\n    fatal(content: string): void;\r\n  }\r\n}\r\n\r\n//
eslint-disable-next-line @typescript-eslint/no-redeclare\r\nexport interface Logger {\r\n  (category: string):
Logger.CategorizedLogger;\r\n\r\n  verbose(content: string): void;\r\n  verbose(category: string, content: string):
void;\r\n  info(content: string): void;\r\n  info(category: string, content: string): void;\r\n  warning(content: string):
void;\r\n  warning(category: string, content: string): void;\r\n  error(content: string): void;\r\n  error(category: string,
content: string): void;\r\n  fatal(content: string): void;\r\n  fatal(category: string, content: string): void;\r\n\r\n  /**\r\n
 * Reset the logger configuration.\r\n   * @param config specify an optional default config\r\n   */\r\n  reset(config?:
Logger.Config): void;\r\n  /**\r\n   * Set the logger's behavior on the given category\r\n   * @param category specify
a category string. If '*' is specified, all previous configuration will be overwritten. If\r\n   * '' is specified, the default
behavior will be updated.\r\n   * @param config the config object to indicate the logger's behavior\r\n   */\r\n
set(category: string, config: Logger.Config): void;\r\n\r\n  /**\r\n   * Set the logger's behavior from ort-common
env\r\n   * @param env the env used to set logger. Currently only setting loglevel is supported through Env.\r\n
*/\r\n  setWithEnv(env: Env): void;\r\n}\r\n\r\ninterface LoggerProvider {\r\n  log(severity: Logger.Severity,
```

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content: string, category?: string): void;\r\n}\r\nclass NoOpLoggerProvider implements LoggerProvider {\r\n
log(_severity: Logger.Severity, _content: string, _category?: string) {\r\n    // do nothing\r\n  }\r\n}\r\nclass
ConsoleLoggerProvider implements LoggerProvider {\r\n  log(severity: Logger.Severity, content: string, category?:
string) {\r\n    // eslint-disable-next-line no-console\r\n    console.log(`${this.color(severity)} ${category ?
'\\x1b[35m' + category + '\\x1b[0m ' : ''}${content}`);\r\n  }\r\n\r\n  private color(severity: Logger.Severity) {\r\n
switch (severity) {\r\n      case 'verbose':\r\n        return '\\x1b[34;40mv\\x1b[0m';\r\n      case 'info':\r\n        return
'\\x1b[32mi\\x1b[0m';\r\n      case 'warning':\r\n        return '\\x1b[30;43mw\\x1b[0m';\r\n      case 'error':\r\n
return '\\x1b[31;40me\\x1b[0m';\r\n      case 'fatal':\r\n        return '\\x1b[101mf\\x1b[0m';\r\n      default:\r\n
throw new Error(`unsupported severity: ${severity}`);\r\n    }\r\n  }\r\n}\r\n\r\nconst SEVERITY_VALUE = {\r\n
verbose: 1000,\r\n  info: 2000,\r\n  warning: 4000,\r\n  error: 5000,\r\n  fatal: 6000\r\n};\r\n\r\nconst
LOGGER_PROVIDER_MAP: {readonly [provider: string]: Readonly<LoggerProvider>} = {\r\n  ['none']: new
NoOpLoggerProvider(),\r\n  ['console']: new ConsoleLoggerProvider()\r\n};\r\nconst
LOGGER_DEFAULT_CONFIG = {\r\n  provider: 'console',\r\n  minimalSeverity: 'warning',\r\n  logDateTime:
true,\r\n  logSourceLocation: false\r\n};\r\nlet LOGGER_CONFIG_MAP:\r\n    {[category: string]:
Readonly<Required<Logger.Config>>} = {['']: LOGGER_DEFAULT_CONFIG as
Required<Logger.Config>};\r\n\r\nfunction log(category: string): Logger.CategorizedLogger;\r\nfunction
log(severity: Logger.Severity, content: string): void;\r\nfunction log(severity: Logger.Severity, category: string,
content: string): void;\r\nfunction log(severity: Logger.Severity, arg1: string, arg2?: string): void;\r\nfunction
log(\r\n    arg0: string|Logger.Severity, arg1?: string, arg2?: string|number, arg3?: number):
Logger.CategorizedLogger|void {\r\n  if (arg1 === undefined) {\r\n    // log(category: string):
Logger.CategorizedLogger;\r\n    return createCategorizedLogger(arg0);\r\n  } else if (arg2 === undefined) {\r\n    //
log(severity, content);\r\n    logInternal(arg0 as Logger.Severity, arg1, 1);\r\n  } else if (typeof arg2 === 'number'
&& arg3 === undefined) {\r\n    // log(severity, content, stack)\r\n    logInternal(arg0 as Logger.Severity, arg1,
arg2);\r\n  } else if (typeof arg2 === 'string' && arg3 === undefined) {\r\n    // log(severity, category, content)\r\n
logInternal(arg0 as Logger.Severity, arg2, 1, arg1);\r\n  } else if (typeof arg2 === 'string' && typeof arg3 ===
'number') {\r\n    // log(severity, category, content, stack)\r\n    logInternal(arg0 as Logger.Severity, arg2, arg3,
arg1);\r\n  } else {\r\n    throw new TypeError('input is valid');\r\n  }\r\n}\r\n\r\nfunction
createCategorizedLogger(category: string): Logger.CategorizedLogger {\r\n  return {\r\n    verbose:
log.verbose.bind(null, category),\r\n    info: log.info.bind(null, category),\r\n    warning: log.warning.bind(null,
category),\r\n    error: log.error.bind(null, category),\r\n    fatal: log.fatal.bind(null, category)\r\n  };\r\n}\r\n\r\n//
NOTE: argument 'category' is put the last parameter beacause typescript\r\n// doesn't allow optional argument put in
front of required argument. This\r\n// order is different from a usual logging API.\r\nfunction logInternal(severity:
Logger.Severity, content: string, stack: number, category?: string) {\r\n  const config =
LOGGER_CONFIG_MAP[category || ''] || LOGGER_CONFIG_MAP[''];\r\n  if (SEVERITY_VALUE[severity] <
SEVERITY_VALUE[config.minimalSeverity]) {\r\n    return;\r\n  }\r\n\r\n  if (config.logDateTime) {\r\n    content
= `${new Date().toISOString()}|${content}`;\r\n  }\r\n\r\n  if (config.logSourceLocation) {\r\n    // TODO: calculate
source location from 'stack'\r\n  }\r\n\r\n  LOGGER_PROVIDER_MAP[config.provider].log(severity, content,
category);\r\n}\r\n\r\n// eslint-disable-next-line @typescript-eslint/no-namespace\r\nnamespace log {\r\n  export
function verbose(content: string): void;\r\n  export function verbose(category: string, content: string): void;\r\n
export function verbose(arg0: string, arg1?: string) {\r\n    log('verbose', arg0, arg1);\r\n  }\r\n  export function
info(content: string): void;\r\n  export function info(category: string, content: string): void;\r\n  export function
info(arg0: string, arg1?: string) {\r\n    log('info', arg0, arg1);\r\n  }\r\n  export function warning(content: string):
void;\r\n  export function warning(category: string, content: string): void;\r\n  export function warning(arg0: string,
arg1?: string) {\r\n    log('warning', arg0, arg1);\r\n  }\r\n  export function error(content: string): void;\r\n  export
function error(category: string, content: string): void;\r\n  export function error(arg0: string, arg1?: string) {\r\n
log('error', arg0, arg1);\r\n  }\r\n  export function fatal(content: string): void;\r\n  export function fatal(category:
string, content: string): void;\r\n  export function fatal(arg0: string, arg1?: string) {\r\n    log('fatal', arg0, arg1);\r\n
}\r\n\r\n  export function reset(config?: Logger.Config): void {\r\n    LOGGER_CONFIG_MAP = {};\r\n    set('',
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config || {});\r\n  }\r\n  export function set(category: string, config: Logger.Config): void {\r\n    if (category === '*')
{\r\n      reset(config);\r\n    } else {\r\n      const previousConfig = LOGGER_CONFIG_MAP[category] ||
LOGGER_DEFAULT_CONFIG;\r\n      LOGGER_CONFIG_MAP[category] = {\r\n        provider: config.provider
|| previousConfig.provider,\r\n        minimalSeverity: config.minimalSeverity || previousConfig.minimalSeverity,\r\n
      logDateTime: (config.logDateTime === undefined) ? previousConfig.logDateTime : config.logDateTime,\r\n
logSourceLocation: (config.logSourceLocation === undefined) ? previousConfig.logSourceLocation :\r\n
                                            config.logSourceLocation\r\n      };\r\n    }\r\n\r\n    // TODO: we want to support
wildcard or regex?\r\n  }\r\n\r\n  export function setWithEnv(env: Env): void {\r\n    const config: Logger.Config =
{};\r\n    if (env.logLevel) {\r\n      config.minimalSeverity = env.logLevel as Logger.Severity;\r\n    }\r\n    set('',
config);\r\n  }\r\n}\r\n\r\n// eslint-disable-next-line @typescript-eslint/no-redeclare, @typescript-eslint/naming-
convention\r\nexport const Logger: Logger = log;\r\n\r\nexport declare namespace Profiler {\r\n  export interface
Config {\r\n    maxNumberEvents?: number;\r\n    flushBatchSize?: number;\r\n    flushIntervalInMilliseconds?:
number;\r\n  }\r\n\r\n  export type EventCategory = 'session'|'node'|'op'|'backend';\r\n\r\n  export interface Event {\r\n
  end(): void|Promise<void>;\r\n  }\r\n}\r\n// TODO\r\n// class WebGLEvent implements Profiler.Event
{}\r\n\r\nclass Event implements Profiler.Event {\r\n  constructor(\r\n      public category: Profiler.EventCategory,
public name: string, public startTime: number,\r\n      private endCallback: (e: Event) => void|Promise<void>,
public timer?: WebGLQuery, public ctx?: WebGLContext) {}\r\n\r\n  end() {\r\n    return this.endCallback(this);\r\n
}\r\n\r\n  async checkTimer(): Promise<number> {\r\n    if (this.ctx === undefined || this.timer === undefined) {\r\n
   throw new Error('No webgl timer found');\r\n    } else {\r\n      this.ctx.endTimer();\r\n      return
this.ctx.waitForQueryAndGetTime(this.timer);\r\n    }\r\n  }\r\n}\r\n\r\nclass EventRecord {\r\n  constructor(\r\n
public category: Profiler.EventCategory, public name: string, public startTime: number, public endTime: number)
{}\r\n}\r\n\r\nexport class Profiler {\r\n  static create(config?: Profiler.Config): Profiler {\r\n    if (config ===
undefined) {\r\n      return new this();\r\n    }\r\n    return new this(config.maxNumberEvents, config.flushBatchSize,
config.flushIntervalInMilliseconds);\r\n  }\r\n\r\n  private constructor(maxNumberEvents?: number,
flushBatchSize?: number, flushIntervalInMilliseconds?: number) {\r\n    this._started = false;\r\n
this._maxNumberEvents = maxNumberEvents === undefined ? 10000 : maxNumberEvents;\r\n
this._flushBatchSize = flushBatchSize === undefined ? 10 : flushBatchSize;\r\n    this._flushIntervalInMilliseconds
= flushIntervalInMilliseconds === undefined ? 5000 : flushIntervalInMilliseconds;\r\n  }\r\n\r\n  // start profiling\r\n
start() {\r\n    this._started = true;\r\n    this._timingEvents = [];\r\n    this._flushTime = now();\r\n
this._flushPointer = 0;\r\n  }\r\n\r\n  // stop profiling\r\n  stop() {\r\n    this._started = false;\r\n    for (;
this._flushPointer < this._timingEvents.length; this._flushPointer++) {\r\n
this.logOneEvent(this._timingEvents[this._flushPointer]);\r\n    }\r\n  }\r\n\r\n  // create an event scope for the
specific function\r\n  event<T>(category: Profiler.EventCategory, name: string, func: () => T, ctx?:
WebGLContext): T;\r\n  event<T>(category: Profiler.EventCategory, name: string, func: () => Promise<T>, ctx?:
WebGLContext): Promise<T>;\r\n\r\n  event<T>(category: Profiler.EventCategory, name: string, func: () => T |
Promise<T>, ctx?: WebGLContext): T\r\n      |Promise<T> {\r\n    const event = this._started ? this.begin(category,
name, ctx) : undefined;\r\n    let isPromise = false;\r\n\r\n    const res = func();\r\n\r\n    // we consider a then-able
object is a promise\r\n    if (res && typeof (res as Promise<T>).then === 'function') {\r\n      isPromise = true;\r\n
return new Promise<T>((resolve, reject) => {\r\n        (res as Promise<T>)\r\n            .then(\r\n                async value
=> {  // fulfilled\r\n                  if (event) {\r\n                    await event.end();\r\n                  }\r\n
resolve(value);\r\n                },\r\n                async reason => {  // rejected\r\n                  if (event) {\r\n
await event.end();\r\n                  }\r\n                  reject(reason);\r\n                });\r\n      });\r\n    }\r\n    if (!isPromise
&& event) {\r\n      const eventRes = event.end();\r\n      if (eventRes && typeof eventRes.then === 'function') {\r\n
      return new Promise<T>((resolve, reject) => {\r\n          (eventRes).then(\r\n              () => {  // fulfilled\r\n
  resolve(res);\r\n              },\r\n              (reason) => {  // rejected\r\n                reject(reason);\r\n              });\r\n
});\r\n      }\r\n    }\r\n    return res;\r\n  }\r\n\r\n  // begin an event\r\n  begin(category: Profiler.EventCategory, name:
string, ctx?: WebGLContext): Event {\r\n    if (!this._started) {\r\n      throw new Error('profiler is not started
yet');\r\n    }\r\n    if (ctx === undefined) {\r\n      const startTime = now();\r\n      this.flush(startTime);\r\n      return
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new Event(category, name, startTime, e => this.endSync(e));\r\n   } else {\r\n   const timer: WebGLQuery = ctx.beginTimer();\r\n   return new Event(category, name, 0, async e => this.end(e), timer, ctx);\r\n   }\r\n }\r\n\r\n // end the specific event\r\n private async end(event: Event): Promise<void> {\r\n   const endTime: number = await event.checkTimer();\r\n   if (this._timingEvents.length < this._maxNumberEvents) {\r\n   this._timingEvents.push(new EventRecord(event.category, event.name, event.startTime, endTime));\r\n   this.flush(endTime);\r\n   }\r\n }\r\n\r\n private endSync(event: Event): void {\r\n   const endTime: number = now();\r\n   if (this._timingEvents.length < this._maxNumberEvents) {\r\n   this._timingEvents.push(new EventRecord(event.category, event.name, event.startTime, endTime));\r\n   this.flush(endTime);\r\n   }\r\n }\r\n\r\n private logOneEvent(event: EventRecord) {\r\n   Logger.verbose(\r\n   `Profiler.${event.category}`,\r\n   `${(event.endTime - event.startTime).toFixed(2)}ms on event '${event.name}' at ${event.endTime.toFixed(2)}`);\r\n }\r\n\r\n private flush(currentTime: number) {\r\n   if (this._timingEvents.length - this._flushPointer >= this._flushBatchSize ||\r\n   currentTime - this._flushTime >= this._flushIntervalInMilliseconds) {\r\n   // should flush when either batch size accumlated or interval elepsed\r\n\r\n   for (const previousPointer = this._flushPointer; this._flushPointer < previousPointer + this._flushBatchSize &&\r\n   this._flushPointer < this._timingEvents.length;\r\n   this._flushPointer++) {\r\n   this.logOneEvent(this._timingEvents[this._flushPointer]);\r\n   }\r\n\r\n   this._flushTime = now();\r\n   }\r\n }\r\n\r\n get started() {\r\n   return this._started;\r\n }\r\n private _started = false;\r\n private _timingEvents: EventRecord[];\r\n\r\n private readonly _maxNumberEvents: number;\r\n\r\n private readonly _flushBatchSize: number;\r\n private readonly _flushIntervalInMilliseconds: number;\r\n\r\n private _flushTime: number;\r\n private _flushPointer = 0;\r\n}\r\n\r\n/**\r\n * returns a number to represent the current timestamp in a resolution as high as possible.\r\n */\r\nexport const now = (typeof performance !== 'undefined' && performance.now) ? () => performance.now() : Date.now;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {flatbuffers} from 'flatbuffers';\r\nimport {onnx} from 'onnx-proto';\r\n\r\nimport {Graph} from './graph';\r\nimport {OpSet} from './opset';\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\nimport {LongUtil} from './util';\r\n\r\nexport class Model {\r\n // empty model\r\n constructor() {}\r\n\r\n load(buf: Uint8Array, graphInitializer?: Graph.Initializer, isOrtFormat?: boolean): void {\r\n   if (!isOrtFormat) {\r\n   // isOrtFormat === false || isOrtFormat === undefined\r\n   try {\r\n   this.loadFromOnnxFormat(buf, graphInitializer);\r\n   return;\r\n   } catch (e) {\r\n   if (isOrtFormat !== undefined) {\r\n   throw e;\r\n   }\r\n   }\r\n   }\r\n\r\n   this.loadFromOrtFormat(buf, graphInitializer);\r\n }\r\n\r\n private loadFromOnnxFormat(buf: Uint8Array, graphInitializer?: Graph.Initializer): void {\r\n   const modelProto = onnx.ModelProto.decode(buf);\r\n   const irVersion = LongUtil.longToNumber(modelProto.irVersion);\r\n   if (irVersion < 3) {\r\n   throw new Error('only support ONNX model with IR_VERSION>=3');\r\n   }\r\n\r\n   this._opsets =\r\n   modelProto.opsetImport.map(i => ({domain: i.domain as string, version: LongUtil.longToNumber(i.version!)}));\r\n\r\n   this._graph = Graph.from(modelProto.graph!, graphInitializer);\r\n }\r\n\r\n private loadFromOrtFormat(buf: Uint8Array, graphInitializer?: Graph.Initializer): void {\r\n   const fb = new flatbuffers.ByteBuffer(buf);\r\n   const ortModel = ortFbs.InferenceSession.getRootAsInferenceSession(fb).model()!;\r\n   const irVersion = LongUtil.longToNumber(ortModel.irVersion());\r\n   if (irVersion < 3) {\r\n   throw new Error('only support ONNX model with IR_VERSION>=3');\r\n   }\r\n   this._opsets = [];\r\n   for (let i = 0; i < ortModel.opsetImportLength(); i++) {\r\n   const opsetId = ortModel.opsetImport(i)!;\r\n   this._opsets.push({domain: opsetId?.domain() as string, version: LongUtil.longToNumber(opsetId.version()!)});\r\n   }\r\n\r\n   this._graph = Graph.from(ortModel.graph()!, graphInitializer);\r\n }\r\n\r\n private _graph: Graph;\r\n get graph(): Graph {\r\n   return this._graph;\r\n }\r\n\r\n private _opsets: OpSet[];\r\n get opsets(): readonly OpSet[] {\r\n   return this._opsets;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceHandler} from './backend';\r\nimport {Graph} from './graph';\r\nimport {Tensor} from './tensor';\r\n\r\nexport type OperatorImplementation<T> = (inferenceHandler: InferenceHandler, inputs: Tensor[], context: T) => Tensor[];\r\nexport type OperatorInitialization<T> = (node:

Graph.Node, graph: Graph) => T;\r\n\r\nexport interface Operator {\r\n readonly impl: OperatorImplementation<unknown>;\r\n readonly context: Graph.Node|unknown;\r\n}\r\n\r\nexport const NUMBER_TYPES: readonly Tensor.DataType[] =\r\n   ['float32', 'float64', 'int32', 'int16', 'int8', 'uint16', 'uint32', 'uint8'];\r\nexport const INT_TYPES: readonly Tensor.DataType[] = ['int32', 'int16', 'int8', 'uint16', 'uint32', 'uint8'];\r\nexport const FLOAT_TYPES: readonly Tensor.DataType[] = ['float32', 'float64'];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from './graph';\r\nimport {OperatorImplementation, OperatorInitialization} from './operators';\r\n\r\nexport interface OpSet {\r\n domain: string;\r\n version: number;\r\n}\r\n\r\nexport declare namespace OpSet {\r\n /**\r\n   * Domain of an opset, it can be an empty string(default value, represent for ai.onnx), or 'ai.onnx.ml'\r\n   */\r\n type Domain = ''|'ai.onnx.ml';\r\n\r\n /**\r\n   * A resolve rule consists of 4 or 5 items: opType, opSetDomain, versionSelector, operatorImplementation and\r\n   * operatorInitialization (optional)\r\n   */\r\n type ResolveRule = [\r\n   string, Domain, string, OperatorImplementation<Graph.Node>\r\n]|[string, Domain, string, OperatorImplementation<unknown>, OperatorInitialization<unknown>];\r\n}\r\n\r\nexport function resolveOperator(node: Graph.Node, opsets: readonly OpSet[], rules: readonly OpSet.ResolveRule[]) {\r\n for (const rule of rules) {\r\n   const opType = rule[0];\r\n   const domain = rule[1];\r\n   const versionSelector = rule[2];\r\n   const opImpl = rule[3];\r\n   const opInit = rule[4];\r\n\r\n   if (node.opType === opType) { // operator type matches\r\n   for (const opset of opsets) {\r\n   // opset '' and 'ai.onnx' are considered the same.\r\n   if (opset.domain === domain || (opset.domain === 'ai.onnx' && domain === '')) { // opset domain found\r\n   if (matchSelector(opset.version, versionSelector)) {\r\n   return {opImpl, opInit};\r\n   }\r\n   }\r\n   }\r\n   }\r\n }\r\n\r\n throw new TypeError(`cannot resolve operator '${node.opType}' with opsets: ${\r\n      opsets.map(set => `${set.domain || 'ai.onnx'} v${set.version}`).join(', ')}`);\r\n}\r\n\r\nfunction matchSelector(version: number, selector: string): boolean {\r\n if (selector.endsWith('+')) {\r\n   // minimum version match ('7+' expects version>=7)\r\n   const rangeStart = Number.parseInt(selector.substring(0, selector.length - 1), 10);\r\n   return !isNaN(rangeStart) && rangeStart <= version;\r\n } else if (selector.split('-').length === 2) {\r\n   // range match ('6-8' expects 6<=version<=8)\r\n   const pair = selector.split('-');\r\n   const rangeStart = Number.parseInt(pair[0], 10);\r\n   const rangeEnd = Number.parseInt(pair[1], 10);\r\n   return !isNaN(rangeStart) && !isNaN(rangeEnd) && rangeStart <= version && version <= rangeEnd;\r\n } else {\r\n   // exact match ('7' expects version===7)\r\n   return Number.parseInt(selector, 10) === version;\r\n }\r\n}\r\n","// automatically generated by the FlatBuffers compiler, do not modify\r\n/* eslint-disable */\r\n\r\nimport {flatbuffers} from 'flatbuffers';\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export enum AttributeType {\r\n   UNDEFINED = 0,\r\n   FLOAT = 1,\r\n   INT = 2,\r\n   STRING = 3,\r\n   TENSOR = 4,\r\n   GRAPH = 5,\r\n   FLOATS = 6,\r\n   INTS = 7,\r\n   STRINGS = 8,\r\n   TENSORS = 9,\r\n   GRAPHS = 10,\r\n   SPARSE_TENSOR = 11,\r\n   SPARSE_TENSORS = 12\r\n }\r\n}\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export enum DimensionValueType {UNKNOWN = 0, VALUE = 1, PARAM = 2}\r\n}\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export enum TensorDataType {\r\n   UNDEFINED = 0,\r\n   FLOAT = 1,\r\n   UINT8 = 2,\r\n   INT8 = 3,\r\n   UINT16 = 4,\r\n   INT16 = 5,\r\n   INT32 = 6,\r\n   INT64 = 7,\r\n   STRING = 8,\r\n   BOOL = 9,\r\n   FLOAT16 = 10,\r\n   DOUBLE = 11,\r\n   UINT32 = 12,\r\n   UINT64 = 13,\r\n   COMPLEX64 = 14,\r\n   COMPLEX128 = 15,\r\n   BFLOAT16 = 16\r\n }\r\n}\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export enum NodeType {Primitive = 0, Fused = 1}\r\n}\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export enum TypeInfoValue {NONE = 0, tensor_type = 1, sequence_type = 2, map_type = 3}\r\n}\r\n\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class Shape {\r\n   bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n   bb_pos = 0;\r\n   /**\r\n   * @param number i\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @returns Shape\r\n   */\r\n   __init(i: number, bb: flatbuffers.ByteBuffer): Shape {\r\n   this.bb_pos = i;\r\n   this.bb = bb;\r\n   return this;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param Shape= obj\r\n   * @returns Shape\r\n   */\r\n   static getRootAsShape(bb: flatbuffers.ByteBuffer, obj?: Shape): Shape {\r\n   return (obj || new

Shape()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Shape= obj\r\n * @returns Shape\r\n */\r\n static getSizePrefixedRootAsShape(bb: flatbuffers.ByteBuffer, obj?: Shape): Shape {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new Shape()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param onnxruntime.experimental.fbs.Dimension= obj\r\n * @returns onnxruntime.experimental.fbs.Dimension\r\n */\r\n dim(index: number, obj?: onnxruntime.experimental.fbs.Dimension): onnxruntime.experimental.fbs.Dimension|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Dimension())\r\n .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n dimLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startShape(builder: flatbuffers.Builder) {\r\n builder.startObject(1);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset dimOffset\r\n */\r\n static addDim(builder: flatbuffers.Builder, dimOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, dimOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createDimVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startDimVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endShape(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createShape(builder: flatbuffers.Builder, dimOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n Shape.startShape(builder);\r\n Shape.addDim(builder, dimOffset);\r\n return Shape.endShape(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class Dimension {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns Dimension\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): Dimension {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Dimension= obj\r\n * @returns Dimension\r\n */\r\n static getRootAsDimension(bb: flatbuffers.ByteBuffer, obj?: Dimension): Dimension {\r\n return (obj || new Dimension()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Dimension= obj\r\n * @returns Dimension\r\n */\r\n static getSizePrefixedRootAsDimension(bb: flatbuffers.ByteBuffer, obj?: Dimension): Dimension {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new Dimension()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.DimensionValue= obj\r\n * @returns onnxruntime.experimental.fbs.DimensionValue|null\r\n */\r\n value(obj?: onnxruntime.experimental.fbs.DimensionValue): onnxruntime.experimental.fbs.DimensionValue|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.DimensionValue())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n denotation(): string|null;\r\n denotation(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n denotation(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startDimension(builder: flatbuffers.Builder) {\r\n builder.startObject(2);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset valueOffset\r\n */\r\n static addValue(builder: flatbuffers.Builder, valueOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, valueOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset denotationOffset\r\n */\r\n static addDenotation(builder: flatbuffers.Builder, denotationOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, denotationOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endDimension(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createDimension(\r\n builder: flatbuffers.Builder, valueOffset: flatbuffers.Offset,\r\n denotationOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n Dimension.startDimension(builder);\r\n Dimension.addValue(builder, valueOffset);\r\n Dimension.addDenotation(builder, denotationOffset);\r\n return Dimension.endDimension(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class DimensionValue {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns DimensionValue\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): DimensionValue {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param DimensionValue= obj\r\n * @returns DimensionValue\r\n */\r\n static getRootAsDimensionValue(bb: flatbuffers.ByteBuffer, obj?: DimensionValue): DimensionValue {\r\n return (obj || new DimensionValue()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param DimensionValue= obj\r\n * @returns DimensionValue\r\n */\r\n static getSizePrefixedRootAsDimensionValue(bb: flatbuffers.ByteBuffer, obj?: DimensionValue): DimensionValue {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new DimensionValue()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @returns onnxruntime.experimental.fbs.DimensionValueType\r\n */\r\n dimType(): onnxruntime.experimental.fbs.DimensionValueType {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? /** */ (this.bb!.readInt8(this.bb_pos + offset)) :\r\n onnxruntime.experimental.fbs.DimensionValueType.UNKNOWN;\r\n }\r\n\r\n /**\r\n * @returns flatbuffers.Long\r\n */\r\n dimValue(): flatbuffers.Long {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n dimParam(): string|null;\r\n dimParam(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n dimParam(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startDimensionValue(builder: flatbuffers.Builder) {\r\n builder.startObject(3);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param onnxruntime.experimental.fbs.DimensionValueType dimType\r\n */\r\n static addDimType(builder: flatbuffers.Builder, dimType: onnxruntime.experimental.fbs.DimensionValueType) {\r\n builder.addFieldInt8(0, dimType, onnxruntime.experimental.fbs.DimensionValueType.UNKNOWN);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Long dimValue\r\n */\r\n static addDimValue(builder: flatbuffers.Builder, dimValue: flatbuffers.Long) {\r\n builder.addFieldInt64(1, dimValue, builder.createLong(0, 0));\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset dimParamOffset\r\n */\r\n static addDimParam(builder: flatbuffers.Builder, dimParamOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, dimParamOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endDimensionValue(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createDimensionValue(\r\n builder: flatbuffers.Builder, dimType: onnxruntime.experimental.fbs.DimensionValueType,\r\n dimValue: flatbuffers.Long, dimParamOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n DimensionValue.startDimensionValue(builder);\r\n

DimensionValue.addDimType(builder, dimType);\r\n DimensionValue.addDimValue(builder, dimValue);\r\n DimensionValue.addDimParam(builder, dimParamOffset);\r\n return DimensionValue.endDimensionValue(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class TensorTypeAndShape {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns TensorTypeAndShape\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): TensorTypeAndShape {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param TensorTypeAndShape= obj\r\n * @returns TensorTypeAndShape\r\n */\r\n static getRootAsTensorTypeAndShape(bb: flatbuffers.ByteBuffer, obj?: TensorTypeAndShape): TensorTypeAndShape {\r\n return (obj || new TensorTypeAndShape()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param TensorTypeAndShape= obj\r\n * @returns TensorTypeAndShape\r\n */\r\n static getSizePrefixedRootAsTensorTypeAndShape(bb: flatbuffers.ByteBuffer, obj?: TensorTypeAndShape):\r\n TensorTypeAndShape {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new TensorTypeAndShape()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @returns onnxruntime.experimental.fbs.TensorDataType\r\n */\r\n elemType(): onnxruntime.experimental.fbs.TensorDataType {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? /** */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n onnxruntime.experimental.fbs.TensorDataType.UNDEFINED;\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.Shape= obj\r\n * @returns onnxruntime.experimental.fbs.Shape|null\r\n */\r\n shape(obj?: onnxruntime.experimental.fbs.Shape): onnxruntime.experimental.fbs.Shape|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Shape())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startTensorTypeAndShape(builder: flatbuffers.Builder) {\r\n builder.startObject(2);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param onnxruntime.experimental.fbs.TensorDataType elemType\r\n */\r\n static addElemType(builder: flatbuffers.Builder, elemType: onnxruntime.experimental.fbs.TensorDataType) {\r\n builder.addFieldInt32(0, elemType, onnxruntime.experimental.fbs.TensorDataType.UNDEFINED);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset shapeOffset\r\n */\r\n static addShape(builder: flatbuffers.Builder, shapeOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, shapeOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endTensorTypeAndShape(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createTensorTypeAndShape(\r\n builder: flatbuffers.Builder, elemType: onnxruntime.experimental.fbs.TensorDataType,\r\n shapeOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n TensorTypeAndShape.startTensorTypeAndShape(builder);\r\n TensorTypeAndShape.addElemType(builder, elemType);\r\n TensorTypeAndShape.addShape(builder, shapeOffset);\r\n return TensorTypeAndShape.endTensorTypeAndShape(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class MapType {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns MapType\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): MapType {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param MapType= obj\r\n * @returns MapType\r\n */\r\n static getRootAsMapType(bb: flatbuffers.ByteBuffer, obj?: MapType): MapType {\r\n return (obj || new MapType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param MapType= obj\r\n * @returns MapType\r\n */\r\n static getSizePrefixedRootAsMapType(bb: flatbuffers.ByteBuffer, obj?: MapType): MapType {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new

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MapType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @returns
onnxruntime.experimental.fbs.TensorDataType\r\n     */\r\n    keyType():
onnxruntime.experimental.fbs.TensorDataType {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return
offset ? /**  */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n
onnxruntime.experimental.fbs.TensorDataType.UNDEFINED;\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.TypeInfo= obj\r\n     * @returns onnxruntime.experimental.fbs.TypeInfo|null\r\n
*/\r\n    valueType(obj?: onnxruntime.experimental.fbs.TypeInfo): onnxruntime.experimental.fbs.TypeInfo|null {\r\n
    let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.TypeInfo())\r\n                         .__init(this.bb!.__indirect(this.bb_pos + offset),
this.bb!) :\r\n                     null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static
startMapType(builder: flatbuffers.Builder) {\r\n      builder.startObject(2);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param onnxruntime.experimental.fbs.TensorDataType keyType\r\n     */\r\n
static addKeyType(builder: flatbuffers.Builder, keyType: onnxruntime.experimental.fbs.TensorDataType) {\r\n
builder.addFieldInt32(0, keyType, onnxruntime.experimental.fbs.TensorDataType.UNDEFINED);\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset valueTypeOffset\r\n     */\r\n
static addValueType(builder: flatbuffers.Builder, valueTypeOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, valueTypeOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
* @returns flatbuffers.Offset\r\n     */\r\n    static endMapType(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n
  let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createMapType(\r\n        builder:
flatbuffers.Builder, keyType: onnxruntime.experimental.fbs.TensorDataType,\r\n        valueTypeOffset:
flatbuffers.Offset): flatbuffers.Offset {\r\n      MapType.startMapType(builder);\r\n
MapType.addKeyType(builder, keyType);\r\n      MapType.addValueType(builder, valueTypeOffset);\r\n      return
MapType.endMapType(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n  export class SequenceType {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n
  bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @returns
SequenceType\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): SequenceType {\r\n      this.bb_pos =
i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     *
@param SequenceType= obj\r\n     * @returns SequenceType\r\n     */\r\n    static getRootAsSequenceType(bb:
flatbuffers.ByteBuffer, obj?: SequenceType): SequenceType {\r\n      return (obj || new
SequenceType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param SequenceType= obj\r\n     * @returns SequenceType\r\n     */\r\n    static
getSizePrefixedRootAsSequenceType(bb: flatbuffers.ByteBuffer, obj?: SequenceType): SequenceType {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
SequenceType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.TypeInfo= obj\r\n     * @returns onnxruntime.experimental.fbs.TypeInfo|null\r\n
*/\r\n    elemType(obj?: onnxruntime.experimental.fbs.TypeInfo): onnxruntime.experimental.fbs.TypeInfo|null {\r\n
   let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.TypeInfo())\r\n                         .__init(this.bb!.__indirect(this.bb_pos + offset),
this.bb!) :\r\n                     null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static
startSequenceType(builder: flatbuffers.Builder) {\r\n      builder.startObject(1);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset elemTypeOffset\r\n     */\r\n    static
addElemType(builder: flatbuffers.Builder, elemTypeOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(0,
elemTypeOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns
flatbuffers.Offset\r\n     */\r\n    static endSequenceType(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let
offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createSequenceType(builder:
flatbuffers.Builder, elemTypeOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
SequenceType.startSequenceType(builder);\r\n      SequenceType.addElemType(builder, elemTypeOffset);\r\n
return SequenceType.endSequenceType(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport
```

```
namespace onnxruntime.experimental.fbs {\r\n  export class EdgeEnd {\r\n    bb: flatbuffers.ByteBuffer|null =
null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     *
@returns EdgeEnd\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): EdgeEnd {\r\n      this.bb_pos = i;\r\n
    this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodeIndex(): number
{\r\n      return this.bb!.readUint32(this.bb_pos);\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n
srcArgIndex(): number {\r\n      return this.bb!.readInt32(this.bb_pos + 4);\r\n    }\r\n\r\n    /**\r\n     * @returns
number\r\n     */\r\n    dstArgIndex(): number {\r\n      return this.bb!.readInt32(this.bb_pos + 8);\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     * @param number node_index\r\n     * @param number
src_arg_index\r\n     * @param number dst_arg_index\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createEdgeEnd(\r\n        builder: flatbuffers.Builder, node_index: number, src_arg_index: number,\r\n
dst_arg_index: number): flatbuffers.Offset {\r\n      builder.prep(4, 12);\r\n      builder.writeInt32(dst_arg_index);\r\n
    builder.writeInt32(src_arg_index);\r\n      builder.writeInt32(node_index);\r\n      return builder.offset();\r\n    }\r\n
}\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class
NodeEdge {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n
   * @param flatbuffers.ByteBuffer bb\r\n     * @returns NodeEdge\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): NodeEdge {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param NodeEdge= obj\r\n     * @returns NodeEdge\r\n
*/\r\n    static getRootAsNodeEdge(bb: flatbuffers.ByteBuffer, obj?: NodeEdge): NodeEdge {\r\n      return (obj ||
new NodeEdge()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param NodeEdge= obj\r\n     * @returns NodeEdge\r\n     */\r\n    static
getSizePrefixedRootAsNodeEdge(bb: flatbuffers.ByteBuffer, obj?: NodeEdge): NodeEdge {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
NodeEdge()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @returns
number\r\n     */\r\n    nodeIndex(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset
? this.bb!.readUint32(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.EdgeEnd= obj\r\n     * @returns onnxruntime.experimental.fbs.EdgeEnd\r\n     */\r\n
inputEdges(index: number, obj?: onnxruntime.experimental.fbs.EdgeEnd):
onnxruntime.experimental.fbs.EdgeEnd|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return
offset ? (obj || new onnxruntime.experimental.fbs.EdgeEnd())\r\n
.__init(this.bb!.__vector(this.bb_pos + offset) + index * 12, this.bb!) :\r\n                   null;\r\n    }\r\n\r\n    /**\r\n
* @returns number\r\n     */\r\n    inputEdgesLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos,
6);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param number
index\r\n     * @param onnxruntime.experimental.fbs.EdgeEnd= obj\r\n     * @returns
onnxruntime.experimental.fbs.EdgeEnd\r\n     */\r\n    outputEdges(index: number, obj?:
onnxruntime.experimental.fbs.EdgeEnd): onnxruntime.experimental.fbs.EdgeEnd|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.EdgeEnd())\r\n
               .__init(this.bb!.__vector(this.bb_pos + offset) + index * 12, this.bb!) :\r\n                   null;\r\n    }\r\n\r\n
 /**\r\n     * @returns number\r\n     */\r\n    outputEdgesLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startNodeEdge(builder: flatbuffers.Builder) {\r\n
   builder.startObject(3);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param number
nodeIndex\r\n     */\r\n    static addNodeIndex(builder: flatbuffers.Builder, nodeIndex: number) {\r\n
builder.addFieldInt32(0, nodeIndex, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     *
@param flatbuffers.Offset inputEdgesOffset\r\n     */\r\n    static addInputEdges(builder: flatbuffers.Builder,
inputEdgesOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1, inputEdgesOffset, 0);\r\n    }\r\n\r\n    /**\r\n
   * @param flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startInputEdgesVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(12, numElems,
4);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset
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outputEdgesOffset\r\n     */\r\n    static addOutputEdges(builder: flatbuffers.Builder, outputEdgesOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(2, outputEdgesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startOutputEdgesVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(12, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static endNodeEdge(builder:
flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n
static createNodeEdge(\r\n        builder: flatbuffers.Builder, nodeIndex: number, inputEdgesOffset:
flatbuffers.Offset,\r\n        outputEdgesOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
NodeEdge.startNodeEdge(builder);\r\n      NodeEdge.addNodeIndex(builder, nodeIndex);\r\n
NodeEdge.addInputEdges(builder, inputEdgesOffset);\r\n      NodeEdge.addOutputEdges(builder,
outputEdgesOffset);\r\n      return NodeEdge.endNodeEdge(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n
*/\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class Node {\r\n    bb: flatbuffers.ByteBuffer|null
= null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     *
@returns Node\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): Node {\r\n      this.bb_pos = i;\r\n
this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param
Node= obj\r\n     * @returns Node\r\n     */\r\n    static getRootAsNode(bb: flatbuffers.ByteBuffer, obj?: Node):
Node {\r\n      return (obj || new Node()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param Node= obj\r\n     * @returns Node\r\n     */\r\n
static getSizePrefixedRootAsNode(bb: flatbuffers.ByteBuffer, obj?: Node): Node {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
Node()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    name():
string|null;\r\n    name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
name(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    docString():
string|null;\r\n    docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
docString(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
  return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    domain():
string|null;\r\n    domain(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
domain(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 8);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @returns
number\r\n     */\r\n    sinceVersion(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 10);\r\n      return
offset ? this.bb!.readInt32(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n
index(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ?
this.bb!.readUint32(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Encoding=
optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    opType(): string|null;\r\n
opType(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n    opType(optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 14);\r\n      return offset ?
this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @returns
onnxruntime.experimental.fbs.NodeType\r\n     */\r\n    type(): onnxruntime.experimental.fbs.NodeType {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 16);\r\n      return offset ? /**  */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n
                  onnxruntime.experimental.fbs.NodeType.Primitive;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n
executionProviderType(): string|null;\r\n    executionProviderType(optionalEncoding: flatbuffers.Encoding):
string|Uint8Array|null;\r\n    executionProviderType(optionalEncoding?: any): string|Uint8Array|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 18);\r\n      return offset ? this.bb!.__string(this.bb_pos + offset,
```

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optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param flatbuffers.Encoding=
optionalEncoding\r\n     * @returns string|Uint8Array\r\n     */\r\n    inputs(index: number): string;\r\n
inputs(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n    inputs(index: number,
optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 20);\r\n      return
offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n    }\r\n\r\n
 /**\r\n     * @returns number\r\n     */\r\n    inputsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 20);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns
string|Uint8Array\r\n     */\r\n    outputs(index: number): string;\r\n    outputs(index: number, optionalEncoding:
flatbuffers.Encoding): string|Uint8Array;\r\n    outputs(index: number, optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 22);\r\n      return offset ?
this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    outputsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 22);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.Attribute= obj\r\n     * @returns
onnxruntime.experimental.fbs.Attribute\r\n     */\r\n    attributes(index: number, obj?:
onnxruntime.experimental.fbs.Attribute): onnxruntime.experimental.fbs.Attribute\r\n        |null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 24);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Attribute())\r\n
                 .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n
null;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    attributesLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 24);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @returns number\r\n     */\r\n    inputArgCounts(index: number):
number|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 26);\r\n      return offset ?
this.bb!.readInt32(this.bb!.__vector(this.bb_pos + offset) + index * 4) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns
number\r\n     */\r\n    inputArgCountsLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 26);\r\n
return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns Int32Array\r\n
*/\r\n    inputArgCountsArray(): Int32Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 26);\r\n      return
offset ?\r\n          new Int32Array(\r\n              this.bb!.bytes().buffer, this.bb!.bytes().byteOffset +
this.bb!.__vector(this.bb_pos + offset),\r\n              this.bb!.__vector_len(this.bb_pos + offset)) :\r\n          null;\r\n
}\r\n\r\n    /**\r\n     * @param number index\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     *
@returns string|Uint8Array\r\n     */\r\n    implicitInputs(index: number): string;\r\n    implicitInputs(index: number,
optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n    implicitInputs(index: number, optionalEncoding?:
any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 28);\r\n      return offset ?
this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    implicitInputsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 28);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startNode(builder: flatbuffers.Builder) {\r\n
builder.startObject(13);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset nameOffset\r\n     */\r\n    static addName(builder: flatbuffers.Builder, nameOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, nameOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset docStringOffset\r\n     */\r\n    static
addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1,
docStringOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset domainOffset\r\n     */\r\n    static addDomain(builder: flatbuffers.Builder, domainOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(2, domainOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number sinceVersion\r\n     */\r\n    static addSinceVersion(builder:
flatbuffers.Builder, sinceVersion: number) {\r\n      builder.addFieldInt32(3, sinceVersion, 0);\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     * @param number index\r\n     */\r\n    static addIndex(builder:
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flatbuffers.Builder, index: number) {\r\n      builder.addFieldInt32(4, index, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset opTypeOffset\r\n     */\r\n    static addOpType(builder:
flatbuffers.Builder, opTypeOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(5, opTypeOffset, 0);\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param onnxruntime.experimental.fbs.NodeType
type\r\n     */\r\n    static addType(builder: flatbuffers.Builder, type: onnxruntime.experimental.fbs.NodeType) {\r\n
  builder.addFieldInt32(6, type, onnxruntime.experimental.fbs.NodeType.Primitive);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset executionProviderTypeOffset\r\n     */\r\n
static addExecutionProviderType(builder: flatbuffers.Builder, executionProviderTypeOffset: flatbuffers.Offset) {\r\n
    builder.addFieldOffset(7, executionProviderTypeOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset inputsOffset\r\n     */\r\n    static addInputs(builder:
flatbuffers.Builder, inputsOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(8, inputsOffset, 0);\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param Array.<flatbuffers.Offset> data\r\n     *
@returns flatbuffers.Offset\r\n     */\r\n    static createInputsVector(builder: flatbuffers.Builder, data:
flatbuffers.Offset[]): flatbuffers.Offset {\r\n      builder.startVector(4, data.length, 4);\r\n      for (let i = data.length -
1; i >= 0; i--) {\r\n        builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n
  * @param flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startInputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n
 }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset outputsOffset\r\n
*/\r\n    static addOutputs(builder: flatbuffers.Builder, outputsOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(9, outputsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     *
@param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createOutputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startOutputsVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset attributesOffset\r\n     */\r\n    static
addAttributes(builder: flatbuffers.Builder, attributesOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(10,
attributesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createAttributesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startAttributesVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset inputArgCountsOffset\r\n     */\r\n    static
addInputArgCounts(builder: flatbuffers.Builder, inputArgCountsOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(11, inputArgCountsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param Array.<number> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createInputArgCountsVector(builder: flatbuffers.Builder, data: number[]|Uint8Array): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addInt32(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startInputArgCountsVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4,
numElems, 4);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset
implicitInputsOffset\r\n     */\r\n    static addImplicitInputs(builder: flatbuffers.Builder, implicitInputsOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(12, implicitInputsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n
```

*/\r\n   static createImplicitInputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n   builder.startVector(4, data.length, 4);\r\n   for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n   }\r\n   return builder.endVector();\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param number numElems\r\n   */\r\n   static startImplicitInputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n   builder.startVector(4, numElems, 4);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @returns flatbuffers.Offset\r\n   */\r\n   static endNode(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n   let offset = builder.endObject();\r\n   return offset;\r\n   }\r\n\r\n   static createNode(\r\n   builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset, docStringOffset: flatbuffers.Offset,\r\n   domainOffset: flatbuffers.Offset, sinceVersion: number, index: number, opTypeOffset: flatbuffers.Offset,\r\n   type: onnxruntime.experimental.fbs.NodeType, executionProviderTypeOffset: flatbuffers.Offset,\r\n   inputsOffset: flatbuffers.Offset, outputsOffset: flatbuffers.Offset, attributesOffset: flatbuffers.Offset,\r\n inputArgCountsOffset: flatbuffers.Offset, implicitInputsOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n Node.startNode(builder);\r\n   Node.addName(builder, nameOffset);\r\n   Node.addDocString(builder, docStringOffset);\r\n   Node.addDomain(builder, domainOffset);\r\n   Node.addSinceVersion(builder, sinceVersion);\r\n   Node.addIndex(builder, index);\r\n   Node.addOpType(builder, opTypeOffset);\r\n Node.addType(builder, type);\r\n   Node.addExecutionProviderType(builder, executionProviderTypeOffset);\r\n Node.addInputs(builder, inputsOffset);\r\n   Node.addOutputs(builder, outputsOffset);\r\n Node.addAttributes(builder, attributesOffset);\r\n   Node.addInputArgCounts(builder, inputArgCountsOffset);\r\n Node.addImplicitInputs(builder, implicitInputsOffset);\r\n   return Node.endNode(builder);\r\n   }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class ValueInfo {\r\n   bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n   bb_pos = 0;\r\n   /**\r\n   * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n   * @returns ValueInfo\r\n   */\r\n   __init(i: number, bb: flatbuffers.ByteBuffer): ValueInfo {\r\n   this.bb_pos = i;\r\n   this.bb = bb;\r\n   return this;\r\n   }\r\n\r\n /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param ValueInfo= obj\r\n   * @returns ValueInfo\r\n */\r\n   static getRootAsValueInfo(bb: flatbuffers.ByteBuffer, obj?: ValueInfo): ValueInfo {\r\n   return (obj || new ValueInfo()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param ValueInfo= obj\r\n   * @returns ValueInfo\r\n   */\r\n   static getSizePrefixedRootAsValueInfo(bb: flatbuffers.ByteBuffer, obj?: ValueInfo): ValueInfo {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n   return (obj || new ValueInfo()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Encoding= optionalEncoding\r\n   * @returns string|Uint8Array|null\r\n   */\r\n   name(): string|null;\r\n   name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n name(optionalEncoding?: any): string|Uint8Array|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Encoding= optionalEncoding\r\n   * @returns string|Uint8Array|null\r\n   */\r\n   docString(): string|null;\r\n   docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n docString(optionalEncoding?: any): string|Uint8Array|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n   }\r\n\r\n   /**\r\n   * @param onnxruntime.experimental.fbs.TypeInfo= obj\r\n   * @returns onnxruntime.experimental.fbs.TypeInfo|null\r\n */\r\n   type(obj?: onnxruntime.experimental.fbs.TypeInfo): onnxruntime.experimental.fbs.TypeInfo|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 8);\r\n   return offset ? (obj || new onnxruntime.experimental.fbs.TypeInfo())\r\n   .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n   null;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   */\r\n   static startValueInfo(builder: flatbuffers.Builder) {\r\n   builder.startObject(3);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset nameOffset\r\n   */\r\n   static addName(builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(0, nameOffset, 0);\r\n   }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset docStringOffset\r\n   */\r\n

static addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, docStringOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset typeOffset\r\n */\r\n static addType(builder: flatbuffers.Builder, typeOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, typeOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endValueInfo(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createValueInfo(\r\n builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset, docStringOffset: flatbuffers.Offset,\r\n typeOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n ValueInfo.startValueInfo(builder);\r\n ValueInfo.addName(builder, nameOffset);\r\n ValueInfo.addDocString(builder, docStringOffset);\r\n ValueInfo.addType(builder, typeOffset);\r\n return ValueInfo.endValueInfo(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class TypeInfo {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns TypeInfo\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): TypeInfo {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param TypeInfo= obj\r\n * @returns TypeInfo\r\n */\r\n static getRootAsTypeInfo(bb: flatbuffers.ByteBuffer, obj?: TypeInfo): TypeInfo {\r\n return (obj || new TypeInfo()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param TypeInfo= obj\r\n * @returns TypeInfo\r\n */\r\n static getSizePrefixedRootAsTypeInfo(bb: flatbuffers.ByteBuffer, obj?: TypeInfo): TypeInfo {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new TypeInfo()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n denotation(): string|null;\r\n denotation(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n denotation(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @returns onnxruntime.experimental.fbs.TypeInfoValue\r\n */\r\n valueType(): onnxruntime.experimental.fbs.TypeInfoValue {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? /** */ (this.bb!.readUint8(this.bb_pos + offset)) :\r\n onnxruntime.experimental.fbs.TypeInfoValue.NONE;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Table obj\r\n * @returns ?flatbuffers.Table\r\n */\r\n value<T extends flatbuffers.Table>(obj: T): T|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.__union(obj, this.bb_pos + offset) : null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startTypeInfo(builder: flatbuffers.Builder) {\r\n builder.startObject(3);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset denotationOffset\r\n */\r\n static addDenotation(builder: flatbuffers.Builder, denotationOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, denotationOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param onnxruntime.experimental.fbs.TypeInfoValue valueType\r\n */\r\n static addValueType(builder: flatbuffers.Builder, valueType: onnxruntime.experimental.fbs.TypeInfoValue) {\r\n builder.addFieldInt8(1, valueType, onnxruntime.experimental.fbs.TypeInfoValue.NONE);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset valueOffset\r\n */\r\n static addValue(builder: flatbuffers.Builder, valueOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, valueOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endTypeInfo(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createTypeInfo(\r\n builder: flatbuffers.Builder, denotationOffset: flatbuffers.Offset,\r\n valueType: onnxruntime.experimental.fbs.TypeInfoValue, valueOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n TypeInfo.startTypeInfo(builder);\r\n TypeInfo.addDenotation(builder, denotationOffset);\r\n TypeInfo.addValueType(builder, valueType);\r\n TypeInfo.addValue(builder, valueOffset);\r\n return TypeInfo.endTypeInfo(builder);\r\n }\r\n }\r\n}\r\n/**\r\n

```
* @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class OperatorSetId {\r\n
bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @returns OperatorSetId\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): OperatorSetId {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param OperatorSetId= obj\r\n     * @returns
OperatorSetId\r\n     */\r\n    static getRootAsOperatorSetId(bb: flatbuffers.ByteBuffer, obj?: OperatorSetId):
OperatorSetId {\r\n      return (obj || new OperatorSetId()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n
 }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param OperatorSetId= obj\r\n     * @returns
OperatorSetId\r\n     */\r\n    static getSizePrefixedRootAsOperatorSetId(bb: flatbuffers.ByteBuffer, obj?:
OperatorSetId): OperatorSetId {\r\n      bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n
return (obj || new OperatorSetId()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n
* @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    domain():
string|null;\r\n    domain(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
domain(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @returns
flatbuffers.Long\r\n     */\r\n    version(): flatbuffers.Long {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
return offset ? this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     */\r\n    static startOperatorSetId(builder: flatbuffers.Builder) {\r\n
builder.startObject(2);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset domainOffset\r\n     */\r\n    static addDomain(builder: flatbuffers.Builder, domainOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, domainOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Long version\r\n     */\r\n    static addVersion(builder:
flatbuffers.Builder, version: flatbuffers.Long) {\r\n      builder.addFieldInt64(1, version, builder.createLong(0,
0));\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n
static endOperatorSetId(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n
  return offset;\r\n    }\r\n\r\n    static createOperatorSetId(\r\n        builder: flatbuffers.Builder, domainOffset:
flatbuffers.Offset, version: flatbuffers.Long): flatbuffers.Offset {\r\n
OperatorSetId.startOperatorSetId(builder);\r\n      OperatorSetId.addDomain(builder, domainOffset);\r\n
OperatorSetId.addVersion(builder, version);\r\n      return OperatorSetId.endOperatorSetId(builder);\r\n    }\r\n
}\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class Tensor
{\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     *
@param flatbuffers.ByteBuffer bb\r\n     * @returns Tensor\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): Tensor {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param Tensor= obj\r\n     * @returns Tensor\r\n     */\r\n
static getRootAsTensor(bb: flatbuffers.ByteBuffer, obj?: Tensor): Tensor {\r\n      return (obj || new
Tensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param Tensor= obj\r\n     * @returns Tensor\r\n     */\r\n    static
getSizePrefixedRootAsTensor(bb: flatbuffers.ByteBuffer, obj?: Tensor): Tensor {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
Tensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    name():
string|null;\r\n    name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
name(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    docString():
string|null;\r\n    docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
docString(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
  return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
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number index\r\n * @returns flatbuffers.Long\r\n */\r\n dims(index: number): flatbuffers.Long|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.readInt64(this.bb!.__vector(this.bb_pos + offset) + index * 8) :\r\n this.bb!.createLong(0, 0);\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n dimsLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @returns onnxruntime.experimental.fbs.TensorDataType\r\n */\r\n dataType(): onnxruntime.experimental.fbs.TensorDataType {\r\n let offset = this.bb!.__offset(this.bb_pos, 10);\r\n return offset ? /** */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n onnxruntime.experimental.fbs.TensorDataType.UNDEFINED;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @returns number\r\n */\r\n rawData(index: number): number|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 12);\r\n return offset ? this.bb!.readUint8(this.bb!.__vector(this.bb_pos + offset) + index) : 0;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n rawDataLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 12);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @returns Uint8Array\r\n */\r\n rawDataArray(): Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 12);\r\n return offset ?\r\n new Uint8Array(\r\n this.bb!.bytes().buffer, this.bb!.bytes().byteOffset + this.bb!.__vector(this.bb_pos + offset),\r\n this.bb!.__vector_len(this.bb_pos + offset)) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array\r\n */\r\n stringData(index: number): string;\r\n stringData(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n stringData(index: number, optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 14);\r\n return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n stringDataLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 14);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startTensor(builder: flatbuffers.Builder) {\r\n builder.startObject(6);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nameOffset\r\n */\r\n static addName(builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, nameOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset docStringOffset\r\n */\r\n static addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, docStringOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset dimsOffset\r\n */\r\n static addDims(builder: flatbuffers.Builder, dimsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, dimsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Long> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createDimsVector(builder: flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n builder.startVector(8, data.length, 8);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addInt64(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startDimsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(8, numElems, 8);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param onnxruntime.experimental.fbs.TensorDataType dataType\r\n */\r\n static addDataType(builder: flatbuffers.Builder, dataType: onnxruntime.experimental.fbs.TensorDataType) {\r\n builder.addFieldInt32(3, dataType, onnxruntime.experimental.fbs.TensorDataType.UNDEFINED);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset rawDataOffset\r\n */\r\n static addRawData(builder: flatbuffers.Builder, rawDataOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(4, rawDataOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<number> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createRawDataVector(builder: flatbuffers.Builder, data: number[]|Uint8Array): flatbuffers.Offset {\r\n builder.startVector(1, data.length, 1);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addInt8(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startRawDataVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(1, numElems, 1);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset stringDataOffset\r\n */\r\n static addStringData(builder: flatbuffers.Builder, stringDataOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(5, stringDataOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createStringDataVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startStringDataVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endTensor(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createTensor(\r\n builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset, docStringOffset: flatbuffers.Offset,\r\n dimsOffset: flatbuffers.Offset, dataType: onnxruntime.experimental.fbs.TensorDataType,\r\n rawDataOffset: flatbuffers.Offset, stringDataOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n Tensor.startTensor(builder);\r\n Tensor.addName(builder, nameOffset);\r\n Tensor.addDocString(builder, docStringOffset);\r\n Tensor.addDims(builder, dimsOffset);\r\n Tensor.addDataType(builder, dataType);\r\n Tensor.addRawData(builder, rawDataOffset);\r\n Tensor.addStringData(builder, stringDataOffset);\r\n return Tensor.endTensor(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class SparseTensor {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns SparseTensor\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): SparseTensor {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param SparseTensor= obj\r\n * @returns SparseTensor\r\n */\r\n static getRootAsSparseTensor(bb: flatbuffers.ByteBuffer, obj?: SparseTensor): SparseTensor {\r\n return (obj || new SparseTensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param SparseTensor= obj\r\n * @returns SparseTensor\r\n */\r\n static getSizePrefixedRootAsSparseTensor(bb: flatbuffers.ByteBuffer, obj?: SparseTensor): SparseTensor {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new SparseTensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.Tensor= obj\r\n * @returns onnxruntime.experimental.fbs.Tensor|null\r\n */\r\n values(obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.Tensor= obj\r\n * @returns onnxruntime.experimental.fbs.Tensor|null\r\n */\r\n indices(obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @returns flatbuffers.Long\r\n */\r\n dims(index: number): flatbuffers.Long|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.readInt64(this.bb!.__vector(this.bb_pos + offset) + index * 8) :\r\n this.bb!.createLong(0, 0);\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n dimsLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startSparseTensor(builder: flatbuffers.Builder) {\r\n builder.startObject(3);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset valuesOffset\r\n */\r\n static addValues(builder: flatbuffers.Builder,

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valuesOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, valuesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset indicesOffset\r\n     */\r\n    static
addIndices(builder: flatbuffers.Builder, indicesOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1,
indicesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset
dimsOffset\r\n     */\r\n    static addDims(builder: flatbuffers.Builder, dimsOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(2, dimsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     *
@param Array.<flatbuffers.Long> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createDimsVector(builder: flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n
builder.startVector(8, data.length, 8);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addInt64(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startDimsVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(8, numElems, 8);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
endSparseTensor(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n
return offset;\r\n    }\r\n\r\n    static createSparseTensor(\r\n        builder: flatbuffers.Builder, valuesOffset:
flatbuffers.Offset, indicesOffset: flatbuffers.Offset,\r\n        dimsOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
SparseTensor.startSparseTensor(builder);\r\n      SparseTensor.addValues(builder, valuesOffset);\r\n
SparseTensor.addIndices(builder, indicesOffset);\r\n      SparseTensor.addDims(builder, dimsOffset);\r\n      return
SparseTensor.endSparseTensor(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n  export class Attribute {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n
bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @returns
Attribute\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): Attribute {\r\n      this.bb_pos = i;\r\n      this.bb
= bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param Attribute=
obj\r\n     * @returns Attribute\r\n     */\r\n    static getRootAsAttribute(bb: flatbuffers.ByteBuffer, obj?: Attribute):
Attribute {\r\n      return (obj || new Attribute()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n
  /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param Attribute= obj\r\n     * @returns Attribute\r\n
*/\r\n    static getSizePrefixedRootAsAttribute(bb: flatbuffers.ByteBuffer, obj?: Attribute): Attribute {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
Attribute()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    name():
string|null;\r\n    name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
name(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    docString():
string|null;\r\n    docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
docString(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
  return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @returns
onnxruntime.experimental.fbs.AttributeType\r\n     */\r\n    type(): onnxruntime.experimental.fbs.AttributeType {\r\n
    let offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? /**  */ (this.bb!.readInt32(this.bb_pos + offset))
:\r\n                      onnxruntime.experimental.fbs.AttributeType.UNDEFINED;\r\n    }\r\n\r\n    /**\r\n     * @returns
number\r\n     */\r\n    f(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 10);\r\n      return offset ?
this.bb!.readFloat32(this.bb_pos + offset) : 0.0;\r\n    }\r\n\r\n    /**\r\n     * @returns flatbuffers.Long\r\n     */\r\n
i(): flatbuffers.Long {\r\n      let offset = this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ?
this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    s(): string|null;\r\n
s(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n    s(optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 14);\r\n      return offset ?
this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
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onnxruntime.experimental.fbs.Tensor= obj\r\n     * @returns onnxruntime.experimental.fbs.Tensor|null\r\n     */\r\n
t(obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 16);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n
            .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     *
@param onnxruntime.experimental.fbs.Graph= obj\r\n     * @returns onnxruntime.experimental.fbs.Graph|null\r\n
*/\r\n    g(obj?: onnxruntime.experimental.fbs.Graph): onnxruntime.experimental.fbs.Graph|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 18);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Graph())\r\n
            .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     *
@param number index\r\n     * @returns number\r\n     */\r\n    floats(index: number): number|null {\r\n      let offset
= this.bb!.__offset(this.bb_pos, 20);\r\n      return offset ? this.bb!.readFloat32(this.bb!.__vector(this.bb_pos +
offset) + index * 4) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    floatsLength(): number {\r\n
let offset = this.bb!.__offset(this.bb_pos, 20);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) :
0;\r\n    }\r\n\r\n    /**\r\n     * @returns Float32Array\r\n     */\r\n    floatsArray(): Float32Array|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 20);\r\n      return offset ?\r\n          new Float32Array(\r\n
this.bb!.bytes().buffer, this.bb!.bytes().byteOffset + this.bb!.__vector(this.bb_pos + offset),\r\n
this.bb!.__vector_len(this.bb_pos + offset)) :\r\n          null;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n
* @returns flatbuffers.Long\r\n     */\r\n    ints(index: number): flatbuffers.Long|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 22);\r\n      return offset ? this.bb!.readInt64(this.bb!.__vector(this.bb_pos + offset) +
index * 8) :\r\n                    this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n
intsLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 22);\r\n      return offset ?
this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array\r\n     */\r\n    strings(index: number):
string;\r\n    strings(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n    strings(index:
number, optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 24);\r\n
 return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    stringsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 24);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.Tensor= obj\r\n     * @returns
onnxruntime.experimental.fbs.Tensor\r\n     */\r\n    tensors(index: number, obj?:
onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 26);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n
            .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n
null;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    tensorsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 26);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.Graph= obj\r\n     * @returns
onnxruntime.experimental.fbs.Graph\r\n     */\r\n    graphs(index: number, obj?:
onnxruntime.experimental.fbs.Graph): onnxruntime.experimental.fbs.Graph|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 28);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Graph())\r\n
            .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n
null;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    graphsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 28);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startAttribute(builder: flatbuffers.Builder) {\r\n
   builder.startObject(13);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset nameOffset\r\n     */\r\n    static addName(builder: flatbuffers.Builder, nameOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, nameOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset docStringOffset\r\n     */\r\n    static
addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1,
docStringOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
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onnxruntime.experimental.fbs.AttributeType type\r\n     */\r\n    static addType(builder: flatbuffers.Builder, type:
onnxruntime.experimental.fbs.AttributeType) {\r\n      builder.addFieldInt32(2, type,
onnxruntime.experimental.fbs.AttributeType.UNDEFINED);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number f\r\n     */\r\n    static addF(builder: flatbuffers.Builder, f:
number) {\r\n      builder.addFieldFloat32(3, f, 0.0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param flatbuffers.Long i\r\n     */\r\n    static addI(builder: flatbuffers.Builder, i: flatbuffers.Long)
{\r\n      builder.addFieldInt64(4, i, builder.createLong(0, 0));\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset sOffset\r\n     */\r\n    static addS(builder:
flatbuffers.Builder, sOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(5, sOffset, 0);\r\n    }\r\n\r\n    /**\r\n
  * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset tOffset\r\n     */\r\n    static addT(builder:
flatbuffers.Builder, tOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(6, tOffset, 0);\r\n    }\r\n\r\n    /**\r\n
 * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset gOffset\r\n     */\r\n    static addG(builder:
flatbuffers.Builder, gOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(7, gOffset, 0);\r\n    }\r\n\r\n    /**\r\n
  * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset floatsOffset\r\n     */\r\n    static
addFloats(builder: flatbuffers.Builder, floatsOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(8,
floatsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param Array.<number>
data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static createFloatsVector(builder: flatbuffers.Builder, data:
number[]|Uint8Array): flatbuffers.Offset {\r\n      builder.startVector(4, data.length, 4);\r\n      for (let i = data.length
- 1; i >= 0; i--) {\r\n        builder.addFloat32(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startFloatsVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n
 }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset intsOffset\r\n     */\r\n
 static addInts(builder: flatbuffers.Builder, intsOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(9,
intsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
Array.<flatbuffers.Long> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static createIntsVector(builder:
flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n      builder.startVector(8, data.length, 8);\r\n
for (let i = data.length - 1; i >= 0; i--) {\r\n        builder.addInt64(data[i]);\r\n      }\r\n      return
builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param number
numElems\r\n     */\r\n    static startIntsVector(builder: flatbuffers.Builder, numElems: number) {\r\n
builder.startVector(8, numElems, 8);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     *
@param flatbuffers.Offset stringsOffset\r\n     */\r\n    static addStrings(builder: flatbuffers.Builder, stringsOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(10, stringsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n
*/\r\n    static createStringsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startStringsVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset tensorsOffset\r\n     */\r\n    static
addTensors(builder: flatbuffers.Builder, tensorsOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(11,
tensorsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static createTensorsVector(builder:
flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n      builder.startVector(4, data.length, 4);\r\n
for (let i = data.length - 1; i >= 0; i--) {\r\n        builder.addOffset(data[i]);\r\n      }\r\n      return
builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param number
numElems\r\n     */\r\n    static startTensorsVector(builder: flatbuffers.Builder, numElems: number) {\r\n
builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     *
@param flatbuffers.Offset graphsOffset\r\n     */\r\n    static addGraphs(builder: flatbuffers.Builder, graphsOffset:
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flatbuffers.Offset) {\r\n builder.addFieldOffset(12, graphsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createGraphsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startGraphsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endAttribute(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createAttribute(\r\n builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset, docStringOffset: flatbuffers.Offset,\r\n type: onnxruntime.experimental.fbs.AttributeType, f: number, i: flatbuffers.Long, sOffset: flatbuffers.Offset,\r\n tOffset: flatbuffers.Offset, gOffset: flatbuffers.Offset, floatsOffset: flatbuffers.Offset,\r\n intsOffset: flatbuffers.Offset, stringsOffset: flatbuffers.Offset, tensorsOffset: flatbuffers.Offset,\r\n graphsOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n Attribute.startAttribute(builder);\r\n Attribute.addName(builder, nameOffset);\r\n Attribute.addDocString(builder, docStringOffset);\r\n Attribute.addType(builder, type);\r\n Attribute.addF(builder, f);\r\n Attribute.addI(builder, i);\r\n Attribute.addS(builder, sOffset);\r\n Attribute.addT(builder, tOffset);\r\n Attribute.addG(builder, gOffset);\r\n Attribute.addFloats(builder, floatsOffset);\r\n Attribute.addInts(builder, intsOffset);\r\n Attribute.addStrings(builder, stringsOffset);\r\n Attribute.addTensors(builder, tensorsOffset);\r\n Attribute.addGraphs(builder, graphsOffset);\r\n return Attribute.endAttribute(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class Graph {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns Graph\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): Graph {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Graph= obj\r\n * @returns Graph\r\n */\r\n static getRootAsGraph(bb: flatbuffers.ByteBuffer, obj?: Graph): Graph {\r\n return (obj || new Graph()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Graph= obj\r\n * @returns Graph\r\n */\r\n static getSizePrefixedRootAsGraph(bb: flatbuffers.ByteBuffer, obj?: Graph): Graph {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new Graph()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param onnxruntime.experimental.fbs.Tensor= obj\r\n * @returns onnxruntime.experimental.fbs.Tensor\r\n */\r\n initializers(index: number, obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n initializersLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param onnxruntime.experimental.fbs.ValueInfo= obj\r\n * @returns onnxruntime.experimental.fbs.ValueInfo\r\n */\r\n nodeArgs(index: number, obj?: onnxruntime.experimental.fbs.ValueInfo): onnxruntime.experimental.fbs.ValueInfo|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.ValueInfo())\r\n .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n nodeArgsLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param number index\r\n * @param onnxruntime.experimental.fbs.Node= obj\r\n * @returns onnxruntime.experimental.fbs.Node\r\n */\r\n nodes(index: number, obj?: onnxruntime.experimental.fbs.Node): onnxruntime.experimental.fbs.Node|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ?

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(obj || new onnxruntime.experimental.fbs.Node())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodesLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    maxNodeIndex(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 10);\r\n      return offset ? this.bb!.readUint32(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.NodeEdge= obj\r\n     * @returns
onnxruntime.experimental.fbs.NodeEdge\r\n     */\r\n    nodeEdges(index: number, obj?:
onnxruntime.experimental.fbs.NodeEdge): onnxruntime.experimental.fbs.NodeEdge|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.NodeEdge())\r\n
                  .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n
 null;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodeEdgesLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns
string|Uint8Array\r\n     */\r\n    inputs(index: number): string;\r\n    inputs(index: number, optionalEncoding:
flatbuffers.Encoding): string|Uint8Array;\r\n    inputs(index: number, optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 14);\r\n      return offset ?
this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    inputsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 14);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns
string|Uint8Array\r\n     */\r\n    outputs(index: number): string;\r\n    outputs(index: number, optionalEncoding:
flatbuffers.Encoding): string|Uint8Array;\r\n    outputs(index: number, optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 16);\r\n      return offset ?
this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    outputsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 16);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.SparseTensor= obj\r\n     *
@returns onnxruntime.experimental.fbs.SparseTensor\r\n     */\r\n    sparseInitializers(index: number, obj?:
onnxruntime.experimental.fbs.SparseTensor):\r\n        onnxruntime.experimental.fbs.SparseTensor|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 18);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.SparseTensor())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    sparseInitializersLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 18);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startGraph(builder: flatbuffers.Builder) {\r\n
builder.startObject(8);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset initializersOffset\r\n     */\r\n    static addInitializers(builder: flatbuffers.Builder, initializersOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, initializersOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n
*/\r\n    static createInitializersVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n
  builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startInitializersVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset nodeArgsOffset\r\n     */\r\n    static
addNodeArgs(builder: flatbuffers.Builder, nodeArgsOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1,
nodeArgsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
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Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createNodeArgsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startNodeArgsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nodesOffset\r\n */\r\n static addNodes(builder: flatbuffers.Builder, nodesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, nodesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createNodesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startNodesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number maxNodeIndex\r\n */\r\n static addMaxNodeIndex(builder: flatbuffers.Builder, maxNodeIndex: number) {\r\n builder.addFieldInt32(3, maxNodeIndex, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nodeEdgesOffset\r\n */\r\n static addNodeEdges(builder: flatbuffers.Builder, nodeEdgesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(4, nodeEdgesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createNodeEdgesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startNodeEdgesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset inputsOffset\r\n */\r\n static addInputs(builder: flatbuffers.Builder, inputsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(5, inputsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createInputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startInputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset outputsOffset\r\n */\r\n static addOutputs(builder: flatbuffers.Builder, outputsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(6, outputsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createOutputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startOutputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset sparseInitializersOffset\r\n */\r\n static addSparseInitializers(builder: flatbuffers.Builder, sparseInitializersOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(7, sparseInitializersOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createSparseInitializersVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]):\r\n flatbuffers.Offset {\r\n

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  builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startSparseInitializersVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4,
numElems, 4);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns
flatbuffers.Offset\r\n     */\r\n    static endGraph(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset =
builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createGraph(\r\n        builder: flatbuffers.Builder,
initializersOffset: flatbuffers.Offset, nodeArgsOffset: flatbuffers.Offset,\r\n        nodesOffset: flatbuffers.Offset,
maxNodeIndex: number, nodeEdgesOffset: flatbuffers.Offset,\r\n        inputsOffset: flatbuffers.Offset,
outputsOffset: flatbuffers.Offset,\r\n        sparseInitializersOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
Graph.startGraph(builder);\r\n      Graph.addInitializers(builder, initializersOffset);\r\n
Graph.addNodeArgs(builder, nodeArgsOffset);\r\n      Graph.addNodes(builder, nodesOffset);\r\n
Graph.addMaxNodeIndex(builder, maxNodeIndex);\r\n      Graph.addNodeEdges(builder, nodeEdgesOffset);\r\n
Graph.addInputs(builder, inputsOffset);\r\n      Graph.addOutputs(builder, outputsOffset);\r\n
Graph.addSparseInitializers(builder, sparseInitializersOffset);\r\n      return Graph.endGraph(builder);\r\n    }\r\n
}\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class Model
{\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     *
@param flatbuffers.ByteBuffer bb\r\n     * @returns Model\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): Model {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n
  * @param flatbuffers.ByteBuffer bb\r\n     * @param Model= obj\r\n     * @returns Model\r\n     */\r\n    static
getRootAsModel(bb: flatbuffers.ByteBuffer, obj?: Model): Model {\r\n      return (obj || new
Model()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param Model= obj\r\n     * @returns Model\r\n     */\r\n    static
getSizePrefixedRootAsModel(bb: flatbuffers.ByteBuffer, obj?: Model): Model {\r\n      bb.setPosition(bb.position()
+ flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new Model()).__init(bb.readInt32(bb.position()) +
bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @returns flatbuffers.Long\r\n     */\r\n    irVersion(): flatbuffers.Long
{\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? this.bb!.readInt64(this.bb_pos + offset) :
this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.OperatorSetId= obj\r\n     * @returns onnxruntime.experimental.fbs.OperatorSetId\r\n
  */\r\n    opsetImport(index: number, obj?: onnxruntime.experimental.fbs.OperatorSetId):\r\n
onnxruntime.experimental.fbs.OperatorSetId|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return
offset ? (obj || new onnxruntime.experimental.fbs.OperatorSetId())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    opsetImportLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n
producerName(): string|null;\r\n    producerName(optionalEncoding: flatbuffers.Encoding):
string|Uint8Array|null;\r\n    producerName(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) :
null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns
string|Uint8Array|null\r\n     */\r\n    producerVersion(): string|null;\r\n    producerVersion(optionalEncoding:
flatbuffers.Encoding): string|Uint8Array|null;\r\n    producerVersion(optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 10);\r\n      return offset ?
this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    domain():
string|null;\r\n    domain(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
domain(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 12);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @returns
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flatbuffers.Long\r\n */\r\n modelVersion(): flatbuffers.Long {\r\n let offset = this.bb!.__offset(this.bb_pos, 14);\r\n return offset ? this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n docString(): string|null;\r\n docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n docString(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 16);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.Graph= obj\r\n * @returns onnxruntime.experimental.fbs.Graph|null\r\n */\r\n graph(obj?: onnxruntime.experimental.fbs.Graph): onnxruntime.experimental.fbs.Graph|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 18);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Graph())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n graphDocString(): string|null;\r\n graphDocString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n graphDocString(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 20);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startModel(builder: flatbuffers.Builder) {\r\n builder.startObject(9);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Long irVersion\r\n */\r\n static addIrVersion(builder: flatbuffers.Builder, irVersion: flatbuffers.Long) {\r\n builder.addFieldInt64(0, irVersion, builder.createLong(0, 0));\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset opsetImportOffset\r\n */\r\n static addOpsetImport(builder: flatbuffers.Builder, opsetImportOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, opsetImportOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createOpsetImportVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startOpsetImportVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset producerNameOffset\r\n */\r\n static addProducerName(builder: flatbuffers.Builder, producerNameOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, producerNameOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset producerVersionOffset\r\n */\r\n static addProducerVersion(builder: flatbuffers.Builder, producerVersionOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(3, producerVersionOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset domainOffset\r\n */\r\n static addDomain(builder: flatbuffers.Builder, domainOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(4, domainOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Long modelVersion\r\n */\r\n static addModelVersion(builder: flatbuffers.Builder, modelVersion: flatbuffers.Long) {\r\n builder.addFieldInt64(5, modelVersion, builder.createLong(0, 0));\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset docStringOffset\r\n */\r\n static addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(6, docStringOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset graphOffset\r\n */\r\n static addGraph(builder: flatbuffers.Builder, graphOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(7, graphOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset graphDocStringOffset\r\n */\r\n static addGraphDocString(builder: flatbuffers.Builder, graphDocStringOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(8, graphDocStringOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endModel(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n

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static createModel(\r\n        builder: flatbuffers.Builder, irVersion: flatbuffers.Long, opsetImportOffset:
flatbuffers.Offset,\r\n        producerNameOffset: flatbuffers.Offset, producerVersionOffset: flatbuffers.Offset,\r\n
domainOffset: flatbuffers.Offset, modelVersion: flatbuffers.Long, docStringOffset: flatbuffers.Offset,\r\n
graphOffset: flatbuffers.Offset, graphDocStringOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
Model.startModel(builder);\r\n      Model.addIrVersion(builder, irVersion);\r\n      Model.addOpsetImport(builder,
opsetImportOffset);\r\n      Model.addProducerName(builder, producerNameOffset);\r\n
Model.addProducerVersion(builder, producerVersionOffset);\r\n      Model.addDomain(builder, domainOffset);\r\n
  Model.addModelVersion(builder, modelVersion);\r\n      Model.addDocString(builder, docStringOffset);\r\n
Model.addGraph(builder, graphOffset);\r\n      Model.addGraphDocString(builder, graphDocStringOffset);\r\n
return Model.endModel(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n  export class KernelCreateInfos {\r\n    bb: flatbuffers.ByteBuffer|null =
null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     *
@returns KernelCreateInfos\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): KernelCreateInfos {\r\n
this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer
bb\r\n     * @param KernelCreateInfos= obj\r\n     * @returns KernelCreateInfos\r\n     */\r\n    static
getRootAsKernelCreateInfos(bb: flatbuffers.ByteBuffer, obj?: KernelCreateInfos): KernelCreateInfos {\r\n
return (obj || new KernelCreateInfos()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param KernelCreateInfos= obj\r\n     * @returns
KernelCreateInfos\r\n     */\r\n    static getSizePrefixedRootAsKernelCreateInfos(bb: flatbuffers.ByteBuffer, obj?:
KernelCreateInfos):\r\n        KernelCreateInfos {\r\n      bb.setPosition(bb.position() +
flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
KernelCreateInfos()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
number index\r\n     * @returns number\r\n     */\r\n    nodeIndices(index: number): number|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? this.bb!.readUint32(this.bb!.__vector(this.bb_pos + offset) +
index * 4) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodeIndicesLength(): number {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n
}\r\n\r\n    /**\r\n     * @returns Uint32Array\r\n     */\r\n    nodeIndicesArray(): Uint32Array|null {\r\n      let offset
= this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ?\r\n          new Uint32Array(\r\n
this.bb!.bytes().buffer, this.bb!.bytes().byteOffset + this.bb!.__vector(this.bb_pos + offset),\r\n
this.bb!.__vector_len(this.bb_pos + offset)) :\r\n          null;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n
* @returns flatbuffers.Long\r\n     */\r\n    kernelDefHashes(index: number): flatbuffers.Long|null {\r\n      let offset
= this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? this.bb!.readUint64(this.bb!.__vector(this.bb_pos + offset)
+ index * 8) :\r\n                      this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n
kernelDefHashesLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ?
this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
*/\r\n    static startKernelCreateInfos(builder: flatbuffers.Builder) {\r\n      builder.startObject(2);\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset nodeIndicesOffset\r\n     */\r\n
static addNodeIndices(builder: flatbuffers.Builder, nodeIndicesOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(0, nodeIndicesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
 * @param Array.<number> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createNodeIndicesVector(builder: flatbuffers.Builder, data: number[]|Uint8Array): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addInt32(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startNodeIndicesVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset kernelDefHashesOffset\r\n     */\r\n    static
addKernelDefHashes(builder: flatbuffers.Builder, kernelDefHashesOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, kernelDefHashesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
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builder\r\n     * @param Array.<flatbuffers.Long> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createKernelDefHashesVector(builder: flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n
builder.startVector(8, data.length, 8);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addInt64(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startKernelDefHashesVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(8,
numElems, 8);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns
flatbuffers.Offset\r\n     */\r\n    static endKernelCreateInfos(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n
let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createKernelCreateInfos(\r\n        builder:
flatbuffers.Builder, nodeIndicesOffset: flatbuffers.Offset,\r\n        kernelDefHashesOffset: flatbuffers.Offset):
flatbuffers.Offset {\r\n      KernelCreateInfos.startKernelCreateInfos(builder);\r\n
KernelCreateInfos.addNodeIndices(builder, nodeIndicesOffset);\r\n
KernelCreateInfos.addKernelDefHashes(builder, kernelDefHashesOffset);\r\n      return
KernelCreateInfos.endKernelCreateInfos(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport
namespace onnxruntime.experimental.fbs {\r\n  export class SubGraphSessionState {\r\n    bb:
flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @returns SubGraphSessionState\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): SubGraphSessionState {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param SubGraphSessionState= obj\r\n     *
@returns SubGraphSessionState\r\n     */\r\n    static getRootAsSubGraphSessionState(bb: flatbuffers.ByteBuffer,
obj?: SubGraphSessionState): SubGraphSessionState {\r\n      return (obj || new
SubGraphSessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.ByteBuffer bb\r\n     * @param SubGraphSessionState= obj\r\n     * @returns
SubGraphSessionState\r\n     */\r\n    static getSizePrefixedRootAsSubGraphSessionState(bb:
flatbuffers.ByteBuffer, obj?: SubGraphSessionState):\r\n        SubGraphSessionState {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
SubGraphSessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    graphId():
string|null;\r\n    graphId(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
graphId(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.SessionState= obj\r\n     * @returns
onnxruntime.experimental.fbs.SessionState|null\r\n     */\r\n    sessionState(obj?:
onnxruntime.experimental.fbs.SessionState): onnxruntime.experimental.fbs.SessionState|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.SessionState())\r\n
                  .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n
  * @param flatbuffers.Builder builder\r\n     */\r\n    static startSubGraphSessionState(builder: flatbuffers.Builder)
{\r\n      builder.startObject(2);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset graphIdOffset\r\n     */\r\n    static addGraphId(builder: flatbuffers.Builder, graphIdOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, graphIdOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset sessionStateOffset\r\n     */\r\n    static
addSessionState(builder: flatbuffers.Builder, sessionStateOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, sessionStateOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
 * @returns flatbuffers.Offset\r\n     */\r\n    static endSubGraphSessionState(builder: flatbuffers.Builder):
flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      builder.requiredField(offset, 4);  // graph_id\r\n
return offset;\r\n    }\r\n\r\n    static createSubGraphSessionState(\r\n        builder: flatbuffers.Builder, graphIdOffset:
flatbuffers.Offset,\r\n        sessionStateOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
SubGraphSessionState.startSubGraphSessionState(builder);\r\n      SubGraphSessionState.addGraphId(builder,
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graphIdOffset);\r\n      SubGraphSessionState.addSessionState(builder, sessionStateOffset);\r\n      return
SubGraphSessionState.endSubGraphSessionState(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n
*/\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class SessionState {\r\n    bb:
flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @returns SessionState\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer):
SessionState {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param SessionState= obj\r\n     * @returns SessionState\r\n     */\r\n    static
getRootAsSessionState(bb: flatbuffers.ByteBuffer, obj?: SessionState): SessionState {\r\n      return (obj || new
SessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param SessionState= obj\r\n     * @returns SessionState\r\n     */\r\n    static
getSizePrefixedRootAsSessionState(bb: flatbuffers.ByteBuffer, obj?: SessionState): SessionState {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
SessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.KernelCreateInfos= obj\r\n     * @returns
onnxruntime.experimental.fbs.KernelCreateInfos|null\r\n     */\r\n    kernels(obj?:
onnxruntime.experimental.fbs.KernelCreateInfos): onnxruntime.experimental.fbs.KernelCreateInfos|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.KernelCreateInfos())\r\n                        .__init(this.bb!.__indirect(this.bb_pos +
offset), this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.SubGraphSessionState= obj\r\n     * @returns
onnxruntime.experimental.fbs.SubGraphSessionState\r\n     */\r\n    subGraphSessionStates(index: number, obj?:
onnxruntime.experimental.fbs.SubGraphSessionState):\r\n
onnxruntime.experimental.fbs.SubGraphSessionState|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
 return offset ? (obj || new onnxruntime.experimental.fbs.SubGraphSessionState())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    subGraphSessionStatesLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startSessionState(builder: flatbuffers.Builder)
{\r\n      builder.startObject(2);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset kernelsOffset\r\n     */\r\n    static addKernels(builder: flatbuffers.Builder, kernelsOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, kernelsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset subGraphSessionStatesOffset\r\n     */\r\n    static
addSubGraphSessionStates(builder: flatbuffers.Builder, subGraphSessionStatesOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, subGraphSessionStatesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createSubGraphSessionStatesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]):\r\n
flatbuffers.Offset {\r\n      builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startSubGraphSessionStatesVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4,
numElems, 4);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns
flatbuffers.Offset\r\n     */\r\n    static endSessionState(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let
offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createSessionState(\r\n        builder:
flatbuffers.Builder, kernelsOffset: flatbuffers.Offset,\r\n        subGraphSessionStatesOffset: flatbuffers.Offset):
flatbuffers.Offset {\r\n      SessionState.startSessionState(builder);\r\n      SessionState.addKernels(builder,
kernelsOffset);\r\n      SessionState.addSubGraphSessionStates(builder, subGraphSessionStatesOffset);\r\n      return
SessionState.endSessionState(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n  export class InferenceSession {\r\n    bb: flatbuffers.ByteBuffer|null =
```

null;\r\n\r\n   bb_pos = 0;\r\n   /**\r\n   * @param number i\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @returns InferenceSession\r\n   */\r\n   __init(i: number, bb: flatbuffers.ByteBuffer): InferenceSession {\r\n   this.bb_pos = i;\r\n   this.bb = bb;\r\n   return this;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param InferenceSession= obj\r\n   * @returns InferenceSession\r\n   */\r\n   static getRootAsInferenceSession(bb: flatbuffers.ByteBuffer, obj?: InferenceSession): InferenceSession {\r\n   return (obj || new InferenceSession()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param InferenceSession= obj\r\n   * @returns InferenceSession\r\n   */\r\n   static getSizePrefixedRootAsInferenceSession(bb: flatbuffers.ByteBuffer, obj?: InferenceSession): InferenceSession {\r\n   bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n   return (obj || new InferenceSession()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @returns boolean\r\n   */\r\n   static bufferHasIdentifier(bb: flatbuffers.ByteBuffer): boolean {\r\n   return bb.__has_identifier('ORTM');\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Encoding= optionalEncoding\r\n   * @returns string|Uint8Array|null\r\n   */\r\n   ortVersion(): string|null;\r\n   ortVersion(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n   ortVersion(optionalEncoding?: any): string|Uint8Array|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 4);\r\n   return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n   }\r\n\r\n   /**\r\n   * @param onnxruntime.experimental.fbs.Model= obj\r\n   * @returns onnxruntime.experimental.fbs.Model|null\r\n   */\r\n   model(obj?: onnxruntime.experimental.fbs.Model): onnxruntime.experimental.fbs.Model|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 6);\r\n   return offset ? (obj || new onnxruntime.experimental.fbs.Model())\r\n   .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n   null;\r\n   }\r\n\r\n   /**\r\n   * @param onnxruntime.experimental.fbs.SessionState= obj\r\n   * @returns onnxruntime.experimental.fbs.SessionState|null\r\n   */\r\n   sessionState(obj?: onnxruntime.experimental.fbs.SessionState): onnxruntime.experimental.fbs.SessionState|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 8);\r\n   return offset ? (obj || new onnxruntime.experimental.fbs.SessionState())\r\n   .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n   null;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   */\r\n   static startInferenceSession(builder: flatbuffers.Builder) {\r\n   builder.startObject(3);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset ortVersionOffset\r\n   */\r\n   static addOrtVersion(builder: flatbuffers.Builder, ortVersionOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(0, ortVersionOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset modelOffset\r\n   */\r\n   static addModel(builder: flatbuffers.Builder, modelOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(1, modelOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset sessionStateOffset\r\n   */\r\n   static addSessionState(builder: flatbuffers.Builder, sessionStateOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(2, sessionStateOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @returns flatbuffers.Offset\r\n   */\r\n   static endInferenceSession(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n   let offset = builder.endObject();\r\n   return offset;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset offset\r\n   */\r\n   static finishInferenceSessionBuffer(builder: flatbuffers.Builder, offset: flatbuffers.Offset) {\r\n   builder.finish(offset, 'ORTM');\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset offset\r\n   */\r\n   static finishSizePrefixedInferenceSessionBuffer(builder: flatbuffers.Builder, offset: flatbuffers.Offset) {\r\n   builder.finish(offset, 'ORTM', true);\r\n   }\r\n\r\n   static createInferenceSession(\r\n   builder: flatbuffers.Builder, ortVersionOffset: flatbuffers.Offset, modelOffset: flatbuffers.Offset,\r\n   sessionStateOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n   InferenceSession.startInferenceSession(builder);\r\n   InferenceSession.addOrtVersion(builder, ortVersionOffset);\r\n   InferenceSession.addModel(builder, modelOffset);\r\n   InferenceSession.addSessionState(builder, sessionStateOffset);\r\n   return InferenceSession.endInferenceSession(builder);\r\n   }\r\n }\r\n}\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceSession, SessionHandler, Tensor}

from 'onnxruntime-common';\r\nimport {Session} from './session';\r\nimport {Tensor as OnnxjsTensor} from './tensor';\r\n\r\nexport class OnnxjsSessionHandler implements SessionHandler {\r\n constructor(private session: Session) {\r\n   this.inputNames = this.session.inputNames;\r\n   this.outputNames = this.session.outputNames;\r\n }\r\n\r\n async dispose(): Promise<void> {}\r\n inputNames: readonly string[];\r\n outputNames: readonly string[];\r\n async run(\r\n   feeds: SessionHandler.FeedsType, _fetches: SessionHandler.FetchesType,\r\n   _options: InferenceSession.RunOptions): Promise<SessionHandler.ReturnType> {\r\n   const inputMap = new Map<string, OnnxjsTensor>();\r\n   for (const name in feeds) {\r\n   if (Object.hasOwnProperty.call(feeds, name)) {\r\n   const feed = feeds[name];\r\n   inputMap.set(\r\n   name,\r\n   new OnnxjsTensor(\r\n   feed.dims, feed.type as OnnxjsTensor.DataType, undefined, undefined,\r\n   feed.data as OnnxjsTensor.NumberType));\r\n   }\r\n   }\r\n   const outputMap = await this.session.run(inputMap);\r\n   const output: SessionHandler.ReturnType = {};\r\n   outputMap.forEach((tensor, name) => {\r\n   output[name] = new Tensor(tensor.type, tensor.data, tensor.dims);\r\n   });\r\n   return output;\r\n }\r\n startProfiling(): void {\r\n   this.session.startProfiling();\r\n }\r\n endProfiling(): void {\r\n   this.session.endProfiling();\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {readFile} from 'fs';\r\nimport {promisify} from 'util';\r\n\r\nimport {resolveBackend, SessionHandlerType} from './backend';\r\nimport {ExecutionPlan} from './execution-plan';\r\nimport {Graph} from './graph';\r\nimport {Profiler} from './instrument';\r\nimport {Model} from './model';\r\nimport {Operator} from './operators';\r\nimport {Tensor} from './tensor';\r\n\r\nexport declare namespace Session {\r\n export interface Config {\r\n   backendHint?: string;\r\n   profiler?: Profiler.Config;\r\n }\r\n\r\n export interface Context {\r\n   profiler: Readonly<Profiler>;\r\n   graphInputTypes?: Tensor.DataType[];\r\n   graphInputDims?: Array<readonly number[]>;\r\n }\r\n}\r\n\r\nexport class Session {\r\n constructor(config: Session.Config = {}) {\r\n   this._initialized = false;\r\n   this.backendHint = config.backendHint;\r\n   this.profiler = Profiler.create(config.profiler);\r\n   this.context = {profiler: this.profiler, graphInputTypes: [], graphInputDims: []};\r\n }\r\n\r\n get inputNames(): readonly string[] {\r\n   return this._model.graph.getInputNames();\r\n }\r\n get outputNames(): readonly string[] {\r\n   return this._model.graph.getOutputNames();\r\n }\r\n\r\n startProfiling() {\r\n   this.profiler.start();\r\n }\r\n\r\n endProfiling() {\r\n   this.profiler.stop();\r\n }\r\n\r\n async loadModel(uri: string): Promise<void>;\r\n async loadModel(buffer: ArrayBuffer, byteOffset?: number, length?: number): Promise<void>;\r\n async loadModel(buffer: Uint8Array): Promise<void>;\r\n async loadModel(arg: string|ArrayBuffer|Uint8Array, byteOffset?: number, length?: number): Promise<void> {\r\n   await this.profiler.event('session', 'Session.loadModel', async () => {\r\n   // resolve backend and session handler\r\n   const backend = await resolveBackend(this.backendHint);\r\n   this.sessionHandler = backend.createSessionHandler(this.context);\r\n\r\n   this._model = new Model();\r\n   if (typeof arg === 'string') {\r\n   const isOrtFormat = arg.endsWith('.ort');\r\n   if (typeof fetch === 'undefined') {\r\n   // node\r\n   const buf = await promisify(readFile)(arg);\r\n   this.initialize(Buffer.from(buf), isOrtFormat);\r\n   } else {\r\n   // browser\r\n   const response = await fetch(arg);\r\n   const buf = await response.arrayBuffer();\r\n   this.initialize(new Uint8Array(buf), isOrtFormat);\r\n   }\r\n   } else if (!ArrayBuffer.isView(arg)) {\r\n   // load model from ArrayBuffer\r\n   const arr = new Uint8Array(arg, byteOffset || 0, length || arg.byteLength);\r\n   this.initialize(arr);\r\n   } else {\r\n   // load model from Uint8array\r\n   this.initialize(arg);\r\n   }\r\n   });\r\n }\r\n\r\n private initialize(modelProtoBlob: Uint8Array, isOrtFormat?: boolean): void {\r\n   if (this._initialized) {\r\n   throw new Error('already initialized');\r\n   }\r\n\r\n   this.profiler.event('session', 'Session.initialize', () => {\r\n   // load graph\r\n   const graphInitializer =\r\n   this.sessionHandler.transformGraph ? this.sessionHandler as Graph.Initializer : undefined;\r\n   this._model.load(modelProtoBlob, graphInitializer, isOrtFormat);\r\n\r\n   // graph is completely initialzied at this stage , let the interested handlers know\r\n   if (this.sessionHandler.onGraphInitialized) {\r\n   this.sessionHandler.onGraphInitialized(this._model.graph);\r\n   }\r\n   // initialize each operator in the graph\r\n   this.initializeOps(this._model.graph);\r\n\r\n   // instantiate an ExecutionPlan object to be used by the Session object\r\n   this._executionPlan = new ExecutionPlan(this._model.graph, this._ops, this.profiler);\r\n   });\r\n\r\n   this._initialized = true;\r\n }\r\n\r\n async run(inputs: Map<string, Tensor>|Tensor[]): Promise<Map<string,

```
Tensor>> {\r\n    if (!this._initialized) {\r\n      throw new Error('session not initialized yet');\r\n    }\r\n\r\n    return
this.profiler.event('session', 'Session.run', async () => {\r\n      const inputTensors =
this.normalizeAndValidateInputs(inputs);\r\n\r\n      const outputTensors = await
this._executionPlan.execute(this.sessionHandler, inputTensors);\r\n\r\n      return
this.createOutput(outputTensors);\r\n    });\r\n  }\r\n\r\n  private normalizeAndValidateInputs(inputs: Map<string,
Tensor>|Tensor[]): Tensor[] {\r\n    const modelInputNames = this._model.graph.getInputNames();\r\n\r\n    //
normalize inputs\r\n    // inputs: Tensor[]\r\n    if (Array.isArray(inputs)) {\r\n      if (inputs.length !==
modelInputNames.length) {\r\n        throw new Error(`incorrect input array length: expected
${modelInputNames.length} but got ${inputs.length}`);\r\n      }\r\n    }\r\n    // convert map to array\r\n    // inputs:
Map<string, Tensor>\r\n    else {\r\n      if (inputs.size !== modelInputNames.length) {\r\n        throw new
Error(`incorrect input map size: expected ${modelInputNames.length} but got ${inputs.size}`);\r\n      }\r\n\r\n
const sortedInputs = new Array<Tensor>(inputs.size);\r\n      let sortedInputsIndex = 0;\r\n      for (let i = 0; i <
modelInputNames.length; ++i) {\r\n        const tensor = inputs.get(modelInputNames[i]);\r\n        if (!tensor) {\r\n
   throw new Error(`missing input tensor for: '${name}'`);\r\n        }\r\n        sortedInputs[sortedInputsIndex++] =
tensor;\r\n      }\r\n\r\n      inputs = sortedInputs;\r\n    }\r\n\r\n    // validate dims requirements\r\n    // First session
run - graph input data is not cached for the session\r\n    if (!this.context.graphInputTypes ||
this.context.graphInputTypes.length === 0 || !this.context.graphInputDims ||\r\n
this.context.graphInputDims.length === 0) {\r\n      const modelInputIndices =
this._model.graph.getInputIndices();\r\n      const modelValues = this._model.graph.getValues();\r\n\r\n      const
graphInputDims = new Array<readonly number[]>(modelInputIndices.length);\r\n\r\n      for (let i = 0; i <
modelInputIndices.length; ++i) {\r\n        const graphInput = modelValues[modelInputIndices[i]];\r\n
graphInputDims[i] = graphInput.type!.shape.dims;\r\n\r\n        // cached for second and subsequent runs.\r\n        //
Some parts of the framework works on the assumption that the graph and types and shapes are static\r\n
this.context.graphInputTypes!.push(graphInput.type!.tensorType);\r\n
this.context.graphInputDims!.push(inputs[i].dims);\r\n      }\r\n\r\n
this.validateInputTensorDims(graphInputDims, inputs, true);\r\n    }\r\n\r\n    // Second and subsequent session runs
- graph input data is cached for the session\r\n    else {\r\n
this.validateInputTensorDims(this.context.graphInputDims, inputs, false);\r\n    }\r\n\r\n    // validate types
requirement\r\n    this.validateInputTensorTypes(this.context.graphInputTypes!, inputs);\r\n\r\n    return inputs;\r\n
}\r\n\r\n  private validateInputTensorTypes(graphInputTypes: Tensor.DataType[], givenInputs: Tensor[]) {\r\n    for
(let i = 0; i < givenInputs.length; i++) {\r\n      const expectedType = graphInputTypes[i];\r\n      const actualType =
givenInputs[i].type;\r\n      if (expectedType !== actualType) {\r\n        throw new Error(`input tensor[${i}] check
failed: expected type '${expectedType}' but got ${actualType}`);\r\n      }\r\n    }\r\n  }\r\n\r\n  private
validateInputTensorDims(\r\n      graphInputDims: Array<readonly number[]>, givenInputs: Tensor[],
noneDimSupported: boolean) {\r\n    for (let i = 0; i < givenInputs.length; i++) {\r\n      const expectedDims =
graphInputDims[i];\r\n      const actualDims = givenInputs[i].dims;\r\n      if
(!this.compareTensorDims(expectedDims, actualDims, noneDimSupported)) {\r\n        throw new Error(`input
tensor[${i}] check failed: expected shape '[${expectedDims.join(',')}]' but got [${\r\n
actualDims.join(',')}]`);\r\n      }\r\n    }\r\n  }\r\n\r\n  private compareTensorDims(expectedDims: readonly
number[], actualDims: readonly number[], noneDimSupported: boolean):\r\n      boolean {\r\n    if
(expectedDims.length !== actualDims.length) {\r\n      return false;\r\n    }\r\n\r\n    for (let i = 0; i <
expectedDims.length; ++i) {\r\n      if (expectedDims[i] !== actualDims[i] && (!noneDimSupported ||
expectedDims[i] !== 0)) {\r\n        // data shape mis-match AND not a 'None' dimension.\r\n        return false;\r\n
}\r\n    }\r\n\r\n    return true;\r\n  }\r\n\r\n  private createOutput(outputTensors: Tensor[]): Map<string, Tensor>
{\r\n    const modelOutputNames = this._model.graph.getOutputNames();\r\n    if (outputTensors.length !==
modelOutputNames.length) {\r\n      throw new Error('expected number of outputs do not match number of
generated outputs');\r\n    }\r\n\r\n    const output = new Map<string, Tensor>();\r\n    for (let i = 0; i <
modelOutputNames.length; ++i) {\r\n      output.set(modelOutputNames[i], outputTensors[i]);\r\n    }\r\n\r\n    return
```

output;\r\n }\r\n\r\n private initializeOps(graph: Graph): void {\r\n   const nodes = graph.getNodes();\r\n   this._ops = new Array(nodes.length);\r\n\r\n   for (let i = 0; i < nodes.length; i++) {\r\n   this._ops[i] = this.sessionHandler.resolve(nodes[i], this._model.opsets, graph);\r\n   }\r\n }\r\n\r\n private _model: Model;\r\n private _initialized: boolean;\r\n\r\n private _ops: Operator[];\r\n private _executionPlan: ExecutionPlan;\r\n\r\n private backendHint?: string;\r\n\r\n private sessionHandler: SessionHandlerType;\r\n private context: Session.Context;\r\n private profiler: Readonly<Profiler>;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Guid} from 'guid-typescript';\r\nimport Long from 'long';\r\nimport {onnx} from 'onnx-proto';\r\n\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\n\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\n\r\nimport {ProtoUtil, ShapeUtil} from './util';\r\n\r\nexport declare namespace Tensor {\r\n export interface DataTypeMap {\r\n   bool: Uint8Array;\r\n   float32: Float32Array;\r\n   float64: Float64Array;\r\n   string: string[];\r\n   int8: Int8Array;\r\n   uint8: Uint8Array;\r\n   int16: Int16Array;\r\n   uint16: Uint16Array;\r\n   int32: Int32Array;\r\n   uint32: Uint32Array;\r\n }\r\n\r\n export type DataType = keyof DataTypeMap;\r\n\r\n export type StringType = Tensor.DataTypeMap['string'];\r\n export type BooleanType = Tensor.DataTypeMap['bool'];\r\n export type IntegerType = Tensor.DataTypeMap['int8']|Tensor.DataTypeMap['uint8']|Tensor.DataTypeMap['int16']|\r\n   Tensor.DataTypeMap['uint16']|Tensor.DataTypeMap['int32']|Tensor.DataTypeMap['uint32'];\r\n export type FloatType = Tensor.DataTypeMap['float32']|Tensor.DataTypeMap['float64'];\r\n export type NumberType = BooleanType|IntegerType|FloatType;\r\n\r\n export type Id = Guid;\r\n}\r\n\r\ntype TensorData = Tensor.DataTypeMap[Tensor.DataType];\r\n\r\ntype DataProvider = (id: Tensor.Id) => TensorData;\r\ntype AsyncDataProvider = (id: Tensor.Id) => Promise<TensorData>;\r\n\r\nexport class Tensor {\r\n /**\r\n   * get the underlying tensor data\r\n   */\r\n get data(): TensorData {\r\n   if (this.cache === undefined) {\r\n   const data = this.dataProvider!(this.dataId);\r\n   if (data.length !== this.size) {\r\n   throw new Error('Length of data provided by the Data Provider is inconsistent with the dims of this Tensor.');\r\n   }\r\n   this.cache = data;\r\n   }\r\n   return this.cache;\r\n }\r\n\r\n /**\r\n   * get the underlying string tensor data. Should only use when type is STRING\r\n   */\r\n get stringData() {\r\n   if (this.type !== 'string') {\r\n   throw new TypeError('data type is not string');\r\n   }\r\n\r\n   return this.data as Tensor.StringType;\r\n }\r\n\r\n /**\r\n   * get the underlying integer tensor data. Should only use when type is one of the following: (UINT8, INT8, UINT16,\r\n   * INT16, INT32, UINT32, BOOL)\r\n   */\r\n get integerData() {\r\n   switch (this.type) {\r\n   case 'uint8':\r\n   case 'int8':\r\n   case 'uint16':\r\n   case 'int16':\r\n   case 'int32':\r\n   case 'uint32':\r\n   case 'bool':\r\n   return this.data as Tensor.IntegerType;\r\n\r\n   default:\r\n   throw new TypeError('data type is not integer (uint8, int8, uint16, int16, int32, uint32, bool)');\r\n   }\r\n }\r\n\r\n /**\r\n   * get the underlying float tensor data. Should only use when type is one of the following: (FLOAT, DOUBLE)\r\n   */\r\n get floatData() {\r\n   switch (this.type) {\r\n   case 'float32':\r\n   case 'float64':\r\n   return this.data as Tensor.FloatType;\r\n\r\n   default:\r\n   throw new TypeError('data type is not float (float32, float64)');\r\n   }\r\n }\r\n\r\n /**\r\n   * get the underlying number tensor data. Should only use when type is one of the following: (UINT8, INT8, UINT16,\r\n   * INT16, INT32, UINT32, BOOL, FLOAT, DOUBLE)\r\n   */\r\n get numberData() {\r\n   if (this.type !== 'string') {\r\n   return this.data as Tensor.NumberType;\r\n   }\r\n   throw new TypeError('type cannot be non-number (string)');\r\n }\r\n\r\n /**\r\n   * get value of an element at the given indices\r\n   */\r\n get(indices: readonly number[]): Tensor.DataTypeMap[Tensor.DataType][number] {\r\n   return this.data[ShapeUtil.indicesToOffset(indices, this.strides)];\r\n }\r\n\r\n /**\r\n   * set value of an element at the given indices\r\n   */\r\n set(indices: readonly number[], value: Tensor.DataTypeMap[Tensor.DataType][number]) {\r\n   this.data[ShapeUtil.indicesToOffset(indices, this.strides)] = value;\r\n }\r\n\r\n /**\r\n   * get the underlying tensor data asynchronously\r\n   */\r\n async getData(): Promise<TensorData> {\r\n   if (this.cache === undefined) {\r\n   this.cache = await this.asyncDataProvider!(this.dataId);\r\n   }\r\n   return this.cache;\r\n }\r\n\r\n /**\r\n   * get the number of elements in the tensor\r\n   */\r\n public readonly size: number;\r\n\r\n private _strides: readonly number[];\r\n /**\r\n   * get the strides for each dimension\r\n   */\r\n get strides(): readonly number[] {\r\n   if (!this._strides) {\r\n   this._strides = ShapeUtil.computeStrides(this.dims);\r\n   }\r\n   return this._strides;\r\n }\r\n\r\n constructor(\r\n   /**\r\n   * get the dimensions of the tensor\r\n   */\r\n   public readonly dims:

readonly number[],\r\n /**\r\n * get the type of the tensor\r\n */\r\n public readonly type: Tensor.DataType, private dataProvider?: DataProvider,\r\n private asyncDataProvider?: AsyncDataProvider, private cache?: TensorData,\r\n /**\r\n * get the data ID that used to map to a tensor data\r\n */\r\n public readonly dataId: Guid = Guid.create()) {\r\n this.size = ShapeUtil.validateDimsAndCalcSize(dims);\r\n const size = this.size;\r\n const empty = (dataProvider === undefined && asyncDataProvider === undefined && cache === undefined);\r\n\r\n if (cache !== undefined) {\r\n if (cache.length !== size) {\r\n throw new RangeError('Input dims doesn\\'t match data length.');\r\n }\r\n }\r\n\r\n if (type === 'string') {\r\n if (cache !== undefined && (!Array.isArray(cache) || !cache.every(i => typeof i === 'string'))) {\r\n throw new TypeError('cache should be a string array');\r\n }\r\n\r\n if (empty) {\r\n this.cache = new Array<string>(size);\r\n }\r\n } else {\r\n if (cache !== undefined) {\r\n const constructor = dataviewConstructor(type);\r\n if (!(cache instanceof constructor)) {\r\n throw new TypeError(`cache should be type ${constructor.name}`);\r\n }\r\n }\r\n\r\n if (empty) {\r\n const buf = new ArrayBuffer(size * sizeof(type));\r\n this.cache = createView(buf, type);\r\n }\r\n }\r\n }\r\n\r\n /**\r\n * Construct new Tensor from a ONNX Tensor object\r\n * @param tensorProto the ONNX Tensor\r\n */\r\n static fromProto(tensorProto: onnx.ITensorProto): Tensor {\r\n if (!tensorProto) {\r\n throw new Error('cannot construct Value from an empty tensor');\r\n }\r\n const type = ProtoUtil.tensorDataTypeFromProto(tensorProto.dataType!);\r\n const dims = ProtoUtil.tensorDimsFromProto(tensorProto.dims!);\r\n\r\n const value = new Tensor(dims, type);\r\n\r\n if (type === 'string') {\r\n // When it's STRING type, the value should always be stored in field\r\n // 'stringData'\r\n tensorProto.stringData!.forEach((str, i) => {\r\n const buf = Buffer.from(str.buffer, str.byteOffset, str.byteLength);\r\n value.data[i] = buf.toString();\r\n });\r\n\r\n } else if (\r\n tensorProto.rawData && typeof tensorProto.rawData.byteLength === 'number' &&\r\n tensorProto.rawData.byteLength > 0) {\r\n // NOT considering segment for now (IMPORTANT)\r\n\r\n // populate value from rawData\r\n const dataDest = value.data;\r\n const dataSource =\r\n new DataView(tensorProto.rawData.buffer, tensorProto.rawData.byteOffset, tensorProto.rawData.byteLength);\r\n const elementSize = sizeofProto(tensorProto.dataType!);\r\n const length = tensorProto.rawData.byteLength / elementSize;\r\n\r\n if (tensorProto.rawData.byteLength % elementSize !== 0) {\r\n throw new Error('invalid buffer length');\r\n }\r\n if (dataDest.length !== length) {\r\n throw new Error('buffer length mismatch');\r\n }\r\n\r\n for (let i = 0; i < length; i++) {\r\n const n = readProto(dataSource, tensorProto.dataType!, i * elementSize);\r\n dataDest[i] = n;\r\n }\r\n } else {\r\n // populate value from array\r\n let array: Array<number|Long>;\r\n switch (tensorProto.dataType) {\r\n case onnx.TensorProto.DataType.FLOAT:\r\n array = tensorProto.floatData!;\r\n break;\r\n case onnx.TensorProto.DataType.INT32:\r\n case onnx.TensorProto.DataType.INT16:\r\n case onnx.TensorProto.DataType.UINT16:\r\n case onnx.TensorProto.DataType.INT8:\r\n case onnx.TensorProto.DataType.UINT8:\r\n case onnx.TensorProto.DataType.BOOL:\r\n array = tensorProto.int32Data!;\r\n break;\r\n case onnx.TensorProto.DataType.INT64:\r\n array = tensorProto.int64Data!;\r\n break;\r\n case onnx.TensorProto.DataType.DOUBLE:\r\n array = tensorProto.doubleData!;\r\n break;\r\n case onnx.TensorProto.DataType.UINT32:\r\n case onnx.TensorProto.DataType.UINT64:\r\n array = tensorProto.uint64Data!;\r\n break;\r\n default:\r\n // should never run here\r\n throw new Error('unspecific error');\r\n }\r\n\r\n if (array === null || array === undefined) {\r\n throw new Error('failed to populate data from a tensorproto value');\r\n }\r\n\r\n const data = value.data;\r\n if (data.length !== array.length) {\r\n throw new Error('array length mismatch');\r\n }\r\n\r\n for (let i = 0; i < array.length; i++) {\r\n const element = array[i];\r\n if (Long.isLong(element)) {\r\n data[i] = longToNumber(element, tensorProto.dataType);\r\n } else {\r\n data[i] = element;\r\n }\r\n }\r\n }\r\n\r\n return value;\r\n }\r\n\r\n /**\r\n * Construct new Tensor from raw data\r\n * @param data the raw data object. Should be a string array for 'string' tensor, and the corresponding typed array\r\n * for other types of tensor.\r\n * @param dims the dimensions of the tensor\r\n * @param type the type of the tensor\r\n */\r\n static fromData(data: Tensor.DataTypeMap[Tensor.DataType], dims:

readonly number[], type: Tensor.DataType) {\r\n   return new Tensor(dims, type, undefined, undefined, data);\r\n }\r\n\r\n static fromOrtTensor(ortTensor: ortFbs.Tensor) {\r\n   if (!ortTensor) {\r\n   throw new Error('cannot construct Value from an empty tensor');\r\n   }\r\n   const dims = ProtoUtil.tensorDimsFromORTFormat(ortTensor);\r\n   const type = ProtoUtil.tensorDataTypeFromProto(ortTensor.dataType());\r\n\r\n   const value = new Tensor(dims, type);\r\n\r\n if (type === 'string') {\r\n   // When it's STRING type, the value should always be stored in field\r\n   // 'stringData'\r\n   for (let i = 0; i < ortTensor.stringDataLength(); i++) {\r\n   value.data[i] = ortTensor.stringData(i);\r\n   }\r\n\r\n   } else if (\r\n   ortTensor.rawDataArray() && typeof ortTensor.rawDataLength() === 'number' && ortTensor.rawDataLength() > 0) {\r\n   // NOT considering segment for now (IMPORTANT)\r\n\r\n   // populate value from rawData\r\n   const dataDest = value.data;\r\n   const dataSource = new DataView(\r\n   ortTensor.rawDataArray()!.buffer, ortTensor.rawDataArray()!.byteOffset, ortTensor.rawDataLength());\r\n   const elementSize = sizeofProto(ortTensor.dataType());\r\n   const length = ortTensor.rawDataLength() / elementSize;\r\n\r\n   if (ortTensor.rawDataLength() % elementSize !== 0) {\r\n throw new Error('invalid buffer length');\r\n   }\r\n   if (dataDest.length !== length) {\r\n   throw new Error('buffer length mismatch');\r\n   }\r\n\r\n   for (let i = 0; i < length; i++) {\r\n   const n = readProto(dataSource, ortTensor.dataType(), i * elementSize);\r\n   dataDest[i] = n;\r\n   }\r\n   }\r\n   return value;\r\n }\r\n}\r\n\r\nfunction sizeof(type: Tensor.DataType): number {\r\n switch (type) {\r\n   case 'bool':\r\n case 'int8':\r\n   case 'uint8':\r\n   return 1;\r\n   case 'int16':\r\n   case 'uint16':\r\n   return 2;\r\n   case 'int32':\r\n   case 'uint32':\r\n   case 'float32':\r\n   return 4;\r\n   case 'float64':\r\n   return 8;\r\n   default:\r\n throw new Error(`cannot calculate sizeof() on type ${type}`);\r\n }\r\n}\r\n\r\nfunction sizeofProto(type: onnx.TensorProto.DataType|ortFbs.TensorDataType): number {\r\n switch (type) {\r\n   case onnx.TensorProto.DataType.UINT8:\r\n   case onnx.TensorProto.DataType.INT8:\r\n   case onnx.TensorProto.DataType.BOOL:\r\n   return 1;\r\n   case onnx.TensorProto.DataType.UINT16:\r\n   case onnx.TensorProto.DataType.INT16:\r\n   return 2;\r\n   case onnx.TensorProto.DataType.FLOAT:\r\n   case onnx.TensorProto.DataType.INT32:\r\n   case onnx.TensorProto.DataType.UINT32:\r\n   return 4;\r\n   case onnx.TensorProto.DataType.INT64:\r\n   case onnx.TensorProto.DataType.DOUBLE:\r\n   case onnx.TensorProto.DataType.UINT64:\r\n   return 8;\r\n   default:\r\n   throw new Error(`cannot calculate sizeof() on type ${onnx.TensorProto.DataType[type]}`);\r\n }\r\n}\r\n\r\nfunction createView(dataBuffer: ArrayBuffer, type: Tensor.DataType) {\r\n return new (dataviewConstructor(type))(dataBuffer);\r\n}\r\n\r\nfunction dataviewConstructor(type: Tensor.DataType) {\r\n switch (type) {\r\n   case 'bool':\r\n   case 'uint8':\r\n   return Uint8Array;\r\n   case 'int8':\r\n   return Int8Array;\r\n   case 'int16':\r\n   return Int16Array;\r\n   case 'uint16':\r\n   return Uint16Array;\r\n   case 'int32':\r\n   return Int32Array;\r\n   case 'uint32':\r\n   return Uint32Array;\r\n   case 'float32':\r\n   return Float32Array;\r\n   case 'float64':\r\n   return Float64Array;\r\n default:\r\n   // should never run to here\r\n   throw new Error('unspecified error');\r\n }\r\n}\r\n\r\n// convert a long number to a 32-bit integer (cast-down)\r\nfunction longToNumber(i: Long, type: onnx.TensorProto.DataType|ortFbs.TensorDataType): number {\r\n // INT64, UINT32, UINT64\r\n if (type === onnx.TensorProto.DataType.INT64 || type === ortFbs.TensorDataType.INT64) {\r\n   if (i.greaterThanOrEqual(2147483648) || i.lessThan(-2147483648)) {\r\n   throw new TypeError('int64 is not supported');\r\n   }\r\n } else if (\r\n   type === onnx.TensorProto.DataType.UINT32 || type === ortFbs.TensorDataType.UINT32 ||\r\n   type === onnx.TensorProto.DataType.UINT64 || type === ortFbs.TensorDataType.UINT64) {\r\n   if (i.greaterThanOrEqual(4294967296) || i.lessThan(0)) {\r\n   throw new TypeError('uint64 is not supported');\r\n   }\r\n } else {\r\n   throw new TypeError(`not a LONG type: ${onnx.TensorProto.DataType[type]}`);\r\n }\r\n\r\n return i.toNumber();\r\n}\r\n\r\n// read one value from TensorProto\r\nfunction readProto(view: DataView, type: onnx.TensorProto.DataType|ortFbs.TensorDataType, byteOffset: number): number {\r\n switch (type) {\r\n   case onnx.TensorProto.DataType.BOOL:\r\n   case onnx.TensorProto.DataType.UINT8:\r\n   return view.getUint8(byteOffset);\r\n   case onnx.TensorProto.DataType.INT8:\r\n   return view.getInt8(byteOffset);\r\n   case onnx.TensorProto.DataType.UINT16:\r\n   return view.getUint16(byteOffset, true);\r\n   case

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onnx.TensorProto.DataType.INT16:\r\n      return view.getInt16(byteOffset, true);\r\n    case
onnx.TensorProto.DataType.FLOAT:\r\n      return view.getFloat32(byteOffset, true);\r\n    case
onnx.TensorProto.DataType.INT32:\r\n      return view.getInt32(byteOffset, true);\r\n    case
onnx.TensorProto.DataType.UINT32:\r\n      return view.getUint32(byteOffset, true);\r\n    case
onnx.TensorProto.DataType.INT64:\r\n      return longToNumber(\r\n
Long.fromBits(view.getUint32(byteOffset, true), view.getUint32(byteOffset + 4, true), false), type);\r\n    case
onnx.TensorProto.DataType.DOUBLE:\r\n      return view.getFloat64(byteOffset, true);\r\n    case
onnx.TensorProto.DataType.UINT64:\r\n      return longToNumber(\r\n
Long.fromBits(view.getUint32(byteOffset, true), view.getUint32(byteOffset + 4, true), true), type);\r\n    default:\r\n
    throw new Error(`cannot read from DataView for type ${onnx.TensorProto.DataType[type]}`);\r\n  }\r\n}\r\n","//
Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{flatbuffers} from 'flatbuffers';\r\nimport Long from 'long';\r\nimport {onnx} from 'onnx-proto';\r\n\r\nimport
{Graph} from './graph';\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\nimport {Tensor} from
'./tensor';\r\n\r\n\r\n// check the inputs shape before running an OP.\r\n// return true when the inputs pass the check\r\n//
return false when the inputs do not fit the requirement\r\n// throw exception when fatal error or not
implemented\r\nexport function checkInputsShape(inputs: Tensor[], ...expectedDimensions: number[]): boolean
{\r\n  if (!inputs || inputs.length !== expectedDimensions.length) {\r\n    return false;\r\n  }\r\n  for (let i = 0; i <
inputs.length; i++) {\r\n    if (!inputs[i].dims || inputs[i].dims.length !== expectedDimensions[i]) {\r\n      return
false;\r\n    }\r\n  }\r\n  return true;\r\n}\r\n\r\n// Evaluates the given expression and asserts error message if
condition is unmet.\r\nexport function assert(expr: boolean, msg: () => string) {\r\n  if (!expr) {\r\n    throw new
Error(typeof msg === 'string' ? msg : msg());\r\n  }\r\n}\r\n\r\nexport class ArrayUtil {\r\n  /**\r\n   * Verifies if 2
input arrays contain the same elements.\r\n   * @param n1 Array 1\r\n   * @param n2 Array 2\r\n   * @returns
Whether these 2 are equal\r\n   */\r\n  static arraysEqual(\r\n      n1: readonly
number[]|Int8Array|Uint8Array|Int16Array|Uint16Array|Int32Array|Uint32Array|Uint8ClampedArray|\r\n
Float32Array|Float64Array,\r\n      n2: readonly
number[]|Int8Array|Uint8Array|Int16Array|Uint16Array|Int32Array|Uint32Array|Uint8ClampedArray|\r\n
Float32Array|Float64Array) {\r\n    if (n1.length !== n2.length) {\r\n      return false;\r\n    }\r\n    for (let i = 0; i <
n1.length; i++) {\r\n      if (n1[i] !== n2[i]) {\r\n        return false;\r\n      }\r\n    }\r\n    return true;\r\n
}\r\n}\r\n\r\nexport class MatMulUtil {\r\n  /**\r\n   * Fix the input shapes for MatMul operation if they need
fixing\r\n   * @param dimsA The shape of tensor A. Should be an array of positive integers\r\n   * @param dimsB
The shape of tensor B. Should be an array of positive integers\r\n   * @returns A tuple containing the preprocessed
input shapes as required by ONNX specifications\r\n   */\r\n  static preprocessInputShapes(dimsA: readonly
number[], dimsB: readonly number[]):\r\n      [readonly number[], readonly number[]] {\r\n    // If the first argument
is 1-D, it is promoted to a matrix by prepending\r\n    // a 1 to its dimensions. After matrix multiplication the
prepended 1 is\r\n    // removed.\r\n    const a = (dimsA.length === 1) ? [1, dimsA[0]] : dimsA;\r\n\r\n    // If the
second argument is 1-D, it is promoted to a matrix by appending\r\n    // a 1 to its dimensions. After matrix
multiplication the appended 1 is\r\n    // removed.\r\n    const b = (dimsB.length === 1) ? [dimsB[0], 1] :
dimsB;\r\n\r\n    return [a, b];\r\n  }\r\n\r\n  /**\r\n   * Fix the output shape computed for MatMul operation if it
needs fixing\r\n   * @param outputShape The computed outputShape. Should be an array (atleast of length 2) of
positive integers.\r\n   * This will be mutated.\r\n   * @param aRank The rank of tensor A.\r\n   * @param bRank
The rank of tensor B.\r\n   */\r\n  static postprocessOutputShape(outputShape: number[], aRank: number, bRank:
number) {\r\n    // Remove prepended dimension if first input is 1d\r\n    if (aRank === 1) {\r\n      // outputShape =
outputShape.slice(0, outputShape.length - 2).concat(outputShape.slice(outputShape.length - 1));\r\n
outputShape.splice(outputShape.length - 2, 1);\r\n    }\r\n    // Remove appended dimension if second input is 1d\r\n
if (bRank === 1) {\r\n      outputShape.pop();\r\n    }\r\n  }\r\n\r\n  /**\r\n   * Calculate the expected shape when
matrix multiplication\r\n   * @param a The shape of tensor A. Should be a tuple of 2 positive integers\r\n   *
@param b The shape of tensor B. Should be a tuple of 2 positive integers\r\n   * @returns The expected shape of the
result, or undefined if N/A\r\n   */\r\n  static calcMatMulShape(a: [number, number], b: [number, number]):
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[number, number]|undefined {\r\n   return (a[1] !== b[0]) ? undefined : [a[0], b[1]];\r\n }\r\n}\r\n\r\nexport class BroadcastUtil {\r\n /**\r\n   * Calculate the expected shape when broadcasting 2 tensors\r\n   * @param a The shape of tensor A. Should be an array of positive integers\r\n   * @param b The shape of tensor B. Should be an array of positive integers\r\n   * @param isMatMul Whether the operation is MatMul\r\n   * @returns The expected shape of the result, or undefined if N/A\r\n   */\r\n static calcShape(adims: readonly number[], bdims: readonly number[], isMatMul = false): readonly number[]|undefined {\r\n   const arank = adims.length;\r\n   const brank = bdims.length;\r\n   if (arank === 0) {\r\n   return bdims;\r\n   }\r\n   if (brank === 0) {\r\n   return adims;\r\n   }\r\n   const crank = Math.max(adims.length, bdims.length);\r\n   const cdims = new Array<number>(crank);\r\n\r\n   // calculate the last 2 dimension if it is MatMul\r\n   if (isMatMul) {\r\n   if (arank < 2 || brank < 2) {\r\n   return undefined;\r\n   }\r\n   const cShapeMatMul =\r\n MatMulUtil.calcMatMulShape([adims[arank - 2], adims[arank - 1]], [bdims[brank - 2], bdims[brank - 1]]);\r\n   if (cShapeMatMul === undefined) {\r\n   return undefined;\r\n   }\r\n   [cdims[crank - 2], cdims[crank - 1]] = cShapeMatMul;\r\n   }\r\n\r\n   for (let i = isMatMul ? 3 : 1; i <= crank; i++) {\r\n   const aLen = arank - i < 0 ? 1 : adims[arank - i];\r\n   const bLen = brank - i < 0 ? 1 : bdims[brank - i];\r\n\r\n   if (aLen !== bLen && aLen > 1 && bLen > 1) {\r\n   return undefined;\r\n   }\r\n   cdims[crank - i] = Math.max(aLen, bLen);\r\n   }\r\n\r\n   return cdims;\r\n }\r\n\r\n /**\r\n   * Given the indices of a broadcasted tensor, calculate the original indices\r\n   * @param broadcastedIndices The given indices of the broadcasted tensor.\r\n   * @param originalShape The original shape of the tensor before broadcas\r\n   * @returns The calculated indices that maps to the original tensor.\r\n   */\r\n static index(broadcastedIndices: readonly number[], originalShape: readonly number[]): number[] {\r\n   // NOTE 1: we assume the parameter broadcastedIndices is valid. ie. it should have the same\r\n   // length as the broadcasted shape, and for each dimension the index should\r\n   // not be out of range.\r\n   const originalIndices = new Array(originalShape.length);\r\n   BroadcastUtil.fillIndex(broadcastedIndices, originalShape, originalIndices);\r\n   return originalIndices;\r\n }\r\n\r\n /**\r\n   * Given the indices of a broadcasted tensor, calculate the original indices\r\n   * @param broadcastedIndices The given indices of the broadcasted tensor.\r\n   * @param originalShape The original shape of the tensor before broadcast\r\n   * @param originalIndices The mapping of broadcastedIndices to the originalIndices (output parameter - will be\r\n   *   mutated).\r\n   */\r\n static fillIndex(broadcastedIndices: readonly number[], originalShape: readonly number[], originalIndices: number[]) {\r\n   // NOTE 1: we assume the parameter broadcastedIndices is valid. ie. it should have the same length as the\r\n   // broadcasted shape, and for each dimension the index should not be out of range.\r\n   // NOTE 2: we assume the parameter originalIndices has the same length as the originalShape\r\n   const dimOffset = broadcastedIndices.length - originalShape.length;\r\n   for (let i = 0; i < originalShape.length; i++) {\r\n   originalIndices[i] = broadcastedIndices[dimOffset + i] % originalShape[i];\r\n   }\r\n }\r\n\r\n /**\r\n   * Perform the broadcasting operation on the specific operator\r\n   * @param a The input tensor A\r\n   * @param b The input tensor B\r\n   * @param op The operator lambda function\r\n   * @param inplace Whether to write the result back to A.\r\n   * @returns The result tensor, or undefined if input not broadcastable.\r\n   */\r\n static calc(\r\n   a: Tensor, b: Tensor, op: (a: string|number, b: string|number) => (string | number), inplace: boolean,\r\n   resultType?: Tensor.DataType): Tensor|undefined {\r\n   const outputShape = BroadcastUtil.calcShape(a.dims, b.dims);\r\n\r\n   if (outputShape) {\r\n   if (inplace && !ShapeUtil.areEqual(outputShape, a.dims)) {\r\n   // B is not broadcastable to A, failed to calculate inplace.\r\n   return undefined;\r\n   }\r\n\r\n   const size = ShapeUtil.size(outputShape);\r\n   const c = inplace ? a : new Tensor(outputShape, resultType || a.type);\r\n\r\n   // both inputs are scalars\r\n   if (outputShape.length === 0) {\r\n   c.set([], op(a.get([]), b.get([])));\r\n   }\r\n\r\n   // atleast one input is a non-scalar\r\n   else {\r\n   const outputIndices = new Array<number>(outputShape.length);\r\n   const originalIndicesA = new Array(a.dims.length);\r\n   const originalIndicesB = new Array(b.dims.length);\r\n   let valA: string|number = 0;\r\n   let valB: string|number = 0;\r\n   let isAScalar = false;\r\n   let isBScalar = false;\r\n   if (a.dims.length === 0) {\r\n   valA = a.get([]);\r\n   isAScalar = true;\r\n   }\r\n   if (b.dims.length === 0) {\r\n   valB = b.get([]);\r\n   isBScalar = true;\r\n   }\r\n   let rest: number;\r\n   for (let i = 0; i < size; i++) {\r\n   // traversal indices\r\n   rest = i;\r\n   for (let j = outputShape.length - 1; j >= 0; j--) {\r\n   outputIndices[j] = rest

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% outputShape[j];\r\n            rest = Math.floor(rest / outputShape[j]);\r\n          }\r\n\r\n          if (!isAScalar) {\r\n
    // map outputIndices (which is actually broadcasted) to the originalIndices\r\n
BroadcastUtil.fillIndex(outputIndices, a.dims, originalIndicesA);\r\n            valA = a.get(originalIndicesA);\r\n
}\r\n          if (!isBScalar) {\r\n            BroadcastUtil.fillIndex(outputIndices, b.dims, originalIndicesB);\r\n
valB = b.get(originalIndicesB);\r\n          }\r\n\r\n          c.set(outputIndices, op(valA, valB));\r\n        }\r\n
}\r\n\r\n      return c;\r\n    }\r\n\r\n    return undefined;\r\n  }\r\n\r\n  /**\r\n   * Determine if a shape is unidirectional
broadcastable to another shape\r\n   * @param shape The input shape\r\n   * @param finalShape The desired shape
after broadcasting\r\n   */\r\n  static isValidBroadcast(shape: readonly number[], finalShape: readonly number[]):
boolean {\r\n    // align shape to the right\r\n    const inputRank = shape.length;\r\n    const finalRank =
finalShape.length;\r\n    if (inputRank > finalRank) {\r\n      return false;\r\n    }\r\n    for (let i = 1; i <= inputRank;
i++) {\r\n      if (shape[inputRank - i] !== 1 && shape[inputRank - i] !== finalShape[finalRank - i]) {\r\n        return
false;\r\n      }\r\n    }\r\n    return true;\r\n  }\r\n\r\n  /**\r\n   * Determine the broadcasted dims in input shape based
on the given output shape.\r\n   * Note that this function only returns the broadcasted dims.\r\n   * @param
inputShape The input shape\r\n   * @param outputShape The output shape\r\n   * @returns The broadcasted dims in
input shape.\r\n   */\r\n  static getBroadcastDims(inputShape: readonly number[], outputShape: readonly number[]):
number[] {\r\n    const inRank = inputShape.length;\r\n    const dims: number[] = [];\r\n    for (let i = 0; i < inRank;
i++) {\r\n      const dim = inRank - 1 - i;\r\n      const a = inputShape[dim] || 1;\r\n      const b =
outputShape[outputShape.length - 1 - i] || 1;\r\n      if (b > 1 && a === 1) {\r\n        dims.unshift(dim);\r\n      }\r\n
}\r\n    return dims;\r\n  }\r\n}\r\n\r\n// copy array helper\r\n// mimics memcpy as much as possible\r\nexport
function arrayCopyHelper(\r\n    target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType,
targetIndex: number, sourceIndex: number,\r\n    blockSize: number) {\r\n  if (sourceIndex < 0 || sourceIndex >=
source.length) {\r\n    throw new Error('sourceIndex out of bounds');\r\n  }\r\n  if (targetIndex < 0 || targetIndex >=
target.length) {\r\n    throw new Error('targetIndex out of bounds');\r\n  }\r\n  if (sourceIndex + blockSize >
source.length) {\r\n    throw new Error('source indices to be copied are outside bounds');\r\n  }\r\n  if (targetIndex +
blockSize > target.length) {\r\n    throw new Error('target array is too small to hold result');\r\n  }\r\n\r\n  for (let
offset = 0; offset < blockSize; offset++) {\r\n    target[targetIndex + offset] = source[sourceIndex + offset];\r\n
}\r\n}\r\n\r\nexport class GemmUtil {\r\n  // will make sure input shapes are compatible for this op\r\n  // and return
back the shape of the output in the form of a tuple\r\n  // will throw exception if the input shapes are not
compatible\r\n  static getShapeOfGemmResult(\r\n      leftShape: readonly number[], transLeft: boolean, rightShape:
readonly number[], transRight: boolean,\r\n      biasShape?: readonly number[]): readonly number[] {\r\n    if
(leftShape.length !== 2 || rightShape.length !== 2) {\r\n      throw new Error('shape need to be of size 2');\r\n
}\r\n\r\n    let M: number;\r\n    let K: number;\r\n    let N: number;\r\n\r\n    if (transLeft) {\r\n      M =
leftShape[1];\r\n      K = leftShape[0];\r\n    } else {\r\n      M = leftShape[0];\r\n      K = leftShape[1];\r\n    }\r\n\r\n
let kDim = -1;\r\n\r\n    if (transRight) {\r\n      N = rightShape[0];\r\n      kDim = 1;\r\n    } else {\r\n      N =
rightShape[1];\r\n      kDim = 0;\r\n    }\r\n\r\n    if (rightShape[kDim] !== K) {\r\n      throw new Error('dimension
mismatch');\r\n    }\r\n\r\n    if (M <= 0 || N <= 0 || K <= 0) {\r\n      throw new Error('invalid shape specified');\r\n
}\r\n\r\n    if (biasShape && !BroadcastUtil.isValidBroadcast(biasShape, [M, N])) {\r\n      throw new Error('gemm:
invalid bias shape for broadcast');\r\n    }\r\n\r\n    return [M, N, K];\r\n  }\r\n}\r\n\r\nexport class ProtoUtil {\r\n
static tensorDataTypeFromProto(typeProto: onnx.TensorProto.DataType|\r\n
onnxruntime.experimental.fbs.TensorDataType): Tensor.DataType {\r\n    switch (typeProto) {\r\n      case
onnx.TensorProto.DataType.INT8:\r\n        return 'int8';\r\n      case onnx.TensorProto.DataType.UINT8:\r\n
return 'uint8';\r\n      case onnx.TensorProto.DataType.BOOL:\r\n        return 'bool';\r\n      case
onnx.TensorProto.DataType.INT16:\r\n        return 'int16';\r\n      case onnx.TensorProto.DataType.UINT16:\r\n
return 'uint16';\r\n      case onnx.TensorProto.DataType.INT32:\r\n        return 'int32';\r\n      case
onnx.TensorProto.DataType.UINT32:\r\n        return 'uint32';\r\n      case onnx.TensorProto.DataType.FLOAT:\r\n
  return 'float32';\r\n      case onnx.TensorProto.DataType.DOUBLE:\r\n        return 'float64';\r\n      case
onnx.TensorProto.DataType.STRING:\r\n        return 'string';\r\n\r\n      // For INT64/UINT64, reduce their value to
32-bits.\r\n      // Should throw exception when overflow\r\n      case onnx.TensorProto.DataType.INT64:\r\n
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return 'int32';\r\n      case onnx.TensorProto.DataType.UINT64:\r\n        return 'uint32';\r\n\r\n      default:\r\n
throw new Error(`unsupported data type: ${onnx.TensorProto.DataType[typeProto]}`);\r\n    }\r\n  }\r\n\r\n  static
tensorDataTypeStringToEnum(type: string): onnx.TensorProto.DataType {\r\n    switch (type) {\r\n      case
'int8':\r\n        return onnx.TensorProto.DataType.INT8;\r\n      case 'uint8':\r\n        return
onnx.TensorProto.DataType.UINT8;\r\n      case 'bool':\r\n        return onnx.TensorProto.DataType.BOOL;\r\n
case 'int16':\r\n        return onnx.TensorProto.DataType.INT16;\r\n      case 'uint16':\r\n        return
onnx.TensorProto.DataType.UINT16;\r\n      case 'int32':\r\n        return onnx.TensorProto.DataType.INT32;\r\n
case 'uint32':\r\n        return onnx.TensorProto.DataType.UINT32;\r\n      case 'float32':\r\n        return
onnx.TensorProto.DataType.FLOAT;\r\n      case 'float64':\r\n        return
onnx.TensorProto.DataType.DOUBLE;\r\n      case 'string':\r\n        return onnx.TensorProto.DataType.STRING;\r\n
    case 'int64':\r\n        return onnx.TensorProto.DataType.INT64;\r\n      case 'uint64':\r\n        return
onnx.TensorProto.DataType.UINT64;\r\n\r\n      default:\r\n        throw new Error(`unsupported data type:
${type}`);\r\n    }\r\n  }\r\n\r\n  static tensorDimsFromProto(dims: Array<number|Long>): number[] {\r\n    // get rid
of Long type for dims\r\n    return dims.map(d => Long.isLong(d) ? d.toNumber() : d);\r\n  }\r\n\r\n  static
tensorValueTypeFromProto(valueType: onnx.TypeProto.ITensor): Graph.ValueType {\r\n    return {\r\n
tensorType: ProtoUtil.tensorDataTypeFromProto(valueType.elemType!),\r\n      shape: {dims:
ProtoUtil.tensorDimsFromProto(valueType.shape!.dim!.map(d => d.dimValue!))}\r\n    };\r\n  }\r\n\r\n  static
tensorDimsFromORTFormat(tensor: onnxruntime.experimental.fbs.Tensor) {\r\n    const dims = [];\r\n    for (let i =
0; i < tensor.dimsLength(); i++) {\r\n      dims.push(LongUtil.longToNumber(tensor.dims(i)!));\r\n    }\r\n    return
dims;\r\n  }\r\n\r\n  static tensorAttributesFromORTFormat(node: onnxruntime.experimental.fbs.Node) {\r\n    const
attributes = [];\r\n    for (let i = 0; i < node.attributesLength(); i++) {\r\n      attributes.push(node.attributes(i)!);\r\n
}\r\n    return attributes;\r\n  }\r\n}\r\n\r\nexport class LongUtil {\r\n  static longToNumber(n:
Long|flatbuffers.Long|number) {\r\n    if (Long.isLong(n)) {\r\n      return n.toNumber();\r\n    } else if (n instanceof
flatbuffers.Long) {\r\n      return Long.fromValue({low: n.low, high: n.high, unsigned: true}).toNumber();\r\n    }\r\n
  return n;\r\n  }\r\n  static isLong(n: unknown) {\r\n    return Long.isLong(n) || n instanceof flatbuffers.Long;\r\n
}\r\n}\r\n\r\nexport class ShapeUtil {\r\n  static size(dims: readonly number[]): number {\r\n    return
ShapeUtil.getSizeFromDimensionRange(dims, 0, dims.length);\r\n  }\r\n\r\n  // `axis` inclusive\r\n  static
sizeFromDimension(dims: readonly number[], axis: number): number {\r\n    if (axis < 0 || axis > dims.length) {\r\n
  throw new Error(`invalid dimension of ${axis} for sizeFromDimension as Tensor has ${dims.length}
dimensions.`);\r\n    }\r\n    return ShapeUtil.getSizeFromDimensionRange(dims, axis, dims.length);\r\n  }\r\n\r\n  //
`axis` exclusive\r\n  static sizeToDimension(dims: readonly number[], axis: number): number {\r\n    if (axis < 0 ||
axis > dims.length) {\r\n      throw new Error(`invalid dimension of ${axis} for sizeToDimension as Tensor has
${dims.length} dimensions.`);\r\n    }\r\n    return ShapeUtil.getSizeFromDimensionRange(dims, 0, axis);\r\n
}\r\n\r\n  static getSizeFromDimensionRange(dims: readonly number[], start: number, end: number): number {\r\n
let size = 1;\r\n    for (let i = start; i < end; i++) {\r\n      // safety check as this method is called by multiple other
methods requiring size.\r\n      // size cannot be 0 or negative.\r\n      if (dims[i] <= 0) {\r\n        throw new Error(\r\n
        // eslint-disable-next-line max-len\r\n            'cannot get valid size from specified dimension range. Most likely
the range contains 0 or negative values in them.');\r\n      }\r\n      size *= dims[i];\r\n    }\r\n    return size;\r\n
}\r\n\r\n  static computeStrides(dims: readonly number[]): readonly number[] {\r\n    const rank = dims.length;\r\n
if (rank === 0) {\r\n      return [];\r\n    } else if (rank === 1) {\r\n      return [1];\r\n    }\r\n    const strides = new
Array(rank);\r\n    strides[rank - 1] = 1;\r\n    strides[rank - 2] = dims[rank - 1];\r\n    for (let i = rank - 3; i >= 0; --i)
{\r\n      strides[i] = strides[i + 1] * dims[i + 1];\r\n    }\r\n    return strides;\r\n  }\r\n\r\n  static transpose(dims:
readonly number[]): readonly number[] {\r\n    const copy = dims.slice();\r\n    return copy.reverse();\r\n  }\r\n\r\n
static indicesToOffset(indices: readonly number[], strides: readonly number[], axis?: number): number {\r\n    if
(axis === undefined) {\r\n      axis = indices.length;\r\n    }\r\n    let offset = 0;\r\n    for (let i = 0; i < axis; ++i) {\r\n
   offset += strides[i] * indices[i];\r\n    }\r\n    return offset;\r\n  }\r\n\r\n  static offsetToIndices(offset: number,
strides: readonly number[]): readonly number[] {\r\n    const rank = strides.length;\r\n    if (rank === 0) {\r\n
return [];\r\n    } else if (rank === 1) {\r\n      return [offset * strides[0]];\r\n    }\r\n    const indices: number[] = new
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Array(strides.length);\r\n for (let i = 0; i < indices.length - 1; ++i) {\r\n indices[i] = Math.floor(offset / strides[i]);\r\n offset -= indices[i] * strides[i];\r\n }\r\n indices[indices.length - 1] = offset;\r\n return indices;\r\n }\r\n\r\n /**\r\n * normailze axis of range [-r, r) into [0, r).\r\n */\r\n static normalizeAxis(axis: number, tensorRank: number): number {\r\n if (axis < -tensorRank && axis >= tensorRank) {\r\n throw new Error('unsupported axis for this operation.');\r\n }\r\n return axis < 0 ? axis + tensorRank : axis;\r\n }\r\n\r\n static normalizeAxes(axes: readonly number[], tensorRank: number): number[] {\r\n return axes.map(x => this.normalizeAxis(x, tensorRank));\r\n }\r\n\r\n // Increment an index into a tensor (in lexicographic\r\n // ordering), wrapping around the specified upper_bound.\r\n /**\r\n * Increment an index into a tensor (in lexicographic ordering), wrapping around the specified upper_bound.\r\n * @param index Given index to increment (Will be mutated)\r\n * @param dims The dimensions of the tensor for which the given index corresponds to\r\n * @param axisToIncrementOn The 1-indexed axis to increment on. If undefined, axisToIncrementOn == rank\r\n */\r\n static incrementIndex(index: number[], dims: readonly number[], axisToIncrementOn?: number) {\r\n if (dims.length === 0 || index.length === 0) {\r\n throw new Error('Index incrementing unsupported for scalar Tensor');\r\n }\r\n if (axisToIncrementOn === undefined) {\r\n axisToIncrementOn = dims.length;\r\n } else {\r\n if (axisToIncrementOn <= 0 || axisToIncrementOn > dims.length) {\r\n throw new Error('Incorrect axis to increment on');\r\n }\r\n }\r\n\r\n for (let k = axisToIncrementOn - 1; k >= 0; --k) {\r\n index[k]++;\r\n if (index[k] < dims[k]) {\r\n break;\r\n }\r\n index[k] = 0;\r\n }\r\n }\r\n\r\n /**\r\n * Produces a new dimensions array based on the values in the 'originalDimensions' and 'shape' array\r\n * Used in Reshape\r\n * @param originalDims Original Shape array\r\n * @param shapeHints array containing values to compute the new dimensions\r\n * For example:\r\n * originalDims = [2,2] and shapeHints = [0,-1] will return [2,2]\r\n * originalDims = [2,2] and shapeHints = [4] will return [4]\r\n * originalDims = [2,2] and shapeHints = [5] will throw an exception\r\n * https://github.com/onnx/onnx/blob/master/docs/Operators.md#Reshape\r\n */\r\n\r\n static calculateReshapedDims(originalDims: readonly number[], shapeHints: ArrayLike<number>): number[] {\r\n // reshape to a Scalar Tensor\r\n if (shapeHints.length === 0) {\r\n if (originalDims.length === 0 || ShapeUtil.size(originalDims) === 1) {\r\n return [];\r\n } else {\r\n throw new Error('cannot reshape to a scalar Tensor');\r\n }\r\n }\r\n\r\n const nDims = shapeHints.length;\r\n const reshapedDims = new Array<number>(nDims);\r\n let unknownDimension = -1;\r\n let newTensorSize = 1;\r\n for (let i = 0; i < nDims; i++) {\r\n if (shapeHints[i] < -1) {\r\n throw new Error('a dimension in shape hints cannot be less than -1');\r\n }\r\n if (shapeHints[i] === -1) {\r\n if (unknownDimension !== -1) {\r\n throw new Error('at most one dimension in shape hints can be -1');\r\n }\r\n unknownDimension = i;\r\n } else {\r\n if (shapeHints[i] === 0) {\r\n if (i >= originalDims.length) {\r\n throw new Error('the dimension with value zero exceeds the dimension size of the input tensor');\r\n }\r\n reshapedDims[i] = originalDims[i];\r\n } else {\r\n reshapedDims[i] = shapeHints[i];\r\n }\r\n newTensorSize *= reshapedDims[i];\r\n }\r\n }\r\n\r\n const oldTensorSize = ShapeUtil.size(originalDims);\r\n if (unknownDimension !== -1) {\r\n if (oldTensorSize % newTensorSize !== 0) {\r\n throw new Error(`the input tensor cannot be reshaped to the requested shape. Input shape: [${\r\n originalDims}] Output shape: [${shapeHints}]`);\r\n }\r\n reshapedDims[unknownDimension] = oldTensorSize / newTensorSize;\r\n }\r\n // validate sizes from originalDims and reshapedDims match\r\n else {\r\n if (newTensorSize !== oldTensorSize) {\r\n throw new Error('reshapedDims and originalDims don\\'t have matching sizes');\r\n }\r\n }\r\n return reshapedDims;\r\n }\r\n\r\n /**\r\n * Sorts a given array based on the indices in the Perm array\r\n * Used in Transpose\r\n * @param a Array to be sorted such as dims or strides\r\n * @param perm Perm given; if null a will be reversed\r\n */\r\n static sortBasedOnPerm(a: readonly number[], perm?: readonly number[]): readonly number[] {\r\n if (perm) {\r\n return perm.map((v) => a[v]);\r\n } else {\r\n return a.slice().reverse();\r\n }\r\n }\r\n\r\n /**\r\n * Pads a given shape according to the padding values\r\n * @param dims shape of the Tensor to be padded\r\n * @param pad pad values\r\n */\r\n static padShape(dims: readonly number[], pad: readonly number[]): readonly number[] {\r\n const rank = dims.length;\r\n return dims.map((v, i) => v + pad[i] + pad[i + rank]);\r\n }\r\n\r\n /**\r\n * Determines if the two shapes are identical\r\n

* @param shape1\r\n   * @param shape2\r\n   */\r\n static areEqual(shape1: readonly number[], shape2: readonly number[]): boolean {\r\n   if (shape1.length !== shape2.length) {\r\n   return false;\r\n   }\r\n   return shape1.every((v, i) => v === shape2[i]);\r\n }\r\n\r\n /**\r\n   * Validates if the given `dims` or `shape` is valid in ONNX.js context and returns data size\r\n   * @param dims - input `dims` that needs to be checked\r\n   */\r\n static validateDimsAndCalcSize(dims: readonly number[]): number {\r\n   if (dims.length > 6) {\r\n   throw new TypeError('Only rank 0 to 6 is supported for tensor shape.');\r\n   }\r\n   let size = 1;\r\n   for (const n of dims) {\r\n   if (!Number.isInteger(n)) {\r\n   throw new TypeError(`Invalid shape: ${n} is not an integer`);\r\n   }\r\n   if (n < 0 || n > 2147483647) {\r\n   throw new TypeError(`Invalid shape: length ${n} is not allowed`);\r\n   }\r\n   size *= n;\r\n   }\r\n   return size;\r\n }\r\n\r\n /**\r\n   * Determines the shape of output tensor y = flatten(x, axis)\r\n   * @param dims - shape of input tensor\r\n   * @param axis - flatten axis, in the range [-r, r]\r\n   */\r\n static flattenShape(dims: readonly number[], axis: number): readonly number[] {\r\n   if (axis < 0) {\r\n   axis += dims.length;\r\n   }\r\n   const total = dims.reduce((x, y) => x * y, 1);\r\n   const right = dims.slice(axis).reduce((x, y) => x * y, 1);\r\n   const outputDims = [total / right, right];\r\n\r\n   return outputDims;\r\n }\r\n\r\n /**\r\n   * Determines the shape of output tensor y = squeeze(x, axes)\r\n   * @param dims - shape of input tensor\r\n   * @param axes - squeeze axes\r\n   */\r\n static squeezeShape(dims: readonly number[], axes: readonly number[]): readonly number[] {\r\n   const outputDims = new Array<number>();\r\n\r\n   // sanity check\r\n   axes = ShapeUtil.normalizeAxes(axes, dims.length);\r\n\r\n   for (let i = 0; i < dims.length; i++) {\r\n   const inSqueezeList = axes.indexOf(i) >= 0;\r\n   if (inSqueezeList && dims[i] !== 1) {\r\n   throw new Error('squeeze an axis of size different than 1');\r\n   }\r\n\r\n   if ((axes.length === 0 && dims[i] > 1) || (axes.length > 0 && !inSqueezeList)) {\r\n   outputDims.push(dims[i]);\r\n   }\r\n   }\r\n\r\n   return outputDims;\r\n }\r\n\r\n /**\r\n   * Determines the shape of output tensor y = unsqueeze(x, axes)\r\n   * @param dims - shape of input tensor\r\n   * @param axes - unsqueeze axes\r\n   */\r\n static unsqueezeShape(dims: readonly number[], axes: readonly number[]): readonly number[] {\r\n   const outputDims = new Array<number>(dims.length + axes.length);\r\n\r\n   // initialize the array elements to 0\r\n   outputDims.fill(0);\r\n\r\n   // set all axes indices to 1 in outputDims and check for duplicates\r\n   for (let i = 0; i < axes.length; i++) {\r\n   const axis = ShapeUtil.normalizeAxis(axes[i], dims.length);\r\n   if (axis >= outputDims.length) {\r\n   throw new Error('\\'axes\\' has an out of range axis');\r\n   }\r\n   if (outputDims[axis] !== 0) {\r\n   throw new Error('\\'axes\\' has a duplicate axis');\r\n   }\r\n\r\n   outputDims[axis] = 1;\r\n   }\r\n\r\n   // fill in the zero entries of outputDims with the input tensor's shape\r\n   let inputDimsIterator = 0;\r\n   for (let i = 0; i < outputDims.length; i++) {\r\n   if (outputDims[i] === 0) {\r\n   outputDims[i] = dims[inputDimsIterator++];\r\n   }\r\n   }\r\n\r\n   // sanity check assertion. 'inputDimsIterator'\r\n   // should be equal to the length of 'dims'\r\n   if (inputDimsIterator !== dims.length) {\r\n   throw new Error('the unsqueezed dimension could not be established');\r\n   }\r\n\r\n   return outputDims;\r\n }\r\n}\r\n\r\n// bunch of helper methods that do a variety of math operations\r\nexport class MathUtil {\r\n // y = (x*x) + y\r\n static sqr(\r\n   target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number, sourceIndex: number,\r\n   blockSize: number) {\r\n   if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n   throw new Error('sourceIndex out of bounds');\r\n   }\r\n   if (targetIndex < 0 || targetIndex >= target.length) {\r\n   throw new Error('targetIndex out of bounds');\r\n   }\r\n   if (sourceIndex + blockSize > source.length) {\r\n   throw new Error('source indices to be copied are outside bounds');\r\n   }\r\n   if (targetIndex + blockSize > target.length) {\r\n   throw new Error('target array is too small to hold result');\r\n   }\r\n\r\n   for (let offset = 0; offset < blockSize; offset++) {\r\n   target[targetIndex + offset] += Math.pow(source[sourceIndex + offset], 2);\r\n   }\r\n }\r\n\r\n // y = ax + y\r\n static axpy(\r\n   target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number, sourceIndex: number,\r\n   blockSize: number, alpha: number) {\r\n   if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n   throw new Error('sourceIndex out of bounds');\r\n   }\r\n   if (targetIndex < 0 || targetIndex >= target.length) {\r\n   throw new Error('targetIndex out of bounds');\r\n   }\r\n   if (sourceIndex + blockSize > source.length) {\r\n   throw new Error('source indices to be copied are outside bounds');\r\n   }\r\n   if (targetIndex + blockSize > target.length) {\r\n   throw new Error('target array is too small to hold result');\r\n   }\r\n\r\n   for (let offset = 0;

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offset < blockSize; offset++) {\r\n      target[targetIndex + offset] += (alpha * source[sourceIndex + offset]);\r\n
}\r\n  }\r\n\r\n  // y = pow(x, b)\r\n  static powx(\r\n      target: number[]|Tensor.NumberType, source:
number[]|Tensor.NumberType, targetIndex: number, sourceIndex: number,\r\n      blockSize: number, b: number)
{\r\n    if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n      throw new Error('sourceIndex out of
bounds');\r\n    }\r\n    if (targetIndex < 0 || targetIndex >= target.length) {\r\n      throw new Error('targetIndex out of
bounds');\r\n    }\r\n    if (sourceIndex + blockSize > source.length) {\r\n      throw new Error('source indices to be
copied are outside bounds');\r\n    }\r\n    if (targetIndex + blockSize > target.length) {\r\n      throw new Error('target
array is too small to hold result');\r\n    }\r\n\r\n    for (let offset = 0; offset < blockSize; offset++) {\r\n
target[targetIndex + offset] = Math.pow(source[sourceIndex + offset], b);\r\n    }\r\n  }\r\n\r\n  // y = x * y\r\n  static
mul(\r\n      target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number,
sourceIndex: number,\r\n      blockSize: number) {\r\n    if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n
throw new Error('sourceIndex out of bounds');\r\n    }\r\n    if (targetIndex < 0 || targetIndex >= target.length) {\r\n
throw new Error('targetIndex out of bounds');\r\n    }\r\n    if (sourceIndex + blockSize > source.length) {\r\n
throw new Error('source indices to be copied are outside bounds');\r\n    }\r\n    if (targetIndex + blockSize >
target.length) {\r\n      throw new Error('target array is too small to hold result');\r\n    }\r\n\r\n    for (let offset = 0;
offset < blockSize; offset++) {\r\n      target[targetIndex + offset] = (source[sourceIndex + offset] *
target[targetIndex + offset]);\r\n    }\r\n  }\r\n}\r\n\r\nexport class SplitUtil {\r\n  /**\r\n   * Calculates new Shapes
from existing one and the splits given along the axis provides\r\n   * @param dims Shape of the Tensor to be splitted
into two or more Shapes\r\n   * @param axis The dimension along which the Tensor will be split\r\n   * @param
splits Offsets for the start of each split\r\n   */\r\n  static splitShape(dims: readonly number[], axis: number, split:
number[], numOutputs?: number):\r\n      [number[][], number[]] {\r\n    if (split.length === 0) {\r\n      if
(!numOutputs) {\r\n        throw new Error('need to know number of outputs when the \\'split\\' attribute is not
specified');\r\n      }\r\n      SplitUtil.determineSplit(dims[axis], numOutputs, split);\r\n    }\r\n\r\n    const shapes:
number[][] = [];\r\n    const offsets = [0];\r\n    for (let i = 0; i < split.length; ++i) {\r\n      if (i !== 0) {\r\n
offsets.push(offsets[i - 1] + split[i - 1]);\r\n      }\r\n      const shape = dims.slice();\r\n      shape[axis] = split[i];\r\n
shapes.push(shape);\r\n    }\r\n    return [shapes, offsets];\r\n  }\r\n\r\n  static
determineSplit(numElementsAlongAxis: number, numOutputs: number, split: number[]) {\r\n    // If 'split' is not
specified by the user, we need to partition the number of elements equally among the outputs\r\n    if
(numElementsAlongAxis % numOutputs !== 0) {\r\n      throw new Error('cannot split tensor to equal sized
parts');\r\n    }\r\n    for (let i = 0; i < numOutputs; ++i) {\r\n      split.push(numElementsAlongAxis /
numOutputs);\r\n    }\r\n  }\r\n}\r\n\r\nexport class ReduceUtil {\r\n  /**\r\n   * Perform reduce operations on the
specific operator\r\n   * @param a Input tensor data\r\n   * @param axes The dimensions along which the Tensor
will be reduced\r\n   * @param keepdims If set to true, the axes which are reduced are left in the\r\n   *    result as
dimensions with size one.\r\n   * @param op1 The operation to be performed on each element in the tensor\r\n   *
@param op2 The operation to be performed between elements in the tensor\r\n   */\r\n  static calcReduce(\r\n      a:
Tensor, axes: number[], keepdims: boolean, op1: (b: number) => number,\r\n      op2: (a: number, b: number) =>
number): Tensor {\r\n    const dims = a.dims.slice(0);\r\n    // if axes is not set, perform reduce on all axes\r\n    if
(axes.length === 0) {\r\n      dims.forEach((d, ind) => axes.push(ind));\r\n    }\r\n    // get a temporary broadcastable
output shape\r\n    const outputDims = ReduceUtil.calcReduceShape(dims, axes, true);\r\n\r\n    // loop through the
output and calculate result one by one\r\n    const size = ShapeUtil.size(outputDims);\r\n    const y = new
Tensor(outputDims, a.type);\r\n    const strides = ShapeUtil.computeStrides(outputDims);\r\n    const inputStrides =
ShapeUtil.computeStrides(dims);\r\n    const indicesY = new Array(dims.length);\r\n    for (let i = 0; i < size; i++)
{\r\n      const indices = ShapeUtil.offsetToIndices(i, strides);\r\n      // map index\r\n
BroadcastUtil.fillIndex(indices, dims, indicesY);\r\n      y.set(\r\n          indices,\r\n
ReduceUtil.calcReduceByAxis(\r\n              a.numberData, axes, dims, 0, ShapeUtil.indicesToOffset(indicesY,
inputStrides), op1, op2));\r\n    }\r\n\r\n    if (keepdims) {\r\n      return y;\r\n    } else {\r\n      // keepdims == 0,
calculate the expected shape\r\n      return new Tensor(\r\n          ReduceUtil.calcReduceShape(dims, axes,
keepdims), y.type, undefined, undefined, y.data, y.dataId);\r\n    }\r\n  }\r\n\r\n  /**\r\n   * Perform reduce operations
```

on the specific operator on specific axes\r\n * @param a Input tensor data\r\n * @param axes The dimensions along which the Tensor will be reduced\r\n * @param dims The input dimension.\r\n * @param curAxisInd Index in axes specifying the current dimension along\r\n * which the tensor will be reduced\r\n * @param pos The current index of element to perform operation\r\n * @param op1 The operation to be performed on each element in the tensor\r\n * @param op2 The operation to be performed between elements in the tensor\r\n */\r\n static calcReduceByAxis(\r\n input: Tensor.NumberType, axes: number[], dims: number[], curAxisInd: number, pos: number,\r\n op1: (b: number) => number, op2: (a: number, b: number) => number): number {\r\n let res = 0;\r\n if (curAxisInd >= axes.length) {\r\n return op1(input[pos]);\r\n }\r\n const axis = axes[curAxisInd];\r\n const step = axis >= dims.length ? 1 : ShapeUtil.size(dims.slice(axis + 1));\r\n for (let i = 0; i < dims[axis]; i++) {\r\n res = i === 0 ? ReduceUtil.calcReduceByAxis(input, axes, dims, curAxisInd + 1, pos, op1, op2) :\r\n op2(res, ReduceUtil.calcReduceByAxis(input, axes, dims, curAxisInd + 1, pos, op1, op2));\r\n pos += step;\r\n }\r\n return res;\r\n }\r\n\r\n /**\r\n * Calculate the expected shape of a reduce operation\r\n * @param dims The input tensor dimension\r\n * @param axes The dimensions along which the Tensor will be reduced\r\n * @param keepdims If set to true, the axes which are reduced are left in the\r\n * result as dimensions with size one.\r\n */\r\n static calcReduceShape(dims: readonly number[], axes: readonly number[], keepDims: boolean): number[] {\r\n const outputDims = dims.slice();\r\n for (let i = 0; i < axes.length; i++) {\r\n if (keepDims) {\r\n outputDims[axes[i]] = 1;\r\n } else {\r\n outputDims[axes[i]] = 0;\r\n }\r\n }\r\n return outputDims.filter(dim => dim !== 0);\r\n }\r\n}\r\n\r\nexport class PoolConvUtil {\r\n /**\r\n * Adjust the kernel, strides, pads to correct rank. Set to default value if not present\r\n * @param isGlobalOperator If true, perform global pooling.\r\n * @param inputDims The input tensor dimension.\r\n * @param kernelShape The size of the kernel along each axis.\r\n * @param strides Stride along each axis.\r\n * @param pads Padding for the beginning and ending along each axis.\r\n */\r\n static adjustPoolAttributes(\r\n isGlobalOperator: boolean, inputDims: readonly number[], kernelShape: number[], strides: number[],\r\n pads: number[]) {\r\n if (!isGlobalOperator && kernelShape.length !== inputDims.length - 2) {\r\n throw new Error('length of specified kernel shapes should be 2 less than length of input dimensions');\r\n }\r\n\r\n if (isGlobalOperator) {\r\n // adjust kernel shape to cover the input dims\r\n for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n if (dim >= kernelShape.length) {\r\n kernelShape.push(inputDims[dim + 2]);\r\n } else {\r\n kernelShape[dim] = inputDims[dim + 2];\r\n }\r\n }\r\n }\r\n\r\n // adjust strides length to match kernel shape length\r\n for (let dim = 0; dim < kernelShape.length; dim++) {\r\n if (dim < strides.length) {\r\n if (strides[dim] < 0) {\r\n throw new Error('strides should be greater than or equal to 1');\r\n }\r\n } else {\r\n strides.push(1);\r\n }\r\n }\r\n\r\n // adjust pads length to match 2 * kernel shape length\r\n for (let dim = 0; dim < kernelShape.length * 2; dim++) {\r\n if (dim < pads.length) {\r\n if (pads[dim] < 0) {\r\n throw new Error('pad should be greater than or equal to 1');\r\n }\r\n } else {\r\n pads.push(0);\r\n }\r\n }\r\n\r\n // sanity checks for values in kernel shapes and pads\r\n for (let dim = 0; dim < kernelShape.length; dim++) {\r\n if (kernelShape[dim] <= 0) {\r\n throw new Error('kernel shapes need to be greater than 0');\r\n }\r\n\r\n if (pads[dim] >= kernelShape[dim] || pads[dim + kernelShape.length] >= kernelShape[dim]) {\r\n throw new Error('pads should be smaller than kernel');\r\n }\r\n }\r\n }\r\n\r\n // adjust pad values based on 'autoPad' attribute\r\n static adjustPadsBasedOnAutoPad(\r\n inputDims: readonly number[], strides: readonly number[], dilations: readonly number[],\r\n kernelShape: readonly number[], pads: number[], autoPad?: string) {\r\n if (!autoPad) {\r\n return;\r\n }\r\n\r\n if (pads.length !== 2 * (inputDims.length - 2)) {\r\n throw new Error('length of pads should be twice the length of data dimensions');\r\n }\r\n\r\n if (strides.length !== (inputDims.length - 2)) {\r\n throw new Error('length of strides should be the length of data dimensions');\r\n }\r\n\r\n if (kernelShape.length !== (inputDims.length - 2)) {\r\n throw new Error('length of kernel shapes should be the length of data dimensions');\r\n }\r\n\r\n for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n PoolConvUtil.adjustPadAndReturnShape(\r\n inputDims[dim + 2], strides[dim], dilations[dim], kernelShape[dim], pads, dim, dim + inputDims.length - 2,\r\n autoPad);\r\n }\r\n }\r\n\r\n /**\r\n * Calculate the output shape for Pool ops based on input attributes. (Should be used only for Pool ops)\r\n * @param isGlobalOperator If true, perform global pooling.\r\n * @param inputDims The input tensor dimension. (inputs[0].dims)\r\n * @param strides Stride along each axis.\r\n * @param kernelShape The size of the kernel along each axis.\r\n * @param pads Padding for the beginning and ending along each axis.\r\n * @param autoPad DEPRECATED attribute supported for legacy models. Specifies how to implicitly calculate pads in each\r\n * dimension. Can take values NOTSET, SAME_UPPER, SAME_LOWER, or VALID.\r\n */\r\n static computePoolOutputShape(\r\n isGlobalOperator: boolean, inputDims: readonly number[], strides: number[], kernelShape: number[], pads: number[],\r\n autoPad?: string): number[] {\r\n if (inputDims.length <= 0) {\r\n throw new Error('input shape must be of size greater than 0');\r\n }\r\n\r\n // Add batch size and number of channels of output\r\n const outputDims = [inputDims[0], inputDims[1]];\r\n\r\n // TODO: support dilations for pool operators\r\n const dilations = new Array<number>(kernelShape.length).fill(1);\r\n\r\n PoolConvUtil.computeShapeHelper(\r\n isGlobalOperator, inputDims, outputDims, strides, dilations, kernelShape, pads, autoPad);\r\n return outputDims;\r\n }\r\n\r\n /**\r\n * Calculate the output shape for Conv op based on input attributes. (Should be used only for Conv op)\r\n * @param inputDims The input tensor dimension. (inputs[0].dims)\r\n * @param filterDims The filter tensor dimension. (inputs[1].dims)\r\n * @param strides Stride along each axis.\r\n * @param kernelShape The size of the kernel along each axis.\r\n * @param pads Padding for the beginning and ending along each axis.\r\n * @param autoPad DEPRECATED attribute supported for legacy models. Specifies how to implicitly calculate pads in each\r\n * dimension. Can take values NOTSET, SAME_UPPER, SAME_LOWER, or VALID.\r\n */\r\n static computeConvOutputShape(\r\n inputDims: readonly number[], filterDims: readonly number[], strides: number[], dilations: number[],\r\n kernelShape: number[], pads: number[], autoPad?: string): number[] {\r\n if (inputDims.length <= 0 || filterDims.length <= 0) {\r\n throw new Error('invalid input tensor dims or invalid filter tensor dims');\r\n }\r\n\r\n // Add batch size and number of channels of output\r\n const outputDims = [inputDims[0], filterDims[0]];\r\n\r\n PoolConvUtil.computeShapeHelper(false, inputDims, outputDims, strides, dilations, kernelShape, pads, autoPad);\r\n return outputDims;\r\n }\r\n\r\n // will compute output shapes for data dimensions ONLY (i.e.) no batch size and channels\r\n // called by computePoolOutputShape() and computeConvOutputShape()\r\n // adjust pads based on 'autoPad' attribute prior to shape computation\r\n private static computeShapeHelper(\r\n isGlobalOperator: boolean, inputDims: readonly number[], outputDims: number[], strides: readonly number[],\r\n dilations: readonly number[], kernelShape: readonly number[], pads: number[], autoPad?: string) {\r\n if (isGlobalOperator) {\r\n for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n outputDims.push(1);\r\n }\r\n } else {\r\n for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n outputDims.push(PoolConvUtil.adjustPadAndReturnShape(\r\n inputDims[dim + 2], strides[dim], dilations[dim], kernelShape[dim], pads, dim, dim + inputDims.length - 2,\r\n autoPad));\r\n }\r\n }\r\n }\r\n\r\n // helper for computeShapeHelper() and adjustPadsBasedOnAutoPad()\r\n // adjusts pad value for given 'autoPad' string and computes output shape along a particular dimension\r\n private static adjustPadAndReturnShape(\r\n inSize: number, stride: number, dilation: number, kernel: number, pads: number[], padHeadIndex: number,\r\n padTailIndex: number, autoPad?: string): number {\r\n const dkernel = dilation * (kernel - 1) + 1;\r\n if (autoPad && autoPad !== 'NOTSET') {\r\n switch (autoPad) {\r\n case 'VALID':\r\n pads[padHeadIndex] = 0;\r\n pads[padTailIndex] = 0;\r\n return Math.floor(((inSize - dkernel) / stride) + 1);\r\n case 'SAME_LOWER':\r\n case 'SAME_UPPER':\r\n if (dilation !== 1) {\r\n throw new Error('Dilation not supported for SAME_UPPER or SAME_LOWER');\r\n } else {\r\n const legacyTargetSize = (inSize + stride - 1) / stride;\r\n const padNeeded = (legacyTargetSize - 1) * stride + kernel - inSize;\r\n pads[padHeadIndex] =\r\n (autoPad === 'SAME_LOWER') ? Math.floor((padNeeded + 1) / 2) : Math.floor(padNeeded / 2);\r\n pads[padTailIndex] = padNeeded - pads[padHeadIndex];\r\n return Math.floor(((inSize + padNeeded - kernel) / stride) + 1);\r\n }\r\n default:\r\n throw new Error('Unsupported AutoPad type');\r\n }\r\n } else {\r\n return Math.floor(((inSize + pads[padHeadIndex] + pads[padTailIndex] - dkernel) / stride) + 1);\r\n }\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\ninterface ExtraOptionsHandler {\r\n (name: string, value: string): void;\r\n}\r\n\r\nexport const iterateExtraOptions =\r\n (options: Record<string, unknown>, prefix: string, seen: WeakSet<Record<string, unknown>>,\r\n handler:

```
ExtraOptionsHandler): void => {\r\n      if (typeof options == 'object' && options !== null) {\r\n        if
(seen.has(options)) {\r\n          throw new Error('Circular reference in options');\r\n        } else {\r\n
seen.add(options);\r\n        }\r\n      }\r\n\r\n      Object.entries(options).forEach(([key, value]) => {\r\n        const
name = (prefix) ? prefix + key : key;\r\n        if (typeof value === 'object') {\r\n          iterateExtraOptions(value as
Record<string, unknown>, name + '.', seen, handler);\r\n        } else if (typeof value === 'string' || typeof value ===
'number') {\r\n          handler(name, value.toString());\r\n        } else if (typeof value === 'boolean') {\r\n
handler(name, (value) ? '1' : '0');\r\n        } else {\r\n          throw new Error(`Can't handle extra config type: ${typeof
value}`);\r\n        }\r\n      });\r\n    };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed
under the MIT License.\r\n\r\nimport {env, InferenceSession} from 'onnxruntime-common';\r\nimport
{OrtWasmMessage, SerializableSessionMetadata, SerializableTensor} from './proxy-messages';\r\nimport * as core
from './wasm-core-impl';\r\nimport {initializeWebAssembly} from './wasm-factory';\r\n\r\nconst isProxy = ():
boolean => !!env.wasm.proxy && typeof document !== 'undefined';\r\nlet proxyWorker: Worker|undefined;\r\nlet
initializing = false;\r\nlet initialized = false;\r\nlet aborted = false;\r\n\r\n// resolve; reject\r\ntype
PromiseCallbacks<T = void> = [(result: T) => void, (reason: unknown) => void];\r\n\r\nlet initWasmCallbacks:
PromiseCallbacks;\r\nlet initOrtCallbacks: PromiseCallbacks;\r\nconst createSessionCallbacks:
Array<PromiseCallbacks<SerializableSessionMetadata>> = [];\r\nconst releaseSessionCallbacks:
Array<PromiseCallbacks<void>> = [];\r\nconst runCallbacks: Array<PromiseCallbacks<SerializableTensor[]>> =
[];\r\nconst endProfilingCallbacks: Array<PromiseCallbacks<void>> = [];\r\n\r\nconst ensureWorker = (): void =>
{\r\n  if (initializing || !initialized || aborted || !proxyWorker) {\r\n    throw new Error('worker not ready');\r\n
}\r\n};\r\n\r\nconst onProxyWorkerMessage = (ev: MessageEvent<OrtWasmMessage>): void => {\r\n  switch
(ev.data.type) {\r\n    case 'init-wasm':\r\n      initializing = false;\r\n      if (ev.data.err) {\r\n        aborted = true;\r\n
  initWasmCallbacks[1](ev.data.err);\r\n      } else {\r\n        initialized = true;\r\n        initWasmCallbacks[0]();\r\n
}\r\n      break;\r\n    case 'init-ort':\r\n      if (ev.data.err) {\r\n        initOrtCallbacks[1](ev.data.err);\r\n      } else {\r\n
      initOrtCallbacks[0]();\r\n      }\r\n      break;\r\n    case 'create':\r\n      if (ev.data.err) {\r\n
createSessionCallbacks.shift()![1](ev.data.err);\r\n      } else {\r\n
createSessionCallbacks.shift()![0](ev.data.out!);\r\n      }\r\n      break;\r\n    case 'release':\r\n      if (ev.data.err) {\r\n
     releaseSessionCallbacks.shift()![1](ev.data.err);\r\n      } else {\r\n        releaseSessionCallbacks.shift()![0]();\r\n
 }\r\n      break;\r\n    case 'run':\r\n      if (ev.data.err) {\r\n        runCallbacks.shift()![1](ev.data.err);\r\n      } else
{\r\n        runCallbacks.shift()![0](ev.data.out!);\r\n      }\r\n      break;\r\n    case 'end-profiling':\r\n      if (ev.data.err)
{\r\n        endProfilingCallbacks.shift()![1](ev.data.err);\r\n      } else {\r\n
endProfilingCallbacks.shift()![0]();\r\n      }\r\n      break;\r\n    default:\r\n  }\r\n};\r\n\r\nconst scriptSrc = typeof
document !== 'undefined' ? (document?.currentScript as HTMLScriptElement)?.src : undefined;\r\n\r\nexport const
initWasm = async(): Promise<void> => {\r\n  if (isProxy()) {\r\n    if (initialized) {\r\n      return;\r\n    }\r\n    if
(initializing) {\r\n      throw new Error('multiple calls to \\'initWasm()\\' detected.');\r\n    }\r\n    if (aborted) {\r\n
throw new Error('previous call to \\'initWasm()\\' failed.');\r\n    }\r\n\r\n    initializing = true;\r\n\r\n    // overwrite
wasm filepaths\r\n    if (env.wasm.wasmPaths === undefined) {\r\n      if (scriptSrc && scriptSrc.indexOf('blob:')
!== 0) {\r\n        env.wasm.wasmPaths = scriptSrc.substr(0, (scriptSrc as string).lastIndexOf('/') + 1);\r\n      }\r\n
}\r\n\r\n    return new Promise<void>((resolve, reject) => {\r\n      proxyWorker?.terminate();\r\n      // eslint-disable-
next-line @typescript-eslint/no-var-requires, @typescript-eslint/no-require-imports\r\n      proxyWorker =
require('worker-loader?inline=no-fallback!./proxy-worker/main').default() as Worker;\r\n
proxyWorker.onmessage = onProxyWorkerMessage;\r\n      initWasmCallbacks = [resolve, reject];\r\n      const
message: OrtWasmMessage = {type: 'init-wasm', in : env.wasm};\r\n      proxyWorker.postMessage(message);\r\n
});\r\n\r\n  } else {\r\n    return initializeWebAssembly(env.wasm);\r\n  }\r\n};\r\n\r\nexport const initOrt =
async(numThreads: number, loggingLevel: number): Promise<void> => {\r\n  if (isProxy()) {\r\n
ensureWorker();\r\n    return new Promise<void>((resolve, reject) => {\r\n      initOrtCallbacks = [resolve,
reject];\r\n      const message: OrtWasmMessage = {type: 'init-ort', in : {numThreads, loggingLevel}};\r\n
proxyWorker!.postMessage(message);\r\n    });\r\n  } else {\r\n    core.initOrt(numThreads, loggingLevel);\r\n
}\r\n};\r\n\r\nexport const createSession =\r\n    async(model: Uint8Array, options?:
```

InferenceSession.SessionOptions): Promise<SerializableSessionMetadata> => {\r\n if (isProxy()) {\r\n   ensureWorker();\r\n   return new Promise<SerializableSessionMetadata>((resolve, reject) => {\r\n   createSessionCallbacks.push([resolve, reject]);\r\n   const message: OrtWasmMessage = {type: 'create', in : {model, options}};\r\n   proxyWorker!.postMessage(message, [model.buffer]);\r\n   });\r\n } else {\r\n   return core.createSession(model, options);\r\n }\r\n};\r\n\r\nexport const releaseSession = async(sessionId: number): Promise<void> => {\r\n if (isProxy()) {\r\n   ensureWorker();\r\n   return new Promise<void>((resolve, reject) => {\r\n   releaseSessionCallbacks.push([resolve, reject]);\r\n   const message: OrtWasmMessage = {type: 'release', in : sessionId};\r\n   proxyWorker!.postMessage(message);\r\n   });\r\n } else {\r\n   core.releaseSession(sessionId);\r\n }\r\n};\r\n\r\nexport const run = async(\r\n   sessionId: number, inputIndices: number[], inputs: SerializableTensor[], outputIndices: number[],\r\n   options: InferenceSession.RunOptions): Promise<SerializableTensor[]> => {\r\n if (isProxy()) {\r\n   ensureWorker();\r\n   return new Promise<SerializableTensor[]>((resolve, reject) => {\r\n   runCallbacks.push([resolve, reject]);\r\n   const message: OrtWasmMessage = {type: 'run', in : {sessionId, inputIndices, inputs, outputIndices, options}};\r\n   proxyWorker!.postMessage(message, core.extractTransferableBuffers(inputs));\r\n   });\r\n } else {\r\n   return core.run(sessionId, inputIndices, inputs, outputIndices, options);\r\n }\r\n};\r\n\r\nexport const endProfiling = async(sessionId: number): Promise<void> => {\r\n if (isProxy()) {\r\n   ensureWorker();\r\n   return new Promise<void>((resolve, reject) => {\r\n   endProfilingCallbacks.push([resolve, reject]);\r\n   const message: OrtWasmMessage = {type: 'end-profiling', in : sessionId};\r\n   proxyWorker!.postMessage(message);\r\n   });\r\n } else {\r\n   core.endProfiling(sessionId);\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceSession} from 'onnxruntime-common';\r\n\r\nimport {iterateExtraOptions} from './options-utils';\r\nimport {allocWasmString} from './string-utils';\r\nimport {getInstance} from './wasm-factory';\r\n\r\nexport const setRunOptions = (options: InferenceSession.RunOptions): [number, number[]] => {\r\n const wasm = getInstance();\r\n let runOptionsHandle = 0;\r\n const allocs: number[] = [];\r\n\r\n const runOptions: InferenceSession.RunOptions = options || {};\r\n\r\n try {\r\n   if (options?.logSeverityLevel === undefined) {\r\n   runOptions.logSeverityLevel = 2; // Default to warning\r\n   } else if (\r\n   typeof options.logSeverityLevel !== 'number' || !Number.isInteger(options.logSeverityLevel) ||\r\n   options.logSeverityLevel < 0 || options.logSeverityLevel > 4) {\r\n   throw new Error(`log serverity level is not valid: ${options.logSeverityLevel}`);\r\n   }\r\n\r\n   if (options?.logVerbosityLevel === undefined) {\r\n   runOptions.logVerbosityLevel = 0; // Default to 0\r\n   } else if (typeof options.logVerbosityLevel !== 'number' || !Number.isInteger(options.logVerbosityLevel)) {\r\n   throw new Error(`log verbosity level is not valid: ${options.logVerbosityLevel}`);\r\n   }\r\n\r\n   if (options?.terminate === undefined) {\r\n   runOptions.terminate = false;\r\n   }\r\n\r\n   let tagDataOffset = 0;\r\n   if (options?.tag !== undefined) {\r\n   tagDataOffset = allocWasmString(options.tag, allocs);\r\n   }\r\n\r\n   runOptionsHandle = wasm._OrtCreateRunOptions(\r\n   runOptions.logSeverityLevel!, runOptions.logVerbosityLevel!, !!runOptions.terminate!, tagDataOffset);\r\n   if (runOptionsHandle === 0) {\r\n   throw new Error('Can\\'t create run options');\r\n   }\r\n\r\n   if (options?.extra !== undefined) {\r\n   iterateExtraOptions(options.extra, '', new WeakSet<Record<string, unknown>>(), (key, value) => {\r\n   const keyDataOffset = allocWasmString(key, allocs);\r\n   const valueDataOffset = allocWasmString(value, allocs);\r\n\r\n   if (wasm._OrtAddRunConfigEntry(runOptionsHandle, keyDataOffset, valueDataOffset) !== 0) {\r\n   throw new Error(`Can't set a run config entry: ${key} - ${value}`);\r\n   }\r\n   });\r\n   }\r\n\r\n   return [runOptionsHandle, allocs];\r\n } catch (e) {\r\n   if (runOptionsHandle !== 0) {\r\n   wasm._OrtReleaseRunOptions(runOptionsHandle);\r\n   }\r\n   allocs.forEach(wasm._free);\r\n   throw e;\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env, InferenceSession, SessionHandler, Tensor} from 'onnxruntime-common';\r\n\r\nimport {createSession, endProfiling, initOrt, releaseSession, run} from './proxy-wrapper';\r\n\r\nlet ortInit: boolean;\r\n\r\n\r\nconst getLogLevel = (logLevel: 'verbose'|'info'|'warning'|'error'|'fatal'): number => {\r\n switch (logLevel) {\r\n   case 'verbose':\r\n   return 0;\r\n   case 'info':\r\n   return 1;\r\n   case 'warning':\r\n   return 2;\r\n   case 'error':\r\n   return 3;\r\n   case 'fatal':\r\n   return 4;\r\n   default:\r\n   throw new

Error(`unsupported logging level: ${logLevel}`);\r\n }\r\n};\r\n\r\nexport class
OnnxruntimeWebAssemblySessionHandler implements SessionHandler {\r\n private sessionId: number;\r\n\r\n
inputNames: string[];\r\n outputNames: string[];\r\n\r\n async loadModel(model: Uint8Array, options?:
InferenceSession.SessionOptions): Promise<void> {\r\n   if (!ortInit) {\r\n   await initOrt(env.wasm.numThreads!,
getLogLevel(env.logLevel!));\r\n   ortInit = true;\r\n   }\r\n\r\n   [this.sessionId, this.inputNames,
this.outputNames] = await createSession(model, options);\r\n }\r\n\r\n async dispose(): Promise<void> {\r\n
return releaseSession(this.sessionId);\r\n }\r\n\r\n async run(feeds: SessionHandler.FeedsType, fetches:
SessionHandler.FetchesType, options: InferenceSession.RunOptions):\r\n   Promise<SessionHandler.ReturnType>
{\r\n   const inputArray: Tensor[] = [];\r\n   const inputIndices: number[] = [];\r\n
Object.entries(feeds).forEach(kvp => {\r\n   const name = kvp[0];\r\n   const tensor = kvp[1];\r\n   const index
= this.inputNames.indexOf(name);\r\n   if (index === -1) {\r\n   throw new Error(`invalid input '${name}'`);\r\n
    }\r\n   inputArray.push(tensor);\r\n   inputIndices.push(index);\r\n   });\r\n\r\n   const outputIndices: number[]
= [];\r\n   Object.entries(fetches).forEach(kvp => {\r\n   const name = kvp[0];\r\n   // TODO: support pre-
allocated output\r\n   const index = this.outputNames.indexOf(name);\r\n   if (index === -1) {\r\n   throw new
Error(`invalid output '${name}'`);\r\n   }\r\n   outputIndices.push(index);\r\n   });\r\n\r\n   const outputs =\r\n
 await run(this.sessionId, inputIndices, inputArray.map(t => [t.type, t.dims, t.data]), outputIndices, options);\r\n\r\n
const result: SessionHandler.ReturnType = {};\r\n   for (let i = 0; i < outputs.length; i++) {\r\n
result[this.outputNames[outputIndices[i]]] = new Tensor(outputs[i][0], outputs[i][2], outputs[i][1]);\r\n   }\r\n
return result;\r\n }\r\n\r\n startProfiling(): void {\r\n   // TODO: implement profiling\r\n }\r\n\r\n endProfiling():
void {\r\n   void endProfiling(this.sessionId);\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights
reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceSession} from 'onnxruntime-
common';\r\n\r\nimport {iterateExtraOptions} from './options-utils';\r\nimport {allocWasmString} from './string-
utils';\r\nimport {getInstance} from './wasm-factory';\r\n\r\nconst getGraphOptimzationLevel =
(graphOptimizationLevel: string|unknown): number => {\r\n switch (graphOptimizationLevel) {\r\n   case
'disabled':\r\n   return 0;\r\n   case 'basic':\r\n   return 1;\r\n   case 'extended':\r\n   return 2;\r\n   case 'all':\r\n
 return 99;\r\n   default:\r\n   throw new Error(`unsupported graph optimization level:
${graphOptimizationLevel}`);\r\n }\r\n};\r\n\r\nconst getExecutionMode = (executionMode: 'sequential'|'parallel'):
number => {\r\n switch (executionMode) {\r\n   case 'sequential':\r\n   return 0;\r\n   case 'parallel':\r\n   return
1;\r\n   default:\r\n   throw new Error(`unsupported execution mode: ${executionMode}`);\r\n }\r\n};\r\n\r\nconst
appendDefaultOptions = (options: InferenceSession.SessionOptions): void => {\r\n if (!options.extra) {\r\n
options.extra = {};\r\n }\r\n if (!options.extra.session) {\r\n   options.extra.session = {};\r\n }\r\n const session =
options.extra.session as Record<string, string>;\r\n if (!session.use_ort_model_bytes_directly) {\r\n   // eslint-
disable-next-line camelcase\r\n   session.use_ort_model_bytes_directly = '1';\r\n }\r\n};\r\n\r\nexport const
setSessionOptions = (options?: InferenceSession.SessionOptions): [number, number[]] => {\r\n const wasm =
getInstance();\r\n let sessionOptionsHandle = 0;\r\n const allocs: number[] = [];\r\n\r\n const sessionOptions:
InferenceSession.SessionOptions = options || {};\r\n appendDefaultOptions(sessionOptions);\r\n\r\n try {\r\n   if
(options?.graphOptimizationLevel === undefined) {\r\n   sessionOptions.graphOptimizationLevel = 'all';\r\n
}\r\n   const graphOptimizationLevel =
getGraphOptimzationLevel(sessionOptions.graphOptimizationLevel!);\r\n\r\n   if (options?.enableCpuMemArena
=== undefined) {\r\n   sessionOptions.enableCpuMemArena = true;\r\n   }\r\n\r\n   if
(options?.enableMemPattern === undefined) {\r\n   sessionOptions.enableMemPattern = true;\r\n   }\r\n\r\n   if
(options?.executionMode === undefined) {\r\n   sessionOptions.executionMode = 'sequential';\r\n   }\r\n   const
executionMode = getExecutionMode(sessionOptions.executionMode!);\r\n\r\n   let logIdDataOffset = 0;\r\n   if
(options?.logId !== undefined) {\r\n   logIdDataOffset = allocWasmString(options.logId, allocs);\r\n   }\r\n\r\n
if (options?.logSeverityLevel === undefined) {\r\n   sessionOptions.logSeverityLevel = 2; // Default to
warning\r\n   } else if (\r\n   typeof options.logSeverityLevel !== 'number' ||
!Number.isInteger(options.logSeverityLevel) ||\r\n   options.logSeverityLevel < 0 || options.logSeverityLevel > 4)
{\r\n   throw new Error(`log serverity level is not valid: ${options.logSeverityLevel}`);\r\n   }\r\n\r\n   if

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(options?.logVerbosityLevel === undefined) {\r\n      sessionOptions.logVerbosityLevel = 0;  // Default to 0\r\n    }
else if (typeof options.logVerbosityLevel !== 'number' || !Number.isInteger(options.logVerbosityLevel)) {\r\n
throw new Error(`log verbosity level is not valid: ${options.logVerbosityLevel}`);\r\n    }\r\n\r\n    if
(options?.enableProfiling === undefined) {\r\n      sessionOptions.enableProfiling = false;\r\n    }\r\n\r\n
sessionOptionsHandle = wasm._OrtCreateSessionOptions(\r\n        graphOptimizationLevel,
!!sessionOptions.enableCpuMemArena!, !!sessionOptions.enableMemPattern!, executionMode,\r\n
!!sessionOptions.enableProfiling!, 0, logIdDataOffset, sessionOptions.logSeverityLevel!,\r\n
sessionOptions.logVerbosityLevel!);\r\n    if (sessionOptionsHandle === 0) {\r\n      throw new Error('Can\\'t create
session options');\r\n    }\r\n\r\n    if (options?.extra !== undefined) {\r\n      iterateExtraOptions(options.extra, '', new
WeakSet<Record<string, unknown>>(), (key, value) => {\r\n        const keyDataOffset = allocWasmString(key,
allocs);\r\n        const valueDataOffset = allocWasmString(value, allocs);\r\n\r\n        if
(wasm._OrtAddSessionConfigEntry(sessionOptionsHandle, keyDataOffset, valueDataOffset) !== 0) {\r\n
throw new Error(`Can't set a session config entry: ${key} - ${value}`);\r\n        }\r\n      });\r\n    }\r\n\r\n    return
[sessionOptionsHandle, allocs];\r\n  } catch (e) {\r\n    if (sessionOptionsHandle !== 0) {\r\n
wasm._OrtReleaseSessionOptions(sessionOptionsHandle);\r\n    }\r\n    allocs.forEach(wasm._free);\r\n    throw
e;\r\n  }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {getInstance} from './wasm-factory';\r\n\r\nexport const allocWasmString = (data: string,
allocs: number[]): number => {\r\n  const wasm = getInstance();\r\n\r\n  const dataLength =
wasm.lengthBytesUTF8(data) + 1;\r\n  const dataOffset = wasm._malloc(dataLength);\r\n
wasm.stringToUTF8(data, dataOffset, dataLength);\r\n  allocs.push(dataOffset);\r\n\r\n  return
dataOffset;\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {InferenceSession, Tensor} from 'onnxruntime-common';\r\nimport
{SerializableSessionMetadata, SerializableTensor} from './proxy-messages';\r\nimport {setRunOptions} from './run-
options';\r\nimport {setSessionOptions} from './session-options';\r\nimport {allocWasmString} from './string-
utils';\r\nimport {getInstance} from './wasm-factory';\r\n\r\n/**\r\n * initialize ORT environment.\r\n * @param
numThreads SetGlobalIntraOpNumThreads(numThreads)\r\n * @param loggingLevel
CreateEnv(static_cast<OrtLoggingLevel>(logging_level))\r\n */\r\nexport const initOrt = (numThreads: number,
loggingLevel: number): void => {\r\n  const errorCode = getInstance()._OrtInit(numThreads, loggingLevel);\r\n  if
(errorCode !== 0) {\r\n    throw new Error(`Can't initialize onnxruntime. error code = ${errorCode}`);\r\n
}\r\n};\r\n\r\n/**\r\n *  tuple elements are: InferenceSession ID; inputNamesUTF8Encoded;
outputNamesUTF8Encoded\r\n */\r\ntype SessionMetadata = [number, number[], number[]];\r\n\r\nconst
activeSessions: Array<SessionMetadata|undefined> = [];\r\n\r\n/**\r\n * create an instance of InferenceSession.\r\n
* @returns the metadata of InferenceSession. 0-value handle for failure.\r\n */\r\nexport const createSession =\r\n
(model: Uint8Array, options?: InferenceSession.SessionOptions): SerializableSessionMetadata => {\r\n      const
wasm = getInstance();\r\n      const modelDataOffset = wasm._malloc(model.byteLength);\r\n      let sessionHandle
= 0;\r\n      let sessionOptionsHandle = 0;\r\n      let allocs: number[] = [];\r\n\r\n      try {\r\n
[sessionOptionsHandle, allocs] = setSessionOptions(options);\r\n\r\n        wasm.HEAPU8.set(model,
modelDataOffset);\r\n        sessionHandle = wasm._OrtCreateSession(modelDataOffset, model.byteLength,
sessionOptionsHandle);\r\n        if (sessionHandle === 0) {\r\n          throw new Error('Can\\'t create a session');\r\n
   }\r\n      } finally {\r\n        wasm._free(modelDataOffset);\r\n
wasm._OrtReleaseSessionOptions(sessionOptionsHandle);\r\n        allocs.forEach(wasm._free);\r\n      }\r\n\r\n
const inputCount = wasm._OrtGetInputCount(sessionHandle);\r\n      const outputCount =
wasm._OrtGetOutputCount(sessionHandle);\r\n\r\n      const inputNames = [];\r\n      const
inputNamesUTF8Encoded = [];\r\n      const outputNames = [];\r\n      const outputNamesUTF8Encoded = [];\r\n
for (let i = 0; i < inputCount; i++) {\r\n        const name = wasm._OrtGetInputName(sessionHandle, i);\r\n        if
(name === 0) {\r\n          throw new Error('Can\\'t get an input name');\r\n        }\r\n
inputNamesUTF8Encoded.push(name);\r\n        inputNames.push(wasm.UTF8ToString(name));\r\n      }\r\n      for
(let i = 0; i < outputCount; i++) {\r\n        const name = wasm._OrtGetOutputName(sessionHandle, i);\r\n        if
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(name === 0) {\r\n throw new Error('Can\\'t get an output name');\r\n }\r\n outputNamesUTF8Encoded.push(name);\r\n outputNames.push(wasm.UTF8ToString(name));\r\n }\r\n\r\n activeSessions.push([sessionHandle, inputNamesUTF8Encoded, outputNamesUTF8Encoded]);\r\n return [activeSessions.length - 1, inputNames, outputNames];\r\n };\r\n\r\nexport const releaseSession = (sessionId: number): void => {\r\n const wasm = getInstance();\r\n const session = activeSessions[sessionId];\r\n if (!session) {\r\n throw new Error('invalid session id');\r\n }\r\n const sessionHandle = session[0];\r\n const inputNamesUTF8Encoded = session[1];\r\n const outputNamesUTF8Encoded = session[2];\r\n\r\n inputNamesUTF8Encoded.forEach(wasm._OrtFree);\r\n outputNamesUTF8Encoded.forEach(wasm._OrtFree);\r\n wasm._OrtReleaseSession(sessionHandle);\r\n activeSessions[sessionId] = undefined;\r\n};\r\n\r\n/**\r\n * Copied from ONNX definition. Use this to drop dependency 'onnx_proto' to decrease compiled .js file size.\r\n */\r\nconst enum DataType {\r\n undefined = 0,\r\n float = 1,\r\n uint8 = 2,\r\n int8 = 3,\r\n uint16 = 4,\r\n int16 = 5,\r\n int32 = 6,\r\n int64 = 7,\r\n string = 8,\r\n bool = 9,\r\n float16 = 10,\r\n double = 11,\r\n uint32 = 12,\r\n uint64 = 13,\r\n complex64 = 14,\r\n complex128 = 15,\r\n bfloat16 = 16\r\n}\r\n\r\n\r\nconst tensorDataTypeStringToEnum = (type: string): DataType => {\r\n switch (type) {\r\n case 'int8':\r\n return DataType.int8;\r\n case 'uint8':\r\n return DataType.uint8;\r\n case 'bool':\r\n return DataType.bool;\r\n case 'int16':\r\n return DataType.int16;\r\n case 'uint16':\r\n return DataType.uint16;\r\n case 'int32':\r\n return DataType.int32;\r\n case 'uint32':\r\n return DataType.uint32;\r\n case 'float32':\r\n return DataType.float;\r\n case 'float64':\r\n return DataType.double;\r\n case 'string':\r\n return DataType.string;\r\n case 'int64':\r\n return DataType.int64;\r\n case 'uint64':\r\n return DataType.uint64;\r\n\r\n default:\r\n throw new Error(`unsupported data type: ${type}`);\r\n }\r\n};\r\n\r\nconst tensorDataTypeEnumToString = (typeProto: DataType): Tensor.Type => {\r\n switch (typeProto) {\r\n case DataType.int8:\r\n return 'int8';\r\n case DataType.uint8:\r\n return 'uint8';\r\n case DataType.bool:\r\n return 'bool';\r\n case DataType.int16:\r\n return 'int16';\r\n case DataType.uint16:\r\n return 'uint16';\r\n case DataType.int32:\r\n return 'int32';\r\n case DataType.uint32:\r\n return 'uint32';\r\n case DataType.float:\r\n return 'float32';\r\n case DataType.double:\r\n return 'float64';\r\n case DataType.string:\r\n return 'string';\r\n case DataType.int64:\r\n return 'int32';\r\n case DataType.uint64:\r\n return 'uint32';\r\n\r\n default:\r\n throw new Error(`unsupported data type: ${typeProto}`);\r\n }\r\n};\r\n\r\nconst numericTensorTypeToTypedArray = (type: Tensor.Type): Float32ArrayConstructor|Uint8ArrayConstructor|\r\n Int8ArrayConstructor|Uint16ArrayConstructor|Int16ArrayConstructor|Int32ArrayConstructor|BigInt64ArrayConstructor|\r\n Uint8ArrayConstructor|Float64ArrayConstructor|Uint32ArrayConstructor|BigUint64ArrayConstructor => {\r\n switch (type) {\r\n case 'float32':\r\n return Float32Array;\r\n case 'uint8':\r\n return Uint8Array;\r\n case 'int8':\r\n return Int8Array;\r\n case 'uint16':\r\n return Uint16Array;\r\n case 'int16':\r\n return Int16Array;\r\n case 'int32':\r\n return Int32Array;\r\n case 'bool':\r\n return Uint8Array;\r\n case 'float64':\r\n return Float64Array;\r\n case 'uint32':\r\n return Uint32Array;\r\n case 'int64':\r\n return BigInt64Array;\r\n case 'uint64':\r\n return BigUint64Array;\r\n default:\r\n throw new Error(`unsupported type: ${type}`);\r\n }\r\n };\r\n\r\n/**\r\n * perform inference run\r\n */\r\nexport const run =\r\n (sessionId: number, inputIndices: number[], inputs: SerializableTensor[], outputIndices: number[],\r\n options: InferenceSession.RunOptions): SerializableTensor[] => {\r\n const wasm = getInstance();\r\n const session = activeSessions[sessionId];\r\n if (!session) {\r\n throw new Error('invalid session id');\r\n }\r\n const sessionHandle = session[0];\r\n const inputNamesUTF8Encoded = session[1];\r\n const outputNamesUTF8Encoded = session[2];\r\n\r\n const inputCount = inputIndices.length;\r\n const outputCount = outputIndices.length;\r\n\r\n let runOptionsHandle = 0;\r\n let runOptionsAllocs: number[] = [];\r\n\r\n const inputValues: number[] = [];\r\n const inputAllocs: number[] = [];\r\n\r\n try {\r\n [runOptionsHandle, runOptionsAllocs] = setRunOptions(options);\r\n\r\n // create input tensors\r\n for (let i = 0; i < inputCount; i++) {\r\n const dataType = inputs[i][0];\r\n const dims = inputs[i][1];\r\n const data = inputs[i][2];\r\n\r\n let dataOffset: number;\r\n let dataByteLength: number;\r\n\r\n if (Array.isArray(data)) {\r\n // string

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tensor\r\n            dataByteLength = 4 * data.length;\r\n            dataOffset = wasm._malloc(dataByteLength);\r\n
  inputAllocs.push(dataOffset);\r\n            let dataIndex = dataOffset / 4;\r\n            for (let i = 0; i < data.length; i++)
{\r\n              if (typeof data[i] !== 'string') {\r\n                throw new TypeError(`tensor data at index ${i} is not a
string`);\r\n              }\r\n              wasm.HEAPU32[dataIndex++] = allocWasmString(data[i], inputAllocs);\r\n
}\r\n          } else {\r\n            dataByteLength = data.byteLength;\r\n            dataOffset =
wasm._malloc(dataByteLength);\r\n            inputAllocs.push(dataOffset);\r\n            wasm.HEAPU8.set(new
Uint8Array(data.buffer, data.byteOffset, dataByteLength), dataOffset);\r\n          }\r\n\r\n          const stack =
wasm.stackSave();\r\n          const dimsOffset = wasm.stackAlloc(4 * dims.length);\r\n          try {\r\n            let
dimIndex = dimsOffset / 4;\r\n            dims.forEach(d => wasm.HEAP32[dimIndex++] = d);\r\n            const tensor
= wasm._OrtCreateTensor(\r\n                tensorDataTypeStringToEnum(dataType), dataOffset, dataByteLength,
dimsOffset, dims.length);\r\n            if (tensor === 0) {\r\n              throw new Error('Can\\'t create a tensor');\r\n
   }\r\n            inputValues.push(tensor);\r\n          } finally {\r\n            wasm.stackRestore(stack);\r\n          }\r\n
}\r\n\r\n        const beforeRunStack = wasm.stackSave();\r\n        const inputValuesOffset =
wasm.stackAlloc(inputCount * 4);\r\n        const inputNamesOffset = wasm.stackAlloc(inputCount * 4);\r\n
const outputValuesOffset = wasm.stackAlloc(outputCount * 4);\r\n        const outputNamesOffset =
wasm.stackAlloc(outputCount * 4);\r\n\r\n        try {\r\n          let inputValuesIndex = inputValuesOffset / 4;\r\n
let inputNamesIndex = inputNamesOffset / 4;\r\n          let outputValuesIndex = outputValuesOffset / 4;\r\n          let
outputNamesIndex = outputNamesOffset / 4;\r\n          for (let i = 0; i < inputCount; i++) {\r\n
wasm.HEAPU32[inputValuesIndex++] = inputValues[i];\r\n            wasm.HEAPU32[inputNamesIndex++] =
inputNamesUTF8Encoded[inputIndices[i]];\r\n          }\r\n          for (let i = 0; i < outputCount; i++) {\r\n
wasm.HEAPU32[outputValuesIndex++] = 0;\r\n            wasm.HEAPU32[outputNamesIndex++] =
outputNamesUTF8Encoded[outputIndices[i]];\r\n          }\r\n\r\n          // support RunOptions\r\n          let errorCode
= wasm._OrtRun(\r\n              sessionHandle, inputNamesOffset, inputValuesOffset, inputCount,
outputNamesOffset, outputCount,\r\n              outputValuesOffset, runOptionsHandle);\r\n\r\n          const output:
SerializableTensor[] = [];\r\n\r\n          if (errorCode === 0) {\r\n            for (let i = 0; i < outputCount; i++) {\r\n
    const tensor = wasm.HEAPU32[outputValuesOffset / 4 + i];\r\n\r\n              const beforeGetTensorDataStack =
wasm.stackSave();\r\n              // stack allocate 4 pointer value\r\n              const tensorDataOffset =
wasm.stackAlloc(4 * 4);\r\n\r\n              let type: Tensor.Type|undefined, dataOffset = 0;\r\n              try {\r\n
 errorCode = wasm._OrtGetTensorData(\r\n                  tensor, tensorDataOffset, tensorDataOffset + 4,
tensorDataOffset + 8, tensorDataOffset + 12);\r\n                if (errorCode !== 0) {\r\n                  throw new
Error(`Can't get a tensor data. error code = ${errorCode}`);\r\n                }\r\n                let tensorDataIndex =
tensorDataOffset / 4;\r\n                const dataType = wasm.HEAPU32[tensorDataIndex++];\r\n                dataOffset
= wasm.HEAPU32[tensorDataIndex++];\r\n                const dimsOffset = wasm.HEAPU32[tensorDataIndex++];\r\n
            const dimsLength = wasm.HEAPU32[tensorDataIndex++];\r\n                const dims = [];\r\n                for
(let i = 0; i < dimsLength; i++) {\r\n                  dims.push(wasm.HEAPU32[dimsOffset / 4 + i]);\r\n                }\r\n
          wasm._OrtFree(dimsOffset);\r\n\r\n                const size = dims.length === 0 ? 1 : dims.reduce((a, b) => a *
b);\r\n                type = tensorDataTypeEnumToString(dataType);\r\n                if (type === 'string') {\r\n
const stringData: string[] = [];\r\n                  let dataIndex = dataOffset / 4;\r\n                  for (let i = 0; i < size; i++)
{\r\n                    const offset = wasm.HEAPU32[dataIndex++];\r\n                    const maxBytesToRead = i === size
- 1 ? undefined : wasm.HEAPU32[dataIndex] - offset;\r\n                    stringData.push(wasm.UTF8ToString(offset,
maxBytesToRead));\r\n                  }\r\n                  output.push([type, dims, stringData]);\r\n                } else {\r\n
          const typedArrayConstructor = numericTensorTypeToTypedArray(type);\r\n                  const data = new
typedArrayConstructor(size);\r\n                  new Uint8Array(data.buffer, data.byteOffset, data.byteLength)\r\n
          .set(wasm.HEAPU8.subarray(dataOffset, dataOffset + data.byteLength));\r\n                  output.push([type,
dims, data]);\r\n                }\r\n              } finally {\r\n                wasm.stackRestore(beforeGetTensorDataStack);\r\n
            if (type === 'string' && dataOffset) {\r\n                  wasm._free(dataOffset);\r\n                }\r\n
wasm._OrtReleaseTensor(tensor);\r\n              }\r\n            }\r\n          }\r\n\r\n          if (errorCode === 0) {\r\n
return output;\r\n          } else {\r\n            throw new Error(`failed to call OrtRun(). error code = ${errorCode}.`);\r\n
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      }\r\n      } finally {\r\n        wasm.stackRestore(beforeRunStack);\r\n      }\r\n    } finally {\r\n
inputValues.forEach(wasm._OrtReleaseTensor);\r\n      inputAllocs.forEach(wasm._free);\r\n\r\n
wasm._OrtReleaseRunOptions(runOptionsHandle);\r\n      runOptionsAllocs.forEach(wasm._free);\r\n    }\r\n
};\r\n\r\n/**\r\n * end profiling\r\n */\r\nexport const endProfiling = (sessionId: number): void => {\r\n  const wasm
= getInstance();\r\n  const session = activeSessions[sessionId];\r\n  if (!session) {\r\n    throw new Error('invalid
session id');\r\n  }\r\n  const sessionHandle = session[0];\r\n\r\n  // profile file name is not used yet, but it must be
freed.\r\n  const profileFileName = wasm._OrtEndProfiling(sessionHandle);\r\n  if (profileFileName === 0) {\r\n
throw new Error('Can\\'t get an profile file name');\r\n  }\r\n  wasm._OrtFree(profileFileName);\r\n};\r\n\r\nexport
const extractTransferableBuffers = (tensors: readonly SerializableTensor[]): ArrayBufferLike[] => {\r\n  const
buffers: ArrayBufferLike[] = [];\r\n  for (const tensor of tensors) {\r\n    const data = tensor[2];\r\n    if
(!Array.isArray(data) && data.buffer) {\r\n      buffers.push(data.buffer);\r\n    }\r\n  }\r\n  return
buffers;\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {Env} from 'onnxruntime-common';\r\nimport * as path from 'path';\r\n\r\nimport
{OrtWasmModule} from './binding/ort-wasm';\r\nimport {OrtWasmThreadedModule} from './binding/ort-wasm-
threaded';\r\nimport ortWasmFactoryThreaded from './binding/ort-wasm-threaded.js';\r\nimport ortWasmFactory
from './binding/ort-wasm.js';\r\n\r\nlet wasm: OrtWasmModule|undefined;\r\nlet initialized = false;\r\nlet initializing
= false;\r\nlet aborted = false;\r\n\r\nconst isMultiThreadSupported = (): boolean => {\r\n  try {\r\n    // If
'SharedArrayBuffer' is not available, WebAssembly threads will not work.\r\n    if (typeof SharedArrayBuffer ===
'undefined') {\r\n      return false;\r\n    }\r\n\r\n    // Test for transferability of SABs (for browsers. needed for
Firefox)\r\n    //
https://groups.google.com/forum/#!msg/mozilla.dev.platform/IHkBZlHETpA/dwsMNchWEQAJ\r\n    if (typeof
MessageChannel !== 'undefined') {\r\n      new MessageChannel().port1.postMessage(new
SharedArrayBuffer(1));\r\n    }\r\n\r\n    // Test for WebAssembly threads capability (for both browsers and
Node.js)\r\n    // This typed array is a WebAssembly program containing threaded instructions.\r\n    return
WebAssembly.validate(new Uint8Array([\r\n      0, 97, 115, 109, 1, 0,  0,  0, 1, 4, 1,  96, 0,   0,  3, 2, 1,  0, 5,\r\n
4, 1,  3,   1,   1, 10, 11, 1, 9, 0, 65, 0,  254, 16, 2, 0, 26, 11\r\n    ]));\r\n  } catch (e) {\r\n    return false;\r\n
}\r\n};\r\n\r\nconst isSimdSupported = (): boolean => {\r\n  try {\r\n    // Test for WebAssembly SIMD capability
(for both browsers and Node.js)\r\n    // This typed array is a WebAssembly program containing SIMD
instructions.\r\n    return WebAssembly.validate(new Uint8Array(\r\n        [0, 97, 115, 109, 1, 0, 0, 0, 1, 4, 1, 96, 0,
0, 3, 2, 1, 0, 10, 9, 1, 7, 0, 65, 0, 253, 15, 26, 11]));\r\n  } catch (e) {\r\n    return false;\r\n  }\r\n};\r\n\r\nconst
getWasmFileName = (useSimd: boolean, useThreads: boolean) => {\r\n  if (useThreads) {\r\n    return useSimd ?
'ort-wasm-simd-threaded.wasm' : 'ort-wasm-threaded.wasm';\r\n  } else {\r\n    return useSimd ? 'ort-wasm-
simd.wasm' : 'ort-wasm.wasm';\r\n  }\r\n};\r\n\r\nexport const initializeWebAssembly = async(flags:
Env.WebAssemblyFlags): Promise<void> => {\r\n  if (initialized) {\r\n    return Promise.resolve();\r\n  }\r\n  if
(initializing) {\r\n    throw new Error('multiple calls to \\'initializeWebAssembly()\\' detected.');\r\n  }\r\n  if
(aborted) {\r\n    throw new Error('previous call to \\'initializeWebAssembly()\\' failed.');\r\n  }\r\n\r\n  initializing =
true;\r\n\r\n  // wasm flags are already initialized\r\n  const timeout = flags.initTimeout!;\r\n  const numThreads =
flags.numThreads!;\r\n  const simd = flags.simd!;\r\n\r\n  const useThreads = numThreads > 1 &&
isMultiThreadSupported();\r\n  const useSimd = simd && isSimdSupported();\r\n\r\n  const wasmPrefixOverride =
typeof flags.wasmPaths === 'string' ? flags.wasmPaths : undefined;\r\n  const wasmFileName =
getWasmFileName(false, useThreads);\r\n  const wasmOverrideFileName = getWasmFileName(useSimd,
useThreads);\r\n  const wasmPathOverride = typeof flags.wasmPaths === 'object' ?
flags.wasmPaths[wasmOverrideFileName] : undefined;\r\n\r\n  let isTimeout = false;\r\n\r\n  const tasks:
Array<Promise<void>> = [];\r\n\r\n  // promise for timeout\r\n  if (timeout > 0) {\r\n    tasks.push(new
Promise((resolve) => {\r\n      setTimeout(() => {\r\n        isTimeout = true;\r\n        resolve();\r\n      }, timeout);\r\n
}));\r\n  }\r\n\r\n  // promise for module initialization\r\n  tasks.push(new Promise((resolve, reject) => {\r\n    const
factory = useThreads ? ortWasmFactoryThreaded : ortWasmFactory;\r\n    const config: Partial<OrtWasmModule>
= {\r\n      locateFile: (fileName: string, scriptDirectory: string) => {\r\n        if (fileName.endsWith('.worker.js') &&
```

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typeof Blob !== 'undefined') {\r\n          return URL.createObjectURL(new Blob(\r\n              [\r\n                // This
require() function is handled by webpack to load file content of the corresponding .worker.js\r\n                // eslint-
disable-next-line @typescript-eslint/no-require-imports\r\n                require('./binding/ort-wasm-
threaded.worker.js')\r\n              ],\r\n              {type: 'text/javascript'}));\r\n        }\r\n\r\n        if (fileName ===
wasmFileName) {\r\n          const prefix: string = wasmPrefixOverride ?? scriptDirectory;\r\n          return
wasmPathOverride ?? prefix + wasmOverrideFileName;\r\n        }\r\n\r\n        return scriptDirectory + fileName;\r\n
   }\r\n    };\r\n\r\n    if (useThreads) {\r\n      if (typeof Blob === 'undefined') {\r\n        config.mainScriptUrlOrBlob
= path.join(__dirname, 'ort-wasm-threaded.js');\r\n      } else {\r\n        const scriptSourceCode =\r\n            `var
ortWasmThreaded=(function(){var _scriptDir;return ${ortWasmFactoryThreaded.toString()}})();`;\r\n
config.mainScriptUrlOrBlob = new Blob([scriptSourceCode], {type: 'text/javascript'});\r\n      }\r\n    }\r\n\r\n
factory(config).then(\r\n        // wasm module initialized successfully\r\n        module => {\r\n          initializing =
false;\r\n          initialized = true;\r\n          wasm = module;\r\n          resolve();\r\n        },\r\n        // wasm module
failed to initialize\r\n        (what) => {\r\n          initializing = false;\r\n          aborted = true;\r\n          reject(what);\r\n
      });\r\n  }));\r\n\r\n  await Promise.race(tasks);\r\n\r\n  if (isTimeout) {\r\n    throw new Error(`WebAssembly
backend initializing failed due to timeout: ${timeout}ms`);\r\n  }\r\n};\r\n\r\nexport const getInstance = ():
OrtWasmModule => {\r\n  if (initialized && wasm) {\r\n    return wasm;\r\n  }\r\n\r\n  throw new
Error('WebAssembly is not initialized yet.');\r\n};\r\n\r\nexport const dispose = (): void => {\r\n  if (initialized &&
!initializing && !aborted) {\r\n    initializing = true;\r\n\r\n    (wasm as
OrtWasmThreadedModule).PThread?.terminateAllThreads();\r\n    wasm = undefined;\r\n\r\n    initializing =
false;\r\n    initialized = false;\r\n    aborted = true;\r\n  }\r\n};\r\n","\nimport worker from
\"!!../../../node_modules/worker-loader/dist/runtime/inline.js\";\n\nexport default function Worker_fn() {\n  return
worker(\"/*!\\n* ONNX Runtime Web v1.9.0\\n* Copyright (c) Microsoft Corporation. All rights reserved.\\n*
Licensed under the MIT License.\\n*/\\n(()=>{var e={474:(e,t,n)=>{var
_scriptDir,r=(_scriptDir=(_scriptDir=\\\"undefined\\\"!=typeof
document&&document.currentScript?document.currentScript.src:void 0)||\\\"/index.js\\\",function(e){function
t(){return R.buffer!=j&&J(R.buffer),L}function r(){return R.buffer!=j&&J(R.buffer),W}function a(){return
R.buffer!=j&&J(R.buffer),H}function o(){return R.buffer!=j&&J(R.buffer),Y}function i(){return
R.buffer!=j&&J(R.buffer),z}var u,s,c;e=e||{},u||(u=void 0!==e?e:{}),u.ready=new
Promise((function(e,t){s=e,c=t}));var l,f={};for(l in u)u.hasOwnProperty(l)&&(f[l]=u[l]);var
p=\\\"./this.program\\\";function d(e,t){throw t}var m,h,g,b,y,_=\\\"object\\\"==typeof
window,v=\\\"function\\\"==typeof importScripts,w=\\\"object\\\"==typeof process&&\\\"object\\\"==typeof
process.versions&&\\\"string\\\"==typeof
process.versions.node,O=u.ENVIRONMENT_IS_PTHREAD||!1,A=\\\"\\\";function E(e){return
u.locateFile?u.locateFile(e,A):A+e}if(w){var T;A=v?n(908).dirname(A)+\\\"/\\\":\\\"//\\\",m=function(e,t){return
b||(b=n(384)),y||(y=n(908)),e=y.normalize(e),b.readFileSync(e,t?null:\\\"utf8\\\")},g=function(e){return(e=m(e,!0)).b
uffer||(e=new
Uint8Array(e)),F(e.buffer),e},h=function(e,t,r){b||(b=n(384)),y||(y=n(908)),e=y.normalize(e),b.readFile(e,(function(
e,n){e?r(e):t(n.buffer)}))},1<process.argv.length&&(p=process.argv[1].replace(/\\\\\\\\/g,\\\"/\\\")),process.argv.slice(
2),process.on(\\\"uncaughtException\\\",(function(e){if(!(e instanceof Bt))throw
e})),process.on(\\\"unhandledRejection\\\",le),d=function(e,t){if(ae())throw
process.exitCode=e,t;process.exit(e)},u.inspect=function(){return\\\"[Emscripten Module
object]\\\"};try{T=n(925)}catch(e){throw console.error('The \\\"worker_threads\\\" module is not supported in this
node.js build - perhaps a newer version is
needed?'),e}n.g.Worker=T.Worker}else(_||v)&&(v?A=self.location.href:\\\"undefined\\\"!=typeof
document&&document.currentScript&&(A=document.currentScript.src),_scriptDir&&(A=_scriptDir),A=0!==A.in
dexOf(\\\"blob:\\\")?A.substr(0,A.lastIndexOf(\\\"/\\\")+1):\\\"\\\",w?(m=function(e,t){return
b||(b=n(384)),y||(y=n(908)),e=y.normalize(e),b.readFileSync(e,t?null:\\\"utf8\\\")},g=function(e){return(e=m(e,!0)).b
uffer||(e=new
```

```
Uint8Array(e)),F(e.buffer),e},h=function(e,t,r){b||(b=n(384)),y||(y=n(908)),e=y.normalize(e),b.readFile(e,(function(
e,n){e?r(e):t(n.buffer)}))}):(m=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.send(null),t.responseText},v&&(g=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.responseType=\\\"arraybuffer\\\",t.send(null),new
Uint8Array(t.response)}),h=function(e,t,n){var r=new
XMLHttpRequest;r.open(\\\"GET\\\",e,!0),r.responseType=\\\"arraybuffer\\\",r.onload=function(){200==r.status||0=
=r.status&&r.response?t(r.response):n()},r.onerror=n,r.send(null)}));w&&\\\"undefined\\\"==typeof
performance&&(n.g.performance=n(953).performance);var
S,M,k=u.print||console.log.bind(console),D=u.printErr||console.warn.bind(console);for(l in
f)f.hasOwnProperty(l)&&(u[l]=f[l]);f=null,u.thisProgram&&(p=u.thisProgram),u.quit&&(d=u.quit),u.wasmBinary
&&(M=u.wasmBinary);var x=u.noExitRuntime||!1;\\\"object\\\"!=typeof WebAssembly&&le(\\\"no native wasm
support detected\\\");var R,C,P,I=!1;function F(e,t){e||le(\\\"Assertion failed: \\\"+t)}function U(e){var t=new
TextDecoder(e);this.decode=function(e){return e.buffer instanceof SharedArrayBuffer&&(e=new
Uint8Array(e)),t.decode.call(t,e)}}var j,L,W,H,Y,z,B=\\\"undefined\\\"!=typeof TextDecoder?new
U(\\\"utf8\\\"):void 0;function G(e,t,n){var r=t+n;for(n=t;e[n]&&!(n>=r);)++n;if(16<n-t&&e.subarray&&B)return
B.decode(e.subarray(t,n));for(r=\\\"\\\";t<n;){var a=e[t++];if(128&a){var
o=63&e[t++];if(192==(224&a))r+=String.fromCharCode((31&a)<<6|o);else{var
i=63&e[t++];65536>(a=224==(240&a)?(15&a)<<12|o<<6|i:(7&a)<<18|o<<12|i<<6|63&e[t++])?r+=String.fromCh
arCode(a):(a-=65536,r+=String.fromCharCode(55296|a>>10,56320|1023&a))}}else
r+=String.fromCharCode(a)}return r}function N(e,t){return e?G(r(),e,t):\\\"\\\"}function q(e,t,n,r){if(!(0<r))return
0;var a=n;r=n+r-1;for(var o=0;o<e.length;++o){var
i=e.charCodeAt(o);if(55296<=i&&57343>=i&&(i=65536+((1023&i)<<10)|1023&e.charCodeAt(++o)),127>=i){if(
n>=r)break;t[n++]=i}else{if(2047>=i){if(n+1>=r)break;t[n++]=192|i>>6}else{if(65535>=i){if(n+2>=r)break;t[n++
]=224|i>>12}else{if(n+3>=r)break;t[n++]=240|i>>18,t[n++]=128|i>>12&63}t[n++]=128|i>>6&63}t[n++]=128|63
&i}}return t[n]=0,n-a}function V(e,t,n){return q(e,r(),t,n)}function $(e){for(var t=0,n=0;n<e.length;++n){var
r=e.charCodeAt(n);55296<=r&&57343>=r&&(r=65536+((1023&r)<<10)|1023&e.charCodeAt(++n)),127>=r?++t:t
=2047>=r?t+2:65535>=r?t+3:t+4}return t}function X(e){var n=$(e)+1,r=bt(n);return r&&q(e,t(),r,n),r}function
J(e){j=e,u.HEAP8=L=new Int8Array(e),u.HEAP16=new Int16Array(e),u.HEAP32=H=new
Int32Array(e),u.HEAPU8=W=new Uint8Array(e),u.HEAPU16=new Uint16Array(e),u.HEAPU32=Y=new
Uint32Array(e),u.HEAPF32=new Float32Array(e),u.HEAPF64=z=new Float64Array(e)}\\\"undefined\\\"!=typeof
TextDecoder&&new U(\\\"utf-16le\\\"),O&&(j=u.buffer);var
Q=u.INITIAL_MEMORY||16777216;if(O)R=u.wasmMemory,j=u.buffer;else
if(u.wasmMemory)R=u.wasmMemory;else if(!((R=new
WebAssembly.Memory({initial:Q/65536,maximum:32768,shared:!0})).buffer instanceof SharedArrayBuffer))throw
D(\\\"requested a shared WebAssembly.Memory but the returned buffer is not a SharedArrayBuffer, indicating that
while the browser has SharedArrayBuffer it does not have WebAssembly threads support - you may need to set a
flag\\\"),w&&console.log(\\\"(on node you may need: --experimental-wasm-threads --experimental-wasm-bulk-
memory and also use a recent version)\\\"),Error(\\\"bad memory\\\");R&&(j=R.buffer),Q=j.byteLength,J(j);var
Z,K=[],ee=[],te=[],ne=[],re=0;function ae(){return x||0<re}function oe(){var e=u.preRun.shift();K.unshift(e)}var
ie,ue=0,se=null,ce=null;function le(e){throw u.onAbort&&u.onAbort(e),F(!O),D(e),I=!0,P=1,e=new
WebAssembly.RuntimeError(\\\"abort(\\\"+e+\\\"). Build with -s ASSERTIONS=1 for more
info.\\\"),c(e),e}function fe(){return ie.startsWith(\\\"data:application/octet-stream;base64,\\\")}function pe(){var
e=ie;try{if(e==ie&&M)return new Uint8Array(M);if(g)return g(e);throw\\\"both async and sync fetching of the
wasm failed\\\"}catch(e){le(e)}}u.preloadedImages={},u.preloadedAudios={},ie=\\\"ort-wasm-
threaded.wasm\\\",fe()||(ie=E(ie));var de={973748:function(){throw\\\"Canceled!\\\"}};function
me(e){for(;0<e.length;){var t=e.shift();if(\\\"function\\\"==typeof t)t(u);else{var n=t.Nb;\\\"number\\\"==typeof
n?void 0===t.ib?Z.get(n)():Z.get(n)(t.ib):n(void 0===t.ib?null:t.ib)}}}function
he(e,n){if(0>=e||e>t().length||1&e||0>n)return-28;if(0==n)return 0;2147483647<=n&&(n=1/0);var
```

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r=Atomics.load(a(),zt>>2),o=0;if(r==e&&Atomics.compareExchange(a(),zt>>2,r,0)==r&&(o=1,0>=--n))return
1;if(0<=(e=Atomics.notify(a(),e>>2,n)))return e+o;throw\\\"Atomics.notify returned an unexpected value
\\\"+e}function ge(e){if(O)throw\\\"Internal Error! cleanupThread() can only ever be called from main application
thread!\\\";if(!e)throw\\\"Internal Error! Null pthread_ptr in cleanupThread!\\\";var
t=ye.cb[e];t&&(a()[e+12>>2]=0,ye.sb(t.worker))}u._emscripten_futex_wake=he;var
be,ye={gb:[],fb:[],zb:[],xc:function(){},Rb:function(){for(var
e=bt(228),t=0;57>t;++t)o()[e/4+t]=0;a()[e+12>>2]=e,t=e+152,a()[t>>2]=t;var
n=bt(512);for(t=0;128>t;++t)o()[n/4+t]=0;Atomics.store(o(),e+100>>2,n),Atomics.store(o(),e+40>>2,e),xt(e,!v,1),O
t(e)},Sb:function(){ye.receiveObjectTransfer=ye.Xb,ye.threadInit=ye.hc,ye.threadCancel=ye.fc,ye.threadExit=ye.H
b,ye.setExitStatus=ye.Zb},cb:{},yb:[],Eb:function(){for(;0<ye.yb.length;)ye.yb.pop()();Ct()},Fb:function(e,t){Atom
ics.store(o(),e+56>>2,1),Atomics.store(o(),e+60>>2,0),ye.Eb(),Atomics.store(o(),e+4>>2,t),Atomics.store(o(),e+0>
>2,1),he(e+0,2147483647),xt(0,0,0)},Zb:function(e){P=e},Hb:function(e){var
t=vt();t&&(ye.Fb(t,e),O&&postMessage({cmd:\\\"exit\\\"}))},fc:function(){ye.Fb(vt(),-
1),postMessage({cmd:\\\"cancelDone\\\"})},Gb:function(){for(var e in ye.cb){var
t=ye.cb[e];t&&t.worker&&ye.sb(t.worker)}for(ye.cb={},e=0;e<ye.gb.length;++e){var
n=ye.gb[e];n.terminate()}for(ye.gb=[],e=0;e<ye.fb.length;++e)t=(n=ye.fb[e]).bb,ye.xb(t),n.terminate();ye.fb=[]},xb:
function(e){if(e){if(e.eb){var
t=a()[e.eb+100>>2];a()[e.eb+100>>2]=0,_t(t),_t(e.eb)}e.eb=0,e.wb&&e.hb&&_t(e.hb),e.hb=0,e.worker&&(e.work
er.bb=null)}},sb:function(e){ye.Yb((function(){delete
ye.cb[e.bb.eb],ye.gb.push(e),ye.fb.splice(ye.fb.indexOf(e),1),ye.xb(e.bb),e.bb=void
0}))},Yb:function(e){a()[Yt>>2]=0;try{e()}finally{a()[Yt>>2]=1}},Xb:function(){},hc:function(){for(var e in
ye.zb)ye.zb[e]()},Ub:function(e,t){e.onmessage=function(n){var
r=n.data,i=r.cmd;if(e.bb&&(ye.Lb=e.bb.eb),r.targetThread&&r.targetThread!=vt()){var
u=ye.cb[r.Dc];u?u.worker.postMessage(n.data,r.transferList):D('Internal error! Worker sent a message \\\"'+i+'\\\" to
target pthread '+r.targetThread+\\\", but that thread no longer exists!\\\")}else
if(\\\"processQueuedMainThreadWork\\\"===i)Tt();else if(\\\"spawnThread\\\"===i)Oe(n.data);else
if(\\\"cleanupThread\\\"===i)ge(r.thread);else if(\\\"killThread\\\"===i){if(n=r.thread,O)throw\\\"Internal Error!
killThread() can only ever be called from main application thread!\\\";if(!n)throw\\\"Internal Error! Null pthread_ptr
in killThread!\\\";a()[n+12>>2]=0,r=ye.cb[n],delete
ye.cb[n],r.worker.terminate(),ye.xb(r),ye.fb.splice(ye.fb.indexOf(r.worker),1),r.worker.bb=void 0}else
if(\\\"cancelThread\\\"===i){if(n=r.thread,O)throw\\\"Internal Error! cancelThread() can only ever be called from
main application thread!\\\";if(!n)throw\\\"Internal Error! Null pthread_ptr in
cancelThread!\\\";ye.cb[n].worker.postMessage({cmd:\\\"cancel\\\"})}else
if(\\\"loaded\\\"===i)e.loaded=!0,t&&t(e),e.mb&&(e.mb(),delete e.mb);else if(\\\"print\\\"===i)k(\\\"Thread
\\\"+r.threadId+\\\": \\\"+r.text);else if(\\\"printErr\\\"===i)D(\\\"Thread \\\"+r.threadId+\\\": \\\"+r.text);else
if(\\\"alert\\\"===i)alert(\\\"Thread \\\"+r.threadId+\\\": \\\"+r.text);else
if(\\\"exit\\\"===i)e.bb&&Atomics.load(o(),e.bb.eb+64>>2)&&ye.sb(e);else
if(\\\"exitProcess\\\"===i)try{Nt(r.returnCode)}catch(e){if(e instanceof Bt)return;throw
e}else\\\"cancelDone\\\"===i?ye.sb(e):\\\"objectTransfer\\\"!==i&&(\\\"setimmediate\\\"===n.data.target?e.postMes
sage(n.data):D(\\\"worker sent an unknown command \\\"+i));ye.Lb=void 0},e.onerror=function(e){D(\\\"pthread
sent an error! \\\"+e.filename+\\\":\\\"+e.lineno+\\\":
\\\"+e.message)},w&&(e.on(\\\"message\\\",(function(t){e.onmessage({data:t})})),e.on(\\\"error\\\",(function(t){e.on
error(t)})),e.on(\\\"exit\\\",(function(){}))),e.postMessage({cmd:\\\"load\\\",urlOrBlob:u.mainScriptUrlOrBlob||_scri
ptDir,wasmMemory:R,wasmModule:C})},Ib:function(){var e=E(\\\"ort-wasm-
threaded.worker.js\\\");ye.gb.push(new Worker(e))},Ob:function(){return
0==ye.gb.length&&(ye.Ib(),ye.Ub(ye.gb[0])),ye.gb.pop()},nc:function(e){for(e=performance.now()+e;performance.
now()<e;);}};function _e(e,t){if(0===e)e=Date.now();else{if(1!==e&&4!==e)return a()[yt()>>2]=28,-
1;e=be()}return a()[t>>2]=e/1e3|0,a()[t+4>>2]=e%1e3*1e6|0,0}function ve(e,t){if(O)return
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Ne(1,1,e,t);te.unshift({Nb:e,ib:t})}function we(e){this.lb=e-
16,this.dc=function(e){a()[this.lb+4>>2]=e},this.ac=function(e){a()[this.lb+8>>2]=e},this.bc=function(){a()[this.lb
>>2]=0},this.$b=function(){t()[this.lb+12>>0]=0},this.cc=function(){t()[this.lb+13>>0]=0},this.Pb=function(e,t){t
his.dc(e),this.ac(t),this.bc(),this.$b(),this.cc()}}function Oe(e){if(O)throw\\\"Internal Error! spawnThread() can only
ever be called from main application thread!\\\";var t=ye.Ob();if(!t)return 6;if(void 0!==t.bb)throw\\\"Internal
error!\\\";if(!e.rb)throw\\\"Internal error, no pthread ptr!\\\";ye.fb.push(t);for(var
n=bt(512),r=0;128>r;++r)a()[n+4*r>>2]=0;var
i=e.hb+e.jb,u=(r=ye.cb[e.rb]={worker:t,hb:e.hb,jb:e.jb,wb:e.wb,eb:e.rb}).eb>>2;Atomics.store(o(),u+16,e.detached)
,Atomics.store(o(),u+25,n),Atomics.store(o(),u+10,r.eb),Atomics.store(o(),u+20,e.jb),Atomics.store(o(),u+19,i),Ato
mics.store(o(),u+26,e.jb),Atomics.store(o(),u+28,i),Atomics.store(o(),u+29,e.detached),n=Rt()+40,Atomics.store(o()
,u+43,n),t.bb=r;var
s={cmd:\\\"run\\\",start_routine:e.ec,arg:e.ib,threadInfoStruct:e.rb,stackBase:e.hb,stackSize:e.jb};return
t.mb=function(){s.time=performance.now(),t.postMessage(s,e.mc)},t.loaded&&(t.mb(),delete t.mb),0}function
Ae(e,n,r){if(0>=e||e>t().length||1&e)return-28;if(_){if(Atomics.load(a(),e>>2)!=n)return-6;var
o=performance.now();for(r=o+r,Atomics.exchange(a(),zt>>2,e);;){if((o=performance.now())>r)return
Atomics.exchange(a(),zt>>2,0),-
73;if(0==(o=Atomics.exchange(a(),zt>>2,0)))break;if(Tt(),Atomics.load(a(),e>>2)!=n)return-
6;Atomics.exchange(a(),zt>>2,e)}return 0}if(\\\"timed-out\\\"===(e=Atomics.wait(a(),e>>2,n,r)))return-
73;if(\\\"not-equal\\\"===e)return-6;if(\\\"ok\\\"===e)return 0;throw\\\"Atomics.wait returned an unexpected value
\\\"+e}function Ee(){w||v||(S||(S={}),S[\\\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-thread\\\"]||(S[\\\"Blocking on the
main thread is very dangerous, see https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-
browser-thread\\\"]=1,D(\\\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-
thread\\\")))}u.establishStackSpace=function(e,t){Wt(e,t),jt(e)},u.invokeEntryPoint=function(e,t){return
Z.get(e)(t)},be=w?function(){var e=process.hrtime();return 1e3*e[0]+e[1]/1e6}:O?function(){return
performance.now()-u.__performance_now_clock_drift}:function(){return performance.now()};var
Te={},Se=[null,[],[]];function Me(e,t){var n=Se[e];0===t||10===t?((1===e?k:D)(G(n,0)),n.length=0):n.push(t)}var
ke={};function De(e,t){return O?Ne(2,1,e,t):(e=N(e),ke.rc(e,t))}function xe(e,t,n){return O?Ne(3,1,e,t,n):0}function
Re(e,t){if(O)return Ne(4,1,e,t)}function Ce(e,t,n){if(O)return Ne(5,1,e,t,n)}function Pe(e,t,n){return
O?Ne(6,1,e,t,n):0}function Ie(e,t){if(O)return Ne(7,1,e,t)}function Fe(e,t){return
O?Ne(8,1,e,t):(e=N(e),ke.sc(e,t))}function Ue(e,t,n,a,o,i){if(O)t=Ne(9,1,e,t,n,a,o,i);else
if(i<<=12,0!=(16&a)&&0!=e%65536)t=-28;else if(0!=(32&a)){var
u=65536*Math.ceil(t/65536);(e=Ht(65536,u))?r().fill(0,e,e+u):e=0,e?(Te[e]={Wb:e,Tb:t,Jb:!0,fd:o,Ac:n,flags:a,offs
et:i},t=e):t=-48}else t=-52;return t}function je(e,t){if(O)e=Ne(10,1,e,t);else{var
n=Te[e];0!==t&&n?(t===n.Tb&&(Te[e]=null,n.Jb&&_t(n.Wb)),e=0):e=-28}return e}function Le(e,t,n){if(O)return
Ne(11,1,e,t,n)}function We(e,t,n){return O?Ne(12,1,e,t,n):(e=N(e),ke.tc(e,t,n))}function He(e){if(O)return
Ne(13,1,e)}function Ye(e,t){if(O)return Ne(14,1,e,t)}function ze(e){if(O)return Ne(15,1,e)}function
Be(){if(O)return Ne(16,1);le()}var Ge=[];function Ne(e,t){for(var n=arguments.length-
2,r=Ut(),a=Lt(8*n),o=a>>3,u=0;u<n;u++){var s=arguments[2+u];i()[o+u]=s}return n=St(e,n,a,t),jt(r),n}var
qe=[],Ve=[0,\\\"undefined\\\"!=typeof document?document:0,\\\"undefined\\\"!=typeof window?window:0];function
$e(e){return e=2<e?N(e):e,Ve[e]||(\\\"undefined\\\"!=typeof document?document.querySelector(e):void 0)}function
Xe(e,t,n){var r=$e(e);if(!r)return-
4;if(r.qb&&(a()[r.qb>>2]=t,a()[r.qb+4>>2]=n),!r.Db&&r.pc){if(r.qb){r=a()[r.qb+8>>2],e=e?N(e):\\\"\\\";var
o=Ut(),i=Lt(12),u=0;if(e){u=$(e)+1;var s=bt(u);V(e,s,u),u=s}return
a()[i>>2]=u,a()[i+4>>2]=t,a()[i+8>>2]=n,Mt(0,r,657457152,0,u,i),jt(o),1}return-4}return
r.Db&&(r=r.Db),e=!1,r.pb&&r.pb.ob&&(e=0===(e=r.pb.ob.getParameter(2978))[0]&&0===e[1]&&e[2]===r.widt
h&&e[3]===r.height),r.width=t,r.height=n,e&&r.pb.ob.viewport(0,0,t,n),0}function Je(e,t,n){return
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O?Ne(17,1,e,t,n):Xe(e,t,n)}var Qe,Ze=[\\\"default\\\",\\\"low-power\\\",\\\"high-performance\\\"],Ke={};function
et(){if(!Qe){var
e,t={USER:\\\"web_user\\\",LOGNAME:\\\"web_user\\\",PATH:\\\"/\\\",PWD:\\\"/\\\",HOME:\\\"/home/web_user\\\
",LANG:(\\\"object\\\"==typeof navigator&&navigator.languages&&navigator.languages[0]||\\\"C\\\").replace(\\\"-
\\\",\\\"_\\\")+\\\".UTF-8\\\",_:p||\\\"./this.program\\\"};for(e in Ke)void 0===Ke[e]?delete t[e]:t[e]=Ke[e];var
n=[];for(e in t)n.push(e+\\\"=\\\"+t[e]);Qe=n}return Qe}function tt(e,n){if(O)return Ne(18,1,e,n);var r=0;return
et().forEach((function(o,i){var
u=n+r;for(i=a()[e+4*i>>2]=u,u=0;u<o.length;++u)t()[i++>>0]=o.charCodeAt(u);t()[i>>0]=0,r+=o.length+1})),0}fu
nction nt(e,t){if(O)return Ne(19,1,e,t);var n=et();a()[e>>2]=n.length;var r=0;return
n.forEach((function(e){r+=e.length+1})),a()[t>>2]=r,0}function rt(e){return O?Ne(20,1,e):0}function at(e,n){return
O?Ne(21,1,e,n):(e=1==e||2==e?2:le(),t()[n>>0]=e,0)}function ot(e,t,n,r){return
O?Ne(22,1,e,t,n,r):(e=ke.vc(e),t=ke.uc(e,t,n),a()[r>>2]=t,0)}function it(e,t,n,r,a){if(O)return
Ne(23,1,e,t,n,r,a)}function ut(e,t,n,o){if(O)return Ne(24,1,e,t,n,o);for(var i=0,u=0;u<n;u++){for(var
s=a()[t+8*u>>2],c=a()[t+(8*u+4)>>2],l=0;l<c;l++)Me(e,r()[s+l]);i+=c}return a()[o>>2]=i,0}function st(){function
e(e){return(e=e.toTimeString().match(/\\\\(([A-Za-z ]+)\\\\)$/))?e[1]:\\\"GMT\\\"}if(O)return
Ne(25,1);if(!st.Kb){st.Kb=!0;var t=(new Date).getFullYear(),n=new Date(t,0,1),r=new
Date(t,6,1);t=n.getTimezoneOffset();var
o=r.getTimezoneOffset(),i=Math.max(t,o);a()[Ft()>>2]=60*i,a()[It()>>2]=Number(t!=o),n=e(n),r=e(r),n=X(n),r=X(r
),o<t?(a()[Pt()>>2]=n,a()[Pt()+4>>2]=r):(a()[Pt()>>2]=r,a()[Pt()+4>>2]=n)}}function ct(e){return
0==e%4&&(0!=e%100||0==e%400)}function lt(e,t){for(var n=0,r=0;r<=t;n+=e[r++]);return n}var
ft=[31,29,31,30,31,30,31,31,30,31,30,31],pt=[31,28,31,30,31,30,31,31,30,31,30,31];function dt(e,t){for(e=new
Date(e.getTime());0<t;){var n=e.getMonth(),r=(ct(e.getFullYear())?ft:pt)[n];if(!(t>r-
e.getDate())){e.setDate(e.getDate()+t);break}t-=r-
e.getDate()+1,e.setDate(1),11>n?e.setMonth(n+1):(e.setMonth(0),e.setFullYear(e.getFullYear()+1))}return
e}function mt(e,n,r,o){function i(e,t,n){for(e=\\\"number\\\"==typeof
e?e.toString():e||\\\"\\\";e.length<t;)e=n[0]+e;return e}function u(e,t){return i(e,t,\\\"0\\\")}function s(e,t){function
n(e){return 0>e?-1:0<e?1:0}var r;return 0===(r=n(e.getFullYear()-t.getFullYear()))&&0===(r=n(e.getMonth()-
t.getMonth()))&&(r=n(e.getDate()-t.getDate())),r}function c(e){switch(e.getDay()){case 0:return new
Date(e.getFullYear()-1,11,29);case 1:return e;case 2:return new Date(e.getFullYear(),0,3);case 3:return new
Date(e.getFullYear(),0,2);case 4:return new Date(e.getFullYear(),0,1);case 5:return new Date(e.getFullYear()-
1,11,31);case 6:return new Date(e.getFullYear()-1,11,30)}}function l(e){e=dt(new Date(e.ab+1900,0,1),e.vb);var
t=new Date(e.getFullYear()+1,0,4),n=c(new Date(e.getFullYear(),0,4));return
t=c(t),0>=s(n,e)?0>=s(t,e)?e.getFullYear()+1:e.getFullYear():e.getFullYear()-1}var f=a()[o+40>>2];for(var p in
o={kc:a()[o>>2],jc:a()[o+4>>2],tb:a()[o+8>>2],nb:a()[o+12>>2],kb:a()[o+16>>2],ab:a()[o+20>>2],ub:a()[o+24>>2
],vb:a()[o+28>>2],Ec:a()[o+32>>2],ic:a()[o+36>>2],lc:f?N(f):\\\"\\\"},r=N(r),f={\\\"%c\\\":\\\"%a %b %d
%H:%M:%S %Y\\\",\\\"%D\\\":\\\"%m/%d/%y\\\",\\\"%F\\\":\\\"%Y-%m-
%d\\\",\\\"%h\\\":\\\"%b\\\",\\\"%r\\\":\\\"%I:%M:%S
%p\\\",\\\"%R\\\":\\\"%H:%M\\\",\\\"%T\\\":\\\"%H:%M:%S\\\",\\\"%x\\\":\\\"%m/%d/%y\\\",\\\"%X\\\":\\\"%H:%M:
%S\\\",\\\"%Ec\\\":\\\"%c\\\",\\\"%EC\\\":\\\"%C\\\",\\\"%Ex\\\":\\\"%m/%d/%y\\\",\\\"%EX\\\":\\\"%H:%M:%S\\\",\\\
"%Ey\\\":\\\"%y\\\",\\\"%EY\\\":\\\"%Y\\\",\\\"%Od\\\":\\\"%d\\\",\\\"%Oe\\\":\\\"%e\\\",\\\"%OH\\\":\\\"%H\\\",\\\"%
OI\\\":\\\"%I\\\",\\\"%Om\\\":\\\"%m\\\",\\\"%OM\\\":\\\"%M\\\",\\\"%OS\\\":\\\"%S\\\",\\\"%Ou\\\":\\\"%u\\\",\\\"%O
U\\\":\\\"%U\\\",\\\"%OV\\\":\\\"%V\\\",\\\"%Ow\\\":\\\"%w\\\",\\\"%OW\\\":\\\"%W\\\",\\\"%Oy\\\":\\\"%y\\\"})r=r.re
place(new RegExp(p,\\\"g\\\"),f[p]);var d=\\\"Sunday Monday Tuesday Wednesday Thursday Friday
Saturday\\\".split(\\\" \\\"),m=\\\"January February March April May June July August September October
November December\\\".split(\\\" \\\");for(p in f={\\\"%a\\\":function(e){return
d[e.ub].substring(0,3)},\\\"%A\\\":function(e){return d[e.ub]},\\\"%b\\\":function(e){return
m[e.kb].substring(0,3)},\\\"%B\\\":function(e){return m[e.kb]},\\\"%C\\\":function(e){return
u((e.ab+1900)/100|0,2)},\\\"%d\\\":function(e){return u(e.nb,2)},\\\"%e\\\":function(e){return i(e.nb,2,\\\"
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\\\")},\\\"%g\\\":function(e){return l(e).toString().substring(2)},\\\"%G\\\":function(e){return
l(e)},\\\"%H\\\":function(e){return u(e.tb,2)},\\\"%I\\\":function(e){return 0==(e=e.tb)?e=12:12<e&&(e-
=12),u(e,2)},\\\"%j\\\":function(e){return u(e.nb+lt(ct(e.ab+1900)?ft:pt,e.kb-1),3)},\\\"%m\\\":function(e){return
u(e.kb+1,2)},\\\"%M\\\":function(e){return
u(e.jc,2)},\\\"%n\\\":function(){return\\\"\\\\n\\\"},\\\"%p\\\":function(e){return
0<=e.tb&&12>e.tb?\\\"AM\\\":\\\"PM\\\"},\\\"%S\\\":function(e){return
u(e.kc,2)},\\\"%t\\\":function(){return\\\"\\\\t\\\"},\\\"%u\\\":function(e){return e.ub||7},\\\"%U\\\":function(e){var
t=new Date(e.ab+1900,0,1),n=0===t.getDay()?t:dt(t,7-t.getDay());return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(lt(ct(e.getFullYear())?ft:pt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%V\\\":function(e){var t=new
Date(e.ab+1901,0,4),n=c(new Date(e.ab+1900,0,4));t=c(t);var r=dt(new Date(e.ab+1900,0,1),e.vb);return
0>s(r,n)?\\\"53\\\":0>=s(t,r)?\\\"01\\\":u(Math.ceil((n.getFullYear()<e.ab+1900?e.vb+32-n.getDate():e.vb+1-
n.getDate())/7),2)},\\\"%w\\\":function(e){return e.ub},\\\"%W\\\":function(e){var t=new
Date(e.ab,0,1),n=1===t.getDay()?t:dt(t,0===t.getDay()?1:7-t.getDay()+1);return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(lt(ct(e.getFullYear())?ft:pt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%y\\\":function(e){return(e.ab+1900).toString().substring(
2)},\\\"%Y\\\":function(e){return e.ab+1900},\\\"%z\\\":function(e){var t=0<=(e=e.ic);return
e=Math.abs(e)/60,(t?\\\"+\\\":\\\"-\\\")+String(\\\"0000\\\"+(e/60*100+e%60)).slice(-4)},\\\"%Z\\\":function(e){return
e.lc},\\\"%%\\\":function(){return\\\"%\\\"}})r.includes(p)&&(r=r.replace(new
RegExp(p,\\\"g\\\"),f[p](o)));return(p=function(e){var t=Array($(e)+1);return
q(e,t,0,t.length),t}(r)).length>n?0:(function(e,n){t().set(e,n)}(p,e),p.length-1)}var
ht=[null,ve,De,xe,Re,Ce,Pe,Ie,Fe,Ue,je,Le,We,He,Ye,ze,Be,Je,tt,nt,rt,at,ot,it,ut,st],gt={h:function(e,t,n,r){le(\\\"Asse
rtion failed: \\\"+N(e)+\\\", at: \\\"+[t?N(t):\\\"unknown filename\\\",n,r?N(r):\\\"unknown
function\\\"])},M:function(e,t){return _e(e,t)},b:function(e){return bt(e+16)+16},d:function(e,t){return
ve(e,t)},e:function(e,t){ye.yb.push((function(){Z.get(e)(t)}))},c:function(e,t,n){throw new
we(e).Pb(t,n),e},Z:function(e,t,n,r){if(\\\"undefined\\\"==typeof SharedArrayBuffer)return D(\\\"Current
environment does not support SharedArrayBuffer, pthreads are not available!\\\"),6;if(!e)return D(\\\"pthread_create
called with a null thread pointer!\\\"),28;var i=[];if(O&&0===i.length)return Et(687865856,e,t,n,r);var
u=0,s=0;if(t&&-1!=t){var c=a()[t>>2];c+=81920,u=a()[t+8>>2],s=0!==a()[t+12>>2]}else
c=2097152;(t=0==u)?u=Ht(16,c):F(0<(u-=c));for(var l=bt(228),f=0;57>f;++f)o()[(l>>2)+f]=0;return
a()[e>>2]=l,a()[l+12>>2]=l,e=l+152,a()[e>>2]=e,n={hb:u,jb:c,wb:t,detached:s,ec:n,rb:l,ib:r,mc:i},O?(n.oc=\\\"spaw
nThread\\\",postMessage(n,i),0):Oe(n)},X:function(e){throw
O?ye.Hb(e):(ye.Eb(),Nt(e)),\\\"unwind\\\"},Y:function(e,t){return function(e,t){if(!e)return D(\\\"pthread_join
attempted on a null thread pointer!\\\"),71;if(O&&vt()==e)return D(\\\"PThread \\\"+e+\\\" is attempting to join to
itself!\\\"),16;if(!O&&At()==e)return D(\\\"Main thread \\\"+e+\\\" is attempting to join to
itself!\\\"),16;if(a()[e+12>>2]!==e)return D(\\\"pthread_join attempted on thread \\\"+e+\\\", which does not point to
a valid thread, or does not exist anymore!\\\"),71;if(Atomics.load(o(),e+64>>2))return D(\\\"Attempted to join
thread \\\"+e+\\\", which was already detached!\\\"),28;for(Ee();;){var n=Atomics.load(o(),e+0>>2);if(1==n)return
n=Atomics.load(o(),e+4>>2),t&&(a()[t>>2]=n),Atomics.store(o(),e+64>>2,1),O?postMessage({cmd:\\\"cleanupThr
ead\\\",thread:e}):ge(e),0;kt(),O||Tt(),Ae(e+0,n,O?100:1)}}(e,t)},L:De,s:xe,S:Re,V:Ce,u:function(){return
42},F:Pe,Q:Ie,P:Fe,U:Ue,T:je,q:Le,K:We,N:He,v:Ye,O:ze,da:function(e,t){if(e==t)postMessage({cmd:\\\"processQ
ueuedMainThreadWork\\\"});else
if(O)postMessage({targetThread:e,cmd:\\\"processThreadQueue\\\"});else{if(!(e=(e=ye.cb[e])&&e.worker))return;e.
postMessage({cmd:\\\"processThreadQueue\\\"})}return 1},f:Be,w:_e,ga:function(e,t){return e-
t},A:function(){le(\\\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},l:function(){le(\\\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},C:function(){le(\\\"To use dlopen, you need to use Emscripten's linking support,
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see https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},z:function(){le(\\\"To use dlopen, you need to
use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},ea:function(e,t,n){var
o;for(Ge.length=0,n>>=2;o=r()[t++];)(o=105>o)&&1&n&&n++,Ge.push(o?i()[n++>>1]:a()[n]),++n;return
de[e].apply(null,Ge)},G:Ee,n:function(){},k:Ae,j:he,W:function(){return
2147483648},i:be,D:function(e,t,n){r().copyWithin(e,t,t+n)},o:function(){return
w?n(993).cpus().length:navigator.hardwareConcurrency},aa:function(e,t,n){qe.length=t,n>>=3;for(var
r=0;r<t;r++)qe[r]=i()[n+r];return(0>e?de[-e-1]:ht[e]).apply(null,qe)},E:function(e){var
t=r().length;if((e>>>=0)<=t||2147483648<e)return!1;for(var n=1;4>=n;n*=2){var
a=t*(1+.2/n);a=Math.min(a,e+100663296),0<(a=Math.max(e,a))%65536&&(a+=65536-
a%65536);e:{try{R.grow(Math.min(2147483648,a)-j.byteLength+65535>>>16),J(R.buffer);var o=1;break
e}catch(e){}o=void 0}if(o)return!0}return!1},ba:function(e,t,n){return
$e(e)?Xe(e,t,n):Je(e,t,n)},x:function(){},$:function(e,t,n){return re+=1,setTimeout((function(){--
re,function(e){if(!I){try{e()}catch(e){if(e instanceof Bt)return;if(\\\"unwind\\\"!==e)throw
e&&\\\"object\\\"==typeof e&&e.stack&&D(\\\"exception thrown:
\\\"+[e,e.stack]),e}if(!ae())try{O?Dt(P):Nt(P)}catch(e){if(!(e instanceof Bt))throw
e}}}((function(){Z.get(e)(n)}))}),t)},ca:function(e,t){t>>=2;var n=a()[t+6];return
t={alpha:!!a()[t],depth:!!a()[t+1],stencil:!!a()[t+2],antialias:!!a()[t+3],premultipliedAlpha:!!a()[t+4],preserveDrawin
gBuffer:!!a()[t+5],powerPreference:Ze[n],failIfMajorPerformanceCaveat:!!a()[t+7],Vb:a()[t+8],yc:a()[t+9],Bb:a()[t+
10],Mb:a()[t+11],Bc:a()[t+12],Cc:a()[t+13]},!(e=$e(e))||t.Mb?0:function(e,t){e.Cb||(e.Cb=e.getContext,e.getContext
=function(t,n){return\\\"webgl\\\"==t==(n=e.Cb(t,n))instanceof WebGLRenderingContext?n:null});var
n=e.getContext(\\\"webgl\\\",t);return n?function(e,t){var n=bt(8);a()[n+4>>2]=vt();var
r={wc:n,attributes:t,version:t.Vb,ob:e};return e.canvas&&(e.canvas.pb=r),(void
0===t.Bb||t.Bb)&&function(e){if(e||(e=void 0),!e.Qb){e.Qb=!0;var t=e.ob;!function(e){var
t=e.getExtension(\\\"ANGLE_instanced_arrays\\\");t&&(e.vertexAttribDivisor=function(e,n){t.vertexAttribDivisor
ANGLE(e,n)},e.drawArraysInstanced=function(e,n,r,a){t.drawArraysInstancedANGLE(e,n,r,a)},e.drawElementsIns
tanced=function(e,n,r,a,o){t.drawElementsInstancedANGLE(e,n,r,a,o)})}(t),function(e){var
t=e.getExtension(\\\"OES_vertex_array_object\\\");t&&(e.createVertexArray=function(){return
t.createVertexArrayOES()},e.deleteVertexArray=function(e){t.deleteVertexArrayOES(e)},e.bindVertexArray=funct
ion(e){t.bindVertexArrayOES(e)},e.isVertexArray=function(e){return t.isVertexArrayOES(e)})}(t),function(e){var
t=e.getExtension(\\\"WEBGL_draw_buffers\\\");t&&(e.drawBuffers=function(e,n){t.drawBuffersWEBGL(e,n)})}(t
),t.qc=t.getExtension(\\\"EXT_disjoint_timer_query\\\"),t.zc=t.getExtension(\\\"WEBGL_multi_draw\\\"),(t.getSupp
ortedExtensions()||[]).forEach((function(e){e.includes(\\\"lose_context\\\")||e.includes(\\\"debug\\\")||t.getExtension(e
)}))}}(r),n}(n,t):0}(e,t)},I:tt,J:nt,m:rt,H:at,t:ot,B:it,p:ut,R:function(e){var t=Date.now();return
a()[e>>2]=t/1e3|0,a()[e+4>>2]=t%1e3*1e3|0,0},ha:function e(t,n){return t=new
Date(1e3*a()[t>>2]),a()[n>>2]=t.getUTCSeconds(),a()[n+4>>2]=t.getUTCMinutes(),a()[n+8>>2]=t.getUTCHours()
,a()[n+12>>2]=t.getUTCDate(),a()[n+16>>2]=t.getUTCMonth(),a()[n+20>>2]=t.getUTCFullYear()-
1900,a()[n+24>>2]=t.getUTCDay(),a()[n+36>>2]=0,a()[n+32>>2]=0,t=(t.getTime()-
Date.UTC(t.getUTCFullYear(),0,1,0,0,0,0))/864e5|0,a()[n+28>>2]=t,e.Ab||(e.Ab=X(\\\"GMT\\\")),a()[n+40>>2]=e.
Ab,n},_:function(){ye.Rb()},r:function(e,t){st(),e=new
Date(1e3*a()[e>>2]),a()[t>>2]=e.getSeconds(),a()[t+4>>2]=e.getMinutes(),a()[t+8>>2]=e.getHours(),a()[t+12>>2]
=e.getDate(),a()[t+16>>2]=e.getMonth(),a()[t+20>>2]=e.getFullYear()-1900,a()[t+24>>2]=e.getDay();var n=new
Date(e.getFullYear(),0,1),r=(e.getTime()-n.getTime())/864e5|0;return a()[t+28>>2]=r,a()[t+36>>2]=-
60*e.getTimezoneOffset(),r=new
Date(e.getFullYear(),6,1).getTimezoneOffset(),e=0|(r!=(n=n.getTimezoneOffset())&&e.getTimezoneOffset()==Mat
h.min(n,r)),a()[t+32>>2]=e,e=a()[Pt()+(e?4:0)>>2],a()[t+40>>2]=e,t},a:R||u.wasmMemory,y:function(e){st();var
t=new
Date(a()[e+20>>2]+1900,a()[e+16>>2],a()[e+12>>2],a()[e+8>>2],a()[e+4>>2],a()[e>>2],0),n=a()[e+32>>2],r=t.get
```

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TimezoneOffset(),o=new Date(t.getFullYear(),0,1),i=new
Date(t.getFullYear(),6,1).getTimezoneOffset(),u=o.getTimezoneOffset(),s=Math.min(u,i);return
0>n?a()[e+32>>2]=Number(i!=u&&s==r):0<n!=(s==r)&&(i=Math.max(u,i),t.setTime(t.getTime()+6e4*((0<n?s:i)-
r))),a()[e+24>>2]=t.getDay(),n=(t.getTime()-
o.getTime())/864e5|0,a()[e+28>>2]=n,a()[e>>2]=t.getSeconds(),a()[e+4>>2]=t.getMinutes(),a()[e+8>>2]=t.getHour
s(),a()[e+12>>2]=t.getDate(),a()[e+16>>2]=t.getMonth(),t.getTime()/1e3|0},fa:mt,g:function(e,t,n,r){return
mt(e,t,n,r)}};!function(){function
e(e,t){u.asm=e.exports,Z=u.asm.Ca,ee.unshift(u.asm.ia),ye.zb.push(u.asm.Ha),C=t,O||(ue--
,u.monitorRunDependencies&&u.monitorRunDependencies(ue),0==ue&&(null!==se&&(clearInterval(se),se=null),
ce&&(e=ce,ce=null,e())))}function t(t){e(t.instance,t.module)}function n(e){return
function(){if(!M&&(_||v)){if(\\\"function\\\"==typeof fetch&&!ie.startsWith(\\\"file://\\\"))return
fetch(ie,{credentials:\\\"same-origin\\\"}).then((function(e){if(!e.ok)throw\\\"failed to load wasm binary file at
'\\\"+ie+\\\"'\\\";return e.arrayBuffer()})).catch((function(){return pe()}));if(h)return new
Promise((function(e,t){h(ie,(function(t){e(new Uint8Array(t))}),t)}))}return
Promise.resolve().then((function(){return pe()}))}().then((function(e){return
WebAssembly.instantiate(e,r)})).then(e,(function(e){D(\\\"failed to asynchronously prepare wasm:
\\\"+e),le(e)}))}var
r={a:gt};if(O||(ue++,u.monitorRunDependencies&&u.monitorRunDependencies(ue)),u.instantiateWasm)try{return
u.instantiateWasm(r,e)}catch(e){return D(\\\"Module.instantiateWasm callback failed with error:
\\\"+e),!1}(M||\\\"function\\\"!=typeof
WebAssembly.instantiateStreaming||fe()||ie.startsWith(\\\"file://\\\")||\\\"function\\\"!=typeof
fetch?n(t):fetch(ie,{credentials:\\\"same-origin\\\"}).then((function(e){return
WebAssembly.instantiateStreaming(e,r).then(t,(function(e){return D(\\\"wasm streaming compile failed:
\\\"+e),D(\\\"falling back to ArrayBuffer
instantiation\\\"),n(t)}))}))).catch(c)}(),u.___wasm_call_ctors=function(){return(u.___wasm_call_ctors=u.asm.ia).a
pply(null,arguments)},u._OrtInit=function(){return(u._OrtInit=u.asm.ja).apply(null,arguments)},u._OrtCreateSessio
nOptions=function(){return(u._OrtCreateSessionOptions=u.asm.ka).apply(null,arguments)},u._OrtAddSessionConfi
gEntry=function(){return(u._OrtAddSessionConfigEntry=u.asm.la).apply(null,arguments)},u._OrtReleaseSessionO
ptions=function(){return(u._OrtReleaseSessionOptions=u.asm.ma).apply(null,arguments)},u._OrtCreateSession=fu
nction(){return(u._OrtCreateSession=u.asm.na).apply(null,arguments)},u._OrtReleaseSession=function(){return(u._
OrtReleaseSession=u.asm.oa).apply(null,arguments)},u._OrtGetInputCount=function(){return(u._OrtGetInputCount
=u.asm.pa).apply(null,arguments)},u._OrtGetOutputCount=function(){return(u._OrtGetOutputCount=u.asm.qa).app
ly(null,arguments)},u._OrtGetInputName=function(){return(u._OrtGetInputName=u.asm.ra).apply(null,arguments)
},u._OrtGetOutputName=function(){return(u._OrtGetOutputName=u.asm.sa).apply(null,arguments)},u._OrtFree=f
unction(){return(u._OrtFree=u.asm.ta).apply(null,arguments)},u._OrtCreateTensor=function(){return(u._OrtCreate
Tensor=u.asm.ua).apply(null,arguments)},u._OrtGetTensorData=function(){return(u._OrtGetTensorData=u.asm.va)
.apply(null,arguments)},u._OrtReleaseTensor=function(){return(u._OrtReleaseTensor=u.asm.wa).apply(null,argum
ents)},u._OrtCreateRunOptions=function(){return(u._OrtCreateRunOptions=u.asm.xa).apply(null,arguments)},u._O
rtAddRunConfigEntry=function(){return(u._OrtAddRunConfigEntry=u.asm.ya).apply(null,arguments)},u._OrtRele
aseRunOptions=function(){return(u._OrtReleaseRunOptions=u.asm.za).apply(null,arguments)},u._OrtRun=function
(){return(u._OrtRun=u.asm.Aa).apply(null,arguments)},u._OrtEndProfiling=function(){return(u._OrtEndProfiling=
u.asm.Ba).apply(null,arguments)};var
bt=u._malloc=function(){return(bt=u._malloc=u.asm.Da).apply(null,arguments)},yt=u.___errno_location=function(
){return(yt=u.___errno_location=u.asm.Ea).apply(null,arguments)},_t=u._free=function(){return(_t=u._free=u.asm.
Fa).apply(null,arguments)},vt=u._pthread_self=function(){return(vt=u._pthread_self=u.asm.Ga).apply(null,argumen
ts)};u._emscripten_tls_init=function(){return(u._emscripten_tls_init=u.asm.Ha).apply(null,arguments)},u._emscript
en_current_thread_process_queued_calls=function(){return(u._emscripten_current_thread_process_queued_calls=u.
asm.Ia).apply(null,arguments)};var
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wt,Ot=u._emscripten_register_main_browser_thread_id=function(){return(Ot=u._emscripten_register_main_brows
er_thread_id=u.asm.Ja).apply(null,arguments)},At=u._emscripten_main_browser_thread_id=function(){return(At=u
._emscripten_main_browser_thread_id=u.asm.Ka).apply(null,arguments)},Et=u._emscripten_sync_run_in_main_thr
ead_4=function(){return(Et=u._emscripten_sync_run_in_main_thread_4=u.asm.La).apply(null,arguments)},Tt=u._e
mscripten_main_thread_process_queued_calls=function(){return(Tt=u._emscripten_main_thread_process_queued_
calls=u.asm.Ma).apply(null,arguments)},St=u._emscripten_run_in_main_runtime_thread_js=function(){return(St=u
._emscripten_run_in_main_runtime_thread_js=u.asm.Na).apply(null,arguments)},Mt=u.__emscripten_call_on_thre
ad=function(){return(Mt=u.__emscripten_call_on_thread=u.asm.Oa).apply(null,arguments)},kt=u._pthread_testcan
cel=function(){return(kt=u._pthread_testcancel=u.asm.Pa).apply(null,arguments)},Dt=u._pthread_exit=function(){r
eturn(Dt=u._pthread_exit=u.asm.Qa).apply(null,arguments)},xt=u.__emscripten_thread_init=function(){return(xt=u
.__emscripten_thread_init=u.asm.Ra).apply(null,arguments)},Rt=u._emscripten_get_global_libc=function(){return(
Rt=u._emscripten_get_global_libc=u.asm.Sa).apply(null,arguments)},Ct=u.___pthread_tsd_run_dtors=function(){re
turn(Ct=u.___pthread_tsd_run_dtors=u.asm.Ta).apply(null,arguments)},Pt=u.__get_tzname=function(){return(Pt=u.
__get_tzname=u.asm.Ua).apply(null,arguments)},It=u.__get_daylight=function(){return(It=u.__get_daylight=u.asm
.Va).apply(null,arguments)},Ft=u.__get_timezone=function(){return(Ft=u.__get_timezone=u.asm.Wa).apply(null,ar
guments)},Ut=u.stackSave=function(){return(Ut=u.stackSave=u.asm.Xa).apply(null,arguments)},jt=u.stackRestore
=function(){return(jt=u.stackRestore=u.asm.Ya).apply(null,arguments)},Lt=u.stackAlloc=function(){return(Lt=u.st
ackAlloc=u.asm.Za).apply(null,arguments)},Wt=u._emscripten_stack_set_limits=function(){return(Wt=u._emscript
en_stack_set_limits=u.asm._a).apply(null,arguments)},Ht=u._memalign=function(){return(Ht=u._memalign=u.asm.
$a).apply(null,arguments)},Yt=u.__emscripten_allow_main_runtime_queued_calls=973296,zt=u.__emscripten_mai
n_thread_futex=977204;function Bt(e){this.name=\\\"ExitStatus\\\",this.message=\\\"Program terminated with
exit(\\\"+e+\\\")\\\",this.status=e}function Gt(){function
e(){if(!wt&&(wt=!0,u.calledRun=!0,!I)&&(O||me(ee),s(u),u.onRuntimeInitialized&&u.onRuntimeInitialized(),!O))
{if(u.postRun)for(\\\"function\\\"==typeof u.postRun&&(u.postRun=[u.postRun]);u.postRun.length;){var
e=u.postRun.shift();ne.unshift(e)}me(ne)}}if(!(0<ue))if(O)s(u),O||me(ee),postMessage({cmd:\\\"loaded\\\"});else{if
(!O){if(u.preRun)for(\\\"function\\\"==typeof
u.preRun&&(u.preRun=[u.preRun]);u.preRun.length;)oe();me(K)}0<ue||(u.setStatus?(u.setStatus(\\\"Running...\\\"),
setTimeout((function(){setTimeout((function(){u.setStatus(\\\"\\\")}),1),e()}),1)):e())}}function
Nt(e){if(P=e,O)throw postMessage({cmd:\\\"exitProcess\\\",returnCode:e}),new
Bt(e);ae()||(ye.Gb(),O||(me(te),\\\"undefined\\\"!=typeof
_fflush&&_fflush(0),Se[1].length&&Me(1,10),Se[2].length&&Me(2,10))),P=e,ae()||(ye.Gb(),u.onExit&&u.onExit(
e),I=!0),d(e,new
Bt(e))}if(u.UTF8ToString=N,u.stringToUTF8=V,u.lengthBytesUTF8=$,u.keepRuntimeAlive=ae,u.PThread=ye,u.st
ackSave=Ut,u.stackRestore=jt,u.stackAlloc=Lt,u.PThread=ye,u.wasmMemory=R,u.ExitStatus=Bt,ce=function
e(){wt||Gt(),wt||(ce=e)},u.run=Gt,u.preInit)for(\\\"function\\\"==typeof
u.preInit&&(u.preInit=[u.preInit]);0<u.preInit.length;)u.preInit.pop()();return
O&&(x=!1,ye.Sb()),Gt(),e.ready});e.exports=r},118:e=>{\\\"use strict\\\";e.exports="\\\"use strict\\\";var
e={};if(\\\"object\\\"==typeof process&&\\\"object\\\"==typeof process.versions&&\\\"string\\\"==typeof
process.versions.node){var
a=require(\\\"worker_threads\\\"),t=a.parentPort;t.on(\\\"message\\\",(function(e){onmessage({data:e})}));var
r=require(\\\"fs\\\");Object.assign(global,{self:global,require:require,Module:e,location:{href:__filename},Worker:a.
Worker,importScripts:function(e){(0,eval)(r.readFileSync(e,\\\"utf8\\\"))},postMessage:function(e){t.postMessage(e
)},performance:global.performance||{now:function(){return Date.now()}}})}var s=function(){var
e=Array.prototype.slice.call(arguments).join(\\\" \\\");console.error(e)};self.alert=function(){var
a=Array.prototype.slice.call(arguments).join(\\\"
\\\");postMessage({cmd:\\\"alert\\\",text:a,threadId:e._pthread_self()})},e.instantiateWasm=function(a,t){var r=new
WebAssembly.Instance(e.wasmModule,a);return
t(r),e.wasmModule=null,r.exports},self.onmessage=function(a){try{if(\\\"load\\\"===a.data.cmd){if(e.wasmModule
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=a.data.wasmModule,e.wasmMemory=a.data.wasmMemory,e.buffer=e.wasmMemory.buffer,e.ENVIRONMENT_I
S_PTHREAD=!0,\\\"string\\\"==typeof a.data.urlOrBlob)importScripts(a.data.urlOrBlob);else{var
t=URL.createObjectURL(a.data.urlOrBlob);importScripts(t),URL.revokeObjectURL(t)}ortWasmThreaded(e).then((
function(a){e=a}))}else if(\\\"objectTransfer\\\"===a.data.cmd)e.PThread.receiveObjectTransfer(a.data);else
if(\\\"run\\\"===a.data.cmd){e.__performance_now_clock_drift=performance.now()-
a.data.time,e.__emscripten_thread_init(a.data.threadInfoStruct,0,0);var
r=a.data.stackBase,o=a.data.stackBase+a.data.stackSize;e.establishStackSpace(o,r),e.PThread.receiveObjectTransfer
(a.data),e.PThread.threadInit();try{var
n=e.invokeEntryPoint(a.data.start_routine,a.data.arg);e.keepRuntimeAlive()?e.PThread.setExitStatus(n):e.PThread.t
hreadExit(n)}catch(a){if(\\\"Canceled!\\\"===a)e.PThread.threadCancel();else if(\\\"unwind\\\"!=a){if(!(a instanceof
e.ExitStatus))throw e.PThread.threadExit(-
2),a;e.keepRuntimeAlive()||e.PThread.threadExit(a.status)}}}else\\\"cancel\\\"===a.data.cmd?e._pthread_self()&&e
.PThread.threadCancel():\\\"setimmediate\\\"===a.data.target||(\\\"processThreadQueue\\\"===a.data.cmd?e._pthrea
d_self()&&e._emscripten_current_thread_process_queued_calls():(s(\\\"worker.js received unknown command
\\\"+a.data.cmd),s(a.data)))}catch(e){throw s(\\\"worker.js onmessage() captured an uncaught exception:
\\\"+e),e&&e.stack&&s(e.stack),e}};\\\\n'},932:(e,t,n)=>{var
_scriptDir,r=(_scriptDir=(_scriptDir=\\\"undefined\\\"!=typeof
document&&document.currentScript?document.currentScript.src:void 0)||\\\"/index.js\\\",function(e){var
t,r,a;e=e||{},t||(t=void 0!==e?e:{}),t.ready=new Promise((function(e,t){r=e,a=t}));var o,i={};for(o in
t)t.hasOwnProperty(o)&&(i[o]=t[o]);var u,s,c,l,f,p=\\\"./this.program\\\",d=\\\"object\\\"==typeof
window,m=\\\"function\\\"==typeof importScripts,h=\\\"object\\\"==typeof process&&\\\"object\\\"==typeof
process.versions&&\\\"string\\\"==typeof
process.versions.node,g=\\\"\\\";h?(g=m?n(908).dirname(g)+\\\"/\\\":\\\"//\\\",u=function(e,t){return
l||(l=n(384)),f||(f=n(908)),e=f.normalize(e),l.readFileSync(e,t?null:\\\"utf8\\\")},c=function(e){return(e=u(e,!0)).buff
er||(e=new Uint8Array(e)),e.buffer||B(\\\"Assertion failed:
undefined\\\"),e},s=function(e,t,r){l||(l=n(384)),f||(f=n(908)),e=f.normalize(e),l.readFile(e,(function(e,n){e?r(e):t(n.b
uffer)}))},1<process.argv.length&&(p=process.argv[1].replace(/\\\\\\\/g,\\\"/\\\")),process.argv.slice(2),process.on(\\\
"uncaughtException\\\",(function(e){throw
e})),process.on(\\\"unhandledRejection\\\",B),t.inspect=function(){return\\\"[Emscripten Module
object]\\\"}):(d||m)&&(m?g=self.location.href:\\\"undefined\\\"!=typeof
document&&document.currentScript&&(g=document.currentScript.src),_scriptDir&&(g=_scriptDir),g=0!==g.inde
xOf(\\\"blob:\\\")?g.substr(0,g.lastIndexOf(\\\"/\\\")+1):\\\"\\\",u=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.send(null),t.responseText},m&&(c=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.responseType=\\\"arraybuffer\\\",t.send(null),new
Uint8Array(t.response)}),s=function(e,t,n){var r=new
XMLHttpRequest;r.open(\\\"GET\\\",e,!0),r.responseType=\\\"arraybuffer\\\",r.onload=function(){200==r.status||0=
=r.status&&r.response?t(r.response):n()},r.onerror=n,r.send(null)});var
b,y=t.print||console.log.bind(console),_=t.printErr||console.warn.bind(console);for(o in
i)i.hasOwnProperty(o)&&(t[o]=i[o]);i=null,t.thisProgram&&(p=t.thisProgram),t.wasmBinary&&(b=t.wasmBinary),
t.noExitRuntime,\\\"object\\\"!=typeof WebAssembly&&B(\\\"no native wasm support detected\\\");var
v,w,O,A,E,T=!1,S=\\\"undefined\\\"!=typeof TextDecoder?new TextDecoder(\\\"utf8\\\"):void 0;function
M(e,t,n){var r=t+n;for(n=t;e[n]&&!(n>=r);)++n;if(16<n-t&&e.subarray&&S)return
S.decode(e.subarray(t,n));for(r=\\\"\\\";t<n;){var a=e[t++];if(128&a){var
o=63&e[t++];if(192==(224&a))r+=String.fromCharCode((31&a)<<6|o);else{var
i=63&e[t++];65536>(a=224==(240&a)?(15&a)<<12|o<<6|i:(7&a)<<18|o<<12|i<<6|63&e[t++])?r+=String.fromCh
arCode(a):(a-=65536,r+=String.fromCharCode(55296|a>>10,56320|1023&a))}}else
r+=String.fromCharCode(a)}return r}function k(e,t){return e?M(A,e,t):\\\"\\\"}function D(e,t,n,r){if(!(0<r))return
0;var a=n;r=n+r-1;for(var o=0;o<e.length;++o){var
```

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i=e.charCodeAt(o);if(55296<=i&&57343>=i&&(i=65536+((1023&i)<<10)|1023&e.charCodeAt(++o)),127>=i){if(
n>=r)break;t[n++]=i}else{if(2047>=i){if(n+1>=r)break;t[n++]=192|i>>6}else{if(65535>=i){if(n+2>=r)break;t[n++
]=224|i>>12}else{if(n+3>=r)break;t[n++]=240|i>>18,t[n++]=128|i>>12&63}t[n++]=128|i>>6&63}t[n++]=128|63
&i}}return t[n]=0,n-a}function x(e){for(var t=0,n=0;n<e.length;++n){var
r=e.charCodeAt(n);55296<=r&&57343>=r&&(r=65536+((1023&r)<<10)|1023&e.charCodeAt(++n)),127>=r?++t:t
=2047>=r?t+2:65535>=r?t+3:t+4}return t}function R(e){var t=x(e)+1,n=pe(t);return n&&D(e,O,n,t),n}function
C(){var e=v.buffer;w=e,t.HEAP8=O=new Int8Array(e),t.HEAP16=new Int16Array(e),t.HEAP32=E=new
Int32Array(e),t.HEAPU8=A=new Uint8Array(e),t.HEAPU16=new Uint16Array(e),t.HEAPU32=new
Uint32Array(e),t.HEAPF32=new Float32Array(e),t.HEAPF64=new Float64Array(e)}var
P,I=[],F=[],U=[],j=[];function L(){var e=t.preRun.shift();I.unshift(e)}var W,H=0,Y=null,z=null;function B(e){throw
t.onAbort&&t.onAbort(e),_(e),T=!0,e=new WebAssembly.RuntimeError(\\\"abort(\\\"+e+\\\"). Build with -s
ASSERTIONS=1 for more info.\\\"),a(e),e}function G(){return W.startsWith(\\\"data:application/octet-
stream;base64,\\\")}if(t.preloadedImages={},t.preloadedAudios={},W=\\\"ort-wasm.wasm\\\",!G()){var
N=W;W=t.locateFile?t.locateFile(N,g):g+N}function q(){var e=W;try{if(e==W&&b)return new
Uint8Array(b);if(c)return c(e);throw\\\"both async and sync fetching of the wasm failed\\\"}catch(e){B(e)}}function
V(e){for(;0<e.length;){var n=e.shift();if(\\\"function\\\"==typeof n)n(t);else{var r=n.Ea;\\\"number\\\"==typeof
r?void 0===n.xa?P.get(r)():P.get(r)(n.xa):r(void 0===n.xa?null:n.xa)}}}function $(e){this.ya=e-
16,this.Na=function(e){E[this.ya+4>>2]=e},this.Ka=function(e){E[this.ya+8>>2]=e},this.La=function(){E[this.ya>
>2]=0},this.Ja=function(){O[this.ya+12>>0]=0},this.Ma=function(){O[this.ya+13>>0]=0},this.Ga=function(e,t){thi
s.Na(e),this.Ka(t),this.La(),this.Ja(),this.Ma()}}var X,J={},Q=[null,[],[]],Z={};X=h?function(){var
e=process.hrtime();return 1e3*e[0]+e[1]/1e6}:function(){return performance.now()};var K,ee,te={};function
ne(){if(!K){var
e,t={USER:\\\"web_user\\\",LOGNAME:\\\"web_user\\\",PATH:\\\"/\\\",PWD:\\\"/\\\",HOME:\\\"/home/web_user\\\
",LANG:(\\\"object\\\"==typeof navigator&&navigator.languages&&navigator.languages[0]||\\\"C\\\").replace(\\\"-
\\\",\\\"_\\\")+\\\".UTF-8\\\",_:p||\\\"./this.program\\\"};for(e in te)void 0===te[e]?delete t[e]:t[e]=te[e];var n=[];for(e
in t)n.push(e+\\\"=\\\"+t[e]);K=n}return K}function re(){function e(e){return(e=e.toTimeString().match(/\\\\(([A-Za-
z ]+)\\\\)$/))?e[1]:\\\"GMT\\\"}if(!ee){ee=!0;var t=(new Date).getFullYear(),n=new Date(t,0,1),r=new
Date(t,6,1);t=n.getTimezoneOffset();var
a=r.getTimezoneOffset(),o=Math.max(t,a);E[be()>>2]=60*o,E[ge()>>2]=Number(t!=a),n=e(n),r=e(r),n=R(n),r=R(r)
,a<t?(E[he()>>2]=n,E[he()+4>>2]=r):(E[he()>>2]=r,E[he()+4>>2]=n)}}function ae(e){return
0==e%4&&(0!=e%100||0==e%400)}function oe(e,t){for(var n=0,r=0;r<=t;n+=e[r++]);return n}var
ie=[31,29,31,30,31,30,31,31,30,31,30,31],ue=[31,28,31,30,31,30,31,31,30,31,30,31];function se(e,t){for(e=new
Date(e.getTime());0<t;){var n=e.getMonth(),r=(ae(e.getFullYear())?ie:ue)[n];if(!(t>r-
e.getDate())){e.setDate(e.getDate()+t);break}t-=r-
e.getDate()+1,e.setDate(1),11>n?e.setMonth(n+1):(e.setMonth(0),e.setFullYear(e.getFullYear()+1))}return
e}function ce(e,t,n,r){function a(e,t,n){for(e=\\\"number\\\"==typeof
e?e.toString():e||\\\"\\\";e.length<t;)e=n[0]+e;return e}function o(e,t){return a(e,t,\\\"0\\\")}function i(e,t){function
n(e){return 0>e?-1:0<e?1:0}var r;return 0===(r=n(e.getFullYear()-t.getFullYear()))&&0===(r=n(e.getMonth()-
t.getMonth()))&&(r=n(e.getDate()-t.getDate())),r}function u(e){switch(e.getDay()){case 0:return new
Date(e.getFullYear()-1,11,29);case 1:return e;case 2:return new Date(e.getFullYear(),0,3);case 3:return new
Date(e.getFullYear(),0,2);case 4:return new Date(e.getFullYear(),0,1);case 5:return new Date(e.getFullYear()-
1,11,31);case 6:return new Date(e.getFullYear()-1,11,30)}}function s(e){e=se(new Date(e.va+1900,0,1),e.Ca);var
t=new Date(e.getFullYear()+1,0,4),n=u(new Date(e.getFullYear(),0,4));return
t=u(t),0>=i(n,e)?0>=i(t,e)?e.getFullYear()+1:e.getFullYear():e.getFullYear()-1}var c=E[r+40>>2];for(var l in
r={Qa:E[r>>2],Pa:E[r+4>>2],Aa:E[r+8>>2],za:E[r+12>>2],wa:E[r+16>>2],va:E[r+20>>2],Ba:E[r+24>>2],Ca:E[r+
28>>2],Ya:E[r+32>>2],Oa:E[r+36>>2],Ra:c?k(c):\\\"\\\"},n=k(n),c={\\\"%c\\\":\\\"%a %b %d %H:%M:%S
%Y\\\",\\\"%D\\\":\\\"%m/%d/%y\\\",\\\"%F\\\":\\\"%Y-%m-%d\\\",\\\"%h\\\":\\\"%b\\\",\\\"%r\\\":\\\"%I:%M:%S
%p\\\",\\\"%R\\\":\\\"%H:%M\\\",\\\"%T\\\":\\\"%H:%M:%S\\\",\\\"%x\\\":\\\"%m/%d/%y\\\",\\\"%X\\\":\\\"%H:%M:
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%S\\\",\\\"%Ec\\\":\\\"%c\\\",\\\"%EC\\\":\\\"%C\\\",\\\"%Ex\\\":\\\"%m/%d/%y\\\",\\\"%EX\\\":\\\"%H:%M:%S\\\",\\\
"%Ey\\\":\\\"%y\\\",\\\"%EY\\\":\\\"%Y\\\",\\\"%Od\\\":\\\"%d\\\",\\\"%Oe\\\":\\\"%e\\\",\\\"%OH\\\":\\\"%H\\\",\\\"%
OI\\\":\\\"%I\\\",\\\"%Om\\\":\\\"%m\\\",\\\"%OM\\\":\\\"%M\\\",\\\"%OS\\\":\\\"%S\\\",\\\"%Ou\\\":\\\"%u\\\",\\\"%O
U\\\":\\\"%U\\\",\\\"%OV\\\":\\\"%V\\\",\\\"%Ow\\\":\\\"%w\\\",\\\"%OW\\\":\\\"%W\\\",\\\"%Oy\\\":\\\"%y\\\"})n=n.r
eplace(new RegExp(l,\\\"g\\\"),c[l]);var f=\\\"Sunday Monday Tuesday Wednesday Thursday Friday
Saturday\\\".split(\\\" \\\"),p=\\\"January February March April May June July August September October November
December\\\".split(\\\" \\\");for(l in c={\\\"%a\\\":function(e){return
f[e.Ba].substring(0,3)},\\\"%A\\\":function(e){return f[e.Ba]},\\\"%b\\\":function(e){return
p[e.wa].substring(0,3)},\\\"%B\\\":function(e){return p[e.wa]},\\\"%C\\\":function(e){return
o((e.va+1900)/100|0,2)},\\\"%d\\\":function(e){return o(e.za,2)},\\\"%e\\\":function(e){return a(e.za,2,\\\"
\\\")},\\\"%g\\\":function(e){return s(e).toString().substring(2)},\\\"%G\\\":function(e){return
s(e)},\\\"%H\\\":function(e){return o(e.Aa,2)},\\\"%I\\\":function(e){return 0==(e=e.Aa)?e=12:12<e&&(e-
=12),o(e,2)},\\\"%j\\\":function(e){return o(e.za+oe(ae(e.va+1900)?ie:ue,e.wa-1),3)},\\\"%m\\\":function(e){return
o(e.wa+1,2)},\\\"%M\\\":function(e){return
o(e.Pa,2)},\\\"%n\\\":function(){return\\\"\\\\n\\\"},\\\"%p\\\":function(e){return
0<=e.Aa&&12>e.Aa?\\\"AM\\\":\\\"PM\\\"},\\\"%S\\\":function(e){return
o(e.Qa,2)},\\\"%t\\\":function(){return\\\"\\\\t\\\"},\\\"%u\\\":function(e){return e.Ba||7},\\\"%U\\\":function(e){var
t=new Date(e.va+1900,0,1),n=0===t.getDay()?t:se(t,7-t.getDay());return 0>i(n,e=new
Date(e.va+1900,e.wa,e.za))?o(Math.ceil((31-n.getDate()+(oe(ae(e.getFullYear())?ie:ue,e.getMonth()-1)-
31)+e.getDate())/7),2):0===i(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%V\\\":function(e){var t=new
Date(e.va+1901,0,4),n=u(new Date(e.va+1900,0,4));t=u(t);var r=se(new Date(e.va+1900,0,1),e.Ca);return
0>i(r,n)?\\\"53\\\":0>=i(t,r)?\\\"01\\\":o(Math.ceil((n.getFullYear()<e.va+1900?e.Ca+32-n.getDate():e.Ca+1-
n.getDate())/7),2)},\\\"%w\\\":function(e){return e.Ba},\\\"%W\\\":function(e){var t=new
Date(e.va,0,1),n=1===t.getDay()?t:se(t,0===t.getDay()?1:7-t.getDay()+1);return 0>i(n,e=new
Date(e.va+1900,e.wa,e.za))?o(Math.ceil((31-n.getDate()+(oe(ae(e.getFullYear())?ie:ue,e.getMonth()-1)-
31)+e.getDate())/7),2):0===i(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%y\\\":function(e){return(e.va+1900).toString().substring(
2)},\\\"%Y\\\":function(e){return e.va+1900},\\\"%z\\\":function(e){var t=0<=(e=e.Oa);return
e=Math.abs(e)/60,(t?\\\"+\\\":\\\"-\\\")+String(\\\"0000\\\"+(e/60*100+e%60)).slice(-4)},\\\"%Z\\\":function(e){return
e.Ra},\\\"%%\\\":function(){return\\\"%\\\"}})n.includes(l)&&(n=n.replace(new
RegExp(l,\\\"g\\\"),c[l](r)));return(l=function(e){var t=Array(x(e)+1);return
D(e,t,0,t.length),t}(n)).length>t?0:(O.set(l,e),l.length-1)}var le={a:function(e){return
pe(e+16)+16},c:function(e,t){U.unshift({Ea:e,xa:t})},d:function(e,t){U.unshift({Ea:e,xa:t})},b:function(e,t,n){thro
w new $(e).Ga(t,n),e},D:function(e,t){return e=k(e),Z.Sa(e,t)},m:function(){return
0},I:function(){},L:function(){},o:function(){return 42},x:function(){return
0},H:function(){},G:function(e,t){return
e=k(e),Z.Ta(e,t)},K:function(e,t,n,r,a,o){if(o<<=12,0!=(16&r)&&0!=e%65536)t=-28;else
if(0!=(32&r)){e=65536*Math.ceil(t/65536);var
i=we(65536,e);i?(A.fill(0,i,i+e),e=i):e=0,e?(J[e]={Ia:e,Ha:t,Fa:!0,fd:a,Xa:n,flags:r,offset:o},t=e):t=-48}else t=-
52;return t},J:function(e,t){var n=J[e];return 0!==t&&n?(t===n.Ha&&(J[e]=null,n.Fa&&me(n.Ia)),e=0):e=-
28,e},j:function(){},C:function(e,t,n){return
e=k(e),Z.Ua(e,t,n)},E:function(){},r:function(){},F:function(){},h:function(){B()},p:function(e,t){if(0===e)e=Date.
now();else{if(1!==e&&4!==e)return E[de()>>2]=28,-1;e=X()}return
E[t>>2]=e/1e3|0,E[t+4>>2]=e%1e3*1e6|0,0},s:function(e,t){return e-t},P:function(){B(\\\"To use dlopen, you need
to use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},g:function(){B(\\\"To use dlopen, you need to use Emscripten's linking support,
see https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},Q:function(){B(\\\"To use dlopen, you need to
use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},O:function(){B(\\\"To use dlopen, you need to use Emscripten's linking support,
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see https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},M:function(){return
2147483648},v:function(e,t,n){A.copyWithin(e,t,t+n)},i:function(e){var
t=A.length;if(2147483648<(e>>>=0))return!1;for(var n=1;4>=n;n*=2){var
r=t*(1+.2/n);r=Math.min(r,e+100663296),0<(r=Math.max(e,r))%65536&&(r+=65536-
r%65536);e:{try{v.grow(Math.min(2147483648,r)-w.byteLength+65535>>>16),C();var a=1;break
e}catch(e){}a=void 0}if(a)return!0}return!1},B:function(e){for(var t=X();X()-t<e;);},z:function(e,t){var n=0;return
ne().forEach((function(r,a){var
o=t+n;for(a=E[e+4*a>>2]=o,o=0;o<r.length;++o)O[a++>>0]=r.charCodeAt(o);O[a>>0]=0,n+=r.length+1})),0},A:f
unction(e,t){var n=ne();E[e>>2]=n.length;var r=0;return
n.forEach((function(e){r+=e.length+1})),E[t>>2]=r,0},f:function(){return 0},y:function(e,t){return
e=1==e||2==e?2:B(),O[t>>0]=e,0},n:function(e,t,n,r){return
e=Z.Wa(e),t=Z.Va(e,t,n),E[r>>2]=t,0},u:function(){},q:function(e,t,n,r){for(var a=0,o=0;o<n;o++){for(var
i=E[t+8*o>>2],u=E[t+(8*o+4)>>2],s=0;s<u;s++){var
c=A[i+s],l=Q[e];0===c||10===c?((1===e?y:_)(M(l,0)),l.length=0):l.push(c)}a+=u}return
E[r>>2]=a,0},w:function(e){var t=Date.now();return E[e>>2]=t/1e3|0,E[e+4>>2]=t%1e3*1e3|0,0},t:function
e(t,n){return t=new
Date(1e3*E[t>>2]),E[n>>2]=t.getUTCSeconds(),E[n+4>>2]=t.getUTCMinutes(),E[n+8>>2]=t.getUTCHours(),E[n
+12>>2]=t.getUTCDate(),E[n+16>>2]=t.getUTCMonth(),E[n+20>>2]=t.getUTCFullYear()-
1900,E[n+24>>2]=t.getUTCDay(),E[n+36>>2]=0,E[n+32>>2]=0,E[n+28>>2]=(t.getTime()-
Date.UTC(t.getUTCFullYear(),0,1,0,0,0,0))/864e5|0,e.Da||(e.Da=R(\\\"GMT\\\")),E[n+40>>2]=e.Da,n},l:function(e,
t){re(),e=new
Date(1e3*E[e>>2]),E[t>>2]=e.getSeconds(),E[t+4>>2]=e.getMinutes(),E[t+8>>2]=e.getHours(),E[t+12>>2]=e.get
Date(),E[t+16>>2]=e.getMonth(),E[t+20>>2]=e.getFullYear()-1900,E[t+24>>2]=e.getDay();var n=new
Date(e.getFullYear(),0,1);E[t+28>>2]=(e.getTime()-n.getTime())/864e5|0,E[t+36>>2]=-
60*e.getTimezoneOffset();var r=new Date(e.getFullYear(),6,1).getTimezoneOffset();return
e=0|(r!=(n=n.getTimezoneOffset())&&e.getTimezoneOffset()==Math.min(n,r)),E[t+32>>2]=e,e=E[he()+(e?4:0)>>2
],E[t+40>>2]=e,t},k:function(e){re();var t=new
Date(E[e+20>>2]+1900,E[e+16>>2],E[e+12>>2],E[e+8>>2],E[e+4>>2],E[e>>2],0),n=E[e+32>>2],r=t.getTimezon
eOffset(),a=new Date(t.getFullYear(),0,1),o=new
Date(t.getFullYear(),6,1).getTimezoneOffset(),i=a.getTimezoneOffset(),u=Math.min(i,o);return
0>n?E[e+32>>2]=Number(o!=i&&u==r):0<n!=(u==r)&&(o=Math.max(i,o),t.setTime(t.getTime()+6e4*((0<n?u:o)-
r))),E[e+24>>2]=t.getDay(),E[e+28>>2]=(t.getTime()-
a.getTime())/864e5|0,E[e>>2]=t.getSeconds(),E[e+4>>2]=t.getMinutes(),E[e+8>>2]=t.getHours(),E[e+12>>2]=t.ge
tDate(),E[e+16>>2]=t.getMonth(),t.getTime()/1e3|0},N:ce,e:function(e,t,n,r){return
ce(e,t,n,r)}};!function(){function e(e){t.asm=e.exports,v=t.asm.R,C(),P=t.asm.ua,F.unshift(t.asm.S),H--
,t.monitorRunDependencies&&t.monitorRunDependencies(H),0==H&&(null!==Y&&(clearInterval(Y),Y=null),z&
&(e=z,z=null,e()))}function n(t){e(t.instance)}function r(e){return
function(){if(!b&&(d||m)){if(\\\"function\\\"==typeof fetch&&!W.startsWith(\\\"file://\\\"))return
fetch(W,{credentials:\\\"same-origin\\\"}).then((function(e){if(!e.ok)throw\\\"failed to load wasm binary file at
'\\\"+W+\\\"'\\\";return e.arrayBuffer()})).catch((function(){return q()}));if(s)return new
Promise((function(e,t){s(W,(function(t){e(new Uint8Array(t))}),t)}))}return
Promise.resolve().then((function(){return q()}))}().then((function(e){return
WebAssembly.instantiate(e,o)})).then(e,(function(e){_(\\\"failed to asynchronously prepare wasm:
\\\"+e),B(e)}))}var
o={a:le};if(H++,t.monitorRunDependencies&&t.monitorRunDependencies(H),t.instantiateWasm)try{return
t.instantiateWasm(o,e)}catch(e){return _(\\\"Module.instantiateWasm callback failed with error:
\\\"+e),!1}(b||\\\"function\\\"!=typeof
WebAssembly.instantiateStreaming||G()||W.startsWith(\\\"file://\\\")||\\\"function\\\"!=typeof
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fetch?r(n):fetch(W,{credentials:\\\"same-origin\\\"}).then((function(e){return
WebAssembly.instantiateStreaming(e,o).then(n,(function(e){return _(\\\"wasm streaming compile failed:
\\\"+e),_(\\\"falling back to ArrayBuffer
instantiation\\\"),r(n)}))}))).catch(a)}(),t.___wasm_call_ctors=function(){return(t.___wasm_call_ctors=t.asm.S).app
ly(null,arguments)},t._OrtInit=function(){return(t._OrtInit=t.asm.T).apply(null,arguments)},t._OrtCreateSessionOpt
ions=function(){return(t._OrtCreateSessionOptions=t.asm.U).apply(null,arguments)},t._OrtAddSessionConfigEntry
=function(){return(t._OrtAddSessionConfigEntry=t.asm.V).apply(null,arguments)},t._OrtReleaseSessionOptions=f
unction(){return(t._OrtReleaseSessionOptions=t.asm.W).apply(null,arguments)},t._OrtCreateSession=function(){ret
urn(t._OrtCreateSession=t.asm.X).apply(null,arguments)},t._OrtReleaseSession=function(){return(t._OrtReleaseSes
sion=t.asm.Y).apply(null,arguments)},t._OrtGetInputCount=function(){return(t._OrtGetInputCount=t.asm.Z).apply(
null,arguments)},t._OrtGetOutputCount=function(){return(t._OrtGetOutputCount=t.asm._).apply(null,arguments)},t
._OrtGetInputName=function(){return(t._OrtGetInputName=t.asm.$).apply(null,arguments)},t._OrtGetOutputName
=function(){return(t._OrtGetOutputName=t.asm.aa).apply(null,arguments)},t._OrtFree=function(){return(t._OrtFree
=t.asm.ba).apply(null,arguments)},t._OrtCreateTensor=function(){return(t._OrtCreateTensor=t.asm.ca).apply(null,a
rguments)},t._OrtGetTensorData=function(){return(t._OrtGetTensorData=t.asm.da).apply(null,arguments)},t._OrtR
eleaseTensor=function(){return(t._OrtReleaseTensor=t.asm.ea).apply(null,arguments)},t._OrtCreateRunOptions=fu
nction(){return(t._OrtCreateRunOptions=t.asm.fa).apply(null,arguments)},t._OrtAddRunConfigEntry=function(){re
turn(t._OrtAddRunConfigEntry=t.asm.ga).apply(null,arguments)},t._OrtReleaseRunOptions=function(){return(t._O
rtReleaseRunOptions=t.asm.ha).apply(null,arguments)},t._OrtRun=function(){return(t._OrtRun=t.asm.ia).apply(nul
l,arguments)},t._OrtEndProfiling=function(){return(t._OrtEndProfiling=t.asm.ja).apply(null,arguments)};var
fe,pe=t._malloc=function(){return(pe=t._malloc=t.asm.ka).apply(null,arguments)},de=t.___errno_location=function
(){return(de=t.___errno_location=t.asm.la).apply(null,arguments)},me=t._free=function(){return(me=t._free=t.asm.
ma).apply(null,arguments)},he=t.__get_tzname=function(){return(he=t.__get_tzname=t.asm.na).apply(null,argumen
ts)},ge=t.__get_daylight=function(){return(ge=t.__get_daylight=t.asm.oa).apply(null,arguments)},be=t.__get_timez
one=function(){return(be=t.__get_timezone=t.asm.pa).apply(null,arguments)},ye=t.stackSave=function(){return(ye
=t.stackSave=t.asm.qa).apply(null,arguments)},_e=t.stackRestore=function(){return(_e=t.stackRestore=t.asm.ra).ap
ply(null,arguments)},ve=t.stackAlloc=function(){return(ve=t.stackAlloc=t.asm.sa).apply(null,arguments)},we=t._m
emalign=function(){return(we=t._memalign=t.asm.ta).apply(null,arguments)};function Oe(){function
e(){if(!fe&&(fe=!0,t.calledRun=!0,!T)){if(V(F),r(t),t.onRuntimeInitialized&&t.onRuntimeInitialized(),t.postRun)fo
r(\\\"function\\\"==typeof t.postRun&&(t.postRun=[t.postRun]);t.postRun.length;){var
e=t.postRun.shift();j.unshift(e)}V(j)}}if(!(0<H)){if(t.preRun)for(\\\"function\\\"==typeof
t.preRun&&(t.preRun=[t.preRun]);t.preRun.length;)L();V(I),0<H||(t.setStatus?(t.setStatus(\\\"Running...\\\"),setTime
out((function(){setTimeout((function(){t.setStatus(\\\"\\\")}),1),e()}),1)):e())}}if(t.UTF8ToString=k,t.stringToUTF8
=function(e,t,n){return
D(e,A,t,n)},t.lengthBytesUTF8=x,t.stackSave=ye,t.stackRestore=_e,t.stackAlloc=ve,z=function
e(){fe||Oe(),fe||(z=e)},t.run=Oe,t.preInit)for(\\\"function\\\"==typeof
t.preInit&&(t.preInit=[t.preInit]);0<t.preInit.length;)t.preInit.pop()();return
Oe(),e.ready});e.exports=r},967:(e,t)=>{\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.iterateExtraOptions=void
0,t.iterateExtraOptions=(e,n,r,a)=>{if(\\\"object\\\"==typeof e&&null!==e){if(r.has(e))throw new Error(\\\"Circular
reference in options\\\");r.add(e)}Object.entries(e).forEach((([e,o])=>{const i=n?n+e:e;if(\\\"object\\\"==typeof
o)t.iterateExtraOptions(o,i+\\\".\\\",r,a);else if(\\\"string\\\"==typeof o||\\\"number\\\"==typeof
o)a(i,o.toString());else{if(\\\"boolean\\\"!=typeof o)throw new Error(\\\"Can't handle extra config type: \\\"+typeof
o);a(i,o?\\\"1\\\":\\\"0\\\")}}))}},586:(e,t,n)=>{\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.setRunOptions=void 0;const
r=n(967),a=n(983),o=n(361);t.setRunOptions=e=>{const t=o.getInstance();let n=0;const i=[],u=e||{};try{if(void
0===(null==e?void 0:e.logSeverityLevel))u.logSeverityLevel=2;else if(\\\"number\\\"!=typeof
e.logSeverityLevel||!Number.isInteger(e.logSeverityLevel)||e.logSeverityLevel<0||e.logSeverityLevel>4)throw new
```

```
Error(`log serverity level is not valid: ${e.logSeverityLevel}`);if(void 0===(null==e?void
0:e.logVerbosityLevel))u.logVerbosityLevel=0;else if(\\\"number\\\"!=typeof
e.logVerbosityLevel||!Number.isInteger(e.logVerbosityLevel))throw new Error(`log verbosity level is not valid:
${e.logVerbosityLevel}`);void 0===(null==e?void 0:e.terminate)&&(u.terminate=!1);let o=0;if(void
0!==(null==e?void
0:e.tag)&&(o=a.allocWasmString(e.tag,i)),n=t._OrtCreateRunOptions(u.logSeverityLevel,u.logVerbosityLevel,!!u.t
erminate,o),0===n)throw new Error(\\\"Can't create run options\\\");return void 0!==(null==e?void
0:e.extra)&&r.iterateExtraOptions(e.extra,\\\"\\\",new WeakSet,((e,r)=>{const
o=a.allocWasmString(e,i),u=a.allocWasmString(r,i);if(0!==t._OrtAddRunConfigEntry(n,o,u))throw new
Error(`Can't set a run config entry: ${e} - ${r}`)})),[n,i]}catch(e){throw
0!==n&&t._OrtReleaseRunOptions(n),i.forEach(t._free),e}}},919:(e,t,n)=>{\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.setSessionOptions=void 0;const
r=n(967),a=n(983),o=n(361);t.setSessionOptions=e=>{const t=o.getInstance();let n=0;const
i=[],u=e||{};(e=>{e.extra||(e.extra={}),e.extra.session||(e.extra.session={});const
t=e.extra.session;t.use_ort_model_bytes_directly||(t.use_ort_model_bytes_directly=\\\"1\\\")})(u);try{void
0===(null==e?void 0:e.graphOptimizationLevel)&&(u.graphOptimizationLevel=\\\"all\\\");const
o=(e=>{switch(e){case\\\"disabled\\\":return 0;case\\\"basic\\\":return 1;case\\\"extended\\\":return
2;case\\\"all\\\":return 99;default:throw new Error(`unsupported graph optimization level:
${e}`)}})(u.graphOptimizationLevel);void 0===(null==e?void
0:e.enableCpuMemArena)&&(u.enableCpuMemArena=!0),void 0===(null==e?void
0:e.enableMemPattern)&&(u.enableMemPattern=!0),void 0===(null==e?void
0:e.executionMode)&&(u.executionMode=\\\"sequential\\\");const s=(e=>{switch(e){case\\\"sequential\\\":return
0;case\\\"parallel\\\":return 1;default:throw new Error(`unsupported execution mode:
${e}`)}})(u.executionMode);let c=0;if(void 0!==(null==e?void 0:e.logId)&&(c=a.allocWasmString(e.logId,i)),void
0===(null==e?void 0:e.logSeverityLevel))u.logSeverityLevel=2;else if(\\\"number\\\"!=typeof
e.logSeverityLevel||!Number.isInteger(e.logSeverityLevel)||e.logSeverityLevel<0||e.logSeverityLevel>4)throw new
Error(`log serverity level is not valid: ${e.logSeverityLevel}`);if(void 0===(null==e?void
0:e.logVerbosityLevel))u.logVerbosityLevel=0;else if(\\\"number\\\"!=typeof
e.logVerbosityLevel||!Number.isInteger(e.logVerbosityLevel))throw new Error(`log verbosity level is not valid:
${e.logVerbosityLevel}`);if(void 0===(null==e?void
0:e.enableProfiling)&&(u.enableProfiling=!1),n=t._OrtCreateSessionOptions(o,!!u.enableCpuMemArena,!!u.enable
MemPattern,s,!!u.enableProfiling,0,c,u.logSeverityLevel,u.logVerbosityLevel),0===n)throw new Error(\\\"Can't
create session options\\\");return void 0!==(null==e?void 0:e.extra)&&r.iterateExtraOptions(e.extra,\\\"\\\",new
WeakSet,((e,r)=>{const
o=a.allocWasmString(e,i),u=a.allocWasmString(r,i);if(0!==t._OrtAddSessionConfigEntry(n,o,u))throw new
Error(`Can't set a session config entry: ${e} - ${r}`)})),[n,i]}catch(e){throw
0!==n&&t._OrtReleaseSessionOptions(n),i.forEach(t._free),e}}},983:(e,t,n)=>{\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.allocWasmString=void 0;const
r=n(361);t.allocWasmString=(e,t)=>{const n=r.getInstance(),a=n.lengthBytesUTF8(e)+1,o=n._malloc(a);return
n.stringToUTF8(e,o,a),t.push(o),o}},349:(e,t,n)=>{\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.extractTransferableBuffers=t.endProfiling=t.run=t.
releaseSession=t.createSession=t.initOrt=void 0;const r=n(586),a=n(919),o=n(983),i=n(361);t.initOrt=(e,t)=>{const
n=i.getInstance()._OrtInit(e,t);if(0!==n)throw new Error(`Can't initialize onnxruntime. error code = ${n}`)};const
u=[];t.createSession=(e,t)=>{const n=i.getInstance(),r=n._malloc(e.byteLength);let
o=0,s=0,c=[];try{if([s,c]=a.setSessionOptions(t),n.HEAPU8.set(e,r),o=n._OrtCreateSession(r,e.byteLength,s),0===
o)throw new Error(\\\"Can't create a
session\\\")}finally{n._free(r),n._OrtReleaseSessionOptions(s),c.forEach(n._free)}const
l=n._OrtGetInputCount(o),f=n._OrtGetOutputCount(o),p=[],d=[],m=[],h=[];for(let e=0;e<l;e++){const
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t=n._OrtGetInputName(o,e);if(0===t)throw new Error(\\\"Can't get an input
name\\\");d.push(t),p.push(n.UTF8ToString(t))}for(let e=0;e<f;e++){const
t=n._OrtGetOutputName(o,e);if(0===t)throw new Error(\\\"Can't get an output
name\\\");h.push(t),m.push(n.UTF8ToString(t))}return u.push([o,d,h]),[u.length-1,p,m]},t.releaseSession=e=>{const
t=i.getInstance(),n=u[e];if(!n)throw new Error(\\\"invalid session id\\\");const
r=n[0],a=n[1],o=n[2];a.forEach(t._OrtFree),o.forEach(t._OrtFree),t._OrtReleaseSession(r),u[e]=void 0};const
s=e=>{switch(e){case\\\"int8\\\":return 3;case\\\"uint8\\\":return 2;case\\\"bool\\\":return 9;case\\\"int16\\\":return
5;case\\\"uint16\\\":return 4;case\\\"int32\\\":return 6;case\\\"uint32\\\":return 12;case\\\"float32\\\":return
1;case\\\"float64\\\":return 11;case\\\"string\\\":return 8;case\\\"int64\\\":return 7;case\\\"uint64\\\":return
13;default:throw new Error(`unsupported data type: ${e}`)}},c=e=>{switch(e){case 3:return\\\"int8\\\";case
2:return\\\"uint8\\\";case 9:return\\\"bool\\\";case 5:return\\\"int16\\\";case 4:return\\\"uint16\\\";case
6:return\\\"int32\\\";case 12:return\\\"uint32\\\";case 1:return\\\"float32\\\";case 11:return\\\"float64\\\";case
8:return\\\"string\\\";case 7:return\\\"int32\\\";case 13:return\\\"uint32\\\";default:throw new Error(`unsupported data
type: ${e}`)}},l=e=>{switch(e){case\\\"float32\\\":return Float32Array;case\\\"uint8\\\":return
Uint8Array;case\\\"int8\\\":return Int8Array;case\\\"uint16\\\":return Uint16Array;case\\\"int16\\\":return
Int16Array;case\\\"int32\\\":return Int32Array;case\\\"bool\\\":return Uint8Array;case\\\"float64\\\":return
Float64Array;case\\\"uint32\\\":return Uint32Array;case\\\"int64\\\":return BigInt64Array;case\\\"uint64\\\":return
BigUint64Array;default:throw new Error(`unsupported type: ${e}`)}};t.run=(e,t,n,a,f)=>{const
p=i.getInstance(),d=u[e];if(!d)throw new Error(\\\"invalid session id\\\");const
m=d[0],h=d[1],g=d[2],b=t.length,y=a.length;let _=0,v=[];const w=[],O=[];try{[_,v]=r.setRunOptions(f);for(let
e=0;e<b;e++){const t=n[e][0],r=n[e][1],a=n[e][2];let
i,u;if(Array.isArray(a)){u=4*a.length,i=p._malloc(u),O.push(i);let e=i/4;for(let
t=0;t<a.length;t++){if(\\\"string\\\"!=typeof a[t])throw new TypeError(`tensor data at index ${t} is not a
string`);p.HEAPU32[e++]=o.allocWasmString(a[t],O)}}else
u=a.byteLength,i=p._malloc(u),O.push(i),p.HEAPU8.set(new Uint8Array(a.buffer,a.byteOffset,u),i);const
c=p.stackSave(),l=p.stackAlloc(4*r.length);try{let e=l/4;r.forEach((t=>p.HEAP32[e++]=t));const
n=p._OrtCreateTensor(s(t),i,u,l,r.length);if(0===n)throw new Error(\\\"Can't create a
tensor\\\");w.push(n)}finally{p.stackRestore(c)}}const
e=p.stackSave(),i=p.stackAlloc(4*b),u=p.stackAlloc(4*b),d=p.stackAlloc(4*y),A=p.stackAlloc(4*y);try{let
n=i/4,r=u/4,o=d/4,s=A/4;for(let e=0;e<b;e++)p.HEAPU32[n++]=w[e],p.HEAPU32[r++]=h[t[e]];for(let
e=0;e<y;e++)p.HEAPU32[o++]=0,p.HEAPU32[s++]=g[a[e]];let f=p._OrtRun(m,u,i,b,A,y,d,_);const
v=[];if(0===f)for(let e=0;e<y;e++){const t=p.HEAPU32[d/4+e],n=p.stackSave(),r=p.stackAlloc(16);let
a,o=0;try{if(f=p._OrtGetTensorData(t,r,r+4,r+8,r+12),0!==f)throw new Error(`Can't get a tensor data. error code =
${f}`);let e=r/4;const i=p.HEAPU32[e++];o=p.HEAPU32[e++];const
u=p.HEAPU32[e++],s=p.HEAPU32[e++],d=[];for(let
e=0;e<s;e++)d.push(p.HEAPU32[u/4+e]);p._OrtFree(u);const
m=0===d.length?1:d.reduce(((e,t)=>e*t));if(a=c(i),\\\"string\\\"===a){const e=[];let t=o/4;for(let
n=0;n<m;n++){const r=p.HEAPU32[t++],a=n===m-1?void 0:p.HEAPU32[t]-
r;e.push(p.UTF8ToString(r,a))}v.push([a,d,e])}else{const e=new(l(a))(m);new
Uint8Array(e.buffer,e.byteOffset,e.byteLength).set(p.HEAPU8.subarray(o,o+e.byteLength)),v.push([a,d,e])}}finally
{p.stackRestore(n),\\\"string\\\"===a&&o&&p._free(o),p._OrtReleaseTensor(t)}}if(0===f)return v;throw new
Error(`failed to call OrtRun(). error code =
${f}.`)}finally{p.stackRestore(e)}}finally{w.forEach(p._OrtReleaseTensor),O.forEach(p._free),p._OrtReleaseRunO
ptions(_),v.forEach(p._free)}},t.endProfiling=e=>{const t=i.getInstance(),n=u[e];if(!n)throw new Error(\\\"invalid
session id\\\");const r=n[0],a=t._OrtEndProfiling(r);if(0===a)throw new Error(\\\"Can't get an profile file
name\\\");t._OrtFree(a)},t.extractTransferableBuffers=e=>{const t=[];for(const n of e){const
e=n[2];!Array.isArray(e)&&e.buffer&&t.push(e.buffer)}return t}},361:function(e,t,n){\\\"use strict\\\";var
r=this&&this.__createBinding||(Object.create?function(e,t,n,r){void
```

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0===r&&(r=n),Object.defineProperty(e,r,{enumerable:!0,get:function(){return t[n]}})}:function(e,t,n,r){void
0===r&&(r=n),e[r]=t[n]}),a=this&&this.__setModuleDefault||(Object.create?function(e,t){Object.defineProperty(e,
\\\"default\\\",{enumerable:!0,value:t})}:function(e,t){e.default=t}),o=this&&this.__importStar||function(e){if(e&&
e.__esModule)return e;var t={};if(null!=e)for(var n in
e)\\\"default\\\"!==n&&Object.prototype.hasOwnProperty.call(e,n)&&r(t,e,n);return
a(t,e),t},i=this&&this.__awaiter||function(e,t,n,r){return new(n||(n=Promise))((function(a,o){function
i(e){try{s(r.next(e))}catch(e){o(e)}}function u(e){try{s(r.throw(e))}catch(e){o(e)}}function s(e){var
t;e.done?a(e.value):(t=e.value,t instanceof n?t:new
n((function(e){e(t)}))).then(i,u)}s((r=r.apply(e,t||[])).next())}))},u=this&&this.__importDefault||function(e){return
e&&e.__esModule?e:{default:e}};Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.dispose=t.getInstance=t.i
nitializeWebAssembly=void 0;const s=o(n(449)),c=u(n(474)),l=u(n(932));let f,p=!1,d=!1,m=!1;const
h=(e,t)=>t?e?\\\"ort-wasm-simd-threaded.wasm\\\":\\\"ort-wasm-threaded.wasm\\\":e?\\\"ort-wasm-
simd.wasm\\\":\\\"ort-wasm.wasm\\\";t.initializeWebAssembly=e=>i(void 0,void 0,void 0,(function*(){if(p)return
Promise.resolve();if(d)throw new Error(\\\"multiple calls to 'initializeWebAssembly()' detected.\\\");if(m)throw new
Error(\\\"previous call to 'initializeWebAssembly()' failed.\\\");d=!0;const
t=e.initTimeout,r=e.numThreads,a=e.simd,o=r>1&&(()=>{try{return\\\"undefined\\\"!=typeof
SharedArrayBuffer&&(\\\"undefined\\\"!=typeof MessageChannel&&(new
MessageChannel).port1.postMessage(new SharedArrayBuffer(1)),WebAssembly.validate(new
Uint8Array([0,97,115,109,1,0,0,0,1,4,1,96,0,0,3,2,1,0,5,4,1,3,1,1,10,11,1,9,0,65,0,254,16,2,0,26,11])))}catch(e){ret
urn!1}})(),i=a&&(()=>{try{return WebAssembly.validate(new
Uint8Array([0,97,115,109,1,0,0,0,1,4,1,96,0,0,3,2,1,0,10,9,1,7,0,65,0,253,15,26,11]))}catch(e){return!1}})(),u=\\\"s
tring\\\"==typeof e.wasmPaths?e.wasmPaths:void 0,g=h(!1,o),b=h(i,o),y=\\\"object\\\"==typeof
e.wasmPaths?e.wasmPaths[b]:void 0;let _=!1;const v=[];if(t>0&&v.push(new
Promise((e=>{setTimeout((()=>{_=!0,e()}),t)}))),v.push(new Promise(((e,t)=>{const
r=o?c.default:l.default,a={locateFile:(e,t)=>{if(e.endsWith(\\\".worker.js\\\")&&\\\"undefined\\\"!=typeof
Blob)return URL.createObjectURL(new Blob([n(118)],{type:\\\"text/javascript\\\"}));if(e===g){const
e=null!=u?u:t;return null!=y?y:e+b}return t+e}};if(o)if(\\\"undefined\\\"==typeof
Blob)a.mainScriptUrlOrBlob=s.join(\\\"/\\\",\\\"ort-wasm-threaded.js\\\");else{const e=`var
ortWasmThreaded=(function(){var _scriptDir;return ${c.default.toString()}})();`;a.mainScriptUrlOrBlob=new
Blob([e],{type:\\\"text/javascript\\\"})}r(a).then((t=>{d=!1,p=!0,f=t,e()}),(e=>{d=!1,m=!0,t(e)}))}))),yield
Promise.race(v),_)throw new Error(`WebAssembly backend initializing failed due to timeout:
${t}ms`)})),t.getInstance=()=>{if(p&&f)return f;throw new Error(\\\"WebAssembly is not initialized
yet.\\\")},t.dispose=()=>{var e;!p||d||m||(d=!0,null===(e=f.PThread)||void 0===e||e.terminateAllThreads(),f=void
0,d=!1,p=!1,m=!0)}},384:()=>{},993:()=>{},908:()=>{},953:()=>{},925:()=>{},449:()=>{}},t={};function
n(r){var a=t[r];if(void 0!==a)return a.exports;var o=t[r]={exports:{}};return
e[r].call(o.exports,o,o.exports,n),o.exports}n.g=function(){if(\\\"object\\\"==typeof globalThis)return
globalThis;try{return this||new Function(\\\"return this\\\")()}catch(e){if(\\\"object\\\"==typeof window)return
window}}(),(()=>{\\\"use strict\\\";const e=n(349),t=n(361);self.onmessage=n=>{switch(n.data.type){case\\\"init-
wasm\\\":t.initializeWebAssembly(n.data.in).then((()=>postMessage({type:\\\"init-
wasm\\\"})),(e=>postMessage({type:\\\"init-wasm\\\",err:e})));break;case\\\"init-
ort\\\":try{const{numThreads:t,loggingLevel:r}=n.data.in;e.initOrt(t,r),postMessage({type:\\\"init-
ort\\\"})}catch(e){postMessage({type:\\\"init-
ort\\\",err:e})}break;case\\\"create\\\":try{const{model:t,options:r}=n.data.in,a=e.createSession(t,r);postMessage({ty
pe:\\\"create\\\",out:a})}catch(e){postMessage({type:\\\"create\\\",err:e})}break;case\\\"release\\\":try{const
t=n.data.in;e.releaseSession(t),postMessage({type:\\\"release\\\"})}catch(e){postMessage({type:\\\"release\\\",err:e})
}break;case\\\"run\\\":try{const{sessionId:t,inputIndices:r,inputs:a,outputIndices:o,options:i}=n.data.in,u=e.run(t,r,a,
o,i);postMessage({type:\\\"run\\\",out:u},e.extractTransferableBuffers(u))}catch(e){postMessage({type:\\\"run\\\",err
:e})}break;case\\\"end-profiling\\\":try{const t=n.data.in;e.endProfiling(t),postMessage({type:\\\"end-
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profiling\\\"})}catch(e){postMessage({type:\\\"end-profiling\\\",err:e})}}}})()})();\\n\", \"Worker\", undefined,
undefined);\n}\n","\"use strict\";\n\n/* eslint-env browser */\n\n/* eslint-disable no-undef, no-use-before-define,
new-cap */\nmodule.exports = function (content, workerConstructor, workerOptions, url) {\n  var globalScope = self
|| window;\n\n  try {\n    try {\n      var blob;\n\n      try {\n        // New API\n        blob = new
globalScope.Blob([content]);\n      } catch (e) {\n        // BlobBuilder = Deprecated, but widely implemented\n
var BlobBuilder = globalScope.BlobBuilder || globalScope.WebKitBlobBuilder || globalScope.MozBlobBuilder ||
globalScope.MSBlobBuilder;\n        blob = new BlobBuilder();\n        blob.append(content);\n        blob =
blob.getBlob();\n      }\n\n      var URL = globalScope.URL || globalScope.webkitURL;\n      var objectURL =
URL.createObjectURL(blob);\n      var worker = new globalScope[workerConstructor](objectURL,
workerOptions);\n      URL.revokeObjectURL(objectURL);\n      return worker;\n    } catch (e) {\n      return new
globalScope[workerConstructor](\"data:application/javascript,\".concat(encodeURIComponent(content)),
workerOptions);\n    }\n  } catch (e) {\n    if (!url) {\n      throw Error(\"Inline worker is not supported\");\n    }\n\n
return new globalScope[workerConstructor](url, workerOptions);\n  }\n};","module.exports =
__WEBPACK_EXTERNAL_MODULE__2174__;","// The module cache\nvar __webpack_module_cache__ =
{};\n\n// The require function\nfunction __webpack_require__(moduleId) {\n\t// Check if module is in cache\n\tvar
cachedModule = __webpack_module_cache__[moduleId];\n\tif (cachedModule !== undefined) {\n\t\treturn
cachedModule.exports;\n\t}\n\t// Create a new module (and put it into the cache)\n\tvar module =
__webpack_module_cache__[moduleId] = {\n\t\t// no module.id needed\n\t\t// no module.loaded
needed\n\t\texports: {}\n\t};\n\n\t// Execute the module
function\n\t__webpack_modules__[moduleId].call(module.exports, module, module.exports,
__webpack_require__);\n\n\t// Return the exports of the module\n\treturn module.exports;\n}\n\n","//
getDefaultExport function for compatibility with non-harmony modules\n__webpack_require__.n = (module) =>
{\n\tvar getter = module && module.__esModule ?\n\t\t() => (module['default']) :\n\t\t() =>
(module);\n\t__webpack_require__.d(getter, { a: getter });\n\treturn getter;\n};","// define getter functions for
harmony exports\n__webpack_require__.d = (exports, definition) => {\n\tfor(var key in definition)
{\n\t\tif(__webpack_require__.o(definition, key) && !__webpack_require__.o(exports, key))
{\n\t\t\tObject.defineProperty(exports, key, { enumerable: true, get: definition[key]
});\n\t\t}\n\t}\n};","__webpack_require__.g = (function() {\n\tif (typeof globalThis === 'object') return
globalThis;\n\ttry {\n\t\treturn this || new Function('return this')();\n\t} catch (e) {\n\t\tif (typeof window ===
'object') return window;\n\t}\n})();","__webpack_require__.o = (obj, prop) =>
(Object.prototype.hasOwnProperty.call(obj, prop))","// define __esModule on exports\n__webpack_require__.r =
(exports) => {\n\tif(typeof Symbol !== 'undefined' && Symbol.toStringTag) {\n\t\tObject.defineProperty(exports,
Symbol.toStringTag, { value: 'Module' });\n\t}\n\tObject.defineProperty(exports, '__esModule', { value: true
});\n};","// startup\n// Load entry module and return exports\n// This entry module is referenced by other modules so
it can't be inlined\nvar __webpack_exports__ = __webpack_require__(6018);\n"],"sourceRoot":""}
```

Found in path(s):

* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/dist/ort-web.es6.min.js.map

No license file was found, but licenses were detected in source scan.

```
/*!
* ONNX Runtime Web v1.9.0
* Copyright (c) Microsoft Corporation. All rights reserved.
* Licensed under the MIT License.
*/
```

Found in path(s):

* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/dist/ort-wasm-threaded.js

* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/dist/ort-wasm-threaded.worker.js
No license file was found, but licenses were detected in source scan.

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Found in path(s):
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/lib/backend-onnxjs.js
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/lib/onnxjs/backends/webgl/ops/conv-pack.ts
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/lib/onnxjs/backends/webgl/types.ts
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/lib/onnxjs/session-handler.js
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/lib/onnxjs/backends/webgl/ops/squeeze.js
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/lib/onnxjs/backends/webgl/texture-manager.ts
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/lib/wasm/session-options.ts
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/lib/onnxjs/backends/webgl/glsl-array-lib.js
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object","webpack://ort/webpack/startup"],"names":["root","factory","exports","module","define","amd","self","backends","backendsSortedByPriority","registerBackend","name","backend","priority","init","createSessionHandler","TypeError","currentBackend","undefined","Error","i","length","splice","push","env","this","wasm","webgl","logLevelInternal","value","indexOf","isBigInt64ArrayAvailable","BigInt64Array","from","isBigUint64ArrayAvailable","BigUint64Array","NUMERIC_TENSOR_TYPE_TO_TYPEDARRAY_MAP","Map","Float32Array","Uint8Array","Int8Array","Uint16Array","Int16Array","Int32Array","Float64Array","Uint32Array","NUMERIC_TENSOR_TYPEDARRAY_TO_TYPE_MAP","set","Tensor","arg0","arg1","arg2","type","data","dims","Array","isArray","typedArrayConstructor","get","firstElementType","mappedType","constructor","size","dim","Number","isSafeInteger","RangeError","calculateSize","InferenceSession","handler","feeds","fetches","options","isFetchesEmpty","outputNames","isFetches","arg1Keys","Object","getOwnPropertyNames","v","inputNames","results","run","returnValue","key","hasOwnProperty","call","arg3","filePathOrUint8Array","ArrayBuffer","SharedArrayBuffer","buffer","byteOffset","byteLength","backendHints","executionProviders","map","async","backendNames","errors","backendName","backendInfo","initialized","initializing","aborted","e","err","join","resolveBackend","startProfiling","endProfiling","_scriptDir","document","currentScript","src","t","S","Y","Q","P","n","W","r","q","a","U","B","o","u","s","ready","Promise","c","f","l","p","d","m","b","h","g","_","window","y","importScripts","w","process","versions","node","ENVIRONMENT_IS_PTHREAD","A","T","locateFile","O","__dirname","normalize","readFileSync","F","readFile","argv","replace","slice","on","Gt","ce","re","exitCode","exit","inspect","console","error","Worker","location","href","substr","lastIndexOf","XMLHttpRequest","open","send","responseText","responseType","response","onload","status","onerror","performance","k","E","x","print","log","bind","M","printErr","warn","thisProgram","quit","wasmBinar 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D,IAAImnG,oBAAAsBX,oBAAAoB,M","file":"ort.min.js","sourcesContent":["(function
webpackUniversalModuleDefinition(root, factory) {\n\tif(typeof exports === 'object' && typeof module ===
'object')\n\t\tmodule.exports = factory();\n\telse if(typeof define === 'function' && define.amd)\n\t\tdefine([],
factory);\n\telse if(typeof exports === 'object')\n\t\texports[\"ort\"] = factory();\n\telse\n\t\troot[\"ort\"] =
factory();\n})(self, function() {\nreturn ","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed
under the MIT License.\r\nconst backends = {};\r\nconst backendsSortedByPriority = [];\r\n/**\r\n * Register a
backend.\r\n *\r\n * @param name - the name as a key to lookup as an execution provider.\r\n * @param backend -
the backend object.\r\n * @param priority - an integer indicating the priority of the backend. Higher number means
higher priority.\r\n */\r\nexport const registerBackend = (name, backend, priority) => {\r\n   if (backend && typeof
backend.init === 'function' && typeof backend.createSessionHandler === 'function') {\r\n   const
currentBackend = backends[name];\r\n   if (currentBackend === undefined) {\r\n   backends[name] = {
backend, priority };\r\n   }\r\n   else if (currentBackend.backend === backend) {\r\n   return;\r\n

```
}\r\n        else {\r\n            throw new Error(`backend \"${name}\" is already registered`);\r\n        }\r\n        for (let i
= 0; i < backendsSortedByPriority.length; i++) {\r\n            if (backends[backendsSortedByPriority[i]].priority <=
priority) {\r\n                backendsSortedByPriority.splice(i, 0, name);\r\n                return;\r\n            }\r\n        }\r\n
  backendsSortedByPriority.push(name);\r\n        return;\r\n    }\r\n    throw new TypeError('not a valid
backend');\r\n};\r\n/**\r\n * Resolve backend by specified hints.\r\n *\r\n * @param backendHints - a list of
execution provider names to lookup. If omitted use registered backends as list.\r\n * @returns a promise that
resolves to the backend.\r\n */\r\nexport const resolveBackend = async (backendHints) => {\r\n    const
backendNames = backendHints.length === 0 ? backendsSortedByPriority : backendHints;\r\n    const errors = [];\r\n
  for (const backendName of backendNames) {\r\n        const backendInfo = backends[backendName];\r\n        if
(backendInfo) {\r\n            if (backendInfo.initialized) {\r\n                return backendInfo.backend;\r\n            }\r\n
     else if (backendInfo.initializing) {\r\n                throw new Error(`backend \"${backendName}\" is being
initialized; cannot initialize multiple times.`);\r\n            }\r\n            else if (backendInfo.aborted) {\r\n
continue; // current backend is unavailable; try next\r\n            }\r\n            try {\r\n                backendInfo.initializing
= true;\r\n                await backendInfo.backend.init();\r\n                backendInfo.initialized = true;\r\n
return backendInfo.backend;\r\n            }\r\n            catch (e) {\r\n                errors.push({ name: backendName, err:
e });\r\n                backendInfo.aborted = true;\r\n            }\r\n            finally {\r\n                backendInfo.initializing =
false;\r\n            }\r\n        }\r\n    }\r\n    throw new Error(`no available backend found. ERR: ${errors.map(e =>
`[${e.name}] ${e.err}`).join(', ')}`);\r\n};\r\n//# sourceMappingURL=backend-impl.js.map","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\nimport { EnvImpl } from
'./env-impl';\r\n/**\r\n * Represent a set of flags as a global singleton.\r\n */\r\nexport const env = new
EnvImpl();\r\n//# sourceMappingURL=env.js.map","// Copyright (c) Microsoft Corporation. All rights
reserved.\r\n// Licensed under the MIT License.\r\nexport class EnvImpl {\r\n    constructor() {\r\n        this.wasm =
{};\r\n        this.webgl = {};\r\n        this.logLevelInternal = 'warning';\r\n    }\r\n    // TODO standadize the getter
and setter convention in env for other fields.\r\n    set logLevel(value) {\r\n        if (value === undefined) {\r\n
return;\r\n        }\r\n        if (typeof value !== 'string' || ['verbose', 'info', 'warning', 'error', 'fatal'].indexOf(value) === -
1) {\r\n            throw new Error(`Unsupported logging level: ${value}`);\r\n        }\r\n        this.logLevelInternal =
value;\r\n    }\r\n    get logLevel() {\r\n        return this.logLevelInternal;\r\n    }\r\n}\r\n//# sourceMappingURL=env-
impl.js.map","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\nconst isBigInt64ArrayAvailable = typeof BigInt64Array !== 'undefined' && typeof BigInt64Array.from
=== 'function';\r\nconst isBigUint64ArrayAvailable = typeof BigUint64Array !== 'undefined' && typeof
BigUint64Array.from === 'function';\r\n// a runtime map that maps type string to TypedArray constructor. Should
match Tensor.DataTypeMap.\r\nconst NUMERIC_TENSOR_TYPE_TO_TYPEDARRAY_MAP = new Map([\r\n
['float32', Float32Array],\r\n    ['uint8', Uint8Array],\r\n    ['int8', Int8Array],\r\n    ['uint16', Uint16Array],\r\n
['int16', Int16Array],\r\n    ['int32', Int32Array],\r\n    ['bool', Uint8Array],\r\n    ['float64', Float64Array],\r\n
['uint32', Uint32Array],\r\n]);\r\n// a runtime map that maps type string to TypedArray constructor. Should match
Tensor.DataTypeMap.\r\nconst NUMERIC_TENSOR_TYPEDARRAY_TO_TYPE_MAP = new Map([\r\n
[Float32Array, 'float32'],\r\n    [Uint8Array, 'uint8'],\r\n    [Int8Array, 'int8'],\r\n    [Uint16Array, 'uint16'],\r\n
[Int16Array, 'int16'],\r\n    [Int32Array, 'int32'],\r\n    [Float64Array, 'float64'],\r\n    [Uint32Array,
'uint32'],\r\n]);\r\nif (isBigInt64ArrayAvailable) {\r\n
NUMERIC_TENSOR_TYPE_TO_TYPEDARRAY_MAP.set('int64', BigInt64Array);\r\n
NUMERIC_TENSOR_TYPEDARRAY_TO_TYPE_MAP.set(BigInt64Array, 'int64');\r\n}\r\nif
(isBigUint64ArrayAvailable) {\r\n    NUMERIC_TENSOR_TYPE_TO_TYPEDARRAY_MAP.set('uint64',
BigUint64Array);\r\n    NUMERIC_TENSOR_TYPEDARRAY_TO_TYPE_MAP.set(BigUint64Array,
'uint64');\r\n}\r\n/**\r\n * calculate size from dims.\r\n *\r\n * @param dims the dims array. May be an illegal
input.\r\n */\r\nconst calculateSize = (dims) => {\r\n    let size = 1;\r\n    for (let i = 0; i < dims.length; i++) {\r\n
const dim = dims[i];\r\n        if (typeof dim !== 'number' || !Number.isSafeInteger(dim)) {\r\n            throw new
TypeError(`dims[${i}] must be an integer, got: ${dim}`);\r\n        }\r\n        if (dim < 0) {\r\n            throw new
RangeError(`dims[${i}] must be a non-negative integer, got: ${dim}`);\r\n        }\r\n        size *= dim;\r\n    }\r\n
```

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return size;\r\n};\r\nexport class Tensor {\r\n    constructor(arg0, arg1, arg2) {\r\n        let type;\r\n        let data;\r\n
  let dims;\r\n        // check whether arg0 is type or data\r\n        if (typeof arg0 === 'string') {\r\n            //\r\n
// Override: constructor(type, data, ...)\r\n            //\r\n            type = arg0;\r\n            dims = arg2;\r\n            if (arg0
=== 'string') {\r\n                // string tensor\r\n                if (!Array.isArray(arg1)) {\r\n                    throw new
TypeError('A string tensor\\'s data must be a string array.');\r\n                }\r\n                // we don't check whether
every element in the array is string; this is too slow. we assume it's correct and\r\n                // error will be populated
at inference\r\n                data = arg1;\r\n            }\r\n            else {\r\n                // numeric tensor\r\n                const
typedArrayConstructor = NUMERIC_TENSOR_TYPE_TO_TYPEDARRAY_MAP.get(arg0);\r\n                if
(typedArrayConstructor === undefined) {\r\n                    throw new TypeError(`Unsupported tensor type:
${arg0}.`);\r\n                }\r\n                if (Array.isArray(arg1)) {\r\n                    // use 'as any' here because
TypeScript's check on type of 'SupportedTypedArrayConstructors.from()' produces\r\n                    // incorrect
results.\r\n                    // 'typedArrayConstructor' should be one of the typed array prototype objects.\r\n
// eslint-disable-next-line @typescript-eslint/no-explicit-any\r\n                    data =
typedArrayConstructor.from(arg1);\r\n                }\r\n                else if (arg1 instanceof typedArrayConstructor) {\r\n
                data = arg1;\r\n                }\r\n                else {\r\n                    throw new TypeError(`A ${type} tensor's
data must be type of ${typedArrayConstructor}`);\r\n                }\r\n            }\r\n        }\r\n        else {\r\n            //\r\n
        // Override: constructor(data, ...)\r\n            //\r\n            dims = arg1;\r\n            if (Array.isArray(arg0)) {\r\n
          // only boolean[] and string[] is supported\r\n                if (arg0.length === 0) {\r\n                    throw new
TypeError('Tensor type cannot be inferred from an empty array.');\r\n                }\r\n                const
firstElementType = typeof arg0[0];\r\n                if (firstElementType === 'string') {\r\n                    type =
'string';\r\n                    data = arg0;\r\n                }\r\n                else if (firstElementType === 'boolean') {\r\n
     type = 'bool';\r\n                    // 'arg0' is of type 'boolean[]'. Uint8Array.from(boolean[]) actually works, but
typescript thinks this is\r\n                    // wrong type. We use 'as any' to make it happy.\r\n                    // eslint-
disable-next-line @typescript-eslint/no-explicit-any\r\n                    data = Uint8Array.from(arg0);\r\n                }\r\n
            else {\r\n                    throw new TypeError(`Invalid element type of data array: ${firstElementType}.`);\r\n
            }\r\n            }\r\n            else {\r\n                // get tensor type from TypedArray\r\n                const
mappedType = NUMERIC_TENSOR_TYPEDARRAY_TO_TYPE_MAP.get(arg0.constructor);\r\n                if
(mappedType === undefined) {\r\n                    throw new TypeError(`Unsupported type for tensor data:
${arg0.constructor}.`);\r\n                }\r\n                type = mappedType;\r\n                data = arg0;\r\n            }\r\n
}\r\n        // type and data is processed, now processing dims\r\n        if (dims === undefined) {\r\n            // assume
1-D tensor if dims omitted\r\n            dims = [data.length];\r\n        }\r\n        else if (!Array.isArray(dims)) {\r\n
  throw new TypeError('A tensor\\'s dims must be a number array');\r\n        }\r\n        // perform check\r\n        const
size = calculateSize(dims);\r\n        if (size !== data.length) {\r\n            throw new Error(`Tensor's size(${size})
does not match data length(${data.length}).`);\r\n        }\r\n        this.dims = dims;\r\n        this.type = type;\r\n
this.data = data;\r\n        this.size = size;\r\n    }\r\n    //#endregion\r\n    //#region tensor utilities\r\n    reshape(dims)
{\r\n        return new Tensor(this.type, this.data, dims);\r\n    }\r\n}\r\n//# sourceMappingURL=tensor-
impl.js.map","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\nimport { Tensor as TensorImpl } from './tensor-impl';\r\n// eslint-disable-next-line @typescript-
eslint/naming-convention\r\nexport const Tensor = TensorImpl;\r\n//# sourceMappingURL=tensor.js.map","//
Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\nimport {
resolveBackend } from './backend-impl';\r\nimport { Tensor } from './tensor';\r\nexport class InferenceSession {\r\n
constructor(handler) {\r\n        this.handler = handler;\r\n    }\r\n    async run(feeds, arg1, arg2) {\r\n        const
fetches = {};\r\n        let options = {};\r\n        // check inputs\r\n        if (typeof feeds !== 'object' || feeds === null ||
feeds instanceof Tensor || Array.isArray(feeds)) {\r\n            throw new TypeError('\\'feeds\\' must be an object that
use input names as keys and OnnxValue as corresponding values.');\r\n        }\r\n        let isFetchesEmpty = true;\r\n
    // determine which override is being used\r\n        if (typeof arg1 === 'object') {\r\n            if (arg1 === null) {\r\n
            throw new TypeError('Unexpected argument[1]: cannot be null.');\r\n            }\r\n            if (arg1 instanceof
Tensor) {\r\n                throw new TypeError('\\'fetches\\' cannot be a Tensor');\r\n            }\r\n            if
```

```
(Array.isArray(arg1)) {\r\n            if (arg1.length === 0) {\r\n                throw new TypeError('\\'fetches\\'
cannot be an empty array.');\r\n            }\r\n            isFetchesEmpty = false;\r\n            // output names\r\n
    for (const name of arg1) {\r\n                if (typeof name !== 'string') {\r\n                    throw new
TypeError('\\'fetches\\' must be a string array or an object.');\r\n                }\r\n                if
(this.outputNames.indexOf(name) === -1) {\r\n                    throw new RangeError(`'fetches' contains invalid
output name: ${name}.`);\r\n                }\r\n                fetches[name] = null;\r\n            }\r\n            if
(typeof arg2 === 'object' && arg2 !== null) {\r\n                options = arg2;\r\n            }\r\n            else if
(typeof arg2 !== 'undefined') {\r\n                throw new TypeError('\\'options\\' must be an object.');\r\n
}\r\n        }\r\n        else {\r\n            // decide whether arg1 is fetches or options\r\n            // if any output
name is present and its value is valid OnnxValue, we consider it fetches\r\n            let isFetches = false;\r\n
 const arg1Keys = Object.getOwnPropertyNames(arg1);\r\n            for (const name of this.outputNames) {\r\n
      if (arg1Keys.indexOf(name) !== -1) {\r\n                    const v = arg1[name];\r\n                    if (v ===
null || v instanceof Tensor) {\r\n                        isFetches = true;\r\n                        isFetchesEmpty = false;\r\n
                fetches[name] = v;\r\n                    }\r\n                }\r\n            }\r\n            if (isFetches) {\r\n
            if (typeof arg2 === 'object' && arg2 !== null) {\r\n                    options = arg2;\r\n                }\r\n
          else if (typeof arg2 !== 'undefined') {\r\n                    throw new TypeError('\\'options\\' must be an
object.');\r\n                }\r\n            }\r\n            else {\r\n                options = arg1;\r\n            }\r\n
}\r\n        }\r\n        else if (typeof arg1 !== 'undefined') {\r\n            throw new TypeError('Unexpected argument[1]:
must be \\'fetches\\' or \\'options\\'.');\r\n        }\r\n        // check if all inputs are in feed\r\n        for (const name of
this.inputNames) {\r\n            if (typeof feeds[name] === 'undefined') {\r\n                throw new Error(`input
'${name}' is missing in 'feeds'.`);\r\n            }\r\n        }\r\n        // if no fetches is specified, we use the full output
names list\r\n        if (isFetchesEmpty) {\r\n            for (const name of this.outputNames) {\r\n
fetches[name] = null;\r\n            }\r\n        }\r\n        // feeds, fetches and options are prepared\r\n        const results =
await this.handler.run(feeds, fetches, options);\r\n        const returnValue = {};\r\n        for (const key in results) {\r\n
        if (Object.hasOwnProperty.call(results, key)) {\r\n                returnValue[key] = new Tensor(results[key].type,
results[key].data, results[key].dims);\r\n            }\r\n        }\r\n        return returnValue;\r\n    }\r\n    static async
create(arg0, arg1, arg2, arg3) {\r\n        // either load from a file or buffer\r\n        let filePathOrUint8Array;\r\n
let options = {};\r\n        if (typeof arg0 === 'string') {\r\n            filePathOrUint8Array = arg0;\r\n            if (typeof
arg1 === 'object' && arg1 !== null) {\r\n                options = arg1;\r\n            }\r\n            else if (typeof arg1 !==
'undefined') {\r\n                throw new TypeError('\\'options\\' must be an object.');\r\n            }\r\n        }\r\n        else
if (arg0 instanceof Uint8Array) {\r\n            filePathOrUint8Array = arg0;\r\n            if (typeof arg1 === 'object' &&
arg1 !== null) {\r\n                options = arg1;\r\n            }\r\n            else if (typeof arg1 !== 'undefined') {\r\n
 throw new TypeError('\\'options\\' must be an object.');\r\n            }\r\n        }\r\n        else if (arg0 instanceof
ArrayBuffer ||\r\n            (typeof SharedArrayBuffer !== 'undefined' && arg0 instanceof SharedArrayBuffer)) {\r\n
     const buffer = arg0;\r\n            let byteOffset = 0;\r\n            let byteLength = arg0.byteLength;\r\n            if
(typeof arg1 === 'object' && arg1 !== null) {\r\n                options = arg1;\r\n            }\r\n            else if (typeof arg1
=== 'number') {\r\n                byteOffset = arg1;\r\n                if (!Number.isSafeInteger(byteOffset)) {\r\n
throw new RangeError('\\'byteOffset\\' must be an integer.');\r\n                }\r\n                if (byteOffset < 0 ||
byteOffset >= buffer.byteLength) {\r\n                    throw new RangeError(`'byteOffset' is out of range [0,
${buffer.byteLength}).`);\r\n                }\r\n                byteLength = arg0.byteLength - byteOffset;\r\n                if
(typeof arg2 === 'number') {\r\n                    byteLength = arg2;\r\n                    if
(!Number.isSafeInteger(byteLength)) {\r\n                        throw new RangeError('\\'byteLength\\' must be an
integer.');\r\n                    }\r\n                    if (byteLength <= 0 || byteOffset + byteLength > buffer.byteLength) {\r\n
                  throw new RangeError(`'byteLength' is out of range (0, ${buffer.byteLength - byteOffset}].`);\r\n
     }\r\n                    if (typeof arg3 === 'object' && arg3 !== null) {\r\n                        options = arg3;\r\n
  }\r\n                    else if (typeof arg3 !== 'undefined') {\r\n                        throw new TypeError('\\'options\\' must
be an object.');\r\n                    }\r\n                }\r\n                else if (typeof arg2 !== 'undefined') {\r\n
throw new TypeError('\\'byteLength\\' must be a number.');\r\n                }\r\n            }\r\n            else if (typeof arg1
```

```
!== 'undefined') {\r\n                throw new TypeError('\\'options\\' must be an object.');\r\n            }\r\n
filePathOrUint8Array = new Uint8Array(buffer, byteOffset, byteLength);\r\n        }\r\n        else {\r\n            throw
new TypeError('Unexpected argument[0]: must be \\'path\\' or \\'buffer\\'.');\r\n        }\r\n        // get backend hints\r\n
    const eps = options.executionProviders || [];\r\n        const backendHints = eps.map(i => typeof i === 'string' ? i :
i.name);\r\n        const backend = await resolveBackend(backendHints);\r\n        const handler = await
backend.createSessionHandler(filePathOrUint8Array, options);\r\n        return new InferenceSession(handler);\r\n
}\r\n    startProfiling() {\r\n        this.handler.startProfiling();\r\n    }\r\n    endProfiling() {\r\n
this.handler.endProfiling();\r\n    }\r\n    get inputNames() {\r\n        return this.handler.inputNames;\r\n    }\r\n    get
outputNames() {\r\n        return this.handler.outputNames;\r\n    }\r\n}\r\n//# sourceMappingURL=inference-
session-impl.js.map","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\nimport { InferenceSession as InferenceSessionImpl } from './inference-session-impl';\r\n// eslint-disable-
next-line @typescript-eslint/naming-convention\r\nexport const InferenceSession = InferenceSessionImpl;\r\n//#
sourceMappingURL=inference-session.js.map","var _scriptDir,e=(_scriptDir=\"undefined\"!=typeof
document&&document.currentScript?document.currentScript.src:void 0,\"undefined\"!=typeof
__filename&&(_scriptDir=_scriptDir||__filename),function(e){function t(){return
S.buffer!=Y&&Q(S.buffer),P}function n(){return S.buffer!=Y&&Q(S.buffer),W}function r(){return
S.buffer!=Y&&Q(S.buffer),q}function a(){return S.buffer!=Y&&Q(S.buffer),U}function i(){return
S.buffer!=Y&&Q(S.buffer),B}var o,u,s;e=e||{},o||(o=void 0!==e?e:{}),o.ready=new
Promise((function(e,t){u=e,s=t}));var c,f={};for(c in o)o.hasOwnProperty(c)&&(f[c]=o[c]);var
l=\"./this.program\";function p(e,t){throw t}var d,m,b,h,g,_=\"object\"==typeof window,y=\"function\"==typeof
importScripts,w=\"object\"==typeof process&&\"object\"==typeof process.versions&&\"string\"==typeof
process.versions.node,v=o.ENVIRONMENT_IS_PTHREAD||!1,A=\"\";function T(e){return
o.locateFile?o.locateFile(e,A):A+e}if(w){var
O;A=y?require(\"path\").dirname(A)+\"/\":__dirname+\"/\",d=function(e,t){return
h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.readFileSync(e,t?null:\"utf8\")},b=function(e){retur
n(e=d(e,!0)).buffer||(e=new
Uint8Array(e)),F(e.buffer),e},m=function(e,t,n){h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.rea
dFile(e,(function(e,r){e?n(e):t(r.buffer)}))},1<process.argv.length&&(l=process.argv[1].replace(/\\\\/g,\"/\")),process
.argv.slice(2),process.on(\"uncaughtException\",(function(e){if(!(e instanceof Gt))throw
e})),process.on(\"unhandledRejection\",ce),p=function(e,t){if(re())throw
process.exitCode=e,t;process.exit(e)},o.inspect=function(){return\"[Emscripten Module
object]\"};try{O=require(\"worker_threads\")}catch(e){throw console.error('The \"worker_threads\" module is not
supported in this node.js build - perhaps a newer version is
needed?'),e}global.Worker=O.Worker}else(_||y)&&(y?A=self.location.href:\"undefined\"!=typeof
document&&document.currentScript&&(A=document.currentScript.src),_scriptDir&&(A=_scriptDir),A=0!==A.in
dexOf(\"blob:\")?A.substr(0,A.lastIndexOf(\"/\")+1):\"\",w?(d=function(e,t){return
h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.readFileSync(e,t?null:\"utf8\")},b=function(e){retur
n(e=d(e,!0)).buffer||(e=new
Uint8Array(e)),F(e.buffer),e},m=function(e,t,n){h||(h=require(\"fs\")),g||(g=require(\"path\")),e=g.normalize(e),h.rea
dFile(e,(function(e,r){e?n(e):t(r.buffer)}))}):(d=function(e){var t=new XMLHttpRequest;return
t.open(\"GET\",e,!1),t.send(null),t.responseText},y&&(b=function(e){var t=new XMLHttpRequest;return
t.open(\"GET\",e,!1),t.responseType=\"arraybuffer\",t.send(null),new
Uint8Array(t.response)}),m=function(e,t,n){var r=new
XMLHttpRequest;r.open(\"GET\",e,!0),r.responseType=\"arraybuffer\",r.onload=function(){200==r.status||0==r.stat
us&&r.response?t(r.response):n()},r.onerror=n,r.send(null)}));w&&\"undefined\"==typeof
performance&&(global.performance=require(\"perf_hooks\").performance);var
k,E,x=o.print||console.log.bind(console),M=o.printErr||console.warn.bind(console);for(c in
f)f.hasOwnProperty(c)&&(o[c]=f[c]);f=null,o.thisProgram&&(l=o.thisProgram),o.quit&&(p=o.quit),o.wasmBinary
```

```
&&(E=o.wasmBinary);var D=o.noExitRuntime||!1;\"object\"!=typeof WebAssembly&&ce(\"no native wasm
support detected\");var S,C,R,I=!1;function F(e,t){e||ce(\"Assertion failed: \"+t)}function j(e){var t=new
TextDecoder(e);this.decode=function(e){return e.buffer instanceof SharedArrayBuffer&&(e=new
Uint8Array(e)),t.decode.call(t,e)}}var Y,P,W,q,U,B,G=\"undefined\"!=typeof TextDecoder?new j(\"utf8\"):void
0;function H(e,t,n){var r=t+n;for(n=t;e[n]&&!(n>=r);)++n;if(16<n-t&&e.subarray&&G)return
G.decode(e.subarray(t,n));for(r=\"\";t<n;){var a=e[t++];if(128&a){var
i=63&e[t++];if(192==(224&a))r+=String.fromCharCode((31&a)<<6|i);else{var
o=63&e[t++];65536>(a=224==(240&a)?(15&a)<<12|i<<6|o:(7&a)<<18|i<<12|o<<6|63&e[t++])?r+=String.fromCh
arCode(a):(a-=65536,r+=String.fromCharCode(55296|a>>10,56320|1023&a))}}else
r+=String.fromCharCode(a)}return r}function z(e,t){return e?H(n(),e,t):\"\"}function L(e,t,n,r){if(!(0<r))return 0;var
a=n;r=n+r-1;for(var i=0;i<e.length;++i){var
o=e.charCodeAt(i);if(55296<=o&&57343>=o&&(o=65536+((1023&o)<<10)|1023&e.charCodeAt(++i)),127>=o){i
f(n>=r)break;t[n++]=o}else{if(2047>=o){if(n+1>=r)break;t[n++]=192|o>>6}else{if(65535>=o){if(n+2>=r)break;t[
n++]=224|o>>12}else{if(n+3>=r)break;t[n++]=240|o>>18,t[n++]=128|o>>12&63}t[n++]=128|o>>6&63}t[n++]=1
28|63&o}}return t[n]=0,n-a}function N(e,t,r){return L(e,n(),t,r)}function V(e){for(var t=0,n=0;n<e.length;++n){var
r=e.charCodeAt(n);55296<=r&&57343>=r&&(r=65536+((1023&r)<<10)|1023&e.charCodeAt(++n)),127>=r?++t:t
=2047>=r?t+2:65535>=r?t+3:t+4}return t}function X(e){var n=V(e)+1,r=ht(n);return r&&L(e,t(),r,n),r}function
Q(e){Y=e,o.HEAP8=P=new Int8Array(e),o.HEAP16=new Int16Array(e),o.HEAP32=q=new
Int32Array(e),o.HEAPU8=W=new Uint8Array(e),o.HEAPU16=new Uint16Array(e),o.HEAPU32=U=new
Uint32Array(e),o.HEAPF32=new Float32Array(e),o.HEAPF64=B=new Float64Array(e)}\"undefined\"!=typeof
TextDecoder&&new j(\"utf-16le\"),v&&(Y=o.buffer);var
J=o.INITIAL_MEMORY||16777216;if(v)S=o.wasmMemory,Y=o.buffer;else
if(o.wasmMemory)S=o.wasmMemory;else if(!((S=new
WebAssembly.Memory({initial:J/65536,maximum:32768,shared:!0})).buffer instanceof SharedArrayBuffer))throw
M(\"requested a shared WebAssembly.Memory but the returned buffer is not a SharedArrayBuffer, indicating that
while the browser has SharedArrayBuffer it does not have WebAssembly threads support - you may need to set a
flag\"),w&&console.log(\"(on node you may need: --experimental-wasm-threads --experimental-wasm-bulk-
memory and also use a recent version)\"),Error(\"bad memory\");S&&(Y=S.buffer),J=Y.byteLength,Q(Y);var
Z,$=[],K=[],ee=[],te=[],ne=0;function re(){return D||0<ne}function ae(){var e=o.preRun.shift();$.unshift(e)}var
ie,oe=0,ue=null,se=null;function ce(e){throw o.onAbort&&o.onAbort(e),F(!v),M(e),I=!0,R=1,e=new
WebAssembly.RuntimeError(\"abort(\"+e+\"). Build with -s ASSERTIONS=1 for more info.\"),s(e),e}function
fe(){return ie.startsWith(\"data:application/octet-stream;base64,\")}function le(){var e=ie;try{if(e==ie&&E)return
new Uint8Array(E);if(b)return b(e);throw\"both async and sync fetching of the wasm
failed\"}catch(e){ce(e)}}o.preloadedImages={},o.preloadedAudios={},ie=\"ort-wasm-
threaded.wasm\",fe()||(ie=T(ie));var pe={973748:function(){throw\"Canceled!\"}};function
de(e){for(;0<e.length;){var t=e.shift();if(\"function\"==typeof t)t(o);else{var n=t.Nb;\"number\"==typeof n?void
0===t.ib?Z.get(n)():Z.get(n)(t.ib):n(void 0===t.ib?null:t.ib)}}}function
me(e,n){if(0>=e||e>t().length||1&e||0>n)return-28;if(0==n)return 0;2147483647<=n&&(n=1/0);var
a=Atomics.load(r(),Bt>>2),i=0;if(a==e&&Atomics.compareExchange(r(),Bt>>2,a,0)==a&&(i=1,0>=--n))return
1;if(0<=(e=Atomics.notify(r(),e>>2,n)))return e+i;throw\"Atomics.notify returned an unexpected value
\"+e}function be(e){if(v)throw\"Internal Error! cleanupThread() can only ever be called from main application
thread!\";if(!e)throw\"Internal Error! Null pthread_ptr in cleanupThread!\";var
t=ge.cb[e];t&&(r()[e+12>>2]=0,ge.sb(t.worker))}o._emscripten_futex_wake=me;var
he,ge={gb:[],fb:[],zb:[],xc:function(){},Rb:function(){for(var
e=ht(228),t=0;57>t;++t)a()[e/4+t]=0;r()[e+12>>2]=e,t=e+152,r()[t>>2]=t;var
n=ht(512);for(t=0;128>t;++t)a()[n/4+t]=0;Atomics.store(a(),e+100>>2,n),Atomics.store(a(),e+40>>2,e),Dt(e,!y,1),v
t(e)},Sb:function(){ge.receiveObjectTransfer=ge.Xb,ge.threadInit=ge.hc,ge.threadCancel=ge.fc,ge.threadExit=ge.H
b,ge.setExitStatus=ge.Zb},cb:{},yb:[],Eb:function(){for(;0<ge.yb.length;)ge.yb.pop()();Ct()},Fb:function(e,t){Atom
```

```
ics.store(a(),e+56>>2,1),Atomics.store(a(),e+60>>2,0),ge.Eb(),Atomics.store(a(),e+4>>2,t),Atomics.store(a(),e+0>
>2,1),me(e+0,2147483647),Dt(0,0,0)},Zb:function(e){R=e},Hb:function(e){var
t=yt();t&&(ge.Fb(t,e),v&&postMessage({cmd:\"exit\"}))},fc:function(){ge.Fb(yt(),-
1),postMessage({cmd:\"cancelDone\"})},Gb:function(){for(var e in ge.cb){var
t=ge.cb[e];t&&t.worker&&ge.sb(t.worker)}for(ge.cb={},e=0;e<ge.gb.length;++e){var
n=ge.gb[e];n.terminate()}for(ge.gb=[],e=0;e<ge.fb.length;++e)t=(n=ge.fb[e]).bb,ge.xb(t),n.terminate();ge.fb=[]},xb:
function(e){if(e){if(e.eb){var
t=r()[e.eb+100>>2];r()[e.eb+100>>2]=0,_t(t),_t(e.eb)}e.eb=0,e.wb&&e.hb&&_t(e.hb),e.hb=0,e.worker&&(e.worke
r.bb=null)}},sb:function(e){ge.Yb((function(){delete
ge.cb[e.bb.eb],ge.gb.push(e),ge.fb.splice(ge.fb.indexOf(e),1),ge.xb(e.bb),e.bb=void
0}))},Yb:function(e){r()[Ut>>2]=0;try{e()}finally{r()[Ut>>2]=1}},Xb:function(){},hc:function(){for(var e in
ge.zb)ge.zb[e]()},Ub:function(e,t){e.onmessage=function(n){var
i=n.data,o=i.cmd;if(e.bb&&(ge.Lb=e.bb.eb),i.targetThread&&i.targetThread!=yt()){var
u=ge.cb[i.Dc];u?u.worker.postMessage(n.data,i.transferList):M('Internal error! Worker sent a message \"'+o+'\" to
target pthread '+i.targetThread+\", but that thread no longer exists!\")}else
if(\"processQueuedMainThreadWork\"===o)Ot();else if(\"spawnThread\"===o)ve(n.data);else
if(\"cleanupThread\"===o)be(i.thread);else if(\"killThread\"===o){if(n=i.thread,v)throw\"Internal Error!
killThread() can only ever be called from main application thread!\";if(!n)throw\"Internal Error! Null pthread_ptr in
killThread!\";r()[n+12>>2]=0,i=ge.cb[n],delete
ge.cb[n],i.worker.terminate(),ge.xb(i),ge.fb.splice(ge.fb.indexOf(i.worker),1),i.worker.bb=void 0}else
if(\"cancelThread\"===o){if(n=i.thread,v)throw\"Internal Error! cancelThread() can only ever be called from main
application thread!\";if(!n)throw\"Internal Error! Null pthread_ptr in
cancelThread!\";ge.cb[n].worker.postMessage({cmd:\"cancel\"})}else
if(\"loaded\"===o)e.loaded=!0,t&&t(e),e.mb&&(e.mb(),delete e.mb);else if(\"print\"===o)x(\"Thread
\"+i.threadId+\": \"+i.text);else if(\"printErr\"===o)M(\"Thread \"+i.threadId+\": \"+i.text);else
if(\"alert\"===o)alert(\"Thread \"+i.threadId+\": \"+i.text);else
if(\"exit\"===o)e.bb&&Atomics.load(a(),e.bb.eb+64>>2)&&ge.sb(e);else
if(\"exitProcess\"===o)try{zt(i.returnCode)}catch(e){if(e instanceof Gt)return;throw
e}else\"cancelDone\"===o?ge.sb(e):\"objectTransfer\"!==o&&(\"setimmediate\"===n.data.target?e.postMessage(n.
data):M(\"worker sent an unknown command \"+o));ge.Lb=void 0},e.onerror=function(e){M(\"pthread sent an
error! \"+e.filename+\":\"+e.lineno+\":
\"+e.message)},w&&(e.on(\"message\",(function(t){e.onmessage({data:t})})),e.on(\"error\",(function(t){e.onerror(t)
})),e.on(\"exit\",(function(){}))),e.postMessage({cmd:\"load\",urlOrBlob:o.mainScriptUrlOrBlob||_scriptDir,wasm
Memory:S,wasmModule:C})},Ib:function(){var e=T(\"ort-wasm-threaded.worker.js\");ge.gb.push(new
Worker(e))},Ob:function(){return
0==ge.gb.length&&(ge.Ib(),ge.Ub(ge.gb[0])),ge.gb.pop()},nc:function(e){for(e=performance.now()+e;performance.
now()<e;);}};function _e(e,t){if(0===e)e=Date.now();else{if(1!==e&&4!==e)return r()[gt()>>2]=28,-
1;e=he()}return r()[t>>2]=e/1e3|0,r()[t+4>>2]=e%1e3*1e6|0,0}function ye(e,t){if(v)return
ze(1,1,e,t);ee.unshift({Nb:e,ib:t})}function we(e){this.lb=e-
16,this.dc=function(e){r()[this.lb+4>>2]=e},this.ac=function(e){r()[this.lb+8>>2]=e},this.bc=function(){r()[this.lb>
>2]=0},this.$b=function(){t()[this.lb+12>>0]=0},this.cc=function(){t()[this.lb+13>>0]=0},this.Pb=function(e,t){thi
s.dc(e),this.ac(t),this.bc(),this.$b(),this.cc()}}function ve(e){if(v)throw\"Internal Error! spawnThread() can only ever
be called from main application thread!\";var t=ge.Ob();if(!t)return 6;if(void 0!==t.bb)throw\"Internal
error!\";if(!e.rb)throw\"Internal error, no pthread ptr!\";ge.fb.push(t);for(var
n=ht(512),i=0;128>i;++i)r()[n+4*i>>2]=0;var
o=e.hb+e.jb,u=(i=ge.cb[e.rb]={worker:t,hb:e.hb,jb:e.jb,wb:e.wb,eb:e.rb}).eb>>2;Atomics.store(a(),u+16,e.detached)
,Atomics.store(a(),u+25,n),Atomics.store(a(),u+10,i.eb),Atomics.store(a(),u+20,e.jb),Atomics.store(a(),u+19,o),Ato
mics.store(a(),u+26,e.jb),Atomics.store(a(),u+28,o),Atomics.store(a(),u+29,e.detached),n=St()+40,Atomics.store(a()
```

```
,u+43,n),t.bb=i;var
s={cmd:\"run\",start_routine:e.ec,arg:e.ib,threadInfoStruct:e.rb,stackBase:e.hb,stackSize:e.jb};return
t.mb=function(){s.time=performance.now(),t.postMessage(s,e.mc)},t.loaded&&(t.mb(),delete t.mb),0}function
Ae(e,n,a){if(0>=e||e>t().length||1&e)return-28;if(_){if(Atomics.load(r(),e>>2)!=n)return-6;var
i=performance.now();for(a=i+a,Atomics.exchange(r(),Bt>>2,e);;){if((i=performance.now())>a)return
Atomics.exchange(r(),Bt>>2,0),-
73;if(0==(i=Atomics.exchange(r(),Bt>>2,0)))break;if(Ot(),Atomics.load(r(),e>>2)!=n)return-
6;Atomics.exchange(r(),Bt>>2,e)}return 0}if(\"timed-out\"===(e=Atomics.wait(r(),e>>2,n,a)))return-73;if(\"not-
equal\"===e)return-6;if(\"ok\"===e)return 0;throw\"Atomics.wait returned an unexpected value \"+e}function
Te(){w||y||(k||(k={}),k[\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-thread\"]||(k[\"Blocking on the
main thread is very dangerous, see https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-
browser-thread\"]=1,M(\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-
thread\")))}o.establishStackSpace=function(e,t){Wt(e,t),Yt(e)},o.invokeEntryPoint=function(e,t){return
Z.get(e)(t)},he=w?function(){var e=process.hrtime();return 1e3*e[0]+e[1]/1e6}:v?function(){return
performance.now()-o.__performance_now_clock_drift}:function(){return performance.now()};var
Oe={},ke=[null,[],[]];function Ee(e,t){var n=ke[e];0===t||10===t?((1===e?x:M)(H(n,0)),n.length=0):n.push(t)}var
xe={};function Me(e,t){return v?ze(2,1,e,t):(e=z(e),xe.rc(e,t))}function De(e,t,n){return v?ze(3,1,e,t,n):0}function
Se(e,t){if(v)return ze(4,1,e,t)}function Ce(e,t,n){if(v)return ze(5,1,e,t,n)}function Re(e,t,n){return
v?ze(6,1,e,t,n):0}function Ie(e,t){if(v)return ze(7,1,e,t)}function Fe(e,t){return
v?ze(8,1,e,t):(e=z(e),xe.sc(e,t))}function je(e,t,r,a,i,o){if(v)t=ze(9,1,e,t,r,a,i,o);else
if(o<<=12,0!=(16&a)&&0!=e%65536)t=-28;else if(0!=(32&a)){var
u=65536*Math.ceil(t/65536);(e=qt(65536,u))?n().fill(0,e,e+u):e=0,e?(Oe[e]={Wb:e,Tb:t,Jb:!0,fd:i,Ac:r,flags:a,offse
t:o},t=e):t=-48}else t=-52;return t}function Ye(e,t){if(v)e=ze(10,1,e,t);else{var
n=Oe[e];0!==t&&n?(t===n.Tb&&(Oe[e]=null,n.Jb&&_t(n.Wb)),e=0):e=-28}return e}function Pe(e,t,n){if(v)return
ze(11,1,e,t,n)}function We(e,t,n){return v?ze(12,1,e,t,n):(e=z(e),xe.tc(e,t,n))}function qe(e){if(v)return
ze(13,1,e)}function Ue(e,t){if(v)return ze(14,1,e,t)}function Be(e){if(v)return ze(15,1,e)}function Ge(){if(v)return
ze(16,1);ce()}var He=[];function ze(e,t){for(var n=arguments.length-2,r=jt(),a=Pt(8*n),o=a>>3,u=0;u<n;u++){var
s=arguments[2+u];i()[o+u]=s}return n=kt(e,n,a,t),Yt(r),n}var Le=[],Ne=[0,\"undefined\"!=typeof
document?document:0,\"undefined\"!=typeof window?window:0];function Ve(e){return
e=2<e?z(e):e,Ne[e]||(\"undefined\"!=typeof document?document.querySelector(e):void 0)}function Xe(e,t,n){var
a=Ve(e);if(!a)return-
4;if(a.qb&&(r()[a.qb>>2]=t,r()[a.qb+4>>2]=n),!a.Db&&a.pc){if(a.qb){a=r()[a.qb+8>>2],e=e?z(e):\"\";var
i=jt(),o=Pt(12),u=0;if(e){u=V(e)+1;var s=ht(u);N(e,s,u),u=s}return
r()[o>>2]=u,r()[o+4>>2]=t,r()[o+8>>2]=n,Et(0,a,657457152,0,u,o),Yt(i),1}return-4}return
a.Db&&(a=a.Db),e=!1,a.pb&&a.pb.ob&&(e=0===(e=a.pb.ob.getParameter(2978))[0]&&0===e[1]&&e[2]===a.wi
dth&&e[3]===a.height),a.width=t,a.height=n,e&&a.pb.ob.viewport(0,0,t,n),0}function Qe(e,t,n){return
v?ze(17,1,e,t,n):Xe(e,t,n)}var Je,Ze=[\"default\",\"low-power\",\"high-performance\"],$e={};function
Ke(){if(!Je){var
e,t={USER:\"web_user\",LOGNAME:\"web_user\",PATH:\"/\",PWD:\"/\",HOME:\"/home/web_user\",LANG:(\"ob
ject\"==typeof navigator&&navigator.languages&&navigator.languages[0]||\"C\").replace(\"-\",\"_\")+\".UTF-
8\",_:l||\"./this.program\"};for(e in $e)void 0===$e[e]?delete t[e]:t[e]=$e[e];var n=[];for(e in
t)n.push(e+\"=\"+t[e]);Je=n}return Je}function et(e,n){if(v)return ze(18,1,e,n);var a=0;return
Ke().forEach((function(i,o){var
u=n+a;for(o=r()[e+4*o>>2]=u,u=0;u<i.length;++u)t()[o++>>0]=i.charCodeAt(u);t()[o>>0]=0,a+=i.length+1})),0}f
unction tt(e,t){if(v)return ze(19,1,e,t);var n=Ke();r()[e>>2]=n.length;var a=0;return
n.forEach((function(e){a+=e.length+1})),r()[t>>2]=a,0}function nt(e){return v?ze(20,1,e):0}function rt(e,n){return
```

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v?ze(21,1,e,n):(e=1==e||2==e?2:ce(),t()[n>>0]=e,0)}function at(e,t,n,a){return
v?ze(22,1,e,t,n,a):(e=xe.vc(e),t=xe.uc(e,t,n),r()[a>>2]=t,0)}function it(e,t,n,r,a){if(v)return
ze(23,1,e,t,n,r,a)}function ot(e,t,a,i){if(v)return ze(24,1,e,t,a,i);for(var o=0,u=0;u<a;u++){for(var
s=r()[t+8*u>>2],c=r()[t+(8*u+4)>>2],f=0;f<c;f++)Ee(e,n()[s+f]);o+=c}return r()[i>>2]=o,0}function ut(){function
e(e){return(e=e.toTimeString().match(/\\(([A-Za-z ]+)\\)$/))?e[1]:\"GMT\"}if(v)return
ze(25,1);if(!ut.Kb){ut.Kb=!0;var t=(new Date).getFullYear(),n=new Date(t,0,1),a=new
Date(t,6,1);t=n.getTimezoneOffset();var
i=a.getTimezoneOffset(),o=Math.max(t,i);r()[Ft()>>2]=60*o,r()[It()>>2]=Number(t!=i),n=e(n),a=e(a),n=X(n),a=X(
a),i<t?(r()[Rt()>>2]=n,r()[Rt()+4>>2]=a):(r()[Rt()>>2]=a,r()[Rt()+4>>2]=n)}}function st(e){return
0==e%4&&(0!=e%100||0==e%400)}function ct(e,t){for(var n=0,r=0;r<=t;n+=e[r++]);return n}var
ft=[31,29,31,30,31,30,31,31,30,31,30,31],lt=[31,28,31,30,31,30,31,31,30,31,30,31];function pt(e,t){for(e=new
Date(e.getTime());0<t;){var n=e.getMonth(),r=(st(e.getFullYear())?ft:lt)[n];if(!(t>r-
e.getDate())){e.setDate(e.getDate()+t);break}t-=r-
e.getDate()+1,e.setDate(1),11>n?e.setMonth(n+1):(e.setMonth(0),e.setFullYear(e.getFullYear()+1))}return
e}function dt(e,n,a,i){function o(e,t,n){for(e=\"number\"==typeof e?e.toString():e||\"\";e.length<t;)e=n[0]+e;return
e}function u(e,t){return o(e,t,\"0\")}function s(e,t){function n(e){return 0>e?-1:0<e?1:0}var r;return
0===(r=n(e.getFullYear()-t.getFullYear()))&&0===(r=n(e.getMonth()-t.getMonth()))&&(r=n(e.getDate()-
t.getDate())),r}function c(e){switch(e.getDay()){case 0:return new Date(e.getFullYear()-1,11,29);case 1:return
e;case 2:return new Date(e.getFullYear(),0,3);case 3:return new Date(e.getFullYear(),0,2);case 4:return new
Date(e.getFullYear(),0,1);case 5:return new Date(e.getFullYear()-1,11,31);case 6:return new Date(e.getFullYear()-
1,11,30)}}function f(e){e=pt(new Date(e.ab+1900,0,1),e.vb);var t=new Date(e.getFullYear()+1,0,4),n=c(new
Date(e.getFullYear(),0,4));return t=c(t),0>=s(n,e)?0>=s(t,e)?e.getFullYear()+1:e.getFullYear():e.getFullYear()-
1}var l=r()[i+40>>2];for(var p in
i={kc:r()[i>>2],jc:r()[i+4>>2],tb:r()[i+8>>2],nb:r()[i+12>>2],kb:r()[i+16>>2],ab:r()[i+20>>2],ub:r()[i+24>>2],vb:r(
)[i+28>>2],Ec:r()[i+32>>2],ic:r()[i+36>>2],lc:l?z(l):\"\"},a=z(a),l={\"%c\":\"%a %b %d %H:%M:%S
%Y\",\"%D\":\"%m/%d/%y\",\"%F\":\"%Y-%m-%d\",\"%h\":\"%b\",\"%r\":\"%I:%M:%S
%p\",\"%R\":\"%H:%M\",\"%T\":\"%H:%M:%S\",\"%x\":\"%m/%d/%y\",\"%X\":\"%H:%M:%S\",\"%Ec\":\"%c\",\
"%EC\":\"%C\",\"%Ex\":\"%m/%d/%y\",\"%EX\":\"%H:%M:%S\",\"%Ey\":\"%y\",\"%EY\":\"%Y\",\"%Od\":\"%d
\",\"%Oe\":\"%e\",\"%OH\":\"%H\",\"%OI\":\"%I\",\"%Om\":\"%m\",\"%OM\":\"%M\",\"%OS\":\"%S\",\"%Ou\":\"
%u\",\"%OU\":\"%U\",\"%OV\":\"%V\",\"%Ow\":\"%w\",\"%OW\":\"%W\",\"%Oy\":\"%y\"})a=a.replace(new
RegExp(p,\"g\"),l[p]);var d=\"Sunday Monday Tuesday Wednesday Thursday Friday Saturday\".split(\"
\"),m=\"January February March April May June July August September October November December\".split(\"
\");for(p in l={\"%a\":function(e){return d[e.ub].substring(0,3)},\"%A\":function(e){return
d[e.ub]},\"%b\":function(e){return m[e.kb].substring(0,3)},\"%B\":function(e){return
m[e.kb]},\"%C\":function(e){return u((e.ab+1900)/100|0,2)},\"%d\":function(e){return
u(e.nb,2)},\"%e\":function(e){return o(e.nb,2,\" \")},\"%g\":function(e){return
f(e).toString().substring(2)},\"%G\":function(e){return f(e)},\"%H\":function(e){return
u(e.tb,2)},\"%I\":function(e){return 0==(e=e.tb)?e=12:12<e&&(e-=12),u(e,2)},\"%j\":function(e){return
u(e.nb+ct(st(e.ab+1900)?ft:lt,e.kb-1),3)},\"%m\":function(e){return u(e.kb+1,2)},\"%M\":function(e){return
u(e.jc,2)},\"%n\":function(){return\"\\n\"},\"%p\":function(e){return
0<=e.tb&&12>e.tb?\"AM\":\"PM\"},\"%S\":function(e){return
u(e.kc,2)},\"%t\":function(){return\"\\t\"},\"%u\":function(e){return e.ub||7},\"%U\":function(e){var t=new
Date(e.ab+1900,0,1),n=0===t.getDay()?t:pt(t,7-t.getDay());return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(ct(st(e.getFullYear())?ft:lt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\"01\":\"00\"},\"%V\":function(e){var t=new Date(e.ab+1901,0,4),n=c(new
Date(e.ab+1900,0,4));t=c(t);var r=pt(new Date(e.ab+1900,0,1),e.vb);return
0>s(r,n)?\"53\":0>=s(t,r)?\"01\":u(Math.ceil((n.getFullYear()<e.ab+1900?e.vb+32-n.getDate():e.vb+1-
n.getDate())/7),2)},\"%w\":function(e){return e.ub},\"%W\":function(e){var t=new
```

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Date(e.ab,0,1),n=1===t.getDay()?t:pt(t,0===t.getDay()?1:7-t.getDay()+1);return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(ct(st(e.getFullYear())?ft:lt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\"01\":\"00\"},\"%y\":function(e){return(e.ab+1900).toString().substring(2)},\"%
Y\":function(e){return e.ab+1900},\"%z\":function(e){var t=0<=(e=e.ic);return e=Math.abs(e)/60,(t?\"+\":\"-
\")+String(\"0000\"+(e/60*100+e%60)).slice(-4)},\"%Z\":function(e){return
e.lc},\"%%\":function(){return\"%\"}})a.includes(p)&&(a=a.replace(new
RegExp(p,\"g\"),l[p](i)));return(p=function(e){var t=Array(V(e)+1);return
L(e,t,0,t.length),t}(a)).length>n?0:(function(e,n){t().set(e,n)}(p,e),p.length-1)}var
mt=[null,ye,Me,De,Se,Ce,Re,Ie,Fe,je,Ye,Pe,We,qe,Ue,Be,Ge,Qe,et,tt,nt,rt,at,it,ot,ut],bt={h:function(e,t,n,r){ce(\"As
sertion failed: \"+z(e)+\", at: \"+[t?z(t):\"unknown filename\",n,r?z(r):\"unknown
function\"])},M:function(e,t){return _e(e,t)},b:function(e){return ht(e+16)+16},d:function(e,t){return
ye(e,t)},e:function(e,t){ge.yb.push((function(){Z.get(e)(t)}))},c:function(e,t,n){throw new
we(e).Pb(t,n),e},Z:function(e,t,n,i){if(\"undefined\"==typeof SharedArrayBuffer)return M(\"Current environment
does not support SharedArrayBuffer, pthreads are not available!\"),6;if(!e)return M(\"pthread_create called with a
null thread pointer!\"),28;var o=[];if(v&&0===o.length)return Tt(687865856,e,t,n,i);var u=0,s=0;if(t&&-1!=t){var
c=r()[t>>2];c+=81920,u=r()[t+8>>2],s=0!==r()[t+12>>2]}else c=2097152;(t=0==u)?u=qt(16,c):F(0<(u-=c));for(var
f=ht(228),l=0;57>l;++l)a()[(f>>2)+l]=0;return
r()[e>>2]=f,r()[f+12>>2]=f,e=f+152,r()[e>>2]=e,n={hb:u,jb:c,wb:t,detached:s,ec:n,rb:f,ib:i,mc:o},v?(n.oc=\"spawn
Thread\",postMessage(n,o),0):ve(n)},X:function(e){throw
v?ge.Hb(e):(ge.Eb(),zt(e)),\"unwind\"},Y:function(e,t){return function(e,t){if(!e)return M(\"pthread_join attempted
on a null thread pointer!\"),71;if(v&&yt()==e)return M(\"PThread \"+e+\" is attempting to join to
itself!\"),16;if(!v&&At()==e)return M(\"Main thread \"+e+\" is attempting to join to
itself!\"),16;if(r()[e+12>>2]!==e)return M(\"pthread_join attempted on thread \"+e+\", which does not point to a
valid thread, or does not exist anymore!\"),71;if(Atomics.load(a(),e+64>>2))return M(\"Attempted to join thread
\"+e+\", which was already detached!\"),28;for(Te();;){var n=Atomics.load(a(),e+0>>2);if(1==n)return
n=Atomics.load(a(),e+4>>2),t&&(r()[t>>2]=n),Atomics.store(a(),e+64>>2,1),v?postMessage({cmd:\"cleanupThrea
d\",thread:e}):be(e),0;xt(),v||Ot(),Ae(e+0,n,v?100:1)}}(e,t)},L:Me,s:De,S:Se,V:Ce,u:function(){return
42},F:Re,Q:Ie,P:Fe,U:je,T:Ye,q:Pe,K:We,N:qe,v:Ue,O:Be,da:function(e,t){if(e==t)postMessage({cmd:\"processQu
euedMainThreadWork\"});else
if(v)postMessage({targetThread:e,cmd:\"processThreadQueue\"});else{if(!(e=(e=ge.cb[e])&&e.worker))return;e.po
stMessage({cmd:\"processThreadQueue\"})}return 1},f:Ge,w:_e,ga:function(e,t){return e-t},A:function(){ce(\"To
use dlopen, you need to use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},l:function(){ce(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},C:function(){ce(\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},z:function(){ce(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},ea:function(e,t,a){var
o;for(He.length=0,a>>=2;o=n()[t++];)(o=105>o)&&1&a&&a++,He.push(o?i()[a++>>1]:r()[a]),++a;return
pe[e].apply(null,He)},G:Te,n:function(){},k:Ae,j:me,W:function(){return
2147483648},i:he,D:function(e,t,r){n().copyWithin(e,t,t+r)},o:function(){return
w?require(\"os\").cpus().length:navigator.hardwareConcurrency},aa:function(e,t,n){Le.length=t,n>>=3;for(var
r=0;r<t;r++)Le[r]=i()[n+r];return(0>e?pe[-e-1]:mt[e]).apply(null,Le)},E:function(e){var
t=n().length;if((e>>>=0)<=t||2147483648<e)return!1;for(var r=1;4>=r;r*=2){var
a=t*(1+.2/r);a=Math.min(a,e+100663296),0<(a=Math.max(e,a))%65536&&(a+=65536-
a%65536);e:{try{S.grow(Math.min(2147483648,a)-Y.byteLength+65535>>>16),Q(S.buffer);var i=1;break
e}catch(e){}i=void 0}if(i)return!0}return!1},ba:function(e,t,n){return
Ve(e)?Xe(e,t,n):Qe(e,t,n)},x:function(){},$:function(e,t,n){return ne+=1,setTimeout((function(){--
ne,function(e){if(!I){try{e()}catch(e){if(e instanceof Gt)return;if(\"unwind\"!==e)throw e&&\"object\"==typeof
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e&&e.stack&&M(\"exception thrown: \"+[e,e.stack]),e}if(!re())try{v?Mt(R):zt(R)}catch(e){if(!(e instanceof
Gt))throw e}}}((function(){Z.get(e)(n)}))}),t)},ca:function(e,t){t>>=2;var n=r()[t+6];return
t={alpha:!!r()[t],depth:!!r()[t+1],stencil:!!r()[t+2],antialias:!!r()[t+3],premultipliedAlpha:!!r()[t+4],preserveDrawing
Buffer:!!r()[t+5],powerPreference:Ze[n],failIfMajorPerformanceCaveat:!!r()[t+7],Vb:r()[t+8],yc:r()[t+9],Bb:r()[t+10
],Mb:r()[t+11],Bc:r()[t+12],Cc:r()[t+13]},!(e=Ve(e))||t.Mb?0:function(e,t){e.Cb||(e.Cb=e.getContext,e.getContext=f
unction(t,n){return\"webgl\"==t==(n=e.Cb(t,n))instanceof WebGLRenderingContext?n:null});var
n=e.getContext(\"webgl\",t);return n?function(e,t){var n=ht(8);r()[n+4>>2]=yt();var
a={wc:n,attributes:t,version:t.Vb,ob:e};return e.canvas&&(e.canvas.pb=a),(void
0===t.Bb||t.Bb)&&function(e){if(e||(e=void 0),!e.Qb){e.Qb=!0;var t=e.ob;!function(e){var
t=e.getExtension(\"ANGLE_instanced_arrays\");t&&(e.vertexAttribDivisor=function(e,n){t.vertexAttribDivisorAN
GLE(e,n)},e.drawArraysInstanced=function(e,n,r,a){t.drawArraysInstancedANGLE(e,n,r,a)},e.drawElementsInstan
ced=function(e,n,r,a,i){t.drawElementsInstancedANGLE(e,n,r,a,i)})}(t),function(e){var
t=e.getExtension(\"OES_vertex_array_object\");t&&(e.createVertexArray=function(){return
t.createVertexArrayOES()},e.deleteVertexArray=function(e){t.deleteVertexArrayOES(e)},e.bindVertexArray=funct
ion(e){t.bindVertexArrayOES(e)},e.isVertexArray=function(e){return t.isVertexArrayOES(e)})}(t),function(e){var
t=e.getExtension(\"WEBGL_draw_buffers\");t&&(e.drawBuffers=function(e,n){t.drawBuffersWEBGL(e,n)})}(t),t.
qc=t.getExtension(\"EXT_disjoint_timer_query\"),t.zc=t.getExtension(\"WEBGL_multi_draw\"),(t.getSupportedExt
ensions()||[]).forEach((function(e){e.includes(\"lose_context\")||e.includes(\"debug\")||t.getExtension(e)}))}}(a),n}(n
,t):0}(e,t)},I:et,J:tt,m:nt,H:rt,t:at,B:it,p:ot,R:function(e){var t=Date.now();return
r()[e>>2]=t/1e3|0,r()[e+4>>2]=t%1e3*1e3|0,0},ha:function e(t,n){return t=new
Date(1e3*r()[t>>2]),r()[n>>2]=t.getUTCSeconds(),r()[n+4>>2]=t.getUTCMinutes(),r()[n+8>>2]=t.getUTCHours(),
r()[n+12>>2]=t.getUTCDate(),r()[n+16>>2]=t.getUTCMonth(),r()[n+20>>2]=t.getUTCFullYear()-
1900,r()[n+24>>2]=t.getUTCDay(),r()[n+36>>2]=0,r()[n+32>>2]=0,t=(t.getTime()-
Date.UTC(t.getUTCFullYear(),0,1,0,0,0,0))/864e5|0,r()[n+28>>2]=t,e.Ab||(e.Ab=X(\"GMT\")),r()[n+40>>2]=e.Ab,
n},_:function(){ge.Rb()},r:function(e,t){ut(),e=new
Date(1e3*r()[e>>2]),r()[t>>2]=e.getSeconds(),r()[t+4>>2]=e.getMinutes(),r()[t+8>>2]=e.getHours(),r()[t+12>>2]=e
.getDate(),r()[t+16>>2]=e.getMonth(),r()[t+20>>2]=e.getFullYear()-1900,r()[t+24>>2]=e.getDay();var n=new
Date(e.getFullYear(),0,1),a=(e.getTime()-n.getTime())/864e5|0;return r()[t+28>>2]=a,r()[t+36>>2]=-
60*e.getTimezoneOffset(),a=new
Date(e.getFullYear(),6,1).getTimezoneOffset(),e=0|(a!=(n=n.getTimezoneOffset())&&e.getTimezoneOffset()==Mat
h.min(n,a)),r()[t+32>>2]=e,e=r()[Rt()+(e?4:0)>>2],r()[t+40>>2]=e,t},a:S||o.wasmMemory,y:function(e){ut();var
t=new
Date(r()[e+20>>2]+1900,r()[e+16>>2],r()[e+12>>2],r()[e+8>>2],r()[e+4>>2],r()[e>>2],0),n=r()[e+32>>2],a=t.getT
imezoneOffset(),i=new Date(t.getFullYear(),0,1),o=new
Date(t.getFullYear(),6,1).getTimezoneOffset(),u=i.getTimezoneOffset(),s=Math.min(u,o);return
0>n?r()[e+32>>2]=Number(o!=u&&s==a):0<n!=(s==a)&&(o=Math.max(u,o),t.setTime(t.getTime()+6e4*((0<n?s:o
)-a))),r()[e+24>>2]=t.getDay(),n=(t.getTime()-
i.getTime())/864e5|0,r()[e+28>>2]=n,r()[e>>2]=t.getSeconds(),r()[e+4>>2]=t.getMinutes(),r()[e+8>>2]=t.getHours(
),r()[e+12>>2]=t.getDate(),r()[e+16>>2]=t.getMonth(),t.getTime()/1e3|0},fa:dt,g:function(e,t,n,r){return
dt(e,t,n,r)}};!function(){function
e(e,t){o.asm=e.exports,Z=o.asm.Ca,K.unshift(o.asm.ia),ge.zb.push(o.asm.Ha),C=t,v||(oe--
,o.monitorRunDependencies&&o.monitorRunDependencies(oe),0==oe&&(null!==ue&&(clearInterval(ue),ue=null)
,se&&(e=se,se=null,e())))}function t(t){e(t.instance,t.module)}function n(e){return
function(){if(!E&&(_||y)){if(\"function\"==typeof fetch&&!ie.startsWith(\"file://\"))return
fetch(ie,{credentials:\"same-origin\"}).then((function(e){if(!e.ok)throw\"failed to load wasm binary file at
'\"+ie+\"'\";return e.arrayBuffer()})).catch((function(){return le()}));if(m)return new
Promise((function(e,t){m(ie,(function(t){e(new Uint8Array(t))}),t)}))}return
Promise.resolve().then((function(){return le()}))}().then((function(e){return
```

```
WebAssembly.instantiate(e,r)})).then(e,(function(e){M(\"failed to asynchronously prepare wasm: \"+e),ce(e)}))}var
r={a:bt};if(v||(oe++,o.monitorRunDependencies&&o.monitorRunDependencies(oe)),o.instantiateWasm)try{return
o.instantiateWasm(r,e)}catch(e){return M(\"Module.instantiateWasm callback failed with error:
\"+e),!1}(E||\"function\"!=typeof
WebAssembly.instantiateStreaming||fe()||ie.startsWith(\"file://\")||\"function\"!=typeof
fetch?n(t):fetch(ie,{credentials:\"same-origin\"}).then((function(e){return
WebAssembly.instantiateStreaming(e,r).then(t,(function(e){return M(\"wasm streaming compile failed:
\"+e),M(\"falling back to ArrayBuffer
instantiation\"),n(t)}))}))).catch(s)}(),o.___wasm_call_ctors=function(){return(o.___wasm_call_ctors=o.asm.ia).app
ly(null,arguments)},o._OrtInit=function(){return(o._OrtInit=o.asm.ja).apply(null,arguments)},o._OrtCreateSession
Options=function(){return(o._OrtCreateSessionOptions=o.asm.ka).apply(null,arguments)},o._OrtAddSessionConfig
Entry=function(){return(o._OrtAddSessionConfigEntry=o.asm.la).apply(null,arguments)},o._OrtReleaseSessionOpt
ions=function(){return(o._OrtReleaseSessionOptions=o.asm.ma).apply(null,arguments)},o._OrtCreateSession=funct
ion(){return(o._OrtCreateSession=o.asm.na).apply(null,arguments)},o._OrtReleaseSession=function(){return(o._Ort
ReleaseSession=o.asm.oa).apply(null,arguments)},o._OrtGetInputCount=function(){return(o._OrtGetInputCount=o.
asm.pa).apply(null,arguments)},o._OrtGetOutputCount=function(){return(o._OrtGetOutputCount=o.asm.qa).apply(
null,arguments)},o._OrtGetInputName=function(){return(o._OrtGetInputName=o.asm.ra).apply(null,arguments)},o.
_OrtGetOutputName=function(){return(o._OrtGetOutputName=o.asm.sa).apply(null,arguments)},o._OrtFree=funct
ion(){return(o._OrtFree=o.asm.ta).apply(null,arguments)},o._OrtCreateTensor=function(){return(o._OrtCreateTens
or=o.asm.ua).apply(null,arguments)},o._OrtGetTensorData=function(){return(o._OrtGetTensorData=o.asm.va).appl
y(null,arguments)},o._OrtReleaseTensor=function(){return(o._OrtReleaseTensor=o.asm.wa).apply(null,arguments)
},o._OrtCreateRunOptions=function(){return(o._OrtCreateRunOptions=o.asm.xa).apply(null,arguments)},o._OrtAd
dRunConfigEntry=function(){return(o._OrtAddRunConfigEntry=o.asm.ya).apply(null,arguments)},o._OrtReleaseR
unOptions=function(){return(o._OrtReleaseRunOptions=o.asm.za).apply(null,arguments)},o._OrtRun=function(){re
turn(o._OrtRun=o.asm.Aa).apply(null,arguments)},o._OrtEndProfiling=function(){return(o._OrtEndProfiling=o.as
m.Ba).apply(null,arguments)};var
ht=o._malloc=function(){return(ht=o._malloc=o.asm.Da).apply(null,arguments)},gt=o.___errno_location=function(
){return(gt=o.___errno_location=o.asm.Ea).apply(null,arguments)},_t=o._free=function(){return(_t=o._free=o.asm.
Fa).apply(null,arguments)},yt=o._pthread_self=function(){return(yt=o._pthread_self=o.asm.Ga).apply(null,argumen
ts)};o._emscripten_tls_init=function(){return(o._emscripten_tls_init=o.asm.Ha).apply(null,arguments)},o._emscript
en_current_thread_process_queued_calls=function(){return(o._emscripten_current_thread_process_queued_calls=o.
asm.Ia).apply(null,arguments)};var
wt,vt=o._emscripten_register_main_browser_thread_id=function(){return(vt=o._emscripten_register_main_browser
_thread_id=o.asm.Ja).apply(null,arguments)},At=o._emscripten_main_browser_thread_id=function(){return(At=o._
emscripten_main_browser_thread_id=o.asm.Ka).apply(null,arguments)},Tt=o._emscripten_sync_run_in_main_thre
ad_4=function(){return(Tt=o._emscripten_sync_run_in_main_thread_4=o.asm.La).apply(null,arguments)},Ot=o._e
mscripten_main_thread_process_queued_calls=function(){return(Ot=o._emscripten_main_thread_process_queued_
calls=o.asm.Ma).apply(null,arguments)},kt=o._emscripten_run_in_main_runtime_thread_js=function(){return(kt=o.
_emscripten_run_in_main_runtime_thread_js=o.asm.Na).apply(null,arguments)},Et=o.__emscripten_call_on_threa
d=function(){return(Et=o.__emscripten_call_on_thread=o.asm.Oa).apply(null,arguments)},xt=o._pthread_testcance
l=function(){return(xt=o._pthread_testcancel=o.asm.Pa).apply(null,arguments)},Mt=o._pthread_exit=function(){ret
urn(Mt=o._pthread_exit=o.asm.Qa).apply(null,arguments)},Dt=o.__emscripten_thread_init=function(){return(Dt=o.
__emscripten_thread_init=o.asm.Ra).apply(null,arguments)},St=o._emscripten_get_global_libc=function(){return(S
t=o._emscripten_get_global_libc=o.asm.Sa).apply(null,arguments)},Ct=o.___pthread_tsd_run_dtors=function(){ret
urn(Ct=o.___pthread_tsd_run_dtors=o.asm.Ta).apply(null,arguments)},Rt=o.__get_tzname=function(){return(Rt=o.
__get_tzname=o.asm.Ua).apply(null,arguments)},It=o.__get_daylight=function(){return(It=o.__get_daylight=o.asm
.Va).apply(null,arguments)},Ft=o.__get_timezone=function(){return(Ft=o.__get_timezone=o.asm.Wa).apply(null,ar
guments)},jt=o.stackSave=function(){return(jt=o.stackSave=o.asm.Xa).apply(null,arguments)},Yt=o.stackRestore=f
```

```
unction(){return(Yt=o.stackRestore=o.asm.Ya).apply(null,arguments)},Pt=o.stackAlloc=function(){return(Pt=o.stac
kAlloc=o.asm.Za).apply(null,arguments)},Wt=o._emscripten_stack_set_limits=function(){return(Wt=o._emscripten
_stack_set_limits=o.asm._a).apply(null,arguments)},qt=o._memalign=function(){return(qt=o._memalign=o.asm.$a)
.apply(null,arguments)},Ut=o.__emscripten_allow_main_runtime_queued_calls=973296,Bt=o.__emscripten_main_
thread_futex=977204;function Gt(e){this.name=\"ExitStatus\",this.message=\"Program terminated with
exit(\"+e+\")\",this.status=e}function Ht(){function
e(){if(!wt&&(wt=!0,o.calledRun=!0,!I)&&(v||de(K),u(o),o.onRuntimeInitialized&&o.onRuntimeInitialized(),!v)){if
(o.postRun)for(\"function\"==typeof o.postRun&&(o.postRun=[o.postRun]);o.postRun.length;){var
e=o.postRun.shift();te.unshift(e)}de(te)}}if(!(0<oe))if(v)u(o),v||de(K),postMessage({cmd:\"loaded\"});else{if(!v){if
(o.preRun)for(\"function\"==typeof
o.preRun&&(o.preRun=[o.preRun]);o.preRun.length;)ae();de($)}0<oe||(o.setStatus?(o.setStatus(\"Running...\"),setT
imeout((function(){setTimeout((function(){o.setStatus(\"\")}),1),e()}),1)):e())}}function zt(e){if(R=e,v)throw
postMessage({cmd:\"exitProcess\",returnCode:e}),new Gt(e);re()||(ge.Gb(),v||(de(ee),\"undefined\"!=typeof
_fflush&&_fflush(0),ke[1].length&&Ee(1,10),ke[2].length&&Ee(2,10))),R=e,re()||(ge.Gb(),o.onExit&&o.onExit(e),
I=!0),p(e,new
Gt(e))}if(o.UTF8ToString=z,o.stringToUTF8=N,o.lengthBytesUTF8=V,o.keepRuntimeAlive=re,o.PThread=ge,o.st
ackSave=jt,o.stackRestore=Yt,o.stackAlloc=Pt,o.PThread=ge,o.wasmMemory=S,o.ExitStatus=Gt,se=function
e(){wt||Ht(),wt||(se=e)},o.run=Ht,o.preInit)for(\"function\"==typeof
o.preInit&&(o.preInit=[o.preInit]);0<o.preInit.length;)o.preInit.pop()();return
v&&(D=!1,ge.Sb()),Ht(),e.ready});\"object\"==typeof exports&&\"object\"==typeof
module?module.exports=e:\"function\"==typeof define&&define.amd?define([],(function(){return
e})):\"object\"==typeof exports&&(exports.ortWasmThreaded=e);\n","\r\nvar ortWasm = (function() {\r\n  var
_scriptDir = typeof document !== 'undefined' && document.currentScript ? document.currentScript.src :
undefined;\r\n  if (typeof __filename !== 'undefined') _scriptDir = _scriptDir || __filename;\r\n  return
(\r\nfunction(ortWasm) {\r\n  ortWasm = ortWasm || {};\r\n\r\n\r\nvar c;c||(c=typeof ortWasm !== 'undefined' ?
ortWasm : {});var aa,g;c.ready=new Promise(function(a,b){aa=a;g=b});var r={},t;for(t in
c)c.hasOwnProperty(t)&&(r[t]=c[t]);var v=\"./this.program\",ba=\"object\"===typeof
window,w=\"function\"===typeof importScripts,ca=\"object\"===typeof process&&\"object\"===typeof
process.versions&&\"string\"===typeof
process.versions.node,x=\"\",y,z,B,C,D;\r\nif(ca)x=w?require(\"path\").dirname(x)+\"/\":__dirname+\"/\",y=function
(a,b){C||(C=require(\"fs\"));D||(D=require(\"path\"));a=D.normalize(a);return
C.readFileSync(a,b?null:\"utf8\")},B=function(a){a=y(a,!0);a.buffer||(a=new Uint8Array(a));a.buffer||E(\"Assertion
failed: undefined\");return
a},z=function(a,b,e){C||(C=require(\"fs\"));D||(D=require(\"path\"));a=D.normalize(a);C.readFile(a,function(f,h){f?e
(f):b(h.buffer)})},1<process.argv.length&&(v=process.argv[1].replace(/\\\\/g,\"/\")),process.argv.slice(2),process.on(
\"uncaughtException\",\r\nfunction(a){throw
a;}),process.on(\"unhandledRejection\",E),c.inspect=function(){return\"[Emscripten Module object]\"};else
if(ba||w)w?x=self.location.href:\"undefined\"!==typeof
document&&document.currentScript&&(x=document.currentScript.src),_scriptDir&&(x=_scriptDir),0!==x.indexO
f(\"blob:\")?x=x.substr(0,x.lastIndexOf(\"/\")+1):x=\"\",y=function(a){var b=new
XMLHttpRequest;b.open(\"GET\",a,!1);b.send(null);return b.responseText},w&&(B=function(a){var b=new
XMLHttpRequest;b.open(\"GET\",a,!1);b.responseType=\"arraybuffer\";\r\nb.send(null);return new
Uint8Array(b.response)}),z=function(a,b,e){var f=new
XMLHttpRequest;f.open(\"GET\",a,!0);f.responseType=\"arraybuffer\";f.onload=function(){200==f.status||0==f.stat
us&&f.response?b(f.response):e()};f.onerror=e;f.send(null)};var
da=c.print||console.log.bind(console),F=c.printErr||console.warn.bind(console);for(t in
r)r.hasOwnProperty(t)&&(c[t]=r[t]);r=null;c.thisProgram&&(v=c.thisProgram);var
H;c.wasmBinary&&(H=c.wasmBinary);var noExitRuntime=c.noExitRuntime||!1;\r\n\"object\"!==typeof
```

```
WebAssembly&&E(\"no native wasm support detected\");var I,ea=!1,fa=\"undefined\"!==typeof TextDecoder?new
TextDecoder(\"utf8\"):void 0;\r\nfunction ha(a,b,e){var f=b+e;for(e=b;a[e]&&!(e>=f);)++e;if(16<e-
b&&a.subarray&&fa)return fa.decode(a.subarray(b,e));for(f=\"\";b<e;){var h=a[b++];if(h&128){var
k=a[b++]&63;if(192==(h&224))f+=String.fromCharCode((h&31)<<6|k);else{var
l=a[b++]&63;h=224==(h&240)?(h&15)<<12|k<<6|l:(h&7)<<18|k<<12|l<<6|a[b++]&63;65536>h?f+=String.fromC
harCode(h):(h-=65536,f+=String.fromCharCode(55296|h>>10,56320|h&1023))}}else
f+=String.fromCharCode(h)}return f}function J(a,b){return a?ha(K,a,b):\"\"}\r\nfunction L(a,b,e,f){if(!(0<f))return
0;var h=e;f=e+f-1;for(var k=0;k<a.length;++k){var l=a.charCodeAt(k);if(55296<=l&&57343>=l){var
q=a.charCodeAt(++k);l=65536+((l&1023)<<10)|q&1023}if(127>=l){if(e>=f)break;b[e++]=l}else{if(2047>=l){if(e
+1>=f)break;b[e++]=192|l>>6}else{if(65535>=l){if(e+2>=f)break;b[e++]=224|l>>12}else{if(e+3>=f)break;b[e++]
=240|l>>18;b[e++]=128|l>>12&63}b[e++]=128|l>>6&63}b[e++]=128|l&63}}b[e]=0;return e-h}\r\nfunction
ia(a){for(var b=0,e=0;e<a.length;++e){var
f=a.charCodeAt(e);55296<=f&&57343>=f&&(f=65536+((f&1023)<<10)|a.charCodeAt(++e)&1023);127>=f?++b:
b=2047>=f?b+2:65535>=f?b+3:b+4}return b}function ja(a){var b=ia(a)+1,e=ka(b);e&&L(a,M,e,b);return e}var
la,M,K,N;\r\nfunction ma(){var a=I.buffer;la=a;c.HEAP8=M=new Int8Array(a);c.HEAP16=new
Int16Array(a);c.HEAP32=N=new Int32Array(a);c.HEAPU8=K=new Uint8Array(a);c.HEAPU16=new
Uint16Array(a);c.HEAPU32=new Uint32Array(a);c.HEAPF32=new Float32Array(a);c.HEAPF64=new
Float64Array(a)}var na,oa=[],pa=[],qa=[],ra=[];function sa(){var a=c.preRun.shift();oa.unshift(a)}var
O=0,ta=null,P=null;c.preloadedImages={};c.preloadedAudios={};\r\nfunction
E(a){if(c.onAbort)c.onAbort(a);F(a);ea=!0;a=new WebAssembly.RuntimeError(\"abort(\"+a+\"). Build with -s
ASSERTIONS=1 for more info.\");g(a);throw a;}function ua(){return Q.startsWith(\"data:application/octet-
stream;base64,\")}var Q;Q=\"ort-wasm.wasm\";if(!ua()){var va=Q;Q=c.locateFile?c.locateFile(va,x):x+va}function
wa(){var a=Q;try{if(a==Q&&H)return new Uint8Array(H);if(B)return B(a);throw\"both async and sync fetching of
the wasm failed\";}catch(b){E(b)}}\r\nfunction xa(){if(!H&&(ba||w)){if(\"function\"===typeof
fetch&&!Q.startsWith(\"file://\"))return fetch(Q,{credentials:\"same-
origin\"}).then(function(a){if(!a.ok)throw\"failed to load wasm binary file at '\"+Q+\"'\";return
a.arrayBuffer()}).catch(function(){return wa()});if(z)return new Promise(function(a,b){z(Q,function(e){a(new
Uint8Array(e))},b)})}return Promise.resolve().then(function(){return wa()})}\r\nfunction
ya(a){for(;0<a.length;){var b=a.shift();if(\"function\"==typeof b)b(c);else{var e=b.Ea;\"number\"===typeof e?void
0===b.xa?na.get(e)():na.get(e)(b.xa):e(void 0===b.xa?null:b.xa)}}}function za(a){this.ya=a-
16;this.Na=function(b){N[this.ya+4>>2]=b};this.Ka=function(b){N[this.ya+8>>2]=b};this.La=function(){N[this.ya
>>2]=0};this.Ja=function(){M[this.ya+12>>0]=0};this.Ma=function(){M[this.ya+13>>0]=0};this.Ga=function(b,e)
{this.Na(b);this.Ka(e);this.La();this.Ja();this.Ma()}}\r\nvar Aa=0,Ba={},Ca=[null,[],[]],R={},S;S=ca?function(){var
a=process.hrtime();return 1E3*a[0]+a[1]/1E6}:function(){return performance.now()};var Da={};function
Ea(){if(!Fa){var
a={USER:\"web_user\",LOGNAME:\"web_user\",PATH:\"/\",PWD:\"/\",HOME:\"/home/web_user\",LANG:(\"obj
ect\"===typeof navigator&&navigator.languages&&navigator.languages[0]||\"C\").replace(\"-\",\"_\")+\".UTF-
8\",_:v||\"./this.program\"},b;for(b in Da)void 0===Da[b]?delete a[b]:a[b]=Da[b];var e=[];for(b in
a)e.push(b+\"=\"+a[b]);Fa=e}return Fa}var Fa;\r\nfunction T(a,b){a=new
Date(1E3*N[a>>2]);N[b>>2]=a.getUTCSeconds();N[b+4>>2]=a.getUTCMinutes();N[b+8>>2]=a.getUTCHours();
N[b+12>>2]=a.getUTCDate();N[b+16>>2]=a.getUTCMonth();N[b+20>>2]=a.getUTCFullYear()-
1900;N[b+24>>2]=a.getUTCDay();N[b+36>>2]=0;N[b+32>>2]=0;N[b+28>>2]=(a.getTime()-
Date.UTC(a.getUTCFullYear(),0,1,0,0,0,0))/864E5|0;T.Da||(T.Da=ja(\"GMT\"));N[b+40>>2]=T.Da;return
b}\r\nfunction Ga(){function a(l){return(l=l.toTimeString().match(/\\(([A-Za-z
]+)\\)$/))?l[1]:\"GMT\"}if(!Ka){Ka=!0;var b=(new Date).getFullYear(),e=new Date(b,0,1),f=new
Date(b,6,1);b=e.getTimezoneOffset();var
h=f.getTimezoneOffset(),k=Math.max(b,h);N[La()>>2]=60*k;N[Ma()>>2]=Number(b!=h);e=a(e);f=a(f);e=ja(e);f=j
a(f);h<b?(N[U()>>2]=e,N[U()+4>>2]=f):(N[U()>>2]=f,N[U()+4>>2]=e)}}var Ka;function V(a){return
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0===a%4&&(0!==a%100||0===a%400)}function Na(a,b){for(var e=0,f=0;f<=b;e+=a[f++]);return e}\r\nvar
W=[31,29,31,30,31,30,31,31,30,31,30,31],X=[31,28,31,30,31,30,31,31,30,31,30,31];function Y(a,b){for(a=new
Date(a.getTime());0<b;){var e=a.getMonth(),f=(V(a.getFullYear())?W:X)[e];if(b>f-a.getDate())b-=f-
a.getDate()+1,a.setDate(1),11>e?a.setMonth(e+1):(a.setMonth(0),a.setFullYear(a.getFullYear()+1));else{a.setDate(
a.getDate()+b);break}}return a}\r\nfunction Oa(a,b,e,f){function h(d,m,n){for(d=\"number\"===typeof
d?d.toString():d||\"\";d.length<m;)d=n[0]+d;return d}function k(d,m){return h(d,m,\"0\")}function l(d,m){function
n(Ha){return 0>Ha?-1:0<Ha?1:0}var A;0===(A=n(d.getFullYear()-m.getFullYear()))&&0===(A=n(d.getMonth()-
m.getMonth()))&&(A=n(d.getDate()-m.getDate()));return A}function q(d){switch(d.getDay()){case 0:return new
Date(d.getFullYear()-1,11,29);case 1:return d;case 2:return new Date(d.getFullYear(),0,3);case 3:return new
Date(d.getFullYear(),\r\n0,2);case 4:return new Date(d.getFullYear(),0,1);case 5:return new Date(d.getFullYear()-
1,11,31);case 6:return new Date(d.getFullYear()-1,11,30)}}function G(d){d=Y(new Date(d.va+1900,0,1),d.Ca);var
m=new Date(d.getFullYear()+1,0,4),n=q(new Date(d.getFullYear(),0,4));m=q(m);return
0>=l(n,d)?0>=l(m,d)?d.getFullYear()+1:d.getFullYear():d.getFullYear()-1}var
u=N[f+40>>2];f={Qa:N[f>>2],Pa:N[f+4>>2],Aa:N[f+8>>2],za:N[f+12>>2],wa:N[f+16>>2],va:N[f+20>>2],Ba:N[
f+24>>2],Ca:N[f+28>>2],Ya:N[f+32>>2],Oa:N[f+\r\n36>>2],Ra:u?J(u):\"\"};e=J(e);u={\"%c\":\"%a %b %d
%H:%M:%S %Y\",\"%D\":\"%m/%d/%y\",\"%F\":\"%Y-%m-%d\",\"%h\":\"%b\",\"%r\":\"%I:%M:%S
%p\",\"%R\":\"%H:%M\",\"%T\":\"%H:%M:%S\",\"%x\":\"%m/%d/%y\",\"%X\":\"%H:%M:%S\",\"%Ec\":\"%c\",\
"%EC\":\"%C\",\"%Ex\":\"%m/%d/%y\",\"%EX\":\"%H:%M:%S\",\"%Ey\":\"%y\",\"%EY\":\"%Y\",\"%Od\":\"%d
\",\"%Oe\":\"%e\",\"%OH\":\"%H\",\"%OI\":\"%I\",\"%Om\":\"%m\",\"%OM\":\"%M\",\"%OS\":\"%S\",\"%Ou\":\"
%u\",\"%OU\":\"%U\",\"%OV\":\"%V\",\"%Ow\":\"%w\",\"%OW\":\"%W\",\"%Oy\":\"%y\"};for(var p in
u)e=e.replace(new RegExp(p,\"g\"),u[p]);var Ia=\"Sunday Monday Tuesday Wednesday Thursday Friday
Saturday\".split(\" \"),\r\nJa=\"January February March April May June July August September October November
December\".split(\" \");u={\"%a\":function(d){return Ia[d.Ba].substring(0,3)},\"%A\":function(d){return
Ia[d.Ba]},\"%b\":function(d){return Ja[d.wa].substring(0,3)},\"%B\":function(d){return
Ja[d.wa]},\"%C\":function(d){return k((d.va+1900)/100|0,2)},\"%d\":function(d){return
k(d.za,2)},\"%e\":function(d){return h(d.za,2,\" \")},\"%g\":function(d){return
G(d).toString().substring(2)},\"%G\":function(d){return G(d)},\"%H\":function(d){return
k(d.Aa,\r\n2)},\"%I\":function(d){d=d.Aa;0==d?d=12:12<d&&(d-=12);return k(d,2)},\"%j\":function(d){return
k(d.za+Na(V(d.va+1900)?W:X,d.wa-1),3)},\"%m\":function(d){return k(d.wa+1,2)},\"%M\":function(d){return
k(d.Pa,2)},\"%n\":function(){return\"\\n\"},\"%p\":function(d){return
0<=d.Aa&&12>d.Aa?\"AM\":\"PM\"},\"%S\":function(d){return
k(d.Qa,2)},\"%t\":function(){return\"\\t\"},\"%u\":function(d){return d.Ba||7},\"%U\":function(d){var m=new
Date(d.va+1900,0,1),n=0===m.getDay()?m:Y(m,7-m.getDay());d=new Date(d.va+1900,d.wa,d.za);return
0>\r\nl(n,d)?k(Math.ceil((31-n.getDate()+(Na(V(d.getFullYear())?W:X,d.getMonth()-1)-
31)+d.getDate())/7),2):0===l(n,m)?\"01\":\"00\"},\"%V\":function(d){var m=new Date(d.va+1901,0,4),n=q(new
Date(d.va+1900,0,4));m=q(m);var A=Y(new Date(d.va+1900,0,1),d.Ca);return
0>l(A,n)?\"53\":0>=l(m,A)?\"01\":k(Math.ceil((n.getFullYear()<d.va+1900?d.Ca+32-n.getDate():d.Ca+1-
n.getDate())/7),2)},\"%w\":function(d){return d.Ba},\"%W\":function(d){var m=new
Date(d.va,0,1),n=1===m.getDay()?m:Y(m,0===m.getDay()?1:7-m.getDay()+1);d=new
Date(d.va+\r\n1900,d.wa,d.za);return 0>l(n,d)?k(Math.ceil((31-
n.getDate()+(Na(V(d.getFullYear())?W:X,d.getMonth()-1)-
31)+d.getDate())/7),2):0===l(n,m)?\"01\":\"00\"},\"%y\":function(d){return(d.va+1900).toString().substring(2)},\"
%Y\":function(d){return d.va+1900},\"%z\":function(d){d=d.Oa;var m=0<=d;d=Math.abs(d)/60;return(m?\"+\":\"-
\")+String(\"0000\"+(d/60*100+d%60)).slice(-4)},\"%Z\":function(d){return
d.Ra},\"%%\":function(){return\"%\"}};for(p in u)e.includes(p)&&(e=e.replace(new
RegExp(p,\"g\"),u[p](f)));p=Pa(e);if(p.length>b)return 0;\r\nM.set(p,a);return p.length-1}function Pa(a){var
b=Array(ia(a)+1);L(a,b,0,b.length);return b}\r\nvar Ta={a:function(a){return
ka(a+16)+16},c:function(a,b){qa.unshift({Ea:a,xa:b})},d:function(a,b){qa.unshift({Ea:a,xa:b})},b:function(a,b,e){(
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new za(a)).Ga(b,e);Aa++;throw a;},D:function(a,b){a=J(a);return R.Sa(a,b)},m:function(){return
0},I:function(){},L:function(){},o:function(){return 42},x:function(){return
0},H:function(){},G:function(a,b){a=J(a);return
R.Ta(a,b)},K:function(a,b,e,f,h,k){k<<=12;if(0!==(f&16)&&0!==a%65536)b=-28;else
if(0!==(f&32)){a=65536*Math.ceil(b/65536);var
l=Qa(65536,a);\r\nl?(K.fill(0,l,l+a),a=l):a=0;a?(Ba[a]={Ia:a,Ha:b,Fa:!0,fd:h,Xa:e,flags:f,offset:k},b=a):b=-48}else
b=-52;return b},J:function(a,b){var e=Ba[a];0!==b&&e?(b===e.Ha&&(Ba[a]=null,e.Fa&&Ra(e.Ia)),a=0):a=-
28;return a},j:function(){},C:function(a,b,e){a=J(a);return
R.Ua(a,b,e)},E:function(){},r:function(){},F:function(){},h:function(){E()},p:function(a,b){if(0===a)a=Date.now();
else if(1===a||4===a)a=S();else return N[Sa()>>2]=28,-1;N[b>>2]=a/1E3|0;N[b+4>>2]=a%1E3*1E6|0;return
0},s:function(a,b){return a-\r\nb},P:function(){E(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},g:function(){E(\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},Q:function(){E(\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\")},O:function(){E(\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\")},\r\nM:function(){return
2147483648},v:function(a,b,e){K.copyWithin(a,b,b+e)},i:function(a){var
b=K.length;a>>>=0;if(2147483648<a)return!1;for(var e=1;4>=e;e*=2){var
f=b*(1+.2/e);f=Math.min(f,a+100663296);f=Math.max(a,f);0<f%65536&&(f+=65536-
f%65536);a:{try{I.grow(Math.min(2147483648,f)-la.byteLength+65535>>>16);ma();var h=1;break
a}catch(k){}h=void 0}if(h)return!0}return!1},B:function(a){for(var b=S();S()-b<a;);},z:function(a,b){var
e=0;Ea().forEach(function(f,h){var
k=b+e;h=N[a+4*h>>2]=k;for(k=0;k<f.length;++k)M[h++>>\r\n0]=f.charCodeAt(k);M[h>>0]=0;e+=f.length+1});re
turn 0},A:function(a,b){var e=Ea();N[a>>2]=e.length;var
f=0;e.forEach(function(h){f+=h.length+1});N[b>>2]=f;return 0},f:function(){return
0},y:function(a,b){a=1==a||2==a?2:E();M[b>>0]=a;return
0},n:function(a,b,e,f){a=R.Wa(a);b=R.Va(a,b,e);N[f>>2]=b;return 0},u:function(){},q:function(a,b,e,f){for(var
h=0,k=0;k<e;k++){for(var l=N[b+8*k>>2],q=N[b+(8*k+4)>>2],G=0;G<q;G++){var
u=K[l+G],p=Ca[a];0===u||10===u?((1===a?da:F)(ha(p,0)),p.length=0):p.push(u)}h+=\r\nq}N[f>>2]=h;return
0},w:function(a){var b=Date.now();N[a>>2]=b/1E3|0;N[a+4>>2]=b%1E3*1E3|0;return
0},t:T,l:function(a,b){Ga();a=new
Date(1E3*N[a>>2]);N[b>>2]=a.getSeconds();N[b+4>>2]=a.getMinutes();N[b+8>>2]=a.getHours();N[b+12>>2]=a.
getDate();N[b+16>>2]=a.getMonth();N[b+20>>2]=a.getFullYear()-1900;N[b+24>>2]=a.getDay();var e=new
Date(a.getFullYear(),0,1);N[b+28>>2]=(a.getTime()-e.getTime())/864E5|0;N[b+36>>2]=-
(60*a.getTimezoneOffset());var f=(new
Date(a.getFullYear(),6,1)).getTimezoneOffset();e=\r\ne.getTimezoneOffset();a=(f!=e&&a.getTimezoneOffset()==
Math.min(e,f))|0;N[b+32>>2]=a;a=N[U()+(a?4:0)>>2];N[b+40>>2]=a;return b},k:function(a){Ga();var b=new
Date(N[a+20>>2]+1900,N[a+16>>2],N[a+12>>2],N[a+8>>2],N[a+4>>2],N[a>>2],0),e=N[a+32>>2],f=b.getTimez
oneOffset(),h=new Date(b.getFullYear(),0,1),k=(new
Date(b.getFullYear(),6,1)).getTimezoneOffset(),l=h.getTimezoneOffset(),q=Math.min(l,k);0>e?N[a+32>>2]=Numb
er(k!=l&&q==f):0<e!=(q==f)&&(k=Math.max(l,k),b.setTime(b.getTime()+6E4*((0<e?q:k)-
f)));N[a+\r\n24>>2]=b.getDay();N[a+28>>2]=(b.getTime()-
h.getTime())/864E5|0;N[a>>2]=b.getSeconds();N[a+4>>2]=b.getMinutes();N[a+8>>2]=b.getHours();N[a+12>>2]=
b.getDate();N[a+16>>2]=b.getMonth();return b.getTime()/1E3|0},N:Oa,e:function(a,b,e,f){return
Oa(a,b,e,f)}};\r\n(function(){function a(h){c.asm=h.exports;I=c.asm.R;ma();na=c.asm.ua;pa.unshift(c.asm.S);O--
;c.monitorRunDependencies&&c.monitorRunDependencies(O);0==O&&(null!==ta&&(clearInterval(ta),ta=null),P
&&(h=P,P=null,h()))}function b(h){a(h.instance)}function e(h){return xa().then(function(k){return
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WebAssembly.instantiate(k,f)}).then(h,function(k){F(\"failed to asynchronously prepare wasm: \"+k);E(k)})}var
f={a:Ta};O++;c.monitorRunDependencies&&c.monitorRunDependencies(O);if(c.instantiateWasm)try{return
c.instantiateWasm(f,\r\na)}catch(h){return F(\"Module.instantiateWasm callback failed with error:
\"+h),!1}(function(){return H||\"function\"!==typeof
WebAssembly.instantiateStreaming||ua()||Q.startsWith(\"file://\")||\"function\"!==typeof
fetch?e(b):fetch(Q,{credentials:\"same-origin\"}).then(function(h){return
WebAssembly.instantiateStreaming(h,f).then(b,function(k){F(\"wasm streaming compile failed: \"+k);F(\"falling
back to ArrayBuffer instantiation\");return
e(b)})})})().catch(g);return{}})();\r\nc.___wasm_call_ctors=function(){return(c.___wasm_call_ctors=c.asm.S).appl
y(null,arguments)};c._OrtInit=function(){return(c._OrtInit=c.asm.T).apply(null,arguments)};c._OrtCreateSessionO
ptions=function(){return(c._OrtCreateSessionOptions=c.asm.U).apply(null,arguments)};c._OrtAddSessionConfigE
ntry=function(){return(c._OrtAddSessionConfigEntry=c.asm.V).apply(null,arguments)};c._OrtReleaseSessionOptio
ns=function(){return(c._OrtReleaseSessionOptions=c.asm.W).apply(null,arguments)};\r\nc._OrtCreateSession=func
tion(){return(c._OrtCreateSession=c.asm.X).apply(null,arguments)};c._OrtReleaseSession=function(){return(c._Ort
ReleaseSession=c.asm.Y).apply(null,arguments)};c._OrtGetInputCount=function(){return(c._OrtGetInputCount=c.a
sm.Z).apply(null,arguments)};c._OrtGetOutputCount=function(){return(c._OrtGetOutputCount=c.asm._).apply(null
,arguments)};c._OrtGetInputName=function(){return(c._OrtGetInputName=c.asm.$).apply(null,arguments)};\r\nc._
OrtGetOutputName=function(){return(c._OrtGetOutputName=c.asm.aa).apply(null,arguments)};c._OrtFree=functio
n(){return(c._OrtFree=c.asm.ba).apply(null,arguments)};c._OrtCreateTensor=function(){return(c._OrtCreateTensor
=c.asm.ca).apply(null,arguments)};c._OrtGetTensorData=function(){return(c._OrtGetTensorData=c.asm.da).apply(
null,arguments)};c._OrtReleaseTensor=function(){return(c._OrtReleaseTensor=c.asm.ea).apply(null,arguments)};\r\
nc._OrtCreateRunOptions=function(){return(c._OrtCreateRunOptions=c.asm.fa).apply(null,arguments)};c._OrtAdd
RunConfigEntry=function(){return(c._OrtAddRunConfigEntry=c.asm.ga).apply(null,arguments)};c._OrtReleaseRu
nOptions=function(){return(c._OrtReleaseRunOptions=c.asm.ha).apply(null,arguments)};c._OrtRun=function(){ret
urn(c._OrtRun=c.asm.ia).apply(null,arguments)};c._OrtEndProfiling=function(){return(c._OrtEndProfiling=c.asm.j
a).apply(null,arguments)};\r\nvar
ka=c._malloc=function(){return(ka=c._malloc=c.asm.ka).apply(null,arguments)},Sa=c.___errno_location=function(
){return(Sa=c.___errno_location=c.asm.la).apply(null,arguments)},Ra=c._free=function(){return(Ra=c._free=c.asm
.ma).apply(null,arguments)},U=c.__get_tzname=function(){return(U=c.__get_tzname=c.asm.na).apply(null,argume
nts)},Ma=c.__get_daylight=function(){return(Ma=c.__get_daylight=c.asm.oa).apply(null,arguments)},La=c.__get_t
imezone=function(){return(La=c.__get_timezone=c.asm.pa).apply(null,\r\narguments)},Ua=c.stackSave=function()
{return(Ua=c.stackSave=c.asm.qa).apply(null,arguments)},Va=c.stackRestore=function(){return(Va=c.stackRestore
=c.asm.ra).apply(null,arguments)},Wa=c.stackAlloc=function(){return(Wa=c.stackAlloc=c.asm.sa).apply(null,argu
ments)},Qa=c._memalign=function(){return(Qa=c._memalign=c.asm.ta).apply(null,arguments)};c.UTF8ToString=J
;c.stringToUTF8=function(a,b,e){return
L(a,K,b,e)};c.lengthBytesUTF8=ia;c.stackSave=Ua;c.stackRestore=Va;c.stackAlloc=Wa;var Z;\r\nP=function
Xa(){Z||Ya();Z||(P=Xa)};\r\nfunction Ya(){function
a(){if(!Z&&(Z=!0,c.calledRun=!0,!ea)){ya(pa);aa(c);if(c.onRuntimeInitialized)c.onRuntimeInitialized();if(c.postRu
n)for(\"function\"==typeof c.postRun&&(c.postRun=[c.postRun]);c.postRun.length;){var
b=c.postRun.shift();ra.unshift(b)}ya(ra)}}if(!(0<O)){if(c.preRun)for(\"function\"==typeof
c.preRun&&(c.preRun=[c.preRun]);c.preRun.length;)sa();ya(oa);0<O||(c.setStatus?(c.setStatus(\"Running...\"),setTi
meout(function(){setTimeout(function(){c.setStatus(\"\")},1);a()},1)):a())}}c.run=Ya;\r\nif(c.preInit)for(\"function\"
==typeof c.preInit&&(c.preInit=[c.preInit]);0<c.preInit.length;)c.preInit.pop()();Ya();\r\n\r\n\r\n  return
ortWasm.ready\r\n}\r\n);\r\n})();\r\nif (typeof exports === 'object' && typeof module === 'object')\r\n
module.exports = ortWasm;\r\nelse if (typeof define === 'function' && define['amd'])\r\n  define([], function() {
return ortWasm; });\r\nelse if (typeof exports === 'object')\r\n  exports[\"ortWasm\"] = ortWasm;\r\n","\"use
strict\";\r\nmodule.exports = asPromise;\r\n\r\n/**\r\n * Callback as used by {@link util.asPromise}.\r\n * @typedef
asPromiseCallback\r\n * @type {function}\r\n * @param {Error|null} error Error, if any\r\n * @param {...*}
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params Additional arguments\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n * Returns a promise from a node-style callback function.\r\n * @memberof util\r\n * @param {asPromiseCallback} fn Function to call\r\n * @param {*} ctx Function context\r\n * @param {...*} params Function arguments\r\n * @returns {Promise<*>} Promisified function\r\n */\r\nfunction asPromise(fn, ctx/*, varargs */) {\r\n   var params = new Array(arguments.length - 1),\r\n   offset = 0,\r\n   index   = 2,\r\n   pending = true;\r\n   while (index < arguments.length)\r\n   params[offset++] = arguments[index++];\r\n   return new Promise(function executor(resolve, reject) {\r\n   params[offset] = function callback(err/*, varargs */) {\r\n   if (pending) {\r\n   pending = false;\r\n   if (err)\r\n   reject(err);\r\n   else {\r\n   var params = new Array(arguments.length - 1),\r\n   offset = 0;\r\n   while (offset < params.length)\r\n   params[offset++] = arguments[offset];\r\n   resolve.apply(null, params);\r\n   }\r\n   }\r\n   };\r\n   try {\r\n   fn.apply(ctx || null, params);\r\n   } catch (err) {\r\n   if (pending) {\r\n   pending = false;\r\n   reject(err);\r\n   }\r\n   }\r\n   });\r\n}\r\n","\"use strict\";\r\n\r\n/**\r\n * A minimal base64 implementation for number arrays.\r\n * @memberof util\r\n * @namespace\r\n */\r\nvar base64 = exports;\r\n\r\n/**\r\n * Calculates the byte length of a base64 encoded string.\r\n * @param {string} string Base64 encoded string\r\n * @returns {number} Byte length\r\n */\r\nbase64.length = function length(string) {\r\n   var p = string.length;\r\n   if (!p)\r\n   return 0;\r\n   var n = 0;\r\n   while (--p % 4 > 1 && string.charAt(p) === \"=\")\r\n   ++n;\r\n   return Math.ceil(string.length * 3) / 4 - n;\r\n};\r\n\r\n// Base64 encoding table\r\nvar b64 = new Array(64);\r\n\r\n// Base64 decoding table\r\nvar s64 = new Array(123);\r\n\r\n// 65..90, 97..122, 48..57, 43, 47\r\nfor (var i = 0; i < 64;)\r\n   s64[b64[i] = i < 26 ? i + 65 : i < 52 ? i + 71 : i < 62 ? i - 4 : i - 59 | 43] = i++;\r\n\r\n/**\r\n * Encodes a buffer to a base64 encoded string.\r\n * @param {Uint8Array} buffer Source buffer\r\n * @param {number} start Source start\r\n * @param {number} end Source end\r\n * @returns {string} Base64 encoded string\r\n */\r\nbase64.encode = function encode(buffer, start, end) {\r\n   var parts = null,\r\n   chunk = [];\r\n   var i = 0, // output index\r\n   j = 0, // goto index\r\n   t;   // temporary\r\n   while (start < end) {\r\n   var b = buffer[start++];\r\n   switch (j) {\r\n   case 0:\r\n   chunk[i++] = b64[b >> 2];\r\n   t = (b & 3) << 4;\r\n   j = 1;\r\n   break;\r\n   case 1:\r\n   chunk[i++] = b64[t | b >> 4];\r\n   t = (b & 15) << 2;\r\n   j = 2;\r\n   break;\r\n   case 2:\r\n   chunk[i++] = b64[t | b >> 6];\r\n   chunk[i++] = b64[b & 63];\r\n   j = 0;\r\n   break;\r\n   }\r\n   if (i > 8191) {\r\n   (parts || (parts = [])).push(String.fromCharCode.apply(String, chunk));\r\n   i = 0;\r\n   }\r\n   }\r\n   if (j) {\r\n   chunk[i++] = b64[t];\r\n   chunk[i++] = 61;\r\n   if (j === 1)\r\n   chunk[i++] = 61;\r\n   }\r\n   if (parts) {\r\n   if (i)\r\n   parts.push(String.fromCharCode.apply(String, chunk.slice(0, i)));\r\n   return parts.join(\"\");\r\n   }\r\n   return String.fromCharCode.apply(String, chunk.slice(0, i));\r\n};\r\n\r\nvar invalidEncoding = \"invalid encoding\";\r\n\r\n/**\r\n * Decodes a base64 encoded string to a buffer.\r\n * @param {string} string Source string\r\n * @param {Uint8Array} buffer Destination buffer\r\n * @param {number} offset Destination offset\r\n * @returns {number} Number of bytes written\r\n * @throws {Error} If encoding is invalid\r\n */\r\nbase64.decode = function decode(string, buffer, offset) {\r\n   var start = offset;\r\n   var j = 0, // goto index\r\n   t;   // temporary\r\n   for (var i = 0; i < string.length;) {\r\n   var c = string.charCodeAt(i++);\r\n   if (c === 61 && j > 1)\r\n   break;\r\n   if ((c = s64[c]) === undefined)\r\n   throw Error(invalidEncoding);\r\n   switch (j) {\r\n   case 0:\r\n   t = c;\r\n   j = 1;\r\n   break;\r\n   case 1:\r\n   buffer[offset++] = t << 2 | (c & 48) >> 4;\r\n   t = c;\r\n   j = 2;\r\n   break;\r\n   case 2:\r\n   buffer[offset++] = (t & 15) << 4 | (c & 60) >> 2;\r\n   t = c;\r\n   j = 3;\r\n   break;\r\n   case 3:\r\n   buffer[offset++] = (t & 3) << 6 | c;\r\n   j = 0;\r\n   break;\r\n   }\r\n   }\r\n   if (j === 1)\r\n   throw Error(invalidEncoding);\r\n   return offset - start;\r\n};\r\n\r\n/**\r\n * Tests if the specified string appears to be base64 encoded.\r\n * @param {string} string String to test\r\n * @returns {boolean} `true` if probably base64 encoded, otherwise false\r\n */\r\nbase64.test = function test(string) {\r\n   return /^(?:[A-Za-z0-9+/]{4})*(?:[A-Za-z0-9+/]{2}==|[A-Za-z0-9+/]{3}=)?$/.test(string);\r\n};\r\n","\"use strict\";\r\nmodule.exports = EventEmitter;\r\n\r\n/**\r\n * Constructs a new event emitter instance.\r\n * @classdesc A minimal event emitter.\r\n * @memberof util\r\n * @constructor\r\n */\r\nfunction EventEmitter() {\r\n\r\n   /**\r\n   * Registered

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listeners.\r\n     * @type {Object.<string,*>}\r\n     * @private\r\n     */\r\n    this._listeners = {};\r\n}\r\n\r\n/**\r\n *
Registers an event listener.\r\n * @param {string} evt Event name\r\n * @param {function} fn Listener\r\n *
@param {*} [ctx] Listener context\r\n * @returns {util.EventEmitter} `this`\r\n */\r\nEventEmitter.prototype.on =
function on(evt, fn, ctx) {\r\n    (this._listeners[evt] || (this._listeners[evt] = [])).push({\r\n        fn  : fn,\r\n        ctx :
ctx || this\r\n    });\r\n    return this;\r\n};\r\n\r\n/**\r\n * Removes an event listener or any matching listeners if
arguments are omitted.\r\n * @param {string} [evt] Event name. Removes all listeners if omitted.\r\n * @param
{function} [fn] Listener to remove. Removes all listeners of `evt` if omitted.\r\n * @returns {util.EventEmitter}
`this`\r\n */\r\nEventEmitter.prototype.off = function off(evt, fn) {\r\n    if (evt === undefined)\r\n        this._listeners
= {};\r\n    else {\r\n        if (fn === undefined)\r\n            this._listeners[evt] = [];\r\n        else {\r\n            var
listeners = this._listeners[evt];\r\n            for (var i = 0; i < listeners.length;)\r\n                if (listeners[i].fn ===
fn)\r\n                    listeners.splice(i, 1);\r\n                else\r\n                    ++i;\r\n        }\r\n    }\r\n    return
this;\r\n};\r\n\r\n/**\r\n * Emits an event by calling its listeners with the specified arguments.\r\n * @param {string}
evt Event name\r\n * @param {...*} args Arguments\r\n * @returns {util.EventEmitter} `this`\r\n
*/\r\nEventEmitter.prototype.emit = function emit(evt) {\r\n    var listeners = this._listeners[evt];\r\n    if (listeners)
{\r\n        var args = [],\r\n            i = 1;\r\n        for (; i < arguments.length;)\r\n
args.push(arguments[i++]);\r\n        for (i = 0; i < listeners.length;)\r\n            listeners[i].fn.apply(listeners[i++].ctx,
args);\r\n    }\r\n    return this;\r\n};\r\n","\"use strict\";\r\n\r\nmodule.exports = factory(factory);\r\n\r\n/**\r\n *
Reads / writes floats / doubles from / to buffers.\r\n * @name util.float\r\n * @namespace\r\n */\r\n\r\n/**\r\n *
Writes a 32 bit float to a buffer using little endian byte order.\r\n * @name util.float.writeFloatLE\r\n *
@function\r\n * @param {number} val Value to write\r\n * @param {Uint8Array} buf Target buffer\r\n * @param
{number} pos Target buffer offset\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n * Writes a 32 bit float to a buffer
using big endian byte order.\r\n * @name util.float.writeFloatBE\r\n * @function\r\n * @param {number} val
Value to write\r\n * @param {Uint8Array} buf Target buffer\r\n * @param {number} pos Target buffer offset\r\n *
@returns {undefined}\r\n */\r\n\r\n/**\r\n * Reads a 32 bit float from a buffer using little endian byte order.\r\n *
@name util.float.readFloatLE\r\n * @function\r\n * @param {Uint8Array} buf Source buffer\r\n * @param
{number} pos Source buffer offset\r\n * @returns {number} Value read\r\n */\r\n\r\n/**\r\n * Reads a 32 bit float
from a buffer using big endian byte order.\r\n * @name util.float.readFloatBE\r\n * @function\r\n * @param
{Uint8Array} buf Source buffer\r\n * @param {number} pos Source buffer offset\r\n * @returns {number} Value
read\r\n */\r\n\r\n/**\r\n * Writes a 64 bit double to a buffer using little endian byte order.\r\n * @name
util.float.writeDoubleLE\r\n * @function\r\n * @param {number} val Value to write\r\n * @param {Uint8Array}
buf Target buffer\r\n * @param {number} pos Target buffer offset\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n *
Writes a 64 bit double to a buffer using big endian byte order.\r\n * @name util.float.writeDoubleBE\r\n *
@function\r\n * @param {number} val Value to write\r\n * @param {Uint8Array} buf Target buffer\r\n * @param
{number} pos Target buffer offset\r\n * @returns {undefined}\r\n */\r\n\r\n/**\r\n * Reads a 64 bit double from a
buffer using little endian byte order.\r\n * @name util.float.readDoubleLE\r\n * @function\r\n * @param
{Uint8Array} buf Source buffer\r\n * @param {number} pos Source buffer offset\r\n * @returns {number} Value
read\r\n */\r\n\r\n/**\r\n * Reads a 64 bit double from a buffer using big endian byte order.\r\n * @name
util.float.readDoubleBE\r\n * @function\r\n * @param {Uint8Array} buf Source buffer\r\n * @param {number}
pos Source buffer offset\r\n * @returns {number} Value read\r\n */\r\n\r\n// Factory function for the purpose of
node-based testing in modified global environments\r\nfunction factory(exports) {\r\n\r\n    // float: typed array\r\n
if (typeof Float32Array !== \"undefined\") (function() {\r\n\r\n        var f32 = new Float32Array([ -0 ]),\r\n
f8b = new Uint8Array(f32.buffer),\r\n            le  = f8b[3] === 128;\r\n\r\n        function writeFloat_f32_cpy(val, buf,
pos) {\r\n            f32[0] = val;\r\n            buf[pos    ] = f8b[0];\r\n            buf[pos + 1] = f8b[1];\r\n            buf[pos +
2] = f8b[2];\r\n            buf[pos + 3] = f8b[3];\r\n        }\r\n\r\n        function writeFloat_f32_rev(val, buf, pos) {\r\n
    f32[0] = val;\r\n            buf[pos    ] = f8b[3];\r\n            buf[pos + 1] = f8b[2];\r\n            buf[pos + 2] = f8b[1];\r\n
        buf[pos + 3] = f8b[0];\r\n        }\r\n\r\n        /* istanbul ignore next */\r\n        exports.writeFloatLE = le ?
writeFloat_f32_cpy : writeFloat_f32_rev;\r\n        /* istanbul ignore next */\r\n        exports.writeFloatBE = le ?
writeFloat_f32_rev : writeFloat_f32_cpy;\r\n\r\n        function readFloat_f32_cpy(buf, pos) {\r\n            f8b[0] =
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buf[pos    ];\r\n            f8b[1] = buf[pos + 1];\r\n            f8b[2] = buf[pos + 2];\r\n            f8b[3] = buf[pos + 3];\r\n
     return f32[0];\r\n        }\r\n\r\n        function readFloat_f32_rev(buf, pos) {\r\n            f8b[3] = buf[pos    ];\r\n
   f8b[2] = buf[pos + 1];\r\n            f8b[1] = buf[pos + 2];\r\n            f8b[0] = buf[pos + 3];\r\n            return
f32[0];\r\n        }\r\n\r\n        /* istanbul ignore next */\r\n        exports.readFloatLE = le ? readFloat_f32_cpy :
readFloat_f32_rev;\r\n        /* istanbul ignore next */\r\n        exports.readFloatBE = le ? readFloat_f32_rev :
readFloat_f32_cpy;\r\n\r\n    // float: ieee754\r\n    })(); else (function() {\r\n\r\n        function
writeFloat_ieee754(writeUint, val, buf, pos) {\r\n            var sign = val < 0 ? 1 : 0;\r\n            if (sign)\r\n
val = -val;\r\n            if (val === 0)\r\n                writeUint(1 / val > 0 ? /* positive */ 0 : /* negative 0 */
2147483648, buf, pos);\r\n            else if (isNaN(val))\r\n                writeUint(2143289344, buf, pos);\r\n            else
if (val > 3.4028234663852886e+38) // +-Infinity\r\n                writeUint((sign << 31 | 2139095040) >>> 0, buf,
pos);\r\n            else if (val < 1.1754943508222875e-38) // denormal\r\n                writeUint((sign << 31 |
Math.round(val / 1.401298464324817e-45)) >>> 0, buf, pos);\r\n            else {\r\n                var exponent =
Math.floor(Math.log(val) / Math.LN2),\r\n                    mantissa = Math.round(val * Math.pow(2, -exponent) *
8388608) & 8388607;\r\n                writeUint((sign << 31 | exponent + 127 << 23 | mantissa) >>> 0, buf, pos);\r\n
      }\r\n        }\r\n\r\n        exports.writeFloatLE = writeFloat_ieee754.bind(null, writeUintLE);\r\n
exports.writeFloatBE = writeFloat_ieee754.bind(null, writeUintBE);\r\n\r\n        function
readFloat_ieee754(readUint, buf, pos) {\r\n            var uint = readUint(buf, pos),\r\n                sign = (uint >> 31) * 2
+ 1,\r\n                exponent = uint >>> 23 & 255,\r\n                mantissa = uint & 8388607;\r\n            return exponent
=== 255\r\n                ? mantissa\r\n                ? NaN\r\n                : sign * Infinity\r\n                : exponent === 0 //
denormal\r\n                ? sign * 1.401298464324817e-45 * mantissa\r\n                : sign * Math.pow(2, exponent -
150) * (mantissa + 8388608);\r\n        }\r\n\r\n        exports.readFloatLE = readFloat_ieee754.bind(null,
readUintLE);\r\n        exports.readFloatBE = readFloat_ieee754.bind(null, readUintBE);\r\n\r\n    })();\r\n\r\n    //
double: typed array\r\n    if (typeof Float64Array !== \"undefined\") (function() {\r\n\r\n        var f64 = new
Float64Array([-0]),\r\n            f8b = new Uint8Array(f64.buffer),\r\n            le  = f8b[7] === 128;\r\n\r\n
function writeDouble_f64_cpy(val, buf, pos) {\r\n            f64[0] = val;\r\n            buf[pos    ] = f8b[0];\r\n
buf[pos + 1] = f8b[1];\r\n            buf[pos + 2] = f8b[2];\r\n            buf[pos + 3] = f8b[3];\r\n            buf[pos + 4] =
f8b[4];\r\n            buf[pos + 5] = f8b[5];\r\n            buf[pos + 6] = f8b[6];\r\n            buf[pos + 7] = f8b[7];\r\n
}\r\n\r\n        function writeDouble_f64_rev(val, buf, pos) {\r\n            f64[0] = val;\r\n            buf[pos    ] =
f8b[7];\r\n            buf[pos + 1] = f8b[6];\r\n            buf[pos + 2] = f8b[5];\r\n            buf[pos + 3] = f8b[4];\r\n
buf[pos + 4] = f8b[3];\r\n            buf[pos + 5] = f8b[2];\r\n            buf[pos + 6] = f8b[1];\r\n            buf[pos + 7] =
f8b[0];\r\n        }\r\n\r\n        /* istanbul ignore next */\r\n        exports.writeDoubleLE = le ? writeDouble_f64_cpy :
writeDouble_f64_rev;\r\n        /* istanbul ignore next */\r\n        exports.writeDoubleBE = le ? writeDouble_f64_rev
: writeDouble_f64_cpy;\r\n\r\n        function readDouble_f64_cpy(buf, pos) {\r\n            f8b[0] = buf[pos    ];\r\n
   f8b[1] = buf[pos + 1];\r\n            f8b[2] = buf[pos + 2];\r\n            f8b[3] = buf[pos + 3];\r\n            f8b[4] =
buf[pos + 4];\r\n            f8b[5] = buf[pos + 5];\r\n            f8b[6] = buf[pos + 6];\r\n            f8b[7] = buf[pos + 7];\r\n
       return f64[0];\r\n        }\r\n\r\n        function readDouble_f64_rev(buf, pos) {\r\n            f8b[7] = buf[pos    ];\r\n
        f8b[6] = buf[pos + 1];\r\n            f8b[5] = buf[pos + 2];\r\n            f8b[4] = buf[pos + 3];\r\n            f8b[3] =
buf[pos + 4];\r\n            f8b[2] = buf[pos + 5];\r\n            f8b[1] = buf[pos + 6];\r\n            f8b[0] = buf[pos + 7];\r\n
       return f64[0];\r\n        }\r\n\r\n        /* istanbul ignore next */\r\n        exports.readDoubleLE = le ?
readDouble_f64_cpy : readDouble_f64_rev;\r\n        /* istanbul ignore next */\r\n        exports.readDoubleBE = le ?
readDouble_f64_rev : readDouble_f64_cpy;\r\n\r\n    // double: ieee754\r\n    })(); else (function() {\r\n\r\n
function writeDouble_ieee754(writeUint, off0, off1, val, buf, pos) {\r\n            var sign = val < 0 ? 1 : 0;\r\n            if
(sign)\r\n                val = -val;\r\n            if (val === 0) {\r\n                writeUint(0, buf, pos + off0);\r\n
writeUint(1 / val > 0 ? /* positive */ 0 : /* negative 0 */ 2147483648, buf, pos + off1);\r\n            } else if
(isNaN(val)) {\r\n                writeUint(0, buf, pos + off0);\r\n                writeUint(2146959360, buf, pos + off1);\r\n
       } else if (val > 1.7976931348623157e+308) { // +-Infinity\r\n                writeUint(0, buf, pos + off0);\r\n
 writeUint((sign << 31 | 2146435072) >>> 0, buf, pos + off1);\r\n            } else {\r\n                var mantissa;\r\n
    if (val < 2.2250738585072014e-308) { // denormal\r\n                    mantissa = val / 5e-324;\r\n
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writeUint(mantissa >>> 0, buf, pos + off0);\r\n                    writeUint((sign << 31 | mantissa / 4294967296) >>> 0,
buf, pos + off1);\r\n                } else {\r\n                    var exponent = Math.floor(Math.log(val) / Math.LN2);\r\n
        if (exponent === 1024)\r\n                        exponent = 1023;\r\n                    mantissa = val * Math.pow(2, -
exponent);\r\n                    writeUint(mantissa * 4503599627370496 >>> 0, buf, pos + off0);\r\n
writeUint((sign << 31 | exponent + 1023 << 20 | mantissa * 1048576 & 1048575) >>> 0, buf, pos + off1);\r\n
   }\r\n            }\r\n        }\r\n\r\n        exports.writeDoubleLE = writeDouble_ieee754.bind(null, writeUintLE, 0,
4);\r\n        exports.writeDoubleBE = writeDouble_ieee754.bind(null, writeUintBE, 4, 0);\r\n\r\n        function
readDouble_ieee754(readUint, off0, off1, buf, pos) {\r\n            var lo = readUint(buf, pos + off0),\r\n                hi =
readUint(buf, pos + off1);\r\n            var sign = (hi >> 31) * 2 + 1,\r\n                exponent = hi >>> 20 & 2047,\r\n
        mantissa = 4294967296 * (hi & 1048575) + lo;\r\n            return exponent === 2047\r\n                ?
mantissa\r\n                ? NaN\r\n                : sign * Infinity\r\n                : exponent === 0 // denormal\r\n                ?
sign * 5e-324 * mantissa\r\n                : sign * Math.pow(2, exponent - 1075) * (mantissa + 4503599627370496);\r\n
      }\r\n\r\n        exports.readDoubleLE = readDouble_ieee754.bind(null, readUintLE, 0, 4);\r\n
exports.readDoubleBE = readDouble_ieee754.bind(null, readUintBE, 4, 0);\r\n\r\n    })();\r\n\r\n    return
exports;\r\n}\r\n\r\n// uint helpers\r\n\r\nfunction writeUintLE(val, buf, pos) {\r\n    buf[pos    ] =  val        & 255;\r\n
  buf[pos + 1] =  val >>> 8  & 255;\r\n    buf[pos + 2] =  val >>> 16 & 255;\r\n    buf[pos + 3] =  val >>>
24;\r\n}\r\n\r\nfunction writeUintBE(val, buf, pos) {\r\n    buf[pos    ] =  val >>> 24;\r\n    buf[pos + 1] =  val >>>
16 & 255;\r\n    buf[pos + 2] =  val >>> 8  & 255;\r\n    buf[pos + 3] =  val        & 255;\r\n}\r\n\r\nfunction
readUintLE(buf, pos) {\r\n    return (buf[pos    ]\r\n          | buf[pos + 1] << 8\r\n          | buf[pos + 2] << 16\r\n          |
buf[pos + 3] << 24) >>> 0;\r\n}\r\n\r\nfunction readUintBE(buf, pos) {\r\n    return (buf[pos    ] << 24\r\n          |
buf[pos + 1] << 16\r\n          | buf[pos + 2] << 8\r\n          | buf[pos + 3]) >>> 0;\r\n}\r\n","\"use
strict\";\r\nmodule.exports = inquire;\r\n\r\n/**\r\n * Requires a module only if available.\r\n * @memberof util\r\n
* @param {string} moduleName Module to require\r\n * @returns {?Object} Required module if available and not
empty, otherwise `null`\r\n */\r\nfunction inquire(moduleName) {\r\n    try {\r\n        var mod =
eval(\"quire\".replace(/^/,\"re\"))(moduleName); // eslint-disable-line no-eval\r\n        if (mod && (mod.length ||
Object.keys(mod).length))\r\n            return mod;\r\n    } catch (e) {} // eslint-disable-line no-empty\r\n    return
null;\r\n}\r\n","\"use strict\";\r\nmodule.exports = pool;\r\n\r\n/**\r\n * An allocator as used by {@link
util.pool}.\r\n * @typedef PoolAllocator\r\n * @type {function}\r\n * @param {number} size Buffer size\r\n *
@returns {Uint8Array} Buffer\r\n */\r\n\r\n/**\r\n * A slicer as used by {@link util.pool}.\r\n * @typedef
PoolSlicer\r\n * @type {function}\r\n * @param {number} start Start offset\r\n * @param {number} end End
offset\r\n * @returns {Uint8Array} Buffer slice\r\n * @this {Uint8Array}\r\n */\r\n\r\n/**\r\n * A general purpose
buffer pool.\r\n * @memberof util\r\n * @function\r\n * @param {PoolAllocator} alloc Allocator\r\n * @param
{PoolSlicer} slice Slicer\r\n * @param {number} [size=8192] Slab size\r\n * @returns {PoolAllocator} Pooled
allocator\r\n */\r\nfunction pool(alloc, slice, size) {\r\n    var SIZE   = size || 8192;\r\n    var MAX    = SIZE >>>
1;\r\n    var slab   = null;\r\n    var offset = SIZE;\r\n    return function pool_alloc(size) {\r\n        if (size < 1 || size >
MAX)\r\n            return alloc(size);\r\n        if (offset + size > SIZE) {\r\n            slab = alloc(SIZE);\r\n            offset
= 0;\r\n        }\r\n        var buf = slice.call(slab, offset, offset += size);\r\n        if (offset & 7) // align to 32 bit\r\n
  offset = (offset | 7) + 1;\r\n        return buf;\r\n    };\r\n}\r\n","\"use strict\";\r\n\r\n/**\r\n * A minimal UTF8
implementation for number arrays.\r\n * @memberof util\r\n * @namespace\r\n */\r\nvar utf8 =
exports;\r\n\r\n/**\r\n * Calculates the UTF8 byte length of a string.\r\n * @param {string} string String\r\n *
@returns {number} Byte length\r\n */\r\nutf8.length = function utf8_length(string) {\r\n    var len = 0,\r\n        c =
0;\r\n    for (var i = 0; i < string.length; ++i) {\r\n        c = string.charCodeAt(i);\r\n        if (c < 128)\r\n            len +=
1;\r\n        else if (c < 2048)\r\n            len += 2;\r\n        else if ((c & 0xFC00) === 0xD800 && (string.charCodeAt(i
+ 1) & 0xFC00) === 0xDC00) {\r\n            ++i;\r\n            len += 4;\r\n        } else\r\n            len += 3;\r\n    }\r\n
return len;\r\n};\r\n\r\n/**\r\n * Reads UTF8 bytes as a string.\r\n * @param {Uint8Array} buffer Source buffer\r\n
* @param {number} start Source start\r\n * @param {number} end Source end\r\n * @returns {string} String
read\r\n */\r\nutf8.read = function utf8_read(buffer, start, end) {\r\n    var len = end - start;\r\n    if (len < 1)\r\n
return \"\";\r\n    var parts = null,\r\n        chunk = [],\r\n        i = 0, // char offset\r\n        t;     // temporary\r\n    while
```

```
(start < end) {\r\n        t = buffer[start++];\r\n        if (t < 128)\r\n            chunk[i++] = t;\r\n        else if (t > 191 && t
< 224)\r\n            chunk[i++] = (t & 31) << 6 | buffer[start++] & 63;\r\n        else if (t > 239 && t < 365) {\r\n
t = ((t & 7) << 18 | (buffer[start++] & 63) << 12 | (buffer[start++] & 63) << 6 | buffer[start++] & 63) - 0x10000;\r\n
        chunk[i++] = 0xD800 + (t >> 10);\r\n            chunk[i++] = 0xDC00 + (t & 1023);\r\n        } else\r\n
chunk[i++] = (t & 15) << 12 | (buffer[start++] & 63) << 6 | buffer[start++] & 63;\r\n        if (i > 8191) {\r\n
(parts || (parts = [])).push(String.fromCharCode.apply(String, chunk));\r\n            i = 0;\r\n        }\r\n    }\r\n    if
(parts) {\r\n        if (i)\r\n            parts.push(String.fromCharCode.apply(String, chunk.slice(0, i)));\r\n        return
parts.join(\"\");\r\n    }\r\n    return String.fromCharCode.apply(String, chunk.slice(0, i));\r\n};\r\n\r\n/**\r\n * Writes
a string as UTF8 bytes.\r\n * @param {string} string Source string\r\n * @param {Uint8Array} buffer Destination
buffer\r\n * @param {number} offset Destination offset\r\n * @returns {number} Bytes written\r\n */\r\nutf8.write
= function utf8_write(string, buffer, offset) {\r\n    var start = offset,\r\n        c1, // character 1\r\n        c2; // character
2\r\n    for (var i = 0; i < string.length; ++i) {\r\n        c1 = string.charCodeAt(i);\r\n        if (c1 < 128) {\r\n
buffer[offset++] = c1;\r\n        } else if (c1 < 2048) {\r\n            buffer[offset++] = c1 >> 6       | 192;\r\n
buffer[offset++] = c1       & 63 | 128;\r\n        } else if ((c1 & 0xFC00) === 0xD800 && ((c2 = string.charCodeAt(i
+ 1)) & 0xFC00) === 0xDC00) {\r\n            c1 = 0x10000 + ((c1 & 0x03FF) << 10) + (c2 & 0x03FF);\r\n
++i;\r\n            buffer[offset++] = c1 >> 18      | 240;\r\n            buffer[offset++] = c1 >> 12 & 63 | 128;\r\n
buffer[offset++] = c1 >> 6  & 63 | 128;\r\n            buffer[offset++] = c1       & 63 | 128;\r\n        } else {\r\n
buffer[offset++] = c1 >> 12      | 224;\r\n            buffer[offset++] = c1 >> 6  & 63 | 128;\r\n            buffer[offset++] =
c1       & 63 | 128;\r\n        }\r\n    }\r\n    return offset - start;\r\n};\r\n","/// @file\n/// @addtogroup
flatbuffers_javascript_api\n/// @{\n/// @cond FLATBUFFERS_INTERNAL\n\n/**\n * @fileoverview\n *\n *
Need to suppress 'global this' error so the Node.js export line doesn't cause\n * closure compile to error out.\n *
@suppress {globalThis}\n */\n\n/**\n * @const\n * @namespace\n */\nvar flatbuffers = {};\n\n/**\n * @typedef
{number}\n */\nflatbuffers.Offset;\n\n/**\n * @typedef {{\n *   bb: flatbuffers.ByteBuffer,\n *   bb_pos: number\n *
}}\n */\nflatbuffers.Table;\n\n/**\n * @type {number}\n * @const\n */\nflatbuffers.SIZEOF_SHORT = 2;\n\n/**\n
* @type {number}\n * @const\n */\nflatbuffers.SIZEOF_INT = 4;\n\n/**\n * @type {number}\n * @const\n
*/\nflatbuffers.FILE_IDENTIFIER_LENGTH = 4;\n\n/**\n * @type {number}\n * @const\n
*/\nflatbuffers.SIZE_PREFIX_LENGTH = 4;\n\n/**\n * @enum {number}\n */\nflatbuffers.Encoding = {\n
UTF8_BYTES: 1,\n  UTF16_STRING: 2\n};\n\n/**\n * @type {Int32Array}\n * @const\n */\nflatbuffers.int32 =
new Int32Array(2);\n\n/**\n * @type {Float32Array}\n * @const\n */\nflatbuffers.float32 = new
Float32Array(flatbuffers.int32.buffer);\n\n/**\n * @type {Float64Array}\n * @const\n */\nflatbuffers.float64 = new
Float64Array(flatbuffers.int32.buffer);\n\n/**\n * @type {boolean}\n * @const\n */\nflatbuffers.isLittleEndian =
new Uint16Array(new Uint8Array([1, 0]).buffer)[0] ===
1;\n\n////////////////////////////////////////////////////////////////////////////////\n\n/**\n * @constructor\n * @param {number} low\n
* @param {number} high\n */\nflatbuffers.Long = function(low, high) {\n  /**\n   * @type {number}\n   *
@const\n   */\n  this.low = low | 0;\n\n  /**\n   * @type {number}\n   * @const\n   */\n  this.high = high |
0;\n};\n\n/**\n * @param {number} low\n * @param {number} high\n * @returns {!flatbuffers.Long}\n
*/\nflatbuffers.Long.create = function(low, high) {\n  // Special-case zero to avoid GC overhead for default values\n
return low == 0 && high == 0 ? flatbuffers.Long.ZERO : new flatbuffers.Long(low, high);\n};\n\n/**\n * @returns
{number}\n */\nflatbuffers.Long.prototype.toFloat64 = function() {\n  return (this.low >>> 0) + this.high *
0x100000000;\n};\n\n/**\n * @param {flatbuffers.Long} other\n * @returns {boolean}\n
*/\nflatbuffers.Long.prototype.equals = function(other) {\n  return this.low == other.low && this.high ==
other.high;\n};\n\n/**\n * @type {!flatbuffers.Long}\n * @const\n */\nflatbuffers.Long.ZERO = new
flatbuffers.Long(0, 0);\n\n/// @endcond\n////////////////////////////////////////////////////////////////////////////////\n/**\n * Create a
FlatBufferBuilder.\n *\n * @constructor\n * @param {number=} opt_initial_size\n */\nflatbuffers.Builder =
function(opt_initial_size) {\n  if (!opt_initial_size) {\n    var initial_size = 1024;\n  } else {\n    var initial_size =
opt_initial_size;\n  }\n\n  /**\n   * @type {flatbuffers.ByteBuffer}\n   * @private\n   */\n  this.bb =
flatbuffers.ByteBuffer.allocate(initial_size);\n\n  /**\n   * Remaining space in the ByteBuffer.\n   *\n   * @type
{number}\n   * @private\n   */\n  this.space = initial_size;\n\n  /**\n   * Minimum alignment encountered so far.\n
```

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*\n   * @type {number}\n   * @private\n   */\n  this.minalign = 1;\n\n  /**\n   * The vtable for the current table.\n
*\n   * @type {Array.<number>}\n   * @private\n   */\n  this.vtable = null;\n\n  /**\n   * The amount of fields we're
actually using.\n   *\n   * @type {number}\n   * @private\n   */\n  this.vtable_in_use = 0;\n\n  /**\n   * Whether we
are currently serializing a table.\n   *\n   * @type {boolean}\n   * @private\n   */\n  this.isNested = false;\n\n  /**\n
* Starting offset of the current struct/table.\n   *\n   * @type {number}\n   * @private\n   */\n  this.object_start =
0;\n\n  /**\n   * List of offsets of all vtables.\n   *\n   * @type {Array.<number>}\n   * @private\n   */\n  this.vtables
= [];\n\n  /**\n   * For the current vector being built.\n   *\n   * @type {number}\n   * @private\n   */\n
this.vector_num_elems = 0;\n\n  /**\n   * False omits default values from the serialized data\n   *\n   * @type
{boolean}\n   * @private\n   */\n  this.force_defaults = false;\n};\n\nflatbuffers.Builder.prototype.clear = function()
{\n  this.bb.clear();\n  this.space = this.bb.capacity();\n  this.minalign = 1;\n  this.vtable = null;\n  this.vtable_in_use
= 0;\n  this.isNested = false;\n  this.object_start = 0;\n  this.vtables = [];\n  this.vector_num_elems = 0;\n
this.force_defaults = false;\n};\n\n/**\n * In order to save space, fields that are set to their default value\n * don't get
serialized into the buffer. Forcing defaults provides a\n * way to manually disable this optimization.\n *\n * @param
{boolean} forceDefaults true always serializes default values\n */\nflatbuffers.Builder.prototype.forceDefaults =
function(forceDefaults) {\n  this.force_defaults = forceDefaults;\n};\n\n/**\n * Get the ByteBuffer representing the
FlatBuffer. Only call this after you've\n * called finish(). The actual data starts at the ByteBuffer's current position,\n
* not necessarily at 0.\n *\n * @returns {flatbuffers.ByteBuffer}\n */\nflatbuffers.Builder.prototype.dataBuffer =
function() {\n  return this.bb;\n};\n\n/**\n * Get the bytes representing the FlatBuffer. Only call this after you've\n *
called finish().\n *\n * @returns {!Uint8Array}\n */\nflatbuffers.Builder.prototype.asUint8Array = function() {\n
return this.bb.bytes().subarray(this.bb.position(), this.bb.position() + this.offset());\n};\n\n/// @cond
FLATBUFFERS_INTERNAL\n/**\n * Prepare to write an element of `size` after `additional_bytes` have been\n *
written, e.g. if you write a string, you need to align such the int length\n * field is aligned to 4 bytes, and the string
data follows it directly. If all\n * you need to do is alignment, `additional_bytes` will be 0.\n *\n * @param
{number} size This is the of the new element to write\n * @param {number} additional_bytes The padding size\n
*/\nflatbuffers.Builder.prototype.prep = function(size, additional_bytes) {\n  // Track the biggest thing we've ever
aligned to.\n  if (size > this.minalign) {\n    this.minalign = size;\n  }\n\n  // Find the amount of alignment needed
such that `size` is properly\n  // aligned after `additional_bytes`\n  var align_size = ((~(this.bb.capacity() - this.space
+ additional_bytes)) + 1) & (size - 1);\n\n  // Reallocate the buffer if needed.\n  while (this.space < align_size + size
+ additional_bytes) {\n    var old_buf_size = this.bb.capacity();\n    this.bb =
flatbuffers.Builder.growByteBuffer(this.bb);\n    this.space += this.bb.capacity() - old_buf_size;\n  }\n\n
this.pad(align_size);\n};\n\n/**\n * @param {number} byte_size\n */\nflatbuffers.Builder.prototype.pad =
function(byte_size) {\n  for (var i = 0; i < byte_size; i++) {\n    this.bb.writeInt8(--this.space, 0);\n  }\n};\n\n/**\n *
@param {number} value\n */\nflatbuffers.Builder.prototype.writeInt8 = function(value) {\n
this.bb.writeInt8(this.space -= 1, value);\n};\n\n/**\n * @param {number} value\n
*/\nflatbuffers.Builder.prototype.writeInt16 = function(value) {\n  this.bb.writeInt16(this.space -= 2,
value);\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeInt32 = function(value) {\n
this.bb.writeInt32(this.space -= 4, value);\n};\n\n/**\n * @param {flatbuffers.Long} value\n
*/\nflatbuffers.Builder.prototype.writeInt64 = function(value) {\n  this.bb.writeInt64(this.space -= 8,
value);\n};\n\n/**\n * @param {number} value\n */\nflatbuffers.Builder.prototype.writeFloat32 = function(value)
{\n  this.bb.writeFloat32(this.space -= 4, value);\n};\n\n/**\n * @param {number} value\n
*/\nflatbuffers.Builder.prototype.writeFloat64 = function(value) {\n  this.bb.writeFloat64(this.space -= 8,
value);\n};\n/// @endcond\n\n/**\n * Add an `int8` to the buffer, properly aligned, and grows the buffer (if
necessary).\n * @param {number} value The `int8` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addInt8
= function(value) {\n  this.prep(1, 0);\n  this.writeInt8(value);\n};\n\n/**\n * Add an `int16` to the buffer, properly
aligned, and grows the buffer (if necessary).\n * @param {number} value The `int16` to add the the buffer.\n
*/\nflatbuffers.Builder.prototype.addInt16 = function(value) {\n  this.prep(2, 0);\n
this.writeInt16(value);\n};\n\n/**\n * Add an `int32` to the buffer, properly aligned, and grows the buffer (if
necessary).\n * @param {number} value The `int32` to add the the buffer.\n
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*/\nflatbuffers.Builder.prototype.addInt32 = function(value) {\n this.prep(4, 0);\n this.writeInt32(value);\n};\n\n/**\n * Add an `int64` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {flatbuffers.Long} value The `int64` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addInt64 = function(value) {\n this.prep(8, 0);\n this.writeInt64(value);\n};\n\n/**\n * Add a `float32` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `float32` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addFloat32 = function(value) {\n this.prep(4, 0);\n this.writeFloat32(value);\n};\n\n/**\n * Add a `float64` to the buffer, properly aligned, and grows the buffer (if necessary).\n * @param {number} value The `float64` to add the the buffer.\n */\nflatbuffers.Builder.prototype.addFloat64 = function(value) {\n this.prep(8, 0);\n this.writeFloat64(value);\n};\n\n/// @cond FLATBUFFERS_INTERNAL\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt8 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n this.addInt8(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt16 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addInt16(value);\n this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt32 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addInt32(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {flatbuffers.Long} value\n * @param {flatbuffers.Long} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldInt64 = function(voffset, value, defaultValue) {\n if (this.force_defaults || !value.equals(defaultValue)) {\n   this.addInt64(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldFloat32 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addFloat32(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {number} value\n * @param {number} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldFloat64 = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addFloat64(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * @param {number} voffset\n * @param {flatbuffers.Offset} value\n * @param {flatbuffers.Offset} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldOffset = function(voffset, value, defaultValue) {\n if (this.force_defaults || value != defaultValue) {\n   this.addOffset(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * Structs are stored inline, so nothing additional is being added. `d` is always 0.\n *\n * @param {number} voffset\n * @param {flatbuffers.Offset} value\n * @param {flatbuffers.Offset} defaultValue\n */\nflatbuffers.Builder.prototype.addFieldStruct = function(voffset, value, defaultValue) {\n if (value != defaultValue) {\n   this.nested(value);\n   this.slot(voffset);\n }\n};\n\n/**\n * Structures are always stored inline, they need to be created right\n * where they're used. You'll get this assertion failure if you\n * created it elsewhere.\n *\n * @param {flatbuffers.Offset} obj The offset of the created object\n */\nflatbuffers.Builder.prototype.nested = function(obj) {\n if (obj != this.offset()) {\n   throw new Error('FlatBuffers: struct must be serialized inline.');\n }\n};\n\n/**\n * Should not be creating any other object, string or vector\n * while an object is being constructed\n */\nflatbuffers.Builder.prototype.notNested = function() {\n if (this.isNested) {\n   throw new Error('FlatBuffers: object serialization must not be nested.');\n }\n};\n\n/**\n * Set the current vtable at `voffset` to the current location in the buffer.\n *\n * @param {number} voffset\n */\nflatbuffers.Builder.prototype.slot = function(voffset) {\n this.vtable[voffset] = this.offset();\n};\n\n/**\n * @returns {flatbuffers.Offset} Offset relative to the end of the buffer.\n */\nflatbuffers.Builder.prototype.offset = function() {\n return this.bb.capacity() - this.space;\n};\n\n/**\n * Doubles the size of the backing ByteBuffer and copies the old data towards\n * the end of the new buffer (since we build the buffer backwards).\n *\n * @param {flatbuffers.ByteBuffer} bb The current buffer with the existing data\n * @returns {!flatbuffers.ByteBuffer} A new byte buffer with the old data copied\n * to it. The data is located at the end of the buffer.\n *\n * uint8Array.set()

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formally takes {Array<number>|ArrayBufferView}, so to pass\n * it a uint8Array we need to suppress the type
check:\n * @suppress {checkTypes}\n */\nflatbuffers.Builder.growByteBuffer = function(bb) {\n  var old_buf_size
= bb.capacity();\n\n  // Ensure we don't grow beyond what fits in an int.\n  if (old_buf_size & 0xC0000000) {\n
throw new Error('FlatBuffers: cannot grow buffer beyond 2 gigabytes.');\n  }\n\n  var new_buf_size = old_buf_size
<< 1;\n  var nbb = flatbuffers.ByteBuffer.allocate(new_buf_size);\n  nbb.setPosition(new_buf_size -
old_buf_size);\n  nbb.bytes().set(bb.bytes(), new_buf_size - old_buf_size);\n  return nbb;\n};\n///
@endcond\n\n/**\n * Adds on offset, relative to where it will be written.\n *\n * @param {flatbuffers.Offset} offset
The offset to add.\n */\nflatbuffers.Builder.prototype.addOffset = function(offset) {\n
this.prep(flatbuffers.SIZEOF_INT, 0); // Ensure alignment is already done.\n  this.writeInt32(this.offset() - offset +
flatbuffers.SIZEOF_INT);\n};\n\n/// @cond FLATBUFFERS_INTERNAL\n/**\n * Start encoding a new object in
the buffer.  Users will not usually need to\n * call this directly. The FlatBuffers compiler will generate helper
methods\n * that call this method internally.\n *\n * @param {number} numfields\n
*/\nflatbuffers.Builder.prototype.startObject = function(numfields) {\n  this.notNested();\n  if (this.vtable == null)
{\n    this.vtable = [];\n  }\n  this.vtable_in_use = numfields;\n  for (var i = 0; i < numfields; i++) {\n    this.vtable[i]
= 0; // This will push additional elements as needed\n  }\n  this.isNested = true;\n  this.object_start =
this.offset();\n};\n\n/**\n * Finish off writing the object that is under construction.\n *\n * @returns
{flatbuffers.Offset} The offset to the object inside `dataBuffer`\n */\nflatbuffers.Builder.prototype.endObject =
function() {\n  if (this.vtable == null || !this.isNested) {\n    throw new Error('FlatBuffers: endObject called without
startObject');\n  }\n\n  this.addInt32(0);\n  var vtableloc = this.offset();\n\n  // Trim trailing zeroes.\n  var i =
this.vtable_in_use - 1;\n  for (; i >= 0 && this.vtable[i] == 0; i--) {}\n  var trimmed_size = i + 1;\n\n  // Write out the
current vtable.\n  for (; i >= 0; i--) {\n    // Offset relative to the start of the table.\n    this.addInt16(this.vtable[i] != 0
? vtableloc - this.vtable[i] : 0);\n  }\n\n  var standard_fields = 2; // The fields below:\n  this.addInt16(vtableloc -
this.object_start);\n  var len = (trimmed_size + standard_fields) * flatbuffers.SIZEOF_SHORT;\n
this.addInt16(len);\n\n  // Search for an existing vtable that matches the current one.\n  var existing_vtable = 0;\n
var vt1 = this.space;\nouter_loop:\n  for (i = 0; i < this.vtables.length; i++) {\n    var vt2 = this.bb.capacity() -
this.vtables[i];\n    if (len == this.bb.readInt16(vt2)) {\n      for (var j = flatbuffers.SIZEOF_SHORT; j < len; j +=
flatbuffers.SIZEOF_SHORT) {\n        if (this.bb.readInt16(vt1 + j) != this.bb.readInt16(vt2 + j)) {\n          continue
outer_loop;\n        }\n      }\n      existing_vtable = this.vtables[i];\n      break;\n    }\n  }\n\n  if (existing_vtable) {\n
// Found a match:\n    // Remove the current vtable.\n    this.space = this.bb.capacity() - vtableloc;\n\n    // Point table
to existing vtable.\n    this.bb.writeInt32(this.space, existing_vtable - vtableloc);\n  } else {\n    // No match:\n    //
Add the location of the current vtable to the list of vtables.\n    this.vtables.push(this.offset());\n\n    // Point table to
current vtable.\n    this.bb.writeInt32(this.bb.capacity() - vtableloc, this.offset() - vtableloc);\n  }\n\n  this.isNested =
false;\n  return vtableloc;\n};\n/// @endcond\n\n/**\n * Finalize a buffer, poiting to the given `root_table`.\n *\n *
@param {flatbuffers.Offset} root_table\n * @param {string=} opt_file_identifier\n * @param {boolean=}
opt_size_prefix\n */\nflatbuffers.Builder.prototype.finish = function(root_table, opt_file_identifier, opt_size_prefix)
{\n  var size_prefix = opt_size_prefix ? flatbuffers.SIZE_PREFIX_LENGTH : 0;\n  if (opt_file_identifier) {\n    var
file_identifier = opt_file_identifier;\n    this.prep(this.minalign, flatbuffers.SIZEOF_INT +\n
flatbuffers.FILE_IDENTIFIER_LENGTH + size_prefix);\n    if (file_identifier.length !=
flatbuffers.FILE_IDENTIFIER_LENGTH) {\n      throw new Error('FlatBuffers: file identifier must be length ' +\n
   flatbuffers.FILE_IDENTIFIER_LENGTH);\n    }\n    for (var i = flatbuffers.FILE_IDENTIFIER_LENGTH - 1; i
>= 0; i--) {\n      this.writeInt8(file_identifier.charCodeAt(i));\n    }\n  }\n  this.prep(this.minalign,
flatbuffers.SIZEOF_INT + size_prefix);\n  this.addOffset(root_table);\n  if (size_prefix) {\n
this.addInt32(this.bb.capacity() - this.space);\n  }\n  this.bb.setPosition(this.space);\n};\n\n/**\n * Finalize a size
prefixed buffer, pointing to the given `root_table`.\n *\n * @param {flatbuffers.Offset} root_table\n * @param
{string=} opt_file_identifier\n */\nflatbuffers.Builder.prototype.finishSizePrefixed = function (root_table,
opt_file_identifier) {\n  this.finish(root_table, opt_file_identifier, true);\n};\n\n/// @cond
FLATBUFFERS_INTERNAL\n/**\n * This checks a required field has been set in a given table that has\n * just
been constructed.\n *\n * @param {flatbuffers.Offset} table\n * @param {number} field\n
```

```
*/\nflatbuffers.Builder.prototype.requiredField = function(table, field) {\n  var table_start = this.bb.capacity() -
table;\n  var vtable_start = table_start - this.bb.readInt32(table_start);\n  var ok = this.bb.readInt16(vtable_start +
field) != 0;\n\n  // If this fails, the caller will show what field needs to be set.\n  if (!ok) {\n    throw new
Error('FlatBuffers: field ' + field + ' must be set');\n  }\n};\n\n/**\n * Start a new array/vector of objects.  Users
usually will not call\n * this directly. The FlatBuffers compiler will create a start/end\n * method for vector types in
generated code.\n *\n * @param {number} elem_size The size of each element in the array\n * @param {number}
num_elems The number of elements in the array\n * @param {number} alignment The alignment of the array\n
*/\nflatbuffers.Builder.prototype.startVector = function(elem_size, num_elems, alignment) {\n  this.notNested();\n
this.vector_num_elems = num_elems;\n  this.prep(flatbuffers.SIZEOF_INT, elem_size * num_elems);\n
this.prep(alignment, elem_size * num_elems); // Just in case alignment > int.\n};\n\n/**\n * Finish off the creation
of an array and all its elements. The array must be\n * created with `startVector`.\n *\n * @returns
{flatbuffers.Offset} The offset at which the newly created array\n * starts.\n
*/\nflatbuffers.Builder.prototype.endVector = function() {\n  this.writeInt32(this.vector_num_elems);\n  return
this.offset();\n};\n/// @endcond\n\n/**\n * Encode the string `s` in the buffer using UTF-8. If a Uint8Array is
passed\n * instead of a string, it is assumed to contain valid UTF-8 encoded data.\n *\n * @param
{string|Uint8Array} s The string to encode\n * @return {flatbuffers.Offset} The offset in the buffer where the
encoded string starts\n */\nflatbuffers.Builder.prototype.createString = function(s) {\n  if (s instanceof Uint8Array)
{\n    var utf8 = s;\n  } else {\n    var utf8 = [];\n    var i = 0;\n\n    while (i < s.length) {\n      var codePoint;\n\n      //
Decode UTF-16\n      var a = s.charCodeAt(i++);\n      if (a < 0xD800 || a >= 0xDC00) {\n        codePoint = a;\n      }
else {\n        var b = s.charCodeAt(i++);\n        codePoint = (a << 10) + b + (0x10000 - (0xD800 << 10) -
0xDC00);\n      }\n\n      // Encode UTF-8\n      if (codePoint < 0x80) {\n        utf8.push(codePoint);\n      } else {\n
  if (codePoint < 0x800) {\n          utf8.push(((codePoint >> 6) & 0x1F) | 0xC0);\n        } else {\n          if (codePoint
< 0x10000) {\n            utf8.push(((codePoint >> 12) & 0x0F) | 0xE0);\n          } else {\n            utf8.push(\n
((codePoint >> 18) & 0x07) | 0xF0,\n              ((codePoint >> 12) & 0x3F) | 0x80);\n          }\n
utf8.push(((codePoint >> 6) & 0x3F) | 0x80);\n        }\n        utf8.push((codePoint & 0x3F) | 0x80);\n      }\n    }\n
}\n\n  this.addInt8(0);\n  this.startVector(1, utf8.length, 1);\n  this.bb.setPosition(this.space -= utf8.length);\n  for
(var i = 0, offset = this.space, bytes = this.bb.bytes(); i < utf8.length; i++) {\n    bytes[offset++] = utf8[i];\n  }\n
return this.endVector();\n};\n\n/**\n * A helper function to avoid generated code depending on this file directly.\n
*\n * @param {number} low\n * @param {number} high\n * @returns {!flatbuffers.Long}\n
*/\nflatbuffers.Builder.prototype.createLong = function(low, high) {\n  return flatbuffers.Long.create(low,
high);\n};\n////////////////////////////////////////////////////////////////////////////////\n/// @cond
FLATBUFFERS_INTERNAL\n/**\n * Create a new ByteBuffer with a given array of bytes (`Uint8Array`).\n *\n *
@constructor\n * @param {Uint8Array} bytes\n */\nflatbuffers.ByteBuffer = function(bytes) {\n  /**\n   * @type
{Uint8Array}\n   * @private\n   */\n  this.bytes_ = bytes;\n\n  /**\n   * @type {number}\n   * @private\n   */\n
this.position_ = 0;\n};\n\n/**\n * Create and allocate a new ByteBuffer with a given size.\n *\n * @param {number}
byte_size\n * @returns {!flatbuffers.ByteBuffer}\n */\nflatbuffers.ByteBuffer.allocate = function(byte_size) {\n
return new flatbuffers.ByteBuffer(new Uint8Array(byte_size));\n};\n\nflatbuffers.ByteBuffer.prototype.clear =
function() {\n  this.position_ = 0;\n};\n\n/**\n * Get the underlying `Uint8Array`.\n *\n * @returns {Uint8Array}\n
*/\nflatbuffers.ByteBuffer.prototype.bytes = function() {\n  return this.bytes_;\n};\n\n/**\n * Get the buffer's
position.\n *\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.position = function() {\n  return
this.position_;\n};\n\n/**\n * Set the buffer's position.\n *\n * @param {number} position\n
*/\nflatbuffers.ByteBuffer.prototype.setPosition = function(position) {\n  this.position_ = position;\n};\n\n/**\n *
Get the buffer's capacity.\n *\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.capacity = function()
{\n  return this.bytes_.length;\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n
*/\nflatbuffers.ByteBuffer.prototype.readInt8 = function(offset) {\n  return this.readUint8(offset) << 24 >>
24;\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n
*/\nflatbuffers.ByteBuffer.prototype.readUint8 = function(offset) {\n  return this.bytes_[offset];\n};\n\n/**\n *
@param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readInt16 =
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function(offset) {\n  return this.readUint16(offset) << 16 >> 16;\n};\n\n/**\n * @param {number} offset\n *
@returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readUint16 = function(offset) {\n  return
this.bytes_[offset] | this.bytes_[offset + 1] << 8;\n};\n\n/**\n * @param {number} offset\n * @returns {number}\n
*/\nflatbuffers.ByteBuffer.prototype.readInt32 = function(offset) {\n  return this.bytes_[offset] | this.bytes_[offset +
1] << 8 | this.bytes_[offset + 2] << 16 | this.bytes_[offset + 3] << 24;\n};\n\n/**\n * @param {number} offset\n *
@returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readUint32 = function(offset) {\n  return
this.readInt32(offset) >>> 0;\n};\n\n/**\n * @param {number} offset\n * @returns {!flatbuffers.Long}\n
*/\nflatbuffers.ByteBuffer.prototype.readInt64 = function(offset) {\n  return new
flatbuffers.Long(this.readInt32(offset), this.readInt32(offset + 4));\n};\n\n/**\n * @param {number} offset\n *
@returns {!flatbuffers.Long}\n */\nflatbuffers.ByteBuffer.prototype.readUint64 = function(offset) {\n  return new
flatbuffers.Long(this.readUint32(offset), this.readUint32(offset + 4));\n};\n\n/**\n * @param {number} offset\n *
@returns {number}\n */\nflatbuffers.ByteBuffer.prototype.readFloat32 = function(offset) {\n  flatbuffers.int32[0] =
this.readInt32(offset);\n  return flatbuffers.float32[0];\n};\n\n/**\n * @param {number} offset\n * @returns
{number}\n */\nflatbuffers.ByteBuffer.prototype.readFloat64 = function(offset) {\n
flatbuffers.int32[flatbuffers.isLittleEndian ? 0 : 1] = this.readInt32(offset);\n
flatbuffers.int32[flatbuffers.isLittleEndian ? 1 : 0] = this.readInt32(offset + 4);\n  return
flatbuffers.float64[0];\n};\n\n/**\n * @param {number} offset\n * @param {number|boolean} value\n
*/\nflatbuffers.ByteBuffer.prototype.writeInt8 = function(offset, value) {\n  this.bytes_[offset] = /** @type
{number} */(value);\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n
*/\nflatbuffers.ByteBuffer.prototype.writeUint8 = function(offset, value) {\n  this.bytes_[offset] =
value;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n
*/\nflatbuffers.ByteBuffer.prototype.writeInt16 = function(offset, value) {\n  this.bytes_[offset] = value;\n
this.bytes_[offset + 1] = value >> 8;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n
*/\nflatbuffers.ByteBuffer.prototype.writeUint16 = function(offset, value) {\n    this.bytes_[offset] = value;\n
this.bytes_[offset + 1] = value >> 8;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n
*/\nflatbuffers.ByteBuffer.prototype.writeInt32 = function(offset, value) {\n  this.bytes_[offset] = value;\n
this.bytes_[offset + 1] = value >> 8;\n  this.bytes_[offset + 2] = value >> 16;\n  this.bytes_[offset + 3] = value >>
24;\n};\n\n/**\n * @param {number} offset\n * @param {number} value\n
*/\nflatbuffers.ByteBuffer.prototype.writeUint32 = function(offset, value) {\n    this.bytes_[offset] = value;\n
this.bytes_[offset + 1] = value >> 8;\n    this.bytes_[offset + 2] = value >> 16;\n    this.bytes_[offset + 3] = value >>
24;\n};\n\n/**\n * @param {number} offset\n * @param {flatbuffers.Long} value\n
*/\nflatbuffers.ByteBuffer.prototype.writeInt64 = function(offset, value) {\n  this.writeInt32(offset, value.low);\n
this.writeInt32(offset + 4, value.high);\n};\n\n/**\n * @param {number} offset\n * @param {flatbuffers.Long}
value\n */\nflatbuffers.ByteBuffer.prototype.writeUint64 = function(offset, value) {\n    this.writeUint32(offset,
value.low);\n    this.writeUint32(offset + 4, value.high);\n};\n\n/**\n * @param {number} offset\n * @param
{number} value\n */\nflatbuffers.ByteBuffer.prototype.writeFloat32 = function(offset, value) {\n
flatbuffers.float32[0] = value;\n  this.writeInt32(offset, flatbuffers.int32[0]);\n};\n\n/**\n * @param {number}
offset\n * @param {number} value\n */\nflatbuffers.ByteBuffer.prototype.writeFloat64 = function(offset, value) {\n
flatbuffers.float64[0] = value;\n  this.writeInt32(offset, flatbuffers.int32[flatbuffers.isLittleEndian ? 0 : 1]);\n
this.writeInt32(offset + 4, flatbuffers.int32[flatbuffers.isLittleEndian ? 1 : 0]);\n};\n\n/**\n * Return the file
identifier.   Behavior is undefined for FlatBuffers whose\n * schema does not include a file_identifier (likely points
at padding or the\n * start of a the root vtable).\n * @returns {string}\n
*/\nflatbuffers.ByteBuffer.prototype.getBufferIdentifier = function() {\n  if (this.bytes_.length < this.position_ +
flatbuffers.SIZEOF_INT +\n      flatbuffers.FILE_IDENTIFIER_LENGTH) {\n    throw new Error(\n
'FlatBuffers: ByteBuffer is too short to contain an identifier.');\n  }\n  var result = \"\";\n  for (var i = 0; i <
flatbuffers.FILE_IDENTIFIER_LENGTH; i++) {\n    result += String.fromCharCode(\n
this.readInt8(this.position_ + flatbuffers.SIZEOF_INT + i));\n  }\n  return result;\n};\n\n/**\n * Look up a field in
the vtable, return an offset into the object, or 0 if the\n * field is not present.\n *\n * @param {number} bb_pos\n *
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@param {number} vtable_offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__offset =
function(bb_pos, vtable_offset) {\n var vtable = bb_pos - this.readInt32(bb_pos);\n return vtable_offset <
this.readInt16(vtable) ? this.readInt16(vtable + vtable_offset) : 0;\n};\n\n/**\n * Initialize any Table-derived type to
point to the union at the given offset.\n *\n * @param {flatbuffers.Table} t\n * @param {number} offset\n *
@returns {flatbuffers.Table}\n */\nflatbuffers.ByteBuffer.prototype.__union = function(t, offset) {\n t.bb_pos =
offset + this.readInt32(offset);\n t.bb = this;\n return t;\n};\n\n/**\n * Create a JavaScript string from UTF-8 data
stored inside the FlatBuffer.\n * This allocates a new string and converts to wide chars upon each access.\n *\n * To
avoid the conversion to UTF-16, pass flatbuffers.Encoding.UTF8_BYTES as\n * the \"optionalEncoding\"
argument. This is useful for avoiding conversion to\n * and from UTF-16 when the data will just be packaged back
up in another\n * FlatBuffer later on.\n *\n * @param {number} offset\n * @param {flatbuffers.Encoding=}
opt_encoding Defaults to UTF16_STRING\n * @returns {string|!Uint8Array}\n
*/\nflatbuffers.ByteBuffer.prototype.__string = function(offset, opt_encoding) {\n offset +=
this.readInt32(offset);\n\n var length = this.readInt32(offset);\n var result = '';\n var i = 0;\n\n offset +=
flatbuffers.SIZEOF_INT;\n\n if (opt_encoding === flatbuffers.Encoding.UTF8_BYTES) {\n   return
this.bytes_.subarray(offset, offset + length);\n }\n\n while (i < length) {\n   var codePoint;\n\n   // Decode UTF-
8\n   var a = this.readUint8(offset + i++);\n   if (a < 0xC0) {\n   codePoint = a;\n   } else {\n   var b =
this.readUint8(offset + i++);\n   if (a < 0xE0) {\n   codePoint =\n   ((a & 0x1F) << 6) |\n   (b &
0x3F);\n   } else {\n   var c = this.readUint8(offset + i++);\n   if (a < 0xF0) {\n   codePoint =\n   ((a
& 0x0F) << 12) |\n   ((b & 0x3F) << 6) |\n   (c & 0x3F);\n   } else {\n   var d =
this.readUint8(offset + i++);\n   codePoint =\n   ((a & 0x07) << 18) |\n   ((b & 0x3F) << 12) |\n
((c & 0x3F) << 6) |\n   (d & 0x3F);\n   }\n   }\n   }\n\n   // Encode UTF-16\n   if (codePoint < 0x10000)
{\n   result += String.fromCharCode(codePoint);\n   } else {\n   codePoint -= 0x10000;\n   result +=
String.fromCharCode(\n   (codePoint >> 10) + 0xD800,\n   (codePoint & ((1 << 10) - 1)) + 0xDC00);\n   }\n
}\n\n return result;\n};\n\n/**\n * Retrieve the relative offset stored at \"offset\"\n * @param {number} offset\n *
@returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__indirect = function(offset) {\n return offset +
this.readInt32(offset);\n};\n\n/**\n * Get the start of data of a vector whose offset is stored at \"offset\" in this
object.\n *\n * @param {number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__vector =
function(offset) {\n return offset + this.readInt32(offset) + flatbuffers.SIZEOF_INT; // data starts after the
length\n};\n\n/**\n * Get the length of a vector whose offset is stored at \"offset\" in this object.\n *\n * @param
{number} offset\n * @returns {number}\n */\nflatbuffers.ByteBuffer.prototype.__vector_len = function(offset) {\n
return this.readInt32(offset + this.readInt32(offset));\n};\n\n/**\n * @param {string} ident\n * @returns
{boolean}\n */\nflatbuffers.ByteBuffer.prototype.__has_identifier = function(ident) {\n if (ident.length !=
flatbuffers.FILE_IDENTIFIER_LENGTH) {\n   throw new Error('FlatBuffers: file identifier must be length ' +\n
flatbuffers.FILE_IDENTIFIER_LENGTH);\n }\n for (var i = 0; i <
flatbuffers.FILE_IDENTIFIER_LENGTH; i++) {\n   if (ident.charCodeAt(i) != this.readInt8(this.position_ +
flatbuffers.SIZEOF_INT + i)) {\n   return false;\n   }\n }\n return true;\n};\n\n/**\n * A helper function to avoid
generated code depending on this file directly.\n *\n * @param {number} low\n * @param {number} high\n *
@returns {!flatbuffers.Long}\n */\nflatbuffers.ByteBuffer.prototype.createLong = function(low, high) {\n return
flatbuffers.Long.create(low, high);\n};\n\n// Exports for Node.js and RequireJS\nexport { flatbuffers };\n\n///
@endcond\n/// @}\n","\"use strict\";\r\nexports.__esModule = true;\r\nvar Guid = /** @class */ (function () {\r\n
function Guid(guid) {\r\n   if (!guid) {\r\n   throw new TypeError(\"Invalid argument; `value` has no
value.\");\r\n   }\r\n   this.value = Guid.EMPTY;\r\n   if (guid && Guid.isGuid(guid)) {\r\n
this.value = guid;\r\n   }\r\n   }\r\n   Guid.isGuid = function (guid) {\r\n   var value = guid.toString();\r\n
return guid && (guid instanceof Guid || Guid.validator.test(value));\r\n   };\r\n   Guid.create = function () {\r\n
return new Guid([Guid.gen(2), Guid.gen(1), Guid.gen(1), Guid.gen(1), Guid.gen(3)].join(\"-\"));\r\n   };\r\n
Guid.createEmpty = function () {\r\n   return new Guid(\"emptyguid\");\r\n   };\r\n   Guid.parse = function
(guid) {\r\n   return new Guid(guid);\r\n   };\r\n   Guid.raw = function () {\r\n   return [Guid.gen(2),
Guid.gen(1), Guid.gen(1), Guid.gen(1), Guid.gen(3)].join(\"-\");\r\n   };\r\n   Guid.gen = function (count) {\r\n

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var out = \"\";\r\n        for (var i = 0; i < count; i++) {\r\n            // tslint:disable-next-line:no-bitwise\r\n            out
+= (((1 + Math.random()) * 0x10000) | 0).toString(16).substring(1);\r\n        }\r\n        return out;\r\n    };\r\n
Guid.prototype.equals = function (other) {\r\n        // Comparing string `value` against provided `guid` will auto-
call\r\n        // toString on `guid` for comparison\r\n        return Guid.isGuid(other) && this.value ===
other.toString();\r\n    };\r\n    Guid.prototype.isEmpty = function () {\r\n        return this.value ===
Guid.EMPTY;\r\n    };\r\n    Guid.prototype.toString = function () {\r\n        return this.value;\r\n    };\r\n
Guid.prototype.toJSON = function () {\r\n        return {\r\n            value: this.value\r\n        };\r\n    };\r\n
Guid.validator = new RegExp(\"^[a-z0-9]{8}-[a-z0-9]{4}-[a-z0-9]{4}-[a-z0-9]{4}-[a-z0-9]{12}$\", \"i\");\r\n
Guid.EMPTY = \"00000000-0000-0000-0000-000000000000\";\r\n    return Guid;\r\n}());\r\nexports.Guid =
Guid;\r\n","module.exports = Long;\r\n\r\n/**\r\n * wasm optimizations, to do native i64 multiplication and
divide\r\n */\r\nvar wasm = null;\r\n\r\ntry {\r\n  wasm = new WebAssembly.Instance(new
WebAssembly.Module(new Uint8Array([\r\n    0, 97, 115, 109, 1, 0, 0, 0, 1, 13, 2, 96, 0, 1, 127, 96, 4, 127, 127,
127, 127, 1, 127, 3, 7, 6, 0, 1, 1, 1, 1, 1, 6, 6, 1, 127, 1, 65, 0, 11, 7, 50, 6, 3, 109, 117, 108, 0, 1, 5, 100, 105, 118, 95,
115, 0, 2, 5, 100, 105, 118, 95, 117, 0, 3, 5, 114, 101, 109, 95, 115, 0, 4, 5, 114, 101, 109, 95, 117, 0, 5, 8, 103, 101,
116, 95, 104, 105, 103, 104, 0, 0, 10, 191, 1, 6, 4, 0, 35, 0, 11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132,
32, 2, 173, 32, 3, 173, 66, 32, 134, 132, 126, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167, 11, 36, 1, 1, 126, 32, 0, 173,
32, 1, 173, 66, 32, 134, 132, 32, 2, 173, 32, 3, 173, 66, 32, 134, 132, 127, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167,
11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132, 32, 2, 173, 32, 3, 173, 66, 32, 134, 132, 128, 34, 4, 66, 32,
135, 167, 36, 0, 32, 4, 167, 11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132, 32, 2, 173, 32, 3, 173, 66, 32,
134, 132, 129, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167, 11, 36, 1, 1, 126, 32, 0, 173, 32, 1, 173, 66, 32, 134, 132, 32,
2, 173, 32, 3, 173, 66, 32, 134, 132, 130, 34, 4, 66, 32, 135, 167, 36, 0, 32, 4, 167, 11\r\n  ])), {}).exports;\r\n} catch
(e) {\r\n  // no wasm support :(\r\n}\r\n\r\n/**\r\n * Constructs a 64 bit two's-complement integer, given its low and
high 32 bit values as *signed* integers.\r\n *  See the from* functions below for more convenient ways of
constructing Longs.\r\n * @exports Long\r\n * @class A Long class for representing a 64 bit two's-complement
integer value.\r\n * @param {number} low The low (signed) 32 bits of the long\r\n * @param {number} high The
high (signed) 32 bits of the long\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n
* @constructor\r\n */\r\nfunction Long(low, high, unsigned) {\r\n\r\n    /**\r\n     * The low 32 bits as a signed
value.\r\n     * @type {number}\r\n     */\r\n    this.low = low | 0;\r\n\r\n    /**\r\n     * The high 32 bits as a signed
value.\r\n     * @type {number}\r\n     */\r\n    this.high = high | 0;\r\n\r\n    /**\r\n     * Whether unsigned or not.\r\n
  * @type {boolean}\r\n     */\r\n    this.unsigned = !!unsigned;\r\n}\r\n\r\n// The internal representation of a long is
the two given signed, 32-bit values.\r\n// We use 32-bit pieces because these are the size of integers on which\r\n//
Javascript performs bit-operations.  For operations like addition and\r\n// multiplication, we split each number into
16 bit pieces, which can easily be\r\n// multiplied within Javascript's floating-point representation without
overflow\r\n// or change in sign.\r\n//\r\n// In the algorithms below, we frequently reduce the negative case to
the\r\n// positive case by negating the input(s) and then post-processing the result.\r\n// Note that we must ALWAYS
check specially whether those values are MIN_VALUE\r\n// (-2^63) because -MIN_VALUE == MIN_VALUE
(since 2^63 cannot be represented as\r\n// a positive number, it overflows back into a negative).  Not handling
this\r\n// case would often result in infinite recursion.\r\n//\r\n// Common constant values ZERO, ONE, NEG_ONE,
etc. are defined below the from*\r\n// methods on which they depend.\r\n\r\n/**\r\n * An indicator used to reliably
determine if an object is a Long or not.\r\n * @type {boolean}\r\n * @const\r\n * @private\r\n
*/\r\nLong.prototype.__isLong__;\r\n\r\nObject.defineProperty(Long.prototype, \"__isLong__\", { value: true
});\r\n\r\n/**\r\n * @function\r\n * @param {*} obj Object\r\n * @returns {boolean}\r\n * @inner\r\n */\r\nfunction
isLong(obj) {\r\n    return (obj && obj[\"__isLong__\"]) === true;\r\n}\r\n\r\n/**\r\n * Tests if the specified object
is a Long.\r\n * @function\r\n * @param {*} obj Object\r\n * @returns {boolean}\r\n */\r\nLong.isLong =
isLong;\r\n\r\n/**\r\n * A cache of the Long representations of small integer values.\r\n * @type {!Object}\r\n *
@inner\r\n */\r\nvar INT_CACHE = {};\r\n\r\n/**\r\n * A cache of the Long representations of small unsigned
integer values.\r\n * @type {!Object}\r\n * @inner\r\n */\r\nvar UINT_CACHE = {};\r\n\r\n/**\r\n * @param
{number} value\r\n * @param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction
```

fromInt(value, unsigned) {\r\n   var obj, cachedObj, cache;\r\n   if (unsigned) {\r\n   value >>>= 0;\r\n   if (cache = (0 <= value && value < 256)) {\r\n   cachedObj = UINT_CACHE[value];\r\n   if (cachedObj)\r\n   return cachedObj;\r\n   }\r\n   obj = fromBits(value, (value | 0) < 0 ? -1 : 0, true);\r\n   if (cache)\r\n   UINT_CACHE[value] = obj;\r\n   return obj;\r\n   } else {\r\n   value |= 0;\r\n   if (cache = (-128 <= value && value < 128)) {\r\n   cachedObj = INT_CACHE[value];\r\n   if (cachedObj)\r\n   return cachedObj;\r\n   }\r\n   obj = fromBits(value, value < 0 ? -1 : 0, false);\r\n   if (cache)\r\n   INT_CACHE[value] = obj;\r\n   return obj;\r\n   }\r\n}\r\n\r\n/**\r\n * Returns a Long representing the given 32 bit integer value.\r\n * @function\r\n * @param {number} value The 32 bit integer in question\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long} The corresponding Long value\r\n */\r\nLong.fromInt = fromInt;\r\n\r\n/**\r\n * @param {number} value\r\n * @param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromNumber(value, unsigned) {\r\n   if (isNaN(value))\r\n   return unsigned ? UZERO : ZERO;\r\n   if (unsigned) {\r\n   if (value < 0)\r\n   return UZERO;\r\n   if (value >= TWO_PWR_64_DBL)\r\n   return MAX_UNSIGNED_VALUE;\r\n   } else {\r\n   if (value <= -TWO_PWR_63_DBL)\r\n   return MIN_VALUE;\r\n   if (value + 1 >= TWO_PWR_63_DBL)\r\n   return MAX_VALUE;\r\n   }\r\n   if (value < 0)\r\n   return fromNumber(-value, unsigned).neg();\r\n   return fromBits((value % TWO_PWR_32_DBL) | 0, (value / TWO_PWR_32_DBL) | 0, unsigned);\r\n}\r\n\r\n/**\r\n * Returns a Long representing the given value, provided that it is a finite number. Otherwise, zero is returned.\r\n * @function\r\n * @param {number} value The number in question\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long} The corresponding Long value\r\n */\r\nLong.fromNumber = fromNumber;\r\n\r\n/**\r\n * @param {number} lowBits\r\n * @param {number} highBits\r\n * @param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromBits(lowBits, highBits, unsigned) {\r\n   return new Long(lowBits, highBits, unsigned);\r\n}\r\n\r\n/**\r\n * Returns a Long representing the 64 bit integer that comes by concatenating the given low and high bits. Each is\r\n * assumed to use 32 bits.\r\n * @function\r\n * @param {number} lowBits The low 32 bits\r\n * @param {number} highBits The high 32 bits\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long} The corresponding Long value\r\n */\r\nLong.fromBits = fromBits;\r\n\r\n/**\r\n * @function\r\n * @param {number} base\r\n * @param {number} exponent\r\n * @returns {number}\r\n * @inner\r\n */\r\nvar pow_dbl = Math.pow; // Used 4 times (4*8 to 15+4)\r\n\r\n/**\r\n * @param {string} str\r\n * @param {(boolean|number)=} unsigned\r\n * @param {number=} radix\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromString(str, unsigned, radix) {\r\n   if (str.length === 0)\r\n   throw Error('empty string');\r\n   if (str === \"NaN\" || str === \"Infinity\" || str === \"+Infinity\" || str === \"-Infinity\")\r\n   return ZERO;\r\n   if (typeof unsigned === 'number') {\r\n   // For goog.math.long compatibility\r\n   radix = unsigned,\r\n   unsigned = false;\r\n   } else {\r\n   unsigned = !! unsigned;\r\n   }\r\n   radix = radix || 10;\r\n   if (radix < 2 || 36 < radix)\r\n   throw RangeError('radix');\r\n\r\n   var p;\r\n   if ((p = str.indexOf('-')) > 0)\r\n   throw Error('interior hyphen');\r\n   else if (p === 0) {\r\n   return fromString(str.substring(1), unsigned, radix).neg();\r\n   }\r\n\r\n   // Do several (8) digits each time through the loop, so as to\r\n   // minimize the calls to the very expensive emulated div.\r\n   var radixToPower = fromNumber(pow_dbl(radix, 8));\r\n\r\n   var result = ZERO;\r\n   for (var i = 0; i < str.length; i += 8) {\r\n   var size = Math.min(8, str.length - i),\r\n   value = parseInt(str.substring(i, i + size), radix);\r\n   if (size < 8) {\r\n   var power = fromNumber(pow_dbl(radix, size));\r\n   result = result.mul(power).add(fromNumber(value));\r\n   } else {\r\n   result = result.mul(radixToPower);\r\n   result = result.add(fromNumber(value));\r\n   }\r\n   }\r\n   result.unsigned = unsigned;\r\n   return result;\r\n}\r\n\r\n/**\r\n * Returns a Long representation of the given string, written using the specified radix.\r\n * @function\r\n * @param {string} str The textual representation of the Long\r\n * @param {(boolean|number)=} unsigned Whether unsigned or not, defaults to signed\r\n * @param {number=} radix The radix in which the text is written (2-36), defaults to 10\r\n * @returns {!Long} The corresponding Long value\r\n */\r\nLong.fromString = fromString;\r\n\r\n/**\r\n * @function\r\n * @param {!Long|number|string|!{low: number, high: number, unsigned: boolean}} val\r\n * @param {boolean=} unsigned\r\n * @returns {!Long}\r\n * @inner\r\n */\r\nfunction fromValue(val, unsigned) {\r\n   if (typeof val === 'number')\r\n   return fromNumber(val, unsigned);\r\n   if (typeof val === 'string')\r\n   return fromString(val, unsigned);\r\n   // Throws for non-objects, converts non-instanceof Long:\r\n   return fromBits(val.low, val.high, typeof unsigned === 'boolean' ? unsigned : val.unsigned);\r\n}\r\n\r\n/**\r\n * Converts the specified value to a Long using the appropriate from* function for its type.\r\n * @function\r\n * @param {!Long|number|string|!{low: number, high: number, unsigned: boolean}} val Value\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {!Long}\r\n */\r\nLong.fromValue = fromValue;\r\n\r\n// NOTE: the compiler should inline these constant values below and then remove these variables, so there should be\r\n// no runtime penalty for these.\r\n\r\n/**\r\n * @type {number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_16_DBL = 1 << 16;\r\n\r\n/**\r\n * @type {number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_24_DBL = 1 << 24;\r\n\r\n/**\r\n * @type {number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_32_DBL = TWO_PWR_16_DBL * TWO_PWR_16_DBL;\r\n\r\n/**\r\n * @type {number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_64_DBL = TWO_PWR_32_DBL * TWO_PWR_32_DBL;\r\n\r\n/**\r\n * @type {number}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_63_DBL = TWO_PWR_64_DBL / 2;\r\n\r\n/**\r\n * @type {!Long}\r\n * @const\r\n * @inner\r\n */\r\nvar TWO_PWR_24 = fromInt(TWO_PWR_24_DBL);\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar ZERO = fromInt(0);\r\n\r\n/**\r\n * Signed zero.\r\n * @type {!Long}\r\n */\r\nLong.ZERO = ZERO;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar UZERO = fromInt(0, true);\r\n\r\n/**\r\n * Unsigned zero.\r\n * @type {!Long}\r\n */\r\nLong.UZERO = UZERO;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar ONE = fromInt(1);\r\n\r\n/**\r\n * Signed one.\r\n * @type {!Long}\r\n */\r\nLong.ONE = ONE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar UONE = fromInt(1, true);\r\n\r\n/**\r\n * Unsigned one.\r\n * @type {!Long}\r\n */\r\nLong.UONE = UONE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar NEG_ONE = fromInt(-1);\r\n\r\n/**\r\n * Signed negative one.\r\n * @type {!Long}\r\n */\r\nLong.NEG_ONE = NEG_ONE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar MAX_VALUE = fromBits(0xFFFFFFFF|0, 0x7FFFFFFF|0, false);\r\n\r\n/**\r\n * Maximum signed value.\r\n * @type {!Long}\r\n */\r\nLong.MAX_VALUE = MAX_VALUE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar MAX_UNSIGNED_VALUE = fromBits(0xFFFFFFFF|0, 0xFFFFFFFF|0, true);\r\n\r\n/**\r\n * Maximum unsigned value.\r\n * @type {!Long}\r\n */\r\nLong.MAX_UNSIGNED_VALUE = MAX_UNSIGNED_VALUE;\r\n\r\n/**\r\n * @type {!Long}\r\n * @inner\r\n */\r\nvar MIN_VALUE = fromBits(0, 0x80000000|0, false);\r\n\r\n/**\r\n * Minimum signed value.\r\n * @type {!Long}\r\n */\r\nLong.MIN_VALUE = MIN_VALUE;\r\n\r\n/**\r\n * @alias Long.prototype\r\n * @inner\r\n */\r\nvar LongPrototype = Long.prototype;\r\n\r\n/**\r\n * Converts the Long to a 32 bit integer, assuming it is a 32 bit integer.\r\n * @returns {number}\r\n */\r\nLongPrototype.toInt = function toInt() {\r\n   return this.unsigned ? this.low >>> 0 : this.low;\r\n};\r\n\r\n/**\r\n * Converts the Long to a the nearest floating-point representation of this value (double, 53 bit mantissa).\r\n * @returns {number}\r\n */\r\nLongPrototype.toNumber = function toNumber() {\r\n   if (this.unsigned)\r\n   return ((this.high >>> 0) * TWO_PWR_32_DBL) + (this.low >>> 0);\r\n   return this.high * TWO_PWR_32_DBL + (this.low >>> 0);\r\n};\r\n\r\n/**\r\n * Converts the Long to a string written in the specified radix.\r\n * @param {number=} radix Radix (2-36), defaults to 10\r\n * @returns {string}\r\n * @override\r\n * @throws {RangeError} If `radix` is out of range\r\n */\r\nLongPrototype.toString = function toString(radix) {\r\n   radix = radix || 10;\r\n   if (radix < 2 || 36 < radix)\r\n   throw RangeError('radix');\r\n   if (this.isZero())\r\n   return '0';\r\n   if (this.isNegative()) { // Unsigned Longs are never negative\r\n   if (this.eq(MIN_VALUE)) {\r\n   // We need to change the Long value before it can be negated, so we remove\r\n   // the bottom-most digit in this base and then recurse to do the rest.\r\n   var radixLong = fromNumber(radix),\r\n   div = this.div(radixLong),\r\n   rem1 = div.mul(radixLong).sub(this);\r\n   return div.toString(radix) + rem1.toInt().toString(radix);\r\n   } else\r\n   return '-' + this.neg().toString(radix);\r\n   }\r\n\r\n   // Do several (6) digits each time through the loop, so as to\r\n   // minimize the calls to the very expensive emulated div.\r\n   var radixToPower = fromNumber(pow_dbl(radix, 6), this.unsigned),\r\n   rem = this;\r\n   var result = '';\r\n   while (true) {\r\n   var remDiv = rem.div(radixToPower),\r\n   intval = rem.sub(remDiv.mul(radixToPower)).toInt() >>> 0,\r\n

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    digits = intval.toString(radix);\r\n        rem = remDiv;\r\n        if (rem.isZero())\r\n            return digits + result;\r\n
     else {\r\n            while (digits.length < 6)\r\n                digits = '0' + digits;\r\n            result = '' + digits +
result;\r\n        }\r\n    }\r\n};\r\n\r\n/**\r\n * Gets the high 32 bits as a signed integer.\r\n * @returns {number}
Signed high bits\r\n */\r\nLongPrototype.getHighBits = function getHighBits() {\r\n    return
this.high;\r\n};\r\n\r\n/**\r\n * Gets the high 32 bits as an unsigned integer.\r\n * @returns {number} Unsigned high
bits\r\n */\r\nLongPrototype.getHighBitsUnsigned = function getHighBitsUnsigned() {\r\n    return this.high >>>
0;\r\n};\r\n\r\n/**\r\n * Gets the low 32 bits as a signed integer.\r\n * @returns {number} Signed low bits\r\n
*/\r\nLongPrototype.getLowBits = function getLowBits() {\r\n    return this.low;\r\n};\r\n\r\n/**\r\n * Gets the low
32 bits as an unsigned integer.\r\n * @returns {number} Unsigned low bits\r\n
*/\r\nLongPrototype.getLowBitsUnsigned = function getLowBitsUnsigned() {\r\n    return this.low >>>
0;\r\n};\r\n\r\n/**\r\n * Gets the number of bits needed to represent the absolute value of this Long.\r\n * @returns
{number}\r\n */\r\nLongPrototype.getNumBitsAbs = function getNumBitsAbs() {\r\n    if (this.isNegative()) //
Unsigned Longs are never negative\r\n        return this.eq(MIN_VALUE) ? 64 : this.neg().getNumBitsAbs();\r\n
var val = this.high != 0 ? this.high : this.low;\r\n    for (var bit = 31; bit > 0; bit--)\r\n        if ((val & (1 << bit)) !=
0)\r\n            break;\r\n    return this.high != 0 ? bit + 33 : bit + 1;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value
equals zero.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isZero = function isZero() {\r\n    return this.high
=== 0 && this.low === 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value equals zero. This is an alias of {@link
Long#isZero}.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.eqz = LongPrototype.isZero;\r\n\r\n/**\r\n * Tests
if this Long's value is negative.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isNegative = function
isNegative() {\r\n    return !this.unsigned && this.high < 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is
positive.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isPositive = function isPositive() {\r\n    return
this.unsigned || this.high >= 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is odd.\r\n * @returns {boolean}\r\n
*/\r\nLongPrototype.isOdd = function isOdd() {\r\n    return (this.low & 1) === 1;\r\n};\r\n\r\n/**\r\n * Tests if this
Long's value is even.\r\n * @returns {boolean}\r\n */\r\nLongPrototype.isEven = function isEven() {\r\n    return
(this.low & 1) === 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value equals the specified's.\r\n * @param
{!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.equals = function
equals(other) {\r\n    if (!isLong(other))\r\n        other = fromValue(other);\r\n    if (this.unsigned !== other.unsigned
&& (this.high >>> 31) === 1 && (other.high >>> 31) === 1)\r\n        return false;\r\n    return this.high ===
other.high && this.low === other.low;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value equals the specified's. This is
an alias of {@link Long#equals}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n *
@returns {boolean}\r\n */\r\nLongPrototype.eq = LongPrototype.equals;\r\n\r\n/**\r\n * Tests if this Long's value
differs from the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n
*/\r\nLongPrototype.notEquals = function notEquals(other) {\r\n    return !this.eq(/* validates */
other);\r\n};\r\n\r\n/**\r\n * Tests if this Long's value differs from the specified's. This is an alias of {@link
Long#notEquals}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns
{boolean}\r\n */\r\nLongPrototype.neq = LongPrototype.notEquals;\r\n\r\n/**\r\n * Tests if this Long's value differs
from the specified's. This is an alias of {@link Long#notEquals}.\r\n * @function\r\n * @param
{!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.ne =
LongPrototype.notEquals;\r\n\r\n/**\r\n * Tests if this Long's value is less than the specified's.\r\n * @param
{!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.lessThan = function
lessThan(other) {\r\n    return this.comp(/* validates */ other) < 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is
less than the specified's. This is an alias of {@link Long#lessThan}.\r\n * @function\r\n * @param
{!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.lt =
LongPrototype.lessThan;\r\n\r\n/**\r\n * Tests if this Long's value is less than or equal the specified's.\r\n * @param
{!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.lessThanOrEqual =
function lessThanOrEqual(other) {\r\n    return this.comp(/* validates */ other) <= 0;\r\n};\r\n\r\n/**\r\n * Tests if
this Long's value is less than or equal the specified's. This is an alias of {@link Long#lessThanOrEqual}.\r\n *
@function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n
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*/\r\nLongPrototype.lte = LongPrototype.lessThanOrEqual;\r\n\r\n/**\r\n * Tests if this Long's value is less than or equal the specified's. This is an alias of {@link Long#lessThanOrEqual}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.le = LongPrototype.lessThanOrEqual;\r\n\r\n/**\r\n * Tests if this Long's value is greater than the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.greaterThan = function greaterThan(other) {\r\n   return this.comp(/* validates */ other) > 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is greater than the specified's. This is an alias of {@link Long#greaterThan}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.gt = LongPrototype.greaterThan;\r\n\r\n/**\r\n * Tests if this Long's value is greater than or equal the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.greaterThanOrEqual = function greaterThanOrEqual(other) {\r\n   return this.comp(/* validates */ other) >= 0;\r\n};\r\n\r\n/**\r\n * Tests if this Long's value is greater than or equal the specified's. This is an alias of {@link Long#greaterThanOrEqual}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.gte = LongPrototype.greaterThanOrEqual;\r\n\r\n/**\r\n * Tests if this Long's value is greater than or equal the specified's. This is an alias of {@link Long#greaterThanOrEqual}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {boolean}\r\n */\r\nLongPrototype.ge = LongPrototype.greaterThanOrEqual;\r\n\r\n/**\r\n * Compares this Long's value with the specified's.\r\n * @param {!Long|number|string} other Other value\r\n * @returns {number} 0 if they are the same, 1 if the this is greater and -1\r\n * if the given one is greater\r\n */\r\nLongPrototype.compare = function compare(other) {\r\n   if (!isLong(other))\r\n   other = fromValue(other);\r\n   if (this.eq(other))\r\n return 0;\r\n   var thisNeg = this.isNegative(),\r\n   otherNeg = other.isNegative();\r\n   if (thisNeg && !otherNeg)\r\n   return -1;\r\n   if (!thisNeg && otherNeg)\r\n   return 1;\r\n   // At this point the sign bits are the same\r\n   if (!this.unsigned)\r\n   return this.sub(other).isNegative() ? -1 : 1;\r\n   // Both are positive if at least one is unsigned\r\n   return (other.high >>> 0) > (this.high >>> 0) || (other.high === this.high && (other.low >>> 0) > (this.low >>> 0)) ? -1 : 1;\r\n};\r\n\r\n/**\r\n * Compares this Long's value with the specified's. This is an alias of {@link Long#compare}.\r\n * @function\r\n * @param {!Long|number|string} other Other value\r\n * @returns {number} 0 if they are the same, 1 if the this is greater and -1\r\n * if the given one is greater\r\n */\r\nLongPrototype.comp = LongPrototype.compare;\r\n\r\n/**\r\n * Negates this Long's value.\r\n * @returns {!Long} Negated Long\r\n */\r\nLongPrototype.negate = function negate() {\r\n   if (!this.unsigned && this.eq(MIN_VALUE))\r\n   return MIN_VALUE;\r\n   return this.not().add(ONE);\r\n};\r\n\r\n/**\r\n * Negates this Long's value. This is an alias of {@link Long#negate}.\r\n * @function\r\n * @returns {!Long} Negated Long\r\n */\r\nLongPrototype.neg = LongPrototype.negate;\r\n\r\n/**\r\n * Returns the sum of this and the specified Long.\r\n * @param {!Long|number|string} addend Addend\r\n * @returns {!Long} Sum\r\n */\r\nLongPrototype.add = function add(addend) {\r\n   if (!isLong(addend))\r\n   addend = fromValue(addend);\r\n\r\n   // Divide each number into 4 chunks of 16 bits, and then sum the chunks.\r\n\r\n   var a48 = this.high >>> 16;\r\n   var a32 = this.high & 0xFFFF;\r\n   var a16 = this.low >>> 16;\r\n   var a00 = this.low & 0xFFFF;\r\n\r\n   var b48 = addend.high >>> 16;\r\n   var b32 = addend.high & 0xFFFF;\r\n   var b16 = addend.low >>> 16;\r\n   var b00 = addend.low & 0xFFFF;\r\n\r\n   var c48 = 0, c32 = 0, c16 = 0, c00 = 0;\r\n   c00 += a00 + b00;\r\n   c16 += c00 >>> 16;\r\n   c00 &= 0xFFFF;\r\n   c16 += a16 + b16;\r\n   c32 += c16 >>> 16;\r\n   c16 &= 0xFFFF;\r\n   c32 += a32 + b32;\r\n   c48 += c32 >>> 16;\r\n   c32 &= 0xFFFF;\r\n   c48 += a48 + b48;\r\n   c48 &= 0xFFFF;\r\n   return fromBits((c16 << 16) | c00, (c48 << 16) | c32, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the difference of this and the specified Long.\r\n * @param {!Long|number|string} subtrahend Subtrahend\r\n * @returns {!Long} Difference\r\n */\r\nLongPrototype.subtract = function subtract(subtrahend) {\r\n   if (!isLong(subtrahend))\r\n   subtrahend = fromValue(subtrahend);\r\n return this.add(subtrahend.neg());\r\n};\r\n\r\n/**\r\n * Returns the difference of this and the specified Long. This is an alias of {@link Long#subtract}.\r\n * @function\r\n * @param {!Long|number|string} subtrahend Subtrahend\r\n * @returns {!Long} Difference\r\n */\r\nLongPrototype.sub = LongPrototype.subtract;\r\n\r\n/**\r\n * Returns the product of this and the specified Long.\r\n * @param {!Long|number|string} multiplier Multiplier\r\n * @returns

{!Long} Product\r\n */\r\nLongPrototype.multiply = function multiply(multiplier) {\r\n   if (this.isZero())\r\n   return ZERO;\r\n   if (!isLong(multiplier))\r\n   multiplier = fromValue(multiplier);\r\n\r\n   // use wasm support if present\r\n   if (wasm) {\r\n   var low = wasm.mul(this.low,\r\n   this.high,\r\n   multiplier.low,\r\n   multiplier.high);\r\n   return fromBits(low, wasm.get_high(), this.unsigned);\r\n   }\r\n\r\n   if (multiplier.isZero())\r\n   return ZERO;\r\n   if (this.eq(MIN_VALUE))\r\n   return multiplier.isOdd() ? MIN_VALUE : ZERO;\r\n   if (multiplier.eq(MIN_VALUE))\r\n   return this.isOdd() ? MIN_VALUE : ZERO;\r\n\r\n   if (this.isNegative()) {\r\n   if (multiplier.isNegative())\r\n   return this.neg().mul(multiplier.neg());\r\n   else\r\n   return this.neg().mul(multiplier).neg();\r\n   } else if (multiplier.isNegative())\r\n   return this.mul(multiplier.neg()).neg();\r\n\r\n   // If both longs are small, use float multiplication\r\n   if (this.lt(TWO_PWR_24) && multiplier.lt(TWO_PWR_24))\r\n   return fromNumber(this.toNumber() * multiplier.toNumber(), this.unsigned);\r\n\r\n   // Divide each long into 4 chunks of 16 bits, and then add up 4x4 products.\r\n   // We can skip products that would overflow.\r\n\r\n   var a48 = this.high >>> 16;\r\n   var a32 = this.high & 0xFFFF;\r\n   var a16 = this.low >>> 16;\r\n   var a00 = this.low & 0xFFFF;\r\n\r\n   var b48 = multiplier.high >>> 16;\r\n   var b32 = multiplier.high & 0xFFFF;\r\n   var b16 = multiplier.low >>> 16;\r\n   var b00 = multiplier.low & 0xFFFF;\r\n\r\n   var c48 = 0, c32 = 0, c16 = 0, c00 = 0;\r\n   c00 += a00 * b00;\r\n   c16 += c00 >>> 16;\r\n   c00 &= 0xFFFF;\r\n   c16 += a16 * b00;\r\n   c32 += c16 >>> 16;\r\n   c16 &= 0xFFFF;\r\n   c16 += a00 * b16;\r\n   c32 += c16 >>> 16;\r\n   c16 &= 0xFFFF;\r\n   c32 += a32 * b00;\r\n   c48 += c32 >>> 16;\r\n   c32 &= 0xFFFF;\r\n   c32 += a16 * b16;\r\n   c48 += c32 >>> 16;\r\n   c32 &= 0xFFFF;\r\n   c32 += a00 * b32;\r\n   c48 += c32 >>> 16;\r\n   c32 &= 0xFFFF;\r\n   c48 += a48 * b00 + a32 * b16 + a16 * b32 + a00 * b48;\r\n   c48 &= 0xFFFF;\r\n   return fromBits((c16 << 16) | c00, (c48 << 16) | c32, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the product of this and the specified Long. This is an alias of {@link Long#multiply}.\r\n * @function\r\n * @param {!Long|number|string} multiplier Multiplier\r\n * @returns {!Long} Product\r\n */\r\nLongPrototype.mul = LongPrototype.multiply;\r\n\r\n/**\r\n * Returns this Long divided by the specified. The result is signed if this Long is signed or\r\n * unsigned if this Long is unsigned.\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Quotient\r\n */\r\nLongPrototype.divide = function divide(divisor) {\r\n   if (!isLong(divisor))\r\n   divisor = fromValue(divisor);\r\n   if (divisor.isZero())\r\n   throw Error('division by zero');\r\n\r\n   // use wasm support if present\r\n   if (wasm) {\r\n   // guard against signed division overflow: the largest\r\n   // negative number / -1 would be 1 larger than the largest\r\n   // positive number, due to two's complement.\r\n   if (!this.unsigned &&\r\n   this.high === -0x80000000 &&\r\n   divisor.low === -1 && divisor.high === -1) {\r\n   // be consistent with non-wasm code path\r\n   return this;\r\n   }\r\n   var low = (this.unsigned ? wasm.div_u : wasm.div_s)(\r\n   this.low,\r\n   this.high,\r\n   divisor.low,\r\n   divisor.high\r\n   );\r\n   return fromBits(low, wasm.get_high(), this.unsigned);\r\n   }\r\n\r\n   if (this.isZero())\r\n   return this.unsigned ? UZERO : ZERO;\r\n   var approx, rem, res;\r\n   if (!this.unsigned) {\r\n   // This section is only relevant for signed longs and is derived from the\r\n   // closure library as a whole.\r\n   if (this.eq(MIN_VALUE)) {\r\n   if (divisor.eq(ONE) || divisor.eq(NEG_ONE))\r\n   return MIN_VALUE; // recall that -MIN_VALUE == MIN_VALUE\r\n   else if (divisor.eq(MIN_VALUE))\r\n   return ONE;\r\n   else {\r\n   // At this point, we have |other| >= 2, so |this/other| < |MIN_VALUE|.\r\n   var halfThis = this.shr(1);\r\n   approx = halfThis.div(divisor).shl(1);\r\n   if (approx.eq(ZERO)) {\r\n   return divisor.isNegative() ? ONE : NEG_ONE;\r\n   } else {\r\n   rem = this.sub(divisor.mul(approx));\r\n   res = approx.add(rem.div(divisor));\r\n   return res;\r\n   }\r\n   }\r\n   } else if (divisor.eq(MIN_VALUE))\r\n   return this.unsigned ? UZERO : ZERO;\r\n   if (this.isNegative()) {\r\n   if (divisor.isNegative())\r\n   return this.neg().div(divisor.neg());\r\n   return this.neg().div(divisor).neg();\r\n   } else if (divisor.isNegative())\r\n   return this.div(divisor.neg()).neg();\r\n   res = ZERO;\r\n   } else {\r\n   // The algorithm below has not been made for unsigned longs. It's therefore\r\n   // required to take special care of the MSB prior to running it.\r\n   if (!divisor.unsigned)\r\n   divisor = divisor.toUnsigned();\r\n   if (divisor.gt(this))\r\n   return UZERO;\r\n   if (divisor.gt(this.shru(1))) // 15 >>> 1 = 7 ; with divisor = 8 ; true\r\n   return UONE;\r\n   res = UZERO;\r\n

}\r\n\r\n   // Repeat the following until the remainder is less than other: find a\r\n   // floating-point that approximates remainder / other *from below*, add this\r\n   // into the result, and subtract it from the remainder. It is critical that\r\n   // the approximate value is less than or equal to the real value so that the\r\n   // remainder never becomes negative.\r\n   rem = this;\r\n   while (rem.gte(divisor)) {\r\n   // Approximate the result of division. This may be a little greater or\r\n   // smaller than the actual value.\r\n   approx = Math.max(1, Math.floor(rem.toNumber() / divisor.toNumber()));\r\n\r\n   // We will tweak the approximate result by changing it in the 48-th digit or\r\n   // the smallest non-fractional digit, whichever is larger.\r\n   var log2 = Math.ceil(Math.log(approx) / Math.LN2),\r\n   delta = (log2 <= 48) ? 1 : pow_dbl(2, log2 - 48),\r\n\r\n   // Decrease the approximation until it is smaller than the remainder. Note\r\n   // that if it is too large, the product overflows and is negative.\r\n   approxRes = fromNumber(approx),\r\n   approxRem = approxRes.mul(divisor);\r\n   while (approxRem.isNegative() || approxRem.gt(rem)) {\r\n   approx -= delta;\r\n   approxRes = fromNumber(approx, this.unsigned);\r\n   approxRem = approxRes.mul(divisor);\r\n   }\r\n\r\n   // We know the answer can't be zero... and actually, zero would cause\r\n   // infinite recursion since we would make no progress.\r\n   if (approxRes.isZero())\r\n   approxRes = ONE;\r\n\r\n   res = res.add(approxRes);\r\n   rem = rem.sub(approxRem);\r\n   }\r\n   return res;\r\n};\r\n\r\n/**\r\n * Returns this Long divided by the specified. This is an alias of {@link Long#divide}.\r\n * @function\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Quotient\r\n */\r\nLongPrototype.div = LongPrototype.divide;\r\n\r\n/**\r\n * Returns this Long modulo the specified.\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Remainder\r\n */\r\nLongPrototype.modulo = function modulo(divisor) {\r\n   if (!isLong(divisor))\r\n   divisor = fromValue(divisor);\r\n\r\n   // use wasm support if present\r\n   if (wasm) {\r\n   var low = (this.unsigned ? wasm.rem_u : wasm.rem_s)(\r\n   this.low,\r\n   this.high,\r\n   divisor.low,\r\n   divisor.high\r\n   );\r\n   return fromBits(low, wasm.get_high(), this.unsigned);\r\n   }\r\n\r\n   return this.sub(this.div(divisor).mul(divisor));\r\n};\r\n\r\n/**\r\n * Returns this Long modulo the specified. This is an alias of {@link Long#modulo}.\r\n * @function\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Remainder\r\n */\r\nLongPrototype.mod = LongPrototype.modulo;\r\n\r\n/**\r\n * Returns this Long modulo the specified. This is an alias of {@link Long#modulo}.\r\n * @function\r\n * @param {!Long|number|string} divisor Divisor\r\n * @returns {!Long} Remainder\r\n */\r\nLongPrototype.rem = LongPrototype.modulo;\r\n\r\n/**\r\n * Returns the bitwise NOT of this Long.\r\n * @returns {!Long}\r\n */\r\nLongPrototype.not = function not() {\r\n   return fromBits(~this.low, ~this.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the bitwise AND of this Long and the specified.\r\n * @param {!Long|number|string} other Other Long\r\n * @returns {!Long}\r\n */\r\nLongPrototype.and = function and(other) {\r\n   if (!isLong(other))\r\n   other = fromValue(other);\r\n   return fromBits(this.low & other.low, this.high & other.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the bitwise OR of this Long and the specified.\r\n * @param {!Long|number|string} other Other Long\r\n * @returns {!Long}\r\n */\r\nLongPrototype.or = function or(other) {\r\n   if (!isLong(other))\r\n   other = fromValue(other);\r\n   return fromBits(this.low | other.low, this.high | other.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns the bitwise XOR of this Long and the given one.\r\n * @param {!Long|number|string} other Other Long\r\n * @returns {!Long}\r\n */\r\nLongPrototype.xor = function xor(other) {\r\n   if (!isLong(other))\r\n   other = fromValue(other);\r\n   return fromBits(this.low ^ other.low, this.high ^ other.high, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns this Long with bits shifted to the left by the given amount.\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shiftLeft = function shiftLeft(numBits) {\r\n   if (isLong(numBits))\r\n   numBits = numBits.toInt();\r\n   if ((numBits &= 63) === 0)\r\n   return this;\r\n   else if (numBits < 32)\r\n   return fromBits(this.low << numBits, (this.high << numBits) | (this.low >>> (32 - numBits)), this.unsigned);\r\n   else\r\n   return fromBits(0, this.low << (numBits - 32), this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns this Long with bits shifted to the left by the given amount. This is an alias of {@link Long#shiftLeft}.\r\n * @function\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shl = LongPrototype.shiftLeft;\r\n\r\n/**\r\n * Returns this Long with bits arithmetically shifted to the right by the given amount.\r\n * @param {number|!Long} numBits

Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shiftRight = function shiftRight(numBits) {\r\n if (isLong(numBits))\r\n numBits = numBits.toInt();\r\n if ((numBits &= 63) === 0)\r\n return this;\r\n else if (numBits < 32)\r\n return fromBits((this.low >>> numBits) | (this.high << (32 - numBits)), this.high >> numBits, this.unsigned);\r\n else\r\n return fromBits(this.high >> (numBits - 32), this.high >= 0 ? 0 : -1, this.unsigned);\r\n};\r\n\r\n/**\r\n * Returns this Long with bits arithmetically shifted to the right by the given amount. This is an alias of {@link Long#shiftRight}.\r\n * @function\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shr = LongPrototype.shiftRight;\r\n\r\n/**\r\n * Returns this Long with bits logically shifted to the right by the given amount.\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shiftRightUnsigned = function shiftRightUnsigned(numBits) {\r\n if (isLong(numBits))\r\n numBits = numBits.toInt();\r\n numBits &= 63;\r\n if (numBits === 0)\r\n return this;\r\n else {\r\n var high = this.high;\r\n if (numBits < 32) {\r\n var low = this.low;\r\n return fromBits((low >>> numBits) | (high << (32 - numBits)), high >>> numBits, this.unsigned);\r\n } else if (numBits === 32)\r\n return fromBits(high, 0, this.unsigned);\r\n else\r\n return fromBits(high >>> (numBits - 32), 0, this.unsigned);\r\n }\r\n};\r\n\r\n/**\r\n * Returns this Long with bits logically shifted to the right by the given amount. This is an alias of {@link Long#shiftRightUnsigned}.\r\n * @function\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shru = LongPrototype.shiftRightUnsigned;\r\n\r\n/**\r\n * Returns this Long with bits logically shifted to the right by the given amount. This is an alias of {@link Long#shiftRightUnsigned}.\r\n * @function\r\n * @param {number|!Long} numBits Number of bits\r\n * @returns {!Long} Shifted Long\r\n */\r\nLongPrototype.shr_u = LongPrototype.shiftRightUnsigned;\r\n\r\n/**\r\n * Converts this Long to signed.\r\n * @returns {!Long} Signed long\r\n */\r\nLongPrototype.toSigned = function toSigned() {\r\n if (!this.unsigned)\r\n return this;\r\n return fromBits(this.low, this.high, false);\r\n};\r\n\r\n/**\r\n * Converts this Long to unsigned.\r\n * @returns {!Long} Unsigned long\r\n */\r\nLongPrototype.toUnsigned = function toUnsigned() {\r\n if (this.unsigned)\r\n return this;\r\n return fromBits(this.low, this.high, true);\r\n};\r\n\r\n/**\r\n * Converts this Long to its byte representation.\r\n * @param {boolean=} le Whether little or big endian, defaults to big endian\r\n * @returns {!Array.<number>} Byte representation\r\n */\r\nLongPrototype.toBytes = function toBytes(le) {\r\n return le ? this.toBytesLE() : this.toBytesBE();\r\n};\r\n\r\n/**\r\n * Converts this Long to its little endian byte representation.\r\n * @returns {!Array.<number>} Little endian byte representation\r\n */\r\nLongPrototype.toBytesLE = function toBytesLE() {\r\n var hi = this.high,\r\n lo = this.low;\r\n return [\r\n lo & 0xff,\r\n lo >>> 8 & 0xff,\r\n lo >>> 16 & 0xff,\r\n lo >>> 24 ,\r\n hi & 0xff,\r\n hi >>> 8 & 0xff,\r\n hi >>> 16 & 0xff,\r\n hi >>> 24\r\n];\r\n};\r\n\r\n/**\r\n * Converts this Long to its big endian byte representation.\r\n * @returns {!Array.<number>} Big endian byte representation\r\n */\r\nLongPrototype.toBytesBE = function toBytesBE() {\r\n var hi = this.high,\r\n lo = this.low;\r\n return [\r\n hi >>> 24 ,\r\n hi >>> 16 & 0xff,\r\n hi >>> 8 & 0xff,\r\n hi & 0xff,\r\n lo >>> 24 ,\r\n lo >>> 16 & 0xff,\r\n lo >>> 8 & 0xff,\r\n lo & 0xff\r\n];\r\n};\r\n\r\n/**\r\n * Creates a Long from its byte representation.\r\n * @param {!Array.<number>} bytes Byte representation\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @param {boolean=} le Whether little or big endian, defaults to big endian\r\n * @returns {Long} The corresponding Long value\r\n */\r\nLong.fromBytes = function fromBytes(bytes, unsigned, le) {\r\n return le ? Long.fromBytesLE(bytes, unsigned) : Long.fromBytesBE(bytes, unsigned);\r\n};\r\n\r\n/**\r\n * Creates a Long from its little endian byte representation.\r\n * @param {!Array.<number>} bytes Little endian byte representation\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to signed\r\n * @returns {Long} The corresponding Long value\r\n */\r\nLong.fromBytesLE = function fromBytesLE(bytes, unsigned) {\r\n return new Long(\r\n bytes[0] |\r\n bytes[1] << 8 |\r\n bytes[2] << 16 |\r\n bytes[3] << 24,\r\n bytes[4] |\r\n bytes[5] << 8 |\r\n bytes[6] << 16 |\r\n bytes[7] << 24,\r\n unsigned\r\n);\r\n};\r\n\r\n/**\r\n * Creates a Long from its big endian byte representation.\r\n * @param {!Array.<number>} bytes Big endian byte representation\r\n * @param {boolean=} unsigned Whether unsigned or not, defaults to

signed\r\n * @returns {Long} The corresponding Long value\r\n */\r\nLong.fromBytesBE = function
fromBytesBE(bytes, unsigned) {\r\n   return new Long(\r\n   bytes[4] << 24 |\r\n   bytes[5] << 16 |\r\n
bytes[6] << 8 |\r\n   bytes[7],\r\n   bytes[0] << 24 |\r\n   bytes[1] << 16 |\r\n   bytes[2] << 8 |\r\n
bytes[3],\r\n   unsigned\r\n   );\r\n};\r\n","/*eslint-disable block-scoped-var, id-length, no-control-regex, no-
magic-numbers, no-prototype-builtins, no-redeclare, no-shadow, no-var, sort-vars*/\n\"use strict\";\n\nvar $protobuf
= require(\"protobufjs/minimal\");\n\n// Common aliases\nvar $Reader = $protobuf.Reader, $Writer =
$protobuf.Writer, $util = $protobuf.util;\n\n// Exported root namespace\nvar $root = $protobuf.roots[\"default\"] ||
($protobuf.roots[\"default\"] = {});\n\n$root.onnx = (function() {\n\n   /**\n   * Namespace onnx.\n   * @exports
onnx\n   * @namespace\n   */\n   var onnx = {};\n\n   /**\n   * Version enum.\n   * @name onnx.Version\n
* @enum {string}\n   * @property {number} _START_VERSION=0 _START_VERSION value\n   * @property
{number} IR_VERSION_2017_10_10=1 IR_VERSION_2017_10_10 value\n   * @property {number}
IR_VERSION_2017_10_30=2 IR_VERSION_2017_10_30 value\n   * @property {number}
IR_VERSION_2017_11_3=3 IR_VERSION_2017_11_3 value\n   * @property {number}
IR_VERSION_2019_1_22=4 IR_VERSION_2019_1_22 value\n   * @property {number} IR_VERSION=5
IR_VERSION value\n   */\n   onnx.Version = (function() {\n   var valuesById = {}, values =
Object.create(valuesById);\n   values[valuesById[0] = \"_START_VERSION\"] = 0;\n   values[valuesById[1]
= \"IR_VERSION_2017_10_10\"] = 1;\n   values[valuesById[2] = \"IR_VERSION_2017_10_30\"] = 2;\n
values[valuesById[3] = \"IR_VERSION_2017_11_3\"] = 3;\n   values[valuesById[4] =
\"IR_VERSION_2019_1_22\"] = 4;\n   values[valuesById[5] = \"IR_VERSION\"] = 5;\n   return values;\n
})();\n\n   onnx.AttributeProto = (function() {\n\n   /**\n   * Properties of an AttributeProto.\n   *
@memberof onnx\n   * @interface IAttributeProto\n   * @property {string|null} [name] AttributeProto
name\n   * @property {string|null} [refAttrName] AttributeProto refAttrName\n   * @property {string|null}
[docString] AttributeProto docString\n   * @property {onnx.AttributeProto.AttributeType|null} [type]
AttributeProto type\n   * @property {number|null} [f] AttributeProto f\n   * @property {number|Long|null}
[i] AttributeProto i\n   * @property {Uint8Array|null} [s] AttributeProto s\n   * @property
{onnx.ITensorProto|null} [t] AttributeProto t\n   * @property {onnx.IGraphProto|null} [g] AttributeProto g\n
 * @property {Array.<number>|null} [floats] AttributeProto floats\n   * @property
{Array.<number|Long>|null} [ints] AttributeProto ints\n   * @property {Array.<Uint8Array>|null} [strings]
AttributeProto strings\n   * @property {Array.<onnx.ITensorProto>|null} [tensors] AttributeProto tensors\n
* @property {Array.<onnx.IGraphProto>|null} [graphs] AttributeProto graphs\n   */\n\n   /**\n   *
Constructs a new AttributeProto.\n   * @memberof onnx\n   * @classdesc Represents an AttributeProto.\n
  * @implements IAttributeProto\n   * @constructor\n   * @param {onnx.IAttributeProto=} [properties]
Properties to set\n   */\n   function AttributeProto(properties) {\n   this.floats = [];\n   this.ints =
[];\n   this.strings = [];\n   this.tensors = [];\n   this.graphs = [];\n   if (properties)\n
for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n   if (properties[keys[i]] != null)\n
              this[keys[i]] = properties[keys[i]];\n   }\n\n   /**\n   * AttributeProto name.\n   * @member
{string} name\n   * @memberof onnx.AttributeProto\n   * @instance\n   */\n
AttributeProto.prototype.name = \"\";\n\n   /**\n   * AttributeProto refAttrName.\n   * @member {string}
refAttrName\n   * @memberof onnx.AttributeProto\n   * @instance\n   */\n
AttributeProto.prototype.refAttrName = \"\";\n\n   /**\n   * AttributeProto docString.\n   * @member
{string} docString\n   * @memberof onnx.AttributeProto\n   * @instance\n   */\n
AttributeProto.prototype.docString = \"\";\n\n   /**\n   * AttributeProto type.\n   * @member
{onnx.AttributeProto.AttributeType} type\n   * @memberof onnx.AttributeProto\n   * @instance\n   */\n
    AttributeProto.prototype.type = 0;\n\n   /**\n   * AttributeProto f.\n   * @member {number} f\n   *
@memberof onnx.AttributeProto\n   * @instance\n   */\n   AttributeProto.prototype.f = 0;\n\n   /**\n
   * AttributeProto i.\n   * @member {number|Long} i\n   * @memberof onnx.AttributeProto\n   *
@instance\n   */\n   AttributeProto.prototype.i = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n   /**\n
      * AttributeProto s.\n   * @member {Uint8Array} s\n   * @memberof onnx.AttributeProto\n   *

```
@instance\n        */\n        AttributeProto.prototype.s = $util.newBuffer([]);\n\n        /**\n         * AttributeProto t.\n
     * @member {onnx.ITensorProto|null|undefined} t\n         * @memberof onnx.AttributeProto\n         *
@instance\n        */\n        AttributeProto.prototype.t = null;\n\n        /**\n         * AttributeProto g.\n         *
@member {onnx.IGraphProto|null|undefined} g\n         * @memberof onnx.AttributeProto\n         * @instance\n
 */\n        AttributeProto.prototype.g = null;\n\n        /**\n         * AttributeProto floats.\n         * @member
{Array.<number>} floats\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.floats = $util.emptyArray;\n\n        /**\n         * AttributeProto ints.\n         * @member
{Array.<number|Long>} ints\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.ints = $util.emptyArray;\n\n        /**\n         * AttributeProto strings.\n         * @member
{Array.<Uint8Array>} strings\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.strings = $util.emptyArray;\n\n        /**\n         * AttributeProto tensors.\n         * @member
{Array.<onnx.ITensorProto>} tensors\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.tensors = $util.emptyArray;\n\n        /**\n         * AttributeProto graphs.\n         * @member
{Array.<onnx.IGraphProto>} graphs\n         * @memberof onnx.AttributeProto\n         * @instance\n         */\n
AttributeProto.prototype.graphs = $util.emptyArray;\n\n        /**\n         * Creates a new AttributeProto instance
using the specified properties.\n         * @function create\n         * @memberof onnx.AttributeProto\n         *
@static\n         * @param {onnx.IAttributeProto=} [properties] Properties to set\n         * @returns
{onnx.AttributeProto} AttributeProto instance\n         */\n        AttributeProto.create = function create(properties) {\n
         return new AttributeProto(properties);\n        };\n\n        /**\n         * Encodes the specified AttributeProto
message. Does not implicitly {@link onnx.AttributeProto.verify|verify} messages.\n         * @function encode\n
* @memberof onnx.AttributeProto\n         * @static\n         * @param {onnx.IAttributeProto} message
AttributeProto message or plain object to encode\n         * @param {$protobuf.Writer} [writer] Writer to encode
to\n         * @returns {$protobuf.Writer} Writer\n         */\n        AttributeProto.encode = function encode(message,
writer) {\n            if (!writer)\n                writer = $Writer.create();\n            if (message.name != null &&
message.hasOwnProperty(\"name\"))\n                writer.uint32(/* id 1, wireType 2 =*/10).string(message.name);\n
      if (message.f != null && message.hasOwnProperty(\"f\"))\n                writer.uint32(/* id 2, wireType 5
=*/21).float(message.f);\n            if (message.i != null && message.hasOwnProperty(\"i\"))\n
writer.uint32(/* id 3, wireType 0 =*/24).int64(message.i);\n            if (message.s != null &&
message.hasOwnProperty(\"s\"))\n                writer.uint32(/* id 4, wireType 2 =*/34).bytes(message.s);\n            if
(message.t != null && message.hasOwnProperty(\"t\"))\n                $root.onnx.TensorProto.encode(message.t,
writer.uint32(/* id 5, wireType 2 =*/42).fork()).ldelim();\n            if (message.g != null &&
message.hasOwnProperty(\"g\"))\n                $root.onnx.GraphProto.encode(message.g, writer.uint32(/* id 6,
wireType 2 =*/50).fork()).ldelim();\n            if (message.floats != null && message.floats.length) {\n
writer.uint32(/* id 7, wireType 2 =*/58).fork();\n                for (var i = 0; i < message.floats.length; ++i)\n
 writer.float(message.floats[i]);\n                writer.ldelim();\n            }\n            if (message.ints != null &&
message.ints.length) {\n                writer.uint32(/* id 8, wireType 2 =*/66).fork();\n                for (var i = 0; i <
message.ints.length; ++i)\n                    writer.int64(message.ints[i]);\n                writer.ldelim();\n            }\n
if (message.strings != null && message.strings.length)\n                for (var i = 0; i < message.strings.length; ++i)\n
            writer.uint32(/* id 9, wireType 2 =*/74).bytes(message.strings[i]);\n            if (message.tensors != null &&
message.tensors.length)\n                for (var i = 0; i < message.tensors.length; ++i)\n
$root.onnx.TensorProto.encode(message.tensors[i], writer.uint32(/* id 10, wireType 2 =*/82).fork()).ldelim();\n
   if (message.graphs != null && message.graphs.length)\n                for (var i = 0; i < message.graphs.length; ++i)\n
               $root.onnx.GraphProto.encode(message.graphs[i], writer.uint32(/* id 11, wireType 2
=*/90).fork()).ldelim();\n            if (message.docString != null && message.hasOwnProperty(\"docString\"))\n
    writer.uint32(/* id 13, wireType 2 =*/106).string(message.docString);\n            if (message.type != null &&
message.hasOwnProperty(\"type\"))\n                writer.uint32(/* id 20, wireType 0 =*/160).int32(message.type);\n
      if (message.refAttrName != null && message.hasOwnProperty(\"refAttrName\"))\n                writer.uint32(/* id
21, wireType 2 =*/170).string(message.refAttrName);\n            return writer;\n        };\n\n        /**\n         * Encodes
```

the specified AttributeProto message, length delimited. Does not implicitly {@link onnx.AttributeProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.AttributeProto\n * @static\n * @param {onnx.IAttributeProto} message AttributeProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n AttributeProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes an AttributeProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.AttributeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.AttributeProto} AttributeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n AttributeProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.AttributeProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.name = reader.string();\n break;\n case 21:\n message.refAttrName = reader.string();\n break;\n case 13:\n message.docString = reader.string();\n break;\n case 20:\n message.type = reader.int32();\n break;\n case 2:\n message.f = reader.float();\n break;\n case 3:\n message.i = reader.int64();\n break;\n case 4:\n message.s = reader.bytes();\n break;\n case 5:\n message.t = $root.onnx.TensorProto.decode(reader, reader.uint32());\n break;\n case 6:\n message.g = $root.onnx.GraphProto.decode(reader, reader.uint32());\n break;\n case 7:\n if (!(message.floats && message.floats.length))\n message.floats = [];\n if ((tag & 7) === 2) {\n var end2 = reader.uint32() + reader.pos;\n while (reader.pos < end2)\n message.floats.push(reader.float());\n } else\n message.floats.push(reader.float());\n break;\n case 8:\n if (!(message.ints && message.ints.length))\n message.ints = [];\n if ((tag & 7) === 2) {\n var end2 = reader.uint32() + reader.pos;\n while (reader.pos < end2)\n message.ints.push(reader.int64());\n } else\n message.ints.push(reader.int64());\n break;\n case 9:\n if (!(message.strings && message.strings.length))\n message.strings = [];\n message.strings.push(reader.bytes());\n break;\n case 10:\n if (!(message.tensors && message.tensors.length))\n message.tensors = [];\n message.tensors.push($root.onnx.TensorProto.decode(reader, reader.uint32()));\n break;\n case 11:\n if (!(message.graphs && message.graphs.length))\n message.graphs = [];\n message.graphs.push($root.onnx.GraphProto.decode(reader, reader.uint32()));\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes an AttributeProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.AttributeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.AttributeProto} AttributeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n AttributeProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies an AttributeProto message.\n * @function verify\n * @memberof onnx.AttributeProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n AttributeProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.name != null && message.hasOwnProperty(\"name\"))\n if (!$util.isString(message.name))\n

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        return \"name: string expected\";\n            if (message.refAttrName != null &&
message.hasOwnProperty(\"refAttrName\"))\n                if (!$util.isString(message.refAttrName))\n
return \"refAttrName: string expected\";\n            if (message.docString != null &&
message.hasOwnProperty(\"docString\"))\n                if (!$util.isString(message.docString))\n                return
\"docString: string expected\";\n            if (message.type != null && message.hasOwnProperty(\"type\"))\n
switch (message.type) {\n                default:\n                    return \"type: enum value expected\";\n                case 0:\n
        case 1:\n                case 2:\n                case 3:\n                case 4:\n                case 5:\n                case 6:\n
    case 7:\n                case 8:\n                case 9:\n                case 10:\n                    break;\n                }\n            if
(message.f != null && message.hasOwnProperty(\"f\"))\n                if (typeof message.f !== \"number\")\n
  return \"f: number expected\";\n            if (message.i != null && message.hasOwnProperty(\"i\"))\n                if
(!$util.isInteger(message.i) && !(message.i && $util.isInteger(message.i.low) &&
$util.isInteger(message.i.high)))\n                    return \"i: integer|Long expected\";\n            if (message.s != null &&
message.hasOwnProperty(\"s\"))\n                if (!(message.s && typeof message.s.length === \"number\" ||
$util.isString(message.s)))\n                    return \"s: buffer expected\";\n            if (message.t != null &&
message.hasOwnProperty(\"t\")) {\n                var error = $root.onnx.TensorProto.verify(message.t);\n                if
(error)\n                    return \"t.\" + error;\n            }\n            if (message.g != null &&
message.hasOwnProperty(\"g\")) {\n                var error = $root.onnx.GraphProto.verify(message.g);\n                if
(error)\n                    return \"g.\" + error;\n            }\n            if (message.floats != null &&
message.hasOwnProperty(\"floats\")) {\n                if (!Array.isArray(message.floats))\n                    return \"floats:
array expected\";\n                for (var i = 0; i < message.floats.length; ++i)\n                    if (typeof message.floats[i]
!== \"number\")\n                        return \"floats: number[] expected\";\n            }\n            if (message.ints != null
&& message.hasOwnProperty(\"ints\")) {\n                if (!Array.isArray(message.ints))\n                    return \"ints:
array expected\";\n                for (var i = 0; i < message.ints.length; ++i)\n                    if
(!$util.isInteger(message.ints[i]) && !(message.ints[i] && $util.isInteger(message.ints[i].low) &&
$util.isInteger(message.ints[i].high)))\n                        return \"ints: integer|Long[] expected\";\n            }\n            if
(message.strings != null && message.hasOwnProperty(\"strings\")) {\n                if
(!Array.isArray(message.strings))\n                    return \"strings: array expected\";\n                for (var i = 0; i <
message.strings.length; ++i)\n                    if (!(message.strings[i] && typeof message.strings[i].length ===
\"number\" || $util.isString(message.strings[i])))\n                        return \"strings: buffer[] expected\";\n            }\n
    if (message.tensors != null && message.hasOwnProperty(\"tensors\")) {\n                if
(!Array.isArray(message.tensors))\n                    return \"tensors: array expected\";\n                for (var i = 0; i <
message.tensors.length; ++i) {\n                    var error = $root.onnx.TensorProto.verify(message.tensors[i]);\n
      if (error)\n                        return \"tensors.\" + error;\n                }\n            }\n            if (message.graphs != null
&& message.hasOwnProperty(\"graphs\")) {\n                if (!Array.isArray(message.graphs))\n                    return
\"graphs: array expected\";\n                for (var i = 0; i < message.graphs.length; ++i) {\n                    var error =
$root.onnx.GraphProto.verify(message.graphs[i]);\n                    if (error)\n                        return \"graphs.\" +
error;\n                }\n            }\n            return null;\n        };\n\n        /**\n         * Creates an AttributeProto message
from a plain object. Also converts values to their respective internal types.\n         * @function fromObject\n         *
@memberof onnx.AttributeProto\n         * @static\n         * @param {Object.<string,*>} object Plain object\n
* @returns {onnx.AttributeProto} AttributeProto\n         */\n        AttributeProto.fromObject = function
fromObject(object) {\n            if (object instanceof $root.onnx.AttributeProto)\n                return object;\n            var
message = new $root.onnx.AttributeProto();\n            if (object.name != null)\n                message.name =
String(object.name);\n            if (object.refAttrName != null)\n                message.refAttrName =
String(object.refAttrName);\n            if (object.docString != null)\n                message.docString =
String(object.docString);\n            switch (object.type) {\n            case \"UNDEFINED\":\n            case 0:\n
message.type = 0;\n                break;\n            case \"FLOAT\":\n            case 1:\n                message.type = 1;\n
    break;\n            case \"INT\":\n            case 2:\n                message.type = 2;\n                break;\n            case
\"STRING\":\n            case 3:\n                message.type = 3;\n                break;\n            case \"TENSOR\":\n
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case 4:\n message.type = 4;\n break;\n case \"GRAPH\":\n case 5:\n message.type = 5;\n break;\n case \"FLOATS\":\n case 6:\n message.type = 6;\n break;\n case \"INTS\":\n case 7:\n message.type = 7;\n break;\n case \"STRINGS\":\n case 8:\n message.type = 8;\n break;\n case \"TENSORS\":\n case 9:\n message.type = 9;\n break;\n case \"GRAPHS\":\n case 10:\n message.type = 10;\n break;\n }\n if (object.f != null)\n message.f = Number(object.f);\n if (object.i != null)\n if ($util.Long)\n (message.i = $util.Long.fromValue(object.i)).unsigned = false;\n else if (typeof object.i === \"string\")\n message.i = parseInt(object.i, 10);\n else if (typeof object.i === \"number\")\n message.i = object.i;\n else if (typeof object.i === \"object\")\n message.i = new $util.LongBits(object.i.low >>> 0, object.i.high >>> 0).toNumber();\n if (object.s != null)\n if (typeof object.s === \"string\")\n $util.base64.decode(object.s, message.s = $util.newBuffer($util.base64.length(object.s)), 0);\n else if (object.s.length)\n message.s = object.s;\n if (object.t != null) {\n if (typeof object.t !== \"object\")\n throw TypeError(\".onnx.AttributeProto.t: object expected\");\n message.t = $root.onnx.TensorProto.fromObject(object.t);\n }\n if (object.g != null) {\n if (typeof object.g !== \"object\")\n throw TypeError(\".onnx.AttributeProto.g: object expected\");\n message.g = $root.onnx.GraphProto.fromObject(object.g);\n }\n if (object.floats) {\n if (!Array.isArray(object.floats))\n throw TypeError(\".onnx.AttributeProto.floats: array expected\");\n message.floats = [];\n for (var i = 0; i < object.floats.length; ++i)\n message.floats[i] = Number(object.floats[i]);\n }\n if (object.ints) {\n if (!Array.isArray(object.ints))\n throw TypeError(\".onnx.AttributeProto.ints: array expected\");\n message.ints = [];\n for (var i = 0; i < object.ints.length; ++i)\n if ($util.Long)\n (message.ints[i] = $util.Long.fromValue(object.ints[i])).unsigned = false;\n else if (typeof object.ints[i] === \"string\")\n message.ints[i] = parseInt(object.ints[i], 10);\n else if (typeof object.ints[i] === \"number\")\n message.ints[i] = object.ints[i];\n else if (typeof object.ints[i] === \"object\")\n message.ints[i] = new $util.LongBits(object.ints[i].low >>> 0, object.ints[i].high >>> 0).toNumber();\n }\n if (object.strings) {\n if (!Array.isArray(object.strings))\n throw TypeError(\".onnx.AttributeProto.strings: array expected\");\n message.strings = [];\n for (var i = 0; i < object.strings.length; ++i)\n if (typeof object.strings[i] === \"string\")\n $util.base64.decode(object.strings[i], message.strings[i] = $util.newBuffer($util.base64.length(object.strings[i])), 0);\n else if (object.strings[i].length)\n message.strings[i] = object.strings[i];\n }\n if (object.tensors) {\n if (!Array.isArray(object.tensors))\n throw TypeError(\".onnx.AttributeProto.tensors: array expected\");\n message.tensors = [];\n for (var i = 0; i < object.tensors.length; ++i) {\n if (typeof object.tensors[i] !== \"object\")\n throw TypeError(\".onnx.AttributeProto.tensors: object expected\");\n message.tensors[i] = $root.onnx.TensorProto.fromObject(object.tensors[i]);\n }\n }\n if (object.graphs) {\n if (!Array.isArray(object.graphs))\n throw TypeError(\".onnx.AttributeProto.graphs: array expected\");\n message.graphs = [];\n for (var i = 0; i < object.graphs.length; ++i) {\n if (typeof object.graphs[i] !== \"object\")\n throw TypeError(\".onnx.AttributeProto.graphs: object expected\");\n message.graphs[i] = $root.onnx.GraphProto.fromObject(object.graphs[i]);\n }\n }\n return message;\n };\n\n /**\n * Creates a plain object from an AttributeProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.AttributeProto\n * @static\n * @param {onnx.AttributeProto} message AttributeProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n AttributeProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.arrays || options.defaults) {\n object.floats = [];\n object.ints = [];\n object.strings = [];\n object.tensors = [];\n object.graphs = [];\n }\n if (options.defaults) {\n object.name = \"\";\n object.f = 0;\n

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            if ($util.Long) {\n                    var long = new $util.Long(0, 0, false);\n                    object.i = options.longs
=== String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n                } else\n
object.i = options.longs === String ? \"0\" : 0;\n                if (options.bytes === String)\n                    object.s =
\"\";\n                else {\n                    object.s = [];\n                    if (options.bytes !== Array)\n                        object.s
= $util.newBuffer(object.s);\n                }\n                object.t = null;\n                object.g = null;\n
object.docString = \"\";\n                object.type = options.enums === String ? \"UNDEFINED\" : 0;\n
object.refAttrName = \"\";\n            }\n            if (message.name != null && message.hasOwnProperty(\"name\"))\n
           object.name = message.name;\n            if (message.f != null && message.hasOwnProperty(\"f\"))\n
object.f = options.json && !isFinite(message.f) ? String(message.f) : message.f;\n            if (message.i != null &&
message.hasOwnProperty(\"i\"))\n                if (typeof message.i === \"number\")\n                    object.i =
options.longs === String ? String(message.i) : message.i;\n                else\n                    object.i = options.longs ===
String ? $util.Long.prototype.toString.call(message.i) : options.longs === Number ? new
$util.LongBits(message.i.low >>> 0, message.i.high >>> 0).toNumber() : message.i;\n            if (message.s != null
&& message.hasOwnProperty(\"s\"))\n                object.s = options.bytes === String ?
$util.base64.encode(message.s, 0, message.s.length) : options.bytes === Array ?
Array.prototype.slice.call(message.s) : message.s;\n            if (message.t != null &&
message.hasOwnProperty(\"t\"))\n                object.t = $root.onnx.TensorProto.toObject(message.t, options);\n
if (message.g != null && message.hasOwnProperty(\"g\"))\n                object.g =
$root.onnx.GraphProto.toObject(message.g, options);\n            if (message.floats && message.floats.length) {\n
      object.floats = [];\n                for (var j = 0; j < message.floats.length; ++j)\n                    object.floats[j] =
options.json && !isFinite(message.floats[j]) ? String(message.floats[j]) : message.floats[j];\n            }\n            if
(message.ints && message.ints.length) {\n                object.ints = [];\n                for (var j = 0; j <
message.ints.length; ++j)\n                    if (typeof message.ints[j] === \"number\")\n                        object.ints[j] =
options.longs === String ? String(message.ints[j]) : message.ints[j];\n                    else\n                        object.ints[j]
= options.longs === String ? $util.Long.prototype.toString.call(message.ints[j]) : options.longs === Number ? new
$util.LongBits(message.ints[j].low >>> 0, message.ints[j].high >>> 0).toNumber() : message.ints[j];\n            }\n
    if (message.strings && message.strings.length) {\n                object.strings = [];\n                for (var j = 0; j <
message.strings.length; ++j)\n                    object.strings[j] = options.bytes === String ?
$util.base64.encode(message.strings[j], 0, message.strings[j].length) : options.bytes === Array ?
Array.prototype.slice.call(message.strings[j]) : message.strings[j];\n            }\n            if (message.tensors &&
message.tensors.length) {\n                object.tensors = [];\n                for (var j = 0; j < message.tensors.length; ++j)\n
                object.tensors[j] = $root.onnx.TensorProto.toObject(message.tensors[j], options);\n            }\n            if
(message.graphs && message.graphs.length) {\n                object.graphs = [];\n                for (var j = 0; j <
message.graphs.length; ++j)\n                    object.graphs[j] = $root.onnx.GraphProto.toObject(message.graphs[j],
options);\n            }\n            if (message.docString != null && message.hasOwnProperty(\"docString\"))\n
object.docString = message.docString;\n            if (message.type != null && message.hasOwnProperty(\"type\"))\n
          object.type = options.enums === String ? $root.onnx.AttributeProto.AttributeType[message.type] :
message.type;\n            if (message.refAttrName != null && message.hasOwnProperty(\"refAttrName\"))\n
object.refAttrName = message.refAttrName;\n            return object;\n        };\n\n        /**\n         * Converts this
AttributeProto to JSON.\n         * @function toJSON\n         * @memberof onnx.AttributeProto\n         *
@instance\n         * @returns {Object.<string,*>} JSON object\n         */\n        AttributeProto.prototype.toJSON =
function toJSON() {\n            return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n        };\n\n
/**\n         * AttributeType enum.\n         * @name onnx.AttributeProto.AttributeType\n         * @enum {string}\n
   * @property {number} UNDEFINED=0 UNDEFINED value\n         * @property {number} FLOAT=1 FLOAT
value\n         * @property {number} INT=2 INT value\n         * @property {number} STRING=3 STRING value\n
    * @property {number} TENSOR=4 TENSOR value\n         * @property {number} GRAPH=5 GRAPH value\n
    * @property {number} FLOATS=6 FLOATS value\n         * @property {number} INTS=7 INTS value\n         *
@property {number} STRINGS=8 STRINGS value\n         * @property {number} TENSORS=9 TENSORS
```

value\n * @property {number} GRAPHS=10 GRAPHS value\n */\n AttributeProto.AttributeType = (function() {\n var valuesById = {}, values = Object.create(valuesById);\n values[valuesById[0] = \"UNDEFINED\"] = 0;\n values[valuesById[1] = \"FLOAT\"] = 1;\n values[valuesById[2] = \"INT\"] = 2;\n values[valuesById[3] = \"STRING\"] = 3;\n values[valuesById[4] = \"TENSOR\"] = 4;\n values[valuesById[5] = \"GRAPH\"] = 5;\n values[valuesById[6] = \"FLOATS\"] = 6;\n values[valuesById[7] = \"INTS\"] = 7;\n values[valuesById[8] = \"STRINGS\"] = 8;\n values[valuesById[9] = \"TENSORS\"] = 9;\n values[valuesById[10] = \"GRAPHS\"] = 10;\n return values;\n })();\n\n return AttributeProto;\n })();\n\n onnx.ValueInfoProto = (function() {\n\n /**\n * Properties of a ValueInfoProto.\n * @memberof onnx\n * @interface IValueInfoProto\n * @property {string|null} [name] ValueInfoProto name\n * @property {onnx.ITypeProto|null} [type] ValueInfoProto type\n * @property {string|null} [docString] ValueInfoProto docString\n */\n\n /**\n * Constructs a new ValueInfoProto.\n * @memberof onnx\n * @classdesc Represents a ValueInfoProto.\n * @implements IValueInfoProto\n * @constructor\n * @param {onnx.IValueInfoProto=} [properties] Properties to set\n */\n function ValueInfoProto(properties) {\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * ValueInfoProto name.\n * @member {string} name\n * @memberof onnx.ValueInfoProto\n * @instance\n */\n ValueInfoProto.prototype.name = \"\";\n\n /**\n * ValueInfoProto type.\n * @member {onnx.ITypeProto|null|undefined} type\n * @memberof onnx.ValueInfoProto\n * @instance\n */\n ValueInfoProto.prototype.type = null;\n\n /**\n * ValueInfoProto docString.\n * @member {string} docString\n * @memberof onnx.ValueInfoProto\n * @instance\n */\n ValueInfoProto.prototype.docString = \"\";\n\n /**\n * Creates a new ValueInfoProto instance using the specified properties.\n * @function create\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {onnx.IValueInfoProto=} [properties] Properties to set\n * @returns {onnx.ValueInfoProto} ValueInfoProto instance\n */\n ValueInfoProto.create = function create(properties) {\n return new ValueInfoProto(properties);\n };\n\n /**\n * Encodes the specified ValueInfoProto message. Does not implicitly {@link onnx.ValueInfoProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {onnx.IValueInfoProto} message ValueInfoProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n ValueInfoProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.name != null && message.hasOwnProperty(\"name\"))\n writer.uint32(/* id 1, wireType 2 =*/10).string(message.name);\n if (message.type != null && message.hasOwnProperty(\"type\"))\n $root.onnx.TypeProto.encode(message.type, writer.uint32(/* id 2, wireType 2 =*/18).fork()).ldelim();\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n writer.uint32(/* id 3, wireType 2 =*/26).string(message.docString);\n return writer;\n };\n\n /**\n * Encodes the specified ValueInfoProto message, length delimited. Does not implicitly {@link onnx.ValueInfoProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {onnx.IValueInfoProto} message ValueInfoProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n ValueInfoProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a ValueInfoProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.ValueInfoProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.ValueInfoProto} ValueInfoProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n ValueInfoProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined

? reader.len : reader.pos + length, message = new $root.onnx.ValueInfoProto();\n   while (reader.pos < end) {\n   var tag = reader.uint32();\n   switch (tag >>> 3) {\n   case 1:\n   message.name = reader.string();\n   break;\n   case 2:\n   message.type = $root.onnx.TypeProto.decode(reader, reader.uint32());\n   break;\n   case 3:\n   message.docString = reader.string();\n   break;\n   default:\n   reader.skipType(tag & 7);\n   break;\n   }\n   }\n   return message;\n   };\n\n   /**\n   * Decodes a ValueInfoProto message from the specified reader or buffer, length delimited.\n   * @function decodeDelimited\n   * @memberof onnx.ValueInfoProto\n   * @static\n   * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n   * @returns {onnx.ValueInfoProto} ValueInfoProto\n   * @throws {Error} If the payload is not a reader or valid buffer\n   * @throws {$protobuf.util.ProtocolError} If required fields are missing\n   */\n   ValueInfoProto.decodeDelimited = function decodeDelimited(reader) {\n   if (!(reader instanceof $Reader))\n   reader = new $Reader(reader);\n   return this.decode(reader, reader.uint32());\n   };\n\n   /**\n   * Verifies a ValueInfoProto message.\n   * @function verify\n   * @memberof onnx.ValueInfoProto\n   * @static\n   * @param {Object.<string,*>} message Plain object to verify\n   * @returns {string|null} `null` if valid, otherwise the reason why it is not\n   */\n   ValueInfoProto.verify = function verify(message) {\n   if (typeof message !== \"object\" || message === null)\n   return \"object expected\";\n   if (message.name != null && message.hasOwnProperty(\"name\"))\n   if (!$util.isString(message.name))\n   return \"name: string expected\";\n   if (message.type != null && message.hasOwnProperty(\"type\")) {\n   var error = $root.onnx.TypeProto.verify(message.type);\n   if (error)\n   return \"type.\" + error;\n   }\n   if (message.docString != null && message.hasOwnProperty(\"docString\"))\n   if (!$util.isString(message.docString))\n   return \"docString: string expected\";\n   return null;\n   };\n\n   /**\n   * Creates a ValueInfoProto message from a plain object. Also converts values to their respective internal types.\n   * @function fromObject\n   * @memberof onnx.ValueInfoProto\n   * @static\n   * @param {Object.<string,*>} object Plain object\n   * @returns {onnx.ValueInfoProto} ValueInfoProto\n   */\n   ValueInfoProto.fromObject = function fromObject(object) {\n   if (object instanceof $root.onnx.ValueInfoProto)\n   return object;\n   var message = new $root.onnx.ValueInfoProto();\n   if (object.name != null)\n   message.name = String(object.name);\n   if (object.type != null) {\n   if (typeof object.type !== \"object\")\n   throw TypeError(\".onnx.ValueInfoProto.type: object expected\");\n   message.type = $root.onnx.TypeProto.fromObject(object.type);\n   }\n   if (object.docString != null)\n   message.docString = String(object.docString);\n   return message;\n   };\n\n   /**\n   * Creates a plain object from a ValueInfoProto message. Also converts values to other types if specified.\n   * @function toObject\n   * @memberof onnx.ValueInfoProto\n   * @static\n   * @param {onnx.ValueInfoProto} message ValueInfoProto\n   * @param {$protobuf.IConversionOptions} [options] Conversion options\n   * @returns {Object.<string,*>} Plain object\n   */\n   ValueInfoProto.toObject = function toObject(message, options) {\n   if (!options)\n   options = {};\n   var object = {};\n   if (options.defaults) {\n   object.name = \"\";\n   object.type = null;\n   object.docString = \"\";\n   }\n   if (message.name != null && message.hasOwnProperty(\"name\"))\n   object.name = message.name;\n   if (message.type != null && message.hasOwnProperty(\"type\"))\n   object.type = $root.onnx.TypeProto.toObject(message.type, options);\n   if (message.docString != null && message.hasOwnProperty(\"docString\"))\n   object.docString = message.docString;\n   return object;\n   };\n\n   /**\n   * Converts this ValueInfoProto to JSON.\n   * @function toJSON\n   * @memberof onnx.ValueInfoProto\n   * @instance\n   * @returns {Object.<string,*>} JSON object\n   */\n   ValueInfoProto.prototype.toJSON = function toJSON() {\n   return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n   };\n\n   return ValueInfoProto;\n   })();\n\n   onnx.NodeProto = (function() {\n\n   /**\n   * Properties of a NodeProto.\n   * @memberof onnx\n   * @interface INodeProto\n   * @property {Array.<string>|null} [input] NodeProto input\n   * @property

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{Array.<string>|null} [output] NodeProto output\n        * @property {string|null} [name] NodeProto name\n        *
@property {string|null} [opType] NodeProto opType\n        * @property {string|null} [domain] NodeProto
domain\n        * @property {Array.<onnx.IAttributeProto>|null} [attribute] NodeProto attribute\n        * @property
{string|null} [docString] NodeProto docString\n        */\n\n       /**\n        * Constructs a new NodeProto.\n        *
@memberof onnx\n        * @classdesc Represents a NodeProto.\n        * @implements INodeProto\n        *
@constructor\n        * @param {onnx.INodeProto=} [properties] Properties to set\n        */\n       function
NodeProto(properties) {\n           this.input = [];\n           this.output = [];\n           this.attribute = [];\n           if
(properties)\n               for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n                   if
(properties[keys[i]] != null)\n                       this[keys[i]] = properties[keys[i]];\n       }\n\n       /**\n        *
NodeProto input.\n        * @member {Array.<string>} input\n        * @memberof onnx.NodeProto\n        *
@instance\n        */\n       NodeProto.prototype.input = $util.emptyArray;\n\n       /**\n        * NodeProto output.\n
     * @member {Array.<string>} output\n        * @memberof onnx.NodeProto\n        * @instance\n        */\n
NodeProto.prototype.output = $util.emptyArray;\n\n       /**\n        * NodeProto name.\n        * @member {string}
name\n        * @memberof onnx.NodeProto\n        * @instance\n        */\n       NodeProto.prototype.name =
\"\";\n\n       /**\n        * NodeProto opType.\n        * @member {string} opType\n        * @memberof
onnx.NodeProto\n        * @instance\n        */\n       NodeProto.prototype.opType = \"\";\n\n       /**\n        *
NodeProto domain.\n        * @member {string} domain\n        * @memberof onnx.NodeProto\n        *
@instance\n        */\n       NodeProto.prototype.domain = \"\";\n\n       /**\n        * NodeProto attribute.\n        *
@member {Array.<onnx.IAttributeProto>} attribute\n        * @memberof onnx.NodeProto\n        * @instance\n
  */\n       NodeProto.prototype.attribute = $util.emptyArray;\n\n       /**\n        * NodeProto docString.\n        *
@member {string} docString\n        * @memberof onnx.NodeProto\n        * @instance\n        */\n
NodeProto.prototype.docString = \"\";\n\n       /**\n        * Creates a new NodeProto instance using the specified
properties.\n        * @function create\n        * @memberof onnx.NodeProto\n        * @static\n        * @param
{onnx.INodeProto=} [properties] Properties to set\n        * @returns {onnx.NodeProto} NodeProto instance\n
*/\n       NodeProto.create = function create(properties) {\n           return new NodeProto(properties);\n       };\n\n
  /**\n        * Encodes the specified NodeProto message. Does not implicitly {@link onnx.NodeProto.verify|verify}
messages.\n        * @function encode\n        * @memberof onnx.NodeProto\n        * @static\n        * @param
{onnx.INodeProto} message NodeProto message or plain object to encode\n        * @param {$protobuf.Writer}
[writer] Writer to encode to\n        * @returns {$protobuf.Writer} Writer\n        */\n       NodeProto.encode =
function encode(message, writer) {\n           if (!writer)\n               writer = $Writer.create();\n           if
(message.input != null && message.input.length)\n               for (var i = 0; i < message.input.length; ++i)\n
   writer.uint32(/* id 1, wireType 2 =*/10).string(message.input[i]);\n           if (message.output != null &&
message.output.length)\n               for (var i = 0; i < message.output.length; ++i)\n                   writer.uint32(/* id 2,
wireType 2 =*/18).string(message.output[i]);\n           if (message.name != null &&
message.hasOwnProperty(\"name\"))\n               writer.uint32(/* id 3, wireType 2 =*/26).string(message.name);\n
      if (message.opType != null && message.hasOwnProperty(\"opType\"))\n               writer.uint32(/* id 4,
wireType 2 =*/34).string(message.opType);\n           if (message.attribute != null && message.attribute.length)\n
        for (var i = 0; i < message.attribute.length; ++i)\n
$root.onnx.AttributeProto.encode(message.attribute[i], writer.uint32(/* id 5, wireType 2 =*/42).fork()).ldelim();\n
      if (message.docString != null && message.hasOwnProperty(\"docString\"))\n               writer.uint32(/* id 6,
wireType 2 =*/50).string(message.docString);\n           if (message.domain != null &&
message.hasOwnProperty(\"domain\"))\n               writer.uint32(/* id 7, wireType 2
=*/58).string(message.domain);\n           return writer;\n       };\n\n       /**\n        * Encodes the specified
NodeProto message, length delimited. Does not implicitly {@link onnx.NodeProto.verify|verify} messages.\n        *
@function encodeDelimited\n        * @memberof onnx.NodeProto\n        * @static\n        * @param
{onnx.INodeProto} message NodeProto message or plain object to encode\n        * @param {$protobuf.Writer}
[writer] Writer to encode to\n        * @returns {$protobuf.Writer} Writer\n        */\n
NodeProto.encodeDelimited = function encodeDelimited(message, writer) {\n           return this.encode(message,
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writer).ldelim();\n };\n\n /**\n * Decodes a NodeProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.NodeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.NodeProto} NodeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n NodeProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.NodeProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n if (!(message.input && message.input.length))\n message.input = [];\n message.input.push(reader.string());\n break;\n case 2:\n if (!(message.output && message.output.length))\n message.output = [];\n message.output.push(reader.string());\n break;\n case 3:\n message.name = reader.string();\n break;\n case 4:\n message.opType = reader.string();\n break;\n case 7:\n message.domain = reader.string();\n break;\n case 5:\n if (!(message.attribute && message.attribute.length))\n message.attribute = [];\n message.attribute.push($root.onnx.AttributeProto.decode(reader, reader.uint32()));\n break;\n case 6:\n message.docString = reader.string();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a NodeProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.NodeProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.NodeProto} NodeProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n NodeProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a NodeProto message.\n * @function verify\n * @memberof onnx.NodeProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n NodeProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.input != null && message.hasOwnProperty(\"input\")) {\n if (!Array.isArray(message.input))\n return \"input: array expected\";\n for (var i = 0; i < message.input.length; ++i)\n if (!$util.isString(message.input[i]))\n return \"input: string[] expected\";\n }\n if (message.output != null && message.hasOwnProperty(\"output\")) {\n if (!Array.isArray(message.output))\n return \"output: array expected\";\n for (var i = 0; i < message.output.length; ++i)\n if (!$util.isString(message.output[i]))\n return \"output: string[] expected\";\n }\n if (message.name != null && message.hasOwnProperty(\"name\"))\n if (!$util.isString(message.name))\n return \"name: string expected\";\n if (message.opType != null && message.hasOwnProperty(\"opType\"))\n if (!$util.isString(message.opType))\n return \"opType: string expected\";\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n if (!$util.isString(message.domain))\n return \"domain: string expected\";\n if (message.attribute != null && message.hasOwnProperty(\"attribute\")) {\n if (!Array.isArray(message.attribute))\n return \"attribute: array expected\";\n for (var i = 0; i < message.attribute.length; ++i) {\n var error = $root.onnx.AttributeProto.verify(message.attribute[i]);\n if (error)\n return \"attribute.\" + error;\n }\n }\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n if (!$util.isString(message.docString))\n return \"docString: string expected\";\n return null;\n };\n\n /**\n * Creates a NodeProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.NodeProto\n * @static\n * @param {Object.<string,*>} object

Plain object\n * @returns {onnx.NodeProto} NodeProto\n */\n NodeProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.NodeProto)\n return object;\n var message = new $root.onnx.NodeProto();\n if (object.input) {\n if (!Array.isArray(object.input))\n throw TypeError(\".onnx.NodeProto.input: array expected\");\n message.input = [];\n for (var i = 0; i < object.input.length; ++i)\n message.input[i] = String(object.input[i]);\n }\n if (object.output) {\n if (!Array.isArray(object.output))\n throw TypeError(\".onnx.NodeProto.output: array expected\");\n message.output = [];\n for (var i = 0; i < object.output.length; ++i)\n message.output[i] = String(object.output[i]);\n }\n if (object.name != null)\n message.name = String(object.name);\n if (object.opType != null)\n message.opType = String(object.opType);\n if (object.domain != null)\n message.domain = String(object.domain);\n if (object.attribute) {\n if (!Array.isArray(object.attribute))\n throw TypeError(\".onnx.NodeProto.attribute: array expected\");\n message.attribute = [];\n for (var i = 0; i < object.attribute.length; ++i) {\n if (typeof object.attribute[i] !== \"object\")\n throw TypeError(\".onnx.NodeProto.attribute: object expected\");\n message.attribute[i] = $root.onnx.AttributeProto.fromObject(object.attribute[i]);\n }\n }\n if (object.docString != null)\n message.docString = String(object.docString);\n return message;\n };\n\n /**\n * Creates a plain object from a NodeProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.NodeProto\n * @static\n * @param {onnx.NodeProto} message NodeProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n NodeProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.arrays || options.defaults) {\n object.input = [];\n object.output = [];\n object.attribute = [];\n }\n if (options.defaults) {\n object.name = \"\";\n object.opType = \"\";\n object.docString = \"\";\n object.domain = \"\";\n }\n if (message.input && message.input.length) {\n object.input = [];\n for (var j = 0; j < message.input.length; ++j)\n object.input[j] = message.input[j];\n }\n if (message.output && message.output.length) {\n object.output = [];\n for (var j = 0; j < message.output.length; ++j)\n object.output[j] = message.output[j];\n }\n if (message.name != null && message.hasOwnProperty(\"name\"))\n object.name = message.name;\n if (message.opType != null && message.hasOwnProperty(\"opType\"))\n object.opType = message.opType;\n if (message.attribute && message.attribute.length) {\n object.attribute = [];\n for (var j = 0; j < message.attribute.length; ++j)\n object.attribute[j] = $root.onnx.AttributeProto.toObject(message.attribute[j], options);\n }\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n object.docString = message.docString;\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n object.domain = message.domain;\n return object;\n };\n\n /**\n * Converts this NodeProto to JSON.\n * @function toJSON\n * @memberof onnx.NodeProto\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n NodeProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return NodeProto;\n })();\n\n onnx.ModelProto = (function() {\n\n /**\n * Properties of a ModelProto.\n * @memberof onnx\n * @interface IModelProto\n * @property {number|Long|null} [irVersion] ModelProto irVersion\n * @property {Array.<onnx.IOperatorSetIdProto>|null} [opsetImport] ModelProto opsetImport\n * @property {string|null} [producerName] ModelProto producerName\n * @property {string|null} [producerVersion] ModelProto producerVersion\n * @property {string|null} [domain] ModelProto domain\n * @property {number|Long|null} [modelVersion] ModelProto modelVersion\n * @property {string|null} [docString] ModelProto docString\n * @property {onnx.IGraphProto|null} [graph] ModelProto graph\n * @property {Array.<onnx.IStringStringEntryProto>|null} [metadataProps] ModelProto metadataProps\n */\n\n /**\n * Constructs a new ModelProto.\n * @memberof onnx\n * @classdesc Represents a ModelProto.\n * @implements IModelProto\n * @constructor\n * @param {onnx.IModelProto=}

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[properties] Properties to set\n         */\n         function ModelProto(properties) {\n             this.opsetImport = [];\n
  this.metadataProps = [];\n             if (properties)\n                 for (var keys = Object.keys(properties), i = 0; i <
keys.length; ++i)\n                     if (properties[keys[i]] != null)\n                         this[keys[i]] = properties[keys[i]];\n
  }\n\n         /**\n         * ModelProto irVersion.\n         * @member {number|Long} irVersion\n         * @memberof
onnx.ModelProto\n         * @instance\n         */\n         ModelProto.prototype.irVersion = $util.Long ?
$util.Long.fromBits(0,0,false) : 0;\n\n         /**\n         * ModelProto opsetImport.\n         * @member
{Array.<onnx.IOperatorSetIdProto>} opsetImport\n         * @memberof onnx.ModelProto\n         * @instance\n
*/\n         ModelProto.prototype.opsetImport = $util.emptyArray;\n\n         /**\n         * ModelProto producerName.\n
     * @member {string} producerName\n         * @memberof onnx.ModelProto\n         * @instance\n         */\n
ModelProto.prototype.producerName = \"\";\n\n         /**\n         * ModelProto producerVersion.\n         * @member
{string} producerVersion\n         * @memberof onnx.ModelProto\n         * @instance\n         */\n
ModelProto.prototype.producerVersion = \"\";\n\n         /**\n         * ModelProto domain.\n         * @member
{string} domain\n         * @memberof onnx.ModelProto\n         * @instance\n         */\n
ModelProto.prototype.domain = \"\";\n\n         /**\n         * ModelProto modelVersion.\n         * @member
{number|Long} modelVersion\n         * @memberof onnx.ModelProto\n         * @instance\n         */\n
ModelProto.prototype.modelVersion = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n         /**\n         *
ModelProto docString.\n         * @member {string} docString\n         * @memberof onnx.ModelProto\n         *
@instance\n         */\n         ModelProto.prototype.docString = \"\";\n\n         /**\n         * ModelProto graph.\n         *
@member {onnx.IGraphProto|null|undefined} graph\n         * @memberof onnx.ModelProto\n         * @instance\n
   */\n         ModelProto.prototype.graph = null;\n\n         /**\n         * ModelProto metadataProps.\n         * @member
{Array.<onnx.IStringStringEntryProto>} metadataProps\n         * @memberof onnx.ModelProto\n         *
@instance\n         */\n         ModelProto.prototype.metadataProps = $util.emptyArray;\n\n         /**\n         * Creates a
new ModelProto instance using the specified properties.\n         * @function create\n         * @memberof
onnx.ModelProto\n         * @static\n         * @param {onnx.IModelProto=} [properties] Properties to set\n         *
@returns {onnx.ModelProto} ModelProto instance\n         */\n         ModelProto.create = function create(properties)
{\n             return new ModelProto(properties);\n         };\n\n         /**\n         * Encodes the specified ModelProto
message. Does not implicitly {@link onnx.ModelProto.verify|verify} messages.\n         * @function encode\n         *
@memberof onnx.ModelProto\n         * @static\n         * @param {onnx.IModelProto} message ModelProto
message or plain object to encode\n         * @param {$protobuf.Writer} [writer] Writer to encode to\n         *
@returns {$protobuf.Writer} Writer\n         */\n         ModelProto.encode = function encode(message, writer) {\n
   if (!writer)\n                 writer = $Writer.create();\n             if (message.irVersion != null &&
message.hasOwnProperty(\"irVersion\"))\n                 writer.uint32(/* id 1, wireType 0
=*/8).int64(message.irVersion);\n             if (message.producerName != null &&
message.hasOwnProperty(\"producerName\"))\n                 writer.uint32(/* id 2, wireType 2
=*/18).string(message.producerName);\n             if (message.producerVersion != null &&
message.hasOwnProperty(\"producerVersion\"))\n                 writer.uint32(/* id 3, wireType 2
=*/26).string(message.producerVersion);\n             if (message.domain != null &&
message.hasOwnProperty(\"domain\"))\n                 writer.uint32(/* id 4, wireType 2
=*/34).string(message.domain);\n             if (message.modelVersion != null &&
message.hasOwnProperty(\"modelVersion\"))\n                 writer.uint32(/* id 5, wireType 0
=*/40).int64(message.modelVersion);\n             if (message.docString != null &&
message.hasOwnProperty(\"docString\"))\n                 writer.uint32(/* id 6, wireType 2
=*/50).string(message.docString);\n             if (message.graph != null && message.hasOwnProperty(\"graph\"))\n
        $root.onnx.GraphProto.encode(message.graph, writer.uint32(/* id 7, wireType 2 =*/58).fork()).ldelim();\n
   if (message.opsetImport != null && message.opsetImport.length)\n                 for (var i = 0; i <
message.opsetImport.length; ++i)\n                     $root.onnx.OperatorSetIdProto.encode(message.opsetImport[i],
writer.uint32(/* id 8, wireType 2 =*/66).fork()).ldelim();\n             if (message.metadataProps != null &&
message.metadataProps.length)\n                 for (var i = 0; i < message.metadataProps.length; ++i)\n
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$root.onnx.StringStringEntryProto.encode(message.metadataProps[i], writer.uint32(/* id 14, wireType 2 =*/114).fork()).ldelim();\n   return writer;\n   };\n\n   /**\n   * Encodes the specified ModelProto message, length delimited. Does not implicitly {@link onnx.ModelProto.verify|verify} messages.\n   * @function encodeDelimited\n   * @memberof onnx.ModelProto\n   * @static\n   * @param {onnx.IModelProto} message ModelProto message or plain object to encode\n   * @param {$protobuf.Writer} [writer] Writer to encode to\n   * @returns {$protobuf.Writer} Writer\n   */\n   ModelProto.encodeDelimited = function encodeDelimited(message, writer) {\n   return this.encode(message, writer).ldelim();\n   };\n\n   /**\n   * Decodes a ModelProto message from the specified reader or buffer.\n   * @function decode\n   * @memberof onnx.ModelProto\n   * @static\n   * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n   * @param {number} [length] Message length if known beforehand\n   * @returns {onnx.ModelProto} ModelProto\n   * @throws {Error} If the payload is not a reader or valid buffer\n   * @throws {$protobuf.util.ProtocolError} If required fields are missing\n   */\n   ModelProto.decode = function decode(reader, length) {\n   if (!(reader instanceof $Reader))\n   reader = $Reader.create(reader);\n   var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.ModelProto();\n   while (reader.pos < end) {\n   var tag = reader.uint32();\n   switch (tag >>> 3) {\n   case 1:\n   message.irVersion = reader.int64();\n   break;\n   case 8:\n   if (!(message.opsetImport && message.opsetImport.length))\n   message.opsetImport = [];\n   message.opsetImport.push($root.onnx.OperatorSetIdProto.decode(reader, reader.uint32()));\n   break;\n   case 2:\n   message.producerName = reader.string();\n   break;\n   case 3:\n   message.producerVersion = reader.string();\n   break;\n   case 4:\n   message.domain = reader.string();\n   break;\n   case 5:\n   message.modelVersion = reader.int64();\n   break;\n   case 6:\n   message.docString = reader.string();\n   break;\n   case 7:\n   message.graph = $root.onnx.GraphProto.decode(reader, reader.uint32());\n   break;\n   case 14:\n   if (!(message.metadataProps && message.metadataProps.length))\n   message.metadataProps = [];\n   message.metadataProps.push($root.onnx.StringStringEntryProto.decode(reader, reader.uint32()));\n   break;\n   default:\n   reader.skipType(tag & 7);\n   break;\n   }\n   }\n   return message;\n   };\n\n   /**\n   * Decodes a ModelProto message from the specified reader or buffer, length delimited.\n   * @function decodeDelimited\n   * @memberof onnx.ModelProto\n   * @static\n   * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n   * @returns {onnx.ModelProto} ModelProto\n   * @throws {Error} If the payload is not a reader or valid buffer\n   * @throws {$protobuf.util.ProtocolError} If required fields are missing\n   */\n   ModelProto.decodeDelimited = function decodeDelimited(reader) {\n   if (!(reader instanceof $Reader))\n   reader = new $Reader(reader);\n   return this.decode(reader, reader.uint32());\n   };\n\n   /**\n   * Verifies a ModelProto message.\n   * @function verify\n   * @memberof onnx.ModelProto\n   * @static\n   * @param {Object.<string,*>} message Plain object to verify\n   * @returns {string|null} `null` if valid, otherwise the reason why it is not\n   */\n   ModelProto.verify = function verify(message) {\n   if (typeof message !== \"object\" || message === null)\n   return \"object expected\";\n   if (message.irVersion != null && message.hasOwnProperty(\"irVersion\"))\n   if (!$util.isInteger(message.irVersion) && !(message.irVersion && $util.isInteger(message.irVersion.low) && $util.isInteger(message.irVersion.high)))\n   return \"irVersion: integer|Long expected\";\n   if (message.opsetImport != null && message.hasOwnProperty(\"opsetImport\")) {\n   if (!Array.isArray(message.opsetImport))\n   return \"opsetImport: array expected\";\n   for (var i = 0; i < message.opsetImport.length; ++i) {\n   var error = $root.onnx.OperatorSetIdProto.verify(message.opsetImport[i]);\n   if (error)\n   return \"opsetImport.\" + error;\n   }\n   }\n   if (message.producerName != null && message.hasOwnProperty(\"producerName\"))\n   if (!$util.isString(message.producerName))\n   return \"producerName: string expected\";\n   if (message.producerVersion != null &&

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message.hasOwnProperty(\"producerVersion\"))\n            if (!$util.isString(message.producerVersion))\n
    return \"producerVersion: string expected\";\n          if (message.domain != null &&
message.hasOwnProperty(\"domain\"))\n            if (!$util.isString(message.domain))\n               return
\"domain: string expected\";\n          if (message.modelVersion != null &&
message.hasOwnProperty(\"modelVersion\"))\n            if (!$util.isInteger(message.modelVersion) &&
!(message.modelVersion && $util.isInteger(message.modelVersion.low) &&
$util.isInteger(message.modelVersion.high)))\n               return \"modelVersion: integer|Long expected\";\n
if (message.docString != null && message.hasOwnProperty(\"docString\"))\n            if
(!$util.isString(message.docString))\n               return \"docString: string expected\";\n          if (message.graph
!= null && message.hasOwnProperty(\"graph\")) {\n            var error =
$root.onnx.GraphProto.verify(message.graph);\n            if (error)\n               return \"graph.\" + error;\n
}\n          if (message.metadataProps != null && message.hasOwnProperty(\"metadataProps\")) {\n            if
(!Array.isArray(message.metadataProps))\n               return \"metadataProps: array expected\";\n            for
(var i = 0; i < message.metadataProps.length; ++i) {\n               var error =
$root.onnx.StringStringEntryProto.verify(message.metadataProps[i]);\n               if (error)\n                  return
\"metadataProps.\" + error;\n            }\n          }\n          return null;\n      };\n\n      /**\n       * Creates a
ModelProto message from a plain object. Also converts values to their respective internal types.\n       * @function
fromObject\n       * @memberof onnx.ModelProto\n       * @static\n       * @param {Object.<string,*>} object
Plain object\n       * @returns {onnx.ModelProto} ModelProto\n       */\n      ModelProto.fromObject = function
fromObject(object) {\n          if (object instanceof $root.onnx.ModelProto)\n            return object;\n          var
message = new $root.onnx.ModelProto();\n          if (object.irVersion != null)\n            if ($util.Long)\n
  (message.irVersion = $util.Long.fromValue(object.irVersion)).unsigned = false;\n            else if (typeof
object.irVersion === \"string\")\n               message.irVersion = parseInt(object.irVersion, 10);\n            else if
(typeof object.irVersion === \"number\")\n               message.irVersion = object.irVersion;\n            else if
(typeof object.irVersion === \"object\")\n               message.irVersion = new $util.LongBits(object.irVersion.low
>>> 0, object.irVersion.high >>> 0).toNumber();\n          if (object.opsetImport) {\n            if
(!Array.isArray(object.opsetImport))\n               throw TypeError(\".onnx.ModelProto.opsetImport: array
expected\");\n            message.opsetImport = [];\n            for (var i = 0; i < object.opsetImport.length; ++i) {\n
             if (typeof object.opsetImport[i] !== \"object\")\n                  throw
TypeError(\".onnx.ModelProto.opsetImport: object expected\");\n               message.opsetImport[i] =
$root.onnx.OperatorSetIdProto.fromObject(object.opsetImport[i]);\n            }\n          }\n          if
(object.producerName != null)\n            message.producerName = String(object.producerName);\n          if
(object.producerVersion != null)\n            message.producerVersion = String(object.producerVersion);\n          if
(object.domain != null)\n            message.domain = String(object.domain);\n          if (object.modelVersion !=
null)\n            if ($util.Long)\n               (message.modelVersion =
$util.Long.fromValue(object.modelVersion)).unsigned = false;\n            else if (typeof object.modelVersion ===
\"string\")\n               message.modelVersion = parseInt(object.modelVersion, 10);\n            else if (typeof
object.modelVersion === \"number\")\n               message.modelVersion = object.modelVersion;\n            else
if (typeof object.modelVersion === \"object\")\n               message.modelVersion = new
$util.LongBits(object.modelVersion.low >>> 0, object.modelVersion.high >>> 0).toNumber();\n          if
(object.docString != null)\n            message.docString = String(object.docString);\n          if (object.graph != null)
{\n            if (typeof object.graph !== \"object\")\n               throw TypeError(\".onnx.ModelProto.graph: object
expected\");\n            message.graph = $root.onnx.GraphProto.fromObject(object.graph);\n          }\n          if
(object.metadataProps) {\n            if (!Array.isArray(object.metadataProps))\n               throw
TypeError(\".onnx.ModelProto.metadataProps: array expected\");\n            message.metadataProps = [];\n
 for (var i = 0; i < object.metadataProps.length; ++i) {\n               if (typeof object.metadataProps[i] !==
\"object\")\n                  throw TypeError(\".onnx.ModelProto.metadataProps: object expected\");\n
message.metadataProps[i] = $root.onnx.StringStringEntryProto.fromObject(object.metadataProps[i]);\n            }\n
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}\n return message;\n };\n\n /**\n * Creates a plain object from a ModelProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.ModelProto\n * @static\n * @param {onnx.ModelProto} message ModelProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n ModelProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.arrays || options.defaults) {\n object.opsetImport = [];\n object.metadataProps = [];\n }\n if (options.defaults) {\n if ($util.Long) {\n var long = new $util.Long(0, 0, false);\n object.irVersion = options.longs === String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n } else\n object.irVersion = options.longs === String ? \"0\" : 0;\n object.producerName = \"\";\n object.producerVersion = \"\";\n object.domain = \"\";\n if ($util.Long) {\n var long = new $util.Long(0, 0, false);\n object.modelVersion = options.longs === String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n } else\n object.modelVersion = options.longs === String ? \"0\" : 0;\n object.docString = \"\";\n object.graph = null;\n }\n if (message.irVersion != null && message.hasOwnProperty(\"irVersion\"))\n if (typeof message.irVersion === \"number\")\n object.irVersion = options.longs === String ? String(message.irVersion) : message.irVersion;\n else\n object.irVersion = options.longs === String ? $util.Long.prototype.toString.call(message.irVersion) : options.longs === Number ? new $util.LongBits(message.irVersion.low >>> 0, message.irVersion.high >>> 0).toNumber() : message.irVersion;\n if (message.producerName != null && message.hasOwnProperty(\"producerName\"))\n object.producerName = message.producerName;\n if (message.producerVersion != null && message.hasOwnProperty(\"producerVersion\"))\n object.producerVersion = message.producerVersion;\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n object.domain = message.domain;\n if (message.modelVersion != null && message.hasOwnProperty(\"modelVersion\"))\n if (typeof message.modelVersion === \"number\")\n object.modelVersion = options.longs === String ? String(message.modelVersion) : message.modelVersion;\n else\n object.modelVersion = options.longs === String ? $util.Long.prototype.toString.call(message.modelVersion) : options.longs === Number ? new $util.LongBits(message.modelVersion.low >>> 0, message.modelVersion.high >>> 0).toNumber() : message.modelVersion;\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n object.docString = message.docString;\n if (message.graph != null && message.hasOwnProperty(\"graph\"))\n object.graph = $root.onnx.GraphProto.toObject(message.graph, options);\n if (message.opsetImport && message.opsetImport.length) {\n object.opsetImport = [];\n for (var j = 0; j < message.opsetImport.length; ++j)\n object.opsetImport[j] = $root.onnx.OperatorSetIdProto.toObject(message.opsetImport[j], options);\n }\n if (message.metadataProps && message.metadataProps.length) {\n object.metadataProps = [];\n for (var j = 0; j < message.metadataProps.length; ++j)\n object.metadataProps[j] = $root.onnx.StringStringEntryProto.toObject(message.metadataProps[j], options);\n }\n return object;\n };\n\n /**\n * Converts this ModelProto to JSON.\n * @function toJSON\n * @memberof onnx.ModelProto\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n ModelProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return ModelProto;\n })();\n\n onnx.StringStringEntryProto = (function() {\n\n /**\n * Properties of a StringStringEntryProto.\n * @memberof onnx\n * @interface IStringStringEntryProto\n * @property {string|null} [key] StringStringEntryProto key\n * @property {string|null} [value] StringStringEntryProto value\n */\n\n /**\n * Constructs a new StringStringEntryProto.\n * @memberof onnx\n * @classdesc Represents a StringStringEntryProto.\n * @implements IStringStringEntryProto\n * @constructor\n * @param {onnx.IStringStringEntryProto=} [properties] Properties to set\n */\n function StringStringEntryProto(properties) {\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] !=

null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * StringStringEntryProto key.\n * @member {string} key\n * @memberof onnx.StringStringEntryProto\n * @instance\n */\n StringStringEntryProto.prototype.key = \"\";\n\n /**\n * StringStringEntryProto value.\n * @member {string} value\n * @memberof onnx.StringStringEntryProto\n * @instance\n */\n StringStringEntryProto.prototype.value = \"\";\n\n /**\n * Creates a new StringStringEntryProto instance using the specified properties.\n * @function create\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {onnx.IStringStringEntryProto=} [properties] Properties to set\n * @returns {onnx.StringStringEntryProto} StringStringEntryProto instance\n */\n StringStringEntryProto.create = function create(properties) {\n return new StringStringEntryProto(properties);\n };\n\n /**\n * Encodes the specified StringStringEntryProto message. Does not implicitly {@link onnx.StringStringEntryProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {onnx.IStringStringEntryProto} message StringStringEntryProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n StringStringEntryProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.key != null && message.hasOwnProperty(\"key\"))\n writer.uint32(/* id 1, wireType 2 =*/10).string(message.key);\n if (message.value != null && message.hasOwnProperty(\"value\"))\n writer.uint32(/* id 2, wireType 2 =*/18).string(message.value);\n return writer;\n };\n\n /**\n * Encodes the specified StringStringEntryProto message, length delimited. Does not implicitly {@link onnx.StringStringEntryProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {onnx.IStringStringEntryProto} message StringStringEntryProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n StringStringEntryProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a StringStringEntryProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.StringStringEntryProto} StringStringEntryProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n StringStringEntryProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.StringStringEntryProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.key = reader.string();\n break;\n case 2:\n message.value = reader.string();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a StringStringEntryProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.StringStringEntryProto} StringStringEntryProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n StringStringEntryProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a StringStringEntryProto message.\n * @function verify\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n StringStringEntryProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.key != null &&

message.hasOwnProperty(\"key\"))\n if (!$util.isString(message.key))\n return \"key: string expected\";\n if (message.value != null && message.hasOwnProperty(\"value\"))\n if (!$util.isString(message.value))\n return \"value: string expected\";\n return null;\n };\n\n /**\n * Creates a StringStringEntryProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.StringStringEntryProto} StringStringEntryProto\n */\n StringStringEntryProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.StringStringEntryProto)\n return object;\n var message = new $root.onnx.StringStringEntryProto();\n if (object.key != null)\n message.key = String(object.key);\n if (object.value != null)\n message.value = String(object.value);\n return message;\n };\n\n /**\n * Creates a plain object from a StringStringEntryProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.StringStringEntryProto\n * @static\n * @param {onnx.StringStringEntryProto} message StringStringEntryProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n StringStringEntryProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.defaults) {\n object.key = \"\";\n object.value = \"\";\n }\n if (message.key != null && message.hasOwnProperty(\"key\"))\n object.key = message.key;\n if (message.value != null && message.hasOwnProperty(\"value\"))\n object.value = message.value;\n return object;\n };\n\n /**\n * Converts this StringStringEntryProto to JSON.\n * @function toJSON\n * @memberof onnx.StringStringEntryProto\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n StringStringEntryProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return StringStringEntryProto;\n })();\n\n onnx.TensorAnnotation = (function() {\n\n /**\n * Properties of a TensorAnnotation.\n * @memberof onnx\n * @interface ITensorAnnotation\n * @property {string|null} [tensorName] TensorAnnotation tensorName\n * @property {Array.<onnx.IStringStringEntryProto>|null} [quantParameterTensorNames] TensorAnnotation quantParameterTensorNames\n */\n\n /**\n * Constructs a new TensorAnnotation.\n * @memberof onnx\n * @classdesc Represents a TensorAnnotation.\n * @implements ITensorAnnotation\n * @constructor\n * @param {onnx.ITensorAnnotation=} [properties] Properties to set\n */\n function TensorAnnotation(properties) {\n this.quantParameterTensorNames = [];\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * TensorAnnotation tensorName.\n * @member {string} tensorName\n * @memberof onnx.TensorAnnotation\n * @instance\n */\n TensorAnnotation.prototype.tensorName = \"\";\n\n /**\n * TensorAnnotation quantParameterTensorNames.\n * @member {Array.<onnx.IStringStringEntryProto>} quantParameterTensorNames\n * @memberof onnx.TensorAnnotation\n * @instance\n */\n TensorAnnotation.prototype.quantParameterTensorNames = $util.emptyArray;\n\n /**\n * Creates a new TensorAnnotation instance using the specified properties.\n * @function create\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {onnx.ITensorAnnotation=} [properties] Properties to set\n * @returns {onnx.TensorAnnotation} TensorAnnotation instance\n */\n TensorAnnotation.create = function create(properties) {\n return new TensorAnnotation(properties);\n };\n\n /**\n * Encodes the specified TensorAnnotation message. Does not implicitly {@link onnx.TensorAnnotation.verify|verify} messages.\n * @function encode\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {onnx.ITensorAnnotation} message TensorAnnotation message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n TensorAnnotation.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.tensorName != null &&

message.hasOwnProperty(\"tensorName\"))\n writer.uint32(/* id 1, wireType 2 =*/10).string(message.tensorName);\n if (message.quantParameterTensorNames != null && message.quantParameterTensorNames.length)\n for (var i = 0; i < message.quantParameterTensorNames.length; ++i)\n $root.onnx.StringStringEntryProto.encode(message.quantParameterTensorNames[i], writer.uint32(/* id 2, wireType 2 =*/18).fork()).ldelim();\n return writer;\n };\n\n /**\n * Encodes the specified TensorAnnotation message, length delimited. Does not implicitly {@link onnx.TensorAnnotation.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {onnx.ITensorAnnotation} message TensorAnnotation message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n TensorAnnotation.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a TensorAnnotation message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.TensorAnnotation} TensorAnnotation\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n TensorAnnotation.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.TensorAnnotation();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.tensorName = reader.string();\n break;\n case 2:\n if (!(message.quantParameterTensorNames && message.quantParameterTensorNames.length))\n message.quantParameterTensorNames = [];\n message.quantParameterTensorNames.push($root.onnx.StringStringEntryProto.decode(reader, reader.uint32()));\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a TensorAnnotation message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TensorAnnotation} TensorAnnotation\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n TensorAnnotation.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a TensorAnnotation message.\n * @function verify\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n TensorAnnotation.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.tensorName != null && message.hasOwnProperty(\"tensorName\"))\n if (!$util.isString(message.tensorName))\n return \"tensorName: string expected\";\n if (message.quantParameterTensorNames != null && message.hasOwnProperty(\"quantParameterTensorNames\")) {\n if (!Array.isArray(message.quantParameterTensorNames))\n return \"quantParameterTensorNames: array expected\";\n for (var i = 0; i < message.quantParameterTensorNames.length; ++i) {\n var error = $root.onnx.StringStringEntryProto.verify(message.quantParameterTensorNames[i]);\n if (error)\n return \"quantParameterTensorNames.\" + error;\n }\n }\n return null;\n };\n\n /**\n * Creates a TensorAnnotation message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.TensorAnnotation\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.TensorAnnotation} TensorAnnotation\n */\n TensorAnnotation.fromObject = function fromObject(object) {\n if (object instanceof

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$root.onnx.TensorAnnotation)\n            return object;\n        var message = new
$root.onnx.TensorAnnotation();\n        if (object.tensorName != null)\n            message.tensorName =
String(object.tensorName);\n        if (object.quantParameterTensorNames) {\n            if
(!Array.isArray(object.quantParameterTensorNames))\n                throw
TypeError(\".onnx.TensorAnnotation.quantParameterTensorNames: array expected\");\n
message.quantParameterTensorNames = [];\n            for (var i = 0; i < object.quantParameterTensorNames.length;
++i) {\n                if (typeof object.quantParameterTensorNames[i] !== \"object\")\n                    throw
TypeError(\".onnx.TensorAnnotation.quantParameterTensorNames: object expected\");\n
message.quantParameterTensorNames[i] =
$root.onnx.StringStringEntryProto.fromObject(object.quantParameterTensorNames[i]);\n            }\n        }\n
    return message;\n    };\n\n    /**\n     * Creates a plain object from a TensorAnnotation message. Also
converts values to other types if specified.\n     * @function toObject\n     * @memberof
onnx.TensorAnnotation\n     * @static\n     * @param {onnx.TensorAnnotation} message TensorAnnotation\n
    * @param {$protobuf.IConversionOptions} [options] Conversion options\n     * @returns {Object.<string,*>}
Plain object\n     */\n    TensorAnnotation.toObject = function toObject(message, options) {\n        if
(!options)\n            options = {};\n        var object = {};\n        if (options.arrays || options.defaults)\n
object.quantParameterTensorNames = [];\n        if (options.defaults)\n            object.tensorName = \"\";\n
if (message.tensorName != null && message.hasOwnProperty(\"tensorName\"))\n            object.tensorName =
message.tensorName;\n        if (message.quantParameterTensorNames &&
message.quantParameterTensorNames.length) {\n            object.quantParameterTensorNames = [];\n            for
(var j = 0; j < message.quantParameterTensorNames.length; ++j)\n
object.quantParameterTensorNames[j] =
$root.onnx.StringStringEntryProto.toObject(message.quantParameterTensorNames[j], options);\n        }\n
return object;\n    };\n\n    /**\n     * Converts this TensorAnnotation to JSON.\n     * @function toJSON\n
     * @memberof onnx.TensorAnnotation\n     * @instance\n     * @returns {Object.<string,*>} JSON
object\n     */\n    TensorAnnotation.prototype.toJSON = function toJSON() {\n        return
this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n    };\n\n    return TensorAnnotation;\n
})();\n\n  onnx.GraphProto = (function() {\n\n    /**\n     * Properties of a GraphProto.\n     * @memberof
onnx\n     * @interface IGraphProto\n     * @property {Array.<onnx.INodeProto>|null} [node] GraphProto
node\n     * @property {string|null} [name] GraphProto name\n     * @property
{Array.<onnx.ITensorProto>|null} [initializer] GraphProto initializer\n     * @property {string|null} [docString]
GraphProto docString\n     * @property {Array.<onnx.IValueInfoProto>|null} [input] GraphProto input\n     *
@property {Array.<onnx.IValueInfoProto>|null} [output] GraphProto output\n     * @property
{Array.<onnx.IValueInfoProto>|null} [valueInfo] GraphProto valueInfo\n     * @property
{Array.<onnx.ITensorAnnotation>|null} [quantizationAnnotation] GraphProto quantizationAnnotation\n     */\n\n
     /**\n     * Constructs a new GraphProto.\n     * @memberof onnx\n     * @classdesc Represents a
GraphProto.\n     * @implements IGraphProto\n     * @constructor\n     * @param {onnx.IGraphProto=}
[properties] Properties to set\n     */\n    function GraphProto(properties) {\n        this.node = [];\n
this.initializer = [];\n        this.input = [];\n        this.output = [];\n        this.valueInfo = [];\n
this.quantizationAnnotation = [];\n        if (properties)\n            for (var keys = Object.keys(properties), i = 0; i <
keys.length; ++i)\n                if (properties[keys[i]] != null)\n                    this[keys[i]] = properties[keys[i]];\n
  }\n\n    /**\n     * GraphProto node.\n     * @member {Array.<onnx.INodeProto>} node\n     *
@memberof onnx.GraphProto\n     * @instance\n     */\n    GraphProto.prototype.node =
$util.emptyArray;\n\n    /**\n     * GraphProto name.\n     * @member {string} name\n     * @memberof
onnx.GraphProto\n     * @instance\n     */\n    GraphProto.prototype.name = \"\";\n\n    /**\n     *
GraphProto initializer.\n     * @member {Array.<onnx.ITensorProto>} initializer\n     * @memberof
onnx.GraphProto\n     * @instance\n     */\n    GraphProto.prototype.initializer = $util.emptyArray;\n\n
/**\n     * GraphProto docString.\n     * @member {string} docString\n     * @memberof onnx.GraphProto\n
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* @instance\n */\n GraphProto.prototype.docString = \"\";\n\n /**\n * GraphProto input.\n * @member {Array.<onnx.IValueInfoProto>} input\n * @memberof onnx.GraphProto\n * @instance\n */\n GraphProto.prototype.input = $util.emptyArray;\n\n /**\n * GraphProto output.\n * @member {Array.<onnx.IValueInfoProto>} output\n * @memberof onnx.GraphProto\n * @instance\n */\n GraphProto.prototype.output = $util.emptyArray;\n\n /**\n * GraphProto valueInfo.\n * @member {Array.<onnx.IValueInfoProto>} valueInfo\n * @memberof onnx.GraphProto\n * @instance\n */\n GraphProto.prototype.valueInfo = $util.emptyArray;\n\n /**\n * GraphProto quantizationAnnotation.\n * @member {Array.<onnx.ITensorAnnotation>} quantizationAnnotation\n * @memberof onnx.GraphProto\n * @instance\n */\n GraphProto.prototype.quantizationAnnotation = $util.emptyArray;\n\n /**\n * Creates a new GraphProto instance using the specified properties.\n * @function create\n * @memberof onnx.GraphProto\n * @static\n * @param {onnx.IGraphProto=} [properties] Properties to set\n * @returns {onnx.GraphProto} GraphProto instance\n */\n GraphProto.create = function create(properties) {\n return new GraphProto(properties);\n };\n\n /**\n * Encodes the specified GraphProto message. Does not implicitly {@link onnx.GraphProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.GraphProto\n * @static\n * @param {onnx.IGraphProto} message GraphProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n GraphProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.node != null && message.node.length)\n for (var i = 0; i < message.node.length; ++i)\n $root.onnx.NodeProto.encode(message.node[i], writer.uint32(/* id 1, wireType 2 =*/10).fork()).ldelim();\n if (message.name != null && message.hasOwnProperty(\"name\"))\n writer.uint32(/* id 2, wireType 2 =*/18).string(message.name);\n if (message.initializer != null && message.initializer.length)\n for (var i = 0; i < message.initializer.length; ++i)\n $root.onnx.TensorProto.encode(message.initializer[i], writer.uint32(/* id 5, wireType 2 =*/42).fork()).ldelim();\n if (message.docString != null && message.hasOwnProperty(\"docString\"))\n writer.uint32(/* id 10, wireType 2 =*/82).string(message.docString);\n if (message.input != null && message.input.length)\n for (var i = 0; i < message.input.length; ++i)\n $root.onnx.ValueInfoProto.encode(message.input[i], writer.uint32(/* id 11, wireType 2 =*/90).fork()).ldelim();\n if (message.output != null && message.output.length)\n for (var i = 0; i < message.output.length; ++i)\n $root.onnx.ValueInfoProto.encode(message.output[i], writer.uint32(/* id 12, wireType 2 =*/98).fork()).ldelim();\n if (message.valueInfo != null && message.valueInfo.length)\n for (var i = 0; i < message.valueInfo.length; ++i)\n $root.onnx.ValueInfoProto.encode(message.valueInfo[i], writer.uint32(/* id 13, wireType 2 =*/106).fork()).ldelim();\n if (message.quantizationAnnotation != null && message.quantizationAnnotation.length)\n for (var i = 0; i < message.quantizationAnnotation.length; ++i)\n $root.onnx.TensorAnnotation.encode(message.quantizationAnnotation[i], writer.uint32(/* id 14, wireType 2 =*/114).fork()).ldelim();\n return writer;\n };\n\n /**\n * Encodes the specified GraphProto message, length delimited. Does not implicitly {@link onnx.GraphProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.GraphProto\n * @static\n * @param {onnx.IGraphProto} message GraphProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n GraphProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a GraphProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.GraphProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.GraphProto} GraphProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n GraphProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len :

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reader.pos + length, message = new $root.onnx.GraphProto();\n      while (reader.pos < end) {\n        var tag
= reader.uint32();\n        switch (tag >>> 3) {\n        case 1:\n          if (!(message.node &&
message.node.length))\n            message.node = [];\n
message.node.push($root.onnx.NodeProto.decode(reader, reader.uint32()));\n          break;\n        case
2:\n          message.name = reader.string();\n          break;\n        case 5:\n          if
(!(message.initializer && message.initializer.length))\n            message.initializer = [];\n
message.initializer.push($root.onnx.TensorProto.decode(reader, reader.uint32()));\n          break;\n
case 10:\n          message.docString = reader.string();\n          break;\n        case 11:\n          if
(!(message.input && message.input.length))\n            message.input = [];\n
message.input.push($root.onnx.ValueInfoProto.decode(reader, reader.uint32()));\n          break;\n
case 12:\n          if (!(message.output && message.output.length))\n            message.output = [];\n
   message.output.push($root.onnx.ValueInfoProto.decode(reader, reader.uint32()));\n          break;\n
  case 13:\n          if (!(message.valueInfo && message.valueInfo.length))\n            message.valueInfo
= [];\n          message.valueInfo.push($root.onnx.ValueInfoProto.decode(reader, reader.uint32()));\n
 break;\n        case 14:\n          if (!(message.quantizationAnnotation &&
message.quantizationAnnotation.length))\n            message.quantizationAnnotation = [];\n
message.quantizationAnnotation.push($root.onnx.TensorAnnotation.decode(reader, reader.uint32()));\n
break;\n        default:\n          reader.skipType(tag & 7);\n          break;\n        }\n      }\n
  return message;\n    };\n\n    /**\n     * Decodes a GraphProto message from the specified reader or buffer,
length delimited.\n     * @function decodeDelimited\n     * @memberof onnx.GraphProto\n     * @static\n
 * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n     * @returns
{onnx.GraphProto} GraphProto\n     * @throws {Error} If the payload is not a reader or valid buffer\n     *
@throws {$protobuf.util.ProtocolError} If required fields are missing\n     */\n    GraphProto.decodeDelimited
= function decodeDelimited(reader) {\n      if (!(reader instanceof $Reader))\n        reader = new
$Reader(reader);\n      return this.decode(reader, reader.uint32());\n    };\n\n    /**\n     * Verifies a
GraphProto message.\n     * @function verify\n     * @memberof onnx.GraphProto\n     * @static\n     *
@param {Object.<string,*>} message Plain object to verify\n     * @returns {string|null} `null` if valid, otherwise
the reason why it is not\n     */\n    GraphProto.verify = function verify(message) {\n      if (typeof message
!== \"object\" || message === null)\n        return \"object expected\";\n      if (message.node != null &&
message.hasOwnProperty(\"node\")) {\n        if (!Array.isArray(message.node))\n          return \"node:
array expected\";\n        for (var i = 0; i < message.node.length; ++i) {\n          var error =
$root.onnx.NodeProto.verify(message.node[i]);\n          if (error)\n            return \"node.\" + error;\n
     }\n      }\n      if (message.name != null && message.hasOwnProperty(\"name\"))\n        if
(!$util.isString(message.name))\n          return \"name: string expected\";\n      if (message.initializer !=
null && message.hasOwnProperty(\"initializer\")) {\n        if (!Array.isArray(message.initializer))\n
return \"initializer: array expected\";\n        for (var i = 0; i < message.initializer.length; ++i) {\n          var
error = $root.onnx.TensorProto.verify(message.initializer[i]);\n          if (error)\n            return
\"initializer.\" + error;\n        }\n      }\n      if (message.docString != null &&
message.hasOwnProperty(\"docString\"))\n        if (!$util.isString(message.docString))\n          return
\"docString: string expected\";\n      if (message.input != null && message.hasOwnProperty(\"input\")) {\n
  if (!Array.isArray(message.input))\n          return \"input: array expected\";\n        for (var i = 0; i <
message.input.length; ++i) {\n          var error = $root.onnx.ValueInfoProto.verify(message.input[i]);\n
     if (error)\n            return \"input.\" + error;\n        }\n      }\n      if (message.output != null &&
message.hasOwnProperty(\"output\")) {\n        if (!Array.isArray(message.output))\n          return
\"output: array expected\";\n        for (var i = 0; i < message.output.length; ++i) {\n          var error =
$root.onnx.ValueInfoProto.verify(message.output[i]);\n          if (error)\n            return \"output.\" +
error;\n        }\n      }\n      if (message.valueInfo != null && message.hasOwnProperty(\"valueInfo\"))
{\n        if (!Array.isArray(message.valueInfo))\n          return \"valueInfo: array expected\";\n
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for (var i = 0; i < message.valueInfo.length; ++i) {\n                    var error =
$root.onnx.ValueInfoProto.verify(message.valueInfo[i]);\n                    if (error)\n                        return
\"valueInfo.\" + error;\n                }\n            }\n            if (message.quantizationAnnotation != null &&
message.hasOwnProperty(\"quantizationAnnotation\")) {\n                if
(!Array.isArray(message.quantizationAnnotation))\n                    return \"quantizationAnnotation: array
expected\";\n                for (var i = 0; i < message.quantizationAnnotation.length; ++i) {\n                    var error =
$root.onnx.TensorAnnotation.verify(message.quantizationAnnotation[i]);\n                    if (error)\n
return \"quantizationAnnotation.\" + error;\n                }\n            }\n            return null;\n        };\n\n        /**\n         *
Creates a GraphProto message from a plain object. Also converts values to their respective internal types.\n         *
@function fromObject\n         * @memberof onnx.GraphProto\n         * @static\n         * @param
{Object.<string,*>} object Plain object\n         * @returns {onnx.GraphProto} GraphProto\n         */\n
GraphProto.fromObject = function fromObject(object) {\n            if (object instanceof $root.onnx.GraphProto)\n
    return object;\n            var message = new $root.onnx.GraphProto();\n            if (object.node) {\n                if
(!Array.isArray(object.node))\n                    throw TypeError(\".onnx.GraphProto.node: array expected\");\n
message.node = [];\n                for (var i = 0; i < object.node.length; ++i) {\n                    if (typeof object.node[i]
!== \"object\")\n                        throw TypeError(\".onnx.GraphProto.node: object expected\");\n
message.node[i] = $root.onnx.NodeProto.fromObject(object.node[i]);\n                }\n            }\n            if
(object.name != null)\n                message.name = String(object.name);\n            if (object.initializer) {\n                if
(!Array.isArray(object.initializer))\n                    throw TypeError(\".onnx.GraphProto.initializer: array
expected\");\n                message.initializer = [];\n                for (var i = 0; i < object.initializer.length; ++i) {\n
    if (typeof object.initializer[i] !== \"object\")\n                        throw TypeError(\".onnx.GraphProto.initializer:
object expected\");\n                    message.initializer[i] = $root.onnx.TensorProto.fromObject(object.initializer[i]);\n
            }\n            }\n            if (object.docString != null)\n                message.docString =
String(object.docString);\n            if (object.input) {\n                if (!Array.isArray(object.input))\n                    throw
TypeError(\".onnx.GraphProto.input: array expected\");\n                message.input = [];\n                for (var i = 0; i <
object.input.length; ++i) {\n                    if (typeof object.input[i] !== \"object\")\n                        throw
TypeError(\".onnx.GraphProto.input: object expected\");\n                    message.input[i] =
$root.onnx.ValueInfoProto.fromObject(object.input[i]);\n                }\n            }\n            if (object.output) {\n
  if (!Array.isArray(object.output))\n                    throw TypeError(\".onnx.GraphProto.output: array expected\");\n
        message.output = [];\n                for (var i = 0; i < object.output.length; ++i) {\n                    if (typeof
object.output[i] !== \"object\")\n                        throw TypeError(\".onnx.GraphProto.output: object expected\");\n
            message.output[i] = $root.onnx.ValueInfoProto.fromObject(object.output[i]);\n                }\n            }\n
  if (object.valueInfo) {\n                if (!Array.isArray(object.valueInfo))\n                    throw
TypeError(\".onnx.GraphProto.valueInfo: array expected\");\n                message.valueInfo = [];\n                for (var i
= 0; i < object.valueInfo.length; ++i) {\n                    if (typeof object.valueInfo[i] !== \"object\")\n
throw TypeError(\".onnx.GraphProto.valueInfo: object expected\");\n                    message.valueInfo[i] =
$root.onnx.ValueInfoProto.fromObject(object.valueInfo[i]);\n                }\n            }\n            if
(object.quantizationAnnotation) {\n                if (!Array.isArray(object.quantizationAnnotation))\n                    throw
TypeError(\".onnx.GraphProto.quantizationAnnotation: array expected\");\n
message.quantizationAnnotation = [];\n                for (var i = 0; i < object.quantizationAnnotation.length; ++i) {\n
            if (typeof object.quantizationAnnotation[i] !== \"object\")\n                        throw
TypeError(\".onnx.GraphProto.quantizationAnnotation: object expected\");\n
message.quantizationAnnotation[i] = $root.onnx.TensorAnnotation.fromObject(object.quantizationAnnotation[i]);\n
            }\n            }\n            return message;\n        };\n\n        /**\n         * Creates a plain object from a
GraphProto message. Also converts values to other types if specified.\n         * @function toObject\n         *
@memberof onnx.GraphProto\n         * @static\n         * @param {onnx.GraphProto} message GraphProto\n         *
@param {$protobuf.IConversionOptions} [options] Conversion options\n         * @returns {Object.<string,*>}
Plain object\n         */\n        GraphProto.toObject = function toObject(message, options) {\n            if (!options)\n
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    options = {};\n        var object = {};\n        if (options.arrays || options.defaults) {\n            object.node =
[];\n            object.initializer = [];\n            object.input = [];\n            object.output = [];\n
object.valueInfo = [];\n            object.quantizationAnnotation = [];\n        }\n        if (options.defaults) {\n
    object.name = \"\";\n            object.docString = \"\";\n        }\n        if (message.node &&
message.node.length) {\n            object.node = [];\n            for (var j = 0; j < message.node.length; ++j)\n
    object.node[j] = $root.onnx.NodeProto.toObject(message.node[j], options);\n        }\n        if
(message.name != null && message.hasOwnProperty(\"name\"))\n            object.name = message.name;\n
if (message.initializer && message.initializer.length) {\n            object.initializer = [];\n            for (var j = 0; j
< message.initializer.length; ++j)\n                object.initializer[j] =
$root.onnx.TensorProto.toObject(message.initializer[j], options);\n        }\n        if (message.docString != null
&& message.hasOwnProperty(\"docString\"))\n            object.docString = message.docString;\n        if
(message.input && message.input.length) {\n            object.input = [];\n            for (var j = 0; j <
message.input.length; ++j)\n                object.input[j] = $root.onnx.ValueInfoProto.toObject(message.input[j],
options);\n        }\n        if (message.output && message.output.length) {\n            object.output = [];\n
  for (var j = 0; j < message.output.length; ++j)\n                object.output[j] =
$root.onnx.ValueInfoProto.toObject(message.output[j], options);\n        }\n        if (message.valueInfo &&
message.valueInfo.length) {\n            object.valueInfo = [];\n            for (var j = 0; j <
message.valueInfo.length; ++j)\n                object.valueInfo[j] =
$root.onnx.ValueInfoProto.toObject(message.valueInfo[j], options);\n        }\n        if
(message.quantizationAnnotation && message.quantizationAnnotation.length) {\n
object.quantizationAnnotation = [];\n            for (var j = 0; j < message.quantizationAnnotation.length; ++j)\n
      object.quantizationAnnotation[j] =
$root.onnx.TensorAnnotation.toObject(message.quantizationAnnotation[j], options);\n        }\n        return
object;\n    };\n\n    /**\n     * Converts this GraphProto to JSON.\n     * @function toJSON\n     *
@memberof onnx.GraphProto\n     * @instance\n     * @returns {Object.<string,*>} JSON object\n     */\n
  GraphProto.prototype.toJSON = function toJSON() {\n        return this.constructor.toObject(this,
$protobuf.util.toJSONOptions);\n    };\n\n    return GraphProto;\n})();\n\n  onnx.TensorProto = (function()
{\n\n    /**\n     * Properties of a TensorProto.\n     * @memberof onnx\n     * @interface ITensorProto\n
   * @property {Array.<number|Long>|null} [dims] TensorProto dims\n     * @property {number|null}
[dataType] TensorProto dataType\n     * @property {onnx.TensorProto.ISegment|null} [segment] TensorProto
segment\n     * @property {Array.<number>|null} [floatData] TensorProto floatData\n     * @property
{Array.<number>|null} [int32Data] TensorProto int32Data\n     * @property {Array.<Uint8Array>|null}
[stringData] TensorProto stringData\n     * @property {Array.<number|Long>|null} [int64Data] TensorProto
int64Data\n     * @property {string|null} [name] TensorProto name\n     * @property {string|null} [docString]
TensorProto docString\n     * @property {Uint8Array|null} [rawData] TensorProto rawData\n     * @property
{Array.<onnx.IStringStringEntryProto>|null} [externalData] TensorProto externalData\n     * @property
{onnx.TensorProto.DataLocation|null} [dataLocation] TensorProto dataLocation\n     * @property
{Array.<number>|null} [doubleData] TensorProto doubleData\n     * @property {Array.<number|Long>|null}
[uint64Data] TensorProto uint64Data\n     */\n\n    /**\n     * Constructs a new TensorProto.\n     *
@memberof onnx\n     * @classdesc Represents a TensorProto.\n     * @implements ITensorProto\n     *
@constructor\n     * @param {onnx.ITensorProto=} [properties] Properties to set\n     */\n    function
TensorProto(properties) {\n        this.dims = [];\n        this.floatData = [];\n        this.int32Data = [];\n
this.stringData = [];\n        this.int64Data = [];\n        this.externalData = [];\n        this.doubleData = [];\n
  this.uint64Data = [];\n        if (properties)\n            for (var keys = Object.keys(properties), i = 0; i <
keys.length; ++i)\n                if (properties[keys[i]] != null)\n                    this[keys[i]] = properties[keys[i]];\n
  }\n\n    /**\n     * TensorProto dims.\n     * @member {Array.<number|Long>} dims\n     * @memberof
onnx.TensorProto\n     * @instance\n     */\n    TensorProto.prototype.dims = $util.emptyArray;\n\n
/**\n     * TensorProto dataType.\n     * @member {number} dataType\n     * @memberof
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onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.dataType = 0;\n\n /**\n *
TensorProto segment.\n * @member {onnx.TensorProto.ISegment|null|undefined} segment\n *
@memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.segment = null;\n\n
/**\n * TensorProto floatData.\n * @member {Array.<number>} floatData\n * @memberof
onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.floatData = $util.emptyArray;\n\n
/**\n * TensorProto int32Data.\n * @member {Array.<number>} int32Data\n * @memberof
onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.int32Data = $util.emptyArray;\n\n
/**\n * TensorProto stringData.\n * @member {Array.<Uint8Array>} stringData\n * @memberof
onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.stringData = $util.emptyArray;\n\n
/**\n * TensorProto int64Data.\n * @member {Array.<number|Long>} int64Data\n * @memberof
onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.int64Data = $util.emptyArray;\n\n
/**\n * TensorProto name.\n * @member {string} name\n * @memberof onnx.TensorProto\n *
@instance\n */\n TensorProto.prototype.name = \"\";\n\n /**\n * TensorProto docString.\n *
@member {string} docString\n * @memberof onnx.TensorProto\n * @instance\n */\n
TensorProto.prototype.docString = \"\";\n\n /**\n * TensorProto rawData.\n * @member
{Uint8Array} rawData\n * @memberof onnx.TensorProto\n * @instance\n */\n
TensorProto.prototype.rawData = $util.newBuffer([]);\n\n /**\n * TensorProto externalData.\n *
@member {Array.<onnx.IStringStringEntryProto>} externalData\n * @memberof onnx.TensorProto\n *
@instance\n */\n TensorProto.prototype.externalData = $util.emptyArray;\n\n /**\n *
TensorProto dataLocation.\n * @member {onnx.TensorProto.DataLocation} dataLocation\n *
@memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.dataLocation = 0;\n\n
/**\n * TensorProto doubleData.\n * @member {Array.<number>} doubleData\n * @memberof
onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.doubleData = $util.emptyArray;\n\n
 /**\n * TensorProto uint64Data.\n * @member {Array.<number|Long>} uint64Data\n *
@memberof onnx.TensorProto\n * @instance\n */\n TensorProto.prototype.uint64Data =
$util.emptyArray;\n\n /**\n * Creates a new TensorProto instance using the specified properties.\n *
@function create\n * @memberof onnx.TensorProto\n * @static\n * @param {onnx.ITensorProto=}
[properties] Properties to set\n * @returns {onnx.TensorProto} TensorProto instance\n */\n
TensorProto.create = function create(properties) {\n return new TensorProto(properties);\n };\n\n
/**\n * Encodes the specified TensorProto message. Does not implicitly {@link
onnx.TensorProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.TensorProto\n
 * @static\n * @param {onnx.ITensorProto} message TensorProto message or plain object to encode\n *
@param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n
 TensorProto.encode = function encode(message, writer) {\n if (!writer)\n writer =
$Writer.create();\n if (message.dims != null && message.dims.length) {\n writer.uint32(/* id 1,
wireType 2 =*/10).fork();\n for (var i = 0; i < message.dims.length; ++i)\n
writer.int64(message.dims[i]);\n writer.ldelim();\n }\n if (message.dataType != null &&
message.hasOwnProperty(\"dataType\"))\n writer.uint32(/* id 2, wireType 0
=*/16).int32(message.dataType);\n if (message.segment != null &&
message.hasOwnProperty(\"segment\"))\n $root.onnx.TensorProto.Segment.encode(message.segment,
writer.uint32(/* id 3, wireType 2 =*/26).fork()).ldelim();\n if (message.floatData != null &&
message.floatData.length) {\n writer.uint32(/* id 4, wireType 2 =*/34).fork();\n for (var i = 0; i <
message.floatData.length; ++i)\n writer.float(message.floatData[i]);\n writer.ldelim();\n
}\n if (message.int32Data != null && message.int32Data.length) {\n writer.uint32(/* id 5, wireType
2 =*/42).fork();\n for (var i = 0; i < message.int32Data.length; ++i)\n
writer.int32(message.int32Data[i]);\n writer.ldelim();\n }\n if (message.stringData != null
&& message.stringData.length)\n for (var i = 0; i < message.stringData.length; ++i)\n
writer.uint32(/* id 6, wireType 2 =*/50).bytes(message.stringData[i]);\n if (message.int64Data != null &&
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message.int64Data.length) {\n        writer.uint32(/* id 7, wireType 2 =*/58).fork();\n        for (var i = 0; i <
message.int64Data.length; ++i)\n            writer.int64(message.int64Data[i]);\n        writer.ldelim();\n
}\n      if (message.name != null && message.hasOwnProperty(\"name\"))\n        writer.uint32(/* id 8,
wireType 2 =*/66).string(message.name);\n      if (message.rawData != null &&
message.hasOwnProperty(\"rawData\"))\n        writer.uint32(/* id 9, wireType 2
=*/74).bytes(message.rawData);\n      if (message.doubleData != null && message.doubleData.length) {\n
  writer.uint32(/* id 10, wireType 2 =*/82).fork();\n        for (var i = 0; i < message.doubleData.length; ++i)\n
        writer.double(message.doubleData[i]);\n        writer.ldelim();\n      }\n      if
(message.uint64Data != null && message.uint64Data.length) {\n        writer.uint32(/* id 11, wireType 2
=*/90).fork();\n        for (var i = 0; i < message.uint64Data.length; ++i)\n
writer.uint64(message.uint64Data[i]);\n        writer.ldelim();\n      }\n      if (message.docString != null
&& message.hasOwnProperty(\"docString\"))\n        writer.uint32(/* id 12, wireType 2
=*/98).string(message.docString);\n      if (message.externalData != null && message.externalData.length)\n
    for (var i = 0; i < message.externalData.length; ++i)\n
$root.onnx.StringStringEntryProto.encode(message.externalData[i], writer.uint32(/* id 13, wireType 2
=*/106).fork()).ldelim();\n      if (message.dataLocation != null &&
message.hasOwnProperty(\"dataLocation\"))\n        writer.uint32(/* id 14, wireType 0
=*/112).int32(message.dataLocation);\n      return writer;\n    };\n\n    /**\n     * Encodes the specified
TensorProto message, length delimited. Does not implicitly {@link onnx.TensorProto.verify|verify} messages.\n
 * @function encodeDelimited\n     * @memberof onnx.TensorProto\n     * @static\n     * @param
{onnx.ITensorProto} message TensorProto message or plain object to encode\n     * @param {$protobuf.Writer}
[writer] Writer to encode to\n     * @returns {$protobuf.Writer} Writer\n     */\n
TensorProto.encodeDelimited = function encodeDelimited(message, writer) {\n      return this.encode(message,
writer).ldelim();\n    };\n\n    /**\n     * Decodes a TensorProto message from the specified reader or buffer.\n
    * @function decode\n     * @memberof onnx.TensorProto\n     * @static\n     * @param
{$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n     * @param {number} [length]
Message length if known beforehand\n     * @returns {onnx.TensorProto} TensorProto\n     * @throws {Error}
If the payload is not a reader or valid buffer\n     * @throws {$protobuf.util.ProtocolError} If required fields are
missing\n     */\n    TensorProto.decode = function decode(reader, length) {\n      if (!(reader instanceof
$Reader))\n        reader = $Reader.create(reader);\n      var end = length === undefined ? reader.len :
reader.pos + length, message = new $root.onnx.TensorProto();\n      while (reader.pos < end) {\n        var
tag = reader.uint32();\n        switch (tag >>> 3) {\n        case 1:\n          if (!(message.dims &&
message.dims.length))\n            message.dims = [];\n          if ((tag & 7) === 2) {\n            var
end2 = reader.uint32() + reader.pos;\n            while (reader.pos < end2)\n
message.dims.push(reader.int64());\n          } else\n            message.dims.push(reader.int64());\n
    break;\n        case 2:\n          message.dataType = reader.int32();\n          break;\n        case
3:\n          message.segment = $root.onnx.TensorProto.Segment.decode(reader, reader.uint32());\n
break;\n        case 4:\n          if (!(message.floatData && message.floatData.length))\n
message.floatData = [];\n          if ((tag & 7) === 2) {\n            var end2 = reader.uint32() +
reader.pos;\n            while (reader.pos < end2)\n              message.floatData.push(reader.float());\n
      } else\n            message.floatData.push(reader.float());\n          break;\n        case 5:\n
     if (!(message.int32Data && message.int32Data.length))\n            message.int32Data = [];\n
 if ((tag & 7) === 2) {\n            var end2 = reader.uint32() + reader.pos;\n            while (reader.pos <
end2)\n              message.int32Data.push(reader.int32());\n          } else\n
message.int32Data.push(reader.int32());\n          break;\n        case 6:\n          if
(!(message.stringData && message.stringData.length))\n            message.stringData = [];\n
message.stringData.push(reader.bytes());\n          break;\n        case 7:\n          if
(!(message.int64Data && message.int64Data.length))\n            message.int64Data = [];\n          if ((tag
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& 7) === 2) {\n var end2 = reader.uint32() + reader.pos;\n while (reader.pos < end2)\n message.int64Data.push(reader.int64());\n } else\n message.int64Data.push(reader.int64());\n break;\n case 8:\n message.name = reader.string();\n break;\n case 12:\n message.docString = reader.string();\n break;\n case 9:\n message.rawData = reader.bytes();\n break;\n case 13:\n if (!(message.externalData && message.externalData.length))\n message.externalData = [];\n message.externalData.push($root.onnx.StringStringEntryProto.decode(reader, reader.uint32()));\n break;\n case 14:\n message.dataLocation = reader.int32();\n break;\n case 10:\n if (!(message.doubleData && message.doubleData.length))\n message.doubleData = [];\n if ((tag & 7) === 2) {\n var end2 = reader.uint32() + reader.pos;\n while (reader.pos < end2)\n message.doubleData.push(reader.double());\n } else\n message.doubleData.push(reader.double());\n break;\n case 11:\n if (!(message.uint64Data && message.uint64Data.length))\n message.uint64Data = [];\n if ((tag & 7) === 2) {\n var end2 = reader.uint32() + reader.pos;\n while (reader.pos < end2)\n message.uint64Data.push(reader.uint64());\n } else\n message.uint64Data.push(reader.uint64());\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a TensorProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TensorProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TensorProto} TensorProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n TensorProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a TensorProto message.\n * @function verify\n * @memberof onnx.TensorProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n TensorProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.dims != null && message.hasOwnProperty(\"dims\")) {\n if (!Array.isArray(message.dims))\n return \"dims: array expected\";\n for (var i = 0; i < message.dims.length; ++i)\n if (!$util.isInteger(message.dims[i]) && !(message.dims[i] && $util.isInteger(message.dims[i].low) && $util.isInteger(message.dims[i].high)))\n return \"dims: integer|Long[] expected\";\n }\n if (message.dataType != null && message.hasOwnProperty(\"dataType\"))\n if (!$util.isInteger(message.dataType))\n return \"dataType: integer expected\";\n if (message.segment != null && message.hasOwnProperty(\"segment\")) {\n var error = $root.onnx.TensorProto.Segment.verify(message.segment);\n if (error)\n return \"segment.\" + error;\n }\n if (message.floatData != null && message.hasOwnProperty(\"floatData\")) {\n if (!Array.isArray(message.floatData))\n return \"floatData: array expected\";\n for (var i = 0; i < message.floatData.length; ++i)\n if (typeof message.floatData[i] !== \"number\")\n return \"floatData: number[] expected\";\n }\n if (message.int32Data != null && message.hasOwnProperty(\"int32Data\")) {\n if (!Array.isArray(message.int32Data))\n return \"int32Data: array expected\";\n for (var i = 0; i < message.int32Data.length; ++i)\n if (!$util.isInteger(message.int32Data[i]))\n return \"int32Data: integer[] expected\";\n }\n if (message.stringData != null && message.hasOwnProperty(\"stringData\")) {\n if (!Array.isArray(message.stringData))\n return \"stringData: array expected\";\n for (var i = 0; i < message.stringData.length; ++i)\n if (!(message.stringData[i] && typeof message.stringData[i].length === \"number\" || $util.isString(message.stringData[i])))\n return \"stringData: buffer[] expected\";\n

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    }\n      if (message.int64Data != null && message.hasOwnProperty(\"int64Data\")) {\n        if
(!Array.isArray(message.int64Data))\n          return \"int64Data: array expected\";\n        for (var i = 0; i <
message.int64Data.length; ++i)\n          if (!$util.isInteger(message.int64Data[i]) && !(message.int64Data[i]
&& $util.isInteger(message.int64Data[i].low) && $util.isInteger(message.int64Data[i].high)))\n
return \"int64Data: integer|Long[] expected\";\n      }\n      if (message.name != null &&
message.hasOwnProperty(\"name\"))\n        if (!$util.isString(message.name))\n          return \"name:
string expected\";\n      if (message.docString != null && message.hasOwnProperty(\"docString\"))\n        if
(!$util.isString(message.docString))\n          return \"docString: string expected\";\n      if
(message.rawData != null && message.hasOwnProperty(\"rawData\"))\n        if (!(message.rawData && typeof
message.rawData.length === \"number\" || $util.isString(message.rawData)))\n          return \"rawData: buffer
expected\";\n      if (message.externalData != null && message.hasOwnProperty(\"externalData\")) {\n
if (!Array.isArray(message.externalData))\n          return \"externalData: array expected\";\n        for (var i
= 0; i < message.externalData.length; ++i) {\n          var error =
$root.onnx.StringStringEntryProto.verify(message.externalData[i]);\n          if (error)\n            return
\"externalData.\" + error;\n        }\n      }\n      if (message.dataLocation != null &&
message.hasOwnProperty(\"dataLocation\"))\n        switch (message.dataLocation) {\n        default:\n
   return \"dataLocation: enum value expected\";\n        case 0:\n        case 1:\n          break;\n
    }\n      if (message.doubleData != null && message.hasOwnProperty(\"doubleData\")) {\n        if
(!Array.isArray(message.doubleData))\n          return \"doubleData: array expected\";\n        for (var i = 0;
i < message.doubleData.length; ++i)\n          if (typeof message.doubleData[i] !== \"number\")\n
return \"doubleData: number[] expected\";\n      }\n      if (message.uint64Data != null &&
message.hasOwnProperty(\"uint64Data\")) {\n        if (!Array.isArray(message.uint64Data))\n
return \"uint64Data: array expected\";\n        for (var i = 0; i < message.uint64Data.length; ++i)\n          if
(!$util.isInteger(message.uint64Data[i]) && !(message.uint64Data[i] && $util.isInteger(message.uint64Data[i].low)
&& $util.isInteger(message.uint64Data[i].high)))\n            return \"uint64Data: integer|Long[] expected\";\n
     }\n      return null;\n    };\n\n    /**\n     * Creates a TensorProto message from a plain object. Also
converts values to their respective internal types.\n     * @function fromObject\n     * @memberof
onnx.TensorProto\n     * @static\n     * @param {Object.<string,*>} object Plain object\n     * @returns
{onnx.TensorProto} TensorProto\n     */\n    TensorProto.fromObject = function fromObject(object) {\n
if (object instanceof $root.onnx.TensorProto)\n        return object;\n      var message = new
$root.onnx.TensorProto();\n      if (object.dims) {\n        if (!Array.isArray(object.dims))\n
throw TypeError(\".onnx.TensorProto.dims: array expected\");\n        message.dims = [];\n        for (var i =
0; i < object.dims.length; ++i)\n          if ($util.Long)\n            (message.dims[i] =
$util.Long.fromValue(object.dims[i])).unsigned = false;\n          else if (typeof object.dims[i] === \"string\")\n
            message.dims[i] = parseInt(object.dims[i], 10);\n          else if (typeof object.dims[i] ===
\"number\")\n            message.dims[i] = object.dims[i];\n          else if (typeof object.dims[i] ===
\"object\")\n            message.dims[i] = new $util.LongBits(object.dims[i].low >>> 0, object.dims[i].high >>>
0).toNumber();\n      }\n      if (object.dataType != null)\n        message.dataType = object.dataType |
0;\n      if (object.segment != null) {\n        if (typeof object.segment !== \"object\")\n          throw
TypeError(\".onnx.TensorProto.segment: object expected\");\n        message.segment =
$root.onnx.TensorProto.Segment.fromObject(object.segment);\n      }\n      if (object.floatData) {\n
if (!Array.isArray(object.floatData))\n          throw TypeError(\".onnx.TensorProto.floatData: array
expected\");\n        message.floatData = [];\n        for (var i = 0; i < object.floatData.length; ++i)\n
  message.floatData[i] = Number(object.floatData[i]);\n      }\n      if (object.int32Data) {\n        if
(!Array.isArray(object.int32Data))\n          throw TypeError(\".onnx.TensorProto.int32Data: array
expected\");\n        message.int32Data = [];\n        for (var i = 0; i < object.int32Data.length; ++i)\n
   message.int32Data[i] = object.int32Data[i] | 0;\n      }\n      if (object.stringData) {\n        if
(!Array.isArray(object.stringData))\n          throw TypeError(\".onnx.TensorProto.stringData: array
```

```
expected\");\n                message.stringData = [];\n                for (var i = 0; i < object.stringData.length; ++i)\n
       if (typeof object.stringData[i] === \"string\")\n                        $util.base64.decode(object.stringData[i],
message.stringData[i] = $util.newBuffer($util.base64.length(object.stringData[i])), 0);\n                    else if
(object.stringData[i].length)\n                        message.stringData[i] = object.stringData[i];\n            }\n            if
(object.int64Data) {\n                if (!Array.isArray(object.int64Data))\n                    throw
TypeError(\".onnx.TensorProto.int64Data: array expected\");\n                message.int64Data = [];\n                for (var
i = 0; i < object.int64Data.length; ++i)\n                    if ($util.Long)\n                        (message.int64Data[i] =
$util.Long.fromValue(object.int64Data[i])).unsigned = false;\n                    else if (typeof object.int64Data[i] ===
\"string\")\n                        message.int64Data[i] = parseInt(object.int64Data[i], 10);\n                    else if (typeof
object.int64Data[i] === \"number\")\n                        message.int64Data[i] = object.int64Data[i];\n                    else
if (typeof object.int64Data[i] === \"object\")\n                        message.int64Data[i] = new
$util.LongBits(object.int64Data[i].low >>> 0, object.int64Data[i].high >>> 0).toNumber();\n            }\n            if
(object.name != null)\n                message.name = String(object.name);\n            if (object.docString != null)\n
   message.docString = String(object.docString);\n            if (object.rawData != null)\n                if (typeof
object.rawData === \"string\")\n                    $util.base64.decode(object.rawData, message.rawData =
$util.newBuffer($util.base64.length(object.rawData)), 0);\n                else if (object.rawData.length)\n
message.rawData = object.rawData;\n            if (object.externalData) {\n                if
(!Array.isArray(object.externalData))\n                    throw TypeError(\".onnx.TensorProto.externalData: array
expected\");\n                message.externalData = [];\n                for (var i = 0; i < object.externalData.length; ++i) {\n
                if (typeof object.externalData[i] !== \"object\")\n                        throw
TypeError(\".onnx.TensorProto.externalData: object expected\");\n                    message.externalData[i] =
$root.onnx.StringStringEntryProto.fromObject(object.externalData[i]);\n                }\n            }\n            switch
(object.dataLocation) {\n            case \"DEFAULT\":\n            case 0:\n                message.dataLocation = 0;\n
   break;\n            case \"EXTERNAL\":\n            case 1:\n                message.dataLocation = 1;\n                break;\n
       }\n            if (object.doubleData) {\n                if (!Array.isArray(object.doubleData))\n                    throw
TypeError(\".onnx.TensorProto.doubleData: array expected\");\n                message.doubleData = [];\n                for
(var i = 0; i < object.doubleData.length; ++i)\n                    message.doubleData[i] =
Number(object.doubleData[i]);\n            }\n            if (object.uint64Data) {\n                if
(!Array.isArray(object.uint64Data))\n                    throw TypeError(\".onnx.TensorProto.uint64Data: array
expected\");\n                message.uint64Data = [];\n                for (var i = 0; i < object.uint64Data.length; ++i)\n
        if ($util.Long)\n                        (message.uint64Data[i] =
$util.Long.fromValue(object.uint64Data[i])).unsigned = true;\n                    else if (typeof object.uint64Data[i] ===
\"string\")\n                        message.uint64Data[i] = parseInt(object.uint64Data[i], 10);\n                    else if (typeof
object.uint64Data[i] === \"number\")\n                        message.uint64Data[i] = object.uint64Data[i];\n
else if (typeof object.uint64Data[i] === \"object\")\n                        message.uint64Data[i] = new
$util.LongBits(object.uint64Data[i].low >>> 0, object.uint64Data[i].high >>> 0).toNumber(true);\n            }\n
return message;\n        };\n\n        /**\n         * Creates a plain object from a TensorProto message. Also converts
values to other types if specified.\n         * @function toObject\n         * @memberof onnx.TensorProto\n         *
@static\n         * @param {onnx.TensorProto} message TensorProto\n         * @param
{$protobuf.IConversionOptions} [options] Conversion options\n         * @returns {Object.<string,*>} Plain object\n
       */\n        TensorProto.toObject = function toObject(message, options) {\n            if (!options)\n                options
= {};\n            var object = {};\n            if (options.arrays || options.defaults) {\n                object.dims = [];\n
object.floatData = [];\n                object.int32Data = [];\n                object.stringData = [];\n
object.int64Data = [];\n                object.doubleData = [];\n                object.uint64Data = [];\n
object.externalData = [];\n            }\n            if (options.defaults) {\n                object.dataType = 0;\n
object.segment = null;\n                object.name = \"\";\n                if (options.bytes === String)\n
object.rawData = \"\";\n                else {\n                    object.rawData = [];\n                    if (options.bytes !==
Array)\n                        object.rawData = $util.newBuffer(object.rawData);\n                }\n                object.docString
```

```
= \"\";\n                object.dataLocation = options.enums === String ? \"DEFAULT\" : 0;\n            }\n            if
(message.dims && message.dims.length) {\n                object.dims = [];\n                for (var j = 0; j <
message.dims.length; ++j)\n                    if (typeof message.dims[j] === \"number\")\n                        object.dims[j]
= options.longs === String ? String(message.dims[j]) : message.dims[j];\n                    else\n
object.dims[j] = options.longs === String ? $util.Long.prototype.toString.call(message.dims[j]) : options.longs ===
Number ? new $util.LongBits(message.dims[j].low >>> 0, message.dims[j].high >>> 0).toNumber() :
message.dims[j];\n            }\n            if (message.dataType != null && message.hasOwnProperty(\"dataType\"))\n
        object.dataType = message.dataType;\n            if (message.segment != null &&
message.hasOwnProperty(\"segment\"))\n                object.segment =
$root.onnx.TensorProto.Segment.toObject(message.segment, options);\n            if (message.floatData &&
message.floatData.length) {\n                object.floatData = [];\n                for (var j = 0; j < message.floatData.length;
++j)\n                    object.floatData[j] = options.json && !isFinite(message.floatData[j]) ?
String(message.floatData[j]) : message.floatData[j];\n            }\n            if (message.int32Data &&
message.int32Data.length) {\n                object.int32Data = [];\n                for (var j = 0; j <
message.int32Data.length; ++j)\n                    object.int32Data[j] = message.int32Data[j];\n            }\n            if
(message.stringData && message.stringData.length) {\n                object.stringData = [];\n                for (var j = 0; j
< message.stringData.length; ++j)\n                    object.stringData[j] = options.bytes === String ?
$util.base64.encode(message.stringData[j], 0, message.stringData[j].length) : options.bytes === Array ?
Array.prototype.slice.call(message.stringData[j]) : message.stringData[j];\n            }\n            if (message.int64Data
&& message.int64Data.length) {\n                object.int64Data = [];\n                for (var j = 0; j <
message.int64Data.length; ++j)\n                    if (typeof message.int64Data[j] === \"number\")\n
object.int64Data[j] = options.longs === String ? String(message.int64Data[j]) : message.int64Data[j];\n
else\n                        object.int64Data[j] = options.longs === String ?
$util.Long.prototype.toString.call(message.int64Data[j]) : options.longs === Number ? new
$util.LongBits(message.int64Data[j].low >>> 0, message.int64Data[j].high >>> 0).toNumber() :
message.int64Data[j];\n            }\n            if (message.name != null && message.hasOwnProperty(\"name\"))\n
    object.name = message.name;\n            if (message.rawData != null &&
message.hasOwnProperty(\"rawData\"))\n                object.rawData = options.bytes === String ?
$util.base64.encode(message.rawData, 0, message.rawData.length) : options.bytes === Array ?
Array.prototype.slice.call(message.rawData) : message.rawData;\n            if (message.doubleData &&
message.doubleData.length) {\n                object.doubleData = [];\n                for (var j = 0; j <
message.doubleData.length; ++j)\n                    object.doubleData[j] = options.json &&
!isFinite(message.doubleData[j]) ? String(message.doubleData[j]) : message.doubleData[j];\n            }\n            if
(message.uint64Data && message.uint64Data.length) {\n                object.uint64Data = [];\n                for (var j = 0;
j < message.uint64Data.length; ++j)\n                    if (typeof message.uint64Data[j] === \"number\")\n
object.uint64Data[j] = options.longs === String ? String(message.uint64Data[j]) : message.uint64Data[j];\n
   else\n                        object.uint64Data[j] = options.longs === String ?
$util.Long.prototype.toString.call(message.uint64Data[j]) : options.longs === Number ? new
$util.LongBits(message.uint64Data[j].low >>> 0, message.uint64Data[j].high >>> 0).toNumber(true) :
message.uint64Data[j];\n            }\n            if (message.docString != null &&
message.hasOwnProperty(\"docString\"))\n                object.docString = message.docString;\n            if
(message.externalData && message.externalData.length) {\n                object.externalData = [];\n                for (var j
= 0; j < message.externalData.length; ++j)\n                    object.externalData[j] =
$root.onnx.StringStringEntryProto.toObject(message.externalData[j], options);\n            }\n            if
(message.dataLocation != null && message.hasOwnProperty(\"dataLocation\"))\n                object.dataLocation =
options.enums === String ? $root.onnx.TensorProto.DataLocation[message.dataLocation] :
message.dataLocation;\n            return object;\n        };\n\n        /**\n         * Converts this TensorProto to JSON.\n
   * @function toJSON\n         * @memberof onnx.TensorProto\n         * @instance\n         * @returns
```

{Object.<string,*>} JSON object\n */\n TensorProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n /**\n * DataType enum.\n * @name onnx.TensorProto.DataType\n * @enum {string}\n * @property {number} UNDEFINED=0 UNDEFINED value\n * @property {number} FLOAT=1 FLOAT value\n * @property {number} UINT8=2 UINT8 value\n * @property {number} INT8=3 INT8 value\n * @property {number} UINT16=4 UINT16 value\n * @property {number} INT16=5 INT16 value\n * @property {number} INT32=6 INT32 value\n * @property {number} INT64=7 INT64 value\n * @property {number} STRING=8 STRING value\n * @property {number} BOOL=9 BOOL value\n * @property {number} FLOAT16=10 FLOAT16 value\n * @property {number} DOUBLE=11 DOUBLE value\n * @property {number} UINT32=12 UINT32 value\n * @property {number} UINT64=13 UINT64 value\n * @property {number} COMPLEX64=14 COMPLEX64 value\n * @property {number} COMPLEX128=15 COMPLEX128 value\n * @property {number} BFLOAT16=16 BFLOAT16 value\n */\n TensorProto.DataType = (function() {\n var valuesById = {}, values = Object.create(valuesById);\n values[valuesById[0] = \"UNDEFINED\"] = 0;\n values[valuesById[1] = \"FLOAT\"] = 1;\n values[valuesById[2] = \"UINT8\"] = 2;\n values[valuesById[3] = \"INT8\"] = 3;\n values[valuesById[4] = \"UINT16\"] = 4;\n values[valuesById[5] = \"INT16\"] = 5;\n values[valuesById[6] = \"INT32\"] = 6;\n values[valuesById[7] = \"INT64\"] = 7;\n values[valuesById[8] = \"STRING\"] = 8;\n values[valuesById[9] = \"BOOL\"] = 9;\n values[valuesById[10] = \"FLOAT16\"] = 10;\n values[valuesById[11] = \"DOUBLE\"] = 11;\n values[valuesById[12] = \"UINT32\"] = 12;\n values[valuesById[13] = \"UINT64\"] = 13;\n values[valuesById[14] = \"COMPLEX64\"] = 14;\n values[valuesById[15] = \"COMPLEX128\"] = 15;\n values[valuesById[16] = \"BFLOAT16\"] = 16;\n return values;\n })();\n\n TensorProto.Segment = (function() {\n\n /**\n * Properties of a Segment.\n * @memberof onnx.TensorProto\n * @interface ISegment\n * @property {number|Long|null} [begin] Segment begin\n * @property {number|Long|null} [end] Segment end\n */\n\n /**\n * Constructs a new Segment.\n * @memberof onnx.TensorProto\n * @classdesc Represents a Segment.\n * @implements ISegment\n * @constructor\n * @param {onnx.TensorProto.ISegment=} [properties] Properties to set\n */\n function Segment(properties) {\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * Segment begin.\n * @member {number|Long} begin\n * @memberof onnx.TensorProto.Segment\n * @instance\n */\n Segment.prototype.begin = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n /**\n * Segment end.\n * @member {number|Long} end\n * @memberof onnx.TensorProto.Segment\n * @instance\n */\n Segment.prototype.end = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n /**\n * Creates a new Segment instance using the specified properties.\n * @function create\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {onnx.TensorProto.ISegment=} [properties] Properties to set\n * @returns {onnx.TensorProto.Segment} Segment instance\n */\n Segment.create = function create(properties) {\n return new Segment(properties);\n };\n\n /**\n * Encodes the specified Segment message. Does not implicitly {@link onnx.TensorProto.Segment.verify|verify} messages.\n * @function encode\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {onnx.TensorProto.ISegment} message Segment message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n Segment.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.begin != null && message.hasOwnProperty(\"begin\"))\n writer.uint32(/* id 1, wireType 0 =*/8).int64(message.begin);\n if (message.end != null && message.hasOwnProperty(\"end\"))\n writer.uint32(/* id 2, wireType 0 =*/16).int64(message.end);\n return writer;\n };\n\n /**\n * Encodes the specified Segment message, length delimited. Does not implicitly {@link onnx.TensorProto.Segment.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {onnx.TensorProto.ISegment} message Segment message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n Segment.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes a Segment message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.TensorProto.Segment} Segment\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Segment.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.TensorProto.Segment();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.begin = reader.int64();\n break;\n case 2:\n message.end = reader.int64();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes a Segment message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.TensorProto.Segment} Segment\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n Segment.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof $Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies a Segment message.\n * @function verify\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n Segment.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.begin != null && message.hasOwnProperty(\"begin\"))\n if (!$util.isInteger(message.begin) && !(message.begin && $util.isInteger(message.begin.low) && $util.isInteger(message.begin.high)))\n return \"begin: integer|Long expected\";\n if (message.end != null && message.hasOwnProperty(\"end\"))\n if (!$util.isInteger(message.end) && !(message.end && $util.isInteger(message.end.low) && $util.isInteger(message.end.high)))\n return \"end: integer|Long expected\";\n return null;\n };\n\n /**\n * Creates a Segment message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.TensorProto.Segment\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.TensorProto.Segment} Segment\n */\n Segment.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.TensorProto.Segment)\n return object;\n var message = new $root.onnx.TensorProto.Segment();\n if (object.begin != null)\n if ($util.Long)\n (message.begin = $util.Long.fromValue(object.begin)).unsigned = false;\n else if (typeof object.begin === \"string\")\n message.begin = parseInt(object.begin, 10);\n else if (typeof object.begin === \"number\")\n message.begin = object.begin;\n else if (typeof object.begin === \"object\")\n message.begin = new $util.LongBits(object.begin.low >>> 0, object.begin.high >>> 0).toNumber();\n if (object.end != null)\n if ($util.Long)\n (message.end = $util.Long.fromValue(object.end)).unsigned = false;\n else if (typeof object.end === \"string\")\n message.end = parseInt(object.end, 10);\n else if (typeof object.end === \"number\")\n message.end = object.end;\n else if (typeof object.end === \"object\")\n message.end = new $util.LongBits(object.end.low >>> 0, object.end.high >>> 0).toNumber();\n

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return message;\n            };\n\n            /**\n             * Creates a plain object from a Segment message. Also converts
values to other types if specified.\n             * @function toObject\n             * @memberof
onnx.TensorProto.Segment\n             * @static\n             * @param {onnx.TensorProto.Segment} message
Segment\n             * @param {$protobuf.IConversionOptions} [options] Conversion options\n             * @returns
{Object.<string,*>} Plain object\n             */\n            Segment.toObject = function toObject(message, options) {\n
          if (!options)\n                   options = {};\n               var object = {};\n               if (options.defaults) {\n
      if ($util.Long) {\n                      var long = new $util.Long(0, 0, false);\n                      object.begin =
options.longs === String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n                   }
else\n                        object.begin = options.longs === String ? \"0\" : 0;\n                   if ($util.Long) {\n
  var long = new $util.Long(0, 0, false);\n                        object.end = options.longs === String ? long.toString() :
options.longs === Number ? long.toNumber() : long;\n                   } else\n                       object.end = options.longs
=== String ? \"0\" : 0;\n               }\n               if (message.begin != null && message.hasOwnProperty(\"begin\"))\n
                 if (typeof message.begin === \"number\")\n                       object.begin = options.longs === String ?
String(message.begin) : message.begin;\n                   else\n                       object.begin = options.longs === String ?
$util.Long.prototype.toString.call(message.begin) : options.longs === Number ? new
$util.LongBits(message.begin.low >>> 0, message.begin.high >>> 0).toNumber() : message.begin;\n               if
(message.end != null && message.hasOwnProperty(\"end\"))\n                   if (typeof message.end ===
\"number\")\n                        object.end = options.longs === String ? String(message.end) : message.end;\n
  else\n                        object.end = options.longs === String ? $util.Long.prototype.toString.call(message.end) :
options.longs === Number ? new $util.LongBits(message.end.low >>> 0, message.end.high >>> 0).toNumber() :
message.end;\n               return object;\n            };\n\n            /**\n             * Converts this Segment to JSON.\n
  * @function toJSON\n             * @memberof onnx.TensorProto.Segment\n             * @instance\n             *
@returns {Object.<string,*>} JSON object\n             */\n            Segment.prototype.toJSON = function toJSON()
{\n               return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n            };\n\n            return
Segment;\n        })();\n\n        /**\n         * DataLocation enum.\n         * @name onnx.TensorProto.DataLocation\n
    * @enum {string}\n         * @property {number} DEFAULT=0 DEFAULT value\n         * @property {number}
EXTERNAL=1 EXTERNAL value\n         */\n        TensorProto.DataLocation = (function() {\n            var
valuesById = {}, values = Object.create(valuesById);\n            values[valuesById[0] = \"DEFAULT\"] = 0;\n
values[valuesById[1] = \"EXTERNAL\"] = 1;\n            return values;\n        })();\n\n        return TensorProto;\n
})();\n\n    onnx.TensorShapeProto = (function() {\n\n        /**\n         * Properties of a TensorShapeProto.\n         *
@memberof onnx\n         * @interface ITensorShapeProto\n         * @property
{Array.<onnx.TensorShapeProto.IDimension>|null} [dim] TensorShapeProto dim\n         */\n\n        /**\n         *
Constructs a new TensorShapeProto.\n         * @memberof onnx\n         * @classdesc Represents a
TensorShapeProto.\n         * @implements ITensorShapeProto\n         * @constructor\n         * @param
{onnx.ITensorShapeProto=} [properties] Properties to set\n         */\n        function TensorShapeProto(properties)
{\n            this.dim = [];\n            if (properties)\n                for (var keys = Object.keys(properties), i = 0; i <
keys.length; ++i)\n                    if (properties[keys[i]] != null)\n                        this[keys[i]] = properties[keys[i]];\n
  }\n\n        /**\n         * TensorShapeProto dim.\n         * @member {Array.<onnx.TensorShapeProto.IDimension>}
dim\n         * @memberof onnx.TensorShapeProto\n         * @instance\n         */\n
TensorShapeProto.prototype.dim = $util.emptyArray;\n\n        /**\n         * Creates a new TensorShapeProto
instance using the specified properties.\n         * @function create\n         * @memberof onnx.TensorShapeProto\n
   * @static\n         * @param {onnx.ITensorShapeProto=} [properties] Properties to set\n         * @returns
{onnx.TensorShapeProto} TensorShapeProto instance\n         */\n        TensorShapeProto.create = function
create(properties) {\n            return new TensorShapeProto(properties);\n        };\n\n        /**\n         * Encodes the
specified TensorShapeProto message. Does not implicitly {@link onnx.TensorShapeProto.verify|verify}
messages.\n         * @function encode\n         * @memberof onnx.TensorShapeProto\n         * @static\n         *
@param {onnx.ITensorShapeProto} message TensorShapeProto message or plain object to encode\n         *
@param {$protobuf.Writer} [writer] Writer to encode to\n         * @returns {$protobuf.Writer} Writer\n         */\n
```

```
  TensorShapeProto.encode = function encode(message, writer) {\n        if (!writer)\n            writer =
$Writer.create();\n        if (message.dim != null && message.dim.length)\n            for (var i = 0; i <
message.dim.length; ++i)\n                $root.onnx.TensorShapeProto.Dimension.encode(message.dim[i],
writer.uint32(/* id 1, wireType 2 =*/10).fork()).ldelim();\n        return writer;\n    };\n\n    /**\n     *
Encodes the specified TensorShapeProto message, length delimited. Does not implicitly {@link
onnx.TensorShapeProto.verify|verify} messages.\n     * @function encodeDelimited\n     * @memberof
onnx.TensorShapeProto\n     * @static\n     * @param {onnx.ITensorShapeProto} message TensorShapeProto
message or plain object to encode\n     * @param {$protobuf.Writer} [writer] Writer to encode to\n     *
@returns {$protobuf.Writer} Writer\n     */\n    TensorShapeProto.encodeDelimited = function
encodeDelimited(message, writer) {\n        return this.encode(message, writer).ldelim();\n    };\n\n    /**\n
 * Decodes a TensorShapeProto message from the specified reader or buffer.\n     * @function decode\n     *
@memberof onnx.TensorShapeProto\n     * @static\n     * @param {$protobuf.Reader|Uint8Array} reader
Reader or buffer to decode from\n     * @param {number} [length] Message length if known beforehand\n     *
@returns {onnx.TensorShapeProto} TensorShapeProto\n     * @throws {Error} If the payload is not a reader or
valid buffer\n     * @throws {$protobuf.util.ProtocolError} If required fields are missing\n     */\n
TensorShapeProto.decode = function decode(reader, length) {\n        if (!(reader instanceof $Reader))\n
reader = $Reader.create(reader);\n        var end = length === undefined ? reader.len : reader.pos + length, message
= new $root.onnx.TensorShapeProto();\n        while (reader.pos < end) {\n            var tag = reader.uint32();\n
      switch (tag >>> 3) {\n            case 1:\n                if (!(message.dim && message.dim.length))\n
   message.dim = [];\n                message.dim.push($root.onnx.TensorShapeProto.Dimension.decode(reader,
reader.uint32()));\n                break;\n            default:\n                reader.skipType(tag & 7);\n
break;\n            }\n        }\n        return message;\n    };\n\n    /**\n     * Decodes a TensorShapeProto
message from the specified reader or buffer, length delimited.\n     * @function decodeDelimited\n     *
@memberof onnx.TensorShapeProto\n     * @static\n     * @param {$protobuf.Reader|Uint8Array} reader
Reader or buffer to decode from\n     * @returns {onnx.TensorShapeProto} TensorShapeProto\n     * @throws
{Error} If the payload is not a reader or valid buffer\n     * @throws {$protobuf.util.ProtocolError} If required
fields are missing\n     */\n    TensorShapeProto.decodeDelimited = function decodeDelimited(reader) {\n
if (!(reader instanceof $Reader))\n            reader = new $Reader(reader);\n        return this.decode(reader,
reader.uint32());\n    };\n\n    /**\n     * Verifies a TensorShapeProto message.\n     * @function verify\n
  * @memberof onnx.TensorShapeProto\n     * @static\n     * @param {Object.<string,*>} message Plain
object to verify\n     * @returns {string|null} `null` if valid, otherwise the reason why it is not\n     */\n
TensorShapeProto.verify = function verify(message) {\n        if (typeof message !== \"object\" || message ===
null)\n            return \"object expected\";\n        if (message.dim != null && message.hasOwnProperty(\"dim\"))
{\n            if (!Array.isArray(message.dim))\n                return \"dim: array expected\";\n            for (var i = 0;
i < message.dim.length; ++i) {\n                var error =
$root.onnx.TensorShapeProto.Dimension.verify(message.dim[i]);\n                if (error)\n                    return
\"dim.\" + error;\n            }\n        }\n        return null;\n    };\n\n    /**\n     * Creates a
TensorShapeProto message from a plain object. Also converts values to their respective internal types.\n     *
@function fromObject\n     * @memberof onnx.TensorShapeProto\n     * @static\n     * @param
{Object.<string,*>} object Plain object\n     * @returns {onnx.TensorShapeProto} TensorShapeProto\n     */\n
  TensorShapeProto.fromObject = function fromObject(object) {\n        if (object instanceof
$root.onnx.TensorShapeProto)\n            return object;\n        var message = new
$root.onnx.TensorShapeProto();\n        if (object.dim) {\n            if (!Array.isArray(object.dim))\n
throw TypeError(\".onnx.TensorShapeProto.dim: array expected\");\n            message.dim = [];\n            for
(var i = 0; i < object.dim.length; ++i) {\n                if (typeof object.dim[i] !== \"object\")\n                    throw
TypeError(\".onnx.TensorShapeProto.dim: object expected\");\n                message.dim[i] =
$root.onnx.TensorShapeProto.Dimension.fromObject(object.dim[i]);\n            }\n        }\n        return
message;\n    };\n\n    /**\n     * Creates a plain object from a TensorShapeProto message. Also converts
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values to other types if specified.\n         * @function toObject\n         * @memberof onnx.TensorShapeProto\n
* @static\n         * @param {onnx.TensorShapeProto} message TensorShapeProto\n         * @param
{$protobuf.IConversionOptions} [options] Conversion options\n         * @returns {Object.<string,*>} Plain object\n
       */\n        TensorShapeProto.toObject = function toObject(message, options) {\n            if (!options)\n
options = {};\n            var object = {};\n            if (options.arrays || options.defaults)\n                object.dim = [];\n
    if (message.dim && message.dim.length) {\n                object.dim = [];\n                for (var j = 0; j <
message.dim.length; ++j)\n                    object.dim[j] =
$root.onnx.TensorShapeProto.Dimension.toObject(message.dim[j], options);\n            }\n            return object;\n
};\n\n        /**\n         * Converts this TensorShapeProto to JSON.\n         * @function toJSON\n         * @memberof
onnx.TensorShapeProto\n         * @instance\n         * @returns {Object.<string,*>} JSON object\n         */\n
TensorShapeProto.prototype.toJSON = function toJSON() {\n            return this.constructor.toObject(this,
$protobuf.util.toJSONOptions);\n        };\n\n        TensorShapeProto.Dimension = (function() {\n\n            /**\n
   * Properties of a Dimension.\n             * @memberof onnx.TensorShapeProto\n             * @interface
IDimension\n             * @property {number|Long|null} [dimValue] Dimension dimValue\n             * @property
{string|null} [dimParam] Dimension dimParam\n             * @property {string|null} [denotation] Dimension
denotation\n             */\n\n            /**\n             * Constructs a new Dimension.\n             * @memberof
onnx.TensorShapeProto\n             * @classdesc Represents a Dimension.\n             * @implements IDimension\n
     * @constructor\n             * @param {onnx.TensorShapeProto.IDimension=} [properties] Properties to set\n
   */\n            function Dimension(properties) {\n                if (properties)\n                    for (var keys =
Object.keys(properties), i = 0; i < keys.length; ++i)\n                        if (properties[keys[i]] != null)\n
this[keys[i]] = properties[keys[i]];\n            }\n\n            /**\n             * Dimension dimValue.\n             * @member
{number|Long} dimValue\n             * @memberof onnx.TensorShapeProto.Dimension\n             * @instance\n
   */\n            Dimension.prototype.dimValue = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n            /**\n
  * Dimension dimParam.\n             * @member {string} dimParam\n             * @memberof
onnx.TensorShapeProto.Dimension\n             * @instance\n             */\n            Dimension.prototype.dimParam =
\"\";\n\n            /**\n             * Dimension denotation.\n             * @member {string} denotation\n             *
@memberof onnx.TensorShapeProto.Dimension\n             * @instance\n             */\n
Dimension.prototype.denotation = \"\";\n\n            // OneOf field names bound to virtual getters and setters\n
var $oneOfFields;\n\n            /**\n             * Dimension value.\n             * @member
{\"dimValue\"|\"dimParam\"|undefined} value\n             * @memberof onnx.TensorShapeProto.Dimension\n
* @instance\n             */\n            Object.defineProperty(Dimension.prototype, \"value\", {\n                get:
$util.oneOfGetter($oneOfFields = [\"dimValue\", \"dimParam\"]),\n                set: $util.oneOfSetter($oneOfFields)\n
         });\n\n            /**\n             * Creates a new Dimension instance using the specified properties.\n             *
@function create\n             * @memberof onnx.TensorShapeProto.Dimension\n             * @static\n             *
@param {onnx.TensorShapeProto.IDimension=} [properties] Properties to set\n             * @returns
{onnx.TensorShapeProto.Dimension} Dimension instance\n             */\n            Dimension.create = function
create(properties) {\n                return new Dimension(properties);\n            };\n\n            /**\n             * Encodes the
specified Dimension message. Does not implicitly {@link onnx.TensorShapeProto.Dimension.verify|verify}
messages.\n             * @function encode\n             * @memberof onnx.TensorShapeProto.Dimension\n             *
@static\n             * @param {onnx.TensorShapeProto.IDimension} message Dimension message or plain object to
encode\n             * @param {$protobuf.Writer} [writer] Writer to encode to\n             * @returns
{$protobuf.Writer} Writer\n             */\n            Dimension.encode = function encode(message, writer) {\n
if (!writer)\n                    writer = $Writer.create();\n                if (message.dimValue != null &&
message.hasOwnProperty(\"dimValue\"))\n                    writer.uint32(/* id 1, wireType 0
=*/8).int64(message.dimValue);\n                if (message.dimParam != null &&
message.hasOwnProperty(\"dimParam\"))\n                    writer.uint32(/* id 2, wireType 2
=*/18).string(message.dimParam);\n                if (message.denotation != null &&
message.hasOwnProperty(\"denotation\"))\n                    writer.uint32(/* id 3, wireType 2
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=*/26).string(message.denotation);\n        return writer;\n    };\n\n    /**\n     * Encodes the
specified Dimension message, length delimited. Does not implicitly {@link
onnx.TensorShapeProto.Dimension.verify|verify} messages.\n     * @function encodeDelimited\n     *
@memberof onnx.TensorShapeProto.Dimension\n     * @static\n     * @param
{onnx.TensorShapeProto.IDimension} message Dimension message or plain object to encode\n     * @param
{$protobuf.Writer} [writer] Writer to encode to\n     * @returns {$protobuf.Writer} Writer\n     */\n
Dimension.encodeDelimited = function encodeDelimited(message, writer) {\n        return this.encode(message,
writer).ldelim();\n    };\n\n    /**\n     * Decodes a Dimension message from the specified reader or
buffer.\n     * @function decode\n     * @memberof onnx.TensorShapeProto.Dimension\n     *
@static\n     * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n     *
@param {number} [length] Message length if known beforehand\n     * @returns
{onnx.TensorShapeProto.Dimension} Dimension\n     * @throws {Error} If the payload is not a reader or valid
buffer\n     * @throws {$protobuf.util.ProtocolError} If required fields are missing\n     */\n
Dimension.decode = function decode(reader, length) {\n        if (!(reader instanceof $Reader))\n
reader = $Reader.create(reader);\n        var end = length === undefined ? reader.len : reader.pos + length,
message = new $root.onnx.TensorShapeProto.Dimension();\n        while (reader.pos < end) {\n            var
tag = reader.uint32();\n            switch (tag >>> 3) {\n            case 1:\n                message.dimValue =
reader.int64();\n                break;\n            case 2:\n                message.dimParam = reader.string();\n
        break;\n            case 3:\n                message.denotation = reader.string();\n
break;\n            default:\n                reader.skipType(tag & 7);\n                break;\n            }\n
    }\n        return message;\n    };\n\n    /**\n     * Decodes a Dimension message from the
specified reader or buffer, length delimited.\n     * @function decodeDelimited\n     * @memberof
onnx.TensorShapeProto.Dimension\n     * @static\n     * @param {$protobuf.Reader|Uint8Array} reader
Reader or buffer to decode from\n     * @returns {onnx.TensorShapeProto.Dimension} Dimension\n     *
@throws {Error} If the payload is not a reader or valid buffer\n     * @throws {$protobuf.util.ProtocolError} If
required fields are missing\n     */\n    Dimension.decodeDelimited = function decodeDelimited(reader)
{\n        if (!(reader instanceof $Reader))\n            reader = new $Reader(reader);\n        return
this.decode(reader, reader.uint32());\n    };\n\n    /**\n     * Verifies a Dimension message.\n     *
@function verify\n     * @memberof onnx.TensorShapeProto.Dimension\n     * @static\n     *
@param {Object.<string,*>} message Plain object to verify\n     * @returns {string|null} `null` if valid,
otherwise the reason why it is not\n     */\n    Dimension.verify = function verify(message) {\n        if
(typeof message !== \"object\" || message === null)\n            return \"object expected\";\n        var
properties = {};\n        if (message.dimValue != null && message.hasOwnProperty(\"dimValue\")) {\n
  properties.value = 1;\n            if (!$util.isInteger(message.dimValue) && !(message.dimValue &&
$util.isInteger(message.dimValue.low) && $util.isInteger(message.dimValue.high)))\n                return
\"dimValue: integer|Long expected\";\n        }\n        if (message.dimParam != null &&
message.hasOwnProperty(\"dimParam\")) {\n            if (properties.value === 1)\n                return \"value:
multiple values\";\n            properties.value = 1;\n            if (!$util.isString(message.dimParam))\n
    return \"dimParam: string expected\";\n        }\n        if (message.denotation != null &&
message.hasOwnProperty(\"denotation\"))\n            if (!$util.isString(message.denotation))\n
return \"denotation: string expected\";\n        return null;\n    };\n\n    /**\n     * Creates a
Dimension message from a plain object. Also converts values to their respective internal types.\n     *
@function fromObject\n     * @memberof onnx.TensorShapeProto.Dimension\n     * @static\n     *
@param {Object.<string,*>} object Plain object\n     * @returns {onnx.TensorShapeProto.Dimension}
Dimension\n     */\n    Dimension.fromObject = function fromObject(object) {\n        if (object
instanceof $root.onnx.TensorShapeProto.Dimension)\n            return object;\n        var message = new
$root.onnx.TensorShapeProto.Dimension();\n        if (object.dimValue != null)\n            if ($util.Long)\n
        (message.dimValue = $util.Long.fromValue(object.dimValue)).unsigned = false;\n            else if
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(typeof object.dimValue === \"string\")\n message.dimValue = parseInt(object.dimValue, 10);\n
else if (typeof object.dimValue === \"number\")\n message.dimValue = object.dimValue;\n
else if (typeof object.dimValue === \"object\")\n message.dimValue = new
$util.LongBits(object.dimValue.low >>> 0, object.dimValue.high >>> 0).toNumber();\n if
(object.dimParam != null)\n message.dimParam = String(object.dimParam);\n if
(object.denotation != null)\n message.denotation = String(object.denotation);\n return
message;\n };\n\n /**\n * Creates a plain object from a Dimension message. Also converts
values to other types if specified.\n * @function toObject\n * @memberof
onnx.TensorShapeProto.Dimension\n * @static\n * @param {onnx.TensorShapeProto.Dimension}
message Dimension\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n *
@returns {Object.<string,*>} Plain object\n */\n Dimension.toObject = function toObject(message,
options) {\n if (!options)\n options = {};\n var object = {};\n if
(options.defaults)\n object.denotation = \"\";\n if (message.dimValue != null &&
message.hasOwnProperty(\"dimValue\")) {\n if (typeof message.dimValue === \"number\")\n
object.dimValue = options.longs === String ? String(message.dimValue) : message.dimValue;\n
else\n object.dimValue = options.longs === String ?
$util.Long.prototype.toString.call(message.dimValue) : options.longs === Number ? new
$util.LongBits(message.dimValue.low >>> 0, message.dimValue.high >>> 0).toNumber() : message.dimValue;\n
if (options.oneofs)\n object.value = \"dimValue\";\n }\n if
(message.dimParam != null && message.hasOwnProperty(\"dimParam\")) {\n object.dimParam =
message.dimParam;\n if (options.oneofs)\n object.value = \"dimParam\";\n }\n
if (message.denotation != null && message.hasOwnProperty(\"denotation\"))\n object.denotation
= message.denotation;\n return object;\n };\n\n /**\n * Converts this Dimension to
JSON.\n * @function toJSON\n * @memberof onnx.TensorShapeProto.Dimension\n *
@instance\n * @returns {Object.<string,*>} JSON object\n */\n Dimension.prototype.toJSON
= function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n
};\n\n return Dimension;\n })();\n\n return TensorShapeProto;\n })();\n\n onnx.TypeProto =
(function() {\n\n /**\n * Properties of a TypeProto.\n * @memberof onnx\n * @interface
ITypeProto\n * @property {onnx.TypeProto.ITensor|null} [tensorType] TypeProto tensorType\n *
@property {string|null} [denotation] TypeProto denotation\n */\n\n /**\n * Constructs a new
TypeProto.\n * @memberof onnx\n * @classdesc Represents a TypeProto.\n * @implements
ITypeProto\n * @constructor\n * @param {onnx.ITypeProto=} [properties] Properties to set\n */\n
function TypeProto(properties) {\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i
< keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n
}\n\n /**\n * TypeProto tensorType.\n * @member {onnx.TypeProto.ITensor|null|undefined}
tensorType\n * @memberof onnx.TypeProto\n * @instance\n */\n
TypeProto.prototype.tensorType = null;\n\n /**\n * TypeProto denotation.\n * @member {string}
denotation\n * @memberof onnx.TypeProto\n * @instance\n */\n
TypeProto.prototype.denotation = \"\";\n\n // OneOf field names bound to virtual getters and setters\n var
$oneOfFields;\n\n /**\n * TypeProto value.\n * @member {\"tensorType\"|undefined} value\n *
@memberof onnx.TypeProto\n * @instance\n */\n Object.defineProperty(TypeProto.prototype,
\"value\", {\n get: $util.oneOfGetter($oneOfFields = [\"tensorType\"]),\n set:
$util.oneOfSetter($oneOfFields)\n });\n\n /**\n * Creates a new TypeProto instance using the
specified properties.\n * @function create\n * @memberof onnx.TypeProto\n * @static\n *
@param {onnx.ITypeProto=} [properties] Properties to set\n * @returns {onnx.TypeProto} TypeProto
instance\n */\n TypeProto.create = function create(properties) {\n return new
TypeProto(properties);\n };\n\n /**\n * Encodes the specified TypeProto message. Does not implicitly
{@link onnx.TypeProto.verify|verify} messages.\n * @function encode\n * @memberof

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onnx.TypeProto\n         * @static\n         * @param {onnx.ITypeProto} message TypeProto message or plain object
to encode\n         * @param {$protobuf.Writer} [writer] Writer to encode to\n         * @returns {$protobuf.Writer}
Writer\n         */\n        TypeProto.encode = function encode(message, writer) {\n            if (!writer)\n
writer = $Writer.create();\n            if (message.tensorType != null && message.hasOwnProperty(\"tensorType\"))\n
           $root.onnx.TypeProto.Tensor.encode(message.tensorType, writer.uint32(/* id 1, wireType 2
=*/10).fork()).ldelim();\n            if (message.denotation != null && message.hasOwnProperty(\"denotation\"))\n
      writer.uint32(/* id 6, wireType 2 =*/50).string(message.denotation);\n            return writer;\n        };\n\n
/**\n         * Encodes the specified TypeProto message, length delimited. Does not implicitly {@link
onnx.TypeProto.verify|verify} messages.\n         * @function encodeDelimited\n         * @memberof
onnx.TypeProto\n         * @static\n         * @param {onnx.ITypeProto} message TypeProto message or plain object
to encode\n         * @param {$protobuf.Writer} [writer] Writer to encode to\n         * @returns {$protobuf.Writer}
Writer\n         */\n        TypeProto.encodeDelimited = function encodeDelimited(message, writer) {\n            return
this.encode(message, writer).ldelim();\n        };\n\n        /**\n         * Decodes a TypeProto message from the
specified reader or buffer.\n         * @function decode\n         * @memberof onnx.TypeProto\n         * @static\n
* @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n         * @param {number}
[length] Message length if known beforehand\n         * @returns {onnx.TypeProto} TypeProto\n         * @throws
{Error} If the payload is not a reader or valid buffer\n         * @throws {$protobuf.util.ProtocolError} If required
fields are missing\n         */\n        TypeProto.decode = function decode(reader, length) {\n            if (!(reader
instanceof $Reader))\n                reader = $Reader.create(reader);\n            var end = length === undefined ?
reader.len : reader.pos + length, message = new $root.onnx.TypeProto();\n            while (reader.pos < end) {\n
   var tag = reader.uint32();\n                switch (tag >>> 3) {\n                case 1:\n                    message.tensorType =
$root.onnx.TypeProto.Tensor.decode(reader, reader.uint32());\n                    break;\n                case 6:\n
message.denotation = reader.string();\n                    break;\n                default:\n                    reader.skipType(tag &
7);\n                    break;\n                }\n            }\n            return message;\n        };\n\n        /**\n         * Decodes a
TypeProto message from the specified reader or buffer, length delimited.\n         * @function decodeDelimited\n
 * @memberof onnx.TypeProto\n         * @static\n         * @param {$protobuf.Reader|Uint8Array} reader Reader or
buffer to decode from\n         * @returns {onnx.TypeProto} TypeProto\n         * @throws {Error} If the payload is
not a reader or valid buffer\n         * @throws {$protobuf.util.ProtocolError} If required fields are missing\n
*/\n        TypeProto.decodeDelimited = function decodeDelimited(reader) {\n            if (!(reader instanceof
$Reader))\n                reader = new $Reader(reader);\n            return this.decode(reader, reader.uint32());\n
};\n\n        /**\n         * Verifies a TypeProto message.\n         * @function verify\n         * @memberof
onnx.TypeProto\n         * @static\n         * @param {Object.<string,*>} message Plain object to verify\n         *
@returns {string|null} `null` if valid, otherwise the reason why it is not\n         */\n        TypeProto.verify = function
verify(message) {\n            if (typeof message !== \"object\" || message === null)\n                return \"object
expected\";\n            var properties = {};\n            if (message.tensorType != null &&
message.hasOwnProperty(\"tensorType\")) {\n                properties.value = 1;\n                {\n                    var error =
$root.onnx.TypeProto.Tensor.verify(message.tensorType);\n                    if (error)\n                        return
\"tensorType.\" + error;\n                }\n            }\n            if (message.denotation != null &&
message.hasOwnProperty(\"denotation\"))\n                if (!$util.isString(message.denotation))\n                    return
\"denotation: string expected\";\n            return null;\n        };\n\n        /**\n         * Creates a TypeProto message
from a plain object. Also converts values to their respective internal types.\n         * @function fromObject\n         *
@memberof onnx.TypeProto\n         * @static\n         * @param {Object.<string,*>} object Plain object\n         *
@returns {onnx.TypeProto} TypeProto\n         */\n        TypeProto.fromObject = function fromObject(object) {\n
    if (object instanceof $root.onnx.TypeProto)\n                return object;\n            var message = new
$root.onnx.TypeProto();\n            if (object.tensorType != null) {\n                if (typeof object.tensorType !==
\"object\")\n                    throw TypeError(\".onnx.TypeProto.tensorType: object expected\");\n
message.tensorType = $root.onnx.TypeProto.Tensor.fromObject(object.tensorType);\n            }\n            if
(object.denotation != null)\n                message.denotation = String(object.denotation);\n            return message;\n
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 };\n\n        /**\n         * Creates a plain object from a TypeProto message. Also converts values to other types if
specified.\n         * @function toObject\n         * @memberof onnx.TypeProto\n         * @static\n         * @param
{onnx.TypeProto} message TypeProto\n         * @param {$protobuf.IConversionOptions} [options] Conversion
options\n         * @returns {Object.<string,*>} Plain object\n         */\n        TypeProto.toObject = function
toObject(message, options) {\n            if (!options)\n                options = {};\n            var object = {};\n            if
(options.defaults)\n                object.denotation = \"\";\n            if (message.tensorType != null &&
message.hasOwnProperty(\"tensorType\")) {\n                object.tensorType =
$root.onnx.TypeProto.Tensor.toObject(message.tensorType, options);\n                if (options.oneofs)\n
object.value = \"tensorType\";\n            }\n            if (message.denotation != null &&
message.hasOwnProperty(\"denotation\"))\n                object.denotation = message.denotation;\n            return
object;\n        };\n\n        /**\n         * Converts this TypeProto to JSON.\n         * @function toJSON\n         *
@memberof onnx.TypeProto\n         * @instance\n         * @returns {Object.<string,*>} JSON object\n         */\n
 TypeProto.prototype.toJSON = function toJSON() {\n            return this.constructor.toObject(this,
$protobuf.util.toJSONOptions);\n        };\n\n        TypeProto.Tensor = (function() {\n\n            /**\n             *
Properties of a Tensor.\n             * @memberof onnx.TypeProto\n             * @interface ITensor\n             *
@property {number|null} [elemType] Tensor elemType\n             * @property {onnx.ITensorShapeProto|null}
[shape] Tensor shape\n             */\n\n            /**\n             * Constructs a new Tensor.\n             * @memberof
onnx.TypeProto\n             * @classdesc Represents a Tensor.\n             * @implements ITensor\n             *
@constructor\n             * @param {onnx.TypeProto.ITensor=} [properties] Properties to set\n             */\n
function Tensor(properties) {\n                if (properties)\n                    for (var keys = Object.keys(properties), i = 0; i
< keys.length; ++i)\n                        if (properties[keys[i]] != null)\n                            this[keys[i]] =
properties[keys[i]];\n            }\n\n            /**\n             * Tensor elemType.\n             * @member {number}
elemType\n             * @memberof onnx.TypeProto.Tensor\n             * @instance\n             */\n
Tensor.prototype.elemType = 0;\n\n            /**\n             * Tensor shape.\n             * @member
{onnx.ITensorShapeProto|null|undefined} shape\n             * @memberof onnx.TypeProto.Tensor\n             *
@instance\n             */\n            Tensor.prototype.shape = null;\n\n            /**\n             * Creates a new Tensor
instance using the specified properties.\n             * @function create\n             * @memberof
onnx.TypeProto.Tensor\n             * @static\n             * @param {onnx.TypeProto.ITensor=} [properties] Properties
to set\n             * @returns {onnx.TypeProto.Tensor} Tensor instance\n             */\n            Tensor.create = function
create(properties) {\n                return new Tensor(properties);\n            };\n\n            /**\n             * Encodes the
specified Tensor message. Does not implicitly {@link onnx.TypeProto.Tensor.verify|verify} messages.\n             *
@function encode\n             * @memberof onnx.TypeProto.Tensor\n             * @static\n             * @param
{onnx.TypeProto.ITensor} message Tensor message or plain object to encode\n             * @param
{$protobuf.Writer} [writer] Writer to encode to\n             * @returns {$protobuf.Writer} Writer\n             */\n
Tensor.encode = function encode(message, writer) {\n                if (!writer)\n                    writer = $Writer.create();\n
            if (message.elemType != null && message.hasOwnProperty(\"elemType\"))\n                    writer.uint32(/*
id 1, wireType 0 =*/8).int32(message.elemType);\n                if (message.shape != null &&
message.hasOwnProperty(\"shape\"))\n                    $root.onnx.TensorShapeProto.encode(message.shape,
writer.uint32(/* id 2, wireType 2 =*/18).fork()).ldelim();\n                return writer;\n            };\n\n            /**\n
* Encodes the specified Tensor message, length delimited. Does not implicitly {@link
onnx.TypeProto.Tensor.verify|verify} messages.\n             * @function encodeDelimited\n             * @memberof
onnx.TypeProto.Tensor\n             * @static\n             * @param {onnx.TypeProto.ITensor} message Tensor
message or plain object to encode\n             * @param {$protobuf.Writer} [writer] Writer to encode to\n             *
@returns {$protobuf.Writer} Writer\n             */\n            Tensor.encodeDelimited = function
encodeDelimited(message, writer) {\n                return this.encode(message, writer).ldelim();\n            };\n\n
/**\n             * Decodes a Tensor message from the specified reader or buffer.\n             * @function decode\n
* @memberof onnx.TypeProto.Tensor\n             * @static\n             * @param {$protobuf.Reader|Uint8Array}
reader Reader or buffer to decode from\n             * @param {number} [length] Message length if known
```

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beforehand\n            * @returns {onnx.TypeProto.Tensor} Tensor\n            * @throws {Error} If the payload is not
a reader or valid buffer\n            * @throws {$protobuf.util.ProtocolError} If required fields are missing\n
*/\n           Tensor.decode = function decode(reader, length) {\n              if (!(reader instanceof $Reader))\n
    reader = $Reader.create(reader);\n               var end = length === undefined ? reader.len : reader.pos + length,
message = new $root.onnx.TypeProto.Tensor();\n               while (reader.pos < end) {\n                  var tag =
reader.uint32();\n                  switch (tag >>> 3) {\n                  case 1:\n                      message.elemType =
reader.int32();\n                        break;\n                  case 2:\n                      message.shape =
$root.onnx.TensorShapeProto.decode(reader, reader.uint32());\n                        break;\n                  default:\n
         reader.skipType(tag & 7);\n                        break;\n                  }\n              }\n             return message;\n
      };\n\n           /**\n            * Decodes a Tensor message from the specified reader or buffer, length delimited.\n
       * @function decodeDelimited\n            * @memberof onnx.TypeProto.Tensor\n            * @static\n            *
@param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n            * @returns
{onnx.TypeProto.Tensor} Tensor\n            * @throws {Error} If the payload is not a reader or valid buffer\n
* @throws {$protobuf.util.ProtocolError} If required fields are missing\n            */\n
Tensor.decodeDelimited = function decodeDelimited(reader) {\n              if (!(reader instanceof $Reader))\n
     reader = new $Reader(reader);\n              return this.decode(reader, reader.uint32());\n           };\n\n           /**\n
         * Verifies a Tensor message.\n            * @function verify\n            * @memberof onnx.TypeProto.Tensor\n
        * @static\n            * @param {Object.<string,*>} message Plain object to verify\n            * @returns
{string|null} `null` if valid, otherwise the reason why it is not\n            */\n           Tensor.verify = function
verify(message) {\n              if (typeof message !== \"object\" || message === null)\n                 return \"object
expected\";\n              if (message.elemType != null && message.hasOwnProperty(\"elemType\"))\n                 if
(!$util.isInteger(message.elemType))\n                     return \"elemType: integer expected\";\n              if
(message.shape != null && message.hasOwnProperty(\"shape\")) {\n                 var error =
$root.onnx.TensorShapeProto.verify(message.shape);\n                 if (error)\n                     return \"shape.\" +
error;\n              }\n              return null;\n           };\n\n           /**\n            * Creates a Tensor message from a
plain object. Also converts values to their respective internal types.\n            * @function fromObject\n            *
@memberof onnx.TypeProto.Tensor\n            * @static\n            * @param {Object.<string,*>} object Plain
object\n            * @returns {onnx.TypeProto.Tensor} Tensor\n            */\n           Tensor.fromObject = function
fromObject(object) {\n              if (object instanceof $root.onnx.TypeProto.Tensor)\n                 return object;\n
        var message = new $root.onnx.TypeProto.Tensor();\n              if (object.elemType != null)\n
message.elemType = object.elemType | 0;\n              if (object.shape != null) {\n                 if (typeof object.shape
!== \"object\")\n                     throw TypeError(\".onnx.TypeProto.Tensor.shape: object expected\");\n
message.shape = $root.onnx.TensorShapeProto.fromObject(object.shape);\n              }\n              return
message;\n           };\n\n           /**\n            * Creates a plain object from a Tensor message. Also converts values
to other types if specified.\n            * @function toObject\n            * @memberof onnx.TypeProto.Tensor\n
* @static\n            * @param {onnx.TypeProto.Tensor} message Tensor\n            * @param
{$protobuf.IConversionOptions} [options] Conversion options\n            * @returns {Object.<string,*>} Plain
object\n            */\n           Tensor.toObject = function toObject(message, options) {\n              if (!options)\n
       options = {};\n              var object = {};\n              if (options.defaults) {\n                 object.elemType = 0;\n
               object.shape = null;\n              }\n              if (message.elemType != null &&
message.hasOwnProperty(\"elemType\"))\n                 object.elemType = message.elemType;\n              if
(message.shape != null && message.hasOwnProperty(\"shape\"))\n                 object.shape =
$root.onnx.TensorShapeProto.toObject(message.shape, options);\n              return object;\n           };\n\n
/**\n            * Converts this Tensor to JSON.\n            * @function toJSON\n            * @memberof
onnx.TypeProto.Tensor\n            * @instance\n            * @returns {Object.<string,*>} JSON object\n            */\n
       Tensor.prototype.toJSON = function toJSON() {\n              return this.constructor.toObject(this,
$protobuf.util.toJSONOptions);\n           };\n\n           return Tensor;\n       })();\n\n       return TypeProto;\n
})();\n\n    onnx.OperatorSetIdProto = (function() {\n\n       /**\n        * Properties of an OperatorSetIdProto.\n
```

* @memberof onnx\n * @interface IOperatorSetIdProto\n * @property {string|null} [domain] OperatorSetIdProto domain\n * @property {number|Long|null} [version] OperatorSetIdProto version\n */\n\n /**\n * Constructs a new OperatorSetIdProto.\n * @memberof onnx\n * @classdesc Represents an OperatorSetIdProto.\n * @implements IOperatorSetIdProto\n * @constructor\n * @param {onnx.IOperatorSetIdProto=} [properties] Properties to set\n */\n function OperatorSetIdProto(properties) {\n if (properties)\n for (var keys = Object.keys(properties), i = 0; i < keys.length; ++i)\n if (properties[keys[i]] != null)\n this[keys[i]] = properties[keys[i]];\n }\n\n /**\n * OperatorSetIdProto domain.\n * @member {string} domain\n * @memberof onnx.OperatorSetIdProto\n * @instance\n */\n OperatorSetIdProto.prototype.domain = \"\";\n\n /**\n * OperatorSetIdProto version.\n * @member {number|Long} version\n * @memberof onnx.OperatorSetIdProto\n * @instance\n */\n OperatorSetIdProto.prototype.version = $util.Long ? $util.Long.fromBits(0,0,false) : 0;\n\n /**\n * Creates a new OperatorSetIdProto instance using the specified properties.\n * @function create\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {onnx.IOperatorSetIdProto=} [properties] Properties to set\n * @returns {onnx.OperatorSetIdProto} OperatorSetIdProto instance\n */\n OperatorSetIdProto.create = function create(properties) {\n return new OperatorSetIdProto(properties);\n };\n\n /**\n * Encodes the specified OperatorSetIdProto message. Does not implicitly {@link onnx.OperatorSetIdProto.verify|verify} messages.\n * @function encode\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {onnx.IOperatorSetIdProto} message OperatorSetIdProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n OperatorSetIdProto.encode = function encode(message, writer) {\n if (!writer)\n writer = $Writer.create();\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n writer.uint32(/* id 1, wireType 2 =*/10).string(message.domain);\n if (message.version != null && message.hasOwnProperty(\"version\"))\n writer.uint32(/* id 2, wireType 0 =*/16).int64(message.version);\n return writer;\n };\n\n /**\n * Encodes the specified OperatorSetIdProto message, length delimited. Does not implicitly {@link onnx.OperatorSetIdProto.verify|verify} messages.\n * @function encodeDelimited\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {onnx.IOperatorSetIdProto} message OperatorSetIdProto message or plain object to encode\n * @param {$protobuf.Writer} [writer] Writer to encode to\n * @returns {$protobuf.Writer} Writer\n */\n OperatorSetIdProto.encodeDelimited = function encodeDelimited(message, writer) {\n return this.encode(message, writer).ldelim();\n };\n\n /**\n * Decodes an OperatorSetIdProto message from the specified reader or buffer.\n * @function decode\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @param {number} [length] Message length if known beforehand\n * @returns {onnx.OperatorSetIdProto} OperatorSetIdProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n OperatorSetIdProto.decode = function decode(reader, length) {\n if (!(reader instanceof $Reader))\n reader = $Reader.create(reader);\n var end = length === undefined ? reader.len : reader.pos + length, message = new $root.onnx.OperatorSetIdProto();\n while (reader.pos < end) {\n var tag = reader.uint32();\n switch (tag >>> 3) {\n case 1:\n message.domain = reader.string();\n break;\n case 2:\n message.version = reader.int64();\n break;\n default:\n reader.skipType(tag & 7);\n break;\n }\n }\n return message;\n };\n\n /**\n * Decodes an OperatorSetIdProto message from the specified reader or buffer, length delimited.\n * @function decodeDelimited\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {$protobuf.Reader|Uint8Array} reader Reader or buffer to decode from\n * @returns {onnx.OperatorSetIdProto} OperatorSetIdProto\n * @throws {Error} If the payload is not a reader or valid buffer\n * @throws {$protobuf.util.ProtocolError} If required fields are missing\n */\n OperatorSetIdProto.decodeDelimited = function decodeDelimited(reader) {\n if (!(reader instanceof

$Reader))\n reader = new $Reader(reader);\n return this.decode(reader, reader.uint32());\n };\n\n /**\n * Verifies an OperatorSetIdProto message.\n * @function verify\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {Object.<string,*>} message Plain object to verify\n * @returns {string|null} `null` if valid, otherwise the reason why it is not\n */\n OperatorSetIdProto.verify = function verify(message) {\n if (typeof message !== \"object\" || message === null)\n return \"object expected\";\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n if (!$util.isString(message.domain))\n return \"domain: string expected\";\n if (message.version != null && message.hasOwnProperty(\"version\"))\n if (!$util.isInteger(message.version) && !(message.version && $util.isInteger(message.version.low) && $util.isInteger(message.version.high)))\n return \"version: integer|Long expected\";\n return null;\n };\n\n /**\n * Creates an OperatorSetIdProto message from a plain object. Also converts values to their respective internal types.\n * @function fromObject\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {Object.<string,*>} object Plain object\n * @returns {onnx.OperatorSetIdProto} OperatorSetIdProto\n */\n OperatorSetIdProto.fromObject = function fromObject(object) {\n if (object instanceof $root.onnx.OperatorSetIdProto)\n return object;\n var message = new $root.onnx.OperatorSetIdProto();\n if (object.domain != null)\n message.domain = String(object.domain);\n if (object.version != null)\n if ($util.Long)\n (message.version = $util.Long.fromValue(object.version)).unsigned = false;\n else if (typeof object.version === \"string\")\n message.version = parseInt(object.version, 10);\n else if (typeof object.version === \"number\")\n message.version = object.version;\n else if (typeof object.version === \"object\")\n message.version = new $util.LongBits(object.version.low >>> 0, object.version.high >>> 0).toNumber();\n return message;\n };\n\n /**\n * Creates a plain object from an OperatorSetIdProto message. Also converts values to other types if specified.\n * @function toObject\n * @memberof onnx.OperatorSetIdProto\n * @static\n * @param {onnx.OperatorSetIdProto} message OperatorSetIdProto\n * @param {$protobuf.IConversionOptions} [options] Conversion options\n * @returns {Object.<string,*>} Plain object\n */\n OperatorSetIdProto.toObject = function toObject(message, options) {\n if (!options)\n options = {};\n var object = {};\n if (options.defaults) {\n object.domain = \"\";\n if ($util.Long) {\n var long = new $util.Long(0, 0, false);\n object.version = options.longs === String ? long.toString() : options.longs === Number ? long.toNumber() : long;\n } else\n object.version = options.longs === String ? \"0\" : 0;\n }\n if (message.domain != null && message.hasOwnProperty(\"domain\"))\n object.domain = message.domain;\n if (message.version != null && message.hasOwnProperty(\"version\"))\n if (typeof message.version === \"number\")\n object.version = options.longs === String ? String(message.version) : message.version;\n else\n object.version = options.longs === String ? $util.Long.prototype.toString.call(message.version) : options.longs === Number ? new $util.LongBits(message.version.low >>> 0, message.version.high >>> 0).toNumber() : message.version;\n return object;\n };\n\n /**\n * Converts this OperatorSetIdProto to JSON.\n * @function toJSON\n * @memberof onnx.OperatorSetIdProto\n * @instance\n * @returns {Object.<string,*>} JSON object\n */\n OperatorSetIdProto.prototype.toJSON = function toJSON() {\n return this.constructor.toObject(this, $protobuf.util.toJSONOptions);\n };\n\n return OperatorSetIdProto;\n })();\n\n return onnx;\n})();\n\nmodule.exports = $root;\n","// minimal library entry point.\n\n\"use strict\";\nmodule.exports = require(\"./src/index-minimal\");\n","\"use strict\";\nvar protobuf = exports;\n\n/**\n * Build type, one of `\"full\"`, `\"light\"` or `\"minimal\"`.\n * @name build\n * @type {string}\n * @const\n */\nprotobuf.build = \"minimal\";\n\n// Serialization\nprotobuf.Writer = require(\"./writer\");\nprotobuf.BufferWriter = require(\"./writer_buffer\");\nprotobuf.Reader = require(\"./reader\");\nprotobuf.BufferReader = require(\"./reader_buffer\");\n\n// Utility\nprotobuf.util = require(\"./util/minimal\");\nprotobuf.rpc = require(\"./rpc\");\nprotobuf.roots = require(\"./roots\");\nprotobuf.configure = configure;\n\n/* istanbul ignore next */\n/**\n * Reconfigures the

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library according to the environment.\n * @returns {undefined}\n */\nfunction configure() {\n
protobuf.util._configure();\n    protobuf.Writer._configure(protobuf.BufferWriter);\n
protobuf.Reader._configure(protobuf.BufferReader);\n}\n\n// Set up buffer utility according to the
environment\nconfigure();\n","\"use strict\";\nmodule.exports = Reader;\n\nvar util      =
require(\"./util/minimal\");\n\nvar BufferReader; // cyclic\n\nvar LongBits  = util.LongBits,\n    utf8      =
util.utf8;\n\n/* istanbul ignore next */\nfunction indexOutOfRange(reader, writeLength) {\n    return
RangeError(\"index out of range: \" + reader.pos + \" + \" + (writeLength || 1) + \" > \" + reader.len);\n}\n\n/**\n *
Constructs a new reader instance using the specified buffer.\n * @classdesc Wire format reader using `Uint8Array`
if available, otherwise `Array`.\n * @constructor\n * @param {Uint8Array} buffer Buffer to read from\n
*/\nfunction Reader(buffer) {\n\n    /**\n     * Read buffer.\n     * @type {Uint8Array}\n     */\n    this.buf =
buffer;\n\n    /**\n     * Read buffer position.\n     * @type {number}\n     */\n    this.pos = 0;\n\n    /**\n     * Read
buffer length.\n     * @type {number}\n     */\n    this.len = buffer.length;\n}\n\nvar create_array = typeof
Uint8Array !== \"undefined\"\n    ? function create_typed_array(buffer) {\n        if (buffer instanceof Uint8Array ||
Array.isArray(buffer))\n            return new Reader(buffer);\n        throw Error(\"illegal buffer\");\n    }\n    /* istanbul
ignore next */\n    : function create_array(buffer) {\n        if (Array.isArray(buffer))\n            return new
Reader(buffer);\n        throw Error(\"illegal buffer\");\n    };\n\nvar create = function create() {\n    return
util.Buffer\n        ? function create_buffer_setup(buffer) {\n            return (Reader.create = function
create_buffer(buffer) {\n                return util.Buffer.isBuffer(buffer)\n                    ? new BufferReader(buffer)\n
            /* istanbul ignore next */\n                    : create_array(buffer);\n            })(buffer);\n        }\n        /* istanbul
ignore next */\n        : create_array;\n};\n\n/**\n * Creates a new reader using the specified buffer.\n * @function\n
* @param {Uint8Array|Buffer} buffer Buffer to read from\n * @returns {Reader|BufferReader} A {@link
BufferReader} if `buffer` is a Buffer, otherwise a {@link Reader}\n * @throws {Error} If `buffer` is not a valid
buffer\n */\nReader.create = create();\n\nReader.prototype._slice = util.Array.prototype.subarray || /* istanbul ignore
next */ util.Array.prototype.slice;\n\n/**\n * Reads a varint as an unsigned 32 bit value.\n * @function\n * @returns
{number} Value read\n */\nReader.prototype.uint32 = (function read_uint32_setup() {\n    var value = 4294967295;
// optimizer type-hint, tends to deopt otherwise (?!)\n    return function read_uint32() {\n        value = (
this.buf[this.pos] & 127       ) >>> 0; if (this.buf[this.pos++] < 128) return value;\n        value = (value |
(this.buf[this.pos] & 127) <<  7) >>> 0; if (this.buf[this.pos++] < 128) return value;\n        value = (value |
(this.buf[this.pos] & 127) << 14) >>> 0; if (this.buf[this.pos++] < 128) return value;\n        value = (value |
(this.buf[this.pos] & 127) << 21) >>> 0; if (this.buf[this.pos++] < 128) return value;\n        value = (value |
(this.buf[this.pos] &  15) << 28) >>> 0; if (this.buf[this.pos++] < 128) return value;\n\n        /* istanbul ignore if */\n
      if ((this.pos += 5) > this.len) {\n            this.pos = this.len;\n            throw indexOutOfRange(this, 10);\n        }\n
     return value;\n    };\n})();\n\n/**\n * Reads a varint as a signed 32 bit value.\n * @returns {number} Value read\n
*/\nReader.prototype.int32 = function read_int32() {\n    return this.uint32() | 0;\n};\n\n/**\n * Reads a zig-zag
encoded varint as a signed 32 bit value.\n * @returns {number} Value read\n */\nReader.prototype.sint32 = function
read_sint32() {\n    var value = this.uint32();\n    return value >>> 1 ^ -(value & 1) | 0;\n};\n\n/* eslint-disable no-
invalid-this */\n\nfunction readLongVarint() {\n    // tends to deopt with local vars for octet etc.\n    var bits = new
LongBits(0, 0);\n    var i = 0;\n    if (this.len - this.pos > 4) { // fast route (lo)\n        for (; i < 4; ++i) {\n            //
1st..4th\n            bits.lo = (bits.lo | (this.buf[this.pos] & 127) << i * 7) >>> 0;\n            if (this.buf[this.pos++] <
128)\n                return bits;\n        }\n        // 5th\n        bits.lo = (bits.lo | (this.buf[this.pos] & 127) << 28) >>> 0;\n
   bits.hi = (bits.hi | (this.buf[this.pos] & 127) >>  4) >>> 0;\n        if (this.buf[this.pos++] < 128)\n            return
bits;\n        i = 0;\n    } else {\n        for (; i < 3; ++i) {\n            /* istanbul ignore if */\n            if (this.pos >=
this.len)\n                throw indexOutOfRange(this);\n            // 1st..3th\n            bits.lo = (bits.lo | (this.buf[this.pos]
& 127) << i * 7) >>> 0;\n            if (this.buf[this.pos++] < 128)\n                return bits;\n        }\n        // 4th\n
bits.lo = (bits.lo | (this.buf[this.pos++] & 127) << i * 7) >>> 0;\n        return bits;\n    }\n    if (this.len - this.pos > 4)
{ // fast route (hi)\n        for (; i < 5; ++i) {\n            // 6th..10th\n            bits.hi = (bits.hi | (this.buf[this.pos] & 127)
<< i * 7 + 3) >>> 0;\n            if (this.buf[this.pos++] < 128)\n                return bits;\n        }\n    } else {\n        for (; i
< 5; ++i) {\n            /* istanbul ignore if */\n            if (this.pos >= this.len)\n                throw
```

indexOutOfRange(this);\n   // 6th..10th\n   bits.hi = (bits.hi | (this.buf[this.pos] & 127) << i * 7 + 3) >>> 0;\n   if (this.buf[this.pos++] < 128)\n   return bits;\n   }\n   }\n   /* istanbul ignore next */\n   throw Error(\"invalid varint encoding\");\n}\n\n/* eslint-enable no-invalid-this */\n\n/**\n * Reads a varint as a signed 64 bit value.\n * @name Reader#int64\n * @function\n * @returns {Long} Value read\n */\n\n/**\n * Reads a varint as an unsigned 64 bit value.\n * @name Reader#uint64\n * @function\n * @returns {Long} Value read\n */\n\n/**\n * Reads a zig-zag encoded varint as a signed 64 bit value.\n * @name Reader#sint64\n * @function\n * @returns {Long} Value read\n */\n\n/**\n * Reads a varint as a boolean.\n * @returns {boolean} Value read\n */\nReader.prototype.bool = function read_bool() {\n   return this.uint32() !== 0;\n};\n\nfunction readFixed32_end(buf, end) { // note that this uses `end`, not `pos`\n   return (buf[end - 4]\n | buf[end - 3] << 8\n | buf[end - 2] << 16\n | buf[end - 1] << 24) >>> 0;\n}\n\n/**\n * Reads fixed 32 bits as an unsigned 32 bit integer.\n * @returns {number} Value read\n */\nReader.prototype.fixed32 = function read_fixed32() {\n\n   /* istanbul ignore if */\n   if (this.pos + 4 > this.len)\n   throw indexOutOfRange(this, 4);\n\n   return readFixed32_end(this.buf, this.pos += 4);\n};\n\n/**\n * Reads fixed 32 bits as a signed 32 bit integer.\n * @returns {number} Value read\n */\nReader.prototype.sfixed32 = function read_sfixed32() {\n\n   /* istanbul ignore if */\n   if (this.pos + 4 > this.len)\n   throw indexOutOfRange(this, 4);\n\n   return readFixed32_end(this.buf, this.pos += 4) | 0;\n};\n\n/* eslint-disable no-invalid-this */\n\nfunction readFixed64(/* this: Reader */) {\n\n   /* istanbul ignore if */\n   if (this.pos + 8 > this.len)\n   throw indexOutOfRange(this, 8);\n\n   return new LongBits(readFixed32_end(this.buf, this.pos += 4), readFixed32_end(this.buf, this.pos += 4));\n}\n\n/* eslint-enable no-invalid-this */\n\n/**\n * Reads fixed 64 bits.\n * @name Reader#fixed64\n * @function\n * @returns {Long} Value read\n */\n\n/**\n * Reads zig-zag encoded fixed 64 bits.\n * @name Reader#sfixed64\n * @function\n * @returns {Long} Value read\n */\n\n/**\n * Reads a float (32 bit) as a number.\n * @function\n * @returns {number} Value read\n */\nReader.prototype.float = function read_float() {\n\n   /* istanbul ignore if */\n   if (this.pos + 4 > this.len)\n   throw indexOutOfRange(this, 4);\n\n   var value = util.float.readFloatLE(this.buf, this.pos);\n   this.pos += 4;\n   return value;\n};\n\n/**\n * Reads a double (64 bit float) as a number.\n * @function\n * @returns {number} Value read\n */\nReader.prototype.double = function read_double() {\n\n   /* istanbul ignore if */\n   if (this.pos + 8 > this.len)\n   throw indexOutOfRange(this, 4);\n\n   var value = util.float.readDoubleLE(this.buf, this.pos);\n   this.pos += 8;\n   return value;\n};\n\n/**\n * Reads a sequence of bytes preceeded by its length as a varint.\n * @returns {Uint8Array} Value read\n */\nReader.prototype.bytes = function read_bytes() {\n   var length = this.uint32(),\n   start = this.pos,\n   end   = this.pos + length;\n\n   /* istanbul ignore if */\n   if (end > this.len)\n   throw indexOutOfRange(this, length);\n\n   this.pos += length;\n   if (Array.isArray(this.buf)) // plain array\n   return this.buf.slice(start, end);\n   return start === end // fix for IE 10/Win8 and others' subarray returning array of size 1\n   ? new this.buf.constructor(0)\n   : this._slice.call(this.buf, start, end);\n};\n\n/**\n * Reads a string preceeded by its byte length as a varint.\n * @returns {string} Value read\n */\nReader.prototype.string = function read_string() {\n   var bytes = this.bytes();\n   return utf8.read(bytes, 0, bytes.length);\n};\n\n/**\n * Skips the specified number of bytes if specified, otherwise skips a varint.\n * @param {number} [length] Length if known, otherwise a varint is assumed\n * @returns {Reader} `this`\n */\nReader.prototype.skip = function skip(length) {\n   if (typeof length === \"number\") {\n   /* istanbul ignore if */\n   if (this.pos + length > this.len)\n   throw indexOutOfRange(this, length);\n   this.pos += length;\n   } else {\n   do {\n   /* istanbul ignore if */\n   if (this.pos >= this.len)\n   throw indexOutOfRange(this);\n   } while (this.buf[this.pos++] & 128);\n   }\n   return this;\n};\n\n/**\n * Skips the next element of the specified wire type.\n * @param {number} wireType Wire type received\n * @returns {Reader} `this`\n */\nReader.prototype.skipType = function(wireType) {\n   switch (wireType) {\n   case 0:\n   this.skip();\n   break;\n   case 1:\n   this.skip(8);\n   break;\n   case 2:\n   this.skip(this.uint32());\n   break;\n   case 3:\n   while ((wireType = this.uint32() & 7) !== 4) {\n   this.skipType(wireType);\n   }\n   break;\n   case 5:\n   this.skip(4);\n   break;\n\n   /* istanbul ignore next */\n   default:\n   throw Error(\"invalid wire type \" + wireType + \" at offset \" + this.pos);\n   }\n   return this;\n};\n\nReader._configure = function(BufferReader_) {\n   BufferReader = BufferReader_;\n   Reader.create = create();\n   BufferReader._configure();\n\n   var fn = util.Long ? \"toLong\" :

/* istanbul ignore next */ \"toNumber\";\n   util.merge(Reader.prototype, {\n\n   int64: function read_int64() {\n   return readLongVarint.call(this)[fn](false);\n   },\n\n   uint64: function read_uint64() {\n   return readLongVarint.call(this)[fn](true);\n   },\n\n   sint64: function read_sint64() {\n   return readLongVarint.call(this).zzDecode()[fn](false);\n   },\n\n   fixed64: function read_fixed64() {\n   return readFixed64.call(this)[fn](true);\n   },\n\n   sfixed64: function read_sfixed64() {\n   return readFixed64.call(this)[fn](false);\n   }\n\n   });\n};\n","\"use strict\";\nmodule.exports = BufferReader;\n\n// extends Reader\nvar Reader = require(\"./reader\");\n(BufferReader.prototype = Object.create(Reader.prototype)).constructor = BufferReader;\n\nvar util = require(\"./util/minimal\");\n\n/**\n * Constructs a new buffer reader instance.\n * @classdesc Wire format reader using node buffers.\n * @extends Reader\n * @constructor\n * @param {Buffer} buffer Buffer to read from\n */\nfunction BufferReader(buffer) {\n   Reader.call(this, buffer);\n\n   /**\n   * Read buffer.\n   * @name BufferReader#buf\n   * @type {Buffer}\n   */\n}\n\nBufferReader._configure = function () {\n   /* istanbul ignore else */\n   if (util.Buffer)\n   BufferReader.prototype._slice = util.Buffer.prototype.slice;\n};\n\n\n/**\n * @override\n */\nBufferReader.prototype.string = function read_string_buffer() {\n   var len = this.uint32(); // modifies pos\n   return this.buf.utf8Slice\n   ? this.buf.utf8Slice(this.pos, this.pos = Math.min(this.pos + len, this.len))\n   : this.buf.toString(\"utf-8\", this.pos, this.pos = Math.min(this.pos + len, this.len));\n};\n\n/**\n * Reads a sequence of bytes preceeded by its length as a varint.\n * @name BufferReader#bytes\n * @function\n * @returns {Buffer} Value read\n */\n\nBufferReader._configure();\n","\"use strict\";\nmodule.exports = {};\n\n/**\n * Named roots.\n * This is where pbjs stores generated structures (the option `-r, --root` specifies a name).\n * Can also be used manually to make roots available accross modules.\n * @name roots\n * @type {Object.<string,Root>}\n * @example\n * // pbjs -r myroot -o compiled.js ...\n *\n * // in another module:\n * require(\"./compiled.js\");\n *\n * // in any subsequent module:\n * var root = protobuf.roots[\"myroot\"];\n */\n","\"use strict\";\n\n/**\n * Streaming RPC helpers.\n * @namespace\n */\nvar rpc = exports;\n\n/**\n * RPC implementation passed to {@link Service#create} performing a service request on network level, i.e. by utilizing http requests or websockets.\n * @typedef RPCImpl\n * @type {function}\n * @param {Method|rpc.ServiceMethod<Message<{}>,Message<{}>>} method Reflected or static method being called\n * @param {Uint8Array} requestData Request data\n * @param {RPCImplCallback} callback Callback function\n * @returns {undefined}\n * @example\n * function rpcImpl(method, requestData, callback) {\n *   if (protobuf.util.lcFirst(method.name) !== \"myMethod\") // compatible with static code\n *   throw Error(\"no such method\");\n *   asynchronouslyObtainAResponse(requestData, function(err, responseData) {\n *   callback(err, responseData);\n *   });\n * }\n */\n\n/**\n * Node-style callback as used by {@link RPCImpl}.\n * @typedef RPCImplCallback\n * @type {function}\n * @param {Error|null} error Error, if any, otherwise `null`\n * @param {Uint8Array|null} [response] Response data or `null` to signal end of stream, if there hasn't been an error\n * @returns {undefined}\n */\n\nrpc.Service = require(\"./rpc/service\");\n","\"use strict\";\nmodule.exports = Service;\n\nvar util = require(\"../util/minimal\");\n\n// Extends EventEmitter\n(Service.prototype = Object.create(util.EventEmitter.prototype)).constructor = Service;\n\n/**\n * A service method callback as used by {@link rpc.ServiceMethod|ServiceMethod}.\n *\n * Differs from {@link RPCImplCallback} in that it is an actual callback of a service method which may not return `response = null`.\n * @typedef rpc.ServiceMethodCallback\n * @template TRes extends Message<TRes>\n * @type {function}\n * @param {Error|null} error Error, if any\n * @param {TRes} [response] Response message\n * @returns {undefined}\n */\n\n/**\n * A service method part of a {@link rpc.Service} as created by {@link Service.create}.\n * @typedef rpc.ServiceMethod\n * @template TReq extends Message<TReq>\n * @template TRes extends Message<TRes>\n * @type {function}\n * @param {TReq|Properties<TReq>} request Request message or plain object\n * @param {rpc.ServiceMethodCallback<TRes>} [callback] Node-style callback called with the error, if any, and the response message\n * @returns {Promise<Message<TRes>>} Promise if `callback` has been omitted, otherwise `undefined`\n */\n\n/**\n * Constructs a new RPC service instance.\n * @classdesc An RPC service as returned by {@link Service#create}.\n * @exports rpc.Service\n * @extends util.EventEmitter\n * @constructor\n * @param {RPCImpl} rpcImpl RPC implementation\n * @param {boolean} [requestDelimited=false] Whether requests are

length-delimited\n * @param {boolean} [responseDelimited=false] Whether responses are length-delimited\n */\nfunction Service(rpcImpl, requestDelimited, responseDelimited) {\n\n   if (typeof rpcImpl !== \"function\")\n   throw TypeError(\"rpcImpl must be a function\");\n\n   util.EventEmitter.call(this);\n\n   /**\n   * RPC implementation. Becomes `null` once the service is ended.\n   * @type {RPCImpl|null}\n   */\n   this.rpcImpl = rpcImpl;\n\n   /**\n   * Whether requests are length-delimited.\n   * @type {boolean}\n   */\n   this.requestDelimited = Boolean(requestDelimited);\n\n   /**\n   * Whether responses are length-delimited.\n   * @type {boolean}\n   */\n   this.responseDelimited = Boolean(responseDelimited);\n}\n\n/**\n * Calls a service method through {@link rpc.Service#rpcImpl|rpcImpl}.\n * @param {Method|rpc.ServiceMethod<TReq,TRes>} method Reflected or static method\n * @param {Constructor<TReq>} requestCtor Request constructor\n * @param {Constructor<TRes>} responseCtor Response constructor\n * @param {TReq|Properties<TReq>} request Request message or plain object\n * @param {rpc.ServiceMethodCallback<TRes>} callback Service callback\n * @returns {undefined}\n * @template TReq extends Message<TReq>\n * @template TRes extends Message<TRes>\n */\nService.prototype.rpcCall = function rpcCall(method, requestCtor, responseCtor, request, callback) {\n\n   if (!request)\n   throw TypeError(\"request must be specified\");\n\n   var self = this;\n   if (!callback)\n   return util.asPromise(rpcCall, self, method, requestCtor, responseCtor, request);\n\n   if (!self.rpcImpl) {\n   setTimeout(function() { callback(Error(\"already ended\")); }, 0);\n   return undefined;\n   }\n\n   try {\n   return self.rpcImpl(\n   method,\n   requestCtor[self.requestDelimited ? \"encodeDelimited\" : \"encode\"](request).finish(),\n   function rpcCallback(err, response) {\n\n   if (err) {\n   self.emit(\"error\", err, method);\n   return callback(err);\n   }\n\n   if (response === null) {\n   self.end(/* endedByRPC */ true);\n   return undefined;\n   }\n\n   if (!(response instanceof responseCtor)) {\n   try {\n   response = responseCtor[self.responseDelimited ? \"decodeDelimited\" : \"decode\"](response);\n   } catch (err) {\n   self.emit(\"error\", err, method);\n   return callback(err);\n   }\n   }\n\n   self.emit(\"data\", response, method);\n   return callback(null, response);\n   }\n   );\n   } catch (err) {\n   self.emit(\"error\", err, method);\n   setTimeout(function() { callback(err); }, 0);\n   return undefined;\n   }\n};\n\n/**\n * Ends this service and emits the `end` event.\n * @param {boolean} [endedByRPC=false] Whether the service has been ended by the RPC implementation.\n * @returns {rpc.Service} `this`\n */\nService.prototype.end = function end(endedByRPC) {\n   if (this.rpcImpl) {\n   if (!endedByRPC) // signal end to rpcImpl\n   this.rpcImpl(null, null, null);\n   this.rpcImpl = null;\n   this.emit(\"end\").off();\n   }\n   return this;\n};\n","\"use strict\";\nmodule.exports = LongBits;\n\nvar util = require(\"../util/minimal\");\n\n/**\n * Constructs new long bits.\n * @classdesc Helper class for working with the low and high bits of a 64 bit value.\n * @memberof util\n * @constructor\n * @param {number} lo Low 32 bits, unsigned\n * @param {number} hi High 32 bits, unsigned\n */\nfunction LongBits(lo, hi) {\n\n   // note that the casts below are theoretically unnecessary as of today, but older statically\n   // generated converter code might still call the ctor with signed 32bits. kept for compat.\n\n   /**\n   * Low bits.\n   * @type {number}\n   */\n   this.lo = lo >>> 0;\n\n   /**\n   * High bits.\n   * @type {number}\n   */\n   this.hi = hi >>> 0;\n}\n\n/**\n * Zero bits.\n * @memberof util.LongBits\n * @type {util.LongBits}\n */\nvar zero = LongBits.zero = new LongBits(0, 0);\n\nzero.toNumber = function() { return 0; };\nzero.zzEncode = zero.zzDecode = function() { return this; };\nzero.length = function() { return 1; };\n\n/**\n * Zero hash.\n * @memberof util.LongBits\n * @type {string}\n */\nvar zeroHash = LongBits.zeroHash = \"\\0\\0\\0\\0\\0\\0\\0\\0\";\n\n/**\n * Constructs new long bits from the specified number.\n * @param {number} value Value\n * @returns {util.LongBits} Instance\n */\nLongBits.fromNumber = function fromNumber(value) {\n   if (value === 0)\n   return zero;\n   var sign = value < 0;\n   if (sign)\n   value = -value;\n   var lo = value >>> 0,\n   hi = (value - lo) / 4294967296 >>> 0;\n   if (sign) {\n   hi = ~hi >>> 0;\n   lo = ~lo >>> 0;\n   if (++lo > 4294967295) {\n   lo = 0;\n   if (++hi > 4294967295)\n   hi = 0;\n   }\n   }\n   return new LongBits(lo, hi);\n};\n\n/**\n * Constructs new long bits from a number, long or string.\n * @param {Long|number|string} value Value\n * @returns {util.LongBits} Instance\n */\nLongBits.from = function from(value) {\n   if (typeof value === \"number\")\n   return LongBits.fromNumber(value);\n   if (util.isString(value)) {\n   /* istanbul ignore else */\n   if (util.Long)\n value = util.Long.fromString(value);\n else\n return LongBits.fromNumber(parseInt(value, 10));\n }\n return value.low || value.high ? new LongBits(value.low >>> 0, value.high >>> 0) : zero;\n};\n\n/**\n * Converts this long bits to a possibly unsafe JavaScript number.\n * @param {boolean} [unsigned=false] Whether unsigned or not\n * @returns {number} Possibly unsafe number\n */\nLongBits.prototype.toNumber = function toNumber(unsigned) {\n if (!unsigned && this.hi >>> 31) {\n var lo = ~this.lo + 1 >>> 0,\n hi = ~this.hi >>> 0;\n if (!lo)\n hi = hi + 1 >>> 0;\n return -(lo + hi * 4294967296);\n }\n return this.lo + this.hi * 4294967296;\n};\n\n/**\n * Converts this long bits to a long.\n * @param {boolean} [unsigned=false] Whether unsigned or not\n * @returns {Long} Long\n */\nLongBits.prototype.toLong = function toLong(unsigned) {\n return util.Long\n ? new util.Long(this.lo | 0, this.hi | 0, Boolean(unsigned))\n /* istanbul ignore next */\n : { low: this.lo | 0, high: this.hi | 0, unsigned: Boolean(unsigned) };\n};\n\nvar charCodeAt = String.prototype.charCodeAt;\n\n/**\n * Constructs new long bits from the specified 8 characters long hash.\n * @param {string} hash Hash\n * @returns {util.LongBits} Bits\n */\nLongBits.fromHash = function fromHash(hash) {\n if (hash === zeroHash)\n return zero;\n return new LongBits(\n (charCodeAt.call(hash, 0)\n | charCodeAt.call(hash, 1) << 8\n | charCodeAt.call(hash, 2) << 16\n | charCodeAt.call(hash, 3) << 24) >>> 0\n ,\n (charCodeAt.call(hash, 4)\n | charCodeAt.call(hash, 5) << 8\n | charCodeAt.call(hash, 6) << 16\n | charCodeAt.call(hash, 7) << 24) >>> 0\n);\n};\n\n/**\n * Converts this long bits to a 8 characters long hash.\n * @returns {string} Hash\n */\nLongBits.prototype.toHash = function toHash() {\n return String.fromCharCode(\n this.lo & 255,\n this.lo >>> 8 & 255,\n this.lo >>> 16 & 255,\n this.lo >>> 24 ,\n this.hi & 255,\n this.hi >>> 8 & 255,\n this.hi >>> 16 & 255,\n this.hi >>> 24\n);\n};\n\n/**\n * Zig-zag encodes this long bits.\n * @returns {util.LongBits} `this`\n */\nLongBits.prototype.zzEncode = function zzEncode() {\n var mask = this.hi >> 31;\n this.hi = ((this.hi << 1 | this.lo >>> 31) ^ mask) >>> 0;\n this.lo = (this.lo << 1 ^ mask) >>> 0;\n return this;\n};\n\n/**\n * Zig-zag decodes this long bits.\n * @returns {util.LongBits} `this`\n */\nLongBits.prototype.zzDecode = function zzDecode() {\n var mask = -(this.lo & 1);\n this.lo = ((this.lo >>> 1 | this.hi << 31) ^ mask) >>> 0;\n this.hi = (this.hi >>> 1 ^ mask) >>> 0;\n return this;\n};\n\n/**\n * Calculates the length of this longbits when encoded as a varint.\n * @returns {number} Length\n */\nLongBits.prototype.length = function length() {\n var part0 = this.lo,\n part1 = (this.lo >>> 28 | this.hi << 4) >>> 0,\n part2 = this.hi >>> 24;\n return part2 === 0\n ? part1 === 0\n ? part0 < 16384\n ? part0 < 128 ? 1 : 2\n : part0 < 2097152 ? 3 : 4\n : part1 < 16384\n ? part1 < 128 ? 5 : 6\n : part1 < 2097152 ? 7 : 8\n : part2 < 128 ? 9 : 10;\n};\n","\"use strict\";\nvar util = exports;\n\n// used to return a Promise where callback is omitted\nutil.asPromise = require(\"@protobufjs/aspromise\");\n\n// converts to / from base64 encoded strings\nutil.base64 = require(\"@protobufjs/base64\");\n\n// base class of rpc.Service\nutil.EventEmitter = require(\"@protobufjs/eventemitter\");\n\n// float handling accross browsers\nutil.float = require(\"@protobufjs/float\");\n\n// requires modules optionally and hides the call from bundlers\nutil.inquire = require(\"@protobufjs/inquire\");\n\n// converts to / from utf8 encoded strings\nutil.utf8 = require(\"@protobufjs/utf8\");\n\n// provides a node-like buffer pool in the browser\nutil.pool = require(\"@protobufjs/pool\");\n\n// utility to work with the low and high bits of a 64 bit value\nutil.LongBits = require(\"./longbits\");\n\n/**\n * Whether running within node or not.\n * @memberof util\n * @type {boolean}\n */\nutil.isNode = Boolean(typeof global !== \"undefined\"\n && global\n && global.process\n && global.process.versions\n && global.process.versions.node);\n\n/**\n * Global object reference.\n * @memberof util\n * @type {Object}\n */\nutil.global = util.isNode && global\n || typeof window !== \"undefined\" && window\n || typeof self !== \"undefined\" && self\n || this; // eslint-disable-line no-invalid-this\n\n/**\n * An immuable empty array.\n * @memberof util\n * @type {Array.<*>}\n * @const\n */\nutil.emptyArray = Object.freeze ? Object.freeze([]) : /* istanbul ignore next */ []; // used on prototypes\n\n/**\n * An immutable empty object.\n * @type {Object}\n * @const\n */\nutil.emptyObject = Object.freeze ? Object.freeze({}) : /* istanbul ignore next */ {}; // used on prototypes\n\n/**\n * Tests if the specified value is an integer.\n * @function\n * @param {*} value Value to test\n * @returns {boolean} `true` if the value is an integer\n */\nutil.isInteger = Number.isInteger || /* istanbul ignore next */ function isInteger(value) {\n

return typeof value === \"number\" && isFinite(value) && Math.floor(value) === value;\n};\n\n/**\n * Tests if the specified value is a string.\n * @param {*} value Value to test\n * @returns {boolean} `true` if the value is a string\n */\nutil.isString = function isString(value) {\n   return typeof value === \"string\" || value instanceof String;\n};\n\n/**\n * Tests if the specified value is a non-null object.\n * @param {*} value Value to test\n * @returns {boolean} `true` if the value is a non-null object\n */\nutil.isObject = function isObject(value) {\n   return value && typeof value === \"object\";\n};\n\n/**\n * Checks if a property on a message is considered to be present.\n * This is an alias of {@link util.isSet}.\n * @function\n * @param {Object} obj Plain object or message instance\n * @param {string} prop Property name\n * @returns {boolean} `true` if considered to be present, otherwise `false`\n */\nutil.isset =\n\n/**\n * Checks if a property on a message is considered to be present.\n * @param {Object} obj Plain object or message instance\n * @param {string} prop Property name\n * @returns {boolean} `true` if considered to be present, otherwise `false`\n */\nutil.isSet = function isSet(obj, prop) {\n   var value = obj[prop];\n   if (value != null && obj.hasOwnProperty(prop)) // eslint-disable-line eqeqeq, no-prototype-builtins\n   return typeof value !== \"object\" || (Array.isArray(value) ? value.length : Object.keys(value).length) > 0;\n   return false;\n};\n\n/**\n * Any compatible Buffer instance.\n * This is a minimal stand-alone definition of a Buffer instance. The actual type is that exported by node's typings.\n * @interface Buffer\n * @extends Uint8Array\n */\n\n/**\n * Node's Buffer class if available.\n * @type {Constructor<Buffer>}\n */\nutil.Buffer = (function() {\n   try {\n   var Buffer = util.inquire(\"buffer\").Buffer;\n   // refuse to use non-node buffers if not explicitly assigned (perf reasons):\n   return Buffer.prototype.utf8Write ? Buffer : /* istanbul ignore next */ null;\n   } catch (e) {\n   /* istanbul ignore next */\n   return null;\n   }\n})();\n\n// Internal alias of or polyfull for Buffer.from.\nutil._Buffer_from = null;\n\n// Internal alias of or polyfill for Buffer.allocUnsafe.\nutil._Buffer_allocUnsafe = null;\n\n/**\n * Creates a new buffer of whatever type supported by the environment.\n * @param {number|number[]} [sizeOrArray=0] Buffer size or number array\n * @returns {Uint8Array|Buffer} Buffer\n */\nutil.newBuffer = function newBuffer(sizeOrArray) {\n   /* istanbul ignore next */\n   return typeof sizeOrArray === \"number\"\n   ? util.Buffer\n   ? util._Buffer_allocUnsafe(sizeOrArray)\n   : new util.Array(sizeOrArray)\n   : util.Buffer\n   ? util._Buffer_from(sizeOrArray)\n   : typeof Uint8Array === \"undefined\"\n   ? sizeOrArray\n   : new Uint8Array(sizeOrArray);\n};\n\n/**\n * Array implementation used in the browser. `Uint8Array` if supported, otherwise `Array`.\n * @type {Constructor<Uint8Array>}\n */\nutil.Array = typeof Uint8Array !== \"undefined\" ? Uint8Array /* istanbul ignore next */ : Array;\n\n/**\n * Any compatible Long instance.\n * This is a minimal stand-alone definition of a Long instance. The actual type is that exported by long.js.\n * @interface Long\n * @property {number} low Low bits\n * @property {number} high High bits\n * @property {boolean} unsigned Whether unsigned or not\n */\n\n/**\n * Long.js's Long class if available.\n * @type {Constructor<Long>}\n */\nutil.Long = /* istanbul ignore next */ util.global.dcodeIO && /* istanbul ignore next */ util.global.dcodeIO.Long\n || /* istanbul ignore next */ util.global.Long\n || util.inquire(\"long\");\n\n/**\n * Regular expression used to verify 2 bit (`bool`) map keys.\n * @type {RegExp}\n * @const\n */\nutil.key2Re = /^true|false|0|1$/;\n\n/**\n * Regular expression used to verify 32 bit (`int32` etc.) map keys.\n * @type {RegExp}\n * @const\n */\nutil.key32Re = /^-?(?:0|[1-9][0-9]*)$/;\n\n/**\n * Regular expression used to verify 64 bit (`int64` etc.) map keys.\n * @type {RegExp}\n * @const\n */\nutil.key64Re = /^(?:[\\\\x00-\\\\xff]{8}|-?(?:0|[1-9][0-9]*))$/;\n\n/**\n * Converts a number or long to an 8 characters long hash string.\n * @param {Long|number} value Value to convert\n * @returns {string} Hash\n */\nutil.longToHash = function longToHash(value) {\n   return value\n   ? util.LongBits.from(value).toHash()\n   : util.LongBits.zeroHash;\n};\n\n/**\n * Converts an 8 characters long hash string to a long or number.\n * @param {string} hash Hash\n * @param {boolean} [unsigned=false] Whether unsigned or not\n * @returns {Long|number} Original value\n */\nutil.longFromHash = function longFromHash(hash, unsigned) {\n   var bits = util.LongBits.fromHash(hash);\n   if (util.Long)\n   return util.Long.fromBits(bits.lo, bits.hi, unsigned);\n   return bits.toNumber(Boolean(unsigned));\n};\n\n/**\n * Merges the properties of the source object into the destination object.\n * @memberof util\n * @param {Object.<string,*>} dst Destination object\n * @param {Object.<string,*>} src Source object\n * @param {boolean} [ifNotSet=false] Merges only if the key is not already set\n * @returns {Object.<string,*>} Destination object\n */\nfunction merge(dst, src, ifNotSet) { // used by converters\n for (var keys = Object.keys(src), i = 0; i < keys.length; ++i)\n if (dst[keys[i]] === undefined || !ifNotSet)\n dst[keys[i]] = src[keys[i]];\n return dst;\n}\n\nutil.merge = merge;\n\n/**\n * Converts the first character of a string to lower case.\n * @param {string} str String to convert\n * @returns {string} Converted string\n */\nutil.lcFirst = function lcFirst(str) {\n return str.charAt(0).toLowerCase() + str.substring(1);\n};\n\n/**\n * Creates a custom error constructor.\n * @memberof util\n * @param {string} name Error name\n * @returns {Constructor<Error>} Custom error constructor\n */\nfunction newError(name) {\n\n function CustomError(message, properties) {\n\n if (!(this instanceof CustomError))\n return new CustomError(message, properties);\n\n // Error.call(this, message);\n // ^ just returns a new error instance because the ctor can be called as a function\n\n Object.defineProperty(this, \"message\", { get: function() { return message; } });\n\n /* istanbul ignore next */\n if (Error.captureStackTrace) // node\n Error.captureStackTrace(this, CustomError);\n else\n Object.defineProperty(this, \"stack\", { value: new Error().stack || \"\" });\n\n if (properties)\n merge(this, properties);\n }\n\n (CustomError.prototype = Object.create(Error.prototype)).constructor = CustomError;\n\n Object.defineProperty(CustomError.prototype, \"name\", { get: function() { return name; } });\n\n CustomError.prototype.toString = function toString() {\n return this.name + \": \" + this.message;\n };\n\n return CustomError;\n}\n\nutil.newError = newError;\n\n/**\n * Constructs a new protocol error.\n * @classdesc Error subclass indicating a protocol specifc error.\n * @memberof util\n * @extends Error\n * @template T extends Message<T>\n * @constructor\n * @param {string} message Error message\n * @param {Object.<string,*>} [properties] Additional properties\n * @example\n * try {\n * MyMessage.decode(someBuffer); // throws if required fields are missing\n * } catch (e) {\n * if (e instanceof ProtocolError && e.instance)\n * console.log(\"decoded so far: \" + JSON.stringify(e.instance));\n * }\n */\nutil.ProtocolError = newError(\"ProtocolError\");\n\n/**\n * So far decoded message instance.\n * @name util.ProtocolError#instance\n * @type {Message<T>}\n */\n\n/**\n * A OneOf getter as returned by {@link util.oneOfGetter}.\n * @typedef OneOfGetter\n * @type {function}\n * @returns {string|undefined} Set field name, if any\n */\n\n/**\n * Builds a getter for a oneof's present field name.\n * @param {string[]} fieldNames Field names\n * @returns {OneOfGetter} Unbound getter\n */\nutil.oneOfGetter = function getOneOf(fieldNames) {\n var fieldMap = {};\n for (var i = 0; i < fieldNames.length; ++i)\n fieldMap[fieldNames[i]] = 1;\n\n /**\n * @returns {string|undefined} Set field name, if any\n * @this Object\n * @ignore\n */\n return function() { // eslint-disable-line consistent-return\n for (var keys = Object.keys(this), i = keys.length - 1; i > -1; --i)\n if (fieldMap[keys[i]] === 1 && this[keys[i]] !== undefined && this[keys[i]] !== null)\n return keys[i];\n };\n};\n\n/**\n * A OneOf setter as returned by {@link util.oneOfSetter}.\n * @typedef OneOfSetter\n * @type {function}\n * @param {string|undefined} value Field name\n * @returns {undefined}\n */\n\n/**\n * Builds a setter for a oneof's present field name.\n * @param {string[]} fieldNames Field names\n * @returns {OneOfSetter} Unbound setter\n */\nutil.oneOfSetter = function setOneOf(fieldNames) {\n\n /**\n * @param {string} name Field name\n * @returns {undefined}\n * @this Object\n * @ignore\n */\n return function(name) {\n for (var i = 0; i < fieldNames.length; ++i)\n if (fieldNames[i] !== name)\n delete this[fieldNames[i]];\n };\n};\n\n/**\n * Default conversion options used for {@link Message#toJSON} implementations.\n *\n * These options are close to proto3's JSON mapping with the exception that internal types like Any are handled just like messages. More precisely:\n *\n * - Longs become strings\n * - Enums become string keys\n * - Bytes become base64 encoded strings\n * - (Sub-)Messages become plain objects\n * - Maps become plain objects with all string keys\n * - Repeated fields become arrays\n * - NaN and Infinity for float and double fields become strings\n *\n * @type {IConversionOptions}\n * @see https://developers.google.com/protocol-buffers/docs/proto3?hl=en#json\n */\nutil.toJSONOptions = {\n longs: String,\n enums: String,\n bytes: String,\n json: true\n};\n\n// Sets up buffer utility according to the environment (called in index-minimal)\nutil._configure = function() {\n var Buffer = util.Buffer;\n /* istanbul ignore if */\n if (!Buffer) {\n util._Buffer_from = util._Buffer_allocUnsafe = null;\n return;\n }\n // because node 4.x buffers are incompatible & immutable\n // see: https://github.com/dcodeIO/protobuf.js/pull/665\n util._Buffer_from = Buffer.from !== Uint8Array.from && Buffer.from ||\n /* istanbul ignore next */\n function Buffer_from(value, encoding) {\n return new

Buffer(value, encoding);\n };\n util._Buffer_allocUnsafe = Buffer.allocUnsafe ||\n /* istanbul ignore next */\n function Buffer_allocUnsafe(size) {\n return new Buffer(size);\n };\n};\n","\"use strict\";\nmodule.exports = Writer;\n\nvar util = require(\"./util/minimal\");\n\nvar BufferWriter; // cyclic\n\nvar LongBits = util.LongBits,\n base64 = util.base64,\n utf8 = util.utf8;\n\n/**\n * Constructs a new writer operation instance.\n * @classdesc Scheduled writer operation.\n * @constructor\n * @param {function(*, Uint8Array, number)} fn Function to call\n * @param {number} len Value byte length\n * @param {*} val Value to write\n * @ignore\n */\nfunction Op(fn, len, val) {\n\n /**\n * Function to call.\n * @type {function(Uint8Array, number, *)}\n */\n this.fn = fn;\n\n /**\n * Value byte length.\n * @type {number}\n */\n this.len = len;\n\n /**\n * Next operation.\n * @type {Writer.Op|undefined}\n */\n this.next = undefined;\n\n /**\n * Value to write.\n * @type {*}\n */\n this.val = val; // type varies\n}\n\n/* istanbul ignore next */\nfunction noop() {} // eslint-disable-line no-empty-function\n\n/**\n * Constructs a new writer state instance.\n * @classdesc Copied writer state.\n * @memberof Writer\n * @constructor\n * @param {Writer} writer Writer to copy state from\n * @ignore\n */\nfunction State(writer) {\n\n /**\n * Current head.\n * @type {Writer.Op}\n */\n this.head = writer.head;\n\n /**\n * Current tail.\n * @type {Writer.Op}\n */\n this.tail = writer.tail;\n\n /**\n * Current buffer length.\n * @type {number}\n */\n this.len = writer.len;\n\n /**\n * Next state.\n * @type {State|null}\n */\n this.next = writer.states;\n}\n\n/**\n * Constructs a new writer instance.\n * @classdesc Wire format writer using `Uint8Array` if available, otherwise `Array`.\n * @constructor\n */\nfunction Writer() {\n\n /**\n * Current length.\n * @type {number}\n */\n this.len = 0;\n\n /**\n * Operations head.\n * @type {Object}\n */\n this.head = new Op(noop, 0, 0);\n\n /**\n * Operations tail\n * @type {Object}\n */\n this.tail = this.head;\n\n /**\n * Linked forked states.\n * @type {Object|null}\n */\n this.states = null;\n\n // When a value is written, the writer calculates its byte length and puts it into a linked\n // list of operations to perform when finish() is called. This both allows us to allocate\n // buffers of the exact required size and reduces the amount of work we have to do compared\n // to first calculating over objects and then encoding over objects. In our case, the encoding\n // part is just a linked list walk calling operations with already prepared values.\n}\n\nvar create = function create() {\n return util.Buffer\n ? function create_buffer_setup() {\n return (Writer.create = function create_buffer() {\n return new BufferWriter();\n })();\n }\n /* istanbul ignore next */\n : function create_array() {\n return new Writer();\n };\n};\n\n/**\n * Creates a new writer.\n * @function\n * @returns {BufferWriter|Writer} A {@link BufferWriter} when Buffers are supported, otherwise a {@link Writer}\n */\nWriter.create = create();\n\n/**\n * Allocates a buffer of the specified size.\n * @param {number} size Buffer size\n * @returns {Uint8Array} Buffer\n */\nWriter.alloc = function alloc(size) {\n return new util.Array(size);\n};\n\n// Use Uint8Array buffer pool in the browser, just like node does with buffers\n/* istanbul ignore else */\nif (util.Array !== Array)\n Writer.alloc = util.pool(Writer.alloc, util.Array.prototype.subarray);\n\n/**\n * Pushes a new operation to the queue.\n * @param {function(Uint8Array, number, *)} fn Function to call\n * @param {number} len Value byte length\n * @param {number} val Value to write\n * @returns {Writer} `this`\n * @private\n */\nWriter.prototype._push = function push(fn, len, val) {\n this.tail = this.tail.next = new Op(fn, len, val);\n this.len += len;\n return this;\n};\n\nfunction writeByte(val, buf, pos) {\n buf[pos] = val & 255;\n}\n\nfunction writeVarint32(val, buf, pos) {\n while (val > 127) {\n buf[pos++] = val & 127 | 128;\n val >>>= 7;\n }\n buf[pos] = val;\n}\n\n/**\n * Constructs a new varint writer operation instance.\n * @classdesc Scheduled varint writer operation.\n * @extends Op\n * @constructor\n * @param {number} len Value byte length\n * @param {number} val Value to write\n * @ignore\n */\nfunction VarintOp(len, val) {\n this.len = len;\n this.next = undefined;\n this.val = val;\n}\n\nVarintOp.prototype = Object.create(Op.prototype);\nVarintOp.prototype.fn = writeVarint32;\n\n/**\n * Writes an unsigned 32 bit value as a varint.\n * @param {number} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.uint32 = function write_uint32(value) {\n // here, the call to this.push has been inlined and a varint specific Op subclass is used.\n // uint32 is by far the most frequently used operation and benefits significantly from this.\n this.len += (this.tail = this.tail.next = new VarintOp(\n (value = value >>> 0)\n < 128 ? 1\n : value < 16384 ? 2\n : value < 2097152 ? 3\n : value < 268435456 ? 4\n : 5,\n value)).len;\n

```
return this;\n};\n\n/**\n * Writes a signed 32 bit value as a varint.\n * @function\n * @param {number} value
Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.int32 = function write_int32(value) {\n    return
value < 0\n        ? this._push(writeVarint64, 10, LongBits.fromNumber(value)) // 10 bytes per spec\n        :
this.uint32(value);\n};\n\n/**\n * Writes a 32 bit value as a varint, zig-zag encoded.\n * @param {number} value
Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.sint32 = function write_sint32(value) {\n    return
this.uint32((value << 1 ^ value >> 31) >>> 0);\n};\n\nfunction writeVarint64(val, buf, pos) {\n    while (val.hi) {\n
    buf[pos++] = val.lo & 127 | 128;\n        val.lo = (val.lo >>> 7 | val.hi << 25) >>> 0;\n        val.hi >>>= 7;\n    }\n
while (val.lo > 127) {\n        buf[pos++] = val.lo & 127 | 128;\n        val.lo = val.lo >>> 7;\n    }\n    buf[pos++] =
val.lo;\n}\n\n/**\n * Writes an unsigned 64 bit value as a varint.\n * @param {Long|number|string} value Value to
write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n
*/\nWriter.prototype.uint64 = function write_uint64(value) {\n    var bits = LongBits.from(value);\n    return
this._push(writeVarint64, bits.length(), bits);\n};\n\n/**\n * Writes a signed 64 bit value as a varint.\n * @function\n
* @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If
`value` is a string and no long library is present.\n */\nWriter.prototype.int64 = Writer.prototype.uint64;\n\n/**\n *
Writes a signed 64 bit value as a varint, zig-zag encoded.\n * @param {Long|number|string} value Value to write\n
* @returns {Writer} `this`\n * @throws {TypeError} If `value` is a string and no long library is present.\n
*/\nWriter.prototype.sint64 = function write_sint64(value) {\n    var bits = LongBits.from(value).zzEncode();\n
return this._push(writeVarint64, bits.length(), bits);\n};\n\n/**\n * Writes a boolish value as a varint.\n * @param
{boolean} value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.bool = function
write_bool(value) {\n    return this._push(writeByte, 1, value ? 1 : 0);\n};\n\nfunction writeFixed32(val, buf, pos) {\n
  buf[pos    ] =  val         & 255;\n    buf[pos + 1] =  val >>> 8   & 255;\n    buf[pos + 2] =  val >>> 16  & 255;\n
buf[pos + 3] =  val >>> 24;\n}\n\n/**\n * Writes an unsigned 32 bit value as fixed 32 bits.\n * @param {number}
value Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.fixed32 = function write_fixed32(value)
{\n    return this._push(writeFixed32, 4, value >>> 0);\n};\n\n/**\n * Writes a signed 32 bit value as fixed 32 bits.\n
* @function\n * @param {number} value Value to write\n * @returns {Writer} `this`\n
*/\nWriter.prototype.sfixed32 = Writer.prototype.fixed32;\n\n/**\n * Writes an unsigned 64 bit value as fixed 64
bits.\n * @param {Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError}
If `value` is a string and no long library is present.\n */\nWriter.prototype.fixed64 = function write_fixed64(value)
{\n    var bits = LongBits.from(value);\n    return this._push(writeFixed32, 4, bits.lo)._push(writeFixed32, 4,
bits.hi);\n};\n\n/**\n * Writes a signed 64 bit value as fixed 64 bits.\n * @function\n * @param
{Long|number|string} value Value to write\n * @returns {Writer} `this`\n * @throws {TypeError} If `value` is a
string and no long library is present.\n */\nWriter.prototype.sfixed64 = Writer.prototype.fixed64;\n\n/**\n * Writes a
float (32 bit).\n * @function\n * @param {number} value Value to write\n * @returns {Writer} `this`\n
*/\nWriter.prototype.float = function write_float(value) {\n    return this._push(util.float.writeFloatLE, 4,
value);\n};\n\n/**\n * Writes a double (64 bit float).\n * @function\n * @param {number} value Value to write\n *
@returns {Writer} `this`\n */\nWriter.prototype.double = function write_double(value) {\n    return
this._push(util.float.writeDoubleLE, 8, value);\n};\n\nvar writeBytes = util.Array.prototype.set\n    ? function
writeBytes_set(val, buf, pos) {\n        buf.set(val, pos); // also works for plain array values\n    }\n    /* istanbul
ignore next */\n    : function writeBytes_for(val, buf, pos) {\n        for (var i = 0; i < val.length; ++i)\n            buf[pos
+ i] = val[i];\n    };\n\n/**\n * Writes a sequence of bytes.\n * @param {Uint8Array|string} value Buffer or base64
encoded string to write\n * @returns {Writer} `this`\n */\nWriter.prototype.bytes = function write_bytes(value) {\n
var len = value.length >>> 0;\n    if (!len)\n        return this._push(writeByte, 1, 0);\n    if (util.isString(value)) {\n
var buf = Writer.alloc(len = base64.length(value));\n        base64.decode(value, buf, 0);\n        value = buf;\n    }\n
return this.uint32(len)._push(writeBytes, len, value);\n};\n\n/**\n * Writes a string.\n * @param {string} value
Value to write\n * @returns {Writer} `this`\n */\nWriter.prototype.string = function write_string(value) {\n    var len
= utf8.length(value);\n    return len\n        ? this.uint32(len)._push(utf8.write, len, value)\n        :
this._push(writeByte, 1, 0);\n};\n\n/**\n * Forks this writer's state by pushing it to a stack.\n * Calling {@link
Writer#reset|reset} or {@link Writer#ldelim|ldelim} resets the writer to the previous state.\n * @returns {Writer}
```

`this`\n */\nWriter.prototype.fork = function fork() {\n   this.states = new State(this);\n   this.head = this.tail = new Op(noop, 0, 0);\n   this.len = 0;\n   return this;\n};\n\n/**\n * Resets this instance to the last state.\n * @returns {Writer} `this`\n */\nWriter.prototype.reset = function reset() {\n   if (this.states) {\n   this.head   = this.states.head;\n   this.tail   = this.states.tail;\n   this.len   = this.states.len;\n   this.states = this.states.next;\n   } else {\n   this.head = this.tail = new Op(noop, 0, 0);\n   this.len = 0;\n   }\n   return this;\n};\n\n/**\n * Resets to the last state and appends the fork state's current write length as a varint followed by its operations.\n * @returns {Writer} `this`\n */\nWriter.prototype.ldelim = function ldelim() {\n   var head = this.head,\n   tail = this.tail,\n   len = this.len;\n   this.reset().uint32(len);\n   if (len) {\n   this.tail.next = head.next; // skip noop\n   this.tail = tail;\n   this.len += len;\n   }\n   return this;\n};\n\n/**\n * Finishes the write operation.\n * @returns {Uint8Array} Finished buffer\n */\nWriter.prototype.finish = function finish() {\n   var head = this.head.next, // skip noop\n   buf = this.constructor.alloc(this.len),\n   pos = 0;\n   while (head) {\n   head.fn(head.val, buf, pos);\n   pos += head.len;\n   head = head.next;\n   }\n   // this.head = this.tail = null;\n   return buf;\n};\n\nWriter._configure = function(BufferWriter_) {\n   BufferWriter = BufferWriter_;\n   Writer.create = create();\n   BufferWriter._configure();\n};\n","\"use strict\";\nmodule.exports = BufferWriter;\n\n// extends Writer\nvar Writer = require(\"./writer\");\n(BufferWriter.prototype = Object.create(Writer.prototype)).constructor = BufferWriter;\n\nvar util = require(\"./util/minimal\");\n\n/**\n * Constructs a new buffer writer instance.\n * @classdesc Wire format writer using node buffers.\n * @extends Writer\n * @constructor\n */\nfunction BufferWriter() {\n   Writer.call(this);\n}\n\nBufferWriter._configure = function () {\n   /**\n   * Allocates a buffer of the specified size.\n   * @function\n   * @param {number} size Buffer size\n   * @returns {Buffer} Buffer\n   */\n   BufferWriter.alloc = util._Buffer_allocUnsafe;\n\n   BufferWriter.writeBytesBuffer = util.Buffer && util.Buffer.prototype instanceof Uint8Array && util.Buffer.prototype.set.name === \"set\"\n   ? function writeBytesBuffer_set(val, buf, pos) {\n   buf.set(val, pos); // faster than copy (requires node >= 4 where Buffers extend Uint8Array and set is properly inherited)\n   // also works for plain array values\n   }\n   /* istanbul ignore next */\n   : function writeBytesBuffer_copy(val, buf, pos) {\n   if (val.copy) // Buffer values\n   val.copy(buf, pos, 0, val.length);\n   else for (var i = 0; i < val.length;) // plain array values\n   buf[pos++] = val[i++];\n   };\n};\n\n\n/**\n * @override\n */\nBufferWriter.prototype.bytes = function write_bytes_buffer(value) {\n   if (util.isString(value))\n   value = util._Buffer_from(value, \"base64\");\n   var len = value.length >>> 0;\n   this.uint32(len);\n   if (len)\n   this._push(BufferWriter.writeBytesBuffer, len, value);\n   return this;\n};\n\nfunction writeStringBuffer(val, buf, pos) {\n   if (val.length < 40) // plain js is faster for short strings (probably due to redundant assertions)\n   util.utf8.write(val, buf, pos);\n   else if (buf.utf8Write)\n   buf.utf8Write(val, pos);\n   else\n   buf.write(val, pos);\n}\n\n/**\n * @override\n */\nBufferWriter.prototype.string = function write_string_buffer(value) {\n   var len = util.Buffer.byteLength(value);\n   this.uint32(len);\n   if (len)\n   this._push(writeStringBuffer, len, value);\n   return this;\n};\n\n\n/**\n * Finishes the write operation.\n * @name BufferWriter#finish\n * @function\n * @returns {Buffer} Finished buffer\n */\n\nBufferWriter._configure();\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\n/* eslint-disable import/no-internal-modules */\r\nimport {Backend, InferenceSession, SessionHandler} from 'onnxruntime-common';\r\nimport {Session} from './onnxjs/session';\r\nimport {OnnxjsSessionHandler} from './onnxjs/session-handler';\r\n\r\nclass OnnxjsBackend implements Backend {\r\n // eslint-disable-next-line @typescript-eslint/no-empty-function\r\n async init(): Promise<void> {}\r\n\r\n async createSessionHandler(pathOrBuffer: string|Uint8Array, options?: InferenceSession.SessionOptions):\r\n   Promise<SessionHandler> {\r\n   // NOTE: Session.Config(from onnx.js) is not compatible with InferenceSession.SessionOptions(from\r\n   // onnxruntime-common).\r\n   //   In future we should remove Session.Config and use InferenceSession.SessionOptions.\r\n   //   Currently we allow this to happen to make test runner work.\r\n   const session = new Session(options as unknown as Session.Config);\r\n\r\n   // typescript cannot merge method override correctly (so far in 4.2.3). need if-else to call the method.\r\n   if (typeof pathOrBuffer === 'string') {\r\n   await session.loadModel(pathOrBuffer);\r\n   } else {\r\n   await session.loadModel(pathOrBuffer);\r\n   }\r\n\r\n   return new OnnxjsSessionHandler(session);\r\n

}\r\n}\r\n\r\nexport const onnxjsBackend = new OnnxjsBackend();\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {readFile} from 'fs';\r\nimport {Backend, env, InferenceSession, SessionHandler} from 'onnxruntime-common';\r\nimport {cpus} from 'os';\r\nimport {promisify} from 'util';\r\nimport {initWasm} from './wasm/proxy-wrapper';\r\n\r\nimport {OnnxruntimeWebAssemblySessionHandler} from './wasm/session-handler';\r\n\r\n/**\r\n * This function initializes all flags for WebAssembly.\r\n *\r\n * Those flags are accessible from `ort.env.wasm`. Users are allow to set those flags before the first inference session\r\n * being created, to override default value.\r\n */\r\nexport const initializeFlags = (): void => {\r\n if (typeof env.wasm.initTimeout !== 'number' || env.wasm.initTimeout < 0) {\r\n   env.wasm.initTimeout = 0;\r\n }\r\n\r\n if (typeof env.wasm.simd !== 'boolean') {\r\n   env.wasm.simd = true;\r\n }\r\n\r\n if (typeof env.wasm.proxy !== 'boolean') {\r\n   env.wasm.proxy = false;\r\n }\r\n\r\n if (typeof env.wasm.numThreads !== 'number' || !Number.isInteger(env.wasm.numThreads) || env.wasm.numThreads <= 0) {\r\n   const numCpuLogicalCores = typeof navigator === 'undefined' ? cpus().length : navigator.hardwareConcurrency;\r\n   env.wasm.numThreads = Math.min(4, Math.ceil((numCpuLogicalCores || 1) / 2));\r\n }\r\n};\r\n\r\nclass OnnxruntimeWebAssemblyBackend implements Backend {\r\n async init(): Promise<void> {\r\n   // populate wasm flags\r\n   initializeFlags();\r\n\r\n   // init wasm\r\n   await initWasm();\r\n }\r\n createSessionHandler(path: string, options?: InferenceSession.SessionOptions): Promise<SessionHandler>;\r\n createSessionHandler(buffer: Uint8Array, options?: InferenceSession.SessionOptions): Promise<SessionHandler>;\r\n async createSessionHandler(pathOrBuffer: string|Uint8Array, options?: InferenceSession.SessionOptions):\r\n   Promise<SessionHandler> {\r\n   let buffer: Uint8Array;\r\n   if (typeof pathOrBuffer === 'string') {\r\n   if (typeof fetch === 'undefined') {\r\n   // node\r\n   buffer = await promisify(readFile)(pathOrBuffer);\r\n   } else {\r\n   // browser\r\n   const response = await fetch(pathOrBuffer);\r\n   const arrayBuffer = await response.arrayBuffer();\r\n   buffer = new Uint8Array(arrayBuffer);\r\n   }\r\n   } else {\r\n   buffer = pathOrBuffer;\r\n   }\r\n\r\n   const handler = new OnnxruntimeWebAssemblySessionHandler();\r\n   await handler.loadModel(buffer, options);\r\n   return Promise.resolve(handler);\r\n }\r\n}\r\n\r\nexport const wasmBackend = new OnnxruntimeWebAssemblyBackend();\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nexport * from 'onnxruntime-common';\r\nimport {registerBackend} from 'onnxruntime-common';\r\nimport {onnxjsBackend} from './backend-onnxjs';\r\nimport {wasmBackend} from './backend-wasm';\r\n\r\nregisterBackend('webgl', onnxjsBackend, 1);\r\nregisterBackend('wasm', wasmBackend, 2);\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nclass AttributeWithCacheKeyImpl {\r\n constructor(attribute: Record<string, unknown>) {\r\n   Object.assign(this, attribute);\r\n }\r\n\r\n private _cacheKey: string;\r\n public get cacheKey(): string {\r\n   if (!this._cacheKey) {\r\n   this._cacheKey =\r\n   Object.getOwnPropertyNames(this).sort().map(name => `${(this as Record<string, unknown>)[name]}`).join(';');\r\n   }\r\n   return this._cacheKey;\r\n }\r\n}\r\n\r\nexport interface AttributeWithCacheKey {\r\n readonly cacheKey: string;\r\n}\r\n\r\nexport const createAttributeWithCacheKey = <T extends Record<string, unknown>>(attribute: T): T&AttributeWithCacheKey =>\r\n   new AttributeWithCacheKeyImpl(attribute) as unknown as T & AttributeWithCacheKey;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport Long from 'long';\r\nimport {onnx} from 'onnx-proto';\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\n\r\nimport {Tensor} from './tensor';\r\nimport {LongUtil} from './util';\r\n\r\nexport declare namespace Attribute {\r\n export interface DataTypeMap {\r\n   float: number;\r\n   int: number;\r\n   string: string;\r\n   tensor: Tensor;\r\n   floats: number[];\r\n   ints: number[];\r\n   strings: string[];\r\n   tensors: Tensor[];\r\n }\r\n\r\n export type DataType = keyof DataTypeMap;\r\n}\r\n\r\ntype ValueTypes = Attribute.DataTypeMap[Attribute.DataType];\r\n\r\ntype Value = [ValueTypes, Attribute.DataType];\r\n\r\nexport class Attribute {\r\n constructor(attributes: onnx.IAttributeProto[]|ortFbs.Attribute[]|null|undefined) {\r\n   this._attributes = new Map();\r\n   if (attributes !== null && attributes !== undefined) {\r\n   for (const attr of attributes) {\r\n   if (attr instanceof onnx.AttributeProto) {\r\n   this._attributes.set(attr.name, [Attribute.getValue(attr), Attribute.getType(attr)]);\r\n

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      } else if (attr instanceof ortFbs.Attribute) {\r\n          this._attributes.set(attr.name()!, [Attribute.getValue(attr),
Attribute.getType(attr)]);\r\n        }\r\n      }\r\n      if (this._attributes.size < attributes.length) {\r\n        throw new
Error('duplicated attribute names');\r\n      }\r\n    }\r\n  }\r\n\r\n  set(key: string, type: Attribute.DataType, value:
ValueTypes): void {\r\n    this._attributes.set(key, [value, type]);\r\n  }\r\n  delete(key: string): void {\r\n
this._attributes.delete(key);\r\n  }\r\n  getFloat(key: string, defaultValue?: Attribute.DataTypeMap['float']) {\r\n
return this.get(key, 'float', defaultValue);\r\n  }\r\n\r\n  getInt(key: string, defaultValue?:
Attribute.DataTypeMap['int']) {\r\n    return this.get(key, 'int', defaultValue);\r\n  }\r\n\r\n  getString(key: string,
defaultValue?: Attribute.DataTypeMap['string']) {\r\n    return this.get(key, 'string', defaultValue);\r\n  }\r\n\r\n
getTensor(key: string, defaultValue?: Attribute.DataTypeMap['tensor']) {\r\n    return this.get(key, 'tensor',
defaultValue);\r\n  }\r\n\r\n  getFloats(key: string, defaultValue?: Attribute.DataTypeMap['floats']) {\r\n    return
this.get(key, 'floats', defaultValue);\r\n  }\r\n\r\n  getInts(key: string, defaultValue?: Attribute.DataTypeMap['ints'])
{\r\n    return this.get(key, 'ints', defaultValue);\r\n  }\r\n\r\n  getStrings(key: string, defaultValue?:
Attribute.DataTypeMap['strings']) {\r\n    return this.get(key, 'strings', defaultValue);\r\n  }\r\n\r\n  getTensors(key:
string, defaultValue?: Attribute.DataTypeMap['tensors']) {\r\n    return this.get(key, 'tensors', defaultValue);\r\n
}\r\n\r\n  private get<V extends Attribute.DataTypeMap[Attribute.DataType]>(\r\n      key: string, type:
Attribute.DataType, defaultValue?: V): V {\r\n    const valueAndType = this._attributes.get(key);\r\n    if
(valueAndType === undefined) {\r\n      if (defaultValue !== undefined) {\r\n        return defaultValue;\r\n      }\r\n
 throw new Error(`required attribute not found: ${key}`);\r\n    }\r\n    if (valueAndType[1] !== type) {\r\n      throw
new Error(`type mismatch: expected ${type} but got ${valueAndType[1]}`);\r\n    }\r\n    return valueAndType[0]
as V;\r\n  }\r\n\r\n  private static getType(attr: onnx.IAttributeProto|ortFbs.Attribute): Attribute.DataType {\r\n
const type = attr instanceof onnx.AttributeProto ? (attr).type : (attr as ortFbs.Attribute).type();\r\n    switch (type)
{\r\n      case onnx.AttributeProto.AttributeType.FLOAT:\r\n        return 'float';\r\n      case
onnx.AttributeProto.AttributeType.INT:\r\n        return 'int';\r\n      case
onnx.AttributeProto.AttributeType.STRING:\r\n        return 'string';\r\n      case
onnx.AttributeProto.AttributeType.TENSOR:\r\n        return 'tensor';\r\n      case
onnx.AttributeProto.AttributeType.FLOATS:\r\n        return 'floats';\r\n      case
onnx.AttributeProto.AttributeType.INTS:\r\n        return 'ints';\r\n      case
onnx.AttributeProto.AttributeType.STRINGS:\r\n        return 'strings';\r\n      case
onnx.AttributeProto.AttributeType.TENSORS:\r\n        return 'tensors';\r\n      default:\r\n        throw new
Error(`attribute type is not supported yet: ${onnx.AttributeProto.AttributeType[type]}`);\r\n    }\r\n  }\r\n\r\n  private
static getValue(attr: onnx.IAttributeProto|ortFbs.Attribute) {\r\n    const attrType = attr instanceof
onnx.AttributeProto ? attr.type : (attr as ortFbs.Attribute).type();\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.GRAPH || attrType === onnx.AttributeProto.AttributeType.GRAPHS) {\r\n
throw new Error('graph attribute is not supported yet');\r\n    }\r\n\r\n    const value =
this.getValueNoCheck(attr);\r\n\r\n    // cast LONG to number\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.INT && LongUtil.isLong(value)) {\r\n      return LongUtil.longToNumber(value
as Long | flatbuffers.Long);\r\n    }\r\n\r\n    // cast LONG[] to number[]\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.INTS) {\r\n      const arr = (value as Array<number|Long|flatbuffers.Long>);\r\n
  const numberValue: number[] = new Array<number>(arr.length);\r\n\r\n      for (let i = 0; i < arr.length; i++) {\r\n
    const maybeLong = arr[i];\r\n        numberValue[i] = LongUtil.longToNumber(maybeLong);\r\n      }\r\n\r\n
return numberValue;\r\n    }\r\n\r\n    // cast onnx.TensorProto to onnxjs.Tensor\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.TENSOR) {\r\n      return attr instanceof onnx.AttributeProto ?
Tensor.fromProto(value as onnx.ITensorProto) :\r\n                                                  Tensor.fromOrtTensor(value as
ortFbs.Tensor);\r\n    }\r\n\r\n    // cast onnx.TensorProto[] to onnxjs.Tensor[]\r\n    if (attrType ===
onnx.AttributeProto.AttributeType.TENSORS) {\r\n      if (attr instanceof onnx.AttributeProto) {\r\n        const
tensorProtos = value as onnx.ITensorProto[];\r\n        return tensorProtos.map(value =>
Tensor.fromProto(value));\r\n      } else if (attr instanceof ortFbs.Attribute) {\r\n        const tensorProtos = value as
ortFbs.Tensor[];\r\n        return tensorProtos.map(value => Tensor.fromOrtTensor(value));\r\n      }\r\n    }\r\n\r\n    //
```

cast Uint8Array to string\r\n if (attrType === onnx.AttributeProto.AttributeType.STRING) {\r\n // string in onnx attribute is of uint8array type, so we need to convert it to string below. While in ort format,\r\n // string attributes are returned as string, so no conversion is needed.\r\n if (attr instanceof onnx.AttributeProto) {\r\n const utf8String = value as Uint8Array;\r\n return Buffer.from(utf8String.buffer, utf8String.byteOffset, utf8String.byteLength).toString();\r\n }\r\n }\r\n\r\n // cast Uint8Array[] to string[]\r\n if (attrType === onnx.AttributeProto.AttributeType.STRINGS) {\r\n // strings in onnx attribute is returned as uint8array[], so we need to convert it to string[] below. While in ort\r\n // format strings attributes are returned as string[], so no conversion is needed.\r\n if (attr instanceof onnx.AttributeProto) {\r\n const utf8Strings = value as Uint8Array[];\r\n return utf8Strings.map(\r\n utf8String => Buffer.from(utf8String.buffer, utf8String.byteOffset, utf8String.byteLength).toString());\r\n }\r\n }\r\n\r\n return value as ValueTypes;\r\n }\r\n\r\n private static getValueNoCheck(attr: onnx.IAttributeProto|ortFbs.Attribute) {\r\n return attr instanceof (onnx.AttributeProto) ? this.getValueNoCheckFromOnnxFormat(attr) :\r\n this.getValueNoCheckFromOrtFormat(attr as ortFbs.Attribute);\r\n }\r\n\r\n private static getValueNoCheckFromOnnxFormat(attr: onnx.IAttributeProto) {\r\n switch (attr.type!) {\r\n case onnx.AttributeProto.AttributeType.FLOAT:\r\n return attr.f;\r\n case onnx.AttributeProto.AttributeType.INT:\r\n return attr.i;\r\n case onnx.AttributeProto.AttributeType.STRING:\r\n return attr.s;\r\n case onnx.AttributeProto.AttributeType.TENSOR:\r\n return attr.t;\r\n case onnx.AttributeProto.AttributeType.GRAPH:\r\n return attr.g;\r\n case onnx.AttributeProto.AttributeType.FLOATS:\r\n return attr.floats;\r\n case onnx.AttributeProto.AttributeType.INTS:\r\n return attr.ints;\r\n case onnx.AttributeProto.AttributeType.STRINGS:\r\n return attr.strings;\r\n case onnx.AttributeProto.AttributeType.TENSORS:\r\n return attr.tensors;\r\n case onnx.AttributeProto.AttributeType.GRAPHS:\r\n return attr.graphs;\r\n default:\r\n throw new Error(`unsupported attribute type: ${onnx.AttributeProto.AttributeType[attr.type!]}`);\r\n }\r\n }\r\n\r\n private static getValueNoCheckFromOrtFormat(attr: ortFbs.Attribute) {\r\n switch (attr.type()) {\r\n case ortFbs.AttributeType.FLOAT:\r\n return attr.f();\r\n case ortFbs.AttributeType.INT:\r\n return attr.i();\r\n case ortFbs.AttributeType.STRING:\r\n return attr.s();\r\n case ortFbs.AttributeType.TENSOR:\r\n return attr.t();\r\n case ortFbs.AttributeType.GRAPH:\r\n return attr.g();\r\n case ortFbs.AttributeType.FLOATS:\r\n return attr.floatsArray();\r\n case ortFbs.AttributeType.INTS: {\r\n const ints = [];\r\n for (let i = 0; i < attr.intsLength(); i++) {\r\n ints.push(attr.ints(i)!);\r\n }\r\n return ints;\r\n }\r\n case ortFbs.AttributeType.STRINGS: {\r\n const strings = [];\r\n for (let i = 0; i < attr.stringsLength(); i++) {\r\n strings.push(attr.strings(i));\r\n }\r\n return strings;\r\n }\r\n case ortFbs.AttributeType.TENSORS: {\r\n const tensors = [];\r\n for (let i = 0; i < attr.tensorsLength(); i++) {\r\n tensors.push(attr.tensors(i)!);\r\n }\r\n return tensors;\r\n }\r\n // case ortFbs.AttributeType.GRAPHS:\r\n // TODO: Subgraph not supported yet.\r\n // const graphs = [];\r\n // for (let i = 0; i < attr.graphsLength(); i++) {\r\n // graphs.push(attr.graphs(i)!);\r\n // }\r\n // return graphs;\r\n default:\r\n throw new Error(`unsupported attribute type: ${ortFbs.AttributeType[attr.type()]}`);\r\n }\r\n }\r\n\r\n protected _attributes: Map<string, Value>;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {WebGLBackend} from './backends/backend-webgl';\r\nimport {Graph} from './graph';\r\nimport {Operator} from './operators';\r\nimport {OpSet} from './opset';\r\nimport {Session} from './session';\r\n\r\nexport interface InferenceHandler {\r\n /**\r\n * dispose the inference handler. it will be called as the last step in Session.run()\r\n */\r\n dispose(): void;\r\n}\r\n\r\nexport interface SessionHandler {\r\n /**\r\n * transform the graph at initialization time\r\n * @param graphTransformer the graph transformer to manipulate the model graph\r\n */\r\n transformGraph?(graphTransformer: Graph.Transformer): void;\r\n\r\n /**\r\n * create an instance of InferenceHandler to use in a Session.run() call\r\n */\r\n createInferenceHandler(): InferenceHandler;\r\n\r\n /**\r\n * dispose the session handler. it will be called when a session is being disposed explicitly\r\n */\r\n

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dispose(): void;\r\n\r\n  /**\r\n   * Resolves the operator from the name and opset version; backend specific\r\n   *
@param node the node to resolve\r\n   * @param opsets a list of opsets that exported from the model\r\n   * @param
graph the completely initialized graph\r\n   */\r\n  resolve(node: Graph.Node, opsets: readonly OpSet[], graph:
Graph): Operator;\r\n\r\n  /**\r\n   * This method let's the sessionHandler know that the graph initialization is
complete\r\n   * @param graph the completely initialized graph\r\n   */\r\n  onGraphInitialized?(graph: Graph):
void;\r\n\r\n  /**\r\n   * a reference to the corresponding backend\r\n   */\r\n  readonly backend: Backend;\r\n\r\n
/**\r\n   * a reference to the session context\r\n   */\r\n  readonly context: Session.Context;\r\n}\r\n\r\nexport
interface Backend {\r\n  /**\r\n   * initialize the backend. will be called only once, when the first time the\r\n   *
backend it to be used\r\n   */\r\n  initialize(): boolean|Promise<boolean>;\r\n\r\n  /**\r\n   * create an instance of
SessionHandler to use in a Session object's lifecycle\r\n   */\r\n  createSessionHandler(context: Session.Context):
SessionHandler;\r\n\r\n  /**\r\n   * dispose the backend. currently this will not be called\r\n   */\r\n  dispose():
void;\r\n}\r\n\r\n// caches all initialized backend instances\r\nconst backendsCache: Map<string, Backend> = new
Map();\r\n\r\nexport const backend: {[name: string]: Backend} = {\r\n  webgl: new
WebGLBackend(),\r\n};\r\n\r\n/**\r\n * Resolve a reference to the backend. If a hint is specified, the
corresponding\r\n * backend will be used.\r\n */\r\nexport async function resolveBackend(hint?: string|readonly
string[]): Promise<Backend> {\r\n  if (!hint) {\r\n    return resolveBackend(['webgl']);\r\n  } else {\r\n    const hints =
typeof hint === 'string' ? [hint] : hint;\r\n\r\n    for (const backendHint of hints) {\r\n      const cache =
backendsCache.get(backendHint);\r\n      if (cache) {\r\n        return cache;\r\n      }\r\n\r\n      const backend = await
tryLoadBackend(backendHint);\r\n      if (backend) {\r\n        return backend;\r\n      }\r\n    }\r\n  }\r\n\r\n  throw
new Error('no available backend to use');\r\n}\r\n\r\nasync function tryLoadBackend(backendHint: string):
Promise<Backend|undefined> {\r\n  const backendObj = backend;\r\n\r\n  if (typeof backendObj[backendHint] !==
'undefined' && isBackend(backendObj[backendHint])) {\r\n    const backend = backendObj[backendHint];\r\n    let
init = backend.initialize();\r\n    if (typeof init === 'object' && 'then' in init) {\r\n      init = await init;\r\n    }\r\n    if
(init) {\r\n      backendsCache.set(backendHint, backend);\r\n      return backend;\r\n    }\r\n  }\r\n\r\n  return
undefined;\r\n}\r\n\r\nfunction isBackend(obj: unknown) {\r\n  // eslint-disable-next-line @typescript-eslint/no-
explicit-any\r\n  const o = obj as any;\r\n\r\n  // check if an object is a Backend instance\r\n  if (\r\n      'initialize' in o
&& typeof o.initialize === 'function' &&                    // initialize()\r\n      'createSessionHandler' in o && typeof
o.createSessionHandler === 'function' &&  // createSessionHandler()\r\n      'dispose' in o && typeof o.dispose ===
'function'                              // dispose()\r\n  ) {\r\n    return true;\r\n  }\r\n\r\n  return false;\r\n}\r\n\r\nexport type
BackendType = Backend;\r\nexport type SessionHandlerType =
ReturnType<BackendType['createSessionHandler']>;\r\nexport type InferenceHandlerType =
ReturnType<SessionHandlerType['createInferenceHandler']>;\r\n","// Copyright (c) Microsoft Corporation. All
rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env} from 'onnxruntime-common';\r\nimport
{Backend, SessionHandler} from '../backend';\r\nimport {Logger} from '../instrument';\r\nimport {Session} from
'../session';\r\n\r\nimport {WebGLSessionHandler} from './webgl/session-handler';\r\nimport {WebGLContext}
from './webgl/webgl-context';\r\nimport {createWebGLContext} from './webgl/webgl-context-factory';\r\n\r\n/**\r\n
* WebGLBackend is the entry point for all WebGL opeartions\r\n * When it starts it created the
WebGLRenderingContext\r\n * and other main framework components such as Program and Texture Managers\r\n
*/\r\nexport class WebGLBackend implements Backend {\r\n  glContext: WebGLContext;\r\n\r\n  get contextId():
'webgl'|'webgl2'|undefined {\r\n    return env.webgl.contextId;\r\n  }\r\n  set contextId(value:
'webgl'|'webgl2'|undefined) {\r\n    env.webgl.contextId = value;\r\n  }\r\n\r\n  get matmulMaxBatchSize():
number|undefined {\r\n    return env.webgl.matmulMaxBatchSize;\r\n  }\r\n  set matmulMaxBatchSize(value:
number|undefined) {\r\n    env.webgl.matmulMaxBatchSize = value;\r\n  }\r\n\r\n  get textureCacheMode():
'initializerOnly'|'full'|undefined {\r\n    return env.webgl.textureCacheMode;\r\n  }\r\n  set textureCacheMode(value:
'initializerOnly'|'full'|undefined) {\r\n    env.webgl.textureCacheMode = value;\r\n  }\r\n\r\n  get pack():
boolean|undefined {\r\n    return env.webgl.pack;\r\n  }\r\n  set pack(value: boolean|undefined) {\r\n
env.webgl.pack = value;\r\n  }\r\n\r\n  get async(): boolean|undefined {\r\n    return env.webgl.async;\r\n  }\r\n  set
async(value: boolean|undefined) {\r\n    env.webgl.async = value;\r\n  }\r\n\r\n  initialize(): boolean {\r\n    try {\r\n
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  this.glContext = createWebGLContext(this.contextId);\r\n      if (typeof this.matmulMaxBatchSize !== 'number')
{\r\n        this.matmulMaxBatchSize = 16;\r\n      }\r\n      if (typeof this.textureCacheMode !== 'string') {\r\n
this.textureCacheMode = 'full';\r\n      }\r\n      if (typeof this.pack !== 'boolean') {\r\n        this.pack = false;\r\n
}\r\n      if (typeof this.async !== 'boolean') {\r\n        this.async = false;\r\n      }\r\n\r\n
Logger.setWithEnv(env);\r\n\r\n      Logger.verbose(\r\n          'WebGLBackend',\r\n          `Created WebGLContext:
${typeof this.glContext} with matmulMaxBatchSize: ${\r\n              this.matmulMaxBatchSize};
textureCacheMode: ${this.textureCacheMode}; pack: ${this.pack}; async: ${\r\n              this.async}.`);\r\n
return true;\r\n    } catch (e) {\r\n      Logger.warning('WebGLBackend', `Unable to initialize WebGLBackend.
${e}`);\r\n      return false;\r\n    }\r\n  }\r\n  createSessionHandler(context: Session.Context): SessionHandler {\r\n
return new WebGLSessionHandler(this, context);\r\n  }\r\n  dispose(): void {\r\n    this.glContext.dispose();\r\n
}\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {ArrayUtil, BroadcastUtil, ShapeUtil} from '../../util';\r\n\r\nimport {GlslContext, GlslLib,
GlslLibRoutine} from './glsl-definitions';\r\nimport {getGlsl} from './glsl-source';\r\nimport {squeezeShape} from
'./texture-layout-strategy';\r\nimport {TextureLayout} from './types';\r\nimport
{generateShaderFuncNameFromInputSamplerName,
generateShaderFuncNameFromInputSamplerNameAtOutCoords, getCoordsDataType, getGlChannels,
getSqueezedParams, squeezeInputShape} from './utils';\r\n\r\n/**\r\n * GLSL Library responsible for data types and
routines for manipulating\r\n * coordinates and mapping to/from tensor indices\r\n */\r\nexport class CoordsGlslLib
extends GlslLib {\r\n  returnType: string;\r\n\r\n  constructor(context: GlslContext) {\r\n    super(context);\r\n  }\r\n
getFunctions(): {[name: string]: GlslLibRoutine} {\r\n    return {\r\n      ...this.offsetToCoords(),\r\n
...this.coordsToOffset(),\r\n      ...this.toVec(),\r\n      ...this.valueFrom(),\r\n      // TODO return these only when
packing is enabled.\r\n      ...this.getCommonUtilFuncs(),\r\n      ...this.getInputsSamplingSnippets(),\r\n
...this.getOutputSamplingSnippet()\r\n    };\r\n  }\r\n  getCustomTypes() {\r\n    return {};\r\n  }\r\n  /**\r\n   *
Produces a function that can map from\r\n   * 2D normalzied coordinates (s,t) to a flat offset\r\n   */\r\n  protected
offsetToCoords(): {[name: string]: GlslLibRoutine} {\r\n    const funcName = 'offsetToCoords';\r\n    return {\r\n
offsetToCoords: new GlslLibRoutine(`\r\n      vec2 ${funcName}(int offset, int width, int height) {\r\n        int t =
offset / width;\r\n        int s = offset - t*width;\r\n        vec2 coords = (vec2(s,t) + vec2(0.5,0.5)) / vec2(width,
height);\r\n        return coords;\r\n      }\r\n      `)\r\n    };\r\n  }\r\n\r\n  /**\r\n   * Produces a function that can map
from\r\n   * 2D normalzied coordinates (s,t) to a flat offset\r\n   */\r\n  protected coordsToOffset(): {[name: string]:
GlslLibRoutine} {\r\n    const funcName = 'coordsToOffset';\r\n    return {\r\n      coordsToOffset: new
GlslLibRoutine(`\r\n      int ${funcName}(vec2 coords, int width, int height) {\r\n        float s = coords.s *
float(width);\r\n        float t = coords.t * float(height);\r\n        int offset = int(t) * width + int(s);\r\n        return
offset;\r\n      }\r\n      `)\r\n    };\r\n  }\r\n\r\n  /**\r\n   * Generates code for output sampler.\r\n   */\r\n\r\n  protected
getOutputSamplingSnippet(): {[name: string]: GlslLibRoutine} {\r\n    const outputLayout =
this.context.outputTextureLayout;\r\n    if (outputLayout.isPacked) {\r\n      return
this.getPackedOutputSamplingSnippet(outputLayout);\r\n    } else {\r\n      return
this.getUnpackedOutputSamplingSnippet(outputLayout);\r\n    }\r\n  }\r\n\r\n  /**\r\n   * Generates code for packed
output sampler.\r\n   */\r\n  protected getPackedOutputSamplingSnippet(outputLayout: TextureLayout): {[name:
string]: GlslLibRoutine} {\r\n    const outShape = outputLayout.unpackedShape;\r\n    const outTexShape =
[outputLayout.width, outputLayout.height];\r\n    const result: {[name: string]: GlslLibRoutine} = {};\r\n    const
funcName = 'getOutputCoords';\r\n    switch (outShape.length) {\r\n      case 0:\r\n        result[funcName] =
this.getOutputScalarCoords();\r\n        break;\r\n      case 1:\r\n        result[funcName] =
this.getOutputPacked1DCoords(outShape as [number], outTexShape as [number, number]);\r\n        break;\r\n
case 2:\r\n        result[funcName] = this.getOutputPacked2DCoords(outShape as [number, number], outTexShape as
[number, number]);\r\n        break;\r\n      case 3:\r\n        result[funcName] =\r\n
this.getOutputPacked3DCoords(outShape as [number, number, number], outTexShape as [number, number]);\r\n
break;\r\n      default:\r\n        result[funcName] = this.getOutputPackedNDCoords(outShape, outTexShape as
[number, number]);\r\n    }\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n    // TODO we need this to
```

properly return a packed vec4 from kernels.\r\n // Replace all '{glsl.output} = result' with 'setOutput(result)' in all kernels.\r\n const floatTextureSetRGBASource = `\r\n void setOutput(vec4 val) {\r\n ${glsl.output} = val;\r\n }\r\n `;\r\n const floatTextureSetRGBAFuncName = 'floatTextureSetRGBA';\r\n result[floatTextureSetRGBAFuncName] = new GlslLibRoutine(floatTextureSetRGBASource);\r\n return result;\r\n }\r\n\r\n /**\r\n * Generates code for unpacked output sampler.\r\n */\r\n protected getUnpackedOutputSamplingSnippet(outputLayout: TextureLayout): {[name: string]: GlslLibRoutine} {\r\n const outShape = outputLayout.unpackedShape;\r\n const outTexShape = [outputLayout.width, outputLayout.height];\r\n const result: {[name: string]: GlslLibRoutine} = {};\r\n const funcName = 'getOutputCoords';\r\n switch (outShape.length) {\r\n case 0:\r\n result[funcName] = this.getOutputScalarCoords();\r\n break;\r\n case 1:\r\n result[funcName] = this.getOutputUnpacked1DCoords(outShape as [number], outTexShape as [number, number]);\r\n break;\r\n case 2:\r\n result[funcName] =\r\n this.getOutputUnpacked2DCoords(outShape as [number, number], outTexShape as [number, number]);\r\n break;\r\n case 3:\r\n result[funcName] =\r\n this.getOutputUnpacked3DCoords(outShape as [number, number, number], outTexShape as [number, number]);\r\n break;\r\n case 4:\r\n result[funcName] = this.getOutputUnpacked4DCoords(\r\n outShape as [number, number, number, number], outTexShape as [number, number]);\r\n break;\r\n case 5:\r\n result[funcName] = this.getOutputUnpacked5DCoords(\r\n outShape as [number, number, number, number, number], outTexShape as [number, number]);\r\n break;\r\n case 6:\r\n result[funcName] = this.getOutputUnpacked6DCoords(\r\n outShape as [number, number, number, number, number, number], outTexShape as [number, number]);\r\n break;\r\n default:\r\n throw new Error(`Unsupported output dimensionality: ${outShape.length}`);\r\n }\r\n const glsl = getGlsl(this.context.glContext.version);\r\n // TODO we need this to properly return a packed vec4 from kernels.\r\n // Replace all '{glsl.output} = result' with 'setOutput(result)' in all kernels.\r\n const floatTextureSetRSource = `\r\n void setOutput(float val) {\r\n ${glsl.output} = vec4(val, 0, 0, 0);\r\n }\r\n `;\r\n const floatTextureSetRFuncName = 'floatTextureSetR';\r\n result[floatTextureSetRFuncName] = new GlslLibRoutine(floatTextureSetRSource);\r\n return result;\r\n }\r\n\r\n /**\r\n * Scalar output coordinates.\r\n */\r\n protected getOutputScalarCoords(): GlslLibRoutine {\r\n return new GlslLibRoutine(`\r\n int getOutputCoords() {\r\n return 0;\r\n }\r\n `);\r\n }\r\n\r\n /**\r\n * 1D packed output coordinates.\r\n */\r\n protected getOutputPacked1DCoords(shape: [number], texShape: [number, number]): GlslLibRoutine {\r\n const packedTexShape = texShape;\r\n let source = '';\r\n if (packedTexShape[0] === 1) {\r\n source = `\r\n int getOutputCoords() {\r\n return 2 * int(TexCoords.y * ${packedTexShape[1]}.0);\r\n }\r\n `;\r\n return new GlslLibRoutine(source);\r\n }\r\n\r\n if (packedTexShape[1] === 1) {\r\n source = `\r\n int getOutputCoords() {\r\n return 2 * int(TexCoords.x * ${packedTexShape[0]}.0);\r\n }\r\n `;\r\n return new GlslLibRoutine(source);\r\n }\r\n\r\n source = `\r\n int getOutputCoords() {\r\n ivec2 resTexRC = ivec2(TexCoords.xy *\r\n vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n return 2 * (resTexRC.y * ${packedTexShape[0]} + resTexRC.x);\r\n }\r\n `;\r\n return new GlslLibRoutine(source);\r\n }\r\n\r\n /**\r\n * 2D packed output coordinates.\r\n */\r\n protected getOutputPacked2DCoords(shape: [number, number], texShape: [number, number]): GlslLibRoutine {\r\n let source = '';\r\n if (ArrayUtil.arraysEqual(shape, texShape)) {\r\n source = `\r\n ivec2 getOutputCoords() {\r\n return 2 * ivec2(TexCoords.xy * vec2(${texShape[0]}, ${texShape[1]}));\r\n }\r\n `;\r\n return new GlslLibRoutine(source);\r\n }\r\n\r\n const packedTexShape = texShape;\r\n // texels needed to accommodate a logical row\r\n const texelsInLogicalRow = Math.ceil(shape[1] / 2);\r\n\r\n /**\r\n * getOutputCoords\r\n *\r\n * resTexRC: The rows and columns of the texels. If you move over one\r\n * texel to the right in the packed texture, you are moving over one column\r\n * (not two).\r\n *\r\n * index: The texel index\r\n */\r\n source = `\r\n ivec2 getOutputCoords() {\r\n ivec2 resTexRC = ivec2(TexCoords.xy *\r\n vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n\r\n int index = resTexRC.y * ${packedTexShape[0]} + resTexRC.x;\r\n\r\n // reverse r and c order for packed texture\r\n int r = imod(index, ${texelsInLogicalRow}) * 2;\r\n int c = 2 * (index / ${texelsInLogicalRow});\r\n\r\n return

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ivec2(r, c);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * 3D packed output
coordinates.\r\n   */\r\n  protected getOutputPacked3DCoords(shape: [number, number, number], texShape:
[number, number]): GlslLibRoutine {\r\n    const packedTexShape = [texShape[0], texShape[1]];\r\n    const
texelsInLogicalRow = Math.ceil(shape[2] / 2);\r\n    const texelsInBatch = texelsInLogicalRow * Math.ceil(shape[1]
/ 2);\r\n    const source = `\r\n        ivec3 getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                          vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n          int index = resTexRC.y *
${packedTexShape[0]} + resTexRC.x;\r\n\r\n          int b = index / ${texelsInBatch};\r\n          index -= b *
${texelsInBatch};\r\n\r\n          // reverse r and c order for packed texture\r\n          int r = imod(index,
${texelsInLogicalRow}) * 2;\r\n          int c = 2 * (index / ${texelsInLogicalRow});\r\n\r\n          return ivec3(b, r,
c);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * ND packed output
coordinates.\r\n   */\r\n  protected getOutputPackedNDCoords(shape: readonly number[], texShape: [number,
number]): GlslLibRoutine {\r\n    const packedTexShape = [texShape[0], texShape[1]];\r\n\r\n    const
texelsInLogicalRow = Math.ceil(shape[shape.length - 1] / 2);\r\n    const texelsInBatch = texelsInLogicalRow *
Math.ceil(shape[shape.length - 2] / 2);\r\n    let texelsInBatchN = texelsInBatch;\r\n    let batches = '';\r\n    let coords
= 'b, r, c';\r\n\r\n    for (let b = 2; b < shape.length - 1; b++) {\r\n      texelsInBatchN *= shape[shape.length - b -
1];\r\n      batches = `\r\n      int b${b} = index / ${texelsInBatchN};\r\n      index -= b${b} * ${texelsInBatchN};\r\n
 ` + batches;\r\n      coords = `b${b}, ` + coords;\r\n    }\r\n    const source = `\r\n      ivec${shape.length}
getOutputCoords() {\r\n        ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
vec2(${packedTexShape[0]}, ${packedTexShape[1]}));\r\n        int index = resTexRC.y * ${packedTexShape[0]} +
resTexRC.x;\r\n\r\n        ${batches}\r\n\r\n        int b = index / ${texelsInBatch};\r\n        index -= b *
${texelsInBatch};\r\n\r\n        // reverse r and c order for packed texture\r\n        int r = imod(index,
${texelsInLogicalRow}) * 2;\r\n        int c = 2 * (index / ${texelsInLogicalRow});\r\n\r\n        return
ivec${shape.length}(${coords});\r\n      }\r\n    `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   *
Unpacked 1D output coordinates.\r\n   */\r\n  protected getOutputUnpacked1DCoords(shape: [number], texShape:
[number, number]): GlslLibRoutine {\r\n    const source = `\r\n        int getOutputCoords() {\r\n          ivec2
resTexRC = ivec2(TexCoords.xy *\r\n                              vec2(${texShape[0]}, ${texShape[1]}));\r\n          return
resTexRC.y * ${texShape[0]} + resTexRC.x;\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n
}\r\n\r\n  /**\r\n   * Unpacked 2D output coordinates.\r\n   */\r\n  protected getOutputUnpacked2DCoords(shape:
[number, number], texShape: [number, number]): GlslLibRoutine {\r\n    const source = `\r\n        ivec2
getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
vec2(${texShape[0]}, ${texShape[1]}));\r\n          int index = resTexRC.y * ${texShape[0]} + resTexRC.x;\r\n
int r = index / ${shape[1]};\r\n          int c = index - r * ${shape[1]};\r\n          return ivec2(r, c);\r\n        }\r\n
`;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 3D output coordinates.\r\n   */\r\n
protected getOutputUnpacked3DCoords(shape: [number, number, number], texShape: [number, number]):
GlslLibRoutine {\r\n    let source = '';\r\n    const rank = shape.length;\r\n\r\n    let strides = null;\r\n    if (rank < 2)
{\r\n      strides = [];\r\n    }\r\n\r\n    strides = new Array(rank - 1);\r\n    strides[rank - 2] = shape[rank - 1];\r\n    for
(let i = rank - 3; i >= 0; --i) {\r\n      strides[i] = strides[i + 1] * shape[i + 1];\r\n    }\r\n    const coordsToCompute =
['r', 'c', 'd'];\r\n    const coordsFromIndexSnippet =\r\n        strides\r\n            .map((stride, i) => {\r\n              const
line1 = `int ${coordsToCompute[i]} = index / ${stride}`;\r\n              const line2 = i === strides.length - 1 ?\r\n
      `int ${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} * ${stride}` :\r\n                  `index -=
${coordsToCompute[i]} * ${stride}`;\r\n              return `${line1}; ${line2};`;\r\n            })\r\n
.join('');\r\n\r\n    source = `\r\n        ivec3 getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                          vec2(${texShape[0]}, ${texShape[1]}));\r\n          int index = resTexRC.y * ${texShape[0]} +
resTexRC.x;\r\n          ${coordsFromIndexSnippet}\r\n          return ivec3(r, c, d);\r\n        }\r\n      `;\r\n    return new
GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 4D output coordinates.\r\n   */\r\n  protected
getOutputUnpacked4DCoords(shape: [number, number, number, number], texShape: [number, number]):\r\n
GlslLibRoutine {\r\n    let source = '';\r\n    const rank = shape.length;\r\n\r\n    let strides = null;\r\n    if (rank < 2)
{\r\n      strides = [];\r\n    }\r\n\r\n    strides = new Array(rank - 1);\r\n    strides[rank - 2] = shape[rank - 1];\r\n    for
```

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(let i = rank - 3; i >= 0; --i) {\r\n      strides[i] = strides[i + 1] * shape[i + 1];\r\n    }\r\n    const coordsToCompute =
['r', 'c', 'd', 'd2'];\r\n    const coordsFromIndexSnippet =\r\n        strides\r\n            .map((stride, i) => {\r\n
const line1 = `int ${coordsToCompute[i]} = index / ${stride}`;\r\n              const line2 = i === strides.length - 1
?\r\n                  `int ${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} * ${stride}` :\r\n
`index -= ${coordsToCompute[i]} * ${stride}`;\r\n              return `${line1}; ${line2};`;\r\n            })\r\n
.join('');\r\n\r\n    source = `\r\n      ivec4 getOutputCoords() {\r\n          ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                          vec2(${texShape[0]}, ${texShape[1]}));\r\n          int index = resTexRC.y * ${texShape[0]} +
resTexRC.x;\r\n          ${coordsFromIndexSnippet}\r\n          return ivec4(r, c, d, d2);\r\n        }\r\n      `;\r\n    return
new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 5D output coordinates.\r\n   */\r\n  protected
getOutputUnpacked5DCoords(shape: [number, number, number, number, number], texShape: [number,
number]):\r\n      GlslLibRoutine {\r\n    let source = '';\r\n    const rank = shape.length;\r\n\r\n    let strides = null;\r\n
  if (rank < 2) {\r\n      strides = [];\r\n    }\r\n\r\n    strides = new Array(rank - 1);\r\n    strides[rank - 2] = shape[rank
- 1];\r\n    for (let i = rank - 3; i >= 0; --i) {\r\n      strides[i] = strides[i + 1] * shape[i + 1];\r\n    }\r\n    const
coordsToCompute = ['r', 'c', 'd', 'd2', 'd3'];\r\n    const coordsFromIndexSnippet =\r\n        strides\r\n
.map((stride, i) => {\r\n              const line1 = `int ${coordsToCompute[i]} = index / ${stride}`;\r\n              const
line2 = i === strides.length - 1 ?\r\n                  `int ${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} *
${stride}` :\r\n                  `index -= ${coordsToCompute[i]} * ${stride}`;\r\n              return `${line1};
${line2};`;\r\n            })\r\n            .join('');\r\n\r\n    source = `\r\n      ivec5 getOutputCoords() {\r\n          ivec2
resTexRC = ivec2(TexCoords.xy *\r\n                              vec2(${texShape[0]}, ${texShape[1]}));\r\n          int
index = resTexRC.y * ${texShape[0]} + resTexRC.x;\r\n          ${coordsFromIndexSnippet}\r\n          return ivec5(r,
c, d, d2, d3);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 6D
output coordinates.\r\n   */\r\n  protected getOutputUnpacked6DCoords(shape: [number, number, number, number,
number, number], texShape: [\r\n    number, number\r\n  ]): GlslLibRoutine {\r\n    let source = '';\r\n    const rank =
shape.length;\r\n\r\n    let strides = null;\r\n    if (rank < 2) {\r\n      strides = [];\r\n    }\r\n\r\n    strides = new
Array(rank - 1);\r\n    strides[rank - 2] = shape[rank - 1];\r\n    for (let i = rank - 3; i >= 0; --i) {\r\n      strides[i] =
strides[i + 1] * shape[i + 1];\r\n    }\r\n    const coordsToCompute = ['r', 'c', 'd', 'd2', 'd3', 'd4'];\r\n    const
coordsFromIndexSnippet =\r\n        strides\r\n            .map((stride, i) => {\r\n              const line1 = `int
${coordsToCompute[i]} = index / ${stride}`;\r\n              const line2 = i === strides.length - 1 ?\r\n                  `int
${coordsToCompute[i + 1]} = index - ${coordsToCompute[i]} * ${stride}` :\r\n                  `index -=
${coordsToCompute[i]} * ${stride}`;\r\n              return `${line1}; ${line2};`;\r\n            })\r\n
.join('');\r\n\r\n    source = `\r\n     ivec6 getOutputCoords() {\r\n         ivec2 resTexRC = ivec2(TexCoords.xy *\r\n
                         vec2(${texShape[0]}, ${texShape[1]}));\r\n         int index = resTexRC.y * ${texShape[0]} +
resTexRC.x;\r\n         ${coordsFromIndexSnippet}\r\n         return ivec6(r, c, d, d2, d3, d4);\r\n       }\r\n     `;\r\n
return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Generates code for common UV coords computation
utility functions.\r\n   */\r\n  protected getCommonUtilFuncs(): {[name: string]: GlslLibRoutine} {\r\n    const
result: {[name: string]: GlslLibRoutine} = {};\r\n    let funcName = 'uvFromFlat';\r\n    result[funcName] = new
GlslLibRoutine(`\r\n    vec2 uvFromFlat(int texNumR, int texNumC, int index) {\r\n      int texC = index /
texNumR;\r\n      int texR = index - texC * texNumR;\r\n      // TODO: swap texR, texC order in following function
so row is corresponding to u and column is corresponding to\r\n      //       v.\r\n      return (vec2(texR, texC) +
halfCR) / vec2(texNumR, texNumC);\r\n    }\r\n    `);\r\n    funcName = 'packedUVfrom1D';\r\n    result[funcName]
= new GlslLibRoutine(`\r\n      vec2 packedUVfrom1D(int texNumR, int texNumC, int index) {\r\n        int
texelIndex = index / 2;\r\n        int texR = texelIndex / texNumC;\r\n        int texC = texelIndex - texR *
texNumC;\r\n        return (vec2(texC, texR) + halfCR) / vec2(texNumC, texNumR);\r\n      }\r\n      `);\r\n
funcName = 'packedUVfrom2D';\r\n    result[funcName] = new GlslLibRoutine(`\r\n      vec2 packedUVfrom2D(int
texNumR, int texNumC, int texelsInLogicalRow, int row, int col) {\r\n        int texelIndex = (row / 2) *
texelsInLogicalRow + (col / 2);\r\n        int texR = texelIndex / texNumC;\r\n        int texC = texelIndex - texR *
texNumC;\r\n        return (vec2(texC, texR) + halfCR) / vec2(texNumC, texNumR);\r\n      }\r\n      `);\r\n
funcName = 'packedUVfrom3D';\r\n    result[funcName] = new GlslLibRoutine(`\r\n      vec2 packedUVfrom3D(int
```

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texNumR, int texNumC,\r\n          int texelsInBatch, int texelsInLogicalRow, int b,\r\n          int row, int col) {\r\n
int index = b * texelsInBatch + (row / 2) * texelsInLogicalRow + (col / 2);\r\n        int texR = index / texNumC;\r\n
   int texC = index - texR * texNumC;\r\n        return (vec2(texC, texR) + halfCR) / vec2(texNumC, texNumR);\r\n
 }\r\n      `);\r\n    funcName = 'sampleTexture';\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n
result[funcName] = new GlslLibRoutine(`\r\n        float sampleTexture(sampler2D textureSampler, vec2 uv) {\r\n
     return ${glsl.texture2D}(textureSampler, uv).r;\r\n        }`);\r\n    return result;\r\n  }\r\n\r\n  /**\r\n   *
Constructing snippets for inputs\r\n   */\r\n  protected getInputsSamplingSnippets(): {[name: string]:
GlslLibRoutine} {\r\n    const result: {[name: string]: GlslLibRoutine} = {};\r\n    const outputLayout =
this.context.outputTextureLayout;\r\n    this.context.programInfo.inputNames.forEach((samplerName, i) => {\r\n
const inputLayout = this.context.inputTextureLayouts[i];\r\n      const funcName =
generateShaderFuncNameFromInputSamplerName(samplerName);\r\n      if (inputLayout.isPacked) {\r\n
result[funcName] = this.getPackedSamplerFromInput(funcName, samplerName, inputLayout);\r\n      } else {\r\n
 result[funcName] = this.getUnpackedSamplerFromInput(funcName, samplerName, inputLayout);\r\n      }\r\n\r\n
const outCoordFuncName = generateShaderFuncNameFromInputSamplerNameAtOutCoords(samplerName);\r\n
if (inputLayout.unpackedShape.length <= outputLayout.unpackedShape.length) {\r\n        if (inputLayout.isPacked)
{\r\n          result[outCoordFuncName] =\r\n              this.getPackedSamplerAtOutputCoords(outCoordFuncName,
inputLayout, outputLayout, samplerName);\r\n        } else {\r\n          result[outCoordFuncName] =\r\n
this.getUnpackedSamplerAtOutputCoords(outCoordFuncName, inputLayout, outputLayout, samplerName);\r\n
}\r\n      }\r\n    });\r\n\r\n    return result;\r\n  }\r\n\r\n  /**\r\n   * Constructing snippets for output coordinates of
samplers\r\n   */\r\n  protected getPackedSamplerAtOutputCoords(\r\n      funcName: string, inputLayout:
TextureLayout, outputLayout: TextureLayout, name: string): GlslLibRoutine {\r\n    const inShape =
inputLayout.unpackedShape;\r\n    const outShape = outputLayout.unpackedShape;\r\n    const texName = name;\r\n
  const texFuncSnippet = generateShaderFuncNameFromInputSamplerName(texName);\r\n\r\n    const inRank =
inShape.length;\r\n    const outRank = outShape.length;\r\n\r\n    const broadcastDims =
BroadcastUtil.getBroadcastDims(inShape, outShape);\r\n\r\n    const type = getCoordsDataType(outRank);\r\n
const rankDiff = outRank - inRank;\r\n    let coordsSnippet: string;\r\n    const fields = getGlChannels();\r\n\r\n    if
(inRank === 0) {\r\n      coordsSnippet = '';\r\n    } else if (outRank < 2 && broadcastDims.length >= 1) {\r\n
coordsSnippet = 'coords = 0;';\r\n    } else {\r\n      coordsSnippet = broadcastDims.map(d => `coords.${fields[d +
rankDiff]} = 0;`).join('\\n');\r\n    }\r\n    let unpackedCoordsSnippet = '';\r\n    if (outRank < 2 && inRank > 0) {\r\n
   unpackedCoordsSnippet = 'coords';\r\n    } else {\r\n      unpackedCoordsSnippet = inShape.map((s, i) =>
`coords.${fields[i + rankDiff]}`).join(', ');\r\n    }\r\n\r\n    let output = 'return outputValue;';\r\n    const inSize =
ShapeUtil.size(inShape);\r\n    const isInputScalar = inSize === 1;\r\n    const outSize =
ShapeUtil.size(outShape);\r\n    const isOutputScalar = outSize === 1;\r\n\r\n    if (inRank === 1 && !isInputScalar
&& !isOutputScalar) {\r\n      output = `\r\n        return vec4(outputValue.xy, outputValue.xy);\r\n      `;\r\n    } else if
(isInputScalar && !isOutputScalar) {\r\n      if (outRank === 1) {\r\n        output = `\r\n          return
vec4(outputValue.x, outputValue.x, 0., 0.);\r\n        `;\r\n      } else {\r\n        output = `\r\n          return
vec4(outputValue.x);\r\n        `;\r\n      }\r\n    } else if (broadcastDims.length) {\r\n      const rows = inRank - 2;\r\n
 const cols = inRank - 1;\r\n\r\n      if (broadcastDims.indexOf(rows) > -1 && broadcastDims.indexOf(cols) > -1)
{\r\n        output = 'return vec4(outputValue.x);';\r\n      } else if (broadcastDims.indexOf(rows) > -1) {\r\n
output = 'return vec4(outputValue.x, outputValue.y, ' +\r\n            'outputValue.x, outputValue.y);';\r\n      } else if
(broadcastDims.indexOf(cols) > -1) {\r\n        output = 'return vec4(outputValue.xx, outputValue.zz);';\r\n      }\r\n
}\r\n\r\n    const swapLastDimsSnippet = `\r\n        int lastDim = coords.${fields[outRank - 1]};\r\n
coords.${fields[outRank - 1]} = coords.${fields[outRank - 2]};\r\n        coords.${fields[outRank - 2]} = lastDim;\r\n
    `;\r\n    const source = `\r\n      vec4 ${funcName}() {\r\n        ${type} coords = getOutputCoords();\r\n
${swapLastDimsSnippet}\r\n        ${coordsSnippet}\r\n        vec4 outputValue =
${texFuncSnippet}(${unpackedCoordsSnippet});\r\n        ${output}\r\n      }\r\n    `;\r\n    return new
GlslLibRoutine(source, ['coordinates.getOutputCoords']);\r\n  }\r\n\r\n  /**\r\n   * Constructing snippets for
unpacked output coordinates of samplers\r\n   */\r\n  protected getUnpackedSamplerAtOutputCoords(\r\n
```

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funcName: string, inputLayout: TextureLayout, outputLayout: TextureLayout, name: string): GlslLibRoutine {\r\n
const outTexShape = [outputLayout.width, outputLayout.height];\r\n    const inTexShape = [inputLayout.width,
inputLayout.height];\r\n    const inRank = inputLayout.unpackedShape.length;\r\n    const outRank =
outputLayout.unpackedShape.length;\r\n    const inShape = inputLayout.unpackedShape;\r\n    const outShape =
outputLayout.unpackedShape;\r\n    const texFuncSnippet =
generateShaderFuncNameFromInputSamplerName(name);\r\n\r\n    if (inRank === outRank &&
ArrayUtil.arraysEqual(inTexShape, outTexShape)) {\r\n      const source = `\r\n          float ${funcName}() {\r\n
   return sampleTexture(${name}, TexCoords);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source,
['coordinates.sampleTexture']);\r\n    }\r\n\r\n    const type = getCoordsDataType(outRank);\r\n    const
broadcastDims = BroadcastUtil.getBroadcastDims(inShape, outShape);\r\n    const rankDiff = outRank - inRank;\r\n
  let coordsSnippet: string;\r\n    const fields = getGlChannels();\r\n\r\n    if (inRank === 0) {\r\n      coordsSnippet =
'';\r\n    } else if (outRank < 2 && broadcastDims.length >= 1) {\r\n      coordsSnippet = 'coords = 0;';\r\n    } else
{\r\n      coordsSnippet = broadcastDims.map(d => `coords.${fields[d + rankDiff]} = 0;`).join('\\n');\r\n    }\r\n    let
unpackedCoordsSnippet = '';\r\n    if (outRank < 2 && inRank > 0) {\r\n      unpackedCoordsSnippet = 'coords';\r\n
} else {\r\n      unpackedCoordsSnippet = inputLayout.unpackedShape.map((s, i) => `coords.${fields[i +
rankDiff]}`).join(', ');\r\n    }\r\n    const source = `\r\n        float ${funcName}() {\r\n          ${type} coords =
getOutputCoords();\r\n          ${coordsSnippet}\r\n          return ${texFuncSnippet}(${unpackedCoordsSnippet});\r\n
      }\r\n      `;\r\n    return new GlslLibRoutine(source, ['coordinates.getOutputCoords']);\r\n  }\r\n\r\n  /**\r\n   *
Constructing snippets for packed operations.\r\n   */\r\n  protected getPackedSamplerFromInput(funcName: string,
name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    switch (inputLayout.unpackedShape.length)
{\r\n      case 0:\r\n        return this.getPackedSamplerScalar(funcName, name);\r\n      case 1:\r\n        return
this.getPackedSampler1D(funcName, name, inputLayout);\r\n      case 2:\r\n        return
this.getPackedSampler2D(funcName, name, inputLayout);\r\n      case 3:\r\n        return
this.getPackedSampler3D(funcName, name, inputLayout);\r\n      default:\r\n        return
this.getPackedSamplerND(funcName, name, inputLayout);\r\n    }\r\n  }\r\n\r\n  /**\r\n   * Constructing snippets for
unpacked operations.\r\n   */\r\n  protected getUnpackedSamplerFromInput(funcName: string, name: string,
inputLayout: TextureLayout): GlslLibRoutine {\r\n    const shape = inputLayout.unpackedShape;\r\n    switch
(shape.length) {\r\n      case 0:\r\n        return this.getUnpackedSamplerScalar(funcName, name, inputLayout);\r\n
case 1:\r\n        return this.getUnpackedSampler1D(funcName, name, inputLayout);\r\n      case 2:\r\n        return
this.getUnpackedSampler2D(funcName, name, inputLayout);\r\n      case 3:\r\n        return
this.getUnpackedSampler3D(funcName, name, inputLayout);\r\n      case 4:\r\n        return
this.getUnpackedSampler4D(funcName, name, inputLayout);\r\n      case 5:\r\n        return
this.getUnpackedSampler5D(funcName, name, inputLayout);\r\n      case 6:\r\n        return
this.getUnpackedSampler6D(funcName, name, inputLayout);\r\n      default:\r\n        // TODO support more
dimensionalities\r\n        throw new Error(`Unsupported dimension ${shape.length}-D`);\r\n    }\r\n  }\r\n\r\n  /**\r\n
 * Packed scalar snippet.\r\n   */\r\n  protected getPackedSamplerScalar(funcName: string, name: string):
GlslLibRoutine {\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n    const source = `\r\n          vec4
${funcName}() {\r\n            return ${glsl.texture2D}(${name}, halfCR);\r\n          }\r\n        `;\r\n    return new
GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Packed 1D snippet.\r\n   */\r\n  protected
getPackedSampler1D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    const
texShape = [inputLayout.width, inputLayout.height];\r\n    const packedTexShape = [texShape[1], texShape[0]];\r\n
 const glsl = getGlsl(this.context.glContext.version);\r\n\r\n    const packedSampler = `vec4 ${funcName}(int index)
{\r\n      vec2 uv = packedUVfrom1D(\r\n      ${packedTexShape[0]}, ${packedTexShape[1]}, index);\r\n      return
${glsl.texture2D}(${name}, uv);\r\n    }`;\r\n    const source = packedSampler;\r\n    return new
GlslLibRoutine(source, ['coordinates.packedUVfrom1D']);\r\n  }\r\n\r\n  /**\r\n   * Packed 2D snippet.\r\n   */\r\n
protected getPackedSampler2D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n
 const shape = inputLayout.unpackedShape;\r\n    const texShape = [inputLayout.width, inputLayout.height];\r\n
const glsl = getGlsl(this.context.glContext.version);\r\n    const texNumR = texShape[0];\r\n    const texNumC =
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texShape[1];\r\n\r\n    if (texShape != null && ArrayUtil.arraysEqual(shape, texShape)) {\r\n      const
packedSampler = `vec4 ${funcName}(int row, int col) {\r\n        vec2 uv = (vec2(col, row) + halfCR) /
vec2(${texNumC}.0, ${texNumR}.0);\r\n        return ${glsl.texture2D}(${name}, uv);\r\n      }`;\r\n\r\n      return
new GlslLibRoutine(packedSampler);\r\n    }\r\n    const packedTexShape = texShape;\r\n    const valuesPerRow =
Math.ceil(shape[1] / 2);\r\n    const packedSampler = `vec4 ${funcName}(int row, int col) {\r\n      vec2 uv =
packedUVfrom2D(${packedTexShape[1]}, ${packedTexShape[0]}, ${valuesPerRow}, row, col);\r\n      return
${glsl.texture2D}(${name}, uv);\r\n    }`;\r\n    const source = packedSampler;\r\n    return new
GlslLibRoutine(source, ['coordinates.packedUVfrom2D']);\r\n  }\r\n\r\n  /**\r\n   * Packed 3D snippet.\r\n   */\r\n
protected getPackedSampler3D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n
 const shape = inputLayout.unpackedShape;\r\n    const texShape = [inputLayout.width, inputLayout.height];\r\n
const packedTexShape = [texShape[0], texShape[1]];\r\n    const glsl =
getGlsl(this.context.glContext.version);\r\n\r\n    if (shape[0] === 1) {\r\n      const squeezedShape =
shape.slice(1);\r\n      const keptDims = [1, 2];\r\n      const newInputShape = squeezeInputShape(shape,
squeezedShape);\r\n      const params = ['b', 'row', 'col'];\r\n      // Deep copy of input texture layout.\r\n      const
newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
newInputLayout.unpackedShape = newInputShape;\r\n      const samplerRoutine =
this.getPackedSamplerFromInput(funcName, name, newInputLayout);\r\n      const packedSampler =
`${samplerRoutine.routineBody}\r\n      vec4 ${funcName}(int b, int row, int col) {\r\n        return
${funcName}(${getSqueezedParams(params, keptDims)});\r\n      } `;\r\n      const source = packedSampler;\r\n
return new GlslLibRoutine(source, samplerRoutine.dependencies);\r\n    }\r\n    const texNumR =
packedTexShape[0];\r\n    const texNumC = packedTexShape[1];\r\n\r\n    const valuesPerRow =
Math.ceil(shape[2] / 2);\r\n    const texelsInBatch = valuesPerRow * Math.ceil(shape[1] / 2);\r\n\r\n    const
packedSampler = `vec4 ${funcName}(int b, int row, int col) {\r\n      vec2 uv = packedUVfrom3D(\r\n
${texNumC}, ${texNumR}, ${texelsInBatch}, ${valuesPerRow}, b, row, col);\r\n      return
${glsl.texture2D}(${name}, uv);}`;\r\n    const source = packedSampler;\r\n    return new GlslLibRoutine(source,
['coordinates.packedUVfrom3D']);\r\n  }\r\n  /*\r\n   * Packed ND snippet.\r\n   */\r\n  protected
getPackedSamplerND(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    const
shape = inputLayout.unpackedShape;\r\n    const rank = shape.length;\r\n    const texShape = [inputLayout.width,
inputLayout.height];\r\n    const glsl = getGlsl(this.context.glContext.version);\r\n\r\n    const packedTexShape =
[texShape[0], texShape[1]];\r\n    const texNumR = packedTexShape[1];\r\n    const texNumC =
packedTexShape[0];\r\n    const valuesPerRow = Math.ceil(shape[rank - 1] / 2);\r\n    let texelsInBatch =
valuesPerRow * Math.ceil(shape[rank - 2] / 2);\r\n    let params = 'int b, int row, int col';\r\n    let index = `b *
${texelsInBatch} + (row / 2) * ${valuesPerRow} + (col / 2)`;\r\n    for (let b = 2; b < rank - 1; b++) {\r\n      params
= `int b${b}, ` + params;\r\n      texelsInBatch *= shape[rank - b - 1];\r\n      index = `b${b} * ${texelsInBatch} + ` +
index;\r\n    }\r\n    const packedSampler = `vec4 ${funcName}(${params}) {\r\n      int index = ${index};\r\n      int
texR = index / ${texNumC};\r\n      int texC = index - texR * ${texNumC};\r\n      vec2 uv = (vec2(texC, texR) +
halfCR) / vec2(${texNumC}, ${texNumR});\r\n      return ${glsl.texture2D}(${name}, uv);\r\n    }`;\r\n    const
source = packedSampler;\r\n    return new GlslLibRoutine(source);\r\n  }\r\n\r\n  /**\r\n   * Unpacked scalar
snippet.\r\n   */\r\n  protected getUnpackedSamplerScalar(funcName: string, name: string, inputLayout:
TextureLayout): GlslLibRoutine {\r\n    const [texNumR, texNumC] = [inputLayout.width, inputLayout.height];\r\n
 if (texNumR === 1 && texNumC === 1) {\r\n      const source = `\r\n          float ${funcName}() {\r\n            return
sampleTexture(${name}, halfCR);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source,
['coordinates.sampleTexture']);\r\n    }\r\n\r\n    const source = `\r\n        float ${funcName}() {\r\n          int
offset_${name} = coordsToOffset(TexCoords, ${texNumR}, ${texNumC});\r\n          vec2 uv =
uvFromFlat(${texNumR}, ${texNumC}, offset_${name});\r\n          return sampleTexture(${name}, uv);\r\n
}\r\n      `;\r\n    return new GlslLibRoutine(\r\n        source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture',
'coordinates.coordsToOffset']);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 1D snippet.\r\n   */\r\n  protected
getUnpackedSampler1D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    const
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tNumR = inputLayout.width;\r\n    const tNumC = inputLayout.height;\r\n\r\n    if (tNumC === 1 && tNumR ===
1) {\r\n      const source = `\r\n        float ${funcName}(int index) {\r\n          return sampleTexture(${name},
halfCR);\r\n        }\r\n      `;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n\r\n
if (tNumC === 1) {\r\n      const source = `\r\n          float ${funcName}(int index) {\r\n            vec2 uv =
vec2((float(index) + 0.5) / ${tNumR}.0, 0.5);\r\n            return sampleTexture(${name}, uv);\r\n          }\r\n
`;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n    if (tNumR === 1) {\r\n
const source = `\r\n          float ${funcName}(int index) {\r\n            vec2 uv = vec2(0.5, (float(index) + 0.5) /
${tNumC}.0);\r\n            return sampleTexture(${name}, uv);\r\n          }\r\n        `;\r\n      return new
GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n    const source = `\r\n        float ${funcName}(int
index) {\r\n          vec2 uv = uvFromFlat(${tNumR}, ${tNumC}, index);\r\n          return sampleTexture(${name},
uv);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source, ['coordinates.uvFromFlat',
'coordinates.sampleTexture']);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 2D snippet.\r\n   */\r\n\r\n  protected
getUnpackedSampler2D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine {\r\n    const
shape = inputLayout.unpackedShape;\r\n\r\n    // TODO: modify row/col order for other dimensions.\r\n    const
texShape = [inputLayout.height, inputLayout.width];\r\n\r\n    if (texShape != null && ArrayUtil.arraysEqual(shape,
texShape)) {\r\n      const texNumR = texShape[1];\r\n      const texNumC = texShape[0];\r\n      const source = `\r\n
      float ${funcName}(int row, int col) {\r\n            vec2 uv = (vec2(row, col) + halfCR) / vec2(${texNumR}.0,
${texNumC}.0);\r\n            return sampleTexture(${name}, uv);\r\n          }\r\n        `;\r\n      return new
GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n\r\n    const {newShape, keptDims} =
squeezeShape(shape as number[]);\r\n    const squeezedShape = newShape;\r\n    if (squeezedShape.length <
shape.length) {\r\n      const newInputShape = squeezeInputShape(shape, squeezedShape);\r\n      // Deep copy of
input texture layout.\r\n      const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
  newInputLayout.unpackedShape = newInputShape;\r\n\r\n      const params = ['col', 'row'];\r\n      const source =
`\r\n          ${this.getUnpackedSamplerFromInput(funcName, name, newInputLayout).routineBody}\r\n          float
${funcName}(int row, int col) {\r\n            return ${funcName}(${getSqueezedParams(params, keptDims)});\r\n
  }\r\n        `;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture']);\r\n    }\r\n\r\n    const
texNumR = texShape[1];\r\n    const texNumC = texShape[0];\r\n    if (texNumC === 1) {\r\n      const source = `\r\n
        float ${funcName}(int row, int col) {\r\n            int offset_${name} = coordsToOffset(TexCoords,
${texNumR}, ${texNumC});\r\n            float index = dot(vec3(row, col, offset_${name}), vec3(${shape[1]}, 1,
1));\r\n            vec2 uv = vec2(0.5, (index + 0.5) / ${texNumR}.0);\r\n            return sampleTexture(${name},
uv);\r\n          }\r\n        `;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture',
'coordinates.coordsToOffset']);\r\n    }\r\n\r\n    if (texNumR === 1) {\r\n      const source = `\r\n          float
${funcName}(int row, int col) {\r\n            int offset_${name} = coordsToOffset(TexCoords, ${texNumR},
${texNumC});\r\n            float index = dot(vec3(row, col, offset_${name}), vec3(${shape[1]}, 1, 1));\r\n
vec2 uv = vec2((index + 0.5) / ${texNumC}.0, 0.5);\r\n            return sampleTexture(${name}, uv);\r\n          }\r\n
  `;\r\n      return new GlslLibRoutine(source, ['coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n
}\r\n\r\n    const source = `\r\n        float ${funcName}(int row, int col) {\r\n          int index = col * ${shape[1]} +
row;\r\n          vec2 uv = uvFromFlat(${texNumR}, ${texNumC}, index);\r\n          return sampleTexture(${name},
uv);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(\r\n        source, ['coordinates.uvFromFlat',
'coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 3D snippet.\r\n
*/\r\n\r\n  protected getUnpackedSampler3D(funcName: string, name: string, inputLayout: TextureLayout):
GlslLibRoutine {\r\n    const shape = inputLayout.unpackedShape;\r\n    const stride0 = shape[1] * shape[2];\r\n
const stride1 = shape[2];\r\n\r\n    const {newShape, keptDims} = squeezeShape(shape as number[]);\r\n    const
squeezedShape = newShape;\r\n    if (squeezedShape.length < shape.length) {\r\n      const newInputShape =
squeezeInputShape(shape, squeezedShape);\r\n      const params = ['batch', 'col', 'row'];\r\n      // Deep copy of input
texture layout.\r\n      const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
newInputLayout.unpackedShape = newInputShape;\r\n      const routine =
this.getUnpackedSamplerFromInput(funcName, name, newInputLayout);\r\n      // TODO: revisit the logic here to
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make it simpler\r\n      const revDims = keptDims.reverse();\r\n      const source = `\r\n
${routine.routineBody}\r\n          float ${funcName}(int batch, int row, int col) {\r\n            return
${funcName}(${getSqueezedParams(params, revDims)});\r\n          }\r\n        `;\r\n      return new
GlslLibRoutine(source, routine.dependencies);\r\n    }\r\n\r\n    const texNumR = inputLayout.width;\r\n    const
texNumC = inputLayout.height;\r\n    const source = `\r\n          float ${funcName}(int depth, int row, int col) {\r\n
      // Explicitly use integer operations as dot() only works on floats.\r\n            int index = depth * ${stride0} + col
* ${stride1} + row;\r\n            vec2 uv = uvFromFlat(${texNumR}, ${texNumC}, index);\r\n            return
sampleTexture(${name}, uv);\r\n          }\r\n      `;\r\n    return new GlslLibRoutine(\r\n        source,
['coordinates.uvFromFlat', 'coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n  }\r\n\r\n  /**\r\n   *
Unpacked 4D snippet.\r\n   */\r\n\r\n  protected getUnpackedSampler4D(funcName: string, name: string,
inputLayout: TextureLayout): GlslLibRoutine {\r\n    const shape = inputLayout.unpackedShape;\r\n    const stride2
= shape[3];\r\n    const stride1 = shape[2] * stride2;\r\n    const stride0 = shape[1] * stride1;\r\n\r\n    //\r\n    //
TODO: re-enable this shortcut once the index calculation bug is fixed.\r\n    //\r\n    // const {newShape, keptDims}
= squeezeShape(shape as number[]);\r\n    // if (newShape.length < shape.length) {\r\n    //   const newInputShape =
squeezeInputShape(shape, newShape);\r\n    //   const params = ['row', 'col', 'depth', 'depth2'];\r\n    //   // Deep copy
of input texture layout.\r\n    //   const newInputLayout: TextureLayout =
JSON.parse(JSON.stringify(inputLayout));\r\n    //   newInputLayout.unpackedShape = newInputShape;\r\n    //
const source = `\r\n    //       ${this.getUnpackedSamplerFromInput(funcName, name,
newInputLayout).routineBody}\r\n    //       float ${funcName}(int row, int col, int depth, int depth2) {\r\n    //
return ${funcName}(${getSqueezedParams(params, keptDims)});\r\n    //       }\r\n    //     `;\r\n    //   return new
GlslLibRoutine(\r\n    //       source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture',
'coordinates.coordsToOffset']);\r\n    // }\r\n\r\n    const texNumR = inputLayout.width;\r\n    const texNumC =
inputLayout.height;\r\n    const source = `\r\n        float ${funcName}(int row, int col, int depth, int depth2) {\r\n
 int index = row * ${stride0} + col * ${stride1} +\r\n              depth2 * ${stride2} + depth;\r\n          vec2 uv =
uvFromFlat(${texNumR}, ${texNumC}, index);\r\n          return sampleTexture(${name}, uv);\r\n        }\r\n
`;\r\n    return new GlslLibRoutine(source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture']);\r\n  }\r\n\r\n
/**\r\n   * Unpacked 5D snippet.\r\n   */\r\n  protected getUnpackedSampler5D(funcName: string, name: string,
inputLayout: TextureLayout): GlslLibRoutine {\r\n    const shape = inputLayout.unpackedShape;\r\n    const stride3
= shape[4];\r\n    const stride2 = shape[3] * stride3;\r\n    const stride1 = shape[2] * stride2;\r\n    const stride0 =
shape[1] * stride1;\r\n\r\n\r\n    const {newShape, keptDims} = squeezeShape(shape as number[]);\r\n    if
(newShape.length < shape.length) {\r\n      const newInputShape = squeezeInputShape(shape, newShape);\r\n
const params = ['row', 'col', 'depth', 'depth2', 'depth3'];\r\n      // Deep copy of input texture layout.\r\n      const
newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n
newInputLayout.unpackedShape = newInputShape;\r\n\r\n      const source = `\r\n
${this.getUnpackedSamplerFromInput(funcName, name, newInputLayout).routineBody}\r\n          float
${funcName}(int row, int col, int depth, int depth2, int depth3) {\r\n            return
${funcName}(${getSqueezedParams(params, keptDims)});\r\n          }\r\n        `;\r\n      return new
GlslLibRoutine(source, ['coordinates.sampleTexture', 'coordinates.uvFromFlat']);\r\n    }\r\n\r\n    const texNumR =
inputLayout.width;\r\n    const texNumC = inputLayout.height;\r\n    const source = `\r\n        float ${funcName}(int
row, int col, int depth, int depth2, int depth3) {\r\n          int index = row * ${stride0} + col * ${stride1} + depth *
${stride2} +\r\n          depth3 * ${stride3} + depth2;\r\n          vec2 uv = uvFromFlat(${texNumR}, ${texNumC},
index);\r\n          return sampleTexture(${name}, uv);\r\n        }\r\n      `;\r\n    return new GlslLibRoutine(source,
['coordinates.sampleTexture', 'coordinates.uvFromFlat']);\r\n  }\r\n\r\n  /**\r\n   * Unpacked 6D snippet.\r\n   */\r\n
protected getUnpackedSampler6D(funcName: string, name: string, inputLayout: TextureLayout): GlslLibRoutine
{\r\n    const shape = inputLayout.unpackedShape;\r\n    const stride4 = shape[5];\r\n    const stride3 = shape[4] *
stride4;\r\n    const stride2 = shape[3] * stride3;\r\n    const stride1 = shape[2] * stride2;\r\n    const stride0 =
shape[1] * stride1;\r\n\r\n\r\n    const {newShape, keptDims} = squeezeShape(shape as number[]);\r\n    if
(newShape.length < shape.length) {\r\n      const newInputShape = squeezeInputShape(shape, newShape);\r\n
```

const params = ['row', 'col', 'depth', 'depth2', 'depth3', 'depth4'];\r\n // Deep copy of input texture layout.\r\n const newInputLayout: TextureLayout = JSON.parse(JSON.stringify(inputLayout));\r\n newInputLayout.unpackedShape = newInputShape;\r\n\r\n const source = `\r\n ${this.getUnpackedSamplerFromInput(funcName, name, newInputLayout).routineBody}\r\n float ${funcName}(int row, int col, int depth,\r\n int depth2, int depth3, int depth4) {\r\n return ${funcName}(${getSqueezedParams(params, keptDims)});\r\n }\r\n `;\r\n return new GlslLibRoutine(source, ['coordinates.sampleTexture', 'coordinates.uvFromFlat']);\r\n }\r\n\r\n const texNumR = inputLayout.width;\r\n const texNumC = inputLayout.height;\r\n const source = `\r\n float ${funcName}(int row, int col, int depth,\r\n int depth2, int depth3, int depth4) {\r\n int index = row * ${stride0} + col * ${stride1} + depth * ${stride2} +\r\n depth2 * ${stride3} + depth3 * ${stride4} + depth4;\r\n vec2 uv = uvFromFlat(${texNumR}, ${texNumC}, index);\r\n return sampleTexture(${name}, uv);\r\n }\r\n `;\r\n return new GlslLibRoutine(\r\n source, ['coordinates.uvFromFlat', 'coordinates.sampleTexture', 'coordinates.coordsToOffset']);\r\n }\r\n\r\n /**\r\n * This is the main function to map from the given texture coordiantes (s,t)\r\n * to logical indices for the output\r\n * There will only be one single variation of this\r\n * Also see coordsToOffset and offsetToIndices for input-specific versions\r\n */\r\n protected toVec(): {[name: string]: GlslLibRoutine} {\r\n const output = this.context.outputTextureLayout;\r\n const rank = output.shape.length;\r\n const strides = output.strides;\r\n const xScale = output.width;\r\n const yScale = output.height;\r\n\r\n const stridesBlock = [];\r\n for (let i = 0; i < rank - 1; ++i) {\r\n stridesBlock.push(`\r\n c[${i}] = offset / ${strides[i]};`);\r\n stridesBlock.push(`\r\n offset -= c[${i}] * ${strides[i]};`);\r\n }\r\n stridesBlock.push(`\r\n c[${rank - 1}] = offset;`);\r\n const body = `\r\n void toVec(vec2 texCoords, out int c[${rank}]) {\r\n int offset = coordsToOffset(texCoords, ${xScale}, ${yScale});\r\n ${stridesBlock.join('')}\r\n }\r\n void toVec(int offset, out int c[${rank}]) {\r\n ${stridesBlock.join('')}\r\n }\r\n `;\r\n return {toVec: new GlslLibRoutine(body, ['coordinates.coordsToOffset'])};\r\n }\r\n /**\r\n * These are value getter functions generated for each input\r\n * Each function is hardwired to the name and dimensions of the input\r\n * An '_T' variation is also produced which accesses values as if the\r\n * input was transposed\r\n */\r\n protected valueFrom(): {[name: string]: GlslLibRoutine} {\r\n const result: {[name: string]: GlslLibRoutine} = {};\r\n this.context.programInfo.inputNames.forEach((name, i) => {\r\n const layout = this.context.inputTextureLayouts[i];\r\n const shape = layout.unpackedShape.length > 0 ? layout.unpackedShape : layout.shape;\r\n const rank = shape.length;\r\n let funcName = `_${name}`;\r\n result[funcName] = new GlslLibRoutine(\r\n this.getValueFromSingle(name, rank, layout.width, layout.height, false),\r\n [`shapeUtils.indicesToOffset${funcName}`, 'coordinates.offsetToCoords', 'fragcolor.getColorAsFloat']);\r\n funcName = funcName + '_T';\r\n result[funcName] = new GlslLibRoutine(\r\n this.getValueFromSingle(name, rank, layout.width, layout.height, true),\r\n [`shapeUtils.indicesToOffset${funcName}`, 'coordinates.offsetToCoords', 'fragcolor.getColorAsFloat']);\r\n });\r\n return result;\r\n }\r\n /**\r\n * Produces one value getter function for the name and rank given\r\n * If a transpose is set proper offsetToCoords mapping will be used\r\n * @param name name of the function\r\n * @param rank rank of the input\r\n * @param transpose whether or not should generate a transpose variation\r\n */\r\n protected getValueFromSingle(varName: string, rank: number, width: number, height: number, transpose: boolean):\r\n string {\r\n let name = `_${varName}`;\r\n if (transpose) {\r\n name = name + '_T';\r\n }\r\n const glsl = getGlsl(this.context.glContext.version);\r\n return `\r\n float ${name}(int m[${rank}]) {\r\n int offset = indicesToOffset${name}(m);\r\n vec2 coords = offsetToCoords(offset, ${width}, ${height});\r\n float value = getColorAsFloat(${glsl.texture2D}(${varName}, coords));\r\n return value;\r\n }\r\n `;\r\n }\r\n\r\n /**\r\n * Produces a packed value getter function for the name and rank given\r\n * If a transpose is set proper offsetToCoords mapping will be used\r\n * @param name name of the function\r\n * @param rank rank of the input\r\n * @param transpose whether or not should generate a transpose variation\r\n */\r\n protected getPackedValueFrom(varName: string, rank: number, width: number, height: number, transpose: boolean):\r\n string {\r\n let name = `_${varName}_Pack`;\r\n if (transpose) {\r\n name = name + '_T';\r\n   }\r\n   const glsl = getGlsl(this.context.glContext.version);\r\n   return `\r\n        vec4 ${name}(int m[${rank}]) {\r\n          int offset = indicesToOffset_${varName}(m);\r\n          vec2 coords = offsetToCoords(offset, ${width}, ${height});\r\n          return ${glsl.texture2D}(${varName}, coords);\r\n        }\r\n      `;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {ProgramInfo, TextureLayout} from './types';\r\nimport {WebGLContext} from './webgl-context';\r\n\r\n/* eslint-disable @typescript-eslint/naming-convention */\r\nexport enum FunctionType {\r\n ValueBased,\r\n Positional\r\n}\r\nexport interface GlslFunction<T extends FunctionType> {\r\n body: string;\r\n name: string;\r\n type: T;\r\n}\r\nexport type GlslValueFunction = GlslFunction<FunctionType.ValueBased>;\r\nexport interface GlslPositionalFunction extends GlslFunction<FunctionType.Positional> {\r\n inputShape: readonly number[];\r\n outputShape: readonly number[];\r\n}\r\n\r\nexport class GlslContext {\r\n constructor(\r\n   public glContext: WebGLContext, public programInfo: ProgramInfo, public inputTextureLayouts: TextureLayout[],\r\n   public outputTextureLayout: TextureLayout) {}\r\n}\r\nexport abstract class GlslLib {\r\n constructor(public context: GlslContext) {}\r\n abstract getFunctions(): {[name: string]: GlslLibRoutine};\r\n abstract getCustomTypes(): {[name: string]: string};\r\n}\r\n\r\n// abstraction to represent a GLSL library routine and it's dependencies\r\nexport class GlslLibRoutine {\r\n constructor(public routineBody: string, public dependencies?: string[]) {}\r\n}\r\n\r\n// abstraction to represent a GLSL library routine and it's dependencies AS GRAPH Nodes\r\n// this level of abstraction is used to topologically sort routines before fragment shade inclusion\r\nexport class GlslLibRoutineNode {\r\n dependencies: GlslLibRoutineNode[];\r\n routineBody: string;\r\n constructor(public name: string, routineBody?: string, dependencies?: GlslLibRoutineNode[]) {\r\n   if (dependencies) {\r\n   this.dependencies = dependencies;\r\n   } else {\r\n   this.dependencies = [];\r\n   }\r\n\r\n   if (routineBody) {\r\n   this.routineBody = routineBody;\r\n   }\r\n }\r\n addDependency(node: GlslLibRoutineNode) {\r\n   if (node) {\r\n   this.dependencies.push(node);\r\n   }\r\n }\r\n}\r\n\r\n// topologically sort GLSL library routines (graph nodes abstraction) before shader script inclusion\r\nexport class TopologicalSortGlslRoutines {\r\n static returnOrderedNodes(nodes: GlslLibRoutineNode[]): GlslLibRoutineNode[] {\r\n   if (!nodes || nodes.length === 0) {\r\n   return [];\r\n   }\r\n\r\n   if (nodes.length === 1) {\r\n   return nodes;\r\n   }\r\n\r\n   const cycleCheck = new Set<string>();\r\n   const alreadyTraversed = new Set<string>();\r\n   const result = new Array<GlslLibRoutineNode>();\r\n\r\n   this.createOrderedNodes(nodes, cycleCheck, alreadyTraversed, result);\r\n   return result;\r\n }\r\n\r\n private static createOrderedNodes(\r\n   graphNodes: GlslLibRoutineNode[], cycleCheck: Set<string>, alreadyTraversed: Set<string>,\r\n   result: GlslLibRoutineNode[]) {\r\n   for (let i = 0; i < graphNodes.length; ++i) {\r\n   this.dfsTraverse(graphNodes[i], cycleCheck, alreadyTraversed, result);\r\n   }\r\n }\r\n\r\n private static dfsTraverse(\r\n   root: GlslLibRoutineNode, cycleCheck: Set<string>, alreadyTraversed: Set<string>, result: GlslLibRoutineNode[]) {\r\n   // if this root has already been traversed return\r\n   if (!root || alreadyTraversed.has(root.name)) {\r\n   return;\r\n   }\r\n\r\n   // cyclic dependency has been detected\r\n   if (cycleCheck.has(root.name)) {\r\n   throw new Error('Cyclic dependency detected. Can\\'t topologically sort routines needed for shader.');\r\n   }\r\n\r\n   // hold this node to detect cycles if any\r\n   cycleCheck.add(root.name);\r\n\r\n   // traverse children in a dfs fashion\r\n   const dependencies = root.dependencies;\r\n   if (dependencies && dependencies.length > 0) {\r\n   for (let i = 0; i < dependencies.length; ++i) {\r\n   this.dfsTraverse(dependencies[i], cycleCheck, alreadyTraversed, result);\r\n   }\r\n   }\r\n\r\n   // add to result holder\r\n   result.push(root);\r\n\r\n   // mark this node as traversed so that we don't traverse from this again\r\n   alreadyTraversed.add(root.name);\r\n\r\n   // release the hold\r\n   cycleCheck.delete(root.name);\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\n\r\n/**\r\n * This GLSL library handles routines converting\r\n * float32 to/from Unsigned byte or float 16\r\n */\r\nexport class EncodingGlslLib extends GlslLib {\r\n constructor(context: GlslContext) {\r\n   super(context);\r\n }\r\n getFunctions(): {[name: string]: GlslLibRoutine} {\r\n   return {...this.encodeFloat32(), ...this.decodeFloat32()};\r\n }\r\n getCustomTypes(): {[name: string]: string} {\r\n   return {};\r\n }\r\n protected encodeFloat32(): {[name: string]: GlslLibRoutine} {\r\n   return {\r\n   encode: new GlslLibRoutine(`highp vec4 encode(highp float f) {\r\n        return vec4(f, 0.0, 0.0, 0.0);\r\n      }\r\n        `)\r\n   };\r\n }\r\n protected decodeFloat32(): {[name: string]: GlslLibRoutine} {\r\n   return {\r\n   decode: new GlslLibRoutine(`highp float decode(highp vec4 rgba) {\r\n        return rgba.r;\r\n      }\r\n        `)\r\n   };\r\n }\r\n /**\r\n   * returns the routine to encode encode a 32bit float to a vec4 (of unsigned bytes)\r\n   * @credit: https://stackoverflow.com/questions/7059962/how-do-i-convert-a-vec4-rgba-value-to-a-float\r\n   */\r\n protected encodeUint8(): {[name: string]: GlslLibRoutine} {\r\n   const endianness = EncodingGlslLib.isLittleEndian() ? 'rgba.rgba=rgba.abgr;' : '';\r\n   return {\r\n   encode: new GlslLibRoutine(`\r\n   highp vec4 encode(highp float f) {\r\n   highp float F = abs(f);\r\n   highp float Sign = step(0.0,-f);\r\n   highp float Exponent = floor(log2(F));\r\n   highp float Mantissa = (exp2(- Exponent) * F);\r\n   Exponent = floor(log2(F) + 127.0) + floor(log2(Mantissa));\r\n   highp vec4 rgba;\r\n   rgba[0] = 128.0 * Sign + floor(Exponent*exp2(-1.0));\r\n   rgba[1] = 128.0 * mod(Exponent,2.0) + mod(floor(Mantissa*128.0),128.0);\r\n   rgba[2] = floor(mod(floor(Mantissa*exp2(23.0 -8.0)),exp2(8.0)));\r\n   rgba[3] = floor(exp2(23.0)*mod(Mantissa,exp2(-15.0)));\r\n ${endianness}\r\n   rgba = rgba / 255.0; // values need to be normalized to [0,1]\r\n   return rgba;\r\n   }\r\n   `)\r\n   };\r\n }\r\n /**\r\n   * returns the routine to encode a vec4 of unsigned bytes to float32\r\n   * @credit: https://stackoverflow.com/questions/7059962/how-do-i-convert-a-vec4-rgba-value-to-a-float\r\n   */\r\n protected decodeUint8(): {[name: string]: GlslLibRoutine} {\r\n   const endianness = EncodingGlslLib.isLittleEndian() ? 'rgba.rgba=rgba.abgr;' : '';\r\n   return {\r\n   decode: new GlslLibRoutine(`\r\n   highp float decode(highp vec4 rgba) {\r\n   rgba = rgba * 255.0; // values need to be de-normalized from [0,1] to [0,255]\r\n ${endianness}\r\n   highp float Sign = 1.0 - step(128.0,rgba[0])*2.0;\r\n   highp float Exponent = 2.0 * mod(rgba[0],128.0) + step(128.0,rgba[1]) - 127.0;\r\n   highp float Mantissa = mod(rgba[1],128.0)*65536.0 + rgba[2]*256.0 +rgba[3] + float(0x800000);\r\n   highp float Result = Sign * exp2(Exponent) * (Mantissa * exp2(-23.0));\r\n   return Result;\r\n   }\r\n   `)\r\n   };\r\n }\r\n /**\r\n   * Determines if the machine is little endian or not\r\n   * @credit: https://gist.github.com/TooTallNate/4750953\r\n   */\r\n static isLittleEndian(): boolean {\r\n   const b = new ArrayBuffer(4);\r\n   const a = new Uint32Array(b);\r\n   const c = new Uint8Array(b);\r\n   a[0] = 0xdeadbeef;\r\n   if (c[0] === 0xef) {\r\n   return true;\r\n   }\r\n   if (c[0] === 0xde) {\r\n   return false;\r\n   }\r\n   throw new Error('unknown endianness');\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\nimport {getGlsl} from './glsl-source';\r\n\r\n/**\r\n * This GLSL library handles routines around reading a texlet and writing to it\r\n * Reading and writing could be more than just dealing with one channel\r\n * It may require encoding/decoding to/from 4 channels into one\r\n */\r\nexport class FragColorGlslLib extends GlslLib {\r\n constructor(context: GlslContext) {\r\n   super(context);\r\n }\r\n getFunctions(): {[name: string]: GlslLibRoutine} {\r\n   return {...this.setFragColor(), ...this.getColorAsFloat()};\r\n }\r\n getCustomTypes(): {[name: string]: string} {\r\n   return {};\r\n }\r\n protected setFragColor(): {[name: string]: GlslLibRoutine} {\r\n   const glsl = getGlsl(this.context.glContext.version);\r\n   return {\r\n   setFragColor: new GlslLibRoutine(\r\n   `\r\n        void setFragColor(float value) {\r\n            ${glsl.output} = encode(value);\r\n        }\r\n        `,\r\n   ['encoding.encode'])\r\n   };\r\n }\r\n protected getColorAsFloat(): {[name: string]: GlslLibRoutine} {\r\n   return {\r\n   getColorAsFloat: new GlslLibRoutine(\r\n   `\r\n        float getColorAsFloat(vec4 color) {\r\n            return decode(color);\r\n        }\r\n        `,\r\n   ['encoding.decode'])\r\n   };\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nconst INLINE_FUNC_DEF_REGEX = /@inline[\\s\\n\\r]+(\\w+)[\\s\\n\\r]+([0-9a-zA-Z_]+)\\s*\\(([^)]*)\\)\\s*{(([^}]|[\\n\\r])*)}/gm;\r\nconst FUNC_CALL_REGEX = '(\\\\w+)?\\\\s+([_0-9a-zA-Z]+)\\\\s+=\\\\s+__FUNC__\\\\((.*)\\\\)\\\\s*;';\r\n/**\r\n * GLSL preprocessor responsible for resolving @inline directives\r\n */\r\nexport function replaceInlines(script: string): string {\r\n const inlineDefs: {[name: string]: {params: Array<{type: string; name: string}|null>; body: string}} = {};\r\n let match;\r\n while ((match = INLINE_FUNC_DEF_REGEX.exec(script)) !== null) {\r\n   const params = match[3]\r\n   .split(',')\r\n   .map(s => {\r\n   const tokens = s.trim().split(' ');\r\n   if (tokens && tokens.length === 2) {\r\n   return {type: tokens[0], name: tokens[1]};\r\n   }\r\n return null;\r\n })\r\n .filter(v => v !== null);\r\n inlineDefs[match[2]] = {params, body: match[4]};\r\n }\r\n for (const name in inlineDefs) {\r\n const regexString = FUNC_CALL_REGEX.replace('__FUNC__', name);\r\n const regex = new RegExp(regexString, 'gm');\r\n while ((match = regex.exec(script)) !== null) {\r\n const type = match[1];\r\n const variable = match[2];\r\n const params = match[3].split(',');\r\n const declLine = (type) ? `${type} ${variable};` : '';\r\n let newBody: string = inlineDefs[name].body;\r\n let paramRedecLine = '';\r\n inlineDefs[name].params.forEach((v, i) => {\r\n if (v) {\r\n paramRedecLine += `${v.type} ${v.name} = ${params[i]};\\n`;\r\n }\r\n });\r\n newBody = `${paramRedecLine}\\n ${newBody}`;\r\n newBody = newBody.replace('return', `${variable} = `);\r\n const replacement = `\r\n ${declLine}\r\n {\r\n ${newBody}\r\n }\r\n `;\r\n script = script.replace(match[0], replacement);\r\n }\r\n }\r\n script = script.replace(INLINE_FUNC_DEF_REGEX, '');\r\n return script;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutineNode, TopologicalSortGlslRoutines} from './glsl-definitions';\r\nimport {replaceInlines} from './glsl-function-inliner';\r\nimport {glslRegistry} from './glsl-registered-libs';\r\nimport {getDefaultFragShaderMain, getFragShaderPreamble} from './glsl-source';\r\nimport {ProgramInfo, TextureLayout, VariableInfo} from './types';\r\nimport {WebGLContext} from './webgl-context';\r\n\r\n/**\r\n * Preprocessor for the additions to the GLSL language\r\n * It deals with:\r\n * @include directives\r\n * @inline\r\n * Loop unrolling (not implemented)\r\n * Macro resolution (not implemented)\r\n */\r\nexport class GlslPreprocessor {\r\n readonly context: GlslContext;\r\n readonly libs: {[name: string]: GlslLib} = {};\r\n readonly glslLibRoutineDependencyGraph: {[routineName: string]: GlslLibRoutineNode} = {};\r\n\r\n constructor(\r\n glContext: WebGLContext, programInfo: ProgramInfo, inputTextureLayouts: TextureLayout[],\r\n outputTextureLayout: TextureLayout) {\r\n this.context = new GlslContext(glContext, programInfo, inputTextureLayouts, outputTextureLayout);\r\n\r\n // construct GlslLibs\r\n Object.keys(glslRegistry).forEach((name: string) => {\r\n const lib = new glslRegistry[name](this.context);\r\n this.libs[name] = lib;\r\n });\r\n\r\n // construct GlslRoutineDependencyGraph\r\n const map = this.glslLibRoutineDependencyGraph;\r\n for (const libName in this.libs) {\r\n const lib = this.libs[libName];\r\n const routinesInLib = lib.getFunctions();\r\n for (const routine in routinesInLib) {\r\n const key = libName + '.' + routine;\r\n let currentNode: GlslLibRoutineNode;\r\n if (map[key]) {\r\n currentNode = map[key];\r\n currentNode.routineBody = routinesInLib[routine].routineBody;\r\n } else {\r\n currentNode = new GlslLibRoutineNode(key, routinesInLib[routine].routineBody);\r\n map[key] = currentNode;\r\n }\r\n const dependencies = routinesInLib[routine].dependencies;\r\n if (dependencies) {\r\n for (let i = 0; i < dependencies.length; ++i) {\r\n if (!map[dependencies[i]]) {\r\n const node = new GlslLibRoutineNode(dependencies[i]);\r\n map[dependencies[i]] = node;\r\n currentNode.addDependency(node);\r\n } else {\r\n currentNode.addDependency(map[dependencies[i]]);\r\n }\r\n }\r\n }\r\n }\r\n }\r\n }\r\n\r\n preprocess(): string {\r\n const programInfo = this.context.programInfo;\r\n let source = programInfo.shaderSource;\r\n\r\n // append main() function\r\n if (!this.context.programInfo.hasMain) {\r\n source = `${source}\r\n ${getDefaultFragShaderMain(this.context.glContext.version, this.context.outputTextureLayout.shape.length)}`;\r\n }\r\n // replace inlines\r\n source = replaceInlines(source);\r\n\r\n // concat final source string\r\n return `${getFragShaderPreamble(this.context.glContext.version)}\r\n ${this.getUniforms(programInfo.inputNames, programInfo.variables)}\r\n ${this.getImports(source)}\r\n ${source}`;\r\n }\r\n\r\n protected getImports(script: string): string {\r\n const routinesIncluded = this.selectGlslLibRoutinesToBeIncluded(script);\r\n\r\n if (routinesIncluded.length === 0) {\r\n return '';\r\n }\r\n\r\n let routines = '';\r\n for (let i = 0; i < routinesIncluded.length; ++i) {\r\n if (routinesIncluded[i].routineBody) {\r\n routines += routinesIncluded[i].routineBody + '\\n';\r\n } else {\r\n throw new Error(`Missing body for the Glsl Library routine: ${routinesIncluded[i].name}`);\r\n }\r\n }\r\n\r\n return routines;\r\n }\r\n private selectGlslLibRoutinesToBeIncluded(script: string): GlslLibRoutineNode[] {\r\n const nodes: GlslLibRoutineNode[] = [];\r\n\r\n Object.keys(this.glslLibRoutineDependencyGraph).forEach(classAndRoutine

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=> {\r\n      const routine = classAndRoutine.split('.')[1];\r\n      if (script.indexOf(routine) !== -1) {\r\n
nodes.push(this.glslLibRoutineDependencyGraph[classAndRoutine]);\r\n      }\r\n    });\r\n\r\n    return
TopologicalSortGlslRoutines.returnOrderedNodes(nodes);\r\n  }\r\n\r\n\r\n  protected getUniforms(samplers?: string[],
variables?: VariableInfo[]): string {\r\n    const uniformLines: string[] = [];\r\n    if (samplers) {\r\n      for (const
sampler of samplers) {\r\n        uniformLines.push(`uniform sampler2D ${sampler};`);\r\n      }\r\n    }\r\n    if
(variables) {\r\n      for (const variable of variables) {\r\n        uniformLines.push(\r\n            `uniform
${variable.type} ${variable.name}${variable.arrayLength ? `[${variable.arrayLength}]` : ''};`);\r\n      }\r\n    }\r\n
return uniformLines.join('\\n');\r\n  }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n//
Licensed under the MIT License.\r\n\r\nimport {CoordsGlslLib} from './glsl-coordinate-lib';\r\nimport {GlslContext,
GlslLib} from './glsl-definitions';\r\nimport {EncodingGlslLib} from './glsl-encoding-lib';\r\nimport
{FragColorGlslLib} from './glsl-fragcolor-lib';\r\nimport {ShapeUtilsGlslLib} from './glsl-shape-utils-lib';\r\nimport
{VecGlslLib} from './glsl-vec-lib';\r\n\r\nexport const glslRegistry: {[name: string]: new (context: GlslContext) =>
GlslLib} = {\r\n  'encoding': EncodingGlslLib,\r\n  'fragcolor': FragColorGlslLib,\r\n  'vec': VecGlslLib,\r\n
'shapeUtils': ShapeUtilsGlslLib,\r\n  'coordinates': CoordsGlslLib,\r\n  //  'arrays': ArrayGlslSLib\r\n};\r\n","//
Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\n\r\n/**\r\n * GLSL Library responsible for data
types and routines for manipulating\r\n * coordinates and mapping to/from tensor indices\r\n */\r\nexport class
ShapeUtilsGlslLib extends GlslLib {\r\n  constructor(context: GlslContext) {\r\n    super(context);\r\n  }\r\n
getFunctions(): {[name: string]: GlslLibRoutine} {\r\n    return {\r\n      ...this.bcastIndex(),\r\n
...this.bcastMatmulIndex(),\r\n      ...this.offsetToIndices(),\r\n      ...this.indicesToOffset(),\r\n
...this.incrementIndices()\r\n    };\r\n  }\r\n  getCustomTypes() {\r\n    return {};\r\n  }\r\n  protected bcastIndex():
{[name: string]: GlslLibRoutine} {\r\n    const outputRank = this.context.outputTextureLayout.shape.length;\r\n
const result: {[name: string]: GlslLibRoutine} = {};\r\n    this.context.programInfo.inputNames.forEach((name, i)
=> {\r\n      const shape = this.context.inputTextureLayouts[i].unpackedShape;\r\n      if (shape.length <=
outputRank) {\r\n        const rank = shape.length;\r\n        const dimOffset = outputRank - rank;\r\n        const
funcName = `bcastIndices_${name}`;\r\n        let block = '';\r\n        for (let i = 0; i < rank; ++i) {\r\n          block +=
`\r\n          realIndices[${i}] = int( mod(float(bcastedIndices[${dimOffset + i}]), ${shape[i]}.0) );\r\n          `;\r\n
}\r\n        const body = `\r\n        void ${funcName} (int bcastedIndices[${outputRank}], out int
realIndices[${rank}]) {\r\n          ${block}\r\n        }\r\n        `;\r\n        result[funcName] = new
GlslLibRoutine(body);\r\n      }\r\n    });\r\n    return result;\r\n  }\r\n  protected bcastMatmulIndex(): {[name:
string]: GlslLibRoutine} {\r\n    const outputRank = this.context.outputTextureLayout.shape.length;\r\n    const
result: {[name: string]: GlslLibRoutine} = {};\r\n    this.context.programInfo.inputNames.forEach((name, i) => {\r\n
    const shape = this.context.inputTextureLayouts[i].shape;\r\n      if (!(shape.length < 2 || shape.length >
outputRank)) {\r\n        const rank = shape.length;\r\n        const dimOffset = outputRank - rank;\r\n        const
funcName = `bcastMatmulIndices_${name}`;\r\n        let block = '';\r\n        for (let i = 0; i < rank - 2; ++i) {\r\n
block += `\r\n          realIndices[${i}] = int( mod(float(bcastedIndices[${dimOffset + i}]), ${shape[i]}.0) );\r\n
`;\r\n        }\r\n        const body = `\r\n        void ${funcName}(int bcastedIndices[${outputRank}], out int
realIndices[${rank}]) {\r\n          ${block}\r\n          realIndices[${rank - 1}] = bcastedIndices[${outputRank -
1}];\r\n          realIndices[${rank - 2}] = bcastedIndices[${outputRank - 2}];\r\n        }\r\n        `;\r\n
result[funcName] = new GlslLibRoutine(body);\r\n      }\r\n    });\r\n    return result;\r\n  }\r\n  protected
indicesToOffset(): {[name: string]: GlslLibRoutine} {\r\n    const result: {[name: string]: GlslLibRoutine} = {};\r\n
this.context.programInfo.inputNames.forEach((name, i) => {\r\n      const shape =
this.context.inputTextureLayouts[i].shape;\r\n      const strides = this.context.inputTextureLayouts[i].strides;\r\n
const rank = shape.length;\r\n      let funcName = `indicesToOffset_${name}`;\r\n      result[funcName] = new
GlslLibRoutine(ShapeUtilsGlslLib.indexToOffsetSingle(funcName, rank, strides));\r\n      funcName =
`indicesToOffset_${name}_T`;\r\n      result[funcName] =\r\n          new
GlslLibRoutine(ShapeUtilsGlslLib.indexToOffsetSingle(funcName, rank, strides.slice().reverse()));\r\n    });\r\n
return result;\r\n  }\r\n  static indexToOffsetSingle(name: string, rank: number, strides: readonly number[]): string
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{\r\n   let block = '';\r\n   for (let i = rank - 1; i >= 0; --i) {\r\n   block += `\r\n        offset += indices[${i}] * ${strides[i]};\r\n        `;\r\n   }\r\n   return `\r\n      int ${name}(int indices[${rank}]) {\r\n        int offset = 0;\r\n        ${block}\r\n        return offset;\r\n      }\r\n      `;\r\n }\r\n protected offsetToIndices(): {[name: string]: GlslLibRoutine} {\r\n   const result: {[name: string]: GlslLibRoutine} = {};\r\n   this.context.programInfo.inputNames.forEach((name, i) => {\r\n   const shape = this.context.inputTextureLayouts[i].shape;\r\n   const strides = this.context.inputTextureLayouts[i].strides;\r\n   const rank = shape.length;\r\n   let funcName = `offsetToIndices_${name}`;\r\n   result[funcName] = new GlslLibRoutine(ShapeUtilsGlslLib.offsetToIndicesSingle(funcName, rank, strides));\r\n   funcName = `offsetToIndices_${name}_T`;\r\n   result[funcName] =\r\n   new GlslLibRoutine(ShapeUtilsGlslLib.offsetToIndicesSingle(funcName, rank, strides.slice().reverse()));\r\n   });\r\n   return result;\r\n }\r\n static offsetToIndicesSingle(name: string, rank: number, strides: readonly number[]): string {\r\n   const stridesBlock = [];\r\n   for (let i = 0; i < rank - 1; ++i) {\r\n   stridesBlock.push(`\r\n      indices[${i}] = offset / ${strides[i]};`);\r\n   stridesBlock.push(`\r\n        offset -= indices[${i}] * ${strides[i]};`);\r\n   }\r\n   stridesBlock.push(`\r\n      indices[${rank - 1}] = offset;`);\r\n   return `\r\n      void ${name}(int offset, out int indices[${rank}]) {\r\n        ${stridesBlock.join('')}\r\n      }\r\n      `;\r\n }\r\n protected incrementIndices(): {[name: string]: GlslLibRoutine} {\r\n   const result: {[name: string]: GlslLibRoutine} = {};\r\n   this.context.programInfo.inputNames.forEach((name, i) => {\r\n   const shape = this.context.inputTextureLayouts[i].shape;\r\n   const rank = shape.length;\r\n   const funcName = `incrementIndices_${name}`;\r\n   let shapeInit = '';\r\n   for (let i = 0; i < rank; ++i) {\r\n   shapeInit += `\r\n        shape[${i}] = ${shape[i]};`;\r\n   }\r\n   const body = `\r\n   void ${funcName}(int axis, out int indices[${rank}]) {\r\n   int shape[${rank}];\r\n ${shapeInit};\r\n   for(int i = ${rank} -1 ; i >= 0; --i) {\r\n   if(i > axis) continue;\r\n   indices[i] += 1;\r\n   if(indices[i] < shape[i]) {\r\n   break;\r\n   }\r\n   indices[i] = 0;\r\n   }\r\n   }\r\n   `;\r\n   result[funcName] = new GlslLibRoutine(body);\r\n   });\r\n   return result;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\n/**\r\n * represent a version irrelevant abstraction of for GLSL source code\r\n */\r\nexport interface Glsl {\r\n readonly version: string;\r\n readonly attribute: string;\r\n readonly varyingVertex: string;\r\n readonly varyingFrag: string;\r\n readonly texture2D: string;\r\n readonly output: string;\r\n readonly outputDeclaration: string;\r\n}\r\n\r\nconst GLSL_ES_2_0: Glsl = {\r\n version: '',\r\n attribute: 'attribute',\r\n varyingVertex: 'varying',\r\n varyingFrag: 'varying',\r\n texture2D: 'texture2D',\r\n output: 'gl_FragColor',\r\n outputDeclaration: '',\r\n};\r\nconst GLSL_ES_3_0: Glsl = {\r\n version: '#version 300 es',\r\n attribute: 'in',\r\n varyingVertex: 'out',\r\n varyingFrag: 'in',\r\n texture2D: 'texture',\r\n output: 'outputColor',\r\n outputDeclaration: 'out vec4 outputColor;',\r\n};\r\n\r\nexport function getGlsl(version: 1|2) {\r\n return version === 1 ? GLSL_ES_2_0 : GLSL_ES_3_0;\r\n}\r\n\r\nexport function getVertexShaderSource(version: 1|2): string {\r\n const glsl = getGlsl(version);\r\n return `${glsl.version}\r\n   precision highp float;\r\n ${glsl.attribute} vec3 position;\r\n ${glsl.attribute} vec2 textureCoord;\r\n\r\n ${glsl.varyingVertex} vec2 TexCoords;\r\n\r\n   void main()\r\n   {\r\n   gl_Position = vec4(position, 1.0);\r\n   TexCoords = textureCoord;\r\n   }`;\r\n}\r\n\r\nexport function getFragShaderPreamble(version: 1|2): string {\r\n  const glsl = getGlsl(version);\r\n  return `${glsl.version}\r\n   precision highp float;\r\n   precision highp int;\r\n   precision highp sampler2D;\r\n ${glsl.varyingFrag} vec2 TexCoords;\r\n ${glsl.outputDeclaration}\r\n   const vec2 halfCR = vec2(0.5, 0.5);\r\n\r\n   // Custom vector types to handle higher dimenalities.\r\n   struct ivec5\r\n   {\r\n   int x;\r\n   int y;\r\n   int z;\r\n   int w;\r\n   int u;\r\n   };\r\n\r\n   struct ivec6\r\n   {\r\n   int x;\r\n   int y;\r\n   int z;\r\n   int w;\r\n   int u;\r\n   int v;\r\n   };\r\n\r\n   int imod(int x, int y) {\r\n   return x - y * (x / y);\r\n   }\r\n\r\n   `;\r\n}\r\n\r\nexport function getDefaultFragShaderMain(version: 1|2, outputShapeLength: number): string {\r\n  const glsl = getGlsl(version);\r\n  return `\r\n void main() {\r\n   int indices[${outputShapeLength}];\r\n   toVec(TexCoords, indices);\r\n   vec4 result = vec4(process(indices));\r\n ${glsl.output} = result;\r\n }\r\n `;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {GlslContext, GlslLib, GlslLibRoutine} from './glsl-definitions';\r\n\r\n/**\r\n * GLSL Library responsible for vec routines\r\n * Vec is an varible length int array. The length is fixed at the time of\r\n * generating the library functions from the dimensions of the output.\r\n */\r\nexport class VecGlslLib extends GlslLib {\r\n constructor(context: GlslContext) {\r\n   super(context);\r\n }\r\n getCustomTypes(): {[name: string]: string} {\r\n   return {};\r\n }\r\n getFunctions(): {[name: string]: GlslLibRoutine} {\r\n   return {...this.binaryVecFunctions(), ...this.copyVec(), ...this.setVecItem(), ...this.getVecItem()};\r\n }\r\n protected binaryVecFunctions(): {[name: string]: GlslLibRoutine} {\r\n   const outputLayout = this.context.outputTextureLayout;\r\n   const rank = outputLayout.shape.length;\r\n   const nameOp: {[name: string]: string} = {add: '+=', sub: '-=', mul: '*=', div: '/='};\r\n   const result: {[name: string]: GlslLibRoutine} = {};\r\n   for (const name in nameOp) {\r\n   const fname = `${name}Vec`;\r\n   let assignmentBlock = '';\r\n   for (let i = 0; i < rank; ++i) {\r\n   assignmentBlock += `\r\n          dest[${i}] ${nameOp[name]} src[${i}];\r\n          `;\r\n   }\r\n   const body = `\r\n        void ${fname}(int src[${rank}], out int dest[${rank}]) {\r\n          ${assignmentBlock}\r\n        }\r\n        `;\r\n   result[fname] = new GlslLibRoutine(body);\r\n   }\r\n\r\n   return result;\r\n }\r\n protected copyVec(): {[name: string]: GlslLibRoutine} {\r\n   const outputLayout = this.context.outputTextureLayout;\r\n   const rank = outputLayout.shape.length;\r\n   let assignmentBlock = '';\r\n   for (let i = 0; i < rank; ++i) {\r\n   assignmentBlock += `\r\n        dest[${i}] = src[${i}];\r\n        `;\r\n   }\r\n   const body = `\r\n      void copyVec(int src[${rank}], out int dest[${rank}]) {\r\n        ${assignmentBlock}\r\n      }\r\n      `;\r\n   return {copyVec: new GlslLibRoutine(body)};\r\n }\r\n\r\n protected setVecItem(): {[name: string]: GlslLibRoutine} {\r\n   const outputLayout = this.context.outputTextureLayout;\r\n   const rank = outputLayout.shape.length;\r\n   let block = `\r\n        if(index < 0)\r\n            index =${rank} + index;\r\n        if (index == 0)\r\n            m[0] = value;\r\n        `;\r\n   for (let i = 1; i < rank - 1; ++i) {\r\n   block += `\r\n        else if (index == ${i})\r\n            m[${i}] = value;\r\n            `;\r\n   }\r\n   block += `\r\n        else\r\n            m[${rank - 1}] = value;\r\n        `;\r\n   const body = `\r\n      void setVecItem(out int m[${rank}], int index, int value) {\r\n        ${block}\r\n      }\r\n        `;\r\n   return {setVecItem: new GlslLibRoutine(body)};\r\n }\r\n protected getVecItem(): {[name: string]: GlslLibRoutine} {\r\n   const outputLayout = this.context.outputTextureLayout;\r\n   const rank = outputLayout.shape.length;\r\n   let block = `\r\n        if(index < 0)\r\n            index = ${rank} + index;\r\n        if (index == 0)\r\n            return m[0];\r\n      `;\r\n   for (let i = 1; i < rank - 1; ++i) {\r\n   block += `\r\n        else if (index == ${i})\r\n            return m[${i}];\r\n      `;\r\n   }\r\n   block += `\r\n        else\r\n            return m[${rank - 1}];\r\n        `;\r\n   const body = `\r\n      int getVecItem(int m[${rank}], int index) {\r\n        ${block}\r\n      }\r\n    `;\r\n   return {getVecItem: new GlslLibRoutine(body)};\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceHandler} from '../../backend';\r\nimport {Logger} from '../../instrument';\r\nimport {Tensor} from '../../tensor';\r\nimport {ShapeUtil} from '../../util';\r\nimport {createPackProgramInfoLoader} from './ops/pack';\r\nimport {createPackedReshape3DProgramInfoLoader, isReshapeCheap, processDims3D} from './ops/reshape-packed';\r\n\r\nimport {encodeAsUint8} from './ops/uint8-encode';\r\nimport {createUnpackProgramInfoLoader} from './ops/unpack';\r\nimport {WebGLSessionHandler} from './session-handler';\r\nimport {Encoder} from './texture-data-encoder';\r\nimport {calculateTextureWidthAndHeight, createTextureLayoutFromShape, createTextureLayoutFromTextureType} from './texture-layout';\r\nimport {Artifact, ProgramInfo, ProgramInfoLoader, TextureData, TextureLayout, TextureType} from './types';\r\n\r\nconst getProgramInfoUniqueKey =\r\n   (programInfo: ProgramInfo|ProgramInfoLoader, inputTextureDatas: TextureData[]): string => {\r\n   const inputs =\r\n   inputTextureDatas.map(texture => `${texture.unpackedShape.join(',')};${texture.width}x${texture.height}`)\r\n   .join('_');\r\n   let key = programInfo.name;\r\n   if (programInfo.cacheHint) {\r\n   key += '[' + programInfo.cacheHint + ']';\r\n   }\r\n   key += ':' + inputs;\r\n   return key;\r\n   };\r\n\r\nexport class WebGLInferenceHandler implements InferenceHandler {\r\n private packedTextureDataCache: Map<Tensor.Id, TextureData>;\r\n private unpackedTextureDataCache: Map<Tensor.Id, TextureData>;\r\n constructor(public session: WebGLSessionHandler) {\r\n   this.packedTextureDataCache = new Map();\r\n   this.unpackedTextureDataCache = new Map();\r\n }\r\n\r\n /**\r\n   * @returns [width, height]\r\n   */\r\n calculateTextureWidthAndHeight(shape: readonly number[], textureType: TextureType): [number, number] {\r\n   return calculateTextureWidthAndHeight(this.session.layoutStrategy, shape, textureType);\r\n }\r\n\r\n executeProgram(program: ProgramInfo|ProgramInfoLoader, inputs: readonly Tensor[]): TextureData {\r\n   if (inputs.length < program.inputNames.length) {\r\n   throw new Error(`Input size mustn't be less than ${program.inputNames.length}.`);\r\n   }\r\n   if (program.inputNames.length !== program.inputTypes.length) {\r\n   throw new Error('input names size does not match input types');\r\n   }\r\n\r\n   // create texture info for input\r\n   const inputTextureDatas: TextureData[] = [];\r\n   for (let i = 0; i < program.inputNames.length; ++i) {\r\n   inputTextureDatas[i] = this.getOrCreateTextureData(inputs[i], program.inputTypes[i]);\r\n   }\r\n\r\n   const key = getProgramInfoUniqueKey(program, inputTextureDatas);\r\n   let artifact = this.session.programManager.getArtifact(key);\r\n   const programInfo = artifact ?\r\n   artifact.programInfo :\r\n   (typeof (program as ProgramInfoLoader).get === 'function' ? (program as ProgramInfoLoader).get() :\r\n   (program as ProgramInfo));\r\n\r\n   // create texture info for output\r\n   const outputTextureLayout = createTextureLayoutFromTextureType(\r\n   this.session.layoutStrategy, programInfo.output.dims, programInfo.output.textureType);\r\n   const outputTextureData = this.createTextureData(outputTextureLayout, programInfo.output.type);\r\n\r\n   if (!artifact) {\r\n   artifact = this.session.programManager.build(programInfo, inputTextureDatas, outputTextureData);\r\n   this.session.programManager.setArtifact(key, artifact);\r\n   }\r\n\r\n   this.runProgram(artifact, inputTextureDatas, outputTextureData);\r\n   return outputTextureData;\r\n }\r\n\r\n run(program: ProgramInfoLoader, inputs: readonly Tensor[]): Tensor {\r\n   const outputTextureData = this.executeProgram(program, inputs);\r\n   return outputTextureData.tensor;\r\n }\r\n\r\n private runProgram(artifact: Artifact, inputs: TextureData[], output: TextureData): void {\r\n   // input should match\r\n   for (let i = 0; i < inputs.length; ++i) {\r\n   if (!!inputs[i].isPacked !== (artifact.programInfo.inputTypes[i] === TextureType.packed)) {\r\n   throw new Error(`input[${i}] property packed inconsistent`);\r\n   }\r\n   }\r\n\r\n   // output should match\r\n   if (!!output.isPacked !== (artifact.programInfo.output.textureType === TextureType.packed)) {\r\n   throw new Error('output property packed inconsistent');\r\n   }\r\n\r\n   this.session.programManager.run(artifact, inputs, output);\r\n }\r\n\r\n /**\r\n   * Create a TextureData object from a tensor.\r\n   * Usage = Encoder.Usage.UploadOnly.\r\n   * If a related texture data is found in cache, returns it;\r\n   * Otherwise:\r\n   *   Creates a new texture layout if not provided;\r\n   *   Creates WebGLTexture with the layout;\r\n   *   Upload tensor data to the texture;\r\n   *   Creates a texture data object associated with the given tensor.\r\n   * @param tensor the tensor with data to upload\r\n   */\r\n private getOrCreateTextureData(tensor: Tensor, textureType: TextureType) {\r\n   let td = this.getTextureData(tensor.dataId, textureType === TextureType.packed);\r\n\r\n   if (!td) {\r\n   // check if we have texture data in different type\r\n   td = this.getTextureData(tensor.dataId, textureType !== TextureType.packed);\r\n   if (td) {\r\n   if (textureType === TextureType.packed) {\r\n   return this.pack(td);\r\n   } else {\r\n   return this.unpack(td);\r\n   }\r\n   }\r\n   }\r\n\r\n   if (!td) {\r\n   const layout = createTextureLayoutFromTextureType(this.session.layoutStrategy, tensor.dims, textureType);\r\n\r\n   if (textureType === TextureType.packedLastDimension) {\r\n   const group = 1;\r\n   const channels = 4;\r\n   const shape = tensor.dims;\r\n   if (shape.length === 4) {\r\n   // pre-processing for kernel data of Conv.\r\n   //\r\n   // TODO: currently this is a hacking to overwrite Conv's weight. The correct way to do this should be:\r\n   // 1. implement texture based const-folding\r\n   // 2. create a WebGL program \"preprocessConvWeight\" to do the same work as below\r\n   // 3. run the program before dotProduct.\r\n   //\r\n   const adjustedKernelShape = [shape[0], Math.ceil((shape[1] * shape[2] * shape[3]) / channels)];\r\n   const adjustedLayout =\r\n   createTextureLayoutFromTextureType(this.session.layoutStrategy, adjustedKernelShape, textureType);\r\n   let buffer = tensor.numberData;\r\n   if (shape[1] * shape[2] * shape[3] % channels !== 0) {\r\n   const numFeatureMaps = shape[0];\r\n   const oldRowSize = shape[1] * shape[2] * shape[3];\r\n   const newRowSize = Math.ceil(oldRowSize * group / channels) * channels;\r\n   const newSize = numFeatureMaps * newRowSize;\r\n   buffer = new Float32Array(newSize);\r\n   for (let f = 0; f < numFeatureMaps; ++f) {\r\n   const oldOffset = f * oldRowSize;\r\n   const newOffset = f * newRowSize + f % group * oldRowSize;\r\n   buffer.set(tensor.numberData.subarray(oldOffset, oldOffset + oldRowSize), newOffset);\r\n   }\r\n   }\r\n   return this.createTextureData(adjustedLayout, tensor.type, buffer, tensor, Encoder.Usage.UploadOnly);\r\n   }\r\n   }\r\n\r\n   if (textureType ===

TextureType.packed) {\r\n const unpackedTextureLayout =\r\n createTextureLayoutFromShape(this.session.layoutStrategy, tensor.dims, 1, [], {reverseWH: true});\r\n const unpackedTextureData = this.createTextureData(\r\n unpackedTextureLayout, tensor.type, tensor.numberData, tensor, Encoder.Usage.UploadOnly);\r\n td = this.pack(unpackedTextureData);\r\n } else {\r\n td = this.createTextureData(layout, tensor.type, tensor.numberData, tensor, Encoder.Usage.UploadOnly);\r\n }\r\n }\r\n return td;\r\n }\r\n\r\n /**\r\n * Create a TextureData object using the given data and bind to the given tensor.\r\n * Usage = Encoder.Usage.UploadOnly.\r\n * NOTE: this function is a hack for Conv implementation. should remove this function, after rewriting Conv\r\n * implementation by Graph.Transformer\r\n * @param dataType the tensor data type\r\n * @param data the actual data to upload\r\n * @param tensor the tensor to bind. tensor's data is ignored.\r\n */\r\n createTextureDataFromLayoutBindTensor(\r\n layout: TextureLayout, dataType: Tensor.DataType, data: Tensor.NumberType, tensor: Tensor): TextureData {\r\n return this.createTextureData(layout, dataType, data, tensor, Encoder.Usage.UploadOnly);\r\n }\r\n\r\n private createTextureData(\r\n layout: TextureLayout, dataType: Tensor.DataType, data?: Tensor.NumberType, tensor?: Tensor,\r\n usage?: Encoder.Usage): TextureData {\r\n Logger.verbose('InferenceHandler', `Creating TextureData: layout:[${JSON.stringify(layout)}]`);\r\n const texture = this.session.textureManager.createTextureFromLayout(dataType, layout, data, usage);\r\n return this.createTextureDataFromTexture(layout, dataType, texture, tensor);\r\n }\r\n\r\n reshapeUnpacked(input: Tensor, reshapedDims: readonly number[]): Tensor {\r\n const inputTD = this.getOrCreateTextureData(input, TextureType.unpacked);\r\n const newTextureLayout: TextureLayout = {\r\n channels: inputTD.channels,\r\n height: inputTD.height,\r\n width: inputTD.width,\r\n // handle reshaping into scalar Tensors\r\n shape: reshapedDims.length !== 0 ? reshapedDims : [1],\r\n strides: ShapeUtil.computeStrides(reshapedDims),\r\n unpackedShape: reshapedDims,\r\n };\r\n const newTextureData = this.createTextureDataFromTexture(newTextureLayout, input.type, inputTD.texture);\r\n return newTextureData.tensor;\r\n }\r\n\r\n reshapePacked(input: Tensor, reshapedDims: readonly number[]): Tensor {\r\n const inputTD = this.getOrCreateTextureData(input, TextureType.packed);\r\n\r\n // check if the reshape is 'cheap'\r\n if (isReshapeCheap(input.dims, reshapedDims)) {\r\n const newTextureLayout: TextureLayout = {\r\n channels: inputTD.channels,\r\n height: inputTD.height,\r\n width: inputTD.width,\r\n // handle reshaping into scalar Tensors\r\n shape: reshapedDims.length !== 0 ? reshapedDims : [1],\r\n strides: ShapeUtil.computeStrides(reshapedDims),\r\n unpackedShape: reshapedDims,\r\n isPacked: true\r\n };\r\n const newTextureData = this.createTextureDataFromTexture(newTextureLayout, input.type, inputTD.texture);\r\n return newTextureData.tensor;\r\n }\r\n\r\n const squeezedInputShape = processDims3D(input.dims);\r\n const squeezedOutputShape = processDims3D(reshapedDims);\r\n\r\n const squeezedInputTensor = this.reshapePacked(input, squeezedInputShape);\r\n const squeezedOutputTensor = this.run(\r\n createPackedReshape3DProgramInfoLoader(this, squeezedInputTensor, squeezedOutputShape), [squeezedInputTensor]);\r\n const outputTensor = this.reshapePacked(squeezedOutputTensor, reshapedDims);\r\n return outputTensor;\r\n }\r\n\r\n private createTextureDataFromTexture(\r\n layout: TextureLayout, dataType: Tensor.DataType, texture: WebGLTexture, tensor?: Tensor, tensorId?: Tensor.Id) {\r\n const textureData: TextureData = {\r\n ...layout,\r\n tensor: tensor ||\r\n new Tensor(\r\n layout.unpackedShape, dataType, (_id: Tensor.Id) => this.readTexture(textureData),\r\n async (_id: Tensor.Id) => this.readTextureAsync(textureData), undefined, tensorId),\r\n texture\r\n };\r\n this.setTextureData(textureData.tensor.dataId, textureData, layout.isPacked);\r\n return textureData;\r\n }\r\n\r\n private getTextureData(tensorId: Tensor.Id, isPacked = false): TextureData|undefined {\r\n return this.session.isInitializer(tensorId) ?\r\n this.session.getTextureData(tensorId, isPacked) :\r\n isPacked ? this.packedTextureDataCache.get(tensorId) : this.unpackedTextureDataCache.get(tensorId);\r\n }\r\n setTextureData(tensorId: Tensor.Id, td: TextureData, isPacked = false): void {\r\n if (this.session.isInitializer(tensorId)) {\r\n this.session.setTextureData(tensorId, td, isPacked);\r\n } else {\r\n (isPacked ? this.packedTextureDataCache : this.unpackedTextureDataCache).set(tensorId, td);\r\n }\r\n }\r\n isTextureLayoutCached(tensor: Tensor, isPacked = false): boolean {\r\n return

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!!this.getTextureData(tensor.dataId, isPacked);\r\n  }\r\n\r\n  dispose(): void {\r\n
this.session.textureManager.clearActiveTextures();\r\n    this.packedTextureDataCache.forEach(td =>
this.session.textureManager.releaseTexture(td));\r\n    this.packedTextureDataCache = new Map();\r\n
this.unpackedTextureDataCache.forEach(td => this.session.textureManager.releaseTexture(td));\r\n
this.unpackedTextureDataCache = new Map();\r\n  }\r\n\r\n  readTexture(textureData: TextureData):
Tensor.NumberType {\r\n    if (textureData.isPacked) {\r\n      return this.readTexture(this.unpack(textureData));\r\n
 }\r\n    if (!this.session.backend.glContext.isFloat32DownloadSupported) {\r\n      return
this.session.textureManager.readUint8TextureAsFloat(encodeAsUint8(this, textureData));\r\n    }\r\n    return
this.session.textureManager.readTexture(textureData, textureData.tensor.type, textureData.channels);\r\n  }\r\n\r\n
async readTextureAsync(textureData: TextureData): Promise<Tensor.NumberType> {\r\n    if
(textureData.isPacked) {\r\n      return this.readTextureAsync(this.unpack(textureData));\r\n    }\r\n    if
(!this.session.backend.glContext.isFloat32DownloadSupported) {\r\n      return
this.session.textureManager.readUint8TextureAsFloat(encodeAsUint8(this, textureData));\r\n    }\r\n    return
this.session.textureManager.readTextureAsync(textureData, textureData.tensor.type, textureData.channels);\r\n
}\r\n\r\n  pack(input: TextureData): TextureData {\r\n    const outputTextureData =
this.executeProgram(createPackProgramInfoLoader(this, input.tensor), [input.tensor]);\r\n    return
outputTextureData;\r\n  }\r\n\r\n  unpack(input: TextureData): TextureData {\r\n    const outputTextureData =
this.executeProgram(createUnpackProgramInfoLoader(this, input.tensor), [input.tensor]);\r\n    return
outputTextureData;\r\n  }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under
the MIT License.\r\n\r\nimport {OpSet} from '../../opset';\r\n\r\nimport {batchNormalization,
parseBatchNormalizationAttributes} from './ops/batch-normalization';\r\nimport * as binaryOps from './ops/binary-
op';\r\nimport {concat, parseConcatAttributes} from './ops/concat';\r\nimport {conv, parseConvAttributes} from
'./ops/conv';\r\nimport {depthToSpace, parseDepthToSpaceAttributes} from './ops/depth-to-space';\r\nimport
{flatten, parseFlattenAttributes} from './ops/flatten';\r\nimport {gather, parseGatherAttributes} from
'./ops/gather';\r\nimport {gemm, parseGemmAttributesV11, parseGemmAttributesV7} from './ops/gemm';\r\nimport
{imageScaler, parseImageScalerAttributes} from './ops/image-scaler';\r\nimport {instanceNormalization,
parseInstanceNormalizationAttributes} from './ops/instance-normalization';\r\nimport {matMul,
parseMatMulAttributes} from './ops/matmul';\r\nimport {pad, parsePadAttributes} from './ops/pad';\r\nimport
{averagePool, parseAveragePoolAttributes} from './ops/pool';\r\nimport {globalAveragePool,
parseGlobalAveragePoolAttributes} from './ops/pool';\r\nimport {maxPool, parseMaxPoolAttributes} from
'./ops/pool';\r\nimport {globalMaxPool} from './ops/pool';\r\nimport {reduceLogSum, reduceLogSumSquare,
reduceMax, reduceMean, reduceMin, reduceProd, reduceSum} from './ops/reduce';\r\nimport
{parseReduceAttributes} from './ops/reduce';\r\nimport {reshape} from './ops/reshape';\r\nimport
{parseResizeAttributesV10, parseResizeAttributesV11, resize} from './ops/resize-packed';\r\nimport {shape} from
'./ops/shape';\r\nimport {parseSliceAttributes, slice, sliceV10} from './ops/slice';\r\nimport {parseSoftmaxAttributes,
softmax} from './ops/softmax';\r\nimport {parseSplitAttributes, split} from './ops/split';\r\nimport
{parseSqueezeAttributes, squeeze} from './ops/squeeze';\r\nimport {sum} from './ops/sum';\r\nimport {tile} from
'./ops/tile';\r\nimport {parseTransposeAttributes, transpose} from './ops/transpose';\r\nimport * as unaryOps from
'./ops/unary-op';\r\nimport {parseUnsqueezeAttributes, unsqueeze} from './ops/unsqueeze';\r\nimport
{parseUpsampleAttributesV7, parseUpsampleAttributesV9, upsample} from './ops/upsample';\r\n\r\nexport const
WEBGL_OP_RESOLVE_RULES: readonly OpSet.ResolveRule[] = [\r\n  ['Abs', '', '6+', unaryOps.abs],\r\n  ['Acos',
'', '7+', unaryOps.acos],\r\n  ['Add', '', '7+', binaryOps.add],\r\n  ['And', '', '7+', binaryOps.and],\r\n  ['Asin', '', '7+',
unaryOps.asin],\r\n  ['Atan', '', '7+', unaryOps.atan],\r\n  // TODO: support new attributes for AveragePool-10\r\n
['AveragePool', '', '7-10', averagePool, parseAveragePoolAttributes],\r\n  ['BatchNormalization', '', '7+',
batchNormalization, parseBatchNormalizationAttributes],\r\n  ['Ceil', '', '6+', unaryOps.ceil],\r\n  ['Clip', '', '6-10',
unaryOps.clip, unaryOps.parseClipAttributes],\r\n  ['Concat', '', '4+', concat, parseConcatAttributes],\r\n  ['Conv', '',
'1+', conv, parseConvAttributes],\r\n  ['Cos', '', '7+', unaryOps.cos],\r\n  ['Div', '', '7+', binaryOps.div],\r\n  ['Dropout',
'', '7+', unaryOps.identity],\r\n  ['DepthToSpace', '', '1+', depthToSpace, parseDepthToSpaceAttributes],\r\n  ['Equal',
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'', '7+', binaryOps.equal],\r\n ['Elu', '', '6+', unaryOps.elu, unaryOps.parseEluAttributes],\r\n ['Exp', '', '6+', unaryOps.exp],\r\n ['Flatten', '', '1+', flatten, parseFlattenAttributes],\r\n ['Floor', '', '6+', unaryOps.floor],\r\n ['Gather', '', '1+', gather, parseGatherAttributes],\r\n ['Gemm', '', '7-10', gemm, parseGemmAttributesV7],\r\n ['Gemm', '', '11+', gemm, parseGemmAttributesV11],\r\n ['GlobalAveragePool', '', '1+', globalAveragePool, parseGlobalAveragePoolAttributes],\r\n ['GlobalMaxPool', '', '1+', globalMaxPool],\r\n ['Greater', '', '7+', binaryOps.greater],\r\n ['Identity', '', '1+', unaryOps.identity],\r\n ['ImageScaler', '', '1+', imageScaler, parseImageScalerAttributes],\r\n ['InstanceNormalization', '', '6+', instanceNormalization, parseInstanceNormalizationAttributes],\r\n ['LeakyRelu', '', '6+', unaryOps.leakyRelu, unaryOps.parseLeakyReluAttributes],\r\n ['Less', '', '7+', binaryOps.less],\r\n ['Log', '', '6+', unaryOps.log],\r\n ['MatMul', '', '1+', matMul, parseMatMulAttributes],\r\n // TODO: support new attributes for MaxPool-8 and MaxPool-10\r\n ['MaxPool', '', '1-9', maxPool, parseMaxPoolAttributes],\r\n ['Mul', '', '7+', binaryOps.mul],\r\n ['Neg', '', '6+', unaryOps.neg],\r\n ['Not', '', '1+', unaryOps.not],\r\n ['Or', '', '7+', binaryOps.or],\r\n ['Pad', '', '2-10', pad, parsePadAttributes],\r\n ['Pow', '', '7+', binaryOps.pow],\r\n ['PRelu', '', '7+', binaryOps.pRelu],\r\n ['ReduceLogSum', '', '1+', reduceLogSum, parseReduceAttributes],\r\n ['ReduceMax', '', '1+', reduceMax, parseReduceAttributes],\r\n ['ReduceMean', '', '1+', reduceMean, parseReduceAttributes],\r\n ['ReduceMin', '', '1+', reduceMin, parseReduceAttributes],\r\n ['ReduceProd', '', '1+', reduceProd, parseReduceAttributes],\r\n ['ReduceSum', '', '1+', reduceSum, parseReduceAttributes],\r\n ['ReduceSumSquare', '', '1+', reduceLogSumSquare, parseReduceAttributes],\r\n ['Relu', '', '6+', unaryOps.relu],\r\n ['Reshape', '', '5+', reshape],\r\n ['Resize', '', '10', resize, parseResizeAttributesV10],\r\n ['Resize', '', '11+', resize, parseResizeAttributesV11],\r\n ['Shape', '', '1+', shape],\r\n ['Sigmoid', '', '6+', unaryOps.sigmoid],\r\n ['Sin', '', '7+', unaryOps.sin],\r\n ['Slice', '', '10+', sliceV10], // TODO: support 'steps' for Slice-10\r\n ['Slice', '', '1-9', slice, parseSliceAttributes],\r\n ['Softmax', '', '1+', softmax, parseSoftmaxAttributes],\r\n // 'Split' operator has an optional attribute 'split'\r\n // this attribute determines how the specified axis of input data is split.\r\n // When the attribute is missing, we need the count of number of outputs\r\n // so that we can determine the 'split' attribute from the runtime input to the Operator\r\n ['Split', '', '2+', split, parseSplitAttributes],\r\n ['Sqrt', '', '6+', unaryOps.sqrt],\r\n ['Squeeze', '', '1+', squeeze, parseSqueezeAttributes],\r\n ['Sub', '', '7+', binaryOps.sub],\r\n ['Sum', '', '6+', sum],\r\n ['Tan', '', '7+', unaryOps.tan],\r\n ['Tanh', '', '6+', unaryOps.tanh],\r\n ['Tile', '', '6+', tile],\r\n ['Transpose', '', '1+', transpose, parseTransposeAttributes],\r\n ['Upsample', '', '7-8', upsample, parseUpsampleAttributesV7],\r\n ['Upsample', '', '9', upsample, parseUpsampleAttributesV9],\r\n ['Unsqueeze', '', '1+', unsqueeze, parseUnsqueezeAttributes],\r\n ['Xor', '', '7+', binaryOps.xor],\r\n];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface BatchNormalizationAttributes extends AttributeWithCacheKey {\r\n epsilon: number;\r\n momentum: number;\r\n spatial: number;\r\n}\r\n\r\nconst batchNormalizationProgramMetadata = {\r\n name: 'BatchNormalization',\r\n inputNames: ['A', 'Scale', 'B', 'Mean', 'Variance'],\r\n inputTypes:\r\n [TextureType.unpacked, TextureType.unpacked, TextureType.unpacked, TextureType.unpacked, TextureType.unpacked]\r\n};\r\n\r\nexport const batchNormalization: OperatorImplementation<BatchNormalizationAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: BatchNormalizationAttributes): Tensor[] => {\r\n validateInputs(inputs);\r\n const output = inferenceHandler.run(\r\n {\r\n ...batchNormalizationProgramMetadata,\r\n cacheHint: attributes.cacheKey,\r\n get: () => createBatchNormalizationProgramInfo(inferenceHandler, inputs, attributes)\r\n },\r\n inputs);\r\n return [output];\r\n };\r\n\r\nexport const parseBatchNormalizationAttributes: OperatorInitialization<BatchNormalizationAttributes> =\r\n (node: Graph.Node): BatchNormalizationAttributes => {\r\n const epsilon = node.attributes.getFloat('epsilon', 1e-5);\r\n const momentum = node.attributes.getFloat('momentum', 0.9);\r\n const spatial = node.attributes.getInt('spatial', 1);\r\n return createAttributeWithCacheKey({epsilon, momentum, spatial});\r\n };\r\n\r\nconst createBatchNormalizationProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: BatchNormalizationAttributes):\r\n   ProgramInfo => {\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const rank = inputs[0].dims.length;\r\n   const [scaleWidth, scaleHeight] =\r\n   inferenceHandler.calculateTextureWidthAndHeight(inputs[1].dims, TextureType.unpacked);\r\n   const shaderSource = `\r\n float process(int[${rank}] indices) {\r\n   vec2 position = offsetToCoords(indices[1], ${scaleWidth}, ${scaleHeight});\r\n   float scale = getColorAsFloat(${glsl.texture2D}(Scale, position));\r\n   float mean = getColorAsFloat(${glsl.texture2D}(Mean, position));\r\n   float variance = getColorAsFloat(${glsl.texture2D}(Variance, position));\r\n   float b = getColorAsFloat(${glsl.texture2D}(B, position));\r\n\r\n   return scale * ((_A(indices) - mean) / sqrt(variance + float(${attributes.epsilon}))) + b;\r\n }`;\r\n   return {\r\n   ...batchNormalizationProgramMetadata,\r\n   output: {dims: inputs[0].dims, type: inputs[0].type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 5) {\r\n   throw new Error('BatchNormalization requires 5 inputs.');\r\n }\r\n\r\n const X = inputs[0];\r\n const scale = inputs[1];\r\n const B = inputs[2];\r\n const mean = inputs[3];\r\n const var_ = inputs[4];\r\n\r\n // input should atleast have three dimensions - N,C,dim1,...,dimn\r\n // other inputs can have only one dimensions\r\n if (X.dims.length < 3 || scale.dims.length !== 1 || B.dims.length !== 1 || mean.dims.length !== 1 ||\r\n   var_.dims.length !== 1) {\r\n   throw new Error('invalid input shape.');\r\n }\r\n if (scale.dims[0] !== X.dims[1] || B.dims[0] !== X.dims[1] || mean.dims[0] !== X.dims[1] ||\r\n   var_.dims[0] !== X.dims[1]) {\r\n   throw new Error('invalid input shape.');\r\n }\r\n if ((X.type !== 'float32' && X.type !== 'float64') || (scale.type !== 'float32' && scale.type !== 'float64') ||\r\n   (B.type !== 'float32' && B.type !== 'float64') || (mean.type !== 'float32' && mean.type !== 'float64') ||\r\n   (var_.type !== 'float32' && var_.type !== 'float64')) {\r\n   throw new Error('invalid input tensor types.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {BroadcastUtil, ShapeUtil} from '../../../util';\r\nimport {FunctionType, GlslValueFunction} from '../glsl-definitions';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, TextureType} from '../types';\r\n\r\nexport function glslAdd(): GlslValueFunction {\r\n const name = 'add_';\r\n const body = `\r\n  float ${name}(float a, float b) {\r\n    return a + b;\r\n  }\r\n  vec4 ${name}(vec4 v1, vec4 v2) {\r\n    return v1 + v2;\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslDiv(): GlslValueFunction {\r\n const name = 'div_';\r\n const body = `\r\n  float ${name}(float a, float b) {\r\n    return a / b;\r\n  }\r\n  vec4 ${name}(vec4 v1, vec4 v2) {\r\n    return v1 / v2;\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslMul(): GlslValueFunction {\r\n const name = 'mul_';\r\n const body = `\r\n  float ${name}(float a, float b) {\r\n    return a * b;\r\n  }\r\n  vec4 ${name}(vec4 v1, vec4 v2) {\r\n    return v1 * v2;\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslSub(): GlslValueFunction {\r\n const name = 'sub_';\r\n const body = `\r\n  float ${name}(float a, float b) {\r\n    return a - b;\r\n  }\r\n  vec4 ${name}(vec4 v1, vec4 v2) {\r\n    return v1 - v2;\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslEqual(): GlslValueFunction {\r\n const name = 'equal_';\r\n const body = `\r\n  float ${name}(float a, float b) {\r\n    return float(a == b);\r\n  }\r\n  vec4 ${name}(vec4 v1, vec4 v2) {\r\n    return vec4(equal(v1, v2));\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslGreater(): GlslValueFunction {\r\n const name = 'greater_';\r\n const body = `\r\n  float ${name}(float a, float b) {\r\n    return float(a > b);\r\n  }\r\n  vec4 ${name}(vec4 v1, vec4 v2) {\r\n    return vec4( v1.r > v2.r ,\r\n      v1.g > v2.g,\r\n      v1.b > v2.b,\r\n      v1.a > v2.a );\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslLess(): GlslValueFunction {\r\n const name = 'less_';\r\n const body = `\r\n  float ${name}(float a, float b) {\r\n    return float(a < b);\r\n  }\r\n  vec4 ${name}(vec4 v1, vec4 v2) {\r\n    return vec4( v1.r < v2.r ,\r\n                v1.g < v2.g,\r\n                v1.b < v2.b,\r\n                v1.a < v2.a );\r\n  }\r\n  `;\r\n return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslAnd(): GlslValueFunction {\r\n const name = 'and_';\r\n const body = `\r\n float ${name}(float a, float b) {\r\n   return float(bool(a) && bool(b));\r\n }\r\n vec4

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${name}(vec4 v1, vec4 v2) {\r\n    bvec4 b1 = bvec4(v1);\r\n    bvec4 b2 = bvec4(v2);\r\n    return vec4( b1.r &&
b2.r ,\r\n                  b1.g && b2.g,\r\n                  b1.b && b2.b,\r\n                  b1.a && b2.a );\r\n  }\r\n  `;\r\n  return
{body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslOr(): GlslValueFunction {\r\n  const
name = 'or_';\r\n  const body = `\r\n  float ${name}(float a, float b) {\r\n    return float( bool(a) || bool(b) );\r\n  }\r\n
vec4 ${name}(vec4 v1, vec4 v2) {\r\n    bvec4 b1 = bvec4(v1);\r\n    bvec4 b2 = bvec4(v2);\r\n    return vec4( b1.r ||
b2.r ,\r\n                  b1.g || b2.g,\r\n                  b1.b || b2.b,\r\n                  b1.a || b2.a );\r\n  }\r\n  `;\r\n  return {body,
name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslXor(): GlslValueFunction {\r\n  const name =
'xor_';\r\n  const body = `\r\n  float ${name}(float a, float b) {\r\n    return float( bool(a) ^^ bool(b) );\r\n  }\r\n  vec4
${name}(vec4 v1, vec4 v2) {\r\n    bvec4 b1 = bvec4(v1);\r\n    bvec4 b2 = bvec4(v2);\r\n    return vec4( b1.r ^^ b2.r
,\r\n                  b1.g ^^ b2.g,\r\n                  b1.b ^^ b2.b,\r\n                  b1.a ^^ b2.a );\r\n  }\r\n  `;\r\n  return {body,
name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslPow(): GlslValueFunction {\r\n  return
glslBuiltinBinary('pow');\r\n}\r\nexport function glslPRelu(): GlslValueFunction {\r\n  const name = 'prelu_';\r\n
const body = `\r\n  float ${name}(float a, float b) {\r\n    return a < 0.0 ? a * b: a;\r\n  }\r\n  vec4 ${name}(vec4 v1,
vec4 v2) {\r\n    return vec4(\r\n      v1.r < 0.0 ? v1.r * v2.r: v1.r,\r\n      v1.g < 0.0 ? v1.g * v2.g: v1.g,\r\n      v1.b <
0.0 ? v1.b * v2.b: v1.b,\r\n      v1.a < 0.0 ? v1.a * v2.a: v1.a\r\n      );\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\n\r\nfunction glslBuiltinBinary(fname: string): GlslValueFunction {\r\n  const
name = `${fname}_`;\r\n  const body = `\r\n  float ${name}(float a, float b) {\r\n    return ${fname}(a, b);\r\n  }\r\n
vec4 ${name}(vec4 v1, vec4 v2) {\r\n    return ${fname}(v1, v2);\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\n\r\nconst createBinaryProgramInfoLoader =\r\n    (handler:
WebGLInferenceHandler, inputs: Tensor[], glslFunc: GlslValueFunction,\r\n     outputTensorType:
Tensor.DataType = inputs[0].type, cacheKey?: string): ProgramInfoLoader => {\r\n      const textureType =
handler.session.pack ? TextureType.packed : TextureType.unpacked;\r\n      return {\r\n        name:
glslFunc.name,\r\n        inputNames: ['A', 'B'],\r\n        inputTypes: [textureType, textureType],\r\n        cacheHint:
cacheKey,\r\n        get: () => createBinaryProgramInfo(handler, inputs, glslFunc, outputTensorType)\r\n      };\r\n
};\r\n\r\nconst createBinaryProgramInfo =\r\n    (handler: WebGLInferenceHandler, inputs: Tensor[], glslFunc:
GlslValueFunction,\r\n     outputTensorType: Tensor.DataType = inputs[0].type): ProgramInfo => {\r\n      const
textureType = handler.session.pack ? TextureType.packed : TextureType.unpacked;\r\n      const isBroadcast =
!ShapeUtil.areEqual(inputs[0].dims, inputs[1].dims);\r\n      let outputShape = inputs[0].dims;\r\n\r\n      const
usePackedTexture = handler.session.pack;\r\n\r\n      if (isBroadcast) {\r\n        const calculatedShape =
BroadcastUtil.calcShape(inputs[0].dims, inputs[1].dims, false);\r\n        if (!calculatedShape) {\r\n          throw new
Error('Can\\'t perform binary op on the given tensors');\r\n        }\r\n        outputShape = calculatedShape;\r\n
const outputRank = outputShape.length;\r\n        const aRank = inputs[0].dims.length !== 0 ? inputs[0].dims.length :
1;\r\n        const bRank = inputs[1].dims.length !== 0 ? inputs[1].dims.length : 1;\r\n        const aBcast =
inputs[0].dims.length !== 0 ? 'bcastIndices_A(indices, aindices);' : 'aindices[0] = 0;';\r\n        const bBcast =
inputs[1].dims.length !== 0 ? 'bcastIndices_B(indices, bindices);' : 'bindices[0] = 0;';\r\n\r\n        const glsl =
getGlsl(handler.session.backend.glContext.version);\r\n        const shaderSource = usePackedTexture ? `\r\n
${glslFunc.body}\r\n      void main() {\r\n        vec4 a = getAAtOutCoords();\r\n        vec4 b =
getBAtOutCoords();\r\n        vec4 result = ${glslFunc.name}(a, b);\r\n        ${glsl.output} = result;\r\n      }` :\r\n
                                  `\r\n      ${glslFunc.body}\r\n      float process(int indices[${outputRank}]) {\r\n        int
aindices[${aRank}];\r\n        int bindices[${bRank}];\r\n        ${aBcast}\r\n        ${bBcast}\r\n        return
${glslFunc.name}(_A(aindices), _B(bindices));\r\n      }`;\r\n\r\n        return {\r\n          name: glslFunc.name,\r\n
  inputNames: ['A', 'B'],\r\n          inputTypes: [textureType, textureType],\r\n          output: {dims: outputShape,
type: outputTensorType, textureType},\r\n          shaderSource,\r\n          hasMain: usePackedTexture\r\n        };\r\n
 }\r\n      const glsl = getGlsl(handler.session.backend.glContext.version);\r\n      const shaderSource = `\r\n
${glslFunc.body}\r\n    void main() {\r\n      vec4 v1 = ${glsl.texture2D}(A, TexCoords);\r\n      vec4 v2 =
${glsl.texture2D}(B, TexCoords);\r\n      vec4 result = ${glslFunc.name}(v1, v2);\r\n      ${glsl.output} = result;\r\n
 }\r\n    `;\r\n\r\n      return {\r\n        name: glslFunc.name,\r\n        inputNames: ['A', 'B'],\r\n        inputTypes:
[textureType, textureType],\r\n        output: {dims: inputs[0].dims, type: outputTensorType, textureType},\r\n
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shaderSource,\r\n hasMain: true\r\n };\r\n };\r\n\r\nexport const add = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslAdd()), inputs)];\r\n\r\nexport const and = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslAnd(), 'bool'), inputs)];\r\n\r\nexport const div = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslDiv()), inputs)];\r\n\r\nexport const equal = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslEqual(), 'bool'), inputs)];\r\n\r\nexport const greater = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslGreater(), 'bool'), inputs)];\r\n\r\nexport const less = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslLess(), 'bool'), inputs)];\r\n\r\nexport const mul = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslMul()), inputs)];\r\n\r\nexport const or = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslOr(), 'bool'), inputs)];\r\n\r\nexport const pow = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslPow()), inputs)];\r\n\r\nexport const pRelu = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslPRelu()), inputs)];\r\n\r\nexport const sub = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslSub()), inputs)];\r\n\r\nexport const xor = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n Tensor[] => [handler.run(createBinaryProgramInfoLoader(handler, inputs, glslXor(), 'bool'), inputs)];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport {getCoordsDataType, getGlChannels} from '../utils';\r\nimport {ConcatAttributes} from './concat';\r\n\r\nimport {getChannels, unpackFromChannel} from './packing-utils';\r\n\r\nconst createPackedConcatProgramMetadata = (inputCount: number, cacheHint: string) => ({\r\n name: 'Concat (packed)',\r\n inputNames: Array.from({length: inputCount}, (v, i) => `X${i}`),\r\n inputTypes: Array(inputCount).fill(TextureType.packed),\r\n cacheHint\r\n});\r\n\r\nconst createPackedConcatProgramInfo =\r\n (handler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: Tensor[], axis: number): ProgramInfo => {\r\n const inputShape = inputs[0].dims.slice();\r\n if (axis >= inputShape.length || axis < (-1 * inputShape.length)) {\r\n throw new Error('axis specified for concat doesn\\'t match input dimensionality');\r\n }\r\n if (axis < 0) {\r\n axis = inputShape.length + axis;\r\n }\r\n // ensure all of the non-concatenated axes match each other\r\n // calculate the shape of the output tensor while we do that\r\n const outputShape = inputShape.slice(0);\r\n for (let i = 1; i < inputs.length; i++) {\r\n const dataNShape = inputs[i].dims.slice();\r\n for (let axisIndex = 0; axisIndex < inputShape.length; axisIndex++) {\r\n // add to the placeholder for computing output shape\r\n if (axisIndex === axis) {\r\n outputShape[axis] += dataNShape[axisIndex];\r\n }\r\n // ensure all non-cancatenated axes match each other\r\n else if (inputShape[axisIndex] !== dataNShape[axisIndex]) {\r\n throw new Error('non concat dimensions must match');\r\n }\r\n }\r\n }\r\n\r\n const rank = outputShape.length;\r\n const coords = getChannels('coords', rank);\r\n const dtype = getCoordsDataType(rank);\r\n const unpackChannel = unpackFromChannel();\r\n\r\n const shapes = inputs.map(i => i.dims);\r\n const channels = getGlChannels(rank);\r\n const offsets: number[] = new Array(shapes.length - 1);\r\n\r\n offsets[0] = shapes[0][axis];\r\n for (let i = 1; i < offsets.length; i++) {\r\n offsets[i] = offsets[i - 1] + shapes[i][axis];\r\n }\r\n\r\n const channel = channels[axis];\r\n const lastChannels = channels.slice(-2);\r\n const allChannels = channels.join();\r\n\r\n let getValueSnippet = `if

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(${channel} < ${offsets[0]}) {\r\n        return getChannel(\r\n            getX0(${allChannels}),
vec2(${lastChannels.join()}));\r\n        }`;\r\n      for (let i = 1; i < offsets.length; i++) {\r\n        const shift = offsets[i
- 1];\r\n        getValueSnippet += `\r\n            if (${channel} < ${offsets[i]}  && ${channel} >= ${offsets[i - 1]})
{\r\n              return getChannel(\r\n                getX${i}(${getShiftedChannelsSnippet(channels, channel, shift)}),\r\n
            vec2(${getShiftedChannelsSnippet(lastChannels, channel, shift)}));\r\n            }`;\r\n      }\r\n      const
lastIndex = offsets.length;\r\n      const shift = offsets[offsets.length - 1];\r\n      getValueSnippet += `\r\n
return getChannel(\r\n              getX${lastIndex}(${getShiftedChannelsSnippet(channels, channel, shift)}),\r\n
  vec2(${getShiftedChannelsSnippet(lastChannels, channel, shift)}));`;\r\n\r\n      const glsl =
getGlsl(handler.session.backend.glContext.version);\r\n\r\n      const shaderSource = `\r\n
${unpackChannel}\r\n          float getValue(${channels.map(x => 'int ' + x)}) {\r\n            ${getValueSnippet}\r\n
   }\r\n\r\n          void main() {\r\n            ${dtype} coords = getOutputCoords();\r\n            int lastDim =
coords.${channels[rank - 1]};\r\n            coords.${channels[rank - 1]} = coords.${channels[rank - 2]};\r\n
coords.${channels[rank - 2]} = lastDim;\r\n\r\n            vec4 result = vec4(getValue(${coords}), 0., 0., 0.);\r\n\r\n
   ${coords[rank - 1]} = ${coords[rank - 1]} + 1;\r\n            if (${coords[rank - 1]} < ${outputShape[rank - 1]})
{\r\n              result.g = getValue(${coords});\r\n            }\r\n\r\n            ${coords[rank - 2]} = ${coords[rank - 2]} +
1;\r\n            if (${coords[rank - 2]} < ${outputShape[rank - 2]}) {\r\n              result.a = getValue(${coords});\r\n
      }\r\n\r\n            ${coords[rank - 1]} = ${coords[rank - 1]} - 1;\r\n            if (${coords[rank - 2]} <
${outputShape[rank - 2]} &&\r\n                ${coords[rank - 1]} < ${outputShape[rank - 1]}) {\r\n              result.b =
getValue(${coords});\r\n            }\r\n            ${glsl.output} = result;\r\n          }\r\n        `;\r\n\r\n      return {\r\n
...metadata,\r\n        output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.packed},\r\n
shaderSource,\r\n        hasMain: true,\r\n      };\r\n    };\r\n\r\nexport const createPackedConcatProgramInfoLoader
=\r\n    (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: ConcatAttributes): ProgramInfoLoader =>
{\r\n      const metadata = createPackedConcatProgramMetadata(inputs.length, attributes.cacheKey);\r\n      return
{...metadata, get: () => createPackedConcatProgramInfo(handler, metadata, inputs, attributes.axis)};\r\n
};\r\n\r\nconst getShiftedChannelsSnippet = (channels: string[], channel: string, shift: number): string => {\r\n  const
channelIdx = channels.indexOf(channel);\r\n  const res = channels.map((c, idx) => {\r\n    if (idx === channelIdx)
{\r\n      return `${c} - ${shift}`;\r\n    } else {\r\n      return c;\r\n    }\r\n  });\r\n  return res.join();\r\n};\r\n","//
Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph}
from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport
{Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport
{ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nimport
{createPackedConcatProgramInfoLoader} from './concat-packed';\r\n\r\nexport interface ConcatAttributes extends
AttributeWithCacheKey {\r\n  readonly axis: number;\r\n}\r\n\r\nexport const concat:
OperatorImplementation<ConcatAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: ConcatAttributes): Tensor[] => {\r\n      validateInputs(inputs);\r\n      if (inferenceHandler.session.pack
&& inputs[0].dims.length > 1) {\r\n        const output =\r\n
inferenceHandler.run(createPackedConcatProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n
return [output];\r\n      } else {\r\n        const output =\r\n
inferenceHandler.run(createUnpackedConcatProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n
  return [output];\r\n      }\r\n    };\r\n\r\nconst createUnpackedConcatProgramMetadata = (inputCount: number,
cacheHint: string) => ({\r\n  name: 'Concat',\r\n  inputNames: Array.from({length: inputCount}, (v, i) =>
`X${i}`),\r\n  inputTypes: Array(inputCount).fill(TextureType.unpacked),\r\n  cacheHint\r\n});\r\n\r\nconst
createUnpackedConcatProgramInfo =\r\n    (handler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs:
Tensor[], axis: number): ProgramInfo => {\r\n      const inputShape = inputs[0].dims.slice();\r\n      if (axis >=
inputShape.length || axis < (-1 * inputShape.length)) {\r\n        throw new Error('axis specified for concat doesn\\'t
match input dimensionality');\r\n      }\r\n      if (axis < 0) {\r\n        axis = inputShape.length + axis;\r\n      }\r\n      //
ensure all of the non-concatenated axes match each other\r\n      // calculate the shape of the output tensor while we
```

```
do that\r\n      const outputShape = inputShape.slice(0);\r\n      for (let i = 1; i < inputs.length; i++) {\r\n        const
dataNShape = inputs[i].dims.slice();\r\n        for (let axisIndex = 0; axisIndex < inputShape.length; axisIndex++)
{\r\n          // add to the placeholder for computing output shape\r\n          if (axisIndex === axis) {\r\n
outputShape[axis] += dataNShape[axisIndex];\r\n          }\r\n          // ensure all non-cancatenated axes match each
other\r\n          else if (inputShape[axisIndex] !== dataNShape[axisIndex]) {\r\n            throw new Error('non concat
dimensions must match');\r\n          }\r\n        }\r\n      }\r\n\r\n      const rank = outputShape.length;\r\n\r\n      const
sizeInConcatAxis = new Array<number>(inputs.length);\r\n      let previousSum = 0;\r\n      for (let i = 0; i <
sizeInConcatAxis.length; ++i) {\r\n        previousSum += inputs[i].dims[axis];\r\n        sizeInConcatAxis[i] =
previousSum;\r\n      }\r\n\r\n      let getTextureIndexWhereDataResidesMethod = '';\r\n      // in most cases linear
search is sufficient, as in most scenarios, only 2 tensors are concatenated\r\n      if (inputs.length < 5) {\r\n
getTextureIndexWhereDataResidesMethod =
getTextureIndexWhereDataResidesLinearSearch(sizeInConcatAxis);\r\n      } else {\r\n
getTextureIndexWhereDataResidesMethod =
getTextureIndexWhereDataResidesBinarySearch(sizeInConcatAxis);\r\n      }\r\n\r\n      const
fetchDataFromCorrectTextureMethod = getFetchDataFromCorrectTextureMethod(inputs.length, rank);\r\n      const
getSizeInConcatAxisValueFromIndexMethod =
getGetSizeInConcatAxisValueFromIndexMethod(sizeInConcatAxis);\r\n      const shaderSource = `\r\n
${fetchDataFromCorrectTextureMethod}\r\n        ${getSizeInConcatAxisValueFromIndexMethod}\r\n
${getTextureIndexWhereDataResidesMethod}\r\n        float process(int indices[${rank}]) {\r\n          int
textureIndex = getTextureWhereDataResides (indices[${axis}]);\r\n\r\n          if(textureIndex != 0) {\r\n
indices[${axis}] = indices[${axis}] - int(getSizeInConcatAxisValueFromIndex(textureIndex-int(1)));\r\n
}\r\n\r\n          return fetchDataFromCorrectTexture(textureIndex, indices);\r\n        }`;\r\n      return {\r\n
...metadata,\r\n        output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n
shaderSource,\r\n      };\r\n    };\r\n\r\nconst createUnpackedConcatProgramInfoLoader =\r\n    (handler:
WebGLInferenceHandler, inputs: Tensor[], attributes: ConcatAttributes): ProgramInfoLoader => {\r\n      const
metadata = createUnpackedConcatProgramMetadata(inputs.length, attributes.cacheKey);\r\n      return {...metadata,
get: () => createUnpackedConcatProgramInfo(handler, metadata, inputs, attributes.axis)};\r\n    };\r\n\r\nconst
getTextureIndexWhereDataResidesLinearSearch = (sizeInConcatAxis: number[]): string => {\r\n  const searchAxis
= sizeInConcatAxis.map((size, i) => `if(index<${size}) {return ${i};}\r\n`);\r\n  return `int
getTextureWhereDataResides(int index) {\r\n      ${searchAxis.join('')}\r\n    }`;\r\n};\r\n\r\n// TODO: Implement
BinarySearch in GLSL\r\nconst getTextureIndexWhereDataResidesBinarySearch = (sizeInConcatAxis: number[]):
string =>\r\n    getTextureIndexWhereDataResidesLinearSearch(sizeInConcatAxis);\r\n\r\nconst
getFetchDataFromCorrectTextureMethod = (numberOfTensors: number, tensorRank: number) => {\r\n  const
codeLines: string[] = [`float fetchDataFromCorrectTexture(int textureIndex, int indices[${tensorRank}]) {`];\r\n  for
(let i = 0; i < numberOfTensors; ++i) {\r\n    if (i === 0) {\r\n      codeLines.push(\r\n          '\\t' +\r\n          `if
(textureIndex == ${i}) { return _X${i}(indices); }`);\r\n    } else if (i === numberOfTensors - 1) {\r\n
codeLines.push(\r\n          '\\t' +\r\n          `else { return _X${i}(indices); }`);\r\n    } else {\r\n      codeLines.push(\r\n
       '\\t' +\r\n          `else if (textureIndex == ${i}) { return _X${i}(indices); }`);\r\n    }\r\n  }\r\n
codeLines.push(\r\n      '\\t' +\r\n      '}');\r\n  return codeLines.join('\\n');\r\n};\r\n\r\nconst
getGetSizeInConcatAxisValueFromIndexMethod = (sizeInConcatAxis: number[]): string => {\r\n  const codeLines:
string[] = ['int getSizeInConcatAxisValueFromIndex(int index) {'];\r\n  for (let i = 0; i < sizeInConcatAxis.length;
++i) {\r\n    if (i === 0) {\r\n      codeLines.push(\r\n          '\\t' +\r\n          `if (index == ${i}) { return
${sizeInConcatAxis[i]}; }`);\r\n    } else if (i === sizeInConcatAxis.length - 1) {\r\n      codeLines.push(\r\n
'\\t' +\r\n          `else { return ${sizeInConcatAxis[i]}; }`);\r\n    } else {\r\n      codeLines.push(\r\n          '\\t' +\r\n
 `else if (index == ${i}) { return ${sizeInConcatAxis[i]}; }`);\r\n    }\r\n  }\r\n  codeLines.push(\r\n      '\\t' +\r\n
'}');\r\n\r\n  return codeLines.join('\\n');\r\n};\r\n\r\nexport const parseConcatAttributes:
OperatorInitialization<ConcatAttributes> = (node: Graph.Node): ConcatAttributes =>\r\n
createAttributeWithCacheKey({axis: node.attributes.getInt('axis')});\r\n\r\nconst validateInputs = (inputs: Tensor[]):
```

void => {\r\n if (!inputs || inputs.length < 1) {\r\n throw new Error('too few inputs');\r\n }\r\n\r\n const inputType = inputs[0].type;\r\n const inputDimensionality = inputs[0].dims.length;\r\n\r\n // TODO: Support string concat\r\n if (inputType === 'string') {\r\n throw new Error('string tensor is not supported yet');\r\n }\r\n\r\n for (const input of inputs) {\r\n // make sure types of all inputs match\r\n if (input.type !== inputType) {\r\n throw new Error('input tensors should be one type');\r\n }\r\n\r\n // make sure the dimensionality of all inputs are the same\r\n if (input.dims.length !== inputDimensionality) {\r\n throw new Error('input tensors should have the same shape');\r\n }\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Logger} from '../../../instrument';\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nimport {calculateOutputShape, ConvAttributes} from './conv';\r\nimport {getActicationSnippet} from './fuse-utils';\r\n\r\nconst createUnpackedGroupedConvProgramMetadata = (hasBias: boolean, cacheHint: string): ProgramMetadata => ({\r\n name: 'GroupedConv',\r\n inputNames: hasBias ? ['X', 'W', 'Bias'] : ['X', 'W'],\r\n inputTypes: hasBias ? [TextureType.unpacked, TextureType.unpacked, TextureType.unpacked] :\r\n [TextureType.unpacked, TextureType.unpacked],\r\n cacheHint\r\n});\r\n\r\nconst createUnpackedGroupedConvProgramInfo =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], metadata: ProgramMetadata,\r\n attributes: ConvAttributes): ProgramInfo => {\r\n const hasBias = inputs.length > 2;\r\n const processBias = hasBias ? 'value += getBias(output_channel);' : '';\r\n const xShape = inputs[0].dims.slice();\r\n const wShape = inputs[1].dims.slice();\r\n const outputChannelsPerGroup = wShape[0] / attributes.group;\r\n Logger.verbose(\r\n 'GroupedConv',\r\n `autpPad:${attributes.autoPad}, dilations:${attributes.dilations}, group:${attributes.group}, kernelShape:${\r\n attributes.kernelShape}, pads:${attributes.pads}, strides:${attributes.strides}`);\r\n const outputShape =\r\n calculateOutputShape(xShape, wShape, attributes.dilations, attributes.pads, attributes.strides);\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n const {activationFunction, applyActivation} = getActicationSnippet(attributes);\r\n\r\n const shaderSource = `\r\n const ivec2 strides = ivec2(${attributes.strides[0]}, ${attributes.strides[1]});\r\n const ivec2 pads = ivec2(${attributes.pads[0]}, ${attributes.pads[1]});\r\n ${activationFunction}\r\n void main() {\r\n ivec4 coords = getOutputCoords();\r\n int batch = coords.x;\r\n int output_channel = coords.y;\r\n ivec2 xRCCorner = coords.zw * strides - pads;\r\n int group_id = output_channel / ${outputChannelsPerGroup};\r\n\r\n float value = 0.0;\r\n for (int wInChannel = 0; wInChannel < ${wShape[1]}; wInChannel++) {\r\n int input_channel = group_id * ${wShape[1]} + wInChannel;\r\n for (int wHeight = 0; wHeight < ${wShape[2]}; wHeight++) {\r\n int xHeight = xRCCorner.x + wHeight * ${attributes.dilations[0]};\r\n\r\n if (xHeight < 0 || xHeight >= ${xShape[2]}) {\r\n continue;\r\n }\r\n\r\n for (int wWidth = 0; wWidth < ${wShape[3]}; wWidth++) {\r\n int xWidth = xRCCorner.y + wWidth * ${attributes.dilations[1]};\r\n if (xWidth < 0 || xWidth >= ${xShape[3]}) {\r\n continue;\r\n }\r\n\r\n float xVal = getX(batch, input_channel, xWidth, xHeight);\r\n float wVal = getW(output_channel, wInChannel, wWidth, wHeight);\r\n value += xVal*wVal;\r\n }\r\n }\r\n }\r\n ${processBias}\r\n ${applyActivation}\r\n ${glsl.output} = vec4(value, .0, .0, .0);\r\n }\r\n`;\r\n return {\r\n ...metadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n shaderSource,\r\n hasMain: true,\r\n };\r\n };\r\n\r\nexport const createUnpackedGroupedConvProgramInfoLoader =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes):\r\n ProgramInfoLoader => {\r\n const metadata = createUnpackedGroupedConvProgramMetadata(inputs.length > 2, attributes.cacheKey);\r\n return {\r\n ...metadata,\r\n get: () => createUnpackedGroupedConvProgramInfo(inferenceHandler, inputs, metadata, attributes)\r\n };\r\n };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {calculateOutputShape, ConvAttributes} from './conv';\r\nimport {createPackedIm2ColProgramInfoLoader} from './im2col-pack';\r\nimport {createPackedMatmulProgramInfoLoader} from './matmul-pack';\r\n\r\nexport const conv2DPackedPointwise =\r\n

(inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes): Tensor => {\r\n   const xshape = inputs[0].dims;\r\n   const kshape = inputs[1].dims;\r\n   const outputShape =\r\n calculateOutputShape(xshape, kshape, attributes.dilations, attributes.pads, attributes.strides);\r\n   const reshapedX = inferenceHandler.reshapePacked(inputs[0], [xshape[1], xshape[2] * xshape[3]]);\r\n   const reshapedK = inferenceHandler.reshapePacked(inputs[1], [kshape[0], kshape[1]]);\r\n\r\n   const matmulInputs = inputs.length > 2 ? [reshapedK, reshapedX, inputs[2]] : [reshapedK, reshapedX];\r\n   const matmulOutput = inferenceHandler.run(\r\n   createPackedMatmulProgramInfoLoader(inferenceHandler, matmulInputs, attributes), matmulInputs);\r\n   return inferenceHandler.reshapePacked(matmulOutput, outputShape);\r\n };\r\n\r\nexport const conv2DPacked =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes): Tensor => {\r\n   const xshape = inputs[0].dims;\r\n   const kshape = inputs[1].dims;\r\n   const outputShape =\r\n   calculateOutputShape(xshape, kshape, attributes.dilations, attributes.pads, attributes.strides);\r\n\r\n   // run im2col\r\n   const im2colOutput = inferenceHandler.run(\r\n createPackedIm2ColProgramInfoLoader(inferenceHandler, inputs[0], inputs[1], outputShape, attributes),\r\n [inputs[0]]);\r\n\r\n   // reshape kernel\r\n   const kernelReshaped = inferenceHandler.reshapePacked(inputs[1], [kshape[0], kshape[1] * kshape[2] * kshape[3]]);\r\n\r\n   // run matmul\r\n   const matmulInputs =\r\n (inputs.length === 3) ? [kernelReshaped, im2colOutput, inputs[2]] : [kernelReshaped, im2colOutput];\r\n   const matmulOutput = inferenceHandler.run(\r\n   createPackedMatmulProgramInfoLoader(inferenceHandler, matmulInputs, attributes), matmulInputs);\r\n\r\n   // reshape output\r\n   const outputReshaped = inferenceHandler.reshapePacked(matmulOutput, outputShape);\r\n   return outputReshaped;\r\n };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {InferenceHandler} from '../../../backend';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {PoolConvUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nimport {createUnpackedGroupedConvProgramInfoLoader} from './conv-grouped';\r\nimport {conv2DPacked} from './conv-pack';\r\nimport {createDotProductProgramInfoLoader} from './dot-product';\r\nimport {InternalActivationAttributes, parseInternalActivationAttributes} from './fuse-utils';\r\nimport {createIm2ColProgramInfoLoader} from './im2col';\r\nimport {createMatmulProgramInfoLoader} from './matmul';\r\n\r\n\r\nexport const calculateOutputShape =\r\n (inputShape: readonly number[], kernelShape: readonly number[], dilations: readonly number[],\r\n   adjustPads: readonly number[], strides: readonly number[]): number[] => {\r\n   const batchSize = inputShape[0];\r\n   const inputSpatialShape = inputShape.slice(2);\r\n   const spatialRank = inputSpatialShape.length;\r\n   const outChannels = kernelShape[0];\r\n   const kernelSpatialShape = kernelShape.slice(2);\r\n   const dilatedKernelShape = kernelSpatialShape.map((v, i) => v + (v - 1) * (dilations[i] - 1));\r\n   const inputSpatialShapeWithPad = inputSpatialShape.map((v, i) => v + adjustPads[i] + adjustPads[i + spatialRank]);\r\n   const outputSpatialShape =\r\n inputSpatialShapeWithPad.map((v, i) => Math.floor((v - dilatedKernelShape[i] + strides[i]) / strides[i]));\r\n const outputShape = [batchSize, outChannels].concat(...outputSpatialShape);\r\n   return outputShape;\r\n };\r\n\r\nexport interface ConvAttributes extends InternalActivationAttributes, AttributeWithCacheKey {\r\n readonly autoPad: string;\r\n readonly dilations: readonly number[];\r\n readonly group: number;\r\n readonly kernelShape: readonly number[];\r\n readonly pads: readonly number[];\r\n readonly strides: readonly number[];\r\n}\r\n\r\nexport const conv: OperatorImplementation<ConvAttributes> =\r\n (inferenceHandler: InferenceHandler, inputs: Tensor[], attributes: ConvAttributes): Tensor[] => {\r\n   validateInputs(inputs, attributes); // currently will fail if not conv2D\r\n   return conv2d(inferenceHandler, inputs, attributes);\r\n };\r\n\r\nconst conv2d: OperatorImplementation<ConvAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ConvAttributes): Tensor[] => {\r\n   const adjustedAttributes = getAdjustedConvAttributes(attributes, inputs);\r\n   const packMode = inferenceHandler.session.pack;\r\n   const isPointwise = adjustedAttributes.kernelShape[0] === 1 && adjustedAttributes.kernelShape[1] === 1;\r\n   if (adjustedAttributes.group > 1) {\r\n   const result =

inferenceHandler.run(\r\n createUnpackedGroupedConvProgramInfoLoader(inferenceHandler, inputs, adjustedAttributes), inputs);\r\n return [result];\r\n } else if (isPointwise && packMode) {\r\n return [conv2DUnpackedPointwise(inferenceHandler, inputs, adjustedAttributes)];\r\n } else if (packMode && inputs[0].dims.length === 4 && inputs[0].dims[0] === 1 && !isPointwise) {\r\n return [conv2DPacked(inferenceHandler, inputs, adjustedAttributes)];\r\n } else {\r\n return [conv2DUnpacked(inferenceHandler, inputs, adjustedAttributes)];\r\n }\r\n };\r\n\r\nconst conv2DUnpackedPointwise =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes): Tensor => {\r\n const xshape = inputs[0].dims;\r\n const kshape = inputs[1].dims;\r\n const outputShape =\r\n calculateOutputShape(xshape, kshape, attributes.dilations, attributes.pads, attributes.strides);\r\n const reshapedX = inferenceHandler.reshapeUnpacked(inputs[0], [xshape[1], xshape[2] * xshape[3]]);\r\n const reshapedK = inferenceHandler.reshapeUnpacked(inputs[1], [kshape[0], kshape[1]]);\r\n\r\n const matmulInputs = inputs.length > 2 ? [reshapedK, reshapedX, inputs[2]] : [reshapedK, reshapedX];\r\n const matmulOutput = inferenceHandler.run(createMatmulProgramInfoLoader(matmulInputs, attributes), matmulInputs);\r\n return inferenceHandler.reshapeUnpacked(matmulOutput, outputShape);\r\n };\r\n\r\nconst conv2DUnpacked =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], attributes: ConvAttributes): Tensor => {\r\n const xshape = inputs[0].dims;\r\n const kshape = inputs[1].dims;\r\n const outputShape =\r\n calculateOutputShape(xshape, kshape, attributes.dilations, attributes.pads, attributes.strides);\r\n const xIm2Col = inferenceHandler.run(\r\n createIm2ColProgramInfoLoader(inferenceHandler, inputs[0], inputs[1], outputShape, attributes), [inputs[0]]);\r\n\r\n const dotProductInputs = inputs.length === 3 ? [xIm2Col, inputs[1], inputs[2]] : [xIm2Col, inputs[1]];\r\n const output = inferenceHandler.run(\r\n createDotProductProgramInfoLoader(inferenceHandler, inputs, outputShape, attributes), dotProductInputs);\r\n return output;\r\n };\r\n\r\nconst getAdjustedConvAttributes = <T extends ConvAttributes>(attributes: T, inputs: Tensor[]): T => {\r\n const kernelShape = attributes.kernelShape.slice();\r\n // if kernelShape is not specified in the attributes of this op, infer it from the weight tensor dims\r\n if (attributes.kernelShape.length === 0) {\r\n for (let i = 2; i < inputs[1].dims.length; ++i) {\r\n kernelShape.push(inputs[1].dims[i]);\r\n }\r\n }\r\n const pads = attributes.pads.slice();\r\n PoolConvUtil.adjustPadsBasedOnAutoPad(\r\n inputs[0].dims, attributes.strides, attributes.dilations, kernelShape, pads, attributes.autoPad);\r\n\r\n // always return a new object so does not modify the original attributes\r\n const newAttributes: T = Object.assign({}, attributes);\r\n Object.assign(newAttributes, {kernelShape, pads, cacheKey: attributes.cacheKey});\r\n return newAttributes;\r\n};\r\n\r\nexport const parseConvAttributes: OperatorInitialization<ConvAttributes> = (node: Graph.Node): ConvAttributes => {\r\n const attributes = node.attributes;\r\n const activationAttributes = parseInternalActivationAttributes(attributes);\r\n // TODO : Make this generic enough to compute default attributes for multi-dimensional conv\r\n const autoPad = attributes.getString('auto_pad', 'NOTSET');\r\n const dilations = attributes.getInts('dilations', [1, 1]);\r\n const group = attributes.getInt('group', 1);\r\n const kernelShape = attributes.getInts('kernel_shape', []);\r\n const pads = attributes.getInts('pads', [0, 0, 0, 0]);\r\n const strides = attributes.getInts('strides', [1, 1]);\r\n\r\n return createAttributeWithCacheKey({autoPad, dilations, group, kernelShape, pads, strides, ...activationAttributes});\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[], attributes: ConvAttributes): void => {\r\n // Refer to the below link for all input checks\r\n // https://github.com/onnx/onnx/blob/master/docs/Operators.md#Conv\r\n if (!inputs || (inputs.length !== 2 && inputs.length !== 3)) {\r\n throw new Error('Conv requires 2 or 3 inputs');\r\n }\r\n\r\n // TODO : Need to add support for multi-dimensional conv\r\n if (inputs[0].dims.length !== 4 || inputs[1].dims.length !== 4) {\r\n throw new Error('currently only support 2-dimensional conv');\r\n }\r\n\r\n // FILTER_IN_CHANNEL should be equal to DATA_CHANNEL\r\n const dataChannel = inputs[0].dims[1];\r\n const filterInChannel = inputs[1].dims[1] * attributes.group;\r\n if (dataChannel !== filterInChannel) {\r\n throw new Error('FILTER_IN_CHANNEL should be equal to DATA_CHANNEL');\r\n }\r\n\r\n // if bias is provided it should be 1D and the number of elements should be equal to the number of feature maps\r\n if (inputs.length === 3 && (inputs[2].dims.length !== 1 || inputs[1].dims[0] !== inputs[2].dims[0])) {\r\n throw new Error('invalid bias');\r\n }\r\n\r\n const spatialRank =

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inputs[0].dims.length - 2;\r\n  // wrong dilations dimension\r\n  if (attributes.dilations.length !== spatialRank) {\r\n
throw new Error(`dilations should be ${spatialRank}D`);\r\n  }\r\n\r\n  // Wrong strides dimension\r\n  if
(attributes.strides.length !== spatialRank) {\r\n    throw new Error(`strides should be ${spatialRank}D`);\r\n
}\r\n\r\n  // Wrong pads dimension\r\n  if (attributes.pads.length !== spatialRank * 2) {\r\n    throw new Error(`pads
should be ${spatialRank * 2}D`);\r\n  }\r\n\r\n  // if kernelShape is specified, it's data length must be 2 less than
dims length of the weights tensor\r\n  // (the first 2 dims are batch_size and channels)\r\n  if
(attributes.kernelShape.length !== 0 && attributes.kernelShape.length !== inputs[1].dims.length - 2) {\r\n    throw
new Error('invalid kernel shape');\r\n  }\r\n\r\n  // TODO : Need to add support for float64\r\n  if (inputs[0].type !==
'float32' || inputs[1].type !== 'float32') {\r\n    throw new Error('Conv input(X,W) should be float tensor');\r\n
}\r\n\r\n  if (inputs.length === 3 && inputs[2].type !== 'float32') {\r\n    throw new Error('Conv input(bias) should
be float tensor');\r\n  }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under
the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation,
OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\n\r\nimport {transpose, TransposeAttributes} from
'./transpose';\r\n\r\nexport interface DepthToSpaceAttributes {\r\n  mode: 'DCR'|'CRD';\r\n  blocksize:
number;\r\n}\r\n\r\nexport const depthToSpace: OperatorImplementation<DepthToSpaceAttributes> =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: DepthToSpaceAttributes): Tensor[] =>
{\r\n      validateInputs(inputs);\r\n      const blocksize = attributes.blocksize;\r\n      const blocksizeSqr = blocksize *
blocksize;\r\n      const transposePerm = attributes.mode === 'DCR' ? [0, 3, 4, 1, 5, 2] : [0, 1, 4, 2, 5, 3];\r\n      const
firstReshapeShape = attributes.mode === 'DCR' ?\r\n          [\r\n            inputs[0].dims[0], blocksize, blocksize,
inputs[0].dims[1] / blocksizeSqr, inputs[0].dims[2],\r\n            inputs[0].dims[3]\r\n          ] :\r\n          [\r\n
inputs[0].dims[0], inputs[0].dims[1] / blocksizeSqr, blocksize, blocksize, inputs[0].dims[2],\r\n
inputs[0].dims[3]\r\n          ];\r\n\r\n      // const transpose = new WebGLTranspose();\r\n      // const attributes = new
Attribute(undefined);\r\n      // attributes.set('perm', 'ints', transposePerm);\r\n      //
transpose.initialize(attributes);\r\n\r\n      // First reshape\r\n      const firstReshapedTensor =
inferenceHandler.reshapeUnpacked(inputs[0], firstReshapeShape);\r\n\r\n      // transpose\r\n      const
transposeAttributes: TransposeAttributes = {perm: transposePerm, cacheKey: `${transposePerm}`};\r\n      const
[transposeOutput] = transpose(inferenceHandler, [firstReshapedTensor], transposeAttributes);\r\n\r\n      // Second
reshape\r\n      const secondReshapeShape = [\r\n        inputs[0].dims[0], inputs[0].dims[1] / blocksizeSqr,
inputs[0].dims[2] * blocksize,\r\n        inputs[0].dims[3] * blocksize\r\n      ];\r\n      const result =
inferenceHandler.reshapeUnpacked(transposeOutput, secondReshapeShape);\r\n      return [result];\r\n
};\r\n\r\nexport const parseDepthToSpaceAttributes: OperatorInitialization<DepthToSpaceAttributes> =\r\n    (node:
Graph.Node): DepthToSpaceAttributes => {\r\n      // processing node attributes\r\n      const blocksize =
node.attributes.getInt('blocksize');\r\n      if (blocksize < 1) {\r\n        throw new Error(`blocksize must be >= 1, but
got : ${blocksize} for DepthToSpace`);\r\n      }\r\n      const mode = node.attributes.getString('mode', 'DCR');\r\n
if (mode !== 'DCR' && mode !== 'CRD') {\r\n        throw new Error(`unrecognized mode: ${mode} for
DepthToSpace`);\r\n      }\r\n      return {mode, blocksize};\r\n    };\r\n\r\nconst validateInputs = (inputs: Tensor[]):
void => {\r\n  if (inputs.length !== 1) {\r\n    throw new Error(`DepthToSpace expect 1 inputs, but got
${inputs.length}`);\r\n  }\r\n\r\n  // Input has to be a 4-D tensor\r\n  // TODO: Support string depth-to-space.\r\n  if
(inputs[0].type === 'string' || inputs[0].dims.length !== 4) {\r\n    throw new TypeError('DepthToSpace input should
be a 4-D numeric tensor');\r\n  }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n//
Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from
'../../../util';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-
handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport
{getActicationSnippet, InternalActivationAttributes} from './fuse-utils';\r\nimport {calculateIm2ColDims} from
'./im2col';\r\n\r\nconst createDotProductProgramMetadata = (hasBias: boolean, attributes:
InternalActivationAttributes) => ({\r\n  name: 'ConvDotProduct',\r\n  inputNames: hasBias ? ['Im2Col', 'K', 'B'] :
['Im2Col', 'K'],\r\n  inputTypes: hasBias ? [TextureType.unpacked, TextureType.packedLastDimension,
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TextureType.unpacked] :\r\n [TextureType.unpacked, TextureType.packedLastDimension],\r\n cacheKey: attributes.activationCacheKey\r\n});\r\n\r\nconst createDotProductProgramInfo =\r\n (inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: readonly Tensor[],\r\n outputShape: number[], attributes: InternalActivationAttributes): ProgramInfo => {\r\n const xshape = inputs[0].dims;\r\n const kshape = inputs[1].dims;\r\n const adjustedKernelShape = [kshape[0], Math.ceil((xshape[1] * kshape[2] * kshape[3]) / 4)];\r\n const im2colShape = calculateIm2ColDims(xshape, kshape, outputShape);\r\n const [kWidth, kHeight] =\r\n inferenceHandler.calculateTextureWidthAndHeight(adjustedKernelShape, TextureType.packedLastDimension);\r\n\r\n const im2colStrides = ShapeUtil.computeStrides(im2colShape);\r\n const [im2colWidth, im2colHeight] =\r\n inferenceHandler.calculateTextureWidthAndHeight(im2colShape, TextureType.packedLastDimension);\r\n const rank = outputShape.length;\r\n\r\n const initValue = (inputs.length < 3) ? '0.0' : '_B(b)';\r\n const sharedDim = Math.ceil(xshape[1] * kshape[2] * kshape[3] / 4);\r\n const {activationFunction, applyActivation} = getActicationSnippet(attributes);\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n const shaderSource = `\r\n${activationFunction}\r\nfloat process(int indices[${rank}]) {\r\n int b[1];\r\n b[0] = indices[1];\r\n int im2col[4];\r\n im2col[0] = indices[0];\r\n im2col[1] = indices[2];\r\n im2col[2] = indices[3];\r\n int im2colOffset = im2col[0] * ${im2colStrides[0]} + im2col[1] * ${im2colStrides[1]} + im2col[2] * ${\r\n im2colStrides[2]};\r\n int kernelOffset = indices[1] * ${adjustedKernelShape[1]};\r\n float value = ${initValue};\r\n for (int i = 0; i < ${sharedDim}; ++i) {\r\n vec2 im2colCoords = offsetToCoords(im2colOffset, ${im2colWidth}, ${im2colHeight});\r\n vec2 kernelCoords = offsetToCoords(kernelOffset, ${kWidth}, ${kHeight});\r\n value += dot(${glsl.texture2D}(Im2Col, im2colCoords), ${glsl.texture2D}(K, kernelCoords));\r\n ++im2colOffset;\r\n ++kernelOffset;\r\n }\r\n ${applyActivation}\r\n return value;\r\n}`;\r\n return {\r\n ...metadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\nexport const createDotProductProgramInfoLoader =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: readonly Tensor[], outputShape: number[],\r\n attributes: InternalActivationAttributes): ProgramInfoLoader => {\r\n const metadata = createDotProductProgramMetadata(inputs.length > 2, attributes);\r\n return {\r\n ...metadata,\r\n get: () => createDotProductProgramInfo(inferenceHandler, metadata, inputs, outputShape, attributes)\r\n };\r\n };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const flatten: OperatorImplementation<number> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axis: number): Tensor[] => {\r\n validateInputs(inputs, axis);\r\n\r\n const outputDims = ShapeUtil.flattenShape(inputs[0].dims, axis);\r\n return [inferenceHandler.reshapeUnpacked(inputs[0], outputDims)];\r\n };\r\n\r\nexport const parseFlattenAttributes: OperatorInitialization<number> = (node: Graph.Node): number =>\r\n node.attributes.getInt('axis', 1); // default axis is 1\r\n\r\nconst validateInputs = (inputs: Tensor[], axis: number): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n throw new Error('Flatten requires 1 input.');\r\n }\r\n\r\n const r = inputs[0].dims.length;\r\n if (r === 0) {\r\n throw new Error('scalar tensor is not supported.');\r\n }\r\n\r\n if (axis < -r || axis > r) {\r\n throw new Error('Invalid axis');\r\n }\r\n\r\n // TODO: Support string type\r\n if (inputs[0].type === 'string') {\r\n throw new Error('string tensor is not supported.');\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Attribute} from '../../../attribute';\r\nimport {GlslValueFunction} from '../glsl-definitions';\r\nimport {glslClip, glslRelu, glslSigmoid} from './unary-op';\r\n\r\nexport interface InternalActivationAttributes {\r\n readonly activation: string;\r\n readonly clipMin?: number;\r\n readonly clipMax?: number;\r\n readonly activationCacheKey: string;\r\n}\r\n\r\nexport function getActicationSnippet(attributes: InternalActivationAttributes) {\r\n let func: GlslValueFunction;\r\n switch (attributes.activation) {\r\n case 'Relu':\r\n func = glslRelu();\r\n break;\r\n case 'Sigmoid':\r\n func =

glslSigmoid();\r\n break;\r\n case 'Clip':\r\n func = glslClip(attributes.clipMin!, attributes.clipMax!);\r\n break;\r\n // TODO: adding other activations that can be fused.\r\n default:\r\n return {activationFunction: '', applyActivation: ''};\r\n }\r\n\r\n const activationName = func.name;\r\n const activationFunction = func.body;\r\n const applyActivation = `value = ${activationName}_(value);`;\r\n return {activationFunction, applyActivation};\r\n}\r\n\r\nexport const parseInternalActivationAttributes = (attributes: Attribute): InternalActivationAttributes => {\r\n const activation = attributes.getString('__internal_activation', '');\r\n\r\n if (activation === 'Clip') {\r\n const clipMax = attributes.getFloat('__clip_max', 3.402823e+38);\r\n const clipMin = attributes.getFloat('__clip_min', -3.402823e+38);\r\n return {activation, clipMax, clipMin, activationCacheKey: `${activation}:${clipMin},${clipMax}`};\r\n }\r\n return {activation, activationCacheKey: activation};\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {NUMBER_TYPES, OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\ninterface GatherAttributes extends AttributeWithCacheKey {\r\n readonly axis: number;\r\n}\r\n\r\nexport const gather: OperatorImplementation<GatherAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: GatherAttributes): Tensor[] => {\r\n validateInputs(inputs, attributes.axis);\r\n const output = inferenceHandler.run(createGatherProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n return [output];\r\n };\r\n\r\nexport const parseGatherAttributes: OperatorInitialization<GatherAttributes> = (node: Graph.Node): GatherAttributes =>\r\n createAttributeWithCacheKey({axis: node.attributes.getInt('axis', 0)});\r\n\r\nconst gatherProgramMetadata = {\r\n name: 'Gather',\r\n inputNames: ['A', 'B'],\r\n inputTypes: [TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nconst createGatherProgramInfo =\r\n (handler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: Tensor[], axis: number): ProgramInfo => {\r\n const inputShape = inputs[0].dims.slice();\r\n const indexDataShape = inputs[1].dims.slice();\r\n const outputShape = new Array(inputShape.length + indexDataShape.length - 1);\r\n\r\n axis = ShapeUtil.normalizeAxis(axis, inputShape.length);\r\n const indexCopyOps: string[] = [];\r\n for (let i = 0; i < outputShape.length; i++) {\r\n // outputShape is divided into three parts: A, B, C\r\n // |0 axis| axis + indexDataShape.length | end|\r\n // | A | B | C |\r\n //\r\n // inputIdx: [A, inputs[1][B], C]\r\n if (i < axis) { // A\r\n outputShape[i] = inputShape[i];\r\n indexCopyOps.push(`inputIdx[${i}] = outputIdx[${i}];`);\r\n } else {\r\n if (i < axis + indexDataShape.length) { // B\r\n outputShape[i] = indexDataShape[i - axis];\r\n indexCopyOps.push(`indexDataIdx[${i - axis}] = outputIdx[${i}];`);\r\n } else { // C\r\n outputShape[i] = inputShape[i - indexDataShape.length + 1]; // skip 1 for axis\r\n indexCopyOps.push(`inputIdx[${i - indexDataShape.length + 1}] = outputIdx[${i}];`);\r\n }\r\n }\r\n }\r\n\r\n const orank = outputShape.length || 1;\r\n const irank = inputShape.length;\r\n const iDrank = indexDataShape.length || 1;\r\n const shaderSource = `\r\n float process(int outputIdx[${orank}]) {\r\n int inputIdx[${irank}];\r\n int indexDataIdx[${iDrank}];\r\n indexDataIdx[0] = 0;\r\n ${indexCopyOps.join('\\n ')}\r\n int idx = int(_B(indexDataIdx));\r\n inputIdx[${axis}] = idx < 0 ? idx + ${inputShape[axis]} : idx;\r\n return _A(inputIdx);\r\n }`;\r\n return {\r\n ...metadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\nconst createGatherProgramInfoLoader =\r\n (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: GatherAttributes): ProgramInfoLoader => {\r\n const metadata = {...gatherProgramMetadata, cacheHint: attributes.cacheKey};\r\n return {...metadata, get: () => createGatherProgramInfo(handler, metadata, inputs, attributes.axis)};\r\n };\r\n\r\nconst validateInputs = (inputs: Tensor[], axis: number): void => {\r\n if (!inputs || inputs.length !== 2) {\r\n throw new Error('Gather requires 2 inputs.');\r\n }\r\n const tensorRank = inputs[0].dims.length;\r\n if (tensorRank < 1) {\r\n throw new Error('Invalid input shape.');\r\n }\r\n if (axis < -tensorRank || axis > tensorRank - 1) {\r\n throw new Error('Invalid axis.');\r\n }\r\n if

(NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n throw new Error('Invaid input type.');\r\n }\r\n if (inputs[1].type !== 'int32' && inputs[1].type !== 'int16') {\r\n throw new Error('Invaid input type.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {GemmUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport interface GemmAttributes extends AttributeWithCacheKey {\r\n transA: boolean;\r\n transB: boolean;\r\n alpha: number;\r\n beta: number;\r\n isOptionalC: boolean; // in opset 11, C becomes optional\r\n}\r\n\r\nexport const gemm: OperatorImplementation<GemmAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: GemmAttributes): Tensor[] => {\r\n validateInputs(inputs, attributes);\r\n const output = inferenceHandler.run(createGemmProgramInfoLoader(inputs, attributes), inputs);\r\n return [output];\r\n };\r\n\r\nconst parseGemmAttributes = (node: Graph.Node, isOptionalC: boolean): GemmAttributes => {\r\n const transA = node.attributes.getInt('transA', 0) !== 0;\r\n const transB = node.attributes.getInt('transB', 0) !== 0;\r\n const alpha = node.attributes.getFloat('alpha', 1.0);\r\n const beta = node.attributes.getFloat('beta', 1.0);\r\n return createAttributeWithCacheKey({transA, transB, alpha, beta, isOptionalC});\r\n};\r\n\r\nexport const parseGemmAttributesV7: OperatorInitialization<GemmAttributes> = (node: Graph.Node): GemmAttributes =>\r\n parseGemmAttributes(node, false);\r\n\r\nexport const parseGemmAttributesV11: OperatorInitialization<GemmAttributes> = (node: Graph.Node): GemmAttributes =>\r\n parseGemmAttributes(node, true);\r\n\r\nconst createGemmProgramInfoLoader = (inputs: Tensor[], attributes: GemmAttributes): ProgramInfoLoader => {\r\n const metadata = {\r\n name: 'Gemm',\r\n inputNames: inputs.length === 3 ? ['A', 'B', 'C'] : ['A', 'B'],\r\n inputTypes: inputs.length === 3 ? [TextureType.unpacked, TextureType.unpacked, TextureType.unpacked] :\r\n [TextureType.unpacked, TextureType.unpacked],\r\n key: attributes.cacheKey\r\n };\r\n\r\n return {...metadata, get: () => createGemmProgramInfo(metadata, inputs, attributes)};\r\n};\r\n\r\nconst createGemmProgramInfo =\r\n (metadata: ProgramMetadata, inputs: Tensor[], attributes: GemmAttributes): ProgramInfo => {\r\n const aShape = inputs[0].dims.slice();\r\n const bShape = inputs[1].dims.slice();\r\n const [M, N] = GemmUtil.getShapeOfGemmResult(\r\n aShape, attributes.transA, bShape, attributes.transB, inputs.length === 3 ? inputs[2].dims : undefined);\r\n const outputShape = [M, N];\r\n if (!outputShape) {\r\n throw new Error('Can\\'t use gemm on the given tensors');\r\n }\r\n let sharedDim = aShape[aShape.length - 1];\r\n let line = '';\r\n if (attributes.transA) {\r\n sharedDim = aShape[0];\r\n }\r\n if (attributes.transA && attributes.transB) {\r\n line = 'value += _A_T(a) * _B_T(b);';\r\n } else if (attributes.transA && !attributes.transB) {\r\n line = 'value += _A_T(a) * _B(b);';\r\n } else if (!attributes.transA && attributes.transB) {\r\n line = 'value += _A(a) * _B_T(b);';\r\n } else if (!attributes.transA && !attributes.transB) {\r\n line = 'value += _A(a) * _B(b);';\r\n }\r\n const rank = outputShape.length;\r\n const declareC = inputs.length === 3 ? `int c[${inputs[2].dims.length}];` : '';\r\n const broadcastC = inputs.length === 3 ? 'bcastIndices_C(indices, c);' : '';\r\n const calculateC = inputs.length === 3 ? 'value += beta * _C(c);' : '';\r\n const shaderSource = `\r\n float process(int indices[${rank}]) {\r\n int a[${rank}];\r\n int b[${rank}];\r\n ${declareC}\r\n\r\n copyVec(indices, a);\r\n copyVec(indices, b);\r\n ${broadcastC}\r\n\r\n float value = 0.0;\r\n for (int k=0; k<${sharedDim}; ++k) {\r\n a[${rank - 1}] = k;\r\n b[${rank - 2}] = k;\r\n ${line}\r\n }\r\n\r\n value = value * alpha;\r\n ${calculateC}\r\n return value;\r\n }`;\r\n return {\r\n ...metadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n variables: [\r\n {name: 'alpha', type: 'float', data: attributes.alpha}, {name: 'beta', type: 'float', data: attributes.beta}\r\n],\r\n shaderSource\r\n };\r\n };\r\n\r\nconst validateInputs = (inputs: Tensor[], attributes: GemmAttributes): void => {\r\n if (!inputs) {\r\n throw new Error('Input is missing');\r\n }\r\n if (attributes.isOptionalC && (inputs.length < 2 || inputs.length > 3)) {\r\n throw new Error('Invaid input shape.');\r\n }\r\n if (!attributes.isOptionalC &&

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inputs.length !== 3) {\r\n    throw new Error('Gemm requires 3 inputs');\r\n  }\r\n\r\n  // 'C' can be of dimensionality
1 or 2 only\r\n  if (inputs.length === 3 && inputs[2].dims.length !== 1 && inputs[2].dims.length !== 2) {\r\n
throw new Error('Invalid input shape of C');\r\n  }\r\n\r\n  if ((inputs[0].type !== 'float32' && inputs[0].type !==
'float64') ||\r\n      (inputs[1].type !== 'float32' && inputs[1].type !== 'float64') ||\r\n      (inputs.length === 3 &&
inputs[2].type !== 'float32' && inputs[2].type !== 'float64')) {\r\n    throw new Error('Invalid input type.');\r\n
}\r\n\r\n  if ((inputs[0].type !== inputs[1].type) || (inputs.length === 3 && inputs[0].type !== inputs[2].type)) {\r\n
throw new Error('Input types are mismatched');\r\n  }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights
reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from
'../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo,
ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport {ConvAttributes} from
'./conv';\r\nimport {unpackFromChannel} from './packing-utils';\r\n\r\nconst createPackedIm2ColProgramMetadata
= (cacheHint: string) => ({\r\n  name: 'Im2Col (packed)',\r\n  inputNames: ['A'],\r\n  inputTypes:
[TextureType.packed],\r\n  cacheHint,\r\n});\r\n\r\nconst createPackedIm2ColProgramInfo =\r\n
(inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, x: Tensor, w: Tensor,\r\n
outputShape: readonly number[], attributes: ConvAttributes): ProgramInfo => {\r\n      const xshape = x.dims;\r\n
const wshape = w.dims;\r\n      const rowDim = 2;\r\n      const colDim = 3;\r\n      const rank =
outputShape.length;\r\n      const im2colShape = [wshape[1] * wshape[2] * wshape[3], outputShape[2] *
outputShape[3]];\r\n      const kernelSize = wshape[2] * wshape[3];\r\n      const unpackChannel =
unpackFromChannel();\r\n      const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n      let
unrolled = '';\r\n\r\n      for (let row = 0; row <= 1; row++) {\r\n        for (let col = 0; col <= 1; col++) {\r\n
unrolled += `\r\n            blockIndex = rc.x + ${col};\r\n            pos = rc.y + ${row};\r\n\r\n            if(blockIndex <
${im2colShape[1]} && pos < ${im2colShape[0]}) {\r\n              offsetY = int(blockIndex / (${outputShape[rank -
1]})) * ${attributes.strides[0]} - ${\r\n              attributes.pads[0]};\r\n              d0 = offsetY +
${attributes.dilations[0]} * (imod(pos, ${kernelSize}) / ${wshape[2]});\r\n\r\n              if(d0 < ${xshape[rowDim]}
&& d0 >= 0) {\r\n                offsetX = imod(blockIndex, ${outputShape[rank - 1]}) * ${attributes.strides[1]} -
${\r\n              attributes.pads[1]};\r\n                d1 = offsetX + ${attributes.dilations[1]} * imod(imod(pos,
${kernelSize}), ${wshape[2]});\r\n\r\n                if(d1 < ${xshape[colDim]} && d1 >= 0) {\r\n\r\n                  ch =
int(float(pos)/ ${kernelSize}.);\r\n                    innerDims = vec2(d0, d1);\r\n                    result[${row * 2 + col}] =
getChannel(\r\n                      getA(0, ch, int(innerDims.x),\r\n                      int(innerDims.y)), innerDims);\r\n
    }\r\n              }\r\n            }\r\n\r\n          `;\r\n        }\r\n      }\r\n\r\n      const shaderSource = `\r\n
${unpackChannel}\r\n\r\n      void main() {\r\n        ivec2 rc = getOutputCoords();\r\n          vec4 result =
vec4(0.0);\r\n          int blockIndex, pos, offsetY, d0, offsetX, d1, ch;\r\n          vec2 innerDims;\r\n
${unrolled}\r\n          ${glsl.output} = result;\r\n      }\r\n            `;\r\n      return {\r\n        ...metadata,\r\n        output:
{dims: im2colShape, type: x.type, textureType: TextureType.packed},\r\n        shaderSource,\r\n        hasMain:
true\r\n      };\r\n    };\r\n\r\nexport const createPackedIm2ColProgramInfoLoader =\r\n    (inferenceHandler:
WebGLInferenceHandler, x: Tensor, w: Tensor, outputShape: readonly number[],\r\n     attributes: ConvAttributes):
ProgramInfoLoader => {\r\n      const metadata = createPackedIm2ColProgramMetadata(attributes.cacheKey);\r\n
return {\r\n        ...metadata,\r\n        get: () => createPackedIm2ColProgramInfo(inferenceHandler, metadata, x, w,
outputShape, attributes)\r\n      };\r\n    };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n//
Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler}
from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from
'../types';\r\nimport {ConvAttributes} from './conv';\r\n\r\nconst createIm2ColProgramMetadata = (cacheHint:
string) => ({\r\n  name: 'Im2Col',\r\n  inputNames: ['X'],\r\n  inputTypes: [TextureType.unpacked],\r\n
cacheHint,\r\n});\r\n\r\nconst createIm2ColProgramInfo =\r\n    (inferenceHandler: WebGLInferenceHandler,
metadata: ProgramMetadata, x: Tensor, w: Tensor,\r\n     outputShape: readonly number[], attributes:
ConvAttributes): ProgramInfo => {\r\n      const xshape = x.dims;\r\n      const wshape = w.dims;\r\n\r\n      const
rank = outputShape.length;\r\n      const im2colDims = calculateIm2ColDims(xshape, wshape, outputShape,
4);\r\n\r\n      const shaderSource = `\r\n        const int XC = ${xshape[1]};\r\n        const int XH = ${xshape[2]};\r\n
```

const int XW = ${xshape[3]};\r\n const int KH = ${attributes.kernelShape[0]};\r\n const int KW = ${attributes.kernelShape[1]};\r\n const int dilationH = ${attributes.dilations[0]};\r\n const int dilationW = ${attributes.dilations[1]};\r\n const int strideH = ${attributes.strides[0]};\r\n const int strideW = ${attributes.strides[1]};\r\n const int padH = ${attributes.pads[0]};\r\n const int padW = ${attributes.pads[1]};\r\n const int KHKW = KH*KW;\r\n const int XCKHKW = XC * KHKW;\r\n const int outputChannels = 4;\r\n vec4 process(int indices[${rank}]) {\r\n int b = indices[0]; // batch size\r\n int oh = indices[1] * strideH - padH; //output height\r\n int ow = indices[2] * strideW - padW; //output width\r\n int p = indices[3] * outputChannels; //patch\r\n vec4 value = vec4(0.0);\r\n for(int i=0; i < outputChannels; ++i) {\r\n if(p < XCKHKW) {\r\n int patchC = p / KHKW;\r\n int patchH = (p - patchC*KHKW) / KW;\r\n int patchW = (p - patchC*KHKW) - patchH * KW;\r\n int xh2 = oh + patchH * dilationH;\r\n int xw2 = ow + patchW * dilationW;\r\n int x[${xshape.length}];\r\n x[0] = b;\r\n x[1] = patchC;\r\n x[2] = xh2;\r\n x[3] = xw2;\r\n if(xh2 >= 0 &&\r\n xh2 < XH &&\r\n xw2 >= 0 &&\r\n xw2 < XW) {\r\n value[i] = _X(x);\r\n }\r\n }\r\n ++p;\r\n }\r\n return value;\r\n }\r\n `;\r\n return {\r\n ...metadata,\r\n output: {dims: im2colDims, type: x.type, textureType: TextureType.packedLastDimension},\r\n shaderSource\r\n };\r\n };\r\n\r\nexport const createIm2ColProgramInfoLoader =\r\n (inferenceHandler: WebGLInferenceHandler, x: Tensor, w: Tensor, outputShape: readonly number[],\r\n attributes: ConvAttributes): ProgramInfoLoader => {\r\n const metadata = createIm2ColProgramMetadata(attributes.cacheKey);\r\n return {\r\n ...metadata,\r\n get: () => createIm2ColProgramInfo(inferenceHandler, metadata, x, w, outputShape, attributes)\r\n };\r\n };\r\n\r\n\r\nexport const calculateIm2ColDims =\r\n (inputShape: readonly number[], kernelShape: readonly number[], outputShape: readonly number[], channels = 4):\r\n number[] =>\r\n [outputShape[0], outputShape[2], outputShape[3],\r\n Math.ceil(inputShape[1] * kernelShape[2] * kernelShape[3] / channels)];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport interface ImageScalerAttributes extends AttributeWithCacheKey {\r\n scale: number;\r\n bias: number[];\r\n}\r\n\r\nexport const imageScaler: OperatorImplementation<ImageScalerAttributes> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ImageScalerAttributes): Tensor[] => {\r\n validateInputs(inputs);\r\n const output =\r\n inferenceHandler.run(createImageScalerProgramInfoLoader(inferenceHandler, inputs, attributes), inputs);\r\n return [output];\r\n };\r\n\r\nexport const parseImageScalerAttributes: OperatorInitialization<ImageScalerAttributes> =\r\n (node: Graph.Node): ImageScalerAttributes => {\r\n const scale = node.attributes.getFloat('scale');\r\n const bias = node.attributes.getFloats('bias');\r\n return createAttributeWithCacheKey({scale, bias});\r\n };\r\n\r\nconst imageScalerProgramMetadata = {\r\n name: 'ImageScaler',\r\n inputNames: ['X'],\r\n inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nconst createImageScalerProgramInfo =\r\n (handler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: Tensor[], attributes: ImageScalerAttributes):\r\n ProgramInfo => {\r\n const outputShape = inputs[0].dims.slice();\r\n const rank = outputShape.length;\r\n const getBiasMethod = createGetBiasMethod(attributes.bias.length);\r\n const shaderSource = `\r\n ${getBiasMethod}\r\n float process(int indices[${rank}]) {\r\n return _X(indices) * scale + getBias(bias, indices[1]);\r\n }`;\r\n return {\r\n ...metadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n variables: [\r\n {name: 'bias', type: 'float', arrayLength: attributes.bias.length, data: attributes.bias},\r\n {name: 'scale', type: 'float', data: attributes.scale}\r\n],\r\n shaderSource\r\n };\r\n };\r\n\r\nconst createImageScalerProgramInfoLoader =\r\n (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: ImageScalerAttributes): ProgramInfoLoader => {\r\n const metadata = {...imageScalerProgramMetadata, cacheHint: attributes.cacheKey};\r\n   return {...metadata, get: () => createImageScalerProgramInfo(handler, metadata, inputs, attributes)};\r\n   };\r\n\r\nconst createGetBiasMethod = (numChannels: number): string => {\r\n const codeLines: string[] = [`float getBias(float bias[${numChannels}], int channel) {`];\r\n for (let i = 0; i < numChannels; ++i) {\r\n   if (i === 0) {\r\n   codeLines.push(\r\n   '\\t' +\r\n   `if (channel == ${i}) { return bias[${i}]; }`);\r\n   } else if (i === numChannels - 1) {\r\n   codeLines.push(\r\n   '\\t' +\r\n   `else { return bias[${i}]; }`);\r\n   } else {\r\n   codeLines.push(\r\n   '\\t' +\r\n   `else if (channel == ${i}) { return bias[${i}]; }`);\r\n   }\r\n }\r\n codeLines.push(\r\n   '\\t' +\r\n   '}');\r\n return codeLines.join('\\n');\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('ImageScaler requires 1 input.');\r\n }\r\n if (inputs[0].dims.length !== 4) {\r\n   throw new Error('Invalid input shape.');\r\n }\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n   throw new Error('Invalid input type.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport const instanceNormalization: OperatorImplementation<number> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], epsilon: number): Tensor[] => {\r\n   validateInputs(inputs);\r\n\r\n   const meanAndVariance = inferenceHandler.run(createMeanAndVarianceProgramInfoLoader(inputs[0]), inputs);\r\n   const output = inferenceHandler.run(\r\n   createComputeOutputProgramInfoLoader(inferenceHandler, inputs[0], epsilon, meanAndVariance.dims),\r\n   [inputs[0], meanAndVariance, inputs[1], inputs[2]]);\r\n   return [output];\r\n   };\r\n\r\nexport const parseInstanceNormalizationAttributes: OperatorInitialization<number> = (node: Graph.Node): number =>\r\n   node.attributes.getFloat('epsilon', 1e-5);\r\n\r\nconst meanAndVarianceProgramMetadata = {\r\n name: 'InstanceNormalization_MeanAndVariance',\r\n inputNames: ['X'],\r\n inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nconst createMeanAndVarianceProgramInfo = (metadata: ProgramMetadata, input: Tensor): ProgramInfo => {\r\n const xDims = input.dims.slice();\r\n const channel = xDims[1];\r\n const channelSize = xDims[2] * xDims[3];\r\n const outputShape = [xDims[0], channel];\r\n\r\n const shaderSource = `\r\n   vec4 process(int[2] indices) {\r\n   vec4 v = vec4(0.0);\r\n   int a[4];\r\n   a[0] = indices[0];\r\n   a[1] = indices[1];\r\n   float temp = 0.0;\r\n   for(int a2=0; a2<${xDims[2]}; a2++) {\r\n   a[2] = a2;\r\n   for(int a3=0; a3<${xDims[3]}; a3++) {\r\n   a[3] = a3;\r\n   float x = _X(a);\r\n   temp += x;\r\n   }\r\n   }\r\n   float mean = temp / float(${channelSize});\r\n   temp = 0.0;\r\n   for(int a2=0; a2<${xDims[2]}; a2++) {\r\n   a[2] = a2;\r\n   for(int a3=0; a3<${xDims[3]}; a3++) {\r\n   a[3] = a3;\r\n   float x = _X(a);\r\n   temp += (x - mean) * (x - mean);\r\n   }\r\n   }\r\n   v.r = mean;\r\n   v.g = temp / float(${channelSize});\r\n\r\n   return v;\r\n   }`;\r\n return {\r\n   ...metadata,\r\n   output: {dims: outputShape, type: input.type, textureType: TextureType.packedLastDimension},\r\n   shaderSource\r\n };\r\n};\r\n\r\nconst createMeanAndVarianceProgramInfoLoader = (input: Tensor): ProgramInfoLoader => ({\r\n ...meanAndVarianceProgramMetadata,\r\n get: () => createMeanAndVarianceProgramInfo(meanAndVarianceProgramMetadata, input)\r\n});\r\n\r\nconst computeOutputProgramMetadata = {\r\n name: 'InstanceNormalization_ComputeOutput',\r\n inputNames: ['X', 'MeanAndVariance', 'Scale', 'B'],\r\n inputTypes: [TextureType.unpacked, TextureType.packedLastDimension, TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nconst createComputeOutputProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, input: Tensor, epsilon: number,\r\n   meanAndVarianceShape: readonly number[]): ProgramInfo => {\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const [textureWidth, textureHeight] =\r\n   inferenceHandler.calculateTextureWidthAndHeight(meanAndVarianceShape, TextureType.packedLastDimension);\r\n   const [meanAndVarianceWidth, meanAndVarianceHeight] = [textureWidth / 4, textureHeight];\r\n   const shaderSource = `\r\n   vec4 get_MeanAndVariance(int[2] mv) {\r\n   int offset = indicesToOffset_MeanAndVariance(mv);\r\n   vec2 coords = offsetToCoords(offset,

${meanAndVarianceWidth}, ${meanAndVarianceHeight});\r\n   return ${glsl.texture2D}(MeanAndVariance, coords);\r\n   }\r\n\r\n   float process(int[4] indices) {\r\n   int mv[2];\r\n   mv[0] = indices[0];\r\n   mv[1] = indices[1];\r\n   vec4 mean_and_variance = get_MeanAndVariance(mv);\r\n   float mean = mean_and_variance.r;\r\n   float variance = mean_and_variance.g;\r\n\r\n   int sb[1];\r\n   sb[0] = indices[1];\r\n   float scale = _Scale(sb);\r\n   float b = _B(sb);\r\n\r\n   return scale * (_X(indices) - mean) / sqrt(variance + epsilon) + b;\r\n   }`;\r\n   return {\r\n   ...metadata,\r\n   output: {dims: input.dims, type: input.type, textureType: TextureType.unpacked},\r\n   variables: [{name: 'epsilon', type: 'float', data: epsilon}],\r\n   shaderSource\r\n   };\r\n   };\r\n\r\nconst createComputeOutputProgramInfoLoader =\r\n   (inferenceHandler: WebGLInferenceHandler, input: Tensor, epsilon: number, meanAndVarianceShape: readonly number[]):\r\n   ProgramInfoLoader => {\r\n   const metadata = {...computeOutputProgramMetadata, cacheHint: `${epsilon}`};\r\n   return {\r\n   ...metadata,\r\n   get: () => createComputeOutputProgramInfo(inferenceHandler, metadata, input, epsilon, meanAndVarianceShape)\r\n   };\r\n   };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 3) {\r\n   throw new Error('InstanceNormalization requires 3 inputs.');\r\n }\r\n\r\n const X = inputs[0];\r\n const scale = inputs[1];\r\n const B = inputs[2];\r\n\r\n // input should at least have three dimensions - N,C,dim1,...,dimn\r\n // other inputs can have only one dimensions\r\n if (X.dims.length < 3 || scale.dims.length !== 1 || B.dims.length !== 1) {\r\n   throw new Error('Invalid input shape.');\r\n }\r\n if (scale.dims[0] !== X.dims[1] || B.dims[0] !== X.dims[1]) {\r\n   throw new Error('Input shapes are mismatched.');\r\n }\r\n if ((X.type !== 'float32' && X.type !== 'float64') || (scale.type !== 'float32' && scale.type !== 'float64') ||\r\n   (B.type !== 'float32' && B.type !== 'float64')) {\r\n   throw new Error('Invalid input type.');\r\n }\r\n if (inputs[0].dims.length !== 4) {\r\n   throw new Error('Only support 4-D input shape.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {BroadcastUtil} from '../../../util';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\nimport {getCoordsDataType, getGlChannels} from '../utils';\r\n\r\nimport {getActicationSnippet, InternalActivationAttributes} from './fuse-utils';\r\nimport {getBiasForMatmul} from './matmul';\r\n\r\nconst createPackedMatmulProgramMetadata = (hasBias: boolean, cacheHint: string) => ({\r\n name: 'MatMul (packed)',\r\n inputNames: hasBias ? ['A', 'B', 'Bias'] : ['A', 'B'],\r\n inputTypes: hasBias ? [TextureType.packed, TextureType.packed, TextureType.packed] :\r\n   [TextureType.packed, TextureType.packed],\r\n cacheHint\r\n});\r\n\r\nconst createPackedMatmulProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, metadata: ProgramMetadata, inputs: Tensor[],\r\n   activationAttributes: InternalActivationAttributes): ProgramInfo => {\r\n const hasBias = inputs.length > 2;\r\n   const processBias = hasBias ? 'value += getBiasForMatmul();' : '';\r\n   const aShape = inputs[0].dims;\r\n   const bShape = inputs[1].dims;\r\n   const outputShape = BroadcastUtil.calcShape(aShape, bShape, true);\r\n   const isBroadcast = !ShapeUtil.areEqual(inputs[0].dims, inputs[1].dims);\r\n\r\n   if (!outputShape) {\r\n   throw new Error('Can\\'t use matmul on the given tensors');\r\n   }\r\n   const sharedDim = aShape[aShape.length - 1];\r\n   const sharedDimIndex = Math.ceil(sharedDim / 2);\r\n   const aRank = aShape.length;\r\n   const bRank = bShape.length;\r\n\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const coordsDataType = getCoordsDataType(outputShape.length);\r\n   const outRank = outputShape.length;\r\n   const allGlChannels = getGlChannels();\r\n   const {activationFunction, applyActivation} = getActicationSnippet(activationAttributes);\r\n\r\n   const getBiasForMatmulSnippet =\r\n   hasBias ? `${getBiasForMatmul(coordsDataType, allGlChannels, inputs[2].dims, outputShape, true)}` : '';\r\n\r\n   const getBcastedSamplerForMatmulSnippet =\r\n   isBroadcast ? `${getBcastSamplerForMatmul(coordsDataType, allGlChannels, inputs, outputShape)}` : '';\r\n\r\n   const getSamplerAInLoopSnippet = isBroadcast ? 'getAAtOutCoordsMatmul(i)' : `getA(${getA(allGlChannels, aRank)})`;\r\n   const getSamplerBInLoopSnippet = isBroadcast ? 'getBAtOutCoordsMatmul(i)' : `getB(${getB(allGlChannels, bRank)})`;\r\n   const getOutputCoordsSnippet = isBroadcast ? '' : `${coordsDataType} rc =\r\n   getOutputCoords(); int lastDim =

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rc.${allGlChannels[outRank - 1]}; rc.${allGlChannels[outRank - 1]} =\r\n          rc.${allGlChannels[outRank - 2]};
rc.${allGlChannels[outRank - 2]} = lastDim;\r\n      `;\r\n      const shaderSource = `\r\n
${getBcastedSamplerForMatmulSnippet}\r\n          ${getBiasForMatmulSnippet}\r\n
${activationFunction}\r\n          void main() {\r\n            ${getOutputCoordsSnippet}\r\n\r\n            vec4 value =
vec4(0);\r\n            for (int i = 0; i < ${sharedDimIndex}; i++) {\r\n              vec4 a =
${getSamplerAInLoopSnippet};\r\n              vec4 b = ${getSamplerBInLoopSnippet};\r\n\r\n              value +=
(a.rrbb * b.rgrg);\r\n              value += (a.ggaa * b.baba);\r\n            }\r\n            ${processBias}\r\n
${applyActivation}\r\n            ${glsl.output} = value;\r\n          }`;\r\n      return {\r\n        ...metadata,\r\n
output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.packed},\r\n        shaderSource,\r\n
hasMain: true\r\n      };\r\n    };\r\n\r\nexport const createPackedMatmulProgramInfoLoader =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],\r\n     activationAttributes:
InternalActivationAttributes): ProgramInfoLoader => {\r\n      const metadata =
createPackedMatmulProgramMetadata(inputs.length > 2, activationAttributes.activationCacheKey);\r\n      return
{\r\n        ...metadata,\r\n        get: () => createPackedMatmulProgramInfo(inferenceHandler, metadata, inputs,
activationAttributes)\r\n      };\r\n    };\r\n\r\nfunction getBcastSamplerForMatmul(\r\n    coordsDataType: string,
allGlChannels: readonly string[], inputs: Tensor[], outShape: readonly number[]): string {\r\n  let
unpackedACoordsSnippet = [];\r\n  let unpackedBCoordsSnippet = [];\r\n\r\n  const inAShape = inputs[0].dims;\r\n
const inBShape = inputs[1].dims;\r\n\r\n  const inARank = inAShape.length;\r\n  const inBRank =
inBShape.length;\r\n\r\n  const outRank = outShape.length;\r\n  const rankADiff = outRank - inARank;\r\n  const
rankBDiff = outRank - inBRank;\r\n\r\n  unpackedACoordsSnippet = inAShape.map((s, i) =>
`coords.${allGlChannels[i + rankADiff]}`);\r\n  unpackedACoordsSnippet[inARank - 1] = 'i*2';\r\n
unpackedACoordsSnippet.join(', ');\r\n  unpackedBCoordsSnippet = inBShape.map((s, i) =>
`coords.${allGlChannels[i + rankBDiff]}`);\r\n  unpackedBCoordsSnippet[inBRank - 2] = 'i*2';\r\n
unpackedBCoordsSnippet.join(', ');\r\n\r\n  const broadcastADims = BroadcastUtil.getBroadcastDims(inAShape,
outShape);\r\n  const broadcastBDims = BroadcastUtil.getBroadcastDims(inBShape, outShape);\r\n\r\n  const
coordsASnippet = broadcastADims.map(d => `coords.${allGlChannels[d + rankADiff]} = 0;`).join('\\n');\r\n  const
coordsBSnippet = broadcastBDims.map(d => `coords.${allGlChannels[d + rankBDiff]} = 0;`).join('\\n');\r\n  const
swapDimSnippet = `int lastDim = coords.${allGlChannels[outRank - 1]};\r\n  coords.${allGlChannels[outRank -
1]} = coords.${allGlChannels[outRank - 2]};\r\n  coords.${allGlChannels[outRank - 2]} = lastDim;`;\r\n\r\n  const
getBcastSamplerMatmulSource = `\r\nvec4 getAAtOutCoordsMatmul(int i) {\r\n  ${coordsDataType} coords =
getOutputCoords();\r\n  ${swapDimSnippet}\r\n  ${coordsASnippet}\r\n  vec4 outputValue =
getA(${unpackedACoordsSnippet});\r\n  return outputValue;\r\n}\r\n\r\nvec4 getBAtOutCoordsMatmul(int i) {\r\n
${coordsDataType} coords = getOutputCoords();\r\n  ${swapDimSnippet}\r\n  ${coordsBSnippet}\r\n  vec4
outputValue = getB(${unpackedBCoordsSnippet});\r\n  return outputValue;\r\n}`;\r\n\r\n  return
getBcastSamplerMatmulSource;\r\n}\r\n\r\nfunction getA(allGlChannels: string[], rank: number): string {\r\n  let res
= '';\r\n  for (let i = 0; i < rank - 2; i++) {\r\n    res += `rc.${allGlChannels[i]}, `;\r\n  }\r\n  res +=
`rc.${allGlChannels[rank - 2]}, ` +\r\n      'i*2';\r\n  return res;\r\n}\r\n\r\nfunction getB(allGlChannels: string[],
rank: number): string {\r\n  let res = '';\r\n  for (let i = 0; i < rank - 2; i++) {\r\n    res += `rc.${allGlChannels[i]},
`;\r\n  }\r\n  res += 'i*2, ' +\r\n      `rc.${allGlChannels[rank - 1]}`;\r\n  return res;\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from
'../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor}
from '../../../tensor';\r\nimport {BroadcastUtil, ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler}
from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from
'../types';\r\nimport {getCoordsDataType, getGlChannels} from '../utils';\r\nimport {getActicationSnippet,
InternalActivationAttributes, parseInternalActivationAttributes} from './fuse-utils';\r\nimport
{createPackedMatmulProgramInfoLoader} from './matmul-pack';\r\n\r\nexport const matMul:
OperatorImplementation<InternalActivationAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs:
Tensor[], attributes: InternalActivationAttributes): Tensor[] => {\r\n      validateInputs(inputs);\r\n\r\n      if
```

(inferenceHandler.session.pack) {\r\n return [inferenceHandler.run(\r\n createPackedMatmulProgramInfoLoader(inferenceHandler, inputs, attributes), inputs)];\r\n } else {\r\n return [inferenceHandler.run(createMatmulProgramInfoLoader(inputs, attributes), inputs)];\r\n }\r\n };\r\n\r\nexport const parseMatMulAttributes: OperatorInitialization<InternalActivationAttributes> =\r\n (node: Graph.Node): InternalActivationAttributes => parseInternalActivationAttributes(node.attributes);\r\n\r\nconst createMatmulProgramMetadata = (hasBias: boolean, cacheHint: string) => ({\r\n name: 'MatMul',\r\n inputNames: hasBias ? ['A', 'B', 'Bias'] : ['A', 'B'],\r\n inputTypes: hasBias ? [TextureType.unpacked, TextureType.unpacked, TextureType.unpacked] :\r\n [TextureType.unpacked, TextureType.unpacked],\r\n cacheHint\r\n});\r\n\r\nfunction createMatmulProgramInfo(\r\n metadata: ProgramMetadata, inputs: Tensor[], activationAttributes: InternalActivationAttributes): ProgramInfo {\r\n const aShape = inputs[0].dims;\r\n const bShape = inputs[1].dims;\r\n const outputShape = BroadcastUtil.calcShape(aShape, bShape, true);\r\n if (!outputShape) {\r\n throw new Error('Can\\'t use matmul on the given tensors');\r\n }\r\n const coordsDataType = getCoordsDataType(outputShape.length);\r\n const allGlChannels = getGlChannels();\r\n const {activationFunction, applyActivation} = getActicationSnippet(activationAttributes);\r\n\r\n const hasBias = inputs.length > 2;\r\n const processBias = hasBias ? 'value += getBiasForMatmul();' : '';\r\n const getBiasForMatmulSnippet =\r\n hasBias ? `${getBiasForMatmul(coordsDataType, allGlChannels, inputs[2].dims, outputShape, false)}` : '';\r\n\r\n const rank = outputShape.length;\r\n const arank = aShape.length;\r\n const brank = bShape.length;\r\n const sharedDim = aShape[aShape.length - 1];\r\n const shaderSource = `\r\n ${activationFunction}\r\n ${getBiasForMatmulSnippet}\r\n float process(int indices[${rank}]) {\r\n int a[${arank}];\r\n int b[${brank}];\r\n bcastMatmulIndices_A(indices, a);\r\n bcastMatmulIndices_B(indices, b);\r\n\r\n float value;\r\n for (int k=0; k<${sharedDim}; ++k) {\r\n a[${arank - 1}] = k;\r\n b[${brank - 2}] = k;\r\n value += _A(a) * _B(b);\r\n }\r\n ${processBias}\r\n ${applyActivation}\r\n return value;\r\n }`;\r\n return {\r\n ...metadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n shaderSource,\r\n };\r\n}\r\n\r\nexport function createMatmulProgramInfoLoader(\r\n inputs: Tensor[], activationAttributes: InternalActivationAttributes): ProgramInfoLoader {\r\n const metadata = createMatmulProgramMetadata(inputs.length > 2, activationAttributes.activationCacheKey);\r\n return {...metadata, get: () => createMatmulProgramInfo(metadata, inputs, activationAttributes)};\r\n}\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 2) {\r\n throw new Error('MatMul requires 2 inputs.');\r\n }\r\n\r\n if (inputs[0].dims[inputs[0].dims.length - 1] !== inputs[1].dims[inputs[1].dims.length - 2]) {\r\n throw new Error('shared dimension does not match.');\r\n }\r\n\r\n if ((inputs[0].type !== 'float32' && inputs[0].type !== 'float64') ||\r\n (inputs[1].type !== 'float32' && inputs[1].type !== 'float64')) {\r\n throw new Error('inputs should be float type');\r\n }\r\n\r\n if (inputs[0].type !== inputs[1].type) {\r\n throw new Error('inputs types should match');\r\n }\r\n};\r\n\r\nexport function getBiasForMatmul(\r\n coordsDataType: string, allGlChannels: readonly string[], inShape: readonly number[], outShape: readonly number[],\r\n isPacked: boolean): string {\r\n let unpackedCoordsSnippet = '';\r\n const inRank = inShape.length;\r\n const outRank = outShape.length;\r\n const rankDiff = outRank - inRank;\r\n if (outRank < 2 && inRank > 0) {\r\n unpackedCoordsSnippet = 'coords';\r\n } else {\r\n unpackedCoordsSnippet = inShape.map((s, i) => `coords.${allGlChannels[i + rankDiff]}`).join(', ');\r\n }\r\n const broadcastDims = BroadcastUtil.getBroadcastDims(inShape, outShape);\r\n const coordsSnippet = broadcastDims.map(d => `coords.${allGlChannels[d + rankDiff]} = 0;`).join('\\n');\r\n const inSize = ShapeUtil.size(inShape);\r\n const isInputScalar = inSize === 1;\r\n let output = 'vec4(outputValue.xx, outputValue.yy)';\r\n if (isInputScalar) {\r\n output = 'vec4(outputValue.x)';\r\n }\r\n const getBiasForMatmulSource = isPacked ? `\r\nvec4 getBiasForMatmul() {\r\n ${coordsDataType} coords = getOutputCoords();\r\n ${coordsSnippet}\r\n vec4 outputValue = getBias(${unpackedCoordsSnippet});\r\n return ${output};\r\n}` :\r\n `\r\nfloat getBiasForMatmul() {\r\n ${coordsDataType} coords = getOutputCoords();\r\n ${coordsSnippet}\r\n return getBias(coords.x);\r\n}`;\r\n\r\n return getBiasForMatmulSource;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from

'../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, TextureType} from '../types';\r\nimport {getCoordsDataType} from '../utils';\r\n\r\nimport {getChannels} from './packing-utils';\r\n\r\nconst packProgramMetadata = {\r\n name: 'pack',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpackedReversed]\r\n};\r\n\r\nconst createPackProgramInfo = (handler: WebGLInferenceHandler, input: Tensor): ProgramInfo => {\r\n const glsl = getGlsl(handler.session.backend.glContext.version);\r\n const inputShape = input.dims;\r\n\r\n const inputRank = inputShape.length;\r\n // createTextureLayoutFromShape won't change output rank. Need to verify by running tests\r\n const outputRank = input.dims.length;\r\n\r\n const coordsDataType = getCoordsDataType(outputRank);\r\n const channels = getChannels('rc', outputRank);\r\n const setup = getSetup(outputRank, channels, inputShape[inputShape.length - 2], inputShape[inputShape.length - 1]);\r\n\r\n let reversedInputWH;\r\n if (inputRank === 0) {\r\n reversedInputWH = [1, 1];\r\n } else if (inputRank === 1) {\r\n reversedInputWH = [inputShape[0], 1];\r\n } else {\r\n reversedInputWH = [inputShape[outputRank - 1], inputShape[outputRank - 2]];\r\n }\r\n const outOfBoundsCondition = getOutOfBoundsCondition(outputRank, reversedInputWH, channels);\r\n const output = getOutput(inputShape, channels);\r\n\r\n const shaderSource = `\r\n void main() {\r\n ${coordsDataType} rc = getOutputCoords();\r\n\r\n if(${outOfBoundsCondition}) {\r\n ${glsl.output} = vec4(0);\r\n } else {\r\n ${setup}\r\n\r\n ${glsl.output} = vec4(${output});\r\n }\r\n }\r\n `;\r\n return {\r\n ...packProgramMetadata,\r\n hasMain: true,\r\n output: {dims: input.dims, type: input.type, textureType: TextureType.packed},\r\n shaderSource\r\n };\r\n};\r\n\r\nexport const createPackProgramInfoLoader = (handler: WebGLInferenceHandler, input: Tensor): ProgramInfoLoader =>\r\n ({...packProgramMetadata, get: () => createPackProgramInfo(handler, input)});\r\n\r\n/**\r\n * check output coordinate location and return false if it is outside input's width/height boundary\r\n */\r\nfunction getOutOfBoundsCondition(rank: number, shape: readonly number[], dims: string[]): string {\r\n if (rank === 0) {\r\n return 'false';\r\n }\r\n if (rank === 1) {\r\n return `rc > ${shape[0]}`;\r\n }\r\n\r\n let cond = '';\r\n for (let i = rank - 2; i < rank; i++) {\r\n cond += `${dims[i]} >= ${shape[i - rank + 2]}`;\r\n if (i < rank - 1) {\r\n cond += '||';\r\n }\r\n }\r\n\r\n return cond;\r\n}\r\n\r\n/**\r\n * code snippet to sample input texture with output coordiantes\r\n */\r\nfunction getOutput(shape: readonly number[], dims: string[]): string {\r\n const rank = shape.length;\r\n\r\n if (rank === 0) {\r\n return 'getA(), 0, 0, 0';\r\n }\r\n\r\n if (rank === 1) {\r\n return `getA(rc),\r\n rc + 1 >= ${shape[0]} ? 0. : getA(rc + 1),\r\n 0, 0`;\r\n }\r\n\r\n const coord00 = 'r, c';\r\n const coord01 = 'r, cp1';\r\n const coord10 = 'rp1, c';\r\n const coord11 = 'rp1, cp1';\r\n let D = '';\r\n if (rank > 2) {\r\n for (let i = 0; i < rank - 2; ++i) {\r\n D = D + `${dims[i]},`;\r\n }\r\n }\r\n return `getA(${D}${coord00}),\r\n rEdge ? 0. : getA(${D}${coord10}),\r\n cEdge ? 0. : getA(${D}${coord01}),\r\n rEdge || cEdge ? 0. : getA(${D}${coord11})`;\r\n}\r\n\r\n/**\r\n * code snippet to setup 4 coordinates and edge conditions\r\n */\r\nfunction getSetup(rank: number, dims: string[], rows: number, cols: number): string {\r\n if (rank === 0 || rank === 1) {\r\n return '';\r\n }\r\n // rank >= 2 for width+height pack.\r\n else {\r\n const setup = `\r\n int r = ${dims[rank - 2]};\r\n int c = ${dims[rank - 1]};\r\n int rp1 = ${dims[rank - 2]} + 1;\r\n int cp1 = ${dims[rank - 1]} + 1;\r\n bool rEdge = rp1 >= ${cols};\r\n bool cEdge = cp1 >= ${rows};\r\n `;\r\n return setup;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {getGlChannels} from '../utils';\r\n\r\nexport function getVecChannels(name: string, rank: number): string[] {\r\n return getGlChannels(rank).map(d => `${name}.${d}`);\r\n}\r\n\r\nexport function getChannels(name: string, rank: number): string[] {\r\n if (rank === 1) {\r\n return [name];\r\n }\r\n return getVecChannels(name, rank);\r\n}\r\n\r\nexport function unpackFromChannel(): string {\r\n return `\r\n float getChannel(vec4 frag, int dim) {\r\n int modCoord = imod(dim, 2);\r\n return modCoord == 0 ? frag.r : frag.g;\r\n }\r\n\r\n float getChannel(vec4 frag, vec2 innerDims) {\r\n vec2 modCoord = mod(innerDims, 2.);\r\n return modCoord.x == 0. ?\r\n (modCoord.y == 0. ? frag.r : frag.g) :\r\n (modCoord.y == 0. ? frag.b : frag.a);\r\n }\r\n `;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport

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{Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl, Glsl} from '../glsl-
source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType}
from '../types';\r\n\r\nexport interface PadAttributes extends AttributeWithCacheKey {\r\n  readonly mode:
string;\r\n  readonly pads: number[];\r\n  readonly value: number;\r\n}\r\n\r\nconst padProgramMetadata = {\r\n
name: 'Pad',\r\n  inputNames: ['A'],\r\n  inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nexport const pad:
OperatorImplementation<PadAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: PadAttributes): Tensor[] => {\r\n      validateInputs(inputs);\r\n      const output =
inferenceHandler.run(\r\n          {\r\n            ...padProgramMetadata,\r\n            cacheHint: attributes.cacheKey,\r\n
      get: () => createPadProgramInfo(inferenceHandler, inputs, attributes)\r\n          },\r\n          inputs);\r\n      return
[output];\r\n    };\r\n\r\nexport const parsePadAttributes: OperatorInitialization<PadAttributes> = (node:
Graph.Node): PadAttributes => {\r\n  const mode = node.attributes.getString('mode', 'constant');\r\n  const value =
node.attributes.getFloat('value', 0.0);\r\n  const pads = node.attributes.getInts('pads');\r\n  return
createAttributeWithCacheKey({mode, value, pads});\r\n};\r\n\r\nconst createPadProgramInfo =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: PadAttributes): ProgramInfo => {\r\n
const outputShape = ShapeUtil.padShape(inputs[0].dims.slice(), attributes.pads);\r\n      const rank =
outputShape.length;\r\n      const padFunction = getPadFunction(inferenceHandler, inputs[0], attributes);\r\n
const shaderSource = `\r\n      ${padFunction}\r\n      float process(int[${rank}] indices) {\r\n          return
padA(indices);\r\n      }`;\r\n      return {\r\n        name: 'Pad',\r\n        inputNames: ['A'],\r\n        inputTypes:
[TextureType.unpacked],\r\n        output: {dims: outputShape, type: inputs[0].type, textureType:
TextureType.unpacked},\r\n        shaderSource\r\n      };\r\n    };\r\n\r\nconst validateInputs = (inputs: Tensor[]):
void => {\r\n  if (!inputs || inputs.length !== 1) {\r\n    throw new Error('Pad requires 1 input');\r\n  }\r\n  if
(inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n    throw new Error('Invalid input type.');\r\n
}\r\n};\r\n\r\nconst getPadFunction = (inferenceHandler: WebGLInferenceHandler, input: Tensor, attributes:
PadAttributes): string => {\r\n  const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n  const
[width, height] = inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n  const
strides = ShapeUtil.computeStrides(input.dims);\r\n\r\n  switch (attributes.mode) {\r\n    case 'constant':\r\n      return
getPadConstant(glsl, input.dims, strides, width, height, attributes.pads, attributes.value);\r\n    case 'reflect':\r\n
return getPadReflect(glsl, input.dims, strides, width, height, attributes.pads);\r\n    case 'edge':\r\n      return
getPadEdge(glsl, input.dims, strides, width, height, attributes.pads);\r\n    default:\r\n      throw new Error('Invalid
mode');\r\n  }\r\n};\r\n\r\nconst getPadConstant =\r\n    (glsl: Glsl, shape: readonly number[], strides: readonly
number[], width: number, height: number, pads: number[],\r\n     value: number): string => {\r\n      const rank =
shape.length;\r\n      let block = '';\r\n      for (let i = rank - 1; i >= 0; --i) {\r\n        block += `\r\n        k = m[${i}] -
${pads[i]};\r\n        if (k < 0)  return constant;\r\n        if (k >= ${shape[i]}) return constant;\r\n        offset += k *
${strides[i]};\r\n        `;\r\n      }\r\n      return `\r\n      float padA(int m[${rank}]) {\r\n        const float constant =
float(${value});\r\n        int offset = 0;\r\n        int k = 0;\r\n        ${block}\r\n        vec2 coords =
offsetToCoords(offset, ${width}, ${height});\r\n        float value = getColorAsFloat(${glsl.texture2D}(A,
coords));\r\n        return value;\r\n      }\r\n      `;\r\n    };\r\n\r\nconst getPadReflect =\r\n    (glsl: Glsl, shape:
readonly number[], strides: readonly number[], width: number, height: number, pads: number[]):\r\n        string =>
{\r\n          const rank = shape.length;\r\n\r\n          let block = '';\r\n          for (let i = rank - 1; i >= 0; --i) {\r\n
block += `\r\n        k = m[${i}] - ${pads[i]};\r\n        if (k < 0) { k = -k; }\r\n        {\r\n          const int _2n_1 = ${2 *
(shape[i] - 1)};\r\n          k = int( mod( float(k), float(_2n_1) ) ) ;\r\n          if(k >= ${shape[i]}) { k = _2n_1 - k; }\r\n
     }\r\n        offset += k * ${strides[i]};\r\n        `;\r\n          }\r\n          return `\r\n      float padA(int m[${rank}])
{\r\n        int offset = 0;\r\n        int k = 0;\r\n        ${block}\r\n        vec2 coords = offsetToCoords(offset, ${width},
${height});\r\n        float value = getColorAsFloat(${glsl.texture2D}(A, coords));\r\n        return value;\r\n      }\r\n
 `;\r\n        };\r\n\r\nconst getPadEdge =\r\n    (glsl: Glsl, shape: readonly number[], strides: readonly number[],
width: number, height: number, pads: number[]):\r\n        string => {\r\n          const rank = shape.length;\r\n\r\n
let block = '';\r\n          for (let i = rank - 1; i >= 0; --i) {\r\n            block += `\r\n        k = m[${i}] - ${pads[i]};\r\n
 if (k < 0)  k = 0;\r\n        if (k >= ${shape[i]}) k = ${shape[i] - 1};\r\n        offset += k * ${strides[i]};\r\n      `;\r\n
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  }\r\n      return `\r\n    float padA(int m[${rank}]) {\r\n      int offset = 0;\r\n      int k = 0;\r\n
${block}\r\n      vec2 coords = offsetToCoords(offset, ${width}, ${height});\r\n      float value =
getColorAsFloat(${glsl.texture2D}(A, coords));\r\n      return value;\r\n    }\r\n    `;\r\n    };\r\n","// Copyright
(c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph}
from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport
{Tensor} from '../../../tensor';\r\nimport {PoolConvUtil, ShapeUtil} from '../../../util';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramMetadata, TextureType}
from '../types';\r\n\r\nexport interface AveragePoolAttributes extends AttributeWithCacheKey {\r\n  readonly
autoPad: string;\r\n  readonly ceilMode: number;\r\n  readonly countIncludePad: boolean;\r\n  readonly kernelShape:
number[];\r\n  readonly strides: number[];\r\n  readonly pads: number[];\r\n}\r\n\r\nexport const averagePool:
OperatorImplementation<AveragePoolAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs:
Tensor[], attributes: AveragePoolAttributes): Tensor[] => {\r\n      validateInputs(inputs);\r\n      const metadata
=\r\n          {name: 'AveragePool', inputNames: ['X'], inputTypes: [TextureType.unpacked], cacheHint:
attributes.cacheKey};\r\n      const output = inferenceHandler.run(\r\n          {...metadata, get: () =>
createAveragePoolProgramInfo(inputs, metadata, false, attributes)}, inputs);\r\n      return [output];\r\n
};\r\n\r\nexport const parseAveragePoolAttributes: OperatorInitialization<AveragePoolAttributes> =\r\n    (node:
Graph.Node): AveragePoolAttributes => {\r\n      const autoPad = node.attributes.getString('auto_pad',
'NOTSET');\r\n      const ceilMode = node.attributes.getInt('ceil_mode', 0);\r\n      const countIncludePad =
(node.attributes.getInt('count_include_pad', 0) === 0 ? false : true);\r\n      const kernelShape =
node.attributes.getInts('kernel_shape');\r\n      const strides = node.attributes.getInts('strides', []);\r\n      const pads =
node.attributes.getInts('pads', []);\r\n\r\n      // TODO: support attribute 'ceil_mode'\r\n      if (ceilMode !== 0) {\r\n
  throw new Error('using ceil() in shape computation is not yet supported for AveragePool');\r\n      }\r\n\r\n      return
createAttributeWithCacheKey({autoPad, ceilMode, countIncludePad, kernelShape, strides, pads});\r\n
};\r\n\r\nconst createAveragePoolProgramInfo =\r\n    (inputs: Tensor[], metadata: ProgramMetadata,
isGlobalOperator: boolean, attributes: AveragePoolAttributes):\r\n        ProgramInfo => {\r\n          const inputShape
= inputs[0].dims.slice();\r\n          PoolConvUtil.adjustPoolAttributes(\r\n              isGlobalOperator, inputShape,
attributes.kernelShape, attributes.strides, attributes.pads);\r\n          const outputShape =
PoolConvUtil.computePoolOutputShape(\r\n              isGlobalOperator, inputShape, attributes.strides,
attributes.kernelShape, attributes.pads,\r\n              attributes.autoPad);\r\n          const kernelSize =
ShapeUtil.size(attributes.kernelShape);\r\n          const op1 = 'value += _X(x);';\r\n          let op2 = '';\r\n          if
(attributes.countIncludePad) {\r\n            op2 += `value /= float(${kernelSize});`;\r\n          } else {\r\n            op2 +=
`value /= float(${kernelSize} - pad);`;\r\n          }\r\n          const poolingCode =
generatePoolingCode(inputs[0].dims, attributes, op1, op2, '0.0');\r\n          const shaderSource = `\r\n
${poolingCode}\r\n      `;\r\n          return {\r\n            ...metadata,\r\n            output: {dims: outputShape, type:
inputs[0].type, textureType: TextureType.unpacked},\r\n            shaderSource\r\n          };\r\n        };\r\n\r\nexport
const globalAveragePool: OperatorImplementation<AveragePoolAttributes> =\r\n    (inferenceHandler:
WebGLInferenceHandler, inputs: Tensor[], attributes: AveragePoolAttributes): Tensor[] => {\r\n
validateInputs(inputs);\r\n      const metadata = {\r\n        name: 'GlobalAveragePool',\r\n        inputNames: ['X'],\r\n
    inputTypes: [TextureType.unpacked],\r\n        cacheHint: `${attributes.countIncludePad}`\r\n      };\r\n      const
output = inferenceHandler.run(\r\n          {...metadata, get: () => createAveragePoolProgramInfo(inputs, metadata,
true, attributes)}, inputs);\r\n      return [output];\r\n    };\r\n\r\nexport const parseGlobalAveragePoolAttributes:
OperatorInitialization<AveragePoolAttributes> =\r\n    (node: Graph.Node): AveragePoolAttributes => {\r\n
const countIncludePad = (node.attributes.getInt('count_include_pad', 0) === 0 ? false : true);\r\n      return
createAttributeWithCacheKey(\r\n          {autoPad: '', ceilMode: 0, countIncludePad, kernelShape: [], strides: [],
pads: []});\r\n    };\r\n\r\nexport interface MaxPoolAttributes extends AveragePoolAttributes {\r\n  readonly
storageOrder: number;\r\n}\r\n\r\nexport const maxPool: OperatorImplementation<MaxPoolAttributes> =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: MaxPoolAttributes): Tensor[] => {\r\n
```

```
validateInputs(inputs);\r\n      const metadata =\r\n          {name: 'MaxPool', inputNames: ['X'], inputTypes:
[TextureType.unpacked], cacheHint: attributes.cacheKey};\r\n      const output = inferenceHandler.run(\r\n
{...metadata, get: () => createMaxPoolProgramInfo(inputs, metadata, false, attributes)}, inputs);\r\n      return
[output];\r\n    };\r\n\r\nexport const parseMaxPoolAttributes: OperatorInitialization<MaxPoolAttributes> =\r\n
(node: Graph.Node): MaxPoolAttributes => {\r\n      const autoPad = node.attributes.getString('auto_pad',
'NOTSET');\r\n      const ceilMode = node.attributes.getInt('ceil_mode', 0);\r\n      const kernelShape =
node.attributes.getInts('kernel_shape');\r\n      const strides = node.attributes.getInts('strides', []);\r\n      const pads =
node.attributes.getInts('pads', []);\r\n      const storageOrder = node.attributes.getInt('storage_order', 0);\r\n\r\n      //
TODO: support attribute 'ceil_mode' and 'storage_order'\r\n      if (storageOrder !== 0) {\r\n        throw new
Error('column major storage order is not yet supported for MaxPool');\r\n      }\r\n      if (ceilMode !== 0) {\r\n
throw new Error('using ceil() in shape computation is not yet supported for MaxPool');\r\n      }\r\n\r\n      return
createAttributeWithCacheKey(\r\n          {autoPad, ceilMode, countIncludePad: false, kernelShape, strides, pads,
storageOrder});\r\n    };\r\n\r\nconst createMaxPoolProgramInfo =\r\n    (inputs: Tensor[], metadata:
ProgramMetadata, isGlobalOperator: boolean, attributes: MaxPoolAttributes):\r\n        ProgramInfo => {\r\n
const inputShape = inputs[0].dims.slice();\r\n          PoolConvUtil.adjustPoolAttributes(\r\n
isGlobalOperator, inputShape, attributes.kernelShape, attributes.strides, attributes.pads);\r\n          const outputShape
= PoolConvUtil.computePoolOutputShape(\r\n              isGlobalOperator, inputShape, attributes.strides,
attributes.kernelShape, attributes.pads,\r\n              attributes.autoPad);\r\n          const op1 = `\r\n      value =
max(_X(x), value);\r\n    `;\r\n          const op2 = '';\r\n          const poolingCode = generatePoolingCode(inputShape,
attributes, op1, op2, '-1e5');\r\n          const shaderSource = `\r\n      ${poolingCode}\r\n    `;\r\n          return {\r\n
   ...metadata,\r\n            output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n
        shaderSource\r\n          };\r\n        };\r\n\r\nconst globalMaxPoolAttributes = {\r\n  autoPad: '',\r\n  ceilMode:
0,\r\n  countIncludePad: false,\r\n  kernelShape: [],\r\n  strides: [],\r\n  pads: [],\r\n  storageOrder: 0,\r\n  cacheKey:
''\r\n};\r\n\r\nconst globalMaxPoolMetadata = {\r\n  name: 'GlobalMaxPool',\r\n  inputNames: ['X'],\r\n  inputTypes:
[TextureType.unpacked]\r\n};\r\n\r\nexport const globalMaxPool = (inferenceHandler: WebGLInferenceHandler,
inputs: Tensor[]): Tensor[] => {\r\n  validateInputs(inputs);\r\n  const output = inferenceHandler.run(\r\n      {\r\n
...globalMaxPoolMetadata,\r\n        get: () => createMaxPoolProgramInfo(inputs, globalMaxPoolMetadata, true,
globalMaxPoolAttributes)\r\n      },\r\n      inputs);\r\n  return [output];\r\n};\r\n\r\nconst validateInputs = (inputs:
Tensor[]): void => {\r\n  if (!inputs || inputs.length !== 1) {\r\n    throw new Error('Pool ops requires 1 input.');\r\n
}\r\n  if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n    throw new Error('Invalid input
type.');\r\n  }\r\n};\r\n\r\nconst generatePoolingCode =\r\n    (inputDims: readonly number[], attributes:
AveragePoolAttributes, op1: string, op2: string, start: string):\r\n        string => {\r\n          const rank =
inputDims.length;\r\n          if (attributes.kernelShape.length <= 2) {\r\n            const kw =
attributes.kernelShape[attributes.kernelShape.length - 1];\r\n            const sw =
attributes.strides[attributes.strides.length - 1];\r\n            const pwStart = attributes.pads[attributes.pads.length / 2 -
1];\r\n            const pwEnd = attributes.pads[attributes.pads.length - 1];\r\n            const dimW = inputDims[rank -
1];\r\n            let codeW = '';\r\n            let codeH = '';\r\n            let codeHEnd = '';\r\n            if (pwStart + pwEnd
!== 0) {\r\n              codeW = `\r\n          for (int i = 0; i < ${kw}; i++) {\r\n            x[${rank} - 1] = indices[${rank}
- 1] * ${sw} - ${pwStart} + i;\r\n            if (x[${rank} - 1] < 0 || x[${rank} - 1] >= ${dimW}) {\r\n
pad++;\r\n              continue;\r\n            }\r\n            ${op1}\r\n          }`;\r\n            } else {\r\n              codeW = `\r\n
       for (int i = 0; i < ${kw}; i++) {\r\n            x[${rank} - 1] = indices[${rank} - 1] * ${sw} - ${pwStart} + i;\r\n
      ${op1}\r\n          }`;\r\n            }\r\n\r\n            if (attributes.kernelShape.length === 2) {\r\n              const kh =
attributes.kernelShape[attributes.kernelShape.length - 2];\r\n              const sh =
attributes.strides[attributes.strides.length - 2];\r\n              const phStart = attributes.pads[attributes.pads.length / 2 -
2];\r\n              const phEnd = attributes.pads[attributes.pads.length - 2];\r\n              const dimH = inputDims[rank -
2];\r\n              if (phStart + phEnd !== 0) {\r\n                codeH = `\r\n            for (int j = 0; j < ${kh}; j++) {\r\n
   x[${rank} - 2] = indices[${rank} - 2] * ${sh} - ${phStart} + j;\r\n              if (x[${rank} - 2] < 0 || x[${rank} - 2]
>= ${dimH}) {\r\n                pad+= ${kw};\r\n                continue;\r\n              }\r\n          `;\r\n              } else {\r\n
```

```
codeH = `\r\n for (int j = 0; j < ${kh}; j++) {\r\n x[${rank} - 2] = indices[${rank} - 2] * ${sh}
- ${phStart} + j;\r\n `;\r\n }\r\n codeHEnd = `\r\n }\r\n `;\r\n }\r\n\r\n
const poolingCode = `\r\n float process(int indices[${rank}]) {\r\n int x[${rank}];\r\n
copyVec(indices, x);\r\n\r\n float value = ${start};\r\n int pad = 0;\r\n ${codeH}\r\n
${codeW}\r\n ${codeHEnd}\r\n ${op2}\r\n return value;\r\n }\r\n `;\r\n return
poolingCode;\r\n } else {\r\n const kernelSize = ShapeUtil.size(attributes.kernelShape);\r\n const
kernelStrides = ShapeUtil.computeStrides(attributes.kernelShape);\r\n const stridesRank =
kernelStrides.length;\r\n const padsRank = attributes.pads.length;\r\n const offsetToIndicesFunction =
offsetToIndices(stridesRank);\r\n const copyInputDims = copyArray(inputDims, 'inputDims');\r\n
const copyPads = copyArray(attributes.pads, 'pads');\r\n const copyKernelStrides = copyArray(kernelStrides,
'kernelStrides');\r\n const copyStrides = copyArray(attributes.strides, 'strides');\r\n const hasPads =
attributes.pads.reduce((sum, cur) => sum + cur);\r\n let padCode = '';\r\n if (hasPads) {\r\n
padCode = `\r\n if (x[j] >= inputDims[j] || x[j] < 0) {\r\n pad++;\r\n isPad = true;\r\n
break;\r\n }\r\n }\r\n if (!isPad) {\r\n ${op1}\r\n }`;\r\n } else {\r\n
padCode = `\r\n }\r\n ${op1}\r\n `;\r\n }\r\n const poolingCode = `\r\n
${offsetToIndicesFunction}\r\n float process(int indices[${rank}]) {\r\n int x[${rank}];\r\n
copyVec(indices, x);\r\n int offset[${stridesRank}];\r\n int pads[${padsRank}];\r\n int
inputDims[${rank}];\r\n int kernelStrides[${stridesRank}];\r\n int strides[${stridesRank}];\r\n
${copyPads}\r\n ${copyInputDims}\r\n ${copyStrides}\r\n ${copyKernelStrides}\r\n\r\n
float value = ${start};\r\n int pad = 0;\r\n bool isPad = false;\r\n for (int i = 0; i < ${kernelSize};
i++) {\r\n offsetToIndices(i, kernelStrides, offset);\r\n isPad = false;\r\n for (int j = ${rank} -
${stridesRank}; j < ${rank}; j++) {\r\n x[j] = indices[j] * strides[j - ${rank} + ${stridesRank}]\r\n
+ offset[j - ${rank} + ${stridesRank}] - pads[j - 2];\r\n ${padCode}\r\n }\r\n ${op2}\r\n\r\n
return value;\r\n }\r\n `;\r\n return poolingCode;\r\n }\r\n };\r\n\r\nconst copyArray = (array:
readonly number[], arrayName: string): string => {\r\n let block = '';\r\n for (let i = 0; i < array.length; i++) {\r\n
block += `\r\n ${arrayName}[${i}] = ${array[i]};\r\n `;\r\n }\r\n return block;\r\n};\r\n\r\nconst
offsetToIndices = (rank: number): string => `\r\n void offsetToIndices(int offset, int[${rank}] strides, out
int[${rank}] indices) {\r\n if (${rank} == 0) {\r\n return;\r\n }\r\n for (int i = 0; i < ${rank} - 1; ++i) {\r\n
indices[i] = offset / strides[i];\r\n offset -= indices[i] * strides[i];\r\n }\r\n indices[${rank} - 1] = offset;\r\n
}`;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-
key';\r\nimport {Graph} from '../../../graph';\r\nimport {NUMBER_TYPES, OperatorImplementation,
OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from
'../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo,
ProgramMetadata, TextureType} from '../types';\r\n\r\nexport interface ReduceAttributes extends
AttributeWithCacheKey {\r\n readonly axes: number[];\r\n readonly keepDims: boolean;\r\n}\r\n\r\n// return [init
ops, reduce ops, final ops]\r\ntype ReduceOp = (inputs: Tensor[], axes: number[]) => string[];\r\n\r\nconst reduce
=\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes, name: string,\r\n
 reduceOp: ReduceOp): Tensor[] => {\r\n validateInputs(inputs);\r\n\r\n const reduceProgramMetadata =
{\r\n name,\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.unpacked],\r\n };\r\n\r\n const
output = inferenceHandler.run(\r\n {\r\n ...reduceProgramMetadata,\r\n cacheHint:
attributes.cacheKey,\r\n get: () =>\r\n createReduceProgramInfo(inferenceHandler, inputs,
attributes, name, reduceOp, reduceProgramMetadata)\r\n },\r\n inputs);\r\n return [output];\r\n
};\r\n\r\nexport const parseReduceAttributes: OperatorInitialization<ReduceAttributes> = (node: Graph.Node):
ReduceAttributes => {\r\n const axes = node.attributes.getInts('axes', []);\r\n const keepDims =
node.attributes.getInt('keepdims', 1) === 1;\r\n return createAttributeWithCacheKey({axes,
keepDims});\r\n};\r\n\r\nconst createReduceProgramInfo =\r\n (handler: WebGLInferenceHandler, inputs:
Tensor[], attributes: ReduceAttributes, name: string, reduceOp: ReduceOp,\r\n reduceProgramMetadata:
```

```
ProgramMetadata): ProgramInfo => {\r\n      const outputShape: number[] = [];\r\n      const iRank =
inputs[0].dims.length || 1;\r\n\r\n      const idxCopy = [];  // copy output indexes to input indexes\r\n\r\n      const axes
= ShapeUtil.normalizeAxes(attributes.axes, inputs[0].dims.length);\r\n      const ops = reduceOp(inputs, axes);\r\n
let reduceOps = ops[1];\r\n\r\n      for (let k = 0; k < inputs[0].dims.length; k++) {\r\n        // if this axis is reduced\r\n
      if (axes.indexOf(k) >= 0 || axes.length === 0) {\r\n          if (attributes.keepDims) {\r\n
outputShape.push(1);\r\n          }  // else { remove the axis from outputShape; }\r\n\r\n          // loop over the d-th
axis\r\n          reduceOps = `\r\n          for(int j${k} = 0; j${k} < ${inputs[0].dims[k]}; j${k}++) {\r\n
inputIdx[${k}] = j${k};\r\n            ${reduceOps}\r\n          }`;\r\n        } else {\r\n
idxCopy.push(`inputIdx[${k}] = outputIdx[${outputShape.length}];`);\r\n\r\n
outputShape.push(inputs[0].dims[k]);\r\n        }\r\n      }\r\n\r\n      const oRank = outputShape.length || 1;\r\n\r\n
const shaderSource = `\r\n      float process(int outputIdx[${oRank}]) {\r\n        float value;                 // final
result\r\n        int inputIdx[${iRank}];      // addressing input data\r\n        ${idxCopy.join('\\n')}\r\n        ${ops[0]}
// init ops for reduce max/min\r\n        ${reduceOps}\r\n        ${ops[2]}       // final computation for reduce mean\r\n
    return value;\r\n      }`;\r\n\r\n      return {\r\n        ...reduceProgramMetadata,\r\n        output: {dims: outputShape,
type: inputs[0].type, textureType: TextureType.unpacked},\r\n        shaderSource\r\n      };\r\n    };\r\n\r\nconst
validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length !== 1) {\r\n    throw new Error('Reduce
op requires 1 input.');\r\n  }\r\n\r\n  if (NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n    throw new
Error('Invalid input type.');\r\n  }\r\n};\r\n\r\nexport const reduceSum: OperatorImplementation<ReduceAttributes>
=\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] =>
{\r\n      const reduceOp: ReduceOp = (): string[] => ['value = 0.0;', 'value += _A(inputIdx);', ''];\r\n      return
reduce(inferenceHandler, inputs, attributes, 'ReduceSum', reduceOp);\r\n    };\r\n\r\nexport const reduceMean:
OperatorImplementation<ReduceAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: ReduceAttributes): Tensor[] => {\r\n      const reduceOp: ReduceOp = (inputs: Tensor[], axes: number[]):
string[] => {\r\n        let size = 1.0;\r\n        for (let k = 0; k < inputs[0].dims.length; k++) {\r\n          if
(axes.indexOf(k) >= 0 || axes.length === 0) {\r\n            size *= inputs[0].dims[k];\r\n          }\r\n        }\r\n\r\n
return ['value = 0.0;', 'value += _A(inputIdx);', `value /= ${size}.;`];  // ensure real number with `.`\r\n      };\r\n
return reduce(inferenceHandler, inputs, attributes, 'ReduceMean', reduceOp);\r\n    };\r\n\r\nexport const reduceMax:
OperatorImplementation<ReduceAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: ReduceAttributes): Tensor[] => {\r\n      const reduceOp: ReduceOp = (inputs: Tensor[], axes: number[]):
string[] => {\r\n        const idxZero = [];\r\n        for (let k = 0; k < inputs[0].dims.length; k++) {\r\n          if
(axes.indexOf(k) >= 0 || axes.length === 0) {\r\n            idxZero.push(`inputIdx[${k}] = 0;`);  // first element\r\n
 }\r\n        }\r\n\r\n        return [`${idxZero.join('\\n')}\\nvalue = _A(inputIdx);`, 'value = max(value, _A(inputIdx));',
''];\r\n      };\r\n      return reduce(inferenceHandler, inputs, attributes, 'ReduceMax', reduceOp);\r\n    };\r\n\r\nexport
const reduceMin: OperatorImplementation<ReduceAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler,
inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n      const reduceOp: ReduceOp = (inputs: Tensor[],
axes: number[]): string[] => {\r\n        const idxZero = [];\r\n        for (let k = 0; k < inputs[0].dims.length; k++) {\r\n
        if (axes.indexOf(k) >= 0 || axes.length === 0) {\r\n            idxZero.push(`inputIdx[${k}] = 0;`);  // first
element\r\n          }\r\n        }\r\n\r\n        return [`${idxZero.join('\\n')}\\nvalue = _A(inputIdx);`, 'value = min(value,
_A(inputIdx));', ''];\r\n      };\r\n      return reduce(inferenceHandler, inputs, attributes, 'ReduceMin', reduceOp);\r\n
};\r\n\r\nexport const reduceProd: OperatorImplementation<ReduceAttributes> =\r\n    (inferenceHandler:
WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n      const reduceOp:
ReduceOp = (): string[] => ['value = 1.0;', 'value *= _A(inputIdx);', ''];\r\n      return reduce(inferenceHandler, inputs,
attributes, 'ReduceProd', reduceOp);\r\n    };\r\n\r\nexport const reduceLogSum:
OperatorImplementation<ReduceAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: ReduceAttributes): Tensor[] => {\r\n      const reduceOp: ReduceOp = (): string[] => ['value = 0.0;', 'value
+= _A(inputIdx);', 'value = log(value);'];\r\n      return reduce(inferenceHandler, inputs, attributes, 'ReduceLogSum',
reduceOp);\r\n    };\r\n\r\nexport const reduceLogSumSquare: OperatorImplementation<ReduceAttributes> =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: ReduceAttributes): Tensor[] => {\r\n
```

const reduceOp: ReduceOp = (): string[] => ['float t; value = 0.0;', 't = _A(inputIdx); value += t * t;', ''];\r\n return reduce(inferenceHandler, inputs, attributes, 'ReduceLogSumSquare', reduceOp);\r\n };","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, ProgramMetadata, TextureType} from '../types';\r\n\r\nimport {unpackFromChannel} from './packing-utils';\r\n\r\nconst createPackedReshape3DProgramMetadata = (outputShape3D: readonly number[]) =>\r\n ({name: 'Reshape (packed)', inputTypes: [TextureType.packed], inputNames: ['A'], cacheHint: `${outputShape3D}`});\r\n\r\nconst createPackedReshape3DProgramInfo =\r\n (handler: WebGLInferenceHandler, input3D: Tensor, metadata: ProgramMetadata, outputShape3D: readonly number[]):\r\n ProgramInfo => {\r\n const inputShape3D = input3D.dims as [number, number, number];\r\n const squeezedOutputShape = outputShape3D as [number, number, number];\r\n\r\n let mainLoop = '';\r\n for (let i = 0; i < 4; i++) {\r\n let outputCoords = '';\r\n switch (i) {\r\n case 0:\r\n outputCoords = 'outputCoords = rc;';\r\n break;\r\n case 1:\r\n outputCoords = 'outputCoords = ivec3(rc.x, rc.y+1, rc.z);';\r\n break;\r\n case 2:\r\n outputCoords = 'outputCoords = ivec3(rc.x, rc.y, rc.z+1);';\r\n break;\r\n case 3:\r\n outputCoords = 'outputCoords = ivec3(rc.x, rc.y+1, rc.z+1);';\r\n break;\r\n default:\r\n throw new Error();\r\n }\r\n\r\n mainLoop += `\r\n ${outputCoords}\r\n ${i > 0 ? 'if(outputCoords.y < rows && outputCoords.z < cols){' : ''}\r\n int flattenedIndex = getFlattenedIndex(outputCoords);\r\n\r\n ivec3 inputRC = inputCoordsFromReshapedOutCoords(flattenedIndex);\r\n vec2 innerDims = vec2(float(inputRC.y),float(inputRC.z));\r\n\r\n result[${i}] = getChannel(getA(inputRC.x, inputRC.y, inputRC.z), innerDims);\r\n\r\n ${i > 0 ? '}' : ''}\r\n `;\r\n }\r\n const glsl = getGlsl(handler.session.backend.glContext.version);\r\n\r\n const shaderSource = `\r\n ${getReshapedInputCoords(inputShape3D)}\r\n ${getFlattenedIndexFrom3D(squeezedOutputShape)}\r\n ${unpackFromChannel()}\r\n\r\n void main() {\r\n ivec3 rc = getOutputCoords();\r\n\r\n vec4 result = vec4(0.0);\r\n\r\n ivec3 outputCoords;\r\n int rows = ${squeezedOutputShape[2]};\r\n int cols = ${squeezedOutputShape[1]};\r\n\r\n ${mainLoop}\r\n ${glsl.output} = result;\r\n }\r\n `;\r\n\r\n return {\r\n ...metadata,\r\n output: {dims: squeezedOutputShape, type: input3D.type, textureType: TextureType.packed},\r\n shaderSource,\r\n hasMain: true\r\n };\r\n };\r\n\r\nexport const createPackedReshape3DProgramInfoLoader =\r\n (handler: WebGLInferenceHandler, input3D: Tensor, outputShape3D: readonly number[]): ProgramInfoLoader => {\r\n const metadata = createPackedReshape3DProgramMetadata(outputShape3D);\r\n return {...metadata, get: () => createPackedReshape3DProgramInfo(handler, input3D, metadata, outputShape3D)};\r\n };\r\n\r\nexport function processDims3D(shape: ArrayLike<number>): [number, number, number] {\r\n if (shape.length === 0) {\r\n return [1, 1, 1];\r\n }\r\n // TODO: squeeze other shapes to 2D case\r\n let batch = 1;\r\n for (let i = 0; i < shape.length - 2; ++i) {\r\n batch *= shape[i];\r\n }\r\n return [batch, shape.length > 1 ? shape[shape.length - 2] : 1, shape[shape.length - 1]];\r\n}\r\n\r\n// For packed reshape, we need to re-arrange texel data for output shape.\r\n// Our pack is designed to pack a 2x2 tile in last h and w dimension, so\r\n// for the reshaped new tensor, we just need to re-arrange the last h and\r\n// w dimension. For any shape that is not in 3D, i.e. [batch, W, H], we\r\n// first convert it to 3D by collapsing other dimension to batch dim, then\r\n// process with the last two dimensions.\r\n// Note: we only need the shape tensor to calculate output shape, so the\r\n// content in shape tensor is never uploaded to GPU. It is always kept in CPU.\r\n// TODO: optimize the algorithm -- in some cases, if the last two dims are\r\n// the same between input shape and output shape, the packed reshape can be\r\n// treated as no-op.\r\nexport function isReshapeCheap(dims: readonly number[], reshapedDims: readonly number[]) {\r\n let isCheapReshape = false;\r\n if (dims.length === 0 || reshapedDims.length === 0) { // scalar\r\n isCheapReshape = true;\r\n } else if (dims.length < 2 || reshapedDims.length < 2) { // 1D\r\n isCheapReshape = dims[dims.length - 1] === reshapedDims[reshapedDims.length - 1];\r\n } else { // 2D +\r\n isCheapReshape = dims[dims.length - 1] === reshapedDims[reshapedDims.length - 1] &&\r\n dims[dims.length - 2] === reshapedDims[reshapedDims.length

```
- 2];\r\n  }\r\n\r\n  return isCheapReshape;\r\n}\r\n\r\nfunction getReshapedInputCoords(shape: [number, number,
number]): string {\r\n  const strides = ShapeUtil.computeStrides(shape);\r\n  const coords = ['b', 'r', 'c'];\r\n  const
index = 'index';\r\n  const coordsFromIndexSnippet = strides\r\n                              .map((stride, i) => {\r\n
                        const line1 = `int ${coords[i]} = ${index} / ${stride}`;\r\n                          const line2 = i
=== strides.length - 1 ?\r\n                              `int ${coords[i + 1]} = ${index} - ${coords[i]} * ${stride}`
:\r\n                              `index -= ${coords[i]} * ${stride}`;\r\n                          return `${line1};
${line2};`;\r\n                              })\r\n                              .join('');\r\n\r\n  return `\r\n    ivec3
inputCoordsFromReshapedOutCoords(int index) {\r\n      ${coordsFromIndexSnippet}\r\n      return ivec3(b, r,
c);\r\n    }\r\n  `;\r\n}\r\n\r\nfunction getFlattenedIndexFrom3D(shape: [number, number, number]): string {\r\n
const strides = ShapeUtil.computeStrides(shape);\r\n\r\n  return `\r\n  int getFlattenedIndex(ivec3 coords) {\r\n    //
reverse y, z order\r\n    return coords.x * ${strides[0]} + coords.z * ${strides[1]} + coords.y;\r\n  }\r\n`;\r\n}\r\n","//
Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from
'../inference-handler';\r\n\r\nexport const reshape = (handler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[]
=> {\r\n  const reshapedDims = ShapeUtil.calculateReshapedDims(inputs[0].dims, inputs[1].integerData);\r\n  if
(handler.session.pack) {\r\n    return [handler.reshapePacked(inputs[0], reshapedDims)];\r\n  } else {\r\n    return
[handler.reshapeUnpacked(inputs[0], reshapedDims)];\r\n  }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All
rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport
{OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from
'../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-
handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\nimport {getCoordsDataType} from
'../utils';\r\n\r\nimport {unpackFromChannel} from './packing-utils';\r\nimport {parseUpsampleAttributes,
scalesValidation, UpsampleAttributes, validateInputs} from './upsample';\r\n\r\nconst resizeProgramMetadata =
{\r\n  name: 'Resize',\r\n  inputNames: ['A'],\r\n  inputTypes: [TextureType.packed]\r\n};\r\n\r\nexport const resize:
OperatorImplementation<UpsampleAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs:
Tensor[], attributes: UpsampleAttributes): Tensor[] => {\r\n      validateInputs(inputs, attributes);\r\n      const output
= inferenceHandler.run(\r\n          {\r\n            ...resizeProgramMetadata,\r\n            cacheHint:
attributes.cacheKey,\r\n            get: () => createPackedResizeProgramInfo(inferenceHandler, inputs, attributes)\r\n
     },\r\n          inputs);\r\n      return [output];\r\n    };\r\n\r\nexport const parseResizeAttributesV10:
OperatorInitialization<UpsampleAttributes> =\r\n    (node: Graph.Node): UpsampleAttributes =>
parseUpsampleAttributes(node, 10);\r\n\r\nexport const parseResizeAttributesV11:
OperatorInitialization<UpsampleAttributes> =\r\n    (node: Graph.Node): UpsampleAttributes =>
parseUpsampleAttributes(node, 11);\r\n\r\nconst createPackedResizeProgramInfo =\r\n    (inferenceHandler:
WebGLInferenceHandler, inputs: Tensor[], attributes: UpsampleAttributes): ProgramInfo => {\r\n      const glsl =
getGlsl(inferenceHandler.session.backend.glContext.version);\r\n      const [scales, outputShape] =
prepareInputs(inputs, attributes);\r\n\r\n      const isSame =\r\n          scales.every((s: number) => s === 1) &&
attributes.coordinateTransformMode !== 'tf_crop_and_resize';\r\n      if (isSame) {\r\n        return {\r\n
...resizeProgramMetadata,\r\n          output: {dims: outputShape, type: inputs[0].type, textureType:
TextureType.packed},\r\n          hasMain: true,\r\n          shaderSource: `void main() {\r\n                    vec4 v =
${glsl.texture2D}(X, TexCoords);\r\n                    ${glsl.output} = v;\r\n                }`\r\n        };\r\n      }\r\n\r\n
const dim = outputShape.length;\r\n      if (dim < 2) {\r\n        throw new Error(`output dimension should be at least
2, but got ${dim}`);\r\n      }\r\n\r\n      const outputHeight = outputShape[dim - 2];\r\n      const outputWidth =
outputShape[dim - 1];\r\n\r\n      const inputShape = inputs[0].dims;\r\n      if (dim !== inputShape.length) {\r\n
throw new Error(`output dimension should match input ${inputShape.length}, but got ${dim}`);\r\n      }\r\n
const inputHeight = inputShape[dim - 2];\r\n      const inputWidth = inputShape[dim - 1];\r\n\r\n      const
scalesHeight = scales[dim - 2];\r\n      const scalesWidth = scales[dim - 1];\r\n\r\n      let getSourceFracIndex =
'';\r\n\r\n      if (attributes.mode !== 'linear') {\r\n        // TODO: support other modes\r\n        throw new Error(`resize
(packed) does not support mode: '${attributes.mode}'`);\r\n      }\r\n      switch
```

```
(attributes.coordinateTransformMode) {\r\n        case 'asymmetric':\r\n          getSourceFracIndex = `\r\n
vec4 getSourceFracIndex(ivec4 coords) {\r\n                    return vec4(coords) / scaleWHWH;\r\n                  }\r\n
            `;\r\n          break;\r\n        case 'half_pixel':\r\n          getSourceFracIndex = `\r\n                  vec4
getSourceFracIndex(ivec4 coords) {\r\n                    return (vec4(coords) + 0.5) / scaleWHWH - 0.5;\r\n
  }\r\n                `;\r\n          break;\r\n        case 'align_corners':\r\n          getSourceFracIndex = `\r\n                  vec4
getSourceFracIndex(ivec4 coords) {\r\n                    vec4 resized = vec4(${outputWidth}.0 - 1.0,
${outputHeight}.0 - 1.0, ${outputWidth}.0 - 1.0,\r\n                        ${outputHeight}.0 - 1.0);\r\n
vec4 original = vec4(${inputWidth}.0 - 1.0, ${inputHeight}.0 - 1.0, ${inputWidth}.0 - 1.0,\r\n
${inputHeight}.0 - 1.0);\r\n                    vec4 new_scale = original / resized;\r\n                    return vec4(coords)
* new_scale;\r\n                  }\r\n                `;\r\n          break;\r\n        default:\r\n          // TODO:supporting other
coordinateTransformModes\r\n          throw new Error(`resize (packed) does not support coordinateTransformMode: \
\\\r\n                              '${attributes.coordinateTransformMode}'`);\r\n      }\r\n\r\n      const coordsDataType =
getCoordsDataType(dim);\r\n      const unpackChannel = unpackFromChannel();\r\n      const shaderSource = `\r\n
      const vec2 inputWH = vec2(${inputHeight}.0, ${inputWidth}.0);\r\n            const vec4 scaleWHWH =
vec4(${scalesHeight}.0, ${scalesWidth}.0, ${scalesHeight}.0, ${scalesWidth}.0);\r\n            ${unpackChannel}\r\n
        ${getSourceFracIndex}\r\n            float getAValue(int x10, int r, int c, int d) {\r\n                return
getChannel(getA(x10, r, c, d), vec2(c, d));\r\n            }\r\n            void main() {\r\n                ${coordsDataType} rc
= getOutputCoords();\r\n\r\n                int batch = rc[0];\r\n                int depth = rc[1];\r\n\r\n                // retrieve the
4 coordinates that is used in the 4 packed output values.\r\n                ivec4 coords = ivec4(rc.wz, rc.w + 1, rc.z +
1);\r\n\r\n                // calculate the source index in fraction\r\n                vec4 sourceFrac =
getSourceFracIndex(coords);\r\n\r\n                // get the lower and upper bound of the 4 values that will be packed
into one texel.\r\n                ivec4 x00 = ivec4(max(sourceFrac.xy, vec2(0.0)), min(inputWH - 1.0,
ceil(sourceFrac.xy)));\r\n                ivec4 x01 = ivec4(max(sourceFrac.xw, vec2(0.0)), min(inputWH - 1.0,
ceil(sourceFrac.xw)));\r\n                ivec4 x10 = ivec4(max(sourceFrac.zy, vec2(0.0)), min(inputWH - 1.0,
ceil(sourceFrac.zy)));\r\n                ivec4 x11 = ivec4(max(sourceFrac.zw, vec2(0.0)), min(inputWH - 1.0,
ceil(sourceFrac.zw)));\r\n\r\n                bool hasNextRow = rc.w < ${outputHeight - 1};\r\n                bool
hasNextCol = rc.z < ${outputWidth - 1};\r\n\r\n                // pack x00, x01, x10, x11's top-left corner into one vec4
structure\r\n                vec4 topLeft = vec4(\r\n                    getAValue(batch, depth, x00.x, x00.y),\r\n
hasNextCol ? getAValue(batch, depth, x01.x, x01.y) : 0.0,\r\n                    hasNextRow ? getAValue(batch, depth,
x10.x, x10.y) : 0.0,\r\n                    (hasNextRow && hasNextCol) ? getAValue(batch, depth, x11.x, x11.y) :
0.0);\r\n\r\n                // pack x00, x01, x10, x11's top-right corner into one vec4 structure\r\n                vec4 topRight
= vec4(\r\n                    getAValue(batch, depth, x00.x, x00.w),\r\n                    hasNextCol ? getAValue(batch,
depth, x01.x, x01.w) : 0.0,\r\n                    hasNextRow ? getAValue(batch, depth, x10.x, x10.w) : 0.0,\r\n
 (hasNextRow && hasNextCol) ? getAValue(batch, depth, x11.x, x11.w) : 0.0);\r\n\r\n                // pack x00, x01,
x10, x11's bottom-left corner into one vec4 structure\r\n                vec4 bottomLeft = vec4(\r\n
getAValue(batch, depth, x00.z, x00.y),\r\n                    hasNextCol ? getAValue(batch, depth, x01.z, x01.y) : 0.0,\r\n
                    hasNextRow ? getAValue(batch, depth, x10.z, x10.y) : 0.0,\r\n                    (hasNextRow &&
hasNextCol) ? getAValue(batch, depth, x11.z, x11.y) : 0.0);\r\n\r\n                // pack x00, x01, x10, x11's bottom-
right corner into one vec4 structure\r\n                vec4 bottomRight = vec4(\r\n                    getAValue(batch, depth,
x00.z, x00.w),\r\n                    hasNextCol ? getAValue(batch, depth, x01.z, x01.w) : 0.0,\r\n
hasNextRow ? getAValue(batch, depth, x10.z, x10.w) : 0.0,\r\n                    (hasNextRow && hasNextCol) ?
getAValue(batch, depth, x11.z, x11.w) : 0.0);\r\n\r\n                // calculate the interpolation fraction on u and v
direction\r\n                vec4 frac = vec4(sourceFrac) - floor(sourceFrac);\r\n                vec4 clampFrac = clamp(frac,
vec4(0.0), vec4(1.0));\r\n\r\n                vec4 top = mix(topLeft, topRight, clampFrac.ywyw);\r\n                vec4
bottom = mix(bottomLeft, bottomRight, clampFrac.ywyw);\r\n                vec4 newValue = mix(top, bottom,
clampFrac.xxzz);\r\n\r\n                ${glsl.output} = vec4(newValue);\r\n            }\r\n        `;\r\n      return {\r\n
...resizeProgramMetadata,\r\n        output: {dims: outputShape, type: inputs[0].type, textureType:
TextureType.packed},\r\n        hasMain: true,\r\n        shaderSource\r\n      };\r\n    };\r\n\r\n\r\nconst prepareInputs =
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(inputs: Tensor[], attributes: UpsampleAttributes): [readonly number[], readonly number[]] => {\r\n  const x =
inputs[0];\r\n  const xDims = x.dims;\r\n\r\n  let scales = attributes.scales;\r\n  let outputSizes:
number[]|undefined;\r\n  if (scales.length === 0) {\r\n    const scalesTensor = inputs[attributes.scalesInputIdx];\r\n
if (scalesTensor && scalesTensor.size !== 0) {\r\n      if (inputs[attributes.sizesInputIdx]) {\r\n        throw new
Error('Only one of scales or sizes must be provided as input.');\r\n      }\r\n      scales =
parseScalesData(scalesTensor, attributes.mode, attributes.isResize);\r\n    } else {\r\n      const sizesTensor =
inputs[attributes.sizesInputIdx];\r\n      if (!sizesTensor || sizesTensor.size === 0) {\r\n        throw new Error('Either
scales or sizes MUST be provided as input.');\r\n      }\r\n\r\n      outputSizes =
Array.from(sizesTensor.integerData);\r\n      scales = parseScalesDataFromOutputSize(outputSizes, xDims,
attributes.mode, attributes.isResize);\r\n    }\r\n  } else {\r\n    if (inputs[attributes.sizesInputIdx]) {\r\n      throw new
Error('Only one of scales or sizes must be provided as input.');\r\n    }\r\n  }\r\n\r\n  const yDims = outputSizes ||
(xDims.map((dim, i) => Math.floor(dim * scales[i])));\r\n\r\n  return [scales, yDims];\r\n};\r\n\r\nconst
parseScalesData = (scale: Tensor, mode: string, isResize: boolean): number[] => {\r\n  const scales =
Array.from(scale.floatData);\r\n  scalesValidation(scales, mode, isResize);\r\n  return scales;\r\n};\r\n\r\nconst
parseScalesDataFromOutputSize =\r\n    (yDims: readonly number[], xDims: readonly number[], mode: string,
isResize: boolean): number[] => {\r\n      const length = xDims.length;\r\n      const scales = new
Array<number>(length);\r\n\r\n      for (let i = 0, end = length; i < end; i++) {\r\n        if (xDims[i] === 0) {\r\n
if (yDims[i] !== 0) {\r\n            throw new Error('Input dim is zero but required output dim is non-zero.');\r\n
}\r\n          scales[i] = 1;\r\n        } else {\r\n          scales[i] = yDims[i] / xDims[i];\r\n        }\r\n      }\r\n
scalesValidation(scales, mode, isResize);\r\n      return scales;\r\n    };\r\n\r\n// roi data is not used yet. but leave here
for future usage.\r\n// const getRoi = (inputs: Tensor[], attributes: UpsampleAttributes) : number[] => {\r\n//     let
roi: number[] = [];\r\n//     if (attributes.needRoiInput) {\r\n//         if (attributes.roiInputIdx <= 0) {\r\n//
throw new Error('Invalid roi input index.');\r\n//         }\r\n//         const roiTensor =
inputs[attributes.roiInputIdx];\r\n//         roi = roiTensor.size > 0 ? Array.from(roiTensor.floatData) : [];\r\n//     } else
{\r\n//         roi = new Array(inputs[0].dims.length * 2).fill(0);\r\n//     }\r\n//     return roi;\r\n// };","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from
'../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const shape =
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n  validateInputs(inputs);\r\n  return
[new Tensor([inputs[0].dims.length], 'int32', undefined, undefined, new
Int32Array(inputs[0].dims))];\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs ||
inputs.length !== 1) {\r\n    throw new Error('Shape requires 1 input.');\r\n  }\r\n};","// Copyright (c) Microsoft
Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey,
createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from
'../../../graph';\r\nimport {NUMBER_TYPES, OperatorImplementation, OperatorInitialization} from
'../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from
'../types';\r\n\r\nexport interface SliceAttributes extends AttributeWithCacheKey {\r\n  readonly axes: number[];\r\n
readonly ends: number[];\r\n  readonly starts: number[];\r\n}\r\n\r\nconst sliceProgramMetadata = {\r\n  name:
'Slice',\r\n  inputNames: ['A'],\r\n  inputTypes: [TextureType.unpacked]\r\n};\r\n\r\nexport const slice:
OperatorImplementation<SliceAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[],
attributes: SliceAttributes): Tensor[] => {\r\n      validateInputs(inputs);\r\n      const output =
inferenceHandler.run(\r\n          {\r\n            ...sliceProgramMetadata,\r\n            cacheHint: attributes.cacheKey,\r\n
        get: () => createSliceProgramInfo(inferenceHandler, inputs[0], attributes)\r\n          },\r\n          inputs);\r\n
return [output];\r\n    };\r\n\r\nexport const parseSliceAttributes: OperatorInitialization<SliceAttributes> = (node:
Graph.Node): SliceAttributes => {\r\n  const starts = node.attributes.getInts('starts');\r\n  const ends =
node.attributes.getInts('ends');\r\n  const axes = node.attributes.getInts('axes', []);\r\n  return
createAttributeWithCacheKey({starts, ends, axes});\r\n};\r\n\r\nconst createSliceProgramInfo =\r\n
(inferenceHandler: WebGLInferenceHandler, input: Tensor, attributes: SliceAttributes): ProgramInfo => {\r\n
```

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const axes = (attributes.axes.length === 0) ? input.dims.slice(0).map((val, i) => i) : attributes.axes;\r\n      const
normalizedAxes = ShapeUtil.normalizeAxes(axes, input.dims.length);\r\n      const starts =
attributes.starts.map((start, i) => {\r\n        if (start > input.dims[normalizedAxes[i]] - 1) {\r\n          return
input.dims[normalizedAxes[i]];\r\n        }\r\n        return ShapeUtil.normalizeAxis(start,
input.dims[normalizedAxes[i]]);\r\n      });\r\n      const ends = attributes.ends.map((end, i) => {\r\n        if (end >
input.dims[normalizedAxes[i]] - 1) {\r\n          return input.dims[normalizedAxes[i]];\r\n        }\r\n        return
ShapeUtil.normalizeAxis(end, input.dims[normalizedAxes[i]]);\r\n      });\r\n\r\n      const outputShape =
input.dims.slice();\r\n\r\n\r\n      const sliceOps: string[] = [];\r\n      for (let i = 0; i < normalizedAxes.length; i++) {\r\n
    outputShape[normalizedAxes[i]] = ends[i] - starts[i];\r\n        if (starts[i] > 0) {\r\n
sliceOps.push(`outputIdx[${normalizedAxes[i]}] += ${starts[i]};`);\r\n        }  // else {
sliceOps.push(`outputIdx[${normalizedAxes[i]}] += 0;`); }\r\n      }\r\n\r\n      const rank = outputShape.length;\r\n
  const shaderSource = `\r\n      float process(int outputIdx[${rank}]) {\r\n        ${sliceOps.join('\\n      ')}\r\n
return _A(outputIdx);\r\n      }`;\r\n      return {\r\n        ...sliceProgramMetadata,\r\n        output: {dims: outputShape,
type: input.type, textureType: TextureType.unpacked},\r\n        shaderSource\r\n      };\r\n    };\r\n\r\nconst
validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length !== 1) {\r\n    throw new Error('Slice
requires 1 input.');\r\n  }\r\n  if (NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n    throw new
Error('Invalid input type.');\r\n  }\r\n};\r\n\r\nexport const sliceV10 = (inferenceHandler: WebGLInferenceHandler,
inputs: Tensor[]): Tensor[] => {\r\n  validateInputsV10(inputs);\r\n  const attributes =
generateSliceAttributesFromInputs(inferenceHandler, inputs);\r\n  const output = inferenceHandler.run(\r\n      {\r\n
     ...sliceProgramMetadata,\r\n        cacheHint: attributes.cacheKey,\r\n        get: () =>
createSliceProgramInfo(inferenceHandler, inputs[0], attributes)\r\n      },\r\n      [inputs[0]]);\r\n  return
[output];\r\n};\r\n\r\nconst generateSliceAttributesFromInputs =\r\n    (inferenceHandler: WebGLInferenceHandler,
inputs: Tensor[]): SliceAttributes => {\r\n      if (!inferenceHandler.session.isInitializer(inputs[1].dataId) ||\r\n
!inferenceHandler.session.isInitializer(inputs[2].dataId) ||\r\n          (inputs.length >= 4 &&
!inferenceHandler.session.isInitializer(inputs[3].dataId)) ||\r\n          (inputs.length >= 5 &&
!inferenceHandler.session.isInitializer(inputs[4].dataId))) {\r\n        throw new Error('dynamic slice attributes are not
allowed');\r\n      }\r\n\r\n      if (inputs.length >= 5 && inputs[4].integerData.some((i: number) => i !== 1)) {\r\n
throw new Error('currently non-1 steps is not supported for Slice');\r\n      }\r\n\r\n      const starts =
Array.from(inputs[1].integerData);\r\n      const ends = Array.from(inputs[2].integerData);\r\n      const axes =
inputs.length >= 4 ? Array.from(inputs[3].integerData) : [];\r\n      const cacheKey =
`${axes};${starts};${ends}`;\r\n      return {starts, ends, axes, cacheKey};\r\n    };\r\n\r\nconst validateInputsV10 =
(inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length < 3 || inputs.length > 5) {\r\n    throw new Error('Invalid
input number.');\r\n  }\r\n  if (inputs[1].type !== 'int32' || inputs[1].dims.length !== 1) {\r\n    throw new
Error('Invalid input type.');\r\n  }\r\n  if (inputs[2].type !== 'int32' || inputs[2].dims.length !== 1) {\r\n    throw new
Error('Invalid input type.');\r\n  }\r\n  if (inputs.length >= 4 && (inputs[3].type !== 'int32' || inputs[3].dims.length
!== 1)) {\r\n    throw new Error('Invalid input type.');\r\n  }\r\n  if (inputs.length >= 5 && (inputs[4].type !== 'int32'
|| inputs[4].dims.length !== 1)) {\r\n    throw new Error('Invalid input type.');\r\n  }\r\n};\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport
{AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph}
from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport
{Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {getGlsl} from '../glsl-
source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType}
from '../types';\r\n\r\nexport interface SoftmaxAttributes extends AttributeWithCacheKey {\r\n  readonly axis:
number;\r\n}\r\n\r\nconst softmaxComputeMaxProgramMetadata = {\r\n  name: 'SoftmaxComputeMax',\r\n
inputNames: ['A'],\r\n  inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nconst
softmaxComputeScaleProgramMetadata = {\r\n  name: 'SoftmaxComputeScale',\r\n  inputNames: ['A', 'Max'],\r\n
inputTypes: [TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nconst softmaxProgramMetadata = {\r\n
name: 'SoftMax',\r\n  inputNames: ['A', 'Max', 'Norm'],\r\n  inputTypes: [TextureType.unpacked,
```

TextureType.unpacked, TextureType.unpacked],\r\n};\r\n\r\nexport const softmax: OperatorImplementation<SoftmaxAttributes> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: SoftmaxAttributes): Tensor[] => {\r\n   validateInputs(inputs);\r\n\r\n   const inputShape = inputs[0].dims.slice();\r\n   const axis = ShapeUtil.normalizeAxis(attributes.axis, inputShape.length);\r\n   const N = ShapeUtil.sizeToDimension(inputShape, axis);\r\n   const D = ShapeUtil.sizeFromDimension(inputShape, axis);\r\n\r\n   const computeMaxProgramInfo = createComputeMaxProgramInfo(inferenceHandler, inputs[0], N, D, [N]);\r\n   const max = inferenceHandler.run(\r\n   {...softmaxComputeMaxProgramMetadata, cacheHint: attributes.cacheKey, get: () => computeMaxProgramInfo},\r\n   inputs);\r\n\r\n   const computeScaleProgramInfo =\r\n   createComputScaleProgramInfo(inferenceHandler, inputs[0], N, D, computeMaxProgramInfo.output.dims, [N]);\r\n   const scale = inferenceHandler.run(\r\n   {...softmaxComputeScaleProgramMetadata, cacheHint: attributes.cacheKey, get: () => computeScaleProgramInfo},\r\n   [inputs[0], max]);\r\n\r\n   const softMaxProgramInfo = createSoftMaxProgramInfo(\r\n   inferenceHandler, inputs[0], N, D, computeMaxProgramInfo.output.dims, computeScaleProgramInfo.output.dims);\r\n   const output = inferenceHandler.run(\r\n   {...softmaxProgramMetadata, cacheHint: attributes.cacheKey, get: () => softMaxProgramInfo},\r\n   [inputs[0], max, scale]);\r\n   return [output];\r\n   };\r\n\r\nexport const parseSoftmaxAttributes: OperatorInitialization<SoftmaxAttributes> =\r\n   (node: Graph.Node): SoftmaxAttributes => createAttributeWithCacheKey({axis: node.attributes.getInt('axis', 1)});\r\n\r\n/**\r\n * Create a texture that contains the maximum value of each of the 'N' rows\r\n */\r\nconst createComputeMaxProgramInfo =\r\n   // eslint-disable-next-line @typescript-eslint/naming-convention\r\n   (inferenceHandler: WebGLInferenceHandler, input: Tensor, N: number, D: number, outputShape: number[]):\r\n   ProgramInfo => {\r\n   const [textureWidth, textureHeight] =\r\n   inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n   const rank = outputShape.length;\r\n\r\n   if (N < 1 || D < 1) {\r\n   throw new Error('Logical row count N and feature count D must be greater than or equal to 1');\r\n   }\r\n\r\n   if (outputShape.length !== 1) {\r\n   throw new Error('Dimensionality of the output should be 1');\r\n   }\r\n\r\n   if (outputShape[0] !== N) {\r\n   throw new Error('Shape of the output should be equal to logical row count');\r\n   }\r\n\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const shaderSource = `\r\n   float process(int[${rank}] indices) {\r\n   int logical_row_start_offset = indices[0] * ${D};\r\n\r\n   float max = getColorAsFloat(${glsl.texture2D}(A, offsetToCoords(logical_row_start_offset, ${textureWidth},\r\n ${textureHeight})));\r\n   for(int i=1; i<${D}; ++i)\r\n   {\r\n   float current = getColorAsFloat(${glsl.texture2D}(A, offsetToCoords(logical_row_start_offset + i,\r\n ${textureWidth}, ${textureHeight})));\r\n   if(current > max)\r\n   max = current;\r\n   }\r\n\r\n   return max;\r\n   }`;\r\n   return {\r\n   ...softmaxComputeMaxProgramMetadata,\r\n   output: {dims: outputShape, type: input.type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n   };\r\n   };\r\n\r\n/**\r\n * Create a texture that contains the normalization factor for each of the 'N' rows\r\n */\r\nconst createComputScaleProgramInfo =\r\n   // eslint-disable-next-line @typescript-eslint/naming-convention\r\n   (inferenceHandler: WebGLInferenceHandler, input: Tensor, N: number, D: number,\r\n   maxElementPerLogicalRow: readonly number[], outputShape: number[]): ProgramInfo => {\r\n   const [textureWidth, textureHeight] =\r\n   inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n   const rank = outputShape.length;\r\n\r\n   if (N < 1 || D < 1) {\r\n   throw new Error('Logical row count N and feature count D must be greater than or equal to 1');\r\n   }\r\n\r\n   if (outputShape.length !== 1) {\r\n   throw new Error('Dimensionality of the output should be 1');\r\n   }\r\n\r\n   if (outputShape[0] !== N) {\r\n   throw new Error('Shape of the output should be equal to logical row count');\r\n   }\r\n\r\n   if (maxElementPerLogicalRow.length !== 1) {\r\n   throw new Error('Dimensionality of the intermediate results should be 1');\r\n   }\r\n\r\n   if (maxElementPerLogicalRow[0] !== N) {\r\n   throw new Error('Shape of the intermediate results should be equal to logical row count');\r\n   }\r\n\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const shaderSource = `\r\n   float

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process(int[${rank}] indices) {\r\n        int logical_row_start_offset = indices[0] * ${D};\r\n\r\n        float
norm_factor = 0.0;\r\n        float max = _Max(indices);\r\n        for(int i=0; i<${D}; ++i)\r\n        {\r\n
norm_factor += exp(getColorAsFloat(${glsl.texture2D}(A, offsetToCoords(logical_row_start_offset + i,\r\n
${textureWidth}, ${textureHeight}))) - max);\r\n        }\r\n\r\n        return norm_factor;\r\n      }`;\r\n      return {\r\n
    ...softmaxComputeScaleProgramMetadata,\r\n        output: {dims: outputShape, type: input.type, textureType:
TextureType.unpacked},\r\n        shaderSource\r\n      };\r\n    };\r\n\r\nconst createSoftMaxProgramInfo =\r\n    //
eslint-disable-next-line @typescript-eslint/naming-convention\r\n    (inferenceHandler: WebGLInferenceHandler,
input: Tensor, N: number, D: number,\r\n     maxElementPerLogicalRow: readonly number[],
normalizationPerLogicalRow: readonly number[]): ProgramInfo => {\r\n      const [textureWidth, textureHeight]
=\r\n          inferenceHandler.calculateTextureWidthAndHeight(input.dims, TextureType.unpacked);\r\n      const
rank = input.dims.length;\r\n\r\n      if (N < 1 || D < 1) {\r\n        throw new Error('Logical row count N and feature
count D must be greater than or equal to 1');\r\n      }\r\n\r\n      if (maxElementPerLogicalRow.length !== 1 ||
normalizationPerLogicalRow.length !== 1) {\r\n        throw new Error('Dimensionality of the intermediate results
should be 1');\r\n      }\r\n\r\n      if (maxElementPerLogicalRow[0] !== N || normalizationPerLogicalRow[0] !== N)
{\r\n        throw new Error('Shape of the intermediate results should be equal to logical row count');\r\n      }\r\n\r\n
 const shaderSource = `\r\n      float process(int[${rank}] indices) {\r\n\r\n      // get offset of current logical tensor
index from the 2-D texture coordinates (TexCoords)\r\n      int offset = coordsToOffset(TexCoords,
${textureWidth}, ${textureHeight});\r\n\r\n      //determine the logical row for this index\r\n      int
logical_row_index[1];\r\n      logical_row_index[0] = offset / ${D};\r\n\r\n      float norm_factor =
_Norm(logical_row_index);\r\n\r\n      // avoid possible division by 0\r\n      // if norm_facor is 0, all elements are
zero\r\n      // if so, return 0\r\n      if(norm_factor == 0.0)\r\n        return 0.0;\r\n\r\n      return exp(_A(indices) -
_Max(logical_row_index)) / norm_factor;\r\n    }`;\r\n      return {\r\n        ...softmaxProgramMetadata,\r\n
output: {dims: input.dims, type: input.type, textureType: TextureType.unpacked},\r\n        shaderSource\r\n      };\r\n
  };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length !== 1) {\r\n    throw new
Error('Softmax requires 1 input.');\r\n  }\r\n\r\n  if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n
 throw new Error('Invalid input type');\r\n  }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n//
Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from
'../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation,
OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil,
SplitUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport
{ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface SplitAttributes extends AttributeWithCacheKey
{\r\n  readonly axis: number;\r\n  readonly split: number[];\r\n  readonly numOutputs: number;\r\n}\r\n\r\nconst
splitProgramMetadata = {\r\n  name: 'Split',\r\n  inputNames: ['A'],\r\n  inputTypes:
[TextureType.unpacked],\r\n};\r\n\r\nexport const split: OperatorImplementation<SplitAttributes> =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: SplitAttributes): Tensor[] => {\r\n
validateInputs(inputs);\r\n\r\n      const axis = ShapeUtil.normalizeAxis(attributes.axis, inputs[0].dims.length);\r\n
const count = getProgramCount(inferenceHandler, inputs, axis, attributes);\r\n      const output: Tensor[] = [];\r\n
for (let i = 0; i < count; ++i) {\r\n        output.push(inferenceHandler.run(\r\n            {\r\n
...splitProgramMetadata,\r\n              cacheHint: `${attributes.cacheKey};${i}`,\r\n              get: () =>
createSplitProgramInfo(inferenceHandler, inputs[0], attributes, axis, i)\r\n            },\r\n            inputs));\r\n
}\r\n\r\n      return output;\r\n    };\r\n\r\nexport const parseSplitAttributes: OperatorInitialization<SplitAttributes> =
(node: Graph.Node): SplitAttributes => {\r\n  const axis = node.attributes.getInt('axis', 0);\r\n  const split =
node.attributes.getInts('split', []);\r\n  const numOutputs = node.outputs.length;\r\n  return
createAttributeWithCacheKey({axis, split, numOutputs});\r\n};\r\n\r\nconst getProgramCount =\r\n
(inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axis: number, attributes: SplitAttributes): number =>
{\r\n      const [, offsets] = SplitUtil.splitShape(inputs[0].dims, axis, attributes.split, attributes.numOutputs);\r\n
return offsets.length;\r\n    };\r\n\r\nconst createSplitProgramInfo =\r\n    (inferenceHandler:
WebGLInferenceHandler, input: Tensor, attributes: SplitAttributes, axis: number, index: number):\r\n
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ProgramInfo => {\r\n const [shapes, offsets] = SplitUtil.splitShape(input.dims, axis, attributes.split, attributes.numOutputs);\r\n const offset = offsets[index];\r\n const outputShape = shapes[index];\r\n const rank = outputShape.length;\r\n const shaderSource = `\r\n float process(int indices[${rank}]) {\r\n indices[${axis}] += ${offset};\r\n return _A(indices);\r\n }\r\n `;\r\n return {\r\n ...splitProgramMetadata,\r\n cacheHint: `${attributes.cacheKey}:${index}`,\r\n output: {dims: outputShape, type: input.type, textureType: TextureType.unpacked},\r\n shaderSource\r\n };\r\n };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n throw new Error('Split requires one input.');\r\n }\r\n\r\n if (inputs[0].type !== 'int8' && inputs[0].type !== 'uint8' && inputs[0].type !== 'int16' &&\r\n inputs[0].type !== 'uint16' && inputs[0].type !== 'int32' && inputs[0].type !== 'uint32' &&\r\n inputs[0].type !== 'float32' && inputs[0].type !== 'float64' && inputs[0].type !== 'bool') {\r\n throw new Error('Invalid input type.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const squeeze: OperatorImplementation<number[]> =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axes: number[]): Tensor[] => {\r\n validateInputs(inputs);\r\n const outputShape = ShapeUtil.squeezeShape(inputs[0].dims, axes);\r\n const output = inferenceHandler.reshapeUnpacked(inputs[0], outputShape);\r\n return [output];\r\n };\r\n\r\nexport const parseSqueezeAttributes: OperatorInitialization<number[]> = (node: Graph.Node): number[] =>\r\n node.attributes.getInts('axes');\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n throw new Error('Squeeze requires 1 input.');\r\n }\r\n\r\n if (inputs[0].type === 'string') {\r\n throw new Error('invalid input tensor types.');\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport const sum = (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n validateInputs(inputs);\r\n\r\n const sumProgramMetadata = {\r\n name: 'Sum',\r\n inputNames: inputs.map((v, i) => `X${i}`),\r\n inputTypes: new Array(inputs.length).fill(TextureType.unpacked)\r\n };\r\n\r\n const output = inferenceHandler.run(\r\n {...sumProgramMetadata, get: () => createSumProgramInfo(inferenceHandler, inputs, sumProgramMetadata)}, inputs);\r\n return [output];\r\n};\r\n\r\nconst createSumProgramInfo =\r\n (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], sumProgramMetadata: ProgramMetadata): ProgramInfo => {\r\n const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n const outputShape = inputs[0].dims.slice();\r\n const sumLine = inputs.map((v, i) => `${glsl.texture2D}(X${i},TexCoords)`).join(' + ');\r\n const shaderSource = `\r\n void main() {\r\n vec4 result = ${sumLine};\r\n ${glsl.output} = result;\r\n }\r\n `;\r\n return {\r\n ...sumProgramMetadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n hasMain: true,\r\n shaderSource\r\n };\r\n };\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length === 0) {\r\n throw new Error('Sum requires inputs.');\r\n }\r\n\r\n const length = inputs[0].dims.length;\r\n for (let i = 1; i < inputs.length; i++) {\r\n if (length !== inputs[i].dims.length) {\r\n throw new Error('Input shapes are mismatched.');\r\n }\r\n\r\n for (let j = 0; j < length; j++) {\r\n if (inputs[0].dims[j] !== inputs[i].dims[j]) {\r\n throw new Error('Input shapes are not matched.');\r\n }\r\n }\r\n }\r\n\r\n if (inputs[0].type !== 'float32' && inputs[0].type !== 'float64') {\r\n throw new Error('Invalid input type.');\r\n }\r\n for (let i = 1; i < inputs.length; i++) {\r\n if (inputs[0].type !== inputs[i].type) {\r\n throw new Error('Input types are not matched.');\r\n }\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {NUMBER_TYPES} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramMetadata, TextureType} from '../types';\r\n\r\nexport const tile = (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[]): Tensor[] => {\r\n validateInputs(inputs);\r\n\r\n const tileProgramMetadata = {\r\n name: 'Tile',\r\n inputNames: ['A'],\r\n

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inputTypes: [TextureType.unpacked],\r\n  };\r\n\r\n  const output = inferenceHandler.run(\r\n
{...tileProgramMetadata, get: () => createTileProgramInfo(inferenceHandler, inputs, tileProgramMetadata)},\r\n
inputs);\r\n  return [output];\r\n};\r\n\r\nconst createTileProgramInfo =\r\n    (handler: WebGLInferenceHandler,
inputs: Tensor[], tileProgramMetadata: ProgramMetadata): ProgramInfo => {\r\n      const inputShape =
inputs[0].dims.slice();\r\n      const outputShape = new Array(inputShape.length);\r\n\r\n      const tileOps: string[] =
[];\r\n      for (let i = 0; i < inputShape.length; i++) {\r\n        outputShape[i] = inputShape[i] *
inputs[1].numberData[i];\r\n        tileOps.push(`inputIdx[${i}] = int(mod(float(outputIdx[${i}]),
${inputShape[i]}.));`);\r\n      }\r\n\r\n      const rank = outputShape.length;\r\n      const shaderSource = `\r\n      float
process(int outputIdx[${rank}]) {\r\n        int inputIdx[${rank}];\r\n        ${tileOps.join('\\n')}\r\n        return
_A(inputIdx);\r\n      }\r\n    `;\r\n      return {\r\n        ...tileProgramMetadata,\r\n        output: {dims: outputShape,
type: inputs[0].type, textureType: TextureType.unpacked},\r\n        shaderSource\r\n      };\r\n    };\r\n\r\nconst
validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length !== 2) {\r\n    throw new Error('Tile
requires 2 input.');\r\n  }\r\n  if (inputs[1].dims.length !== 1) {\r\n    throw new Error('The second input shape must 1
dimension.');\r\n  }\r\n  if (inputs[1].dims[0] !== inputs[0].dims.length) {\r\n    throw new Error('Invalid input
shape.');\r\n  }\r\n  if (NUMBER_TYPES.indexOf(inputs[0].type) === -1) {\r\n    throw new Error('Invalid input
type.');\r\n  }\r\n  if (inputs[1].type !== 'int32' && inputs[1].type !== 'int16') {\r\n    throw new Error('Invalid repeat
type.');\r\n  }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-
key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from
'../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from
'../types';\r\n\r\nexport interface TransposeAttributes extends AttributeWithCacheKey {\r\n  readonly perm:
number[];\r\n}\r\n\r\nconst transposeProgramMetadata = {\r\n  name: 'Transpose',\r\n  inputNames: ['A'],\r\n
inputTypes: [TextureType.unpacked]\r\n};\r\n\r\nexport const transpose:
OperatorImplementation<TransposeAttributes> =\r\n    (inferenceHandler: WebGLInferenceHandler, inputs:
Tensor[], attributes: TransposeAttributes): Tensor[] => {\r\n      validateInputs(inputs);\r\n      const output =
inferenceHandler.run(\r\n          {\r\n            ...transposeProgramMetadata,\r\n            cacheHint:
attributes.cacheKey,\r\n            get: () => createTransposeProgramInfo(inferenceHandler, inputs[0],
attributes.perm)\r\n          },\r\n          inputs);\r\n      return [output];\r\n    };\r\n\r\nexport const
parseTransposeAttributes: OperatorInitialization<TransposeAttributes> =\r\n    (node: Graph.Node):
TransposeAttributes => createAttributeWithCacheKey({perm: node.attributes.getInts('perm', [])});\r\n\r\nconst
createTransposeProgramInfo =\r\n    (inferenceHandler: WebGLInferenceHandler, input: Tensor, perm: number[]):
ProgramInfo => {\r\n      const inputShape = input.dims;\r\n      perm = getAdjustedPerm(inputShape, perm);\r\n
const unpackedOutputShape = getOutputShape(inputShape, perm);\r\n      const rank = inputShape.length;\r\n      //
A dims=[${inputs[0].dims.toString()}]\r\n      // out Dims=[${unpackedOutputShape.toString()}]\r\n      // based on
perm=[${perm.toString()}]\r\n      const shaderSource = `\r\n      ${getPermFunctionBody('perm', perm, rank)}\r\n
float process(int indices[${rank}]) {\r\n        int a[${rank}];\r\n        perm(a, indices);\r\n        return _A(a);\r\n
}`;\r\n      return {\r\n        ...transposeProgramMetadata,\r\n        output: {dims: unpackedOutputShape, type:
input.type, textureType: TextureType.unpacked},\r\n        shaderSource\r\n      };\r\n    };\r\n\r\nconst
getAdjustedPerm = (inputShape: readonly number[], perm: number[]): number[] => {\r\n  if (perm && perm.length
!== inputShape.length) {\r\n    perm = [...(inputShape.keys())].reverse();\r\n  }\r\n  return perm;\r\n};\r\n\r\nconst
getOutputShape = (inputShape: readonly number[], perm: number[]): readonly number[] => {\r\n  perm =
getAdjustedPerm(inputShape, perm);\r\n  return ShapeUtil.sortBasedOnPerm(inputShape, perm);\r\n};\r\n\r\nconst
getPermFunctionBody = (name: string, perm: number[], rank: number): string => {\r\n  const reverseFunc = [];\r\n
reverseFunc.push(`void ${name}(out int a[${rank}], int src[${rank}]) {`);\r\n  for (let i = 0; i < rank; ++i) {\r\n
reverseFunc.push(`\\ta[${perm[i]}]=src[${i}];`);\r\n  }\r\n  reverseFunc.push('\\t}');\r\n  return
reverseFunc.join('\\n');\r\n};\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n  if (!inputs || inputs.length
!== 1) {\r\n    throw new Error('Transpose requires 1 input.');\r\n  }\r\n\r\n  if (inputs[0].type !== 'float32' &&
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inputs[0].type !== 'float64') {\r\n    throw new Error('input should be float tensor');\r\n  }\r\n};\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {getGlsl} from
'../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {TextureData,
TextureType} from '../types';\r\n\r\nexport const encodeAsUint8 = (inferenceHandler: WebGLInferenceHandler,
input: TextureData): TextureData => {\r\n  const outputShape = input.shape;\r\n  const glsl =
getGlsl(inferenceHandler.session.backend.glContext.version);\r\n  /**\r\n   * https://github.com/tensorflow/tfjs-
core/blob/master/src/kernels/webgl/encode_float_gpu.ts\r\n   */\r\n  const shaderSource = `\r\n    const float
FLOAT_MAX = 1.70141184e38;\r\n    const float FLOAT_MIN = 1.17549435e-38;\r\n\r\n    bool isNaN(float val)
{\r\n      return (val < 1.0 || 0.0 < val || val == 0.0) ? false : true;\r\n    }\r\n\r\n    highp vec4 encodeAsUint8(highp
float v) {\r\n      if (isNaN(v)) {\r\n        return vec4(255, 255, 255, 255);\r\n      }\r\n\r\n      highp float av =
abs(v);\r\n\r\n      if(av < FLOAT_MIN) {\r\n        return vec4(0.0, 0.0, 0.0, 0.0);\r\n      } else if(v > FLOAT_MAX)
{\r\n        return vec4(0.0, 0.0, 128.0, 127.0) / 255.0;\r\n      } else if(v < -FLOAT_MAX) {\r\n        return vec4(0.0,
0.0,  128.0, 255.0) / 255.0;\r\n      }\r\n\r\n      highp vec4 c = vec4(0,0,0,0);\r\n\r\n      highp float e =
floor(log2(av));\r\n      highp float m = exp2(fract(log2(av))) - 1.0;\r\n\r\n      c[2] = floor(128.0 * m);\r\n      m -=
c[2] / 128.0;\r\n      c[1] = floor(32768.0 * m);\r\n      m -= c[1] / 32768.0;\r\n      c[0] = floor(8388608.0 * m);\r\n\r\n
    highp float ebias = e + 127.0;\r\n      c[3] = floor(ebias / 2.0);\r\n      ebias -= c[3] * 2.0;\r\n      c[2] += floor(ebias)
* 128.0;\r\n\r\n      c[3] += 128.0 * step(0.0, -v);\r\n\r\n      return c / 255.0;\r\n    }\r\n\r\n    void main() {\r\n      float
value = ${glsl.texture2D}(X,TexCoords).r;\r\n      ${glsl.output} = encodeAsUint8(value);\r\n    }`;\r\n  const
programInfo = {\r\n    name: 'Uint8Encode',\r\n    inputTypes: [TextureType.unpacked],\r\n    inputNames: ['X'],\r\n
output: {dims: outputShape, type: input.tensor.type, textureType: TextureType.downloadUint8AsFloat},\r\n
shaderSource,\r\n    hasMain: true\r\n  };\r\n  return inferenceHandler.executeProgram(programInfo,
[input.tensor]);\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-
key';\r\nimport {Graph} from '../../../graph';\r\nimport {Tensor} from '../../../tensor';\r\nimport {FunctionType,
GlslValueFunction} from '../glsl-definitions';\r\nimport {getGlsl} from '../glsl-source';\r\nimport
{WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader,
ProgramMetadata, TextureType} from '../types';\r\n\r\nexport function glslAbs(): GlslValueFunction {\r\n  return
glslBuiltinUnary('abs');\r\n}\r\nexport function glslAcos(): GlslValueFunction {\r\n  return
glslBuiltinUnary('acos');\r\n}\r\nexport function glslAsin(): GlslValueFunction {\r\n  return
glslBuiltinUnary('asin');\r\n}\r\nexport function glslAtan(): GlslValueFunction {\r\n  return
glslBuiltinUnary('atan');\r\n}\r\nexport function glslCeil(): GlslValueFunction {\r\n  return
glslBuiltinUnary('ceil');\r\n}\r\nexport function glslCos(): GlslValueFunction {\r\n  return
glslBuiltinUnary('cos');\r\n}\r\nexport function glslElu(alpha: number): GlslValueFunction {\r\n  const name =
'elu';\r\n  const body = `\r\n  const float alpha = float(${alpha});\r\n\r\n  float ${name}_(float a) {\r\n    return a >=
0.0 ? a: (exp(a) - 1.0) * alpha;\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n    return vec4(${name}_(v.x), ${name}_(v.y),
${name}_(v.z), ${name}_(v.w));\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\nexport function glslExp(): GlslValueFunction {\r\n  return
glslBuiltinUnary('exp');\r\n}\r\nexport function glslFloor(): GlslValueFunction {\r\n  return
glslBuiltinUnary('floor');\r\n}\r\nexport function glslClip(min: number, max: number): GlslValueFunction {\r\n
const name = 'clip';\r\n  const body = `\r\n  const float min = float(${min});\r\n  const float max =
float(${max});\r\n\r\n  float ${name}_(float a) {\r\n    return clamp(a, min, max);\r\n  }\r\n  vec4 ${name}_(vec4 v)
{\r\n    return clamp(v, min, max);\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\nexport function glslIdentity(): GlslValueFunction {\r\n  const name =
'indentity';\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return a;\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n
return v;\r\n  }\r\n  `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function
glslLeakyRelu(alpha: number): GlslValueFunction {\r\n  const name = 'leakyRelu';\r\n  const body = `\r\n  const
float alpha = float(${alpha});\r\n\r\n  float ${name}_(float a) {\r\n    return a < 0.0 ? a * alpha : a;\r\n  }\r\n  vec4
${name}_(vec4 v) {\r\n    return vec4(${name}_(v.x), ${name}_(v.y), ${name}_(v.z), ${name}_(v.w));\r\n  }\r\n
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`;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslLog(): GlslValueFunction
{\r\n  return glslBuiltinUnary('log');\r\n}\r\nexport function glslNeg(): GlslValueFunction {\r\n  const name =
'neg';\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return -a;\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n
return -v;\r\n  }\r\n  `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function glslNot():
GlslValueFunction {\r\n  const name = 'not';\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return float( !
bool(a) );\r\n  }\r\n  bool ${name}_(bool a) {\r\n    return !a;\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n    return
vec4(!bool(v.x), !bool(v.y), !bool(v.z), !bool(v.w));\r\n  }\r\n  bvec4 ${name}_(bvec4 v) {\r\n    return bvec4(!v.x,
!v.y, !v.z, !v.w);\r\n  }\r\n  `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nexport function
glslSin(): GlslValueFunction {\r\n  return glslBuiltinUnary('sin');\r\n}\r\nexport function glslRelu():
GlslValueFunction {\r\n  const name = 'relu';\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return max( a,
0.0 );\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n    return max( v, 0.0 );\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\nexport function glslSigmoid(): GlslValueFunction {\r\n  const name =
'sigmoid';\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return 1.0 / (1.0 + exp(-a));\r\n  }\r\n  vec4
${name}_(vec4 v) {\r\n    return 1.0 / (1.0 + exp(-v));\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\nexport function glslSqrt(): GlslValueFunction {\r\n  return
glslBuiltinUnary('sqrt');\r\n}\r\nexport function glslTan(): GlslValueFunction {\r\n  return
glslBuiltinUnary('tan');\r\n}\r\nexport function glslTanh(): GlslValueFunction {\r\n  const name = 'tanh';\r\n  const
body = `\r\n  float ${name}_(float a) {\r\n    a = clamp(a, -10., 10.);\r\n    a = exp(2.*a);\r\n    return (a - 1.) / (a +
1.);\r\n  }\r\n  vec4 ${name}_(vec4 v) {\r\n    v = clamp(v, -10., 10.);\r\n    v = exp(2.*v);\r\n    return (v - 1.) / (v +
1.);\r\n  }\r\n  `;\r\n  return {body, name, type: FunctionType.ValueBased};\r\n}\r\nfunction glslBuiltinUnary(name:
string): GlslValueFunction {\r\n  const body = `\r\n  float ${name}_(float a) {\r\n    return ${name}(a);\r\n  }\r\n
vec4 ${name}_(vec4 v) {\r\n    return ${name}(v);\r\n  }\r\n  `;\r\n  return {body, name, type:
FunctionType.ValueBased};\r\n}\r\n\r\n/////\r\n/////\r\n/////\r\n\r\nconst createElementwiseProgramInfo =\r\n
(handler: WebGLInferenceHandler, metadata: ProgramMetadata, input: Tensor, glslFunc: GlslValueFunction):\r\n
   ProgramInfo => {\r\n        const textureType = handler.session.pack ? TextureType.packed :
TextureType.unpacked;\r\n        const glsl = getGlsl(handler.session.backend.glContext.version);\r\n        return
{\r\n          ...metadata,\r\n          output: {dims: input.dims, type: input.type, textureType},\r\n
shaderSource: `\r\n     ${glslFunc.body}\r\n     void main() {\r\n       vec4 v = ${glsl.texture2D}(A, TexCoords);\r\n
   v = ${glslFunc.name}_(v);\r\n       ${glsl.output} = v;\r\n     }\r\n     `,\r\n          hasMain: true\r\n        };\r\n
};\r\n\r\nconst createElementwiseProgramInfoLoader =\r\n    (handler: WebGLInferenceHandler, input: Tensor,
glslFunc: GlslValueFunction, cacheKey?: string):\r\n        ProgramInfoLoader => {\r\n          const textureType =
handler.session.pack ? TextureType.packed : TextureType.unpacked;\r\n          const metadata = {name:
glslFunc.name, inputTypes: [textureType], inputNames: ['A'], cacheHint: cacheKey};\r\n          return {...metadata,
get: () => createElementwiseProgramInfo(handler, metadata, input, glslFunc)};\r\n        };\r\n\r\nexport const abs =
(handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAbs()), inputs)];\r\n\r\nexport const acos
= (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAcos()), inputs)];\r\n\r\nexport const asin
= (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAsin()), inputs)];\r\n\r\nexport const atan
= (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n    Tensor[] =>
[handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslAtan()), inputs)];\r\n\r\nexport interface
ClipAttributes extends AttributeWithCacheKey {\r\n  readonly min: number;\r\n  readonly max:
number;\r\n}\r\n\r\nexport const clip =\r\n    (handler: WebGLInferenceHandler, inputs: Tensor[], attributes:
ClipAttributes): Tensor[] => [handler.run(\r\n        createElementwiseProgramInfoLoader(\r\n            handler,
inputs[0], glslClip(attributes.min, attributes.max), attributes.cacheKey),\r\n        inputs)];\r\n\r\nexport const
parseClipAttributes = (node: Graph.Node): ClipAttributes => createAttributeWithCacheKey({\r\n  min:
node.attributes.getFloat('min', -3.4028234663852886e+38),\r\n  max: node.attributes.getFloat('max',
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3.4028234663852886e+38)\r\n});\r\n\r\nexport const ceil = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslCeil()), inputs)];\r\n\r\nexport const cos = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslCos()), inputs)];\r\n\r\nexport interface EluAttributes extends AttributeWithCacheKey {\r\n readonly alpha: number;\r\n}\r\n\r\nexport const elu =\r\n (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: EluAttributes): Tensor[] => [handler.run(\r\n createElementwiseProgramInfoLoader(handler, inputs[0], glslElu(attributes.alpha), attributes.cacheKey),\r\n inputs)];\r\n\r\nexport const parseEluAttributes = (node: Graph.Node): EluAttributes =>\r\n createAttributeWithCacheKey({alpha: node.attributes.getFloat('alpha', 1.0)});\r\n\r\nexport const exp = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslExp()), inputs)];\r\n\r\nexport const floor = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslFloor()), inputs)];\r\n\r\nexport const identity = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslIdentity()), inputs)];\r\n\r\nexport interface LeakyReluAttributes extends AttributeWithCacheKey {\r\n readonly alpha: number;\r\n}\r\n\r\nexport const leakyRelu =\r\n   (handler: WebGLInferenceHandler, inputs: Tensor[], attributes: LeakyReluAttributes): Tensor[] => [handler.run(\r\n   createElementwiseProgramInfoLoader(handler, inputs[0], glslLeakyRelu(attributes.alpha), attributes.cacheKey),\r\n   inputs)];\r\n\r\nexport const parseLeakyReluAttributes = (node: Graph.Node): LeakyReluAttributes =>\r\n createAttributeWithCacheKey({alpha: node.attributes.getFloat('alpha', 0.01)});\r\n\r\nexport const log = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslLog()), inputs)];\r\n\r\nexport const neg = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslNeg()), inputs)];\r\n\r\nexport const not = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslNot()), inputs)];\r\n\r\nexport const relu = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslRelu()), inputs)];\r\n\r\nexport const sigmoid = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslSigmoid()), inputs)];\r\n\r\nexport const sin = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslSin()), inputs)];\r\n\r\nexport const sqrt = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslSqrt()), inputs)];\r\n\r\nexport const tan = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslTan()), inputs)];\r\n\r\nexport const tanh = (handler: WebGLInferenceHandler, inputs: Tensor[]):\r\n   Tensor[] => [handler.run(createElementwiseProgramInfoLoader(handler, inputs[0], glslTanh()), inputs)];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, ProgramInfoLoader, TextureType} from '../types';\r\nimport {getCoordsDataType} from '../utils';\r\nimport {getChannels, unpackFromChannel} from './packing-utils';\r\n\r\nconst unpackProgramMetadata = {\r\n name: 'unpack',\r\n inputNames: ['A'],\r\n inputTypes: [TextureType.packed]\r\n};\r\n\r\nexport const createUnpackProgramInfo = (handler: WebGLInferenceHandler, input: Tensor): ProgramInfo => {\r\n const rank = input.dims.length;\r\n\r\n const channels = getChannels('rc', rank);\r\n const innerDims = channels.slice(-2);\r\n const coordsDataType = getCoordsDataType(rank);\r\n const unpackChannel = unpackFromChannel();\r\n const isScalar = (input.dims.length === 0);\r\n const sourceCoords =

isScalar ? '' : getSourceCoords(rank, channels);\r\n const coords = rank <= 1 ? 'rc' : `vec2(${innerDims.join(',')})`;\r\n const glsl = getGlsl(handler.session.backend.glContext.version);\r\n const shaderSource = `\r\n ${unpackChannel}\r\n   void main() {\r\n ${coordsDataType} rc = getOutputCoords();\r\n\r\n   // Sample the texture with the coords to get the rgba channel value.\r\n   vec4 packedInput = getA(${sourceCoords});\r\n\r\n ${glsl.output} = vec4(getChannel(packedInput, ${coords}), 0, 0, 0);\r\n   }\r\n   `;\r\n\r\n return {\r\n   ...unpackProgramMetadata,\r\n   hasMain: true,\r\n   output: {dims: input.dims, type: input.type, textureType: TextureType.unpacked},\r\n   shaderSource\r\n };\r\n};\r\n\r\nexport const createUnpackProgramInfoLoader = (handler: WebGLInferenceHandler, input: Tensor): ProgramInfoLoader =>\r\n   ({...unpackProgramMetadata, get: () => createUnpackProgramInfo(handler, input)});\r\n\r\nfunction getSourceCoords(rank: number, dims: string[]): string {\r\n if (rank === 1) {\r\n   return 'rc';\r\n }\r\n\r\n let coords = '';\r\n for (let i = 0; i < rank; i++) {\r\n   coords += dims[i];\r\n   if (i < rank - 1) {\r\n   coords += ',';\r\n   }\r\n }\r\n return coords;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {ShapeUtil} from '../../../util';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\n\r\nexport const unsqueeze: OperatorImplementation<number[]> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], axes: number[]): Tensor[] => {\r\n   validateInputs(inputs);\r\n   const outputShape = ShapeUtil.unsqueezeShape(inputs[0].dims, axes);\r\n   const output = inferenceHandler.reshapeUnpacked(inputs[0], outputShape);\r\n   return [output];\r\n   };\r\n\r\nexport const parseUnsqueezeAttributes: OperatorInitialization<number[]> = (node: Graph.Node): number[] =>\r\n   node.attributes.getInts('axes');\r\n\r\nconst validateInputs = (inputs: Tensor[]): void => {\r\n if (!inputs || inputs.length !== 1) {\r\n   throw new Error('Unsqueeze requires 1 input.');\r\n }\r\n\r\n if (inputs[0].type === 'string') {\r\n   throw new Error('invalid input tensor types.');\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {AttributeWithCacheKey, createAttributeWithCacheKey} from '../../../attribute-with-cache-key';\r\nimport {Graph} from '../../../graph';\r\nimport {OperatorImplementation, OperatorInitialization} from '../../../operators';\r\nimport {Tensor} from '../../../tensor';\r\nimport {getGlsl} from '../glsl-source';\r\nimport {WebGLInferenceHandler} from '../inference-handler';\r\nimport {ProgramInfo, TextureType} from '../types';\r\n\r\nexport interface UpsampleAttributes extends AttributeWithCacheKey {\r\n readonly opset: number;\r\n readonly isResize: boolean;\r\n readonly mode: string;\r\n readonly scales: number[];\r\n readonly extrapolationValue: number;\r\n readonly coordinateTransformMode: string;\r\n readonly useExtrapolation: boolean;\r\n readonly needRoiInput: boolean;\r\n readonly nearestMode: string;\r\n readonly cubicCoefficientA: number;\r\n readonly excludeOutside: boolean;\r\n readonly useNearest2xOptimization: boolean;\r\n readonly roiInputIdx: number;\r\n readonly scalesInputIdx: number;\r\n readonly sizesInputIdx: number;\r\n}\r\n\r\nconst upsampleProgramMetadata = {\r\n name: 'Upsample',\r\n inputNames: ['X'],\r\n inputTypes: [TextureType.unpacked],\r\n};\r\n\r\nexport const upsample: OperatorImplementation<UpsampleAttributes> =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: UpsampleAttributes): Tensor[] => {\r\n   validateInputs(inputs, attributes);\r\n   const output = inferenceHandler.run(\r\n   {\r\n   ...upsampleProgramMetadata,\r\n   cacheHint: attributes.cacheKey,\r\n   get: () => createUpsampleProgramInfo(inferenceHandler, inputs, attributes)\r\n   },\r\n   inputs);\r\n   return [output];\r\n   };\r\n\r\nexport const parseUpsampleAttributesV7: OperatorInitialization<UpsampleAttributes> =\r\n   (node: Graph.Node): UpsampleAttributes => parseUpsampleAttributes(node, 7);\r\n\r\nexport const parseUpsampleAttributesV9: OperatorInitialization<UpsampleAttributes> =\r\n   (node: Graph.Node): UpsampleAttributes => parseUpsampleAttributes(node, 9);\r\n\r\nexport const parseUpsampleAttributes = (node: Graph.Node, opset: number): UpsampleAttributes => {\r\n const isResize = (opset >= 10);\r\n\r\n // processing node attributes\r\n const mode = node.attributes.getString('mode', 'nearest');\r\n if (mode !== 'nearest' && mode !== 'linear' && (opset < 11 || mode !== 'cubic')) {\r\n   throw new Error(`unrecognized mode: ${mode}`);\r\n }\r\n\r\n let scales: number[] = [];\r\n if (opset < 9) {\r\n   scales = node.attributes.getFloats('scales');\r\n   scalesValidation(scales, mode, isResize);\r\n }\r\n\r\n const extrapolationValue = node.attributes.getFloat('extrapolation_value', 0.0);\r\n\r\n const coordinateTransformMode =\r\n   opset > 10 ? node.attributes.getString('coordinate_transformation_mode', 'half_pixel') : 'asymmetric';\r\n if ([\r\n   'asymmetric', 'pytorch_half_pixel', 'tf_half_pixel_for_nn', 'align_corners', 'tf_crop_and_resize', 'half_pixel'\r\n   ].indexOf(coordinateTransformMode) === -1) {\r\n   throw new Error(`coordinate_transform_mode '${coordinateTransformMode}' is not supported`);\r\n }\r\n const needRoiInput = (coordinateTransformMode === 'tf_crop_and_resize');\r\n const useExtrapolation = needRoiInput;\r\n\r\n const nearestMode =\r\n   (mode === 'nearest' && opset >= 11) ? node.attributes.getString('nearest_mode', 'round_prefer_floor') : '';\r\n if (['round_prefer_floor', 'round_prefer_ceil', 'floor', 'ceil', ''].indexOf(nearestMode) === -1) {\r\n   throw new Error(`nearest_mode '${nearestMode}' is not supported`);\r\n }\r\n\r\n const cubicCoefficientA = node.attributes.getFloat('cubic_coeff_a', -0.75);\r\n const excludeOutside = node.attributes.getInt('exclude_outside', 0) !== 0;\r\n if (excludeOutside && mode !== 'cubic') {\r\n   throw new Error('exclude_outside can be set to 1 only when mode is CUBIC.');\r\n }\r\n\r\n const useNearest2xOptimization =\r\n   (opset < 11) ? true : (mode === 'nearest' && coordinateTransformMode === 'asymmetric' && nearestMode === 'floor');\r\n\r\n let roiInputIdx = 0;\r\n let scalesInputIdx = 0;\r\n let sizesInputIdx = 0;\r\n\r\n if (opset > 10) {\r\n   roiInputIdx = 1;\r\n   scalesInputIdx = 2;\r\n   sizesInputIdx = 3;\r\n } else if (opset === 9) {\r\n   scalesInputIdx = 1;\r\n }\r\n\r\n return createAttributeWithCacheKey({\r\n opset,\r\n   isResize,\r\n   mode,\r\n   scales,\r\n   extrapolationValue,\r\n   coordinateTransformMode,\r\n useExtrapolation,\r\n   needRoiInput,\r\n   nearestMode,\r\n   cubicCoefficientA,\r\n   excludeOutside,\r\n useNearest2xOptimization,\r\n   roiInputIdx,\r\n   scalesInputIdx,\r\n   sizesInputIdx\r\n });\r\n};\r\n\r\nconst createUpsampleProgramInfo =\r\n   (inferenceHandler: WebGLInferenceHandler, inputs: Tensor[], attributes: UpsampleAttributes): ProgramInfo => {\r\n   const glsl = getGlsl(inferenceHandler.session.backend.glContext.version);\r\n   const [inputWidth, inputHeight] =\r\n inferenceHandler.calculateTextureWidthAndHeight(inputs[0].dims, TextureType.unpacked);\r\n\r\n   const outputShape = inputs[0].dims.map((dim, i) => Math.floor(dim * attributes.scales[i]));\r\n   const [outputWidth, outputHeight] =\r\n   inferenceHandler.calculateTextureWidthAndHeight(outputShape, TextureType.unpacked);\r\n   const dim = outputShape.length;\r\n\r\n   const outputPitches = new Array<number>(dim);\r\n   const inputPitches = new Array<number>(dim);\r\n   let precalculatedPitches = `\r\n   int output_pitches[${dim}];\r\n      int input_pitches[${dim}];\r\n      `;\r\n   for (let d = dim - 1; d >= 0; d--) {\r\n   outputPitches[d] = (d === dim - 1) ? 1 : outputPitches[d + 1] * outputShape[d + 1];\r\n   inputPitches[d] = (d === dim - 1) ? 1 : inputPitches[d + 1] * inputs[0].dims[d + 1];\r\n\r\n   precalculatedPitches += `\r\n output_pitches[${d}] = ${outputPitches[d]};\r\n        input_pitches[${d}] = ${inputPitches[d]};\r\n        `;\r\n }\r\n   const getInputFloatFunction = `\r\n      float getInputFloat(int index) {\r\n        vec2 coords = offsetToCoords(index, ${inputWidth}, ${inputHeight});\r\n        float value = getColorAsFloat(${glsl.texture2D}(X, coords));\r\n        return value;\r\n      }\r\n      `;\r\n\r\n   const shaderSource = attributes.mode === 'nearest' ?\r\n   // nearest\r\n   `\r\n ${getInputFloatFunction}\r\n   float process(int indices[${dim}]) {\r\n   int input_index = 0;\r\n   int output_index = coordsToOffset(TexCoords, ${outputWidth}, ${outputHeight});\r\n\r\n ${precalculatedPitches}\r\n\r\n   int d, m;\r\n   for (int dim = 0; dim < ${dim}; ++dim) {\r\n   d = output_index / output_pitches[dim];\r\n   m = output_index - d * output_pitches[dim];\r\n   output_index = m;\r\n\r\n   if (scales[dim] != 1 && d > 0) {\r\n   int d2 = d / scales[dim];\r\n   m = d - d2 * scales[dim];\r\n   d = d2;\r\n   }\r\n   input_index += input_pitches[dim] * d;\r\n   }\r\n\r\n   return getInputFloat(input_index);\r\n   }` :\r\n          dim === 4 ?\r\n // bilinear 4D\r\n              `\r\n ${getInputFloatFunction}\r\n   float process(int indices[4]) {\r\n   int input_index = 0;\r\n   int output_index = coordsToOffset(TexCoords, ${outputWidth}, ${outputHeight});\r\n\r\n ${precalculatedPitches}\r\n\r\n   int m;\r\n   int index_of_dim0, index_of_dim1, index_of_dim2, index_of_dim3;\r\n   index_of_dim0 = output_index / output_pitches[0];\r\n   m = output_index - index_of_dim0 * output_pitches[0];\r\n   index_of_dim1 = m / output_pitches[1];\r\n   m = m - index_of_dim1 * output_pitches[1];\r\n   index_of_dim2 = m / output_pitches[2];\r\n   m = m - index_of_dim2 * output_pitches[2];\r\n   index_of_dim3 = m;\r\n\r\n   int index_of_input_dim2, index_of_input_dim3, x_offset, y_offset;\r\n index_of_input_dim2 = index_of_dim2 / scales[2];\r\n y_offset = index_of_dim2 - index_of_input_dim2 * scales[2];\r\n index_of_input_dim3 = index_of_dim3 / scales[3];\r\n x_offset = index_of_dim3 - index_of_input_dim3 * scales[3];\r\n\r\n input_index = index_of_dim0 * input_pitches[0] +\r\n index_of_dim1 * input_pitches[1] +\r\n index_of_input_dim2 * input_pitches[2] +\r\n index_of_input_dim3;\r\n\r\n float x00 = getInputFloat(input_index);\r\n float x10, x01, x11;\r\n\r\n bool end_of_dim2 = false;\r\n if (index_of_input_dim2 == (${inputs[0].dims[2]} - 1)) {\r\n // It's the end in dimension 2\r\n x01 = x00;\r\n end_of_dim2 = true;\r\n } else {\r\n x01 = getInputFloat(input_index + input_pitches[2]);\r\n }\r\n\r\n if (index_of_input_dim3 == (input_pitches[2] - 1)) {\r\n // It's the end in dimension 3\r\n x10 = x00;\r\n x11 = x01;\r\n }\r\n else {\r\n x10 = getInputFloat(input_index + 1);\r\n x11 = end_of_dim2 ? x10 : getInputFloat(input_index + input_pitches[2] + 1);\r\n }\r\n\r\n float y0 = x00 + float(y_offset) * (x01 - x00) / float(scales[2]);\r\n float y1 = x10 + float(y_offset) * (x11 - x10) / float(scales[2]);\r\n return y0 + float(x_offset) * (y1 - y0) / float(scales[3]);\r\n }` :\r\n // bilinear 2D\r\n `\r\n ${getInputFloatFunction}\r\n float process(int indices[2]) {\r\n int input_index = 0;\r\n int output_index = coordsToOffset(TexCoords, ${outputWidth}, ${outputHeight});\r\n\r\n ${precalculatedPitches}\r\n\r\n int m;\r\n int index_of_dim0, index_of_dim1;\r\n index_of_dim0 = output_index / output_pitches[0];\r\n m = output_index - index_of_dim0 * output_pitches[0];\r\n index_of_dim1 = m;\r\n\r\n int index_of_input_dim0, index_of_input_dim1, x_offset, y_offset;\r\n index_of_input_dim0 = index_of_dim0 / scales[0];\r\n y_offset = index_of_dim0 - index_of_input_dim0 * scales[0];\r\n index_of_input_dim1 = index_of_dim1 / scales[1];\r\n x_offset = index_of_dim1 - index_of_input_dim1 * scales[1];\r\n\r\n input_index = index_of_input_dim0 * input_pitches[0] + index_of_input_dim1;\r\n\r\n float x00 = getInputFloat(input_index);\r\n float x10, x01, x11;\r\n\r\n bool end_of_dim0 = false;\r\n if (index_of_input_dim0 == (${inputs[0].dims[0]} - 1)) {\r\n // It's the end in dimension 0\r\n x01 = x00;\r\n end_of_dim0 = true;\r\n } else {\r\n x01 = getInputFloat(input_index + input_pitches[0]);\r\n }\r\n\r\n if (index_of_input_dim1 == (input_pitches[0] - 1)) {\r\n // It's the end in dimension 1\r\n x10 = x00;\r\n x11 = x01;\r\n }\r\n else {\r\n x10 = getInputFloat(input_index + 1);\r\n x11 = end_of_dim0 ? x10 : getInputFloat(input_index + input_pitches[0] + 1);\r\n }\r\n\r\n float y0 = x00 + float(y_offset) * (x01 - x00) / float(scales[0]);\r\n float y1 = x10 + float(y_offset) * (x11 - x10) / float(scales[0]);\r\n return y0 + float(x_offset) * (y1 - y0) / float(scales[1]);\r\n }`;\r\n return {\r\n ...upsampleProgramMetadata,\r\n output: {dims: outputShape, type: inputs[0].type, textureType: TextureType.unpacked},\r\n shaderSource,\r\n variables: [{\r\n name: 'scales',\r\n type: 'int',\r\n arrayLength: attributes.scales.length,\r\n data: attributes.scales.map(x => Math.ceil(x))\r\n }]\r\n };\r\n };\r\n\r\nexport const validateInputs = (inputs: Tensor[], attribute: UpsampleAttributes): void => {\r\n if (!inputs || (attribute.opset < 9 && inputs.length !== 1) ||\r\n (attribute.opset >= 9 && attribute.opset < 11 && inputs.length !== 2) ||\r\n (attribute.opset >= 11 && inputs.length !== 3 && inputs.length !== 4)) {\r\n throw new Error('invalid inputs.');\r\n }\r\n\r\n if (attribute.scales.length > 0 && inputs[0].dims.length !== attribute.scales.length) {\r\n throw new Error('Invalid input shape.');\r\n }\r\n\r\n if (inputs[0].type === 'string') {\r\n throw new Error('Invalid input tensor types.');\r\n }\r\n};\r\n\r\nexport const scalesValidation = (scales: number[], mode: string, isResize: boolean): void => {\r\n if (!isResize) {\r\n for (const scale of scales) {\r\n if (scale < 1) {\r\n throw new Error('Scale value should be greater than or equal to 1.');\r\n }\r\n }\r\n } else {\r\n for (const scale of scales) {\r\n if (scale <= 0) {\r\n throw new Error('Scale value should be greater than 0.');\r\n }\r\n }\r\n }\r\n if (mode === 'linear' || mode === 'cubic') {\r\n if (scales.length !== 2 && (scales.length !== 4 || scales[0] !== 1 || scales[1] !== 1)) {\r\n throw new Error(`'Linear' mode and 'Cubic' mode only support 2-D inputs ('Bilinear', 'Bicubic') \\\r\n or 4-D inputs with the corresponding outermost 2 scale values being 1 \\\r\n in the ${isResize ? 'Resize' : 'Upsample'} opeartor.`);\r\n }\r\n }\r\n};","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env} from 'onnxruntime-common';\r\nimport {Logger, Profiler} from '../../instrument';\r\n\r\nimport {GlslPreprocessor} from './glsl-preprocessor';\r\nimport {getVertexShaderSource} from './glsl-source';\r\nimport {TextureLayoutStrategy} from './texture-layout-strategy';\r\nimport {Artifact, ProgramInfo, ProgramVariable, TextureData, TextureLayout, VariableInfo} from './types';\r\nimport {WebGLContext} from './webgl-context';\r\n\r\n/**\r\n * ProgramManager is the main class behind running computations\r\n * It builds ProgramInfo's into Artifacts\r\n * It compiles given ProgramInfo's into WebGL Prorams (cached as Artifacts)\r\n * Uses the artifact to run the computation by calling Draw on\r\n * the WebGL drawing buffer\r\n * ProgramManager automatically maps (binds) input variables to their\r\n * corresponding Location's in the binary program\r\n */\r\nexport class ProgramManager {\r\n repo: Map<unknown, Artifact>; // this should be per-session object\r\n vertexShader: WebGLShader;\r\n attributesBound: boolean;\r\n\r\n constructor(\r\n   public profiler: Readonly<Profiler>, public glContext: WebGLContext,\r\n   public textureLayoutStrategy: TextureLayoutStrategy) {\r\n   this.repo = new Map();\r\n   this.attributesBound = false;\r\n }\r\n getArtifact(key: unknown): Artifact|undefined {\r\n   return this.repo.get(key);\r\n }\r\n setArtifact(key: unknown, artifact: Artifact): void {\r\n   this.repo.set(key, artifact);\r\n }\r\n run(buildArtifact: Artifact, inputs: TextureData[], output: TextureData): void {\r\n   this.profiler.event('op', `ProgramManager.run ${buildArtifact.programInfo.name ?? 'unknown kernel'}`, () => {\r\n   const gl = this.glContext.gl;\r\n   const program = buildArtifact.program;\r\n   gl.useProgram(program);\r\n   try {\r\n   this.bindOutput(output);\r\n   if (!this.attributesBound) {\r\n   this.bindAttributes(buildArtifact.attribLocations);\r\n   }\r\n   this.bindUniforms(buildArtifact.uniformLocations, buildArtifact.programInfo.variables ?? [], inputs);\r\n   } catch (err) {\r\n   Logger.error('ProgramManager', buildArtifact.programInfo.shaderSource);\r\n   throw err;\r\n   }\r\n   this.profiler.event('backend', 'GlContext.draw()', () => {\r\n   this.glContext.draw();\r\n   });\r\n   }, this.glContext);\r\n }\r\n dispose(): void {\r\n   if (this.vertexShader) {\r\n   this.glContext.deleteShader(this.vertexShader);\r\n   }\r\n   this.repo.forEach(a => this.glContext.deleteProgram(a.program));\r\n }\r\n build(programInfo: ProgramInfo, inputTextureLayouts: TextureLayout[], outputTextureLayout: TextureLayout): Artifact {\r\n   return this.profiler.event('backend', 'ProgramManager.build', () => {\r\n   const preprocessor = new GlslPreprocessor(this.glContext, programInfo, inputTextureLayouts, outputTextureLayout);\r\n   const fragScript = preprocessor.preprocess();\r\n   const program = this.compile(fragScript);\r\n   const artifact = {\r\n   programInfo,\r\n   program,\r\n   uniformLocations: this.getUniformLocations(\r\n   program, preprocessor.context.programInfo.inputNames, preprocessor.context.programInfo.variables),\r\n   attribLocations: this.getAttribLocations(program)\r\n   };\r\n   return artifact;\r\n   });\r\n }\r\n protected compile(fragShaderScript: string): WebGLProgram {\r\n   if (!this.vertexShader) {\r\n   Logger.verbose('ProrgramManager', 'Compiling and caching Vertex shader for the first time');\r\n   const vertexShaderScript = getVertexShaderSource(this.glContext.version);\r\n   this.vertexShader = this.glContext.compileShader(vertexShaderScript, this.glContext.gl.VERTEX_SHADER);\r\n   }\r\n   if (env.debug) {\r\n   Logger.verbose('ProrgramManager', `FragShader:\r\n${fragShaderScript}\r\n`);\r\n   }\r\n   const fragShader = this.glContext.compileShader(fragShaderScript, this.glContext.gl.FRAGMENT_SHADER);\r\n   const program = this.glContext.createProgram(this.vertexShader, fragShader);\r\n   this.glContext.deleteShader(fragShader);\r\n   return program;\r\n }\r\n bindOutput(td: TextureData): void {\r\n   const width = td.width;\r\n   const height = td.height;\r\n   Logger.verbose(\r\n   'ProrgramManager',\r\n   `Binding output texture to Framebuffer: w/h=${width}/${height}, shape=${td.shape}, type=${td.tensor.type}`);\r\n   this.glContext.attachFramebuffer(td.texture, width, height);\r\n }\r\n bindAttributes(attribLocations: Artifact.AttribLocations): void {\r\n   const positionHandle = attribLocations.position;\r\n   const textureCoordHandle = attribLocations.textureCoord;\r\n   this.glContext.setVertexAttributes(positionHandle, textureCoordHandle);\r\n   this.attributesBound = true;\r\n }\r\n bindUniforms(uniformLocations: Artifact.UniformLocations, variables: ProgramVariable[], textures: TextureData[]):\r\n   void {\r\n   const gl = this.glContext.gl;\r\n   let texturePosition = 0;\r\n   for (const {name, type, location, arrayLength} of uniformLocations) {\r\n   const value = variables.find(v => v.name === name)?.data;\r\n   if (type !== 'sampler2D' && !value) {\r\n   throw new Error(`variable '${name}' does not have data defined in program info`);\r\n   }\r\n   switch (type) {\r\n   case 'sampler2D':\r\n   this.bindTexture(textures[texturePosition], location, texturePosition);\r\n   texturePosition++;\r\n   break;\r\n   case 'float':\r\n   if (arrayLength) {\r\n   gl.uniform1fv(location, value as number[]);\r\n   } else {\r\n   gl.uniform1f(location, value as

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number);\r\n      }\r\n      break;\r\n    case 'int':\r\n      if (arrayLength) {\r\n        gl.uniform1iv(location,
value as number[]);\r\n      } else {\r\n        gl.uniform1i(location, value as number);\r\n      }\r\n
break;\r\n    default:\r\n      throw new Error(`Uniform not implemented: ${type}`);\r\n    }\r\n  }\r\n }\r\n
bindTexture(td: TextureData, uniformHandle: WebGLUniformLocation, position: number): void {\r\n
this.glContext.bindTextureToUniform(td.texture, position, uniformHandle);\r\n }\r\n getAttribLocations(program:
WebGLProgram): Artifact.AttribLocations {\r\n  return {\r\n    position: this.getAttribLocation(program,
'position'),\r\n    textureCoord: this.getAttribLocation(program, 'textureCoord')\r\n  };\r\n }\r\n
getUniformLocations(program: WebGLProgram, samplers?: string[], variables?: VariableInfo[]):\r\n
Artifact.UniformLocations {\r\n  const uniformLocations: Artifact.UniformLocations = [];\r\n  if (samplers) {\r\n
 for (const sampler of samplers) {\r\n      uniformLocations.push({name: sampler, type: 'sampler2D', location:
this.getUniformLocation(program, sampler)});\r\n    }\r\n  }\r\n  if (variables) {\r\n    for (const variable of
variables) {\r\n      uniformLocations.push({...variable, location: this.getUniformLocation(program,
variable.name)});\r\n    }\r\n  }\r\n  return uniformLocations;\r\n }\r\n getUniformLocation(program:
WebGLProgram, name: string): WebGLUniformLocation {\r\n  const gl = this.glContext.gl;\r\n  const reference =
gl.getUniformLocation(program, name);\r\n  if (reference === null) {\r\n    throw new Error(`Uniform ${name}
not found.`);\r\n  }\r\n  return reference;\r\n }\r\n getAttribLocation(program: WebGLProgram, name: string):
number {\r\n  const gl = this.glContext.gl;\r\n  const attributeLocation: number = gl.getAttribLocation(program,
name);\r\n  return attributeLocation;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights
reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {SessionHandler} from '../../backend';\r\nimport
{Graph} from '../../graph';\r\nimport {Logger} from '../../instrument';\r\nimport {Operator} from
'../../operators';\r\nimport {OpSet, resolveOperator} from '../../opset';\r\nimport {Session} from
'../../session';\r\nimport {Tensor} from '../../tensor';\r\nimport {WebGLBackend} from '../backend-
webgl';\r\n\r\nimport {WebGLInferenceHandler} from './inference-handler';\r\nimport
{WEBGL_OP_RESOLVE_RULES} from './op-resolve-rules';\r\nimport {ProgramManager} from './program-
manager';\r\nimport {PreferLogicalStrategy, TextureLayoutStrategy} from './texture-layout-strategy';\r\nimport
{TextureManager} from './texture-manager';\r\nimport {TextureData} from './types';\r\n\r\nexport class
WebGLSessionHandler implements SessionHandler {\r\n programManager: ProgramManager;\r\n
textureManager: TextureManager;\r\n layoutStrategy: TextureLayoutStrategy;\r\n packedTextureDataCache:
Map<Tensor.Id, TextureData>;\r\n unpackedTextureDataCache: Map<Tensor.Id, TextureData>;\r\n
pack2unpackMap: Map<Tensor.Id, Tensor.Id>;\r\n unpack2packMap: Map<Tensor.Id, Tensor.Id>;\r\n initializers:
Set<Tensor.Id>;\r\n pack?: boolean;\r\n\r\n constructor(public readonly backend: WebGLBackend, public readonly
context: Session.Context) {\r\n  this.layoutStrategy = new
PreferLogicalStrategy(backend.glContext.maxTextureSize);\r\n  this.programManager = new
ProgramManager(this.context.profiler, backend.glContext, this.layoutStrategy);\r\n  this.textureManager = new
TextureManager(\r\n      backend.glContext, this.layoutStrategy, this.context.profiler,\r\n      {reuseTextures:
backend.textureCacheMode === 'full'});\r\n  this.packedTextureDataCache = new Map();\r\n
this.unpackedTextureDataCache = new Map();\r\n  this.pack = backend.pack;\r\n  this.pack2unpackMap = new
Map();\r\n  this.unpack2packMap = new Map();\r\n }\r\n\r\n createInferenceHandler() {\r\n  return new
WebGLInferenceHandler(this);\r\n }\r\n onGraphInitialized(graph: Graph): void {\r\n  const initializers =
graph.getValues().filter(v => v.from === -1 && v.tensor).map(v => v.tensor!.dataId);\r\n  this.initializers = new
Set(initializers);\r\n }\r\n isInitializer(tensorId: Tensor.Id): boolean {\r\n  return this.initializers ?
this.initializers.has(tensorId) : false;\r\n }\r\n addInitializer(tensorId: Tensor.Id): void {\r\n
this.initializers.add(tensorId);\r\n }\r\n getTextureData(tensorId: Tensor.Id, isPacked: boolean):
TextureData|undefined {\r\n  if (isPacked) {\r\n    return this.packedTextureDataCache.get(tensorId);\r\n  } else
{\r\n    return this.unpackedTextureDataCache.get(tensorId);\r\n  }\r\n }\r\n setTextureData(tensorId: Tensor.Id,
textureData: TextureData, isPacked = false): void {\r\n  Logger.verbose('WebGLSessionHandler', 'Storing Texture
data in cache');\r\n  if (isPacked) {\r\n    this.packedTextureDataCache.set(tensorId, textureData);\r\n  } else {\r\n
   this.unpackedTextureDataCache.set(tensorId, textureData);\r\n  }\r\n }\r\n dispose(): void {\r\n
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this.programManager.dispose();\r\n   this.textureManager.clearActiveTextures();\r\n this.packedTextureDataCache.forEach(td => this.textureManager.releaseTexture(td, true));\r\n this.packedTextureDataCache = new Map();\r\n   this.unpackedTextureDataCache.forEach(td => this.textureManager.releaseTexture(td, true));\r\n   this.unpackedTextureDataCache = new Map();\r\n }\r\n resolve(node: Graph.Node, opsets: readonly OpSet[], graph: Graph): Operator {\r\n   const op = resolveOperator(node, opsets, WEBGL_OP_RESOLVE_RULES);\r\n   return {impl: op.opImpl, context: op.opInit ? op.opInit(node, graph) : node};\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Logger} from '../../instrument';\r\n\r\nexport declare namespace Encoder {\r\n export interface DataTypeMap {\r\n   float: Float32Array;\r\n   byte: Uint8Array;\r\n   int: Uint32Array;\r\n }\r\n export type DataType = keyof DataTypeMap;\r\n type DataArrayType = DataTypeMap[DataType];\r\n\r\n /* eslint-disable @typescript-eslint/naming-convention */\r\n export const enum Usage {\r\n   Default = 0,\r\n   UploadOnly,\r\n   Download4BytesAsFloat32,\r\n }\r\n}\r\n\r\n/**\r\n * Abstraction for mapping data types to texture texlets\r\n * Encoding means how a Float32 is mapped to 1 or 4 channels for each texlet\r\n * Decoding means how a texlet's channels are mapped to a resulting Float32\r\n */\r\nexport interface DataEncoder {\r\n internalFormat: number;\r\n format: number;\r\n textureType: number;\r\n channelSize: number;\r\n encode(src: Encoder.DataArrayType, textureSize: number): Encoder.DataArrayType;\r\n allocate(size: number): Encoder.DataArrayType;\r\n decode(buffer: Encoder.DataArrayType, dataSize: number): Encoder.DataArrayType;\r\n}\r\n/**\r\n * WebGL2 data encoder\r\n * Uses R32F as the format for texlet\r\n */\r\nexport class RedFloat32DataEncoder implements DataEncoder {\r\n internalFormat: number;\r\n format: number;\r\n textureType: number;\r\n channelSize: number;\r\n constructor(gl: WebGL2RenderingContext, channels = 1) {\r\n   if (channels === 1) {\r\n   this.internalFormat = gl.R32F;\r\n   this.format = gl.RED;\r\n this.textureType = gl.FLOAT;\r\n   this.channelSize = channels;\r\n   } else if (channels === 4) {\r\n this.internalFormat = gl.RGBA32F;\r\n   this.format = gl.RGBA;\r\n   this.textureType = gl.FLOAT;\r\n this.channelSize = channels;\r\n   } else {\r\n   throw new Error(`Invalid number of channels: ${channels}`);\r\n }\r\n }\r\n encode(src: Encoder.DataArrayType, textureSize: number): Encoder.DataArrayType {\r\n   let result: Float32Array;\r\n   let source: Float32Array;\r\n   if (src.constructor !== Float32Array) {\r\n Logger.warning('Encoder', 'data was not of type Float32; creating new Float32Array');\r\n   source = new Float32Array(src);\r\n   }\r\n   if (textureSize * this.channelSize > src.length) {\r\n   Logger.warning('Encoder', 'Source data too small. Allocating larger array');\r\n   source = src as Float32Array;\r\n   result = this.allocate(textureSize * this.channelSize) as Float32Array;\r\n   source.forEach((v, i) => result[i] = v);\r\n   } else {\r\n   source = src as Float32Array;\r\n   result = source;\r\n   }\r\n   return result;\r\n }\r\n allocate(size: number): Encoder.DataArrayType {\r\n   return new Float32Array(size * 4);\r\n }\r\n decode(buffer: Encoder.DataArrayType, dataSize: number): Float32Array {\r\n   if (this.channelSize === 1) {\r\n   const filteredData = (buffer as Float32Array).filter((value, index) => index % 4 === 0).subarray(0, dataSize);\r\n   return filteredData;\r\n   }\r\n   return buffer.subarray(0, dataSize) as Float32Array;\r\n }\r\n}\r\n/**\r\n * Data encoder for WebGL 1 with support for floating point texture\r\n */\r\nexport class RGBAFloatDataEncoder implements DataEncoder {\r\n internalFormat: number;\r\n format: number;\r\n textureType: number;\r\n channelSize: number;\r\n constructor(gl: WebGLRenderingContext, channels = 1, textureType?: number) {\r\n   if (channels !== 1 && channels !== 4) {\r\n   throw new Error(`Invalid number of channels: ${channels}`);\r\n   }\r\n this.internalFormat = gl.RGBA;\r\n   this.format = gl.RGBA;\r\n   this.channelSize = channels;\r\n this.textureType = textureType || gl.FLOAT;\r\n }\r\n encode(src: Float32Array, textureSize: number): Encoder.DataArrayType {\r\n   let dest = src;\r\n   if (this.channelSize === 1) {\r\n   Logger.verbose('Encoder', 'Exploding into a larger array');\r\n   dest = this.allocate(textureSize) as Float32Array;\r\n   src.forEach((v, i) => dest[i * 4] = v);\r\n   }\r\n   return dest;\r\n }\r\n allocate(size: number): Encoder.DataArrayType {\r\n   return new Float32Array(size * 4);\r\n }\r\n decode(buffer: Encoder.DataArrayType, dataSize: number): Float32Array {\r\n   if (this.channelSize === 1) {\r\n   const filteredData = (buffer as Float32Array).filter((value, index) => index % 4 === 0).subarray(0, dataSize);\r\n   return filteredData;\r\n   }\r\n   return buffer.subarray(0, dataSize) as Float32Array;\r\n }\r\n}\r\n\r\nexport class Uint8DataEncoder implements DataEncoder {\r\n internalFormat:

number;\r\n format: number;\r\n textureType: number;\r\n channelSize = 4;\r\n constructor(gl: WebGLRenderingContext, channels = 1) {\r\n   if (channels === 1) {\r\n   this.internalFormat = gl.ALPHA;\r\n   this.format = gl.ALPHA; // not tested\r\n   this.textureType = gl.UNSIGNED_BYTE;\r\n   this.channelSize = channels;\r\n   } else if (channels === 4) {\r\n   this.internalFormat = gl.RGBA;\r\n   this.format = gl.RGBA;\r\n   this.textureType = gl.UNSIGNED_BYTE;\r\n   this.channelSize = channels;\r\n   } else {\r\n   throw new Error(`Invalid number of channels: ${channels}`);\r\n   }\r\n }\r\n encode(src: Uint8Array, _textureSize: number): Encoder.DataArrayType {\r\n   return new Uint8Array(src.buffer, src.byteOffset, src.byteLength);\r\n }\r\n allocate(size: number): Encoder.DataArrayType {\r\n   return new Uint8Array(size * this.channelSize);\r\n }\r\n decode(buffer: Encoder.DataArrayType, dataSize: number): Uint8Array {\r\n   if (buffer instanceof Uint8Array) {\r\n   return buffer.subarray(0, dataSize);\r\n   }\r\n   throw new Error(`Invalid array type: ${buffer.constructor}`);\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Logger} from '../../instrument';\r\nimport {assert} from '../../util';\r\n/** Layout preferences */\r\nexport interface WidthHeightPrefs {\r\n breakAxis?: number;\r\n isPacked?: boolean;\r\n reverseWH?: boolean;\r\n}\r\n/**\r\n * TextureLayoutStrategy is an abstraction for different plans\r\n * for mapping n-dimensional arrays to 2D textures (and back)\r\n */\r\nexport interface TextureLayoutStrategy {\r\n computeTextureWH(shape: readonly number[], prefs?: WidthHeightPrefs): [number, number];\r\n}\r\n\r\n/**\r\n * This strategy try to find the minimal max(W,H) that fulfills (W * H == totalSize)\r\n */\r\nexport class AlwaysKeepOriginalSizeStrategy implements TextureLayoutStrategy {\r\n constructor(public maxTextureSize: number) {}\r\n computeTextureWH(shape: readonly number[], prefs?: WidthHeightPrefs): [number, number] {\r\n   // scalar tensor\r\n   if (shape.length === 0) {\r\n   return [1, 1];\r\n   }\r\n   const maxTextureSize = this.maxTextureSize;\r\n   if (prefs && prefs.breakAxis !== undefined) {\r\n   // check to see if dims fit\r\n   const wsize = prefs.breakAxis >= shape.length ? 1 : shape.slice(prefs.breakAxis).reduce((a, b) => a * b);\r\n   const hsize = prefs.breakAxis <= 0 ? 1 : shape.slice(0, prefs.breakAxis).reduce((a, b) => a * b);\r\n   if (wsize > maxTextureSize || hsize > maxTextureSize) {\r\n   // ignore preferences\r\n   // continue with default layout\r\n   Logger.verbose(\r\n   'TextureLayout',\r\n   `Given width/height preferences were unattainable: shape:${shape}, breakAxis:${prefs.breakAxis}`);\r\n   } else {\r\n   return [wsize, hsize];\r\n   }\r\n   }\r\n   const totalSize = shape.reduce((a, b) => a * b);\r\n\r\n   let width = Math.floor(Math.sqrt(totalSize));\r\n\r\n   for (; width < maxTextureSize && width < totalSize; width++) {\r\n   if (totalSize % width === 0) {\r\n   break;\r\n   }\r\n   }\r\n\r\n   if (width >= maxTextureSize || totalSize % width !== 0) {\r\n   throw new Error(`The given dimensions are outside this GPU's boundaries: ${shape}`);\r\n   }\r\n   return [width, totalSize / width];\r\n }\r\n}\r\n\r\nexport class PreferLogicalStrategy implements TextureLayoutStrategy {\r\n constructor(public maxTextureSize: number) {}\r\n computeTextureWH(shape: readonly number[], prefs?: WidthHeightPrefs): [number, number] {\r\n   const wh = this.computeTexture(shape, prefs);\r\n   if (prefs && prefs.isPacked) {\r\n   wh[0] /= 2;\r\n   wh[1] /= 2;\r\n   }\r\n   if (prefs && prefs.reverseWH) {\r\n   return [wh[1], wh[0]];\r\n   }\r\n   return wh;\r\n }\r\n\r\n computeTexture(shape: readonly number[], prefs?: WidthHeightPrefs): [number, number] {\r\n   const isPacked = prefs && prefs.isPacked;\r\n   // scalar tensor\r\n   if (shape.length === 0) {\r\n   return isPacked ? [2, 2] : [1, 1];\r\n   }\r\n   let maxTextureSize = this.maxTextureSize;\r\n   if (prefs && prefs.breakAxis !== undefined) {\r\n   // check to see if dims fit\r\n   const wsize = prefs.breakAxis >= shape.length ? 1 : shape.slice(prefs.breakAxis).reduce((a, b) => a * b);\r\n   const hsize = prefs.breakAxis <= 0 ? 1 : shape.slice(0, prefs.breakAxis).reduce((a, b) => a * b);\r\n   if (wsize > maxTextureSize || hsize > maxTextureSize) {\r\n   // ignore preferences\r\n   // continue with default layout\r\n   Logger.verbose(\r\n   'TextureLayout',\r\n   `Given width/height preferences were unattainable: shape:${shape}, breakAxis:${prefs.breakAxis}`);\r\n   } else {\r\n   return [wsize, hsize];\r\n   }\r\n   }\r\n   let logShape = shape.slice(0);\r\n   if (isPacked) {\r\n   maxTextureSize = maxTextureSize * 2;\r\n\r\n   // This logic ensures we accurately count the number of packed texels needed\r\n   // to accommodate the tensor. We can only pack values in the same texel if\r\n   // they are from adjacent pairs of rows/cols within the same batch. So if a\r\n   // tensor has 3 rows, we pretend it has 4 rows in order to account for the\r\n   // fact that the texels containing the third row are half empty.\r\n   logShape = logShape.map(\r\n   (d, i) => i >= logShape.length - 2 ? (logShape[i] % 2 === 0 ? logShape[i] : logShape[i] + 1)

: logShape[i]);\r\n\r\n   // Packed texture height is at least 2 (the channel height of a single\r\n   // texel).\r\n   if (logShape.length === 1) {\r\n   logShape = [2, logShape[0]];\r\n   }\r\n   }\r\n\r\n   // If logical shape is 2, we don't squeeze, since we want to match physical.\r\n   if (logShape.length !== 2) {\r\n   const squeezeResult = squeezeShape(logShape);\r\n   logShape = squeezeResult.newShape;\r\n   }\r\n\r\n   const size = sizeFromShape(logShape);\r\n   if (logShape.length <= 1 && size <= maxTextureSize) {\r\n   return [1, size];\r\n   } else if (logShape.length === 2 && logShape[0] <= maxTextureSize && logShape[1] <= maxTextureSize) {\r\n   return logShape as [number, number];\r\n   } else if (logShape.length === 3 && logShape[0] * logShape[1] <= maxTextureSize && logShape[2] <= maxTextureSize) {\r\n   return [logShape[0] * logShape[1], logShape[2]];\r\n   } else if (logShape.length === 3 && logShape[0] <= maxTextureSize && logShape[1] * logShape[2] <= maxTextureSize) {\r\n   return [logShape[0], logShape[1] * logShape[2]];\r\n   } else if (\r\n   logShape.length === 4 && logShape[0] * logShape[1] * logShape[2] <= maxTextureSize &&\r\n   logShape[3] <= maxTextureSize) {\r\n   return [logShape[0] * logShape[1] * logShape[2], logShape[3]];\r\n   } else if (\r\n   logShape.length === 4 && logShape[0] <= maxTextureSize &&\r\n   logShape[1] * logShape[2] * logShape[3] <= maxTextureSize) {\r\n   return [logShape[0], logShape[1] * logShape[2] * logShape[3]];\r\n   } else {\r\n   if (isPacked) {\r\n   // For packed textures size equals the number of channels required to\r\n   // accommodate the texture data. However in order to squarify such that\r\n   // inner dimensions stay even, we rewrite size to equal the number of\r\n   // texels. Then in the return statement we rehydrate the squarified\r\n   // dimensions to channel units.\r\n   return sizeToSquarishShape(size / 4).map(d => d * 2) as [number, number];\r\n   }\r\n   return sizeToSquarishShape(size);\r\n   }\r\n }\r\n}\r\n\r\nexport function squeezeShape(shape: number[], axis?: number[]): {newShape: number[]; keptDims: number[]} {\r\n const newShape: number[] = [];\r\n const keptDims: number[] = [];\r\n const isEmptyArray = axis != null && Array.isArray(axis) && axis.length === 0;\r\n const axes = (axis == null || isEmptyArray) ? null : parseAxisParam(axis, shape).sort();\r\n let j = 0;\r\n for (let i = 0; i < shape.length; ++i) {\r\n   if (axes != null) {\r\n   if (axes[j] === i && shape[i] !== 1) {\r\n   throw new Error(`Can't squeeze axis ${i} since its dim '${shape[i]}' is not 1`);\r\n   }\r\n   if ((axes[j] == null || axes[j] > i) && shape[i] === 1) {\r\n   newShape.push(shape[i]);\r\n   keptDims.push(i);\r\n   }\r\n   if (axes[j] <= i) {\r\n   j++;\r\n   }\r\n   }\r\n   if (shape[i] !== 1) {\r\n   newShape.push(shape[i]);\r\n   keptDims.push(i);\r\n   }\r\n }\r\n return {newShape, keptDims};\r\n}\r\n\r\nexport function parseAxisParam(axis: number|number[], shape: number[]): number[] {\r\n const rank = shape.length;\r\n\r\n // Normalize input\r\n axis = axis == null ? shape.map((s, i) => i) : ([] as number[]).concat(axis);\r\n\r\n // Check for valid range\r\n assert(\r\n   axis.every(ax => ax >= -rank && ax < rank),\r\n   () => `All values in axis param must be in range [-${rank}, ${rank}) but ` +\r\n   `got axis ${axis}`);\r\n\r\n // Check for only integers\r\n assert(\r\n   axis.every(isInt),\r\n   () => 'All values in axis param must be integers but ' +\r\n   `got axis ${axis}`);\r\n\r\n // Handle negative axis.\r\n return axis.map(a => a < 0 ? rank + a : a);\r\n}\r\nexport function isInt(a: number): boolean {\r\n return a % 1 === 0;\r\n}\r\nexport function sizeFromShape(shape: number[]): number {\r\n if (shape.length === 0) {\r\n   // Scalar.\r\n   return 1;\r\n }\r\n let size = shape[0];\r\n for (let i = 1; i < shape.length; i++) {\r\n   size *= shape[i];\r\n }\r\n return size;\r\n}\r\nexport function getRowsCols(shape: number[]): [number, number] {\r\n if (shape.length === 0) {\r\n   throw Error('Cannot get rows and columns of an empty shape array.');\r\n }\r\n\r\n return [shape.length > 1 ? shape[shape.length - 2] : 1, shape[shape.length - 1]];\r\n}\r\nexport function sizeToSquarishShape(size: number): [number, number] {\r\n const width = Math.ceil(Math.sqrt(size));\r\n return [width, Math.ceil(size / width)];\r\n}\r\nexport function getBatchDim(shape: number[], dimsToSkip = 2): number {\r\n return sizeFromShape(shape.slice(0, shape.length - dimsToSkip));\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {ShapeUtil} from '../../util';\r\nimport {TextureLayoutStrategy, WidthHeightPrefs} from './texture-layout-strategy';\r\nimport {TextureLayout, TextureType} from './types';\r\n\r\nexport const createTextureLayoutFromTextureType =\r\n   (textureLayoutStrategy: TextureLayoutStrategy, shape: readonly number[],\r\n   textureType: TextureType): TextureLayout => {\r\n   const channel = (textureType === TextureType.unpacked || textureType === TextureType.unpackedReversed) ? 1 : 4;\r\n   const isPacked = textureType === TextureType.packed;\r\n   const reverseWH = (textureType === TextureType.unpackedReversed || textureType === TextureType.packed);\r\n

const breakAxis = textureType === TextureType.packedLastDimension ? shape.length - 1 : undefined;\r\n const unpackedShape = textureType === TextureType.packedLastDimension ?\r\n shape.map((d, i) => i === shape.length - 1 ? d * 4 : d) :\r\n undefined;\r\n return createTextureLayoutFromShape(\r\n textureLayoutStrategy, shape, channel, unpackedShape, {isPacked, reverseWH, breakAxis});\r\n };\r\n\r\nexport const calculateTextureWidthAndHeight =\r\n (textureLayoutStrategy: TextureLayoutStrategy, shape: readonly number[], textureType: TextureType):\r\n [number, number] => {\r\n const layout = createTextureLayoutFromTextureType(textureLayoutStrategy, shape, textureType);\r\n return [layout.width, layout.height];\r\n };\r\n\r\n/**\r\n * Create a TextureLayout object from shape.\r\n */\r\nexport const createTextureLayoutFromShape =\r\n (textureLayoutStrategy: TextureLayoutStrategy, shape: readonly number[], channels: 1|4 = 1,\r\n unpackedShape?: readonly number[], prefs?: WidthHeightPrefs): TextureLayout => {\r\n const isPacked = !!(prefs && prefs.isPacked);\r\n const [width, height] = textureLayoutStrategy.computeTextureWH(isPacked ? unpackedShape || shape : shape, prefs);\r\n const rank = shape.length;\r\n let inferredDims = shape.slice(0);\r\n if (rank === 0) {\r\n inferredDims = [1];\r\n }\r\n if (channels === 1) {\r\n // unpackedShape will take `shape` and not `inferredDims` so as to create a scalar Tensor if need be\r\n unpackedShape = shape;\r\n } else if (isPacked) {\r\n if (channels !== 4) {\r\n throw new Error('a packed texture must be 4-channel');\r\n }\r\n unpackedShape = shape;\r\n if (rank > 0) {\r\n inferredDims[rank - 1] = Math.ceil(inferredDims[rank - 1] / 2);\r\n }\r\n if (rank > 1) {\r\n inferredDims[rank - 2] = Math.ceil(inferredDims[rank - 2] / 2);\r\n }\r\n } else if (!unpackedShape) {\r\n throw new Error('Unpacked shape is needed when using channels > 1');\r\n }\r\n return {\r\n width,\r\n height,\r\n channels,\r\n isPacked,\r\n shape: inferredDims,\r\n strides: ShapeUtil.computeStrides(inferredDims),\r\n unpackedShape,\r\n reversedWH: (prefs && prefs.reverseWH)\r\n };\r\n };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Logger, Profiler} from '../../instrument';\r\nimport {Tensor} from '../../tensor';\r\n\r\nimport {Encoder} from './texture-data-encoder';\r\nimport {TextureLayoutStrategy} from './texture-layout-strategy';\r\nimport {TextureData, TextureLayout} from './types';\r\nimport {WebGLContext} from './webgl-context';\r\n\r\nexport interface TextureManagerConfig {\r\n reuseTextures?: boolean;\r\n}\r\n\r\n/**\r\n * TextureManager is the mainly responsible for caching Textures\r\n * Textures are cached in 2 levels:\r\n * 1. the texures which are associated with a dataId (from Tensor)\r\n * Caching these is crucial to performance. These are In-use Textures\r\n * 2. textures which are not in use by any current ProgramInfo/Tensor\r\n * These are called Free Textures\r\n * TextureManager is also used to help creating textures. For this it\r\n * uses WebGLContext and TextureLayoutStrategy\r\n */\r\nexport class TextureManager {\r\n private readonly inUseTextures: Map<string, WebGLTexture[]>;\r\n private readonly idleTextures: Map<string, WebGLTexture[]>;\r\n private readonly textureLookup: Map<WebGLTexture, string>;\r\n private readonly pendingRead: Map<Tensor.Id, Array<(arr: Tensor.NumberType) => void>> = new Map();\r\n\r\n constructor(\r\n public glContext: WebGLContext, public layoutStrategy: TextureLayoutStrategy, public profiler: Readonly<Profiler>,\r\n private config: TextureManagerConfig) {\r\n if (config.reuseTextures) {\r\n this.inUseTextures = new Map();\r\n this.idleTextures = new Map();\r\n this.textureLookup = new Map();\r\n }\r\n }\r\n createTextureFromLayout(\r\n dataType: Tensor.DataType, layout: TextureLayout, data?: Tensor.NumberType, usage?: Encoder.Usage) {\r\n const textureDataType = this.toEncoderType(dataType);\r\n\r\n const encoder = this.glContext.getEncoder(textureDataType, layout.channels || 1, usage);\r\n if (layout.isPacked && usage === Encoder.Usage.UploadOnly) {\r\n throw new Error('not implemented');\r\n }\r\n const width = layout.width;\r\n const height = layout.height;\r\n\r\n let key: string|undefined;\r\n let inUseTextures: WebGLTexture[]|undefined;\r\n if (this.config.reuseTextures) {\r\n key = `${width}x${height}_${encoder.format}_${encoder.internalFormat}_${encoder.textureType}`;\r\n inUseTextures = this.inUseTextures.get(key);\r\n if (!inUseTextures) {\r\n inUseTextures = [];\r\n this.inUseTextures.set(key, inUseTextures);\r\n }\r\n\r\n const idleTextures = this.idleTextures.get(key);\r\n if (idleTextures && idleTextures.length > 0) {\r\n const texture = idleTextures.pop()!;\r\n inUseTextures.push(texture);\r\n if (usage === Encoder.Usage.UploadOnly) {\r\n

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this.glContext.updateTexture(texture, width, height, encoder, this.toTextureData(dataType, data)!);\r\n        }\r\n
return texture;\r\n      }\r\n    }\r\n\r\n    Logger.verbose('TextureManager', `Creating new texture of size
${layout.width}x${layout.height}`);\r\n    const texture = this.glContext.allocateTexture(width, height, encoder,
this.toTextureData(dataType, data));\r\n\r\n    if (this.config.reuseTextures) {\r\n
inUseTextures!.push(texture);\r\n      this.textureLookup.set(texture, key!);\r\n    }\r\n    return texture;\r\n  }\r\n
readTexture(td: TextureData, dataType: Tensor.DataType, channels?: number): Tensor.NumberType {\r\n    if
(!channels) {\r\n      channels = 1;\r\n    }\r\n    return this.profiler.event('backend', 'TextureManager.readTexture', ()
=> {\r\n      const dataSize = td.shape.reduce((a, b) => a * b) * channels!;\r\n      const data =
this.glContext.readTexture(\r\n          td.texture, td.width, td.height, dataSize, this.toEncoderType(dataType),
channels!);\r\n      return this.toTensorData(dataType, data);\r\n    });\r\n  }\r\n  async readTextureAsync(td:
TextureData, dataType: Tensor.DataType, channels?: number): Promise<Tensor.NumberType> {\r\n    const dataId
= td.tensor.dataId;\r\n    if (!channels) {\r\n      channels = 1;\r\n    }\r\n    if (this.pendingRead.has(dataId)) {\r\n
const subscribers = this.pendingRead.get(dataId);\r\n      return new Promise<Tensor.NumberType>(resolve =>
subscribers?.push(resolve));\r\n    }\r\n    return this.profiler.event('backend', 'TextureManager.readTextureAsync',
async () => {\r\n      this.pendingRead.set(dataId, []);\r\n      const dataSize = td.shape.reduce((a, b) => a * b) *
channels!;\r\n      // add a fence waiting for the data to be ready\r\n      await
this.glContext.createAndWaitForFence();\r\n      const data = this.glContext.readTexture(\r\n          td.texture,
td.width, td.height, dataSize, this.toEncoderType(dataType), channels!);\r\n      const tensorData =
this.toTensorData(dataType, data);\r\n      const subscribers = this.pendingRead.get(dataId);\r\n
this.pendingRead.delete(dataId);\r\n      subscribers?.forEach(resolve => resolve(tensorData));\r\n      return
tensorData;\r\n    });\r\n  }\r\n  readUint8TextureAsFloat(td: TextureData): Float32Array {\r\n    return
this.profiler.event('backend', 'TextureManager.readUint8TextureAsFloat', () => {\r\n      const dataSize =
td.shape.reduce((a, b) => a * b);\r\n      const data = this.glContext.readTexture(td.texture, td.width, td.height,
dataSize * 4, 'byte', 4);\r\n      return new Float32Array(data.buffer, data.byteOffset, dataSize);\r\n    });\r\n  }\r\n
releaseTexture(textureData: TextureData, deleteTexture?: boolean): void {\r\n    let key: string|undefined;\r\n    if
(this.config.reuseTextures) {\r\n      key = this.textureLookup.get(textureData.texture);\r\n      if (key) {\r\n        if
(deleteTexture) {\r\n          this.textureLookup.delete(key);\r\n        }\r\n        const inUseTextures =
this.inUseTextures.get(key);\r\n        if (inUseTextures) {\r\n          const index =
inUseTextures.indexOf(textureData.texture);\r\n          if (index !== -1) {\r\n            inUseTextures.splice(index,
1);\r\n            let idleTextures = this.idleTextures.get(key);\r\n            if (!idleTextures) {\r\n              idleTextures =
[];\r\n              this.idleTextures.set(key, idleTextures);\r\n            }\r\n
idleTextures.push(textureData.texture);\r\n          }\r\n        }\r\n      }\r\n    }\r\n\r\n    if (!key || deleteTexture) {\r\n
 Logger.verbose('TextureManager', `Deleting texture of size ${textureData.width}x${textureData.height}`);\r\n
this.glContext.deleteTexture(textureData.texture);\r\n    }\r\n  }\r\n  toTensorData(dataType: Tensor.DataType, data:
Encoder.DataArrayType): Tensor.NumberType {\r\n    switch (dataType) {\r\n      case 'int16':\r\n        return data
instanceof Int16Array ? data : Int16Array.from(data);\r\n      case 'int32':\r\n        return data instanceof Int32Array ?
data : Int32Array.from(data);\r\n      case 'int8':\r\n        return data instanceof Int8Array ? data :
Int8Array.from(data);\r\n      case 'uint16':\r\n        return data instanceof Uint16Array ? data :
Uint16Array.from(data);\r\n      case 'uint32':\r\n        return data instanceof Uint32Array ? data :
Uint32Array.from(data);\r\n      case 'uint8':\r\n      case 'bool':\r\n        return data instanceof Uint8Array ? data :
Uint8Array.from(data);\r\n      case 'float32':\r\n        return data instanceof Float32Array ? data :
Float32Array.from(data);\r\n      case 'float64':\r\n        return data instanceof Float64Array ? data :
Float64Array.from(data);\r\n      default:\r\n        throw new Error(`TensorData type ${dataType} is not
supported`);\r\n    }\r\n  }\r\n  toTextureData(dataType: Tensor.DataType, data: Tensor.NumberType|undefined):
Encoder.DataArrayType|undefined {\r\n    if (!data) {\r\n      return undefined;\r\n    }\r\n    return (data instanceof
Float32Array) ? data : new Float32Array(data);\r\n    /*\r\n    switch (dataType) {\r\n      case 'int16':\r\n      case
'int32':\r\n      case 'uint16':\r\n      case 'uint32':\r\n        return (data.constructor === Uint32Array) ? data as
Uint32Array : new Uint32Array(data);\r\n      case 'int8':\r\n      case 'uint8':\r\n      case 'bool':\r\n        return
```

(data.constructor === Uint8Array) ? data as Uint8Array : new Uint8Array(data);\r\n case 'float32':\r\n case 'float64':\r\n return (data.constructor === Float32Array) ? data as Float32Array : new Float32Array(data);\r\n default:\r\n throw new Error(`TensorData type ${dataType} is not supported`);\r\n }\r\n */\r\n }\r\n toEncoderType(_dataType: Tensor.DataType): Encoder.DataType {\r\n return 'float';\r\n // switch (dataType) {\r\n // case 'int16':\r\n // case 'int32':\r\n // case 'uint16':\r\n // case 'uint32':\r\n // return 'int';\r\n // case 'uint8':\r\n // case 'bool':\r\n // return 'byte';\r\n // case 'float32':\r\n // case 'float64':\r\n // return 'float';\r\n // default:\r\n // throw new Error(`TensorData type ${dataType} is not supported`);\r\n // }\r\n }\r\n clearActiveTextures(): void {\r\n this.glContext.clearActiveTextures();\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Tensor} from '../../tensor';\r\n\r\n/**\r\n * Layout info is used for mapping n-dimensional array to 2D textures\r\n * The layout is created by the TextureLayoutStrategy based on\r\n * the Tensor's dimensions and strides\r\n */\r\nexport interface TextureLayout {\r\n width: number;\r\n height: number;\r\n /**\r\n * specify the number of value that encoded in a single pixel\r\n */\r\n channels: 1|2|3|4;\r\n /**\r\n * whether in packed mode or not\r\n */\r\n isPacked?: boolean;\r\n /**\r\n * the normalized shape\r\n */\r\n shape: readonly number[];\r\n /**\r\n * the stride of each dimensions, calculated according to shape\r\n */\r\n strides: readonly number[];\r\n /**\r\n * the original shape(dims) of the corresponding tensor\r\n */\r\n unpackedShape: readonly number[];\r\n\r\n reversedWH?: boolean;\r\n}\r\nexport interface TextureData extends TextureLayout {\r\n tensor: Tensor;\r\n texture: WebGLTexture;\r\n}\r\n\r\nexport enum TextureType {\r\n unpacked, // <-- normal unpacked texture\r\n unpackedReversed, // <-- unpacked texture used in old ONNX.js implementation (deprecated)\r\n packed, // <-- normal packed texture\r\n downloadUint8AsFloat, // <-- ONLY used in texture downloading for iOS devices\r\n packedLastDimension // <-- ONLY used in old ONNX.js Conv implementation for input W (deprecated)\r\n}\r\n\r\nexport interface TensorInfo {\r\n id?: Tensor.Id;\r\n dims: readonly number[];\r\n type: Tensor.DataType;\r\n textureType: TextureType;\r\n}\r\n\r\nexport interface ProgramVariable {\r\n type: 'float'|'int';\r\n name: string;\r\n arrayLength?: number;\r\n data: number|number[];\r\n}\r\n\r\n\r\n/**\r\n * A set of metadata of a shader program.\r\n */\r\nexport interface ProgramMetadata {\r\n /**\r\n * the name of the program. used for debugging and profiling\r\n */\r\n name: string;\r\n /**\r\n * texture types for each input\r\n */\r\n inputTypes: TextureType[];\r\n /**\r\n * names of each input\r\n */\r\n inputNames: string[];\r\n /**\r\n * an optional string as a cache hint in the artifact cache\r\n */\r\n cacheHint?: string;\r\n}\r\n\r\n/**\r\n * A ProgramInfoLoader allows\r\n */\r\nexport interface ProgramInfoLoader extends ProgramMetadata {\r\n /**\r\n * a function to get the program info\r\n */\r\n get(): ProgramInfo;\r\n}\r\n\r\n/**\r\n * A set of data that represent a shader program\r\n */\r\nexport interface ProgramInfo extends ProgramMetadata {\r\n /**\r\n * information of uniform variables\r\n */\r\n variables?: ProgramVariable[];\r\n /**\r\n * tensor info for output\r\n */\r\n output: TensorInfo;\r\n /**\r\n * the shader's processing source code\r\n */\r\n shaderSource: string;\r\n /**\r\n * whether the shader source contains a customized main function implementation\r\n */\r\n hasMain?: boolean;\r\n}\r\n\r\nexport interface VariableInfo {\r\n type: 'float'|'int';\r\n name: string;\r\n arrayLength?: number;\r\n}\r\n\r\nexport interface ProgramVariable {\r\n type: 'float'|'int';\r\n name: string;\r\n arrayLength?: number;\r\n data: number|number[];\r\n}\r\n\r\n/**\r\n * Information of uniforms that shader uses\r\n */\r\nexport interface UniformInfo {\r\n type: 'sampler2D'|VariableInfo['type'];\r\n name: string;\r\n arrayLength?: number;\r\n}\r\n\r\nexport interface UniformLocation extends UniformInfo {\r\n location: WebGLUniformLocation;\r\n}\r\n\r\n/**\r\n * Artifact is the result of compilation\r\n * It does not contain input of output data\r\n * However anything that could be run as a \"program\"\r\n */\r\nexport interface Artifact {\r\n programInfo: ProgramInfo;\r\n program: WebGLProgram;\r\n uniformLocations: UniformLocation[];\r\n attribLocations: {position: number; textureCoord: number};\r\n}\r\nexport declare namespace Artifact {\r\n type UniformLocations = Artifact['uniformLocations'];\r\n type AttribLocations = Artifact['attribLocations'];\r\n}\r\n\r\nexport interface UniformData {\r\n [name: string]: number|number[];\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {assert} from '../../util';\r\n/**\r\n * Given a non RGBA shape calculate the R version\r\n * It is assumed that the dimensions are multiples of given channels\r\n * NOTE: it is always the last dim that gets

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packed.\r\n * @param unpackedShape original shape to create a packed version from\r\n */\r\nexport function
getPackedShape(unpackedShape: readonly number[]): readonly number[] {\r\n  const len =
unpackedShape.length;\r\n  return unpackedShape.slice(0, len - 1).concat(unpackedShape[len - 1] /
4);\r\n}\r\n\r\nexport async function repeatedTry(\r\n    checkFn: () => boolean, delayFn = (_counter: number) => 0,
maxCounter?: number): Promise<void> {\r\n  return new Promise<void>((resolve, reject) => {\r\n    let tryCount =
0;\r\n\r\n    const tryFn = () => {\r\n      if (checkFn()) {\r\n        resolve();\r\n        return;\r\n      }\r\n\r\n
tryCount++;\r\n\r\n      const nextBackoff = delayFn(tryCount);\r\n\r\n      if (maxCounter != null && tryCount >=
maxCounter) {\r\n        reject();\r\n        return;\r\n      }\r\n      setTimeout(tryFn, nextBackoff);\r\n    };\r\n\r\n
tryFn();\r\n  });\r\n}\r\n\r\n/**\r\n * Generates the function name from an input sampler name.\r\n * @param
samplerName Name of the sampler.\r\n */\r\nexport function
generateShaderFuncNameFromInputSamplerName(samplerName: string): string {\r\n  assert(typeof samplerName
!== 'undefined' && samplerName.length !== 0, () => 'empty string found for sampler name');\r\n  return 'get' +
samplerName.charAt(0).toUpperCase() + samplerName.slice(1);\r\n}\r\n\r\n/**\r\n * Generates the function name
from an input sampler name at output coordinates.\r\n * @param samplerName Name of the sampler.\r\n
*/\r\nexport function generateShaderFuncNameFromInputSamplerNameAtOutCoords(samplerName: string): string
{\r\n  assert(typeof samplerName !== 'undefined' && samplerName.length !== 0, () => 'empty string found for
sampler name');\r\n  return 'get' + samplerName.charAt(0).toUpperCase() + samplerName.slice(1) +
'AtOutCoords';\r\n}\r\n\r\n/** Returns a new input shape (a copy) that has a squeezed logical shape. */\r\nexport
function squeezeInputShape(inputShape: readonly number[], squeezedShape: number[]): number[] {\r\n  // Deep
copy.\r\n  let newInputShape: number[] = JSON.parse(JSON.stringify(inputShape));\r\n  newInputShape =
squeezedShape;\r\n  return newInputShape;\r\n}\r\n\r\n/** Returns a list of squeezed parameters for shader functions
*/\r\nexport function getSqueezedParams(params: string[], keptDims: number[]): string {\r\n  return
keptDims.map(d => params[d]).join(', ');\r\n}\r\n\r\n/** Returns the data type for different ranks. */\r\nexport
function getCoordsDataType(rank: number): string {\r\n  if (rank <= 1) {\r\n    return 'int';\r\n  } else if (rank === 2)
{\r\n    return 'ivec2';\r\n  } else if (rank === 3) {\r\n    return 'ivec3';\r\n  } else if (rank === 4) {\r\n    return
'ivec4';\r\n  } else if (rank === 5) {\r\n    return 'ivec5';\r\n  } else if (rank === 6) {\r\n    return 'ivec6';\r\n  } else
{\r\n    throw Error(`GPU for rank ${rank} is not yet supported`);\r\n  }\r\n}\r\n\r\nexport function
getGlChannels(rank = 6): string[] {\r\n  return ['x', 'y', 'z', 'w', 'u', 'v'].slice(0, rank);\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Logger} from
'../../instrument';\r\n\r\nimport {WebGLContext} from './webgl-context';\r\n\r\nconst cache: {[contextId: string]:
WebGLContext} = {};\r\n\r\n/**\r\n * This factory function creates proper WebGLRenderingContext based on\r\n *
the current browsers capabilities\r\n * The order is from higher/most recent versions to most basic\r\n */\r\nexport
function createWebGLContext(contextId?: 'webgl'|'webgl2'): WebGLContext {\r\n  let context:
WebGLContext|undefined;\r\n  if ((!contextId || contextId === 'webgl2') && 'webgl2' in cache) {\r\n    context =
cache.webgl2;\r\n  } else if ((!contextId || contextId === 'webgl') && 'webgl' in cache) {\r\n    context =
cache.webgl;\r\n  }\r\n\r\n  context = context || createNewWebGLContext(contextId);\r\n  contextId = contextId ||
context.version === 1 ? 'webgl' : 'webgl2';\r\n  const gl = context.gl;\r\n\r\n  cache[contextId] = context;\r\n\r\n  if
(gl.isContextLost()) {\r\n    delete cache[contextId];\r\n    return createWebGLContext(contextId);\r\n  }\r\n\r\n
gl.disable(gl.DEPTH_TEST);\r\n  gl.disable(gl.STENCIL_TEST);\r\n  gl.disable(gl.BLEND);\r\n
gl.disable(gl.DITHER);\r\n  gl.disable(gl.POLYGON_OFFSET_FILL);\r\n
gl.disable(gl.SAMPLE_COVERAGE);\r\n  gl.enable(gl.SCISSOR_TEST);\r\n  gl.enable(gl.CULL_FACE);\r\n
gl.cullFace(gl.BACK);\r\n\r\n  return context;\r\n}\r\n\r\nexport function createNewWebGLContext(contextId?:
'webgl'|'webgl2'): WebGLContext {\r\n  const canvas = createCanvas();\r\n  const contextAttributes:
WebGLContextAttributes = {\r\n    alpha: false,\r\n    depth: false,\r\n    antialias: false,\r\n    stencil: false,\r\n
preserveDrawingBuffer: false,\r\n    premultipliedAlpha: false,\r\n    failIfMajorPerformanceCaveat: false\r\n  };\r\n
let gl: WebGLRenderingContext|null;\r\n  const ca = contextAttributes;\r\n  if (!contextId || contextId === 'webgl2')
{\r\n    gl = canvas.getContext('webgl2', ca);\r\n    if (gl) {\r\n      try {\r\n        return new WebGLContext(gl, 2);\r\n
} catch (err) {\r\n        Logger.warning('GlContextFactory', `failed to create WebGLContext using contextId
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'webgl2'. Error: ${err}`);\r\n }\r\n }\r\n }\r\n if (!contextId || contextId === 'webgl') {\r\n gl = canvas.getContext('webgl', ca) || canvas.getContext('experimental-webgl', ca) as WebGLRenderingContext;\r\n if (gl) {\r\n try {\r\n return new WebGLContext(gl, 1);\r\n } catch (err) {\r\n Logger.warning(\r\n 'GlContextFactory',\r\n `failed to create WebGLContext using contextId 'webgl' or 'experimental-webgl'. Error: ${err}`);\r\n }\r\n }\r\n }\r\n\r\n throw new Error('WebGL is not supported');\r\n}\r\n\r\nfunction createCanvas(): HTMLCanvasElement {\r\n const canvas: HTMLCanvasElement = document.createElement('canvas');\r\n canvas.width = 1;\r\n canvas.height = 1;\r\n return canvas;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env} from 'onnxruntime-common';\r\n\r\nimport * as DataEncoders from './texture-data-encoder';\r\nimport {DataEncoder, Encoder} from './texture-data-encoder';\r\nimport {repeatedTry} from './utils';\r\n\r\nexport interface FenceContext {\r\n query: WebGLSync|null;\r\n isFencePassed(): boolean;\r\n}\r\n\r\ntype PollItem = {\r\n isDoneFn: () => boolean; resolveFn: () => void;\r\n};\r\n\r\nexport function linearSearchLastTrue(arr: Array<() => boolean>): number {\r\n let i = 0;\r\n for (; i < arr.length; ++i) {\r\n const isDone = arr[i]();\r\n if (!isDone) {\r\n break;\r\n }\r\n }\r\n return i - 1;\r\n}\r\n\r\n/**\r\n * Abstraction and wrapper around WebGLRenderingContext and its operations\r\n */\r\nexport class WebGLContext {\r\n gl: WebGLRenderingContext;\r\n version: 1|2;\r\n\r\n private vertexbuffer: WebGLBuffer;\r\n private framebuffer: WebGLFramebuffer;\r\n\r\n // WebGL flags and vital parameters\r\n private isFloatTextureAttachableToFrameBuffer: boolean;\r\n isFloat32DownloadSupported: boolean;\r\n isRenderFloat32Supported: boolean;\r\n isBlendSupported: boolean;\r\n maxTextureSize: number;\r\n // private maxCombinedTextureImageUnits: number;\r\n private maxTextureImageUnits: number;\r\n // private maxCubeMapTextureSize: number;\r\n // private shadingLanguageVersion: string;\r\n // private webglVendor: string;\r\n // private webglVersion: string;\r\n\r\n // WebGL2 flags and vital parameters\r\n // private max3DTextureSize: number;\r\n // private maxArrayTextureLayers: number;\r\n // private maxColorAttachments: number;\r\n // private maxDrawBuffers: number;\r\n\r\n // WebGL extensions\r\n // eslint-disable-next-line camelcase\r\n textureFloatExtension: OES_texture_float|null;\r\n // eslint-disable-next-line camelcase\r\n textureHalfFloatExtension: OES_texture_half_float|null;\r\n\r\n // WebGL2 extensions\r\n colorBufferFloatExtension: unknown|null;\r\n // eslint-disable-next-line @typescript-eslint/naming-convention\r\n disjointTimerQueryWebgl2Extension: {TIME_ELAPSED_EXT: GLenum; GPU_DISJOINT_EXT: GLenum}|null;\r\n\r\n private disposed: boolean;\r\n private frameBufferBound = false;\r\n\r\n constructor(gl: WebGLRenderingContext, version: 1|2) {\r\n this.gl = gl;\r\n this.version = version;\r\n\r\n this.getExtensions();\r\n this.vertexbuffer = this.createVertexbuffer();\r\n this.framebuffer = this.createFramebuffer();\r\n this.queryVitalParameters();\r\n }\r\n\r\n allocateTexture(width: number, height: number, encoder: DataEncoder, data?: Encoder.DataArrayType): WebGLTexture {\r\n const gl = this.gl;\r\n // create the texture\r\n const texture = gl.createTexture();\r\n // bind the texture so the following methods effect this texture.\r\n gl.bindTexture(gl.TEXTURE_2D, texture);\r\n gl.texParameteri(gl.TEXTURE_2D, gl.TEXTURE_MIN_FILTER, gl.NEAREST);\r\n gl.texParameteri(gl.TEXTURE_2D, gl.TEXTURE_MAG_FILTER, gl.NEAREST);\r\n gl.texParameteri(gl.TEXTURE_2D, gl.TEXTURE_WRAP_S, gl.CLAMP_TO_EDGE);\r\n gl.texParameteri(gl.TEXTURE_2D, gl.TEXTURE_WRAP_T, gl.CLAMP_TO_EDGE);\r\n const buffer = data ? encoder.encode(data, width * height) : null;\r\n gl.texImage2D(\r\n gl.TEXTURE_2D,\r\n 0, // Level of detail.\r\n encoder.internalFormat, width, height,\r\n 0, // Always 0 in OpenGL ES.\r\n encoder.format, encoder.textureType, buffer);\r\n this.checkError();\r\n return texture as WebGLTexture;\r\n }\r\n updateTexture(\r\n texture: WebGLTexture, width: number, height: number, encoder: DataEncoder, data: Encoder.DataArrayType): void {\r\n const gl = this.gl;\r\n gl.bindTexture(gl.TEXTURE_2D, texture);\r\n const buffer = encoder.encode(data, width * height);\r\n gl.texSubImage2D(\r\n gl.TEXTURE_2D,\r\n 0, // level\r\n 0, // xoffset\r\n 0, // yoffset\r\n width, height, encoder.format, encoder.textureType, buffer);\r\n this.checkError();\r\n }\r\n attachFramebuffer(texture: WebGLTexture, width: number, height: number): void {\r\n const gl = this.gl;\r\n // Make it the target for framebuffer operations - including rendering.\r\n gl.bindTexture(gl.TEXTURE_2D,

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texture);\r\n    gl.bindFramebuffer(gl.FRAMEBUFFER, this.framebuffer);\r\n    gl.framebufferTexture2D(\r\n
gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0, gl.TEXTURE_2D, texture,\r\n        0);  // 0, we aren't using
MIPMAPs\r\n    this.checkError();\r\n    gl.viewport(0, 0, width, height);\r\n    gl.scissor(0, 0, width, height);\r\n
}\r\n  readTexture(\r\n      texture: WebGLTexture, width: number, height: number, dataSize: number, dataType:
Encoder.DataType,\r\n      channels: number): Encoder.DataArrayType {\r\n    const gl = this.gl;\r\n    if (!channels)
{\r\n      channels = 1;\r\n    }\r\n    if (!this.frameBufferBound) {\r\n      this.attachFramebuffer(texture, width,
height);\r\n    }\r\n    const encoder = this.getEncoder(dataType, channels);\r\n    const buffer =
encoder.allocate(width * height);\r\n    // bind texture to framebuffer\r\n    gl.bindTexture(gl.TEXTURE_2D,
texture);\r\n    gl.framebufferTexture2D(\r\n        gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0,
gl.TEXTURE_2D, texture,\r\n        0);  // 0, we aren't using MIPMAPs\r\n    // TODO: Check if framebuffer is
ready\r\n    gl.readPixels(0, 0, width, height, gl.RGBA, encoder.textureType, buffer);\r\n    this.checkError();\r\n    //
unbind FB\r\n    return encoder.decode(buffer, dataSize);\r\n  }\r\n\r\n  isFramebufferReady(): boolean {\r\n    //
TODO: Implement logic to check if the framebuffer is ready\r\n    return true;\r\n  }\r\n  getActiveTexture(): string
{\r\n    const gl = this.gl;\r\n    const n = gl.getParameter(this.gl.ACTIVE_TEXTURE);\r\n    return `TEXTURE${(n
- gl.TEXTURE0)}`;\r\n  }\r\n  getTextureBinding(): WebGLTexture {\r\n    return
this.gl.getParameter(this.gl.TEXTURE_BINDING_2D);\r\n  }\r\n  getFramebufferBinding(): WebGLFramebuffer
{\r\n    return this.gl.getParameter(this.gl.FRAMEBUFFER_BINDING);\r\n  }\r\n
setVertexAttributes(positionHandle: number, textureCoordHandle: number): void {\r\n    const gl = this.gl;\r\n
gl.vertexAttribPointer(positionHandle, 3, gl.FLOAT, false, 20, 0);\r\n
gl.enableVertexAttribArray(positionHandle);\r\n    if (textureCoordHandle !== -1) {\r\n
gl.vertexAttribPointer(textureCoordHandle, 2, gl.FLOAT, false, 20, 12);\r\n
gl.enableVertexAttribArray(textureCoordHandle);\r\n    }\r\n    this.checkError();\r\n  }\r\n  createProgram(\r\n
vertexShader: WebGLShader,\r\n      fragShader: WebGLShader,\r\n      ): WebGLProgram {\r\n    const gl =
this.gl;\r\n    const program = gl.createProgram()!;\r\n\r\n    // the program consists of our shaders\r\n
gl.attachShader(program, vertexShader);\r\n    gl.attachShader(program, fragShader);\r\n
gl.linkProgram(program);\r\n    return program;\r\n  }\r\n  compileShader(shaderSource: string, shaderType:
number): WebGLShader {\r\n    const gl = this.gl;\r\n    const shader = gl.createShader(shaderType);\r\n    if
(!shader) {\r\n      throw new Error(`createShader() returned null with type ${shaderType}`);\r\n    }\r\n\r\n
gl.shaderSource(shader, shaderSource);\r\n    gl.compileShader(shader);\r\n    if (gl.getShaderParameter(shader,
gl.COMPILE_STATUS) === false) {\r\n      throw new Error(`Failed to compile shader:
${gl.getShaderInfoLog(shader)}\r\nShader source:\r\n${shaderSource}`);\r\n    }\r\n    return shader;\r\n  }\r\n
deleteShader(shader: WebGLShader): void {\r\n    this.gl.deleteShader(shader);\r\n  }\r\n
bindTextureToUniform(texture: WebGLTexture, position: number, uniformHandle: WebGLUniformLocation): void
{\r\n    const gl = this.gl;\r\n    gl.activeTexture(gl.TEXTURE0 + position);\r\n    this.checkError();\r\n
gl.bindTexture(gl.TEXTURE_2D, texture);\r\n    this.checkError();\r\n    gl.uniform1i(uniformHandle, position);\r\n
 this.checkError();\r\n  }\r\n  draw(): void {\r\n    this.gl.drawArrays(this.gl.TRIANGLE_STRIP, 0, 4);\r\n
this.checkError();\r\n  }\r\n  checkError(): void {\r\n    if (env.debug) {\r\n      const gl = this.gl;\r\n      const error =
gl.getError();\r\n      let label = '';\r\n      switch (error) {\r\n        case (gl.NO_ERROR):\r\n          return;\r\n        case
(gl.INVALID_ENUM):\r\n          label = 'INVALID_ENUM';\r\n          break;\r\n        case
(gl.INVALID_VALUE):\r\n          label = 'INVALID_VALUE';\r\n          break;\r\n        case
(gl.INVALID_OPERATION):\r\n          label = 'INVALID_OPERATION';\r\n          break;\r\n        case
(gl.INVALID_FRAMEBUFFER_OPERATION):\r\n          label =
'INVALID_FRAMEBUFFER_OPERATION';\r\n          break;\r\n        case (gl.OUT_OF_MEMORY):\r\n
label = 'OUT_OF_MEMORY';\r\n          break;\r\n        case (gl.CONTEXT_LOST_WEBGL):\r\n          label =
'CONTEXT_LOST_WEBGL';\r\n          break;\r\n        default:\r\n          label = `Unknown WebGL Error:
${error.toString(16)}`;\r\n      }\r\n      throw new Error(label);\r\n    }\r\n  }\r\n  deleteTexture(texture:
WebGLTexture): void {\r\n    this.gl.deleteTexture(texture);\r\n  }\r\n  deleteProgram(program: WebGLProgram):
void {\r\n    this.gl.deleteProgram(program);\r\n  }\r\n  getEncoder(dataType: Encoder.DataType, channels: number,
```

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usage: Encoder.Usage = Encoder.Usage.Default): DataEncoder {\r\n    if (this.version === 2) {\r\n      return new
DataEncoders.RedFloat32DataEncoder(this.gl as WebGL2RenderingContext, channels);\r\n    }\r\n\r\n    switch
(dataType) {\r\n      case 'float':\r\n        if (usage === Encoder.Usage.UploadOnly || this.isRenderFloat32Supported)
{\r\n          return new DataEncoders.RGBAFloatDataEncoder(this.gl, channels);\r\n        } else {\r\n          return
new DataEncoders.RGBAFloatDataEncoder(\r\n              this.gl, channels,
this.textureHalfFloatExtension!.HALF_FLOAT_OES);\r\n        }\r\n      case 'int':\r\n        throw new Error('not
implemented');\r\n      case 'byte':\r\n        return new DataEncoders.Uint8DataEncoder(this.gl, channels);\r\n
default:\r\n        throw new Error(`Invalid dataType: ${dataType}`);\r\n    }\r\n  }\r\n  clearActiveTextures(): void
{\r\n    const gl = this.gl;\r\n    for (let unit = 0; unit < this.maxTextureImageUnits; ++unit) {\r\n
gl.activeTexture(gl.TEXTURE0 + unit);\r\n      gl.bindTexture(gl.TEXTURE_2D, null);\r\n    }\r\n  }\r\n  dispose():
void {\r\n    if (this.disposed) {\r\n      return;\r\n    }\r\n    const gl = this.gl;\r\n
gl.bindFramebuffer(gl.FRAMEBUFFER, null);\r\n    gl.deleteFramebuffer(this.framebuffer);\r\n
gl.bindBuffer(gl.ARRAY_BUFFER, null);\r\n    gl.deleteBuffer(this.vertexbuffer);\r\n
gl.bindBuffer(gl.ELEMENT_ARRAY_BUFFER, null);\r\n    gl.finish();\r\n    this.disposed = true;\r\n  }\r\n\r\n
private createDefaultGeometry(): Float32Array {\r\n    // Sets of x,y,z(=0),s,t coordinates.\r\n    return new
Float32Array([\r\n      -1.0, 1.0,  0.0, 0.0, 1.0,  // upper left\r\n      -1.0, -1.0, 0.0, 0.0, 0.0,  // lower left\r\n      1.0,
1.0,  0.0, 1.0, 1.0,  // upper right\r\n      1.0,  -1.0, 0.0, 1.0, 0.0   // lower right\r\n    ]);\r\n  }\r\n  private
createVertexbuffer(): WebGLBuffer {\r\n    const gl = this.gl;\r\n    const buffer = gl.createBuffer();\r\n    if (!buffer)
{\r\n      throw new Error('createBuffer() returned null');\r\n    }\r\n    const geometry =
this.createDefaultGeometry();\r\n    gl.bindBuffer(gl.ARRAY_BUFFER, buffer);\r\n
gl.bufferData(gl.ARRAY_BUFFER, geometry, gl.STATIC_DRAW);\r\n    this.checkError();\r\n    return buffer;\r\n
}\r\n  private createFramebuffer(): WebGLFramebuffer {\r\n    const fb = this.gl.createFramebuffer();\r\n    if (!fb)
{\r\n      throw new Error('createFramebuffer returned null');\r\n    }\r\n    return fb;\r\n  }\r\n\r\n  private
queryVitalParameters(): void {\r\n    const gl = this.gl;\r\n\r\n    this.isFloatTextureAttachableToFrameBuffer =
this.checkFloatTextureAttachableToFrameBuffer();\r\n    this.isRenderFloat32Supported =
this.checkRenderFloat32();\r\n    this.isFloat32DownloadSupported = this.checkFloat32Download();\r\n\r\n    if
(this.version === 1 && !this.textureHalfFloatExtension && !this.isRenderFloat32Supported) {\r\n      throw new
Error('both float32 and float16 TextureType are not supported');\r\n    }\r\n\r\n    this.isBlendSupported =
!this.isRenderFloat32Supported || this.checkFloat32Blend();\r\n\r\n    // this.maxCombinedTextureImageUnits =
gl.getParameter(gl.MAX_COMBINED_TEXTURE_IMAGE_UNITS);\r\n    this.maxTextureSize =
gl.getParameter(gl.MAX_TEXTURE_SIZE);\r\n    this.maxTextureImageUnits =
gl.getParameter(gl.MAX_TEXTURE_IMAGE_UNITS);\r\n    // this.maxCubeMapTextureSize =
gl.getParameter(gl.MAX_CUBE_MAP_TEXTURE_SIZE);\r\n    // this.shadingLanguageVersion =
gl.getParameter(gl.SHADING_LANGUAGE_VERSION);\r\n    // this.webglVendor =
gl.getParameter(gl.VENDOR);\r\n    // this.webglVersion = gl.getParameter(gl.VERSION);\r\n\r\n    if (this.version
=== 2) {\r\n      // this.max3DTextureSize =
gl.getParameter(WebGL2RenderingContext.MAX_3D_TEXTURE_SIZE);\r\n      // this.maxArrayTextureLayers =
gl.getParameter(WebGL2RenderingContext.MAX_ARRAY_TEXTURE_LAYERS);\r\n      //
this.maxColorAttachments = gl.getParameter(WebGL2RenderingContext.MAX_COLOR_ATTACHMENTS);\r\n
 // this.maxDrawBuffers = gl.getParameter(WebGL2RenderingContext.MAX_DRAW_BUFFERS);\r\n    }\r\n  }\r\n
private getExtensions(): void {\r\n    if (this.version === 2) {\r\n      this.colorBufferFloatExtension =
this.gl.getExtension('EXT_color_buffer_float');\r\n      this.disjointTimerQueryWebgl2Extension =
this.gl.getExtension('EXT_disjoint_timer_query_webgl2');\r\n    } else {\r\n      this.textureFloatExtension =
this.gl.getExtension('OES_texture_float');\r\n      this.textureHalfFloatExtension =
this.gl.getExtension('OES_texture_half_float');\r\n    }\r\n  }\r\n\r\n  private
checkFloatTextureAttachableToFrameBuffer(): boolean {\r\n    // test whether Float32 texture is supported:\r\n    //
STEP.1 create a float texture\r\n    const gl = this.gl;\r\n    const texture = gl.createTexture();\r\n
gl.bindTexture(gl.TEXTURE_2D, texture);\r\n    // eslint-disable-next-line @typescript-eslint/naming-
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convention\r\n const internalFormat = this.version === 2 ? (gl as unknown as {RGBA32F: number}).RGBA32F : gl.RGBA;\r\n gl.texImage2D(gl.TEXTURE_2D, 0, internalFormat, 1, 1, 0, gl.RGBA, gl.FLOAT, null);\r\n // STEP.2 bind a frame buffer\r\n const frameBuffer = gl.createFramebuffer();\r\n gl.bindFramebuffer(gl.FRAMEBUFFER, frameBuffer);\r\n // STEP.3 attach texture to framebuffer\r\n gl.framebufferTexture2D(gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0, gl.TEXTURE_2D, texture, 0);\r\n // STEP.4 test whether framebuffer is complete\r\n const isComplete = gl.checkFramebufferStatus(gl.FRAMEBUFFER) === gl.FRAMEBUFFER_COMPLETE;\r\n gl.bindTexture(gl.TEXTURE_2D, null);\r\n gl.bindFramebuffer(gl.FRAMEBUFFER, null);\r\n gl.deleteTexture(texture);\r\n gl.deleteFramebuffer(frameBuffer);\r\n return isComplete;\r\n }\r\n\r\n private checkRenderFloat32(): boolean {\r\n if (this.version === 2) {\r\n if (!this.colorBufferFloatExtension) {\r\n return false;\r\n }\r\n } else {\r\n if (!this.textureFloatExtension) {\r\n return false;\r\n }\r\n }\r\n return this.isFloatTextureAttachableToFrameBuffer;\r\n }\r\n\r\n private checkFloat32Download(): boolean {\r\n if (this.version === 2) {\r\n if (!this.colorBufferFloatExtension) {\r\n return false;\r\n }\r\n } else {\r\n if (!this.textureFloatExtension) {\r\n return false;\r\n }\r\n if (!this.gl.getExtension('WEBGL_color_buffer_float')) {\r\n return false;\r\n }\r\n }\r\n return this.isFloatTextureAttachableToFrameBuffer;\r\n }\r\n\r\n /**\r\n * Check whether GL_BLEND is supported\r\n */\r\n private checkFloat32Blend(): boolean {\r\n // it looks like currently (2019-05-08) there is no easy way to detect whether BLEND is supported\r\n // https://github.com/microsoft/onnxjs/issues/145\r\n\r\n const gl = this.gl;\r\n\r\n let texture: WebGLTexture|null|undefined;\r\n let frameBuffer: WebGLFramebuffer|null|undefined;\r\n let vertexShader: WebGLShader|null|undefined;\r\n let fragmentShader: WebGLShader|null|undefined;\r\n let program: WebGLProgram|null|undefined;\r\n\r\n try {\r\n texture = gl.createTexture();\r\n frameBuffer = gl.createFramebuffer();\r\n gl.bindTexture(gl.TEXTURE_2D, texture);\r\n\r\n // eslint-disable-next-line @typescript-eslint/naming-convention\r\n const internalFormat = this.version === 2 ? (gl as unknown as {RGBA32F: number}).RGBA32F : gl.RGBA;\r\n gl.texImage2D(gl.TEXTURE_2D, 0, internalFormat, 1, 1, 0, gl.RGBA, gl.FLOAT, null);\r\n\r\n gl.bindFramebuffer(gl.FRAMEBUFFER, frameBuffer);\r\n gl.framebufferTexture2D(gl.FRAMEBUFFER, gl.COLOR_ATTACHMENT0, gl.TEXTURE_2D, texture, 0);\r\n\r\n gl.enable(gl.BLEND);\r\n\r\n vertexShader = gl.createShader(gl.VERTEX_SHADER);\r\n if (!vertexShader) {\r\n return false;\r\n }\r\n gl.shaderSource(vertexShader, 'void main(){}');\r\n gl.compileShader(vertexShader);\r\n\r\n fragmentShader = gl.createShader(gl.FRAGMENT_SHADER);\r\n if (!fragmentShader) {\r\n return false;\r\n }\r\n gl.shaderSource(fragmentShader, 'precision highp float;void main(){gl_FragColor=vec4(0.5);}');\r\n gl.compileShader(fragmentShader);\r\n\r\n program = gl.createProgram();\r\n if (!program) {\r\n return false;\r\n }\r\n gl.attachShader(program, vertexShader);\r\n gl.attachShader(program, fragmentShader);\r\n gl.linkProgram(program);\r\n gl.useProgram(program);\r\n\r\n gl.drawArrays(gl.POINTS, 0, 1);\r\n return gl.getError() === gl.NO_ERROR;\r\n\r\n } finally {\r\n gl.disable(gl.BLEND);\r\n\r\n if (program) {\r\n gl.deleteProgram(program);\r\n }\r\n if (vertexShader) {\r\n gl.deleteShader(vertexShader);\r\n }\r\n if (fragmentShader) {\r\n gl.deleteShader(fragmentShader);\r\n }\r\n if (frameBuffer) {\r\n gl.bindFramebuffer(gl.FRAMEBUFFER, null);\r\n gl.deleteFramebuffer(frameBuffer);\r\n }\r\n if (texture) {\r\n gl.bindTexture(gl.TEXTURE_2D, null);\r\n gl.deleteTexture(texture);\r\n }\r\n }\r\n }\r\n\r\n beginTimer(): WebGLQuery {\r\n if (this.version === 2 && this.disjointTimerQueryWebgl2Extension) {\r\n const gl2 = this.gl as WebGL2RenderingContext;\r\n const ext = this.disjointTimerQueryWebgl2Extension;\r\n\r\n const query = gl2.createQuery() as WebGLQuery;\r\n gl2.beginQuery(ext.TIME_ELAPSED_EXT, query);\r\n return query;\r\n } else {\r\n // TODO: add webgl 1 handling.\r\n throw new Error('WebGL1 profiling currently not supported.');\r\n }\r\n }\r\n\r\n endTimer() {\r\n if (this.version === 2 && this.disjointTimerQueryWebgl2Extension) {\r\n const gl2 = this.gl as WebGL2RenderingContext;\r\n const ext = this.disjointTimerQueryWebgl2Extension;\r\n gl2.endQuery(ext.TIME_ELAPSED_EXT);\r\n return;\r\n } else {\r\n // TODO: add webgl 1 handling.\r\n

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 throw new Error('WebGL1 profiling currently not supported');\r\n    }\r\n  }\r\n\r\n  isTimerResultAvailable(query:
WebGLQuery): boolean {\r\n    let available = false, disjoint = false;\r\n    if (this.version === 2 &&
this.disjointTimerQueryWebgl2Extension) {\r\n      const gl2 = this.gl as WebGL2RenderingContext;\r\n      const
ext = this.disjointTimerQueryWebgl2Extension;\r\n\r\n      available = gl2.getQueryParameter(query,
gl2.QUERY_RESULT_AVAILABLE);\r\n      disjoint = gl2.getParameter(ext.GPU_DISJOINT_EXT);\r\n    } else
{\r\n      // TODO: add webgl 1 handling.\r\n      throw new Error('WebGL1 profiling currently not supported');\r\n
}\r\n\r\n    return available && !disjoint;\r\n  }\r\n\r\n  getTimerResult(query: WebGLQuery): number {\r\n    let
timeElapsed = 0;\r\n    if (this.version === 2) {\r\n      const gl2 = this.gl as WebGL2RenderingContext;\r\n
timeElapsed = gl2.getQueryParameter(query, gl2.QUERY_RESULT);\r\n      gl2.deleteQuery(query);\r\n    } else
{\r\n      // TODO: add webgl 1 handling.\r\n      throw new Error('WebGL1 profiling currently not supported');\r\n
}\r\n    // return miliseconds\r\n    return timeElapsed / 1000000;\r\n  }\r\n\r\n  async
waitForQueryAndGetTime(query: WebGLQuery): Promise<number> {\r\n    await repeatedTry(() =>
this.isTimerResultAvailable(query));\r\n    return this.getTimerResult(query);\r\n  }\r\n\r\n  public async
createAndWaitForFence(): Promise<void> {\r\n    const fenceContext = this.createFence(this.gl);\r\n    return
this.pollFence(fenceContext);\r\n  }\r\n\r\n  private createFence(gl: WebGLRenderingContext): FenceContext {\r\n
let isFencePassed: () => boolean;\r\n    const gl2 = gl as WebGL2RenderingContext;\r\n    const query =
gl2.fenceSync(gl2.SYNC_GPU_COMMANDS_COMPLETE, 0);\r\n    gl.flush();\r\n    if (query === null) {\r\n
isFencePassed = () => true;\r\n    } else {\r\n      isFencePassed = () => {\r\n        const status =
gl2.clientWaitSync(query, 0, 0);\r\n        return status === gl2.ALREADY_SIGNALED || status ===
gl2.CONDITION_SATISFIED;\r\n      };\r\n    }\r\n    return {query, isFencePassed};\r\n  }\r\n\r\n  async
pollFence(fenceContext: FenceContext) {\r\n    return new Promise<void>(resolve => {\r\n      void
this.addItemToPoll(() => fenceContext.isFencePassed(), () => resolve());\r\n    });\r\n  }\r\n\r\n  private itemsToPoll:
PollItem[] = [];\r\n\r\n  pollItems(): void {\r\n    // Find the last query that has finished.\r\n    const index =
linearSearchLastTrue(this.itemsToPoll.map(x => x.isDoneFn));\r\n    for (let i = 0; i <= index; ++i) {\r\n      const
{resolveFn} = this.itemsToPoll[i];\r\n      resolveFn();\r\n    }\r\n    this.itemsToPoll = this.itemsToPoll.slice(index +
1);\r\n  }\r\n\r\n  private async addItemToPoll(isDoneFn: () => boolean, resolveFn: () => void) {\r\n
this.itemsToPoll.push({isDoneFn, resolveFn});\r\n    if (this.itemsToPoll.length > 1) {\r\n      // We already have a
running loop that polls.\r\n      return;\r\n    }\r\n    // Start a new loop that polls.\r\n    await repeatedTry(() => {\r\n
 this.pollItems();\r\n      // End the loop if no more items to poll.\r\n      return this.itemsToPoll.length === 0;\r\n
});\r\n  }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {SessionHandler} from './backend';\r\nimport {Graph} from './graph';\r\nimport {Logger,
Profiler} from './instrument';\r\nimport {Operator} from './operators';\r\nimport {Tensor} from './tensor';\r\n\r\nclass
KernelOp {\r\n  constructor(public op: Operator, public node: Graph.Node) {}\r\n}\r\n\r\nexport class
ExecutionPlan {\r\n  constructor(private graph: Graph, ops: Operator[], private profiler: Readonly<Profiler>) {\r\n
this.initialize(ops);\r\n  }\r\n\r\n  initialize(ops: Operator[]) {\r\n    this.profiler.event('session',
'ExecutionPlan.initialize', () => {\r\n      const graphNodes = this.graph.getNodes();\r\n      if (graphNodes.length !==
ops.length) {\r\n        throw new Error('The size of nodes and OPs do not match.');\r\n      }\r\n\r\n      this._ops =
ops.map((op, i) => new KernelOp(op, graphNodes[i]));\r\n      this.reset();\r\n\r\n      // look for starter node(s)\r\n
this._starter = [];\r\n      this._ops.forEach((op, i) => {\r\n        let resolved = true;\r\n        for (const input of
op.node.inputs) {\r\n          if (\r\n              !this._values[input]                              // not an initialized input\r\n
    && this.graph.getInputIndices().indexOf(input) === -1  // not model input\r\n          ) {\r\n            resolved =
false;\r\n            break;\r\n          }\r\n        }\r\n        if (resolved) {\r\n          this._starter.push(i);\r\n        }\r\n
});\r\n    });\r\n  }\r\n\r\n  reset() {\r\n    this._values = this.graph.getValues().map(i => i.tensor);\r\n  }\r\n\r\n  async
execute(sessionHandler: SessionHandler, modelInputs: Tensor[]): Promise<Tensor[]> {\r\n    return
this.profiler.event('session', 'ExecutionPlan.execute', async () => {\r\n      // reset mediem result\r\n
this.reset();\r\n\r\n      // create inference handler\r\n      const inferenceHandler =
sessionHandler.createInferenceHandler();\r\n\r\n      // populate inputs value\r\n      const graphInputs =
this.graph.getInputIndices();\r\n      if (modelInputs.length !== graphInputs.length) {\r\n        throw new
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Error(`number of input tensors don't match the number of inputs to the model: actual: ${\r\n
modelInputs.length} expected: ${graphInputs.length}`);\r\n      }\r\n\r\n      modelInputs.forEach((input, i) => {\r\n
   const index = graphInputs[i];\r\n        this._values[index] = input;\r\n      });\r\n\r\n      // prepare running
sequence\r\n      const sequence: number[] = this._starter.slice(0);\r\n\r\n      // execution iterations\r\n      const
graphValues = this.graph.getValues();\r\n      const graphNodes = this.graph.getNodes();\r\n\r\n      let rear = 0;\r\n
while (rear < sequence.length) {\r\n        const thisOpIndex = sequence[rear++];\r\n        const thisOp =
this._ops[thisOpIndex];\r\n\r\n        // check input\r\n        const inputList = thisOp.node.inputs.map(i =>
this._values[i]);\r\n        if (inputList.indexOf(undefined) !== -1) {\r\n          throw new Error(`unresolved input
detected: op: ${thisOp.node}`);\r\n        }\r\n\r\n        // run\r\n        const inputTensors = inputList as Tensor[];\r\n
 Logger.verbose(\r\n            'ExecPlan',\r\n            `Runing op:${thisOp.node.name} (${\r\n
inputTensors.map((t, i) => `'${thisOp.node.inputs[i]}': ${t.type}[${t.dims.join(',')}]`).join(', ')})`);\r\n\r\n        const
outputList = await this.profiler.event(\r\n            'node', thisOp.node.name, async () =>
thisOp.op.impl(inferenceHandler, inputTensors, thisOp.op.context));\r\n\r\n        // check output\r\n        if
(outputList.length !== thisOp.node.outputs.length) {\r\n          throw new Error('the size of output does not match
model definition.');\r\n        }\r\n\r\n        // fill value\r\n        outputList.forEach((output, i) => {\r\n          const j =
thisOp.node.outputs[i];\r\n          if (this._values[j]) {\r\n            throw new Error(`output [${j}] already has value:
op:${thisOp.node.name}`);\r\n          }\r\n          this._values[j] = output;\r\n        });\r\n\r\n        // resolve
downstream nodes\r\n        const downstreamNodes = new Set<number>();\r\n        outputList.forEach((output, i) =>
{\r\n          const j = thisOp.node.outputs[i];\r\n          for (const currentDownstreamNodeIndex of graphValues[j].to)
{\r\n            const currentDownstreamNode = graphNodes[currentDownstreamNodeIndex];\r\n            let resolved =
true;\r\n            for (const k of currentDownstreamNode.inputs) {\r\n              if (!this._values[k]) {\r\n
resolved = false;\r\n                break;\r\n              }\r\n            }\r\n            if (resolved) {\r\n
downstreamNodes.add(currentDownstreamNodeIndex);\r\n            }\r\n          }\r\n        });\r\n
sequence.push(...downstreamNodes);\r\n      }\r\n\r\n      const output: Tensor[] = [];\r\n      for (let i = 0; i <
this.graph.getOutputIndices().length; i++) {\r\n        const outputIndex = this.graph.getOutputIndices()[i];\r\n
const outputTensor = this._values[outputIndex];\r\n        if (outputTensor === undefined) {\r\n          throw new
Error(`required output [${outputIndex}] does not have value`);\r\n        }\r\n        if (outputIndex === 0) {\r\n
await outputTensor.getData();\r\n        } else {\r\n          // eslint-disable-next-line no-unused-expressions\r\n
outputTensor.data;\r\n        }\r\n        output.push(outputTensor);\r\n      }\r\n      Logger.verbose('ExecPlan',
'disposing of inferenceHandler');\r\n      inferenceHandler.dispose();\r\n      return output;\r\n    });\r\n  }\r\n\r\n
_values: Array<Tensor|undefined>;\r\n  _ops: KernelOp[];\r\n  _starter: number[];\r\n}\r\n","// Copyright (c)
Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {onnx} from 'onnx-
proto';\r\n\r\nimport {Attribute} from './attribute';\r\nimport {onnxruntime} from './ort-schema/ort-
generated';\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\nimport {Tensor} from './tensor';\r\nimport
{LongUtil, ProtoUtil} from './util';\r\n\r\nexport declare namespace Graph {\r\n  export interface Shape {\r\n
readonly dims: readonly number[];\r\n  }\r\n  export interface ValueType {\r\n    readonly tensorType:
Tensor.DataType;\r\n    readonly shape: Shape;\r\n  }\r\n  export interface Value {\r\n    // the tensor data. empty for
non-initialized inputs\r\n    readonly tensor?: Tensor;\r\n\r\n    // index to the Node where the value comes from. -1
for initializer.\r\n    readonly from: number;\r\n\r\n    // indices to the Nodes where the values go to.\r\n    readonly
to: readonly number[];\r\n\r\n    // value type specification. empty for non-input values.\r\n    readonly type?:
ValueType;\r\n  }\r\n  export interface Node {\r\n    // name of the node\r\n    readonly name: string;\r\n\r\n    // the
operator type\r\n    readonly opType: string;\r\n\r\n    // indices to the Values where the inputs come from.\r\n
readonly inputs: readonly number[];\r\n\r\n    // indices to the Values where the outpus go to.\r\n    readonly outputs:
readonly number[];\r\n\r\n    // the attributes that used by the operator\r\n    readonly attributes: Attribute;\r\n
}\r\n\r\n  /**\r\n   * a Transformer is an instance that allows all possible transformation operations that applied to a
graph\r\n   */\r\n  export interface Transformer {\r\n    removeAllIdentityNodes(): void;\r\n
removeAllDropoutNodes(): void;\r\n    fuseConvActivationNodes(): void;\r\n    // TODO: add generic functions to
manipulate the graph\r\n  }\r\n\r\n  // an initializer can use transformer to transform the graph\r\n  export interface
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Initializer {\r\n   transformGraph(transformer: Transformer): void;\r\n }\r\n}\r\n\r\n\r\n// eslint-disable-next-line @typescript-eslint/no-redeclare\r\nexport interface Graph {\r\n getInputIndices(): readonly number[];\r\n getInputNames(): readonly string[];\r\n getOutputIndices(): readonly number[];\r\n getOutputNames(): readonly string[];\r\n getValues(): readonly Graph.Value[];\r\n getNodes(): readonly Graph.Node[];\r\n}\r\n\r\n\r\n// eslint-disable-next-line @typescript-eslint/naming-convention, @typescript-eslint/no-redeclare\r\nexport const Graph = {\r\n /**\r\n   * construct a graph from a graph protobuf type\r\n   */\r\n from: (graphProto: onnx.IGraphProto|ortFbs.Graph, initializer?: Graph.Initializer) =>\r\n   new GraphImpl(graphProto, initializer),\r\n};\r\n\r\nclass Value implements Graph.Value {\r\n constructor(valueInfo?: onnx.IValueInfoProto) {\r\n   this._from = undefined;\r\n   this._to = [];\r\n   this.tensor = undefined;\r\n   this.type = undefined;\r\n\r\n if (valueInfo) {\r\n   this.type = ProtoUtil.tensorValueTypeFromProto(valueInfo.type!.tensorType!);\r\n   }\r\n }\r\n\r\n _from?: number; // -1 represent from initializer\r\n get from() {\r\n   return this._from!;\r\n }\r\n _to: number[];\r\n get to() {\r\n   return this._to;\r\n }\r\n type?: Graph.ValueType;\r\n tensor?: Tensor;\r\n}\r\n\r\nclass Node implements Graph.Node {\r\n constructor(_nodeProto: onnx.INodeProto|ortFbs.Node, name?: string) {\r\n   if (_nodeProto instanceof onnx.NodeProto) {\r\n   this.name = _nodeProto.name;\r\n   this.opType = _nodeProto.opType;\r\n   this.attributes = new Attribute(_nodeProto.attribute);\r\n   } else if (_nodeProto instanceof ortFbs.Node) {\r\n   this.name = name ?? _nodeProto.name()!;\r\n   this.opType = _nodeProto.opType()!;\r\n   this.attributes = new Attribute(ProtoUtil.tensorAttributesFromORTFormat(_nodeProto));\r\n   }\r\n\r\n   this.inputs = [];\r\n this.outputs = [];\r\n   this.executeNode = true;\r\n }\r\n\r\n name: string;\r\n opType: string;\r\n inputs: number[];\r\n outputs: number[];\r\n attributes: Attribute;\r\n executeNode: boolean;\r\n}\r\n\r\nclass GraphImpl implements Graph, Graph.Transformer {\r\n private _allData: Value[];\r\n\r\n private _allInputIndices: number[];\r\n private _allInputNames: string[];\r\n\r\n private _allOutputIndices: number[];\r\n private _allOutputNames: string[];\r\n\r\n private _nodes: Node[];\r\n\r\n constructor(graph: onnx.IGraphProto|ortFbs.Graph, graphInitializer?: Graph.Initializer) {\r\n   if (!graph) {\r\n   throw new TypeError('graph is empty');\r\n   }\r\n\r\n   // build the graph - will throw exceptions if something fatal is detected\r\n   this.buildGraph(graph);\r\n\r\n   // execute any transformation logic for the graph (if applicable)\r\n this.transformGraph(graphInitializer);\r\n\r\n   // check for cycles and other inconsistencies - will throw exceptions if something fatal is detected\r\n   this.checkIsAcyclic();\r\n }\r\n\r\n getInputIndices(): readonly number[] {\r\n return this._allInputIndices;\r\n }\r\n\r\n getInputNames(): readonly string[] {\r\n   return this._allInputNames;\r\n }\r\n\r\n getOutputIndices(): readonly number[] {\r\n   return this._allOutputIndices;\r\n }\r\n\r\n getOutputNames(): readonly string[] {\r\n   return this._allOutputNames;\r\n }\r\n\r\n getValues(): readonly Graph.Value[] {\r\n   return this._allData;\r\n }\r\n\r\n getNodes(): readonly Graph.Node[] {\r\n   return this._nodes;\r\n }\r\n\r\n private buildGraph(graph: onnx.IGraphProto|ortFbs.Graph) {\r\n   // build the graph - will throw exceptions if something fatal is detected\r\n   if (graph instanceof onnx.GraphProto) {\r\n this.buildGraphFromOnnxFormat(graph);\r\n   } else if (graph instanceof ortFbs.Graph) {\r\n this.buildGraphFromOrtFormat(graph);\r\n   } else {\r\n   throw new TypeError('Graph type is not supported.');\r\n   }\r\n }\r\n private buildGraphFromOnnxFormat(graph: onnx.IGraphProto) {\r\n   const dataIndices = new Map<string, number>();\r\n   this._allData = [];\r\n\r\n   this._allInputIndices = [];\r\n this._allInputNames = [];\r\n\r\n   this._allOutputIndices = [];\r\n   this._allOutputNames = [];\r\n\r\n   this._nodes = [];\r\n\r\n   const nodesIndices = new Map<string, number>();\r\n\r\n   // scan all inputs\r\n   if (!graph.input) {\r\n   throw new Error('missing information in graph: input');\r\n   }\r\n   const inputValueNames = [];\r\n   for (const i of graph.input) {\r\n   if (dataIndices.has(i.name!)) {\r\n   throw new Error(`duplicated input name: ${i.name}`);\r\n   }\r\n   const currentIndex = this._allData.push(new Value(i)) - 1;\r\n dataIndices.set(i.name!, currentIndex);\r\n   inputValueNames.push(i.name!);\r\n   }\r\n\r\n   // scan all initializers\r\n   if (!graph.initializer) {\r\n   throw new Error('missing information in graph: initializer');\r\n   }\r\n   for (const i of graph.initializer) {\r\n   let index = dataIndices.get(i.name!);\r\n   if (index === undefined) {\r\n   const value = new Value();\r\n   value.type = {\r\n   shape: {dims: ProtoUtil.tensorDimsFromProto(i.dims!)},\r\n   tensorType:

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ProtoUtil.tensorDataTypeFromProto(i.dataType!)\r\n        };\r\n        index = this._allData.push(value) - 1;\r\n
dataIndices.set(i.name!, index);\r\n      }\r\n      this._allData[index]._from = -1;\r\n      this._allData[index].tensor =
Tensor.fromProto(i);\r\n    }\r\n\r\n    // filter out input indices\r\n    for (let i = 0; i < this._allData.length; i++) {\r\n
 if (!this._allData[i].tensor) {\r\n        this._allInputIndices.push(i);\r\n
this._allInputNames.push(inputValueNames[i]);\r\n      }\r\n    }\r\n\r\n    // scan all outputs\r\n    if (!graph.output)
{\r\n      throw new Error('missing information in graph: output');\r\n    }\r\n    for (const i of graph.output) {\r\n      if
(dataIndices.has(i.name!)) {\r\n        throw new Error(`duplicated output name: ${i.name}`);\r\n      }\r\n      const
currentIndex = this._allData.push(new Value(i)) - 1;\r\n      dataIndices.set(i.name!, currentIndex);\r\n
this._allOutputIndices.push(currentIndex);\r\n      this._allOutputNames.push(i.name!);\r\n    }\r\n\r\n    // scan all
nodes\r\n    if (!graph.node) {\r\n      throw new Error('missing information in graph: node');\r\n    }\r\n    for (const
nodeProto of graph.node) {\r\n      if (!nodeProto.name) {\r\n        // assign a name to the node if it doesn't have
one\r\n        for (let pick = 0;; pick++) {\r\n          const name = `unnamed_${nodeProto.opType}_${pick}`;\r\n
if (!nodesIndices.has(name)) {\r\n            nodeProto.name = name;\r\n            break;\r\n          }\r\n        }\r\n
}\r\n\r\n      if (nodesIndices.has(nodeProto.name)) {\r\n        throw new Error(`duplicated node name:
${nodeProto.name}`);\r\n      }\r\n      const currentIndex = this._nodes.push(new Node(nodeProto)) - 1;\r\n
nodesIndices.set(nodeProto.name, currentIndex);\r\n    }\r\n\r\n    // scan node's outputs\r\n    for (let i = 0; i <
this._nodes.length; i++) {\r\n      const node = this._nodes[i];\r\n      const nodeProto = graph.node[i];\r\n      if
(!nodeProto.output) {\r\n        throw new Error(`missing output for node: ${nodeProto.name}`);\r\n      }\r\n      for
(const output of nodeProto.output) {\r\n        let dataIndex = dataIndices.get(output);\r\n        if (typeof dataIndex
=== 'undefined') {\r\n          dataIndex = this._allData.push(new Value()) - 1;\r\n          dataIndices.set(output,
dataIndex);\r\n        }\r\n        node.outputs.push(dataIndex);\r\n\r\n        if (this._allData[dataIndex]._from !==
undefined) {\r\n          throw new Error(`multiple nodes output to one data value: ${dataIndex}`);\r\n        }\r\n
this._allData[dataIndex]._from = i;\r\n\r\n        // for the 'Constant' operator, just create a new edge in the graph
corresponding to the 'output' of the\r\n        // operator and ignore the node from the graph\r\n        if
(nodeProto.opType === 'Constant') {\r\n          if (!nodeProto.attribute || nodeProto.attribute.length !== 1 ||
!nodeProto.attribute[0].t) {\r\n            throw new Error('missing attributes or missing tensor value in attributes for
this Constant operator');\r\n          }\r\n          if (!nodeProto.output || nodeProto.output.length !== 1) {\r\n
throw new Error('missing output or incorrect number of outputs for this Constant operator');\r\n          }\r\n
node.outputs.pop();\r\n          node.executeNode = false;\r\n\r\n          this._allData[dataIndex]._from = -1;\r\n
this._allData[dataIndex].tensor = Tensor.fromProto(nodeProto.attribute[0].t);\r\n        }\r\n      }\r\n    }\r\n\r\n    //
scan node's inputs\r\n    for (let i = 0; i < this._nodes.length; i++) {\r\n      const node = this._nodes[i];\r\n      const
nodeProto = graph.node[i];\r\n\r\n      if (!nodeProto.input) {\r\n        throw new Error(`missing input for node:
${nodeProto.name}`);\r\n      }\r\n      for (const input of nodeProto.input) {\r\n        const dataIndex =
dataIndices.get(input);\r\n        if (typeof dataIndex === 'undefined') {\r\n          throw new Error(`unrecognized
input '${input}' for node: ${nodeProto.name}`);\r\n        }\r\n        node.inputs.push(dataIndex);\r\n\r\n
this._allData[dataIndex]._to.push(i);\r\n      }\r\n    }\r\n\r\n    return true;\r\n  }\r\n\r\n  private
buildGraphFromOrtFormat(graph: ortFbs.Graph) {\r\n    const dataIndices = new Map<string, number>();\r\n
this._allData = [];\r\n\r\n    this._allInputIndices = [];\r\n    this._allInputNames = [];\r\n\r\n    this._allOutputIndices
= [];\r\n    this._allOutputNames = [];\r\n\r\n    this._nodes = [];\r\n\r\n    const nodesIndices = new Map<string,
number>();\r\n\r\n    // scan all inputs\r\n    const inputValueNames = [];\r\n    for (let i = 0; i < graph.inputsLength();
i++) {\r\n      const inputName = graph.inputs(i);\r\n      if (dataIndices.has(inputName)) {\r\n        throw new
Error(`duplicated input name: ${inputName}`);\r\n      }\r\n      // Find the input typeInfo from nodeargs\r\n      for
(let j = 0; j < graph.nodeArgsLength(); j++) {\r\n        if (graph.nodeArgs(j)?.name() === inputName) {\r\n
const value = new Value();\r\n          const valueType = graph.nodeArgs(j)?.type()?.valueType();\r\n          if
(valueType !== ortFbs.TypeInfoValue.tensor_type) {\r\n            throw new Error('Unexpected value type for the
nodeArg.');\r\n          }\r\n          const valueInfo = graph.nodeArgs(j)!.type()!.value(new
ortFbs.TensorTypeAndShape())!;\r\n          const type =
ProtoUtil.tensorDataTypeFromProto(valueInfo.elemType());\r\n          const shape = valueInfo.shape()!;\r\n
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const dims = [];\r\n          for (let k = 0; k < shape.dimLength()!; k++) {\r\n
dims.push(LongUtil.longToNumber(shape.dim(k)!.value()!.dimValue()!));\r\n          }\r\n          value.type = {shape:
{dims}, tensorType: type};\r\n          const currentIndex = this._allData.push(value) - 1;\r\n
dataIndices.set(inputName, currentIndex);\r\n          inputValueNames.push(inputName);\r\n        }\r\n      }\r\n
}\r\n    // check initializers\r\n    for (let i = 0; i < graph.initializersLength(); i++) {\r\n      const initializer =
graph.initializers(i)!;\r\n      let index = dataIndices.get(initializer.name()!);\r\n      if (index === undefined) {\r\n
const value = new Value();\r\n        const dims = ProtoUtil.tensorDimsFromORTFormat(initializer);\r\n        const
type = ProtoUtil.tensorDataTypeFromProto(initializer.dataType());\r\n        value.type = {shape: {dims},
tensorType: type};\r\n        index = this._allData.push(value) - 1;\r\n        dataIndices.set(initializer.name()!,
index);\r\n      }\r\n      this._allData[index]._from = -1;\r\n      this._allData[index].tensor =
Tensor.fromOrtTensor(initializer);\r\n    }\r\n\r\n    // filter out input indices\r\n    for (let i = 0; i <
this._allData.length; i++) {\r\n      if (!this._allData[i].tensor) {\r\n        this._allInputIndices.push(i);\r\n
this._allInputNames.push(inputValueNames[i]);\r\n      }\r\n    }\r\n\r\n    // scan all outputs\r\n    for (let i = 0; i <
graph.outputsLength(); i++) {\r\n      const outputName = graph.outputs(i);\r\n      if (dataIndices.has(outputName))
{\r\n        throw new Error(`duplicated output name: ${outputName}`);\r\n      }\r\n      const currentIndex =
this._allData.push(new Value()) - 1;\r\n      dataIndices.set(outputName, currentIndex);\r\n
this._allOutputIndices.push(currentIndex);\r\n      this._allOutputNames.push(outputName);\r\n    }\r\n\r\n    // scan
all nodes\r\n    if (!graph.nodes) {\r\n      throw new Error('missing information in graph: node');\r\n    }\r\n    for (let
i = 0; i < graph.nodesLength(); i++) {\r\n      const nodeProto = graph.nodes(i);\r\n      let name =
nodeProto!.name();\r\n      if (!name) {\r\n        // assign a name to the node if it doesn't have one\r\n        for (let pick
= 0;; pick++) {\r\n          name = `unnamed_${nodeProto!.opType()}_${pick}`;\r\n          if
(!nodesIndices.has(name)) {\r\n            // an unique name is found. break.\r\n            break;\r\n          }\r\n        }\r\n
 }\r\n\r\n      if (nodesIndices.has(name)) {\r\n        throw new Error(`duplicated node name: ${name}`);\r\n      }\r\n
  const currentIndex = this._nodes.push(new Node(nodeProto!, name)) - 1;\r\n      nodesIndices.set(name,
currentIndex);\r\n    }\r\n\r\n    // scan node's outputs\r\n    for (let i = 0; i < this._nodes.length; i++) {\r\n      const
node = this._nodes[i];\r\n      const nodeProto = graph.nodes(i);\r\n      if (nodeProto == null) {\r\n        throw new
Error(`No node exists at index ${i}`);\r\n      }\r\n      if (nodeProto?.outputsLength() === 0) {\r\n        throw new
Error(`missing output for node: ${nodeProto.name}`);\r\n      }\r\n      for (let j = 0; j < nodeProto?.outputsLength();
j++) {\r\n        const output = nodeProto?.outputs(j);\r\n        let dataIndex = dataIndices.get(output);\r\n        if
(typeof dataIndex === 'undefined') {\r\n          dataIndex = this._allData.push(new Value()) - 1;\r\n
dataIndices.set(output, dataIndex);\r\n        }\r\n        node.outputs.push(dataIndex);\r\n\r\n        if
(this._allData[dataIndex]._from !== undefined) {\r\n          throw new Error(`multiple nodes output to one data
value: ${dataIndex}`);\r\n        }\r\n        this._allData[dataIndex]._from = i;\r\n\r\n        // for the 'Constant' operator,
just create a new edge in the graph corresponding to the 'output' of the\r\n        // operator and ignore the node from
the graph\r\n        if (nodeProto.opType() === 'Constant') {\r\n          if (nodeProto.attributesLength() !== 1 ||
!nodeProto.attributes(0)!.t()) {\r\n            throw new Error('missing attributes or missing tensor value in attributes for
this Constant operator');\r\n          }\r\n          if (nodeProto.outputsLength() !== 1) {\r\n            throw new
Error('missing output or incorrect number of outputs for this Constant operator');\r\n          }\r\n
node.outputs.pop();\r\n          node.executeNode = false;\r\n\r\n          this._allData[dataIndex]._from = -1;\r\n
this._allData[dataIndex].tensor = Tensor.fromOrtTensor(nodeProto.attributes(0)!.t()!);\r\n        }\r\n      }\r\n
}\r\n\r\n    // scan node's inputs\r\n    for (let i = 0; i < this._nodes.length; i++) {\r\n      const node =
this._nodes[i];\r\n      const nodeProto = graph.nodes(i)!;\r\n\r\n      if (nodeProto.inputsLength() === 0) {\r\n
throw new Error(`missing input for node: ${nodeProto.name}`);\r\n      }\r\n      for (let j = 0; j <
nodeProto.inputsLength()!; j++) {\r\n        const input = nodeProto.inputs(j)!;\r\n        const dataIndex =
dataIndices.get(input);\r\n        if (typeof dataIndex === 'undefined') {\r\n          throw new Error(`unrecognized
input '${input}' for node: ${nodeProto!.name()}`);\r\n        }\r\n        node.inputs.push(dataIndex);\r\n\r\n
this._allData[dataIndex]._to.push(i);\r\n      }\r\n    }\r\n  }\r\n\r\n  private checkIsAcyclic() {\r\n    // go through the
graph and check for cycles or other fatal inconsistencies\r\n    const starters: Set<number> = new
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Set<number>();\r\n this._allInputIndices.forEach(i => {\r\n const data = this._allData[i];\r\n data._to.forEach(j => {\r\n starters.add(j);\r\n });\r\n });\r\n\r\n // Iterative DFS to check for cycles\r\n const nodesStack = Array.from(starters);\r\n const nodesState = new Array<string>(this._nodes.length).fill('white');\r\n\r\n while (nodesStack.length > 0) {\r\n const nodeIndex = nodesStack.pop()!;\r\n // this node has now been processed completely. Mark this node 'black' to denote this.\r\n if (nodesState[nodeIndex] === 'gray') {\r\n nodesState[nodeIndex] = 'black';\r\n } else {\r\n // this node is under processing stage. mark this node 'gray' to denote this.\r\n nodesStack.push(nodeIndex);\r\n nodesState[nodeIndex] = 'gray';\r\n\r\n this._nodes[nodeIndex].outputs.forEach((outgoingEdgeIndex) => {\r\n const data = this._allData[outgoingEdgeIndex];\r\n if (typeof data.tensor !== 'undefined') {\r\n throw new Error('node outputs should not be initialized');\r\n }\r\n if (data._from !== nodeIndex) {\r\n throw new Error('from property of the Value object doesn\\'t match index of Node being processed');\r\n }\r\n data._to.forEach((downstreamNodeIndex) => {\r\n // back edge found - cyclic\r\n if (nodesState[downstreamNodeIndex] === 'gray') {\r\n throw new Error('model graph is cyclic');\r\n }\r\n // tree edge found - continue processing by adding it to stack\r\n else if (nodesState[downstreamNodeIndex] === 'white') {\r\n nodesStack.push(downstreamNodeIndex);\r\n }\r\n });\r\n });\r\n }\r\n }\r\n }\r\n\r\n private transformGraph(graphInitializer?: Graph.Initializer): void {\r\n // apply common transform\r\n this.removeAllIdentityNodes();\r\n this.removeAllDropoutNodes();\r\n this.fuseConvActivationNodes();\r\n // apply initializer specific transform\r\n if (graphInitializer) {\r\n graphInitializer.transformGraph(this);\r\n }\r\n\r\n // finalize graph\r\n this.finalizeGraph();\r\n }\r\n\r\n /**\r\n * finalize the graph.\r\n *\r\n * this function should be called after all the transformation completed.\r\n * this function removes all unnecessary nodes and values from the graph\r\n */\r\n finalizeGraph() {\r\n let offset = 0;\r\n // delete all nodes that are not being executed\r\n for (let i = 0; i < this._nodes.length; i++) {\r\n if (!this._nodes[i].executeNode) {\r\n // delete this node and shift all subsequent nodes up\r\n offset++;\r\n // delete all output values\r\n this._nodes[i].outputs.forEach(ind => {\r\n this._allData[ind]._from = -2;\r\n });\r\n this._nodes.splice(i, 1);\r\n i--;\r\n continue;\r\n }\r\n if (offset > 0) {\r\n // update the value table\r\n this._nodes[i].inputs.forEach(value => {\r\n const ind = this._allData[value]._to.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._allData[value]._to[ind] = i;\r\n }\r\n });\r\n this._nodes[i].outputs.forEach(value => {\r\n if (this._allData[value]._from && this._allData[value]._from! === i + offset) {\r\n this._allData[value]._from! = i;\r\n }\r\n });\r\n }\r\n }\r\n offset = 0;\r\n // delete all values that are not being referenced\r\n for (let i = 0; i < this._allData.length; i++) {\r\n // if current value is neither linked to next node, nor an output value, remove it.\r\n if (this._allData[i].from === -2 && this._allOutputIndices.indexOf(i + offset) === -1) {\r\n offset++;\r\n this._allData.splice(i, 1);\r\n i--;\r\n continue;\r\n }\r\n if (offset > 0) {\r\n let ind = -1;\r\n // if current value is neither an input value nor an initializer, find the node it's\r\n // coming from and update the corresponding node output\r\n if (this._allData[i].from !== undefined && this._allData[i].from !== -1) {\r\n ind = this._nodes[this._allData[i].from].outputs.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._nodes[this._allData[i].from].outputs[ind] = i;\r\n }\r\n } else {\r\n // if current value is an input value, update its reference in inputIndices\r\n ind = this._allInputIndices.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._allInputIndices[ind] = i;\r\n }\r\n }\r\n\r\n // find the node that the current value is linking to and update its input reference\r\n this._allData[i].to.forEach(node => {\r\n ind = this._nodes[node].inputs.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._nodes[node].inputs[ind] = i;\r\n }\r\n });\r\n if (this._allData[i].to.length === 0) {\r\n // if current value is a graph output, update its reference in outputIndices\r\n ind = this._allOutputIndices.indexOf(i + offset);\r\n if (ind !== -1) {\r\n this._allOutputIndices[ind] = i;\r\n }\r\n }\r\n }\r\n }\r\n }\r\n\r\n /**\r\n * Delete the specifed node. Assume the node has only one input and the first output connected to other nodes\r\n * @param nodeIndex The index of node to be deleted\r\n */\r\n private deleteNode(nodeIndex: number) {\r\n const node = this._nodes[nodeIndex];\r\n if (node.inputs.length > 1) {\r\n throw new Error('Node deletion with multiple inputs is not supported. ');\r\n   }\r\n   if (node.outputs.length > 1) {\r\n   for (let i = 1; i < node.outputs.length; i++) {\r\n   if (this._allData[node.outputs[i]].to.length > 0) {\r\n   throw new Error('Node deletion with more than one output connected to other nodes is not supported. ');\r\n   }\r\n   }\r\n   }\r\n\r\n   // this node wil not be executed\r\n   node.executeNode = false;\r\n   const inputValueIndex = node.inputs[0];\r\n   const outputValueIndex = node.outputs[0];\r\n   const nodesConsumingOutput = this._allData[outputValueIndex].to;\r\n\r\n   // remove this node from the to property of the input Value\r\n   const delIndex = this._allData[inputValueIndex].to.indexOf(nodeIndex);\r\n   // should not happen\r\n   if (delIndex === -1) {\r\n   throw new Error('The Value object doesn\\'t have the current Node in it\\'s \\'to\\' property ');\r\n   }\r\n   this._allData[inputValueIndex].to.splice(delIndex, 1);\r\n\r\n   // clear node indices consuming this output Value\r\n   this._allData[outputValueIndex]._to = [];\r\n\r\n   // if the output of this node is a graph output, adjust the index appropriately\r\n   const index = this._allOutputIndices.indexOf(outputValueIndex);\r\n   if (index !== -1) {\r\n   this._allOutputIndices[index] = inputValueIndex;\r\n   }\r\n\r\n   // override the inputs for nodes consuming this node's output with the input to this node\r\n   if (nodesConsumingOutput && nodesConsumingOutput.length > 0) {\r\n   for (const nodeIndex of nodesConsumingOutput) {\r\n   const replaceIndex = this._nodes[nodeIndex].inputs.indexOf(outputValueIndex);\r\n   // should not happen\r\n   if (replaceIndex === -1) {\r\n   throw new Error('The Node object doesn\\'t have the output Value in it\\'s \\'inputs\\' property ');\r\n   }\r\n   this._nodes[nodeIndex].inputs[replaceIndex] = inputValueIndex;\r\n   this._allData[inputValueIndex].to.push(nodeIndex);\r\n   }\r\n   }\r\n }\r\n\r\n removeAllDropoutNodes() {\r\n   let nodeIndex = 0;\r\n   for (const node of this._nodes) {\r\n   // weed out 'Dropout' nodes so that no time is wasted in execution\r\n   if (node.opType === 'Dropout') {\r\n   // the node should have exactly 1 input and 1 or 2 outputs\r\n   if (node.inputs.length !== 1) {\r\n   throw new Error('Dropout nodes should only contain one input. ');\r\n   }\r\n   if (node.outputs.length !== 1 && node.outputs.length !== 2) {\r\n   throw new Error('Dropout nodes should contain either 1 or 2 output(s)');\r\n   }\r\n   // the second output should not be referenced by any other node\r\n   if (node.outputs.length === 2 && this._allData[node.outputs[1]]._to.length !== 0) {\r\n   throw new Error('Dropout nodes\\'s second output should not be referenced by other nodes');\r\n   }\r\n   this.deleteNode(nodeIndex);\r\n   }\r\n   nodeIndex++;\r\n   }\r\n }\r\n\r\n removeAllIdentityNodes() {\r\n   let nodeIndex = 0;\r\n   for (const node of this._nodes) {\r\n   // weed out 'Identity' nodes so that no time is wasted in execution\r\n   if (node.opType === 'Identity') {\r\n   this.deleteNode(nodeIndex);\r\n   }\r\n   nodeIndex++;\r\n   }\r\n }\r\n\r\n isActivation(n: Node): boolean {\r\n   switch (n.opType) {\r\n   // TODO: add other activation methods\r\n   case 'Relu':\r\n   case 'Sigmoid':\r\n   case 'Clip':\r\n   return true;\r\n   default:\r\n   return false;\r\n   }\r\n }\r\n\r\n fuseConvActivationNodes() {\r\n   for (const node of this._nodes) {\r\n   if (node.opType === 'Conv') {\r\n   const next = this._allData[node.outputs[0]]._to;\r\n   if (next.length === 1 && this.isActivation(this._nodes[next[0]])) {\r\n   const child = this._nodes[next[0]];\r\n   node.attributes.set('__internal_activation', 'string', (child.opType));\r\n   // TODO: need add support for Clip after opset 11, which has min/max as inputs\r\n   if (child.opType === 'Clip') {\r\n   node.attributes.set('__clip_min', 'float', child.attributes.getFloat('min'));\r\n   node.attributes.set('__clip_max', 'float', child.attributes.getFloat('max'));\r\n   }\r\n   this.deleteNode(next[0]);\r\n   }\r\n   }\r\n   }\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Env} from 'onnxruntime-common';\r\n\r\nimport {WebGLContext} from './backends/webgl/webgl-context';\r\n\r\nexport declare namespace Logger {\r\n export interface SeverityTypeMap {\r\n   verbose: 'v';\r\n   info: 'i';\r\n   warning: 'w';\r\n   error: 'e';\r\n   fatal: 'f';\r\n }\r\n\r\n export type Severity = keyof SeverityTypeMap;\r\n\r\n export type Provider = 'none'|'console';\r\n\r\n /**\r\n   * Logging config that used to control the behavior of logger\r\n   */\r\n export interface Config {\r\n   /**\r\n   * Specify the logging provider. 'console' by default\r\n   */\r\n   provider?: Provider;\r\n   /**\r\n   * Specify the minimal logger serverity. 'warning' by default\r\n   */\r\n   minimalSeverity?: Logger.Severity;\r\n   /**\r\n   * Whether to output date time in log. true by default\r\n   */\r\n   logDateTime?: boolean;\r\n   /**\r\n   * Whether to output source information (Not yet supported). false by default\r\n   */\r\n   logSourceLocation?: boolean;\r\n }\r\n\r\n export interface CategorizedLogger {\r\n   verbose(content: string): void;\r\n   info(content: string): void;\r\n warning(content: string): void;\r\n error(content: string): void;\r\n fatal(content: string): void;\r\n }\r\n}\r\n\r\n// eslint-disable-next-line @typescript-eslint/no-redeclare\r\nexport interface Logger {\r\n (category: string): Logger.CategorizedLogger;\r\n\r\n verbose(content: string): void;\r\n verbose(category: string, content: string): void;\r\n info(content: string): void;\r\n info(category: string, content: string): void;\r\n warning(content: string): void;\r\n warning(category: string, content: string): void;\r\n error(content: string): void;\r\n error(category: string, content: string): void;\r\n fatal(content: string): void;\r\n fatal(category: string, content: string): void;\r\n\r\n /**\r\n * Reset the logger configuration.\r\n * @param config specify an optional default config\r\n */\r\n reset(config?: Logger.Config): void;\r\n /**\r\n * Set the logger's behavior on the given category\r\n * @param category specify a category string. If '*' is specified, all previous configuration will be overwritten. If\r\n * '' is specified, the default behavior will be updated.\r\n * @param config the config object to indicate the logger's behavior\r\n */\r\n set(category: string, config: Logger.Config): void;\r\n\r\n /**\r\n * Set the logger's behavior from ort-common env\r\n * @param env the env used to set logger. Currently only setting loglevel is supported through Env.\r\n */\r\n setWithEnv(env: Env): void;\r\n}\r\n\r\ninterface LoggerProvider {\r\n log(severity: Logger.Severity, content: string, category?: string): void;\r\n}\r\nclass NoOpLoggerProvider implements LoggerProvider {\r\n log(_severity: Logger.Severity, _content: string, _category?: string) {\r\n // do nothing\r\n }\r\n}\r\nclass ConsoleLoggerProvider implements LoggerProvider {\r\n log(severity: Logger.Severity, content: string, category?: string) {\r\n // eslint-disable-next-line no-console\r\n console.log(`${this.color(severity)} ${category ? '\\x1b[35m' + category + '\\x1b[0m ' : ''}${content}`);\r\n }\r\n\r\n private color(severity: Logger.Severity) {\r\n switch (severity) {\r\n case 'verbose':\r\n return '\\x1b[34;40mv\\x1b[0m';\r\n case 'info':\r\n return '\\x1b[32mi\\x1b[0m';\r\n case 'warning':\r\n return '\\x1b[30;43mw\\x1b[0m';\r\n case 'error':\r\n return '\\x1b[31;40me\\x1b[0m';\r\n case 'fatal':\r\n return '\\x1b[101mf\\x1b[0m';\r\n default:\r\n throw new Error(`unsupported severity: ${severity}`);\r\n }\r\n }\r\n}\r\n\r\nconst SEVERITY_VALUE = {\r\n verbose: 1000,\r\n info: 2000,\r\n warning: 4000,\r\n error: 5000,\r\n fatal: 6000\r\n};\r\n\r\nconst LOGGER_PROVIDER_MAP: {readonly [provider: string]: Readonly<LoggerProvider>} = {\r\n ['none']: new NoOpLoggerProvider(),\r\n ['console']: new ConsoleLoggerProvider()\r\n};\r\nconst LOGGER_DEFAULT_CONFIG = {\r\n provider: 'console',\r\n minimalSeverity: 'warning',\r\n logDateTime: true,\r\n logSourceLocation: false\r\n};\r\nlet LOGGER_CONFIG_MAP:\r\n {[category: string]: Readonly<Required<Logger.Config>>} = {['']: LOGGER_DEFAULT_CONFIG as Required<Logger.Config>};\r\n\r\nfunction log(category: string): Logger.CategorizedLogger;\r\nfunction log(severity: Logger.Severity, content: string): void;\r\nfunction log(severity: Logger.Severity, category: string, content: string): void;\r\nfunction log(severity: Logger.Severity, arg1: string, arg2?: string): void;\r\nfunction log(\r\n arg0: string|Logger.Severity, arg1?: string, arg2?: string|number, arg3?: number): Logger.CategorizedLogger|void {\r\n if (arg1 === undefined) {\r\n // log(category: string): Logger.CategorizedLogger;\r\n return createCategorizedLogger(arg0);\r\n } else if (arg2 === undefined) {\r\n // log(severity, content);\r\n logInternal(arg0 as Logger.Severity, arg1, 1);\r\n } else if (typeof arg2 === 'number' && arg3 === undefined) {\r\n // log(severity, content, stack)\r\n logInternal(arg0 as Logger.Severity, arg1, arg2);\r\n } else if (typeof arg2 === 'string' && arg3 === undefined) {\r\n // log(severity, category, content)\r\n logInternal(arg0 as Logger.Severity, arg2, 1, arg1);\r\n } else if (typeof arg2 === 'string' && typeof arg3 === 'number') {\r\n // log(severity, category, content, stack)\r\n logInternal(arg0 as Logger.Severity, arg2, arg3, arg1);\r\n } else {\r\n throw new TypeError('input is valid');\r\n }\r\n}\r\n\r\nfunction createCategorizedLogger(category: string): Logger.CategorizedLogger {\r\n return {\r\n verbose: log.verbose.bind(null, category),\r\n info: log.info.bind(null, category),\r\n warning: log.warning.bind(null, category),\r\n error: log.error.bind(null, category),\r\n fatal: log.fatal.bind(null, category)\r\n };\r\n}\r\n\r\n// NOTE: argument 'category' is put the last parameter beacause typescript\r\n// doesn't allow optional argument put in front of required argument. This\r\n// order is different from a usual logging API.\r\nfunction logInternal(severity: Logger.Severity, content: string, stack: number, category?: string) {\r\n const config = LOGGER_CONFIG_MAP[category || ''] || LOGGER_CONFIG_MAP[''];\r\n if (SEVERITY_VALUE[severity] < SEVERITY_VALUE[config.minimalSeverity]) {\r\n return;\r\n }\r\n\r\n if (config.logDateTime) {\r\n content

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= `${new Date().toISOString()}|${content}`;\r\n  }\r\n\r\n  if (config.logSourceLocation) {\r\n    // TODO: calculate
source location from 'stack'\r\n  }\r\n\r\n  LOGGER_PROVIDER_MAP[config.provider].log(severity, content,
category);\r\n}\r\n\r\n// eslint-disable-next-line @typescript-eslint/no-namespace\r\nnamespace log {\r\n  export
function verbose(content: string): void;\r\n  export function verbose(category: string, content: string): void;\r\n
export function verbose(arg0: string, arg1?: string) {\r\n    log('verbose', arg0, arg1);\r\n  }\r\n  export function
info(content: string): void;\r\n  export function info(category: string, content: string): void;\r\n  export function
info(arg0: string, arg1?: string) {\r\n    log('info', arg0, arg1);\r\n  }\r\n  export function warning(content: string):
void;\r\n  export function warning(category: string, content: string): void;\r\n  export function warning(arg0: string,
arg1?: string) {\r\n    log('warning', arg0, arg1);\r\n  }\r\n  export function error(content: string): void;\r\n  export
function error(category: string, content: string): void;\r\n  export function error(arg0: string, arg1?: string) {\r\n
log('error', arg0, arg1);\r\n  }\r\n  export function fatal(content: string): void;\r\n  export function fatal(category:
string, content: string): void;\r\n  export function fatal(arg0: string, arg1?: string) {\r\n    log('fatal', arg0, arg1);\r\n
}\r\n\r\n  export function reset(config?: Logger.Config): void {\r\n    LOGGER_CONFIG_MAP = {};\r\n    set('',
config || {});\r\n  }\r\n  export function set(category: string, config: Logger.Config): void {\r\n    if (category === '*')
{\r\n      reset(config);\r\n    } else {\r\n      const previousConfig = LOGGER_CONFIG_MAP[category] ||
LOGGER_DEFAULT_CONFIG;\r\n      LOGGER_CONFIG_MAP[category] = {\r\n        provider: config.provider
|| previousConfig.provider,\r\n        minimalSeverity: config.minimalSeverity || previousConfig.minimalSeverity,\r\n
     logDateTime: (config.logDateTime === undefined) ? previousConfig.logDateTime : config.logDateTime,\r\n
logSourceLocation: (config.logSourceLocation === undefined) ? previousConfig.logSourceLocation :\r\n
                                            config.logSourceLocation\r\n      };\r\n    }\r\n\r\n    // TODO: we want to support
wildcard or regex?\r\n  }\r\n\r\n  export function setWithEnv(env: Env): void {\r\n    const config: Logger.Config =
{};\r\n    if (env.logLevel) {\r\n      config.minimalSeverity = env.logLevel as Logger.Severity;\r\n    }\r\n    set('',
config);\r\n  }\r\n}\r\n\r\n// eslint-disable-next-line @typescript-eslint/no-redeclare, @typescript-eslint/naming-
convention\r\nexport const Logger: Logger = log;\r\n\r\nexport declare namespace Profiler {\r\n  export interface
Config {\r\n    maxNumberEvents?: number;\r\n    flushBatchSize?: number;\r\n    flushIntervalInMilliseconds?:
number;\r\n  }\r\n\r\n  export type EventCategory = 'session'|'node'|'op'|'backend';\r\n\r\n  export interface Event {\r\n
  end(): void|Promise<void>;\r\n  }\r\n}\r\n// TODO\r\n// class WebGLEvent implements Profiler.Event
{}\r\n\r\nclass Event implements Profiler.Event {\r\n  constructor(\r\n      public category: Profiler.EventCategory,
public name: string, public startTime: number,\r\n      private endCallback: (e: Event) => void|Promise<void>,
public timer?: WebGLQuery, public ctx?: WebGLContext) {}\r\n\r\n  end() {\r\n    return this.endCallback(this);\r\n
}\r\n\r\n  async checkTimer(): Promise<number> {\r\n    if (this.ctx === undefined || this.timer === undefined) {\r\n
   throw new Error('No webgl timer found');\r\n    } else {\r\n      this.ctx.endTimer();\r\n      return
this.ctx.waitForQueryAndGetTime(this.timer);\r\n    }\r\n  }\r\n}\r\n\r\nclass EventRecord {\r\n  constructor(\r\n
public category: Profiler.EventCategory, public name: string, public startTime: number, public endTime: number)
{}\r\n}\r\n\r\nexport class Profiler {\r\n  static create(config?: Profiler.Config): Profiler {\r\n    if (config ===
undefined) {\r\n      return new this();\r\n    }\r\n    return new this(config.maxNumberEvents, config.flushBatchSize,
config.flushIntervalInMilliseconds);\r\n  }\r\n\r\n  private constructor(maxNumberEvents?: number,
flushBatchSize?: number, flushIntervalInMilliseconds?: number) {\r\n    this._started = false;\r\n
this._maxNumberEvents = maxNumberEvents === undefined ? 10000 : maxNumberEvents;\r\n
this._flushBatchSize = flushBatchSize === undefined ? 10 : flushBatchSize;\r\n    this._flushIntervalInMilliseconds
= flushIntervalInMilliseconds === undefined ? 5000 : flushIntervalInMilliseconds;\r\n  }\r\n\r\n  // start profiling\r\n
start() {\r\n    this._started = true;\r\n    this._timingEvents = [];\r\n    this._flushTime = now();\r\n
this._flushPointer = 0;\r\n  }\r\n\r\n  // stop profiling\r\n  stop() {\r\n    this._started = false;\r\n    for (;
this._flushPointer < this._timingEvents.length; this._flushPointer++) {\r\n
this.logOneEvent(this._timingEvents[this._flushPointer]);\r\n    }\r\n  }\r\n\r\n  // create an event scope for the
specific function\r\n  event<T>(category: Profiler.EventCategory, name: string, func: () => T, ctx?:
WebGLContext): T;\r\n  event<T>(category: Profiler.EventCategory, name: string, func: () => Promise<T>, ctx?:
WebGLContext): Promise<T>;\r\n\r\n  event<T>(category: Profiler.EventCategory, name: string, func: () => T |
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Promise<T>, ctx?: WebGLContext): T\r\n |Promise<T> {\r\n   const event = this._started ? this.begin(category, name, ctx) : undefined;\r\n   let isPromise = false;\r\n\r\n   const res = func();\r\n\r\n   // we consider a then-able object is a promise\r\n   if (res && typeof (res as Promise<T>).then === 'function') {\r\n   isPromise = true;\r\n   return new Promise<T>((resolve, reject) => {\r\n   (res as Promise<T>)\r\n   .then(\r\n   async value => { // fulfilled\r\n   if (event) {\r\n   await event.end();\r\n   }\r\n   resolve(value);\r\n   },\r\n   async reason => { // rejected\r\n   if (event) {\r\n   await event.end();\r\n   }\r\n   reject(reason);\r\n   });\r\n   });\r\n   }\r\n   if (!isPromise && event) {\r\n   const eventRes = event.end();\r\n   if (eventRes && typeof eventRes.then === 'function') {\r\n   return new Promise<T>((resolve, reject) => {\r\n   (eventRes).then(\r\n   () => { // fulfilled\r\n   resolve(res);\r\n   },\r\n   (reason) => { // rejected\r\n   reject(reason);\r\n   });\r\n   });\r\n   }\r\n   }\r\n   return res;\r\n }\r\n\r\n // begin an event\r\n begin(category: Profiler.EventCategory, name: string, ctx?: WebGLContext): Event {\r\n   if (!this._started) {\r\n   throw new Error('profiler is not started yet');\r\n   }\r\n   if (ctx === undefined) {\r\n   const startTime = now();\r\n   this.flush(startTime);\r\n   return new Event(category, name, startTime, e => this.endSync(e));\r\n   } else {\r\n   const timer: WebGLQuery = ctx.beginTimer();\r\n   return new Event(category, name, 0, async e => this.end(e), timer, ctx);\r\n   }\r\n }\r\n\r\n // end the specific event\r\n private async end(event: Event): Promise<void> {\r\n   const endTime: number = await event.checkTimer();\r\n   if (this._timingEvents.length < this._maxNumberEvents) {\r\n   this._timingEvents.push(new EventRecord(event.category, event.name, event.startTime, endTime));\r\n   this.flush(endTime);\r\n   }\r\n }\r\n\r\n private endSync(event: Event): void {\r\n   const endTime: number = now();\r\n   if (this._timingEvents.length < this._maxNumberEvents) {\r\n   this._timingEvents.push(new EventRecord(event.category, event.name, event.startTime, endTime));\r\n   this.flush(endTime);\r\n   }\r\n }\r\n\r\n private logOneEvent(event: EventRecord) {\r\n   Logger.verbose(\r\n   `Profiler.${event.category}`,\r\n   `${(event.endTime - event.startTime).toFixed(2)}ms on event '${event.name}' at ${event.endTime.toFixed(2)}`);\r\n }\r\n\r\n private flush(currentTime: number) {\r\n   if (this._timingEvents.length - this._flushPointer >= this._flushBatchSize ||\r\n   currentTime - this._flushTime >= this._flushIntervalInMilliseconds) {\r\n   // should flush when either batch size accumlated or interval elepsed\r\n\r\n   for (const previousPointer = this._flushPointer; this._flushPointer < previousPointer + this._flushBatchSize &&\r\n   this._flushPointer < this._timingEvents.length;\r\n   this._flushPointer++) {\r\n   this.logOneEvent(this._timingEvents[this._flushPointer]);\r\n   }\r\n\r\n   this._flushTime = now();\r\n   }\r\n }\r\n\r\n get started() {\r\n   return this._started;\r\n }\r\n private _started = false;\r\n private _timingEvents: EventRecord[];\r\n\r\n private readonly _maxNumberEvents: number;\r\n\r\n private readonly _flushBatchSize: number;\r\n private readonly _flushIntervalInMilliseconds: number;\r\n\r\n private _flushTime: number;\r\n private _flushPointer = 0;\r\n}\r\n\r\n/**\r\n * returns a number to represent the current timestamp in a resolution as high as possible.\r\n */\r\nexport const now = (typeof performance !== 'undefined' && performance.now) ? () => performance.now() : Date.now;\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {flatbuffers} from 'flatbuffers';\r\nimport {onnx} from 'onnx-proto';\r\n\r\nimport {Graph} from './graph';\r\nimport {OpSet} from './opset';\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\nimport {LongUtil} from './util';\r\n\r\nexport class Model {\r\n // empty model\r\n constructor() {}\r\n\r\n load(buf: Uint8Array, graphInitializer?: Graph.Initializer, isOrtFormat?: boolean): void {\r\n   if (!isOrtFormat) {\r\n   // isOrtFormat === false || isOrtFormat === undefined\r\n   try {\r\n   this.loadFromOnnxFormat(buf, graphInitializer);\r\n   return;\r\n   } catch (e) {\r\n   if (isOrtFormat !== undefined) {\r\n   throw e;\r\n   }\r\n   }\r\n   }\r\n\r\n   this.loadFromOrtFormat(buf, graphInitializer);\r\n }\r\n\r\n private loadFromOnnxFormat(buf: Uint8Array, graphInitializer?: Graph.Initializer): void {\r\n   const modelProto = onnx.ModelProto.decode(buf);\r\n   const irVersion = LongUtil.longToNumber(modelProto.irVersion);\r\n   if (irVersion < 3) {\r\n   throw new Error('only support ONNX model with IR_VERSION>=3');\r\n   }\r\n\r\n   this._opsets =\r\n modelProto.opsetImport.map(i => ({domain: i.domain as string, version: LongUtil.longToNumber(i.version!)}));\r\n\r\n   this._graph = Graph.from(modelProto.graph!, graphInitializer);\r\n

}\r\n\r\n private loadFromOrtFormat(buf: Uint8Array, graphInitializer?: Graph.Initializer): void {\r\n   const fb = new flatbuffers.ByteBuffer(buf);\r\n   const ortModel = ortFbs.InferenceSession.getRootAsInferenceSession(fb).model()!;\r\n   const irVersion = LongUtil.longToNumber(ortModel.irVersion());\r\n   if (irVersion < 3) {\r\n   throw new Error('only support ONNX model with IR_VERSION>=3');\r\n   }\r\n   this._opsets = [];\r\n   for (let i = 0; i < ortModel.opsetImportLength(); i++) {\r\n   const opsetId = ortModel.opsetImport(i)!;\r\n   this._opsets.push({domain: opsetId?.domain() as string, version: LongUtil.longToNumber(opsetId.version()!)});\r\n   }\r\n\r\n   this._graph = Graph.from(ortModel.graph()!, graphInitializer);\r\n }\r\n\r\n private _graph: Graph;\r\n get graph(): Graph {\r\n   return this._graph;\r\n }\r\n\r\n private _opsets: OpSet[];\r\n get opsets(): readonly OpSet[] {\r\n   return this._opsets;\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceHandler} from './backend';\r\nimport {Graph} from './graph';\r\nimport {Tensor} from './tensor';\r\n\r\nexport type OperatorImplementation<T> = (inferenceHandler: InferenceHandler, inputs: Tensor[], context: T) => Tensor[];\r\nexport type OperatorInitialization<T> = (node: Graph.Node, graph: Graph) => T;\r\n\r\nexport interface Operator {\r\n readonly impl: OperatorImplementation<unknown>;\r\n readonly context: Graph.Node|unknown;\r\n}\r\n\r\nexport const NUMBER_TYPES: readonly Tensor.DataType[] =\r\n   ['float32', 'float64', 'int32', 'int16', 'int8', 'uint16', 'uint32', 'uint8'];\r\nexport const INT_TYPES: readonly Tensor.DataType[] = ['int32', 'int16', 'int8', 'uint16', 'uint32', 'uint8'];\r\nexport const FLOAT_TYPES: readonly Tensor.DataType[] = ['float32', 'float64'];\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Graph} from './graph';\r\nimport {OperatorImplementation, OperatorInitialization} from './operators';\r\n\r\nexport interface OpSet {\r\n domain: string;\r\n version: number;\r\n}\r\n\r\nexport declare namespace OpSet {\r\n /**\r\n   * Domain of an opset, it can be an empty string(default value, represent for ai.onnx), or 'ai.onnx.ml'\r\n   */\r\n type Domain = ''|'ai.onnx.ml';\r\n\r\n /**\r\n   * A resolve rule consists of 4 or 5 items: opType, opSetDomain, versionSelector, operatorImplementation and\r\n   * operatorInitialization (optional)\r\n   */\r\n type ResolveRule = [\r\n   string, Domain, string, OperatorImplementation<Graph.Node>\r\n]|[string, Domain, string, OperatorImplementation<unknown>, OperatorInitialization<unknown>];\r\n}\r\n\r\nexport function resolveOperator(node: Graph.Node, opsets: readonly OpSet[], rules: readonly OpSet.ResolveRule[]) {\r\n for (const rule of rules) {\r\n   const opType = rule[0];\r\n   const domain = rule[1];\r\n   const versionSelector = rule[2];\r\n   const opImpl = rule[3];\r\n   const opInit = rule[4];\r\n\r\n   if (node.opType === opType) { // operator type matches\r\n   for (const opset of opsets) {\r\n   // opset '' and 'ai.onnx' are considered the same.\r\n   if (opset.domain === domain || (opset.domain === 'ai.onnx' && domain === '')) { // opset domain found\r\n   if (matchSelector(opset.version, versionSelector)) {\r\n   return {opImpl, opInit};\r\n   }\r\n   }\r\n   }\r\n   }\r\n }\r\n\r\n throw new TypeError(`cannot resolve operator '${node.opType}' with opsets: ${\r\n      opsets.map(set => `${set.domain || 'ai.onnx'} v${set.version}`).join(', ')}`);\r\n}\r\n\r\nfunction matchSelector(version: number, selector: string): boolean {\r\n if (selector.endsWith('+')) {\r\n   // minimum version match ('7+' expects version>=7)\r\n   const rangeStart = Number.parseInt(selector.substring(0, selector.length - 1), 10);\r\n   return !isNaN(rangeStart) && rangeStart <= version;\r\n } else if (selector.split('-').length === 2) {\r\n   // range match ('6-8' expects 6<=version<=8)\r\n   const pair = selector.split('-');\r\n   const rangeStart = Number.parseInt(pair[0], 10);\r\n   const rangeEnd = Number.parseInt(pair[1], 10);\r\n   return !isNaN(rangeStart) && !isNaN(rangeEnd) && rangeStart <= version && version <= rangeEnd;\r\n } else {\r\n   // exact match ('7' expects version===7)\r\n   return Number.parseInt(selector, 10) === version;\r\n }\r\n}\r\n","// automatically generated by the FlatBuffers compiler, do not modify\r\n\r\n/* eslint-disable */\r\n\r\nimport {flatbuffers} from 'flatbuffers';\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export enum AttributeType {\r\n   UNDEFINED = 0,\r\n   FLOAT = 1,\r\n   INT = 2,\r\n   STRING = 3,\r\n   TENSOR = 4,\r\n   GRAPH = 5,\r\n   FLOATS = 6,\r\n   INTS = 7,\r\n   STRINGS = 8,\r\n   TENSORS = 9,\r\n   GRAPHS = 10,\r\n   SPARSE_TENSOR = 11,\r\n   SPARSE_TENSORS = 12\r\n }\r\n}\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export enum DimensionValueType {UNKNOWN = 0, VALUE = 1, PARAM = 2}\r\n}\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export enum TensorDataType {\r\n   UNDEFINED = 0,\r\n   FLOAT = 1,\r\n   UINT8 = 2,\r\n   INT8 = 3,\r\n   UINT16 = 4,\r\n   INT16 = 5,\r\n   INT32 = 6,\r\n   INT64 = 7,\r\n   STRING = 8,\r\n   BOOL = 9,\r\n   FLOAT16 = 10,\r\n   DOUBLE = 11,\r\n   UINT32 = 12,\r\n   UINT64 = 13,\r\n   COMPLEX64 = 14,\r\n   COMPLEX128 = 15,\r\n   BFLOAT16 = 16\r\n }\r\n}\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export enum NodeType {Primitive = 0, Fused = 1}\r\n}\r\n\r\n/**\r\n * @enum {number}\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export enum TypeInfoValue {NONE = 0, tensor_type = 1, sequence_type = 2, map_type = 3}\r\n}\r\n\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class Shape {\r\n   bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n   bb_pos = 0;\r\n   /**\r\n   * @param number i\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @returns Shape\r\n   */\r\n   __init(i: number, bb: flatbuffers.ByteBuffer): Shape {\r\n   this.bb_pos = i;\r\n   this.bb = bb;\r\n   return this;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param Shape= obj\r\n   * @returns Shape\r\n   */\r\n   static getRootAsShape(bb: flatbuffers.ByteBuffer, obj?: Shape): Shape {\r\n   return (obj || new Shape()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param Shape= obj\r\n   * @returns Shape\r\n   */\r\n   static getSizePrefixedRootAsShape(bb: flatbuffers.ByteBuffer, obj?: Shape): Shape {\r\n   bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n   return (obj || new Shape()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n   /**\r\n   * @param number index\r\n   * @param onnxruntime.experimental.fbs.Dimension= obj\r\n   * @returns onnxruntime.experimental.fbs.Dimension\r\n   */\r\n   dim(index: number, obj?: onnxruntime.experimental.fbs.Dimension): onnxruntime.experimental.fbs.Dimension|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 4);\r\n   return offset ? (obj || new onnxruntime.experimental.fbs.Dimension())\r\n .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n   null;\r\n   }\r\n\r\n   /**\r\n   * @returns number\r\n   */\r\n   dimLength(): number {\r\n   let offset = this.bb!.__offset(this.bb_pos, 4);\r\n   return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   */\r\n   static startShape(builder: flatbuffers.Builder) {\r\n   builder.startObject(1);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset dimOffset\r\n   */\r\n   static addDim(builder: flatbuffers.Builder, dimOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(0, dimOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param Array.<flatbuffers.Offset> data\r\n   * @returns flatbuffers.Offset\r\n   */\r\n   static createDimVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n   builder.startVector(4, data.length, 4);\r\n   for (let i = data.length - 1; i >= 0; i--) {\r\n   builder.addOffset(data[i]);\r\n   }\r\n   return builder.endVector();\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param number numElems\r\n   */\r\n   static startDimVector(builder: flatbuffers.Builder, numElems: number) {\r\n   builder.startVector(4, numElems, 4);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @returns flatbuffers.Offset\r\n   */\r\n   static endShape(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n   let offset = builder.endObject();\r\n   return offset;\r\n   }\r\n\r\n   static createShape(builder: flatbuffers.Builder, dimOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n   Shape.startShape(builder);\r\n   Shape.addDim(builder, dimOffset);\r\n   return Shape.endShape(builder);\r\n   }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class Dimension {\r\n   bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n   bb_pos = 0;\r\n   /**\r\n   * @param number i\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @returns Dimension\r\n   */\r\n   __init(i: number, bb: flatbuffers.ByteBuffer): Dimension {\r\n   this.bb_pos = i;\r\n   this.bb = bb;\r\n   return this;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param Dimension= obj\r\n   * @returns Dimension\r\n   */\r\n   static getRootAsDimension(bb: flatbuffers.ByteBuffer, obj?: Dimension): Dimension {\r\n   return (obj || new Dimension()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param Dimension= obj\r\n   * @returns Dimension\r\n   */\r\n   static getSizePrefixedRootAsDimension(bb: flatbuffers.ByteBuffer, obj?: Dimension): Dimension {\r\n

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bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
Dimension()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.DimensionValue= obj\r\n     * @returns
onnxruntime.experimental.fbs.DimensionValue|null\r\n     */\r\n    value(obj?:
onnxruntime.experimental.fbs.DimensionValue): onnxruntime.experimental.fbs.DimensionValue|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.DimensionValue())\r\n                          .__init(this.bb!.__indirect(this.bb_pos +
offset), this.bb!) :\r\n                      null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Encoding=
optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    denotation(): string|null;\r\n
denotation(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n    denotation(optionalEncoding?:
any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ?
this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     */\r\n    static startDimension(builder: flatbuffers.Builder) {\r\n
builder.startObject(2);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset valueOffset\r\n     */\r\n    static addValue(builder: flatbuffers.Builder, valueOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, valueOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset denotationOffset\r\n     */\r\n    static
addDenotation(builder: flatbuffers.Builder, denotationOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1,
denotationOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns
flatbuffers.Offset\r\n     */\r\n    static endDimension(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let
offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createDimension(\r\n        builder:
flatbuffers.Builder, valueOffset: flatbuffers.Offset,\r\n        denotationOffset: flatbuffers.Offset): flatbuffers.Offset
{\r\n      Dimension.startDimension(builder);\r\n      Dimension.addValue(builder, valueOffset);\r\n
Dimension.addDenotation(builder, denotationOffset);\r\n      return Dimension.endDimension(builder);\r\n    }\r\n
}\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class
DimensionValue {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param
number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @returns DimensionValue\r\n     */\r\n    __init(i:
number, bb: flatbuffers.ByteBuffer): DimensionValue {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return
this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param DimensionValue= obj\r\n     *
@returns DimensionValue\r\n     */\r\n    static getRootAsDimensionValue(bb: flatbuffers.ByteBuffer, obj?:
DimensionValue): DimensionValue {\r\n      return (obj || new DimensionValue()).__init(bb.readInt32(bb.position())
+ bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param
DimensionValue= obj\r\n     * @returns DimensionValue\r\n     */\r\n    static
getSizePrefixedRootAsDimensionValue(bb: flatbuffers.ByteBuffer, obj?: DimensionValue): DimensionValue {\r\n
  bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
DimensionValue()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @returns
onnxruntime.experimental.fbs.DimensionValueType\r\n     */\r\n    dimType():
onnxruntime.experimental.fbs.DimensionValueType {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? /**  */ (this.bb!.readInt8(this.bb_pos + offset)) :\r\n
onnxruntime.experimental.fbs.DimensionValueType.UNKNOWN;\r\n    }\r\n\r\n    /**\r\n     * @returns
flatbuffers.Long\r\n     */\r\n    dimValue(): flatbuffers.Long {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
    return offset ? this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n
dimParam(): string|null;\r\n    dimParam(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
dimParam(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 8);\r\n
   return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     */\r\n    static startDimensionValue(builder: flatbuffers.Builder) {\r\n
builder.startObject(3);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
```

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onnxruntime.experimental.fbs.DimensionValueType dimType\r\n     */\r\n    static addDimType(builder:
flatbuffers.Builder, dimType: onnxruntime.experimental.fbs.DimensionValueType) {\r\n      builder.addFieldInt8(0,
dimType, onnxruntime.experimental.fbs.DimensionValueType.UNKNOWN);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Long dimValue\r\n     */\r\n    static addDimValue(builder:
flatbuffers.Builder, dimValue: flatbuffers.Long) {\r\n      builder.addFieldInt64(1, dimValue, builder.createLong(0,
0));\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset
dimParamOffset\r\n     */\r\n    static addDimParam(builder: flatbuffers.Builder, dimParamOffset: flatbuffers.Offset)
{\r\n      builder.addFieldOffset(2, dimParamOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static endDimensionValue(builder: flatbuffers.Builder):
flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static
createDimensionValue(\r\n        builder: flatbuffers.Builder, dimType:
onnxruntime.experimental.fbs.DimensionValueType,\r\n        dimValue: flatbuffers.Long, dimParamOffset:
flatbuffers.Offset): flatbuffers.Offset {\r\n      DimensionValue.startDimensionValue(builder);\r\n
DimensionValue.addDimType(builder, dimType);\r\n      DimensionValue.addDimValue(builder, dimValue);\r\n
DimensionValue.addDimParam(builder, dimParamOffset);\r\n      return
DimensionValue.endDimensionValue(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport
namespace onnxruntime.experimental.fbs {\r\n  export class TensorTypeAndShape {\r\n    bb:
flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @returns TensorTypeAndShape\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): TensorTypeAndShape {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param TensorTypeAndShape= obj\r\n     *
@returns TensorTypeAndShape\r\n     */\r\n    static getRootAsTensorTypeAndShape(bb: flatbuffers.ByteBuffer,
obj?: TensorTypeAndShape): TensorTypeAndShape {\r\n      return (obj || new
TensorTypeAndShape()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.ByteBuffer bb\r\n     * @param TensorTypeAndShape= obj\r\n     * @returns
TensorTypeAndShape\r\n     */\r\n    static getSizePrefixedRootAsTensorTypeAndShape(bb: flatbuffers.ByteBuffer,
obj?: TensorTypeAndShape):\r\n        TensorTypeAndShape {\r\n      bb.setPosition(bb.position() +
flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
TensorTypeAndShape()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     *
@returns onnxruntime.experimental.fbs.TensorDataType\r\n     */\r\n    elemType():
onnxruntime.experimental.fbs.TensorDataType {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return
offset ? /**  */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n
onnxruntime.experimental.fbs.TensorDataType.UNDEFINED;\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.Shape= obj\r\n     * @returns onnxruntime.experimental.fbs.Shape|null\r\n     */\r\n
shape(obj?: onnxruntime.experimental.fbs.Shape): onnxruntime.experimental.fbs.Shape|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Shape())\r\n
          .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     */\r\n    static startTensorTypeAndShape(builder: flatbuffers.Builder) {\r\n
    builder.startObject(2);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
onnxruntime.experimental.fbs.TensorDataType elemType\r\n     */\r\n    static addElemType(builder:
flatbuffers.Builder, elemType: onnxruntime.experimental.fbs.TensorDataType) {\r\n      builder.addFieldInt32(0,
elemType, onnxruntime.experimental.fbs.TensorDataType.UNDEFINED);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset shapeOffset\r\n     */\r\n    static addShape(builder:
flatbuffers.Builder, shapeOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1, shapeOffset, 0);\r\n    }\r\n\r\n
 /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
endTensorTypeAndShape(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset =
builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createTensorTypeAndShape(\r\n        builder:
flatbuffers.Builder, elemType: onnxruntime.experimental.fbs.TensorDataType,\r\n        shapeOffset:
```

flatbuffers.Offset): flatbuffers.Offset {\r\n   TensorTypeAndShape.startTensorTypeAndShape(builder);\r\n TensorTypeAndShape.addElemType(builder, elemType);\r\n   TensorTypeAndShape.addShape(builder, shapeOffset);\r\n   return TensorTypeAndShape.endTensorTypeAndShape(builder);\r\n   }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class MapType {\r\n   bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n   bb_pos = 0;\r\n   /**\r\n   * @param number i\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @returns MapType\r\n   */\r\n   __init(i: number, bb: flatbuffers.ByteBuffer): MapType {\r\n   this.bb_pos = i;\r\n   this.bb = bb;\r\n   return this;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param MapType= obj\r\n   * @returns MapType\r\n   */\r\n   static getRootAsMapType(bb: flatbuffers.ByteBuffer, obj?: MapType): MapType {\r\n   return (obj || new MapType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param MapType= obj\r\n   * @returns MapType\r\n   */\r\n   static getSizePrefixedRootAsMapType(bb: flatbuffers.ByteBuffer, obj?: MapType): MapType {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n   return (obj || new MapType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n   /**\r\n   * @returns onnxruntime.experimental.fbs.TensorDataType\r\n   */\r\n   keyType(): onnxruntime.experimental.fbs.TensorDataType {\r\n   let offset = this.bb!.__offset(this.bb_pos, 4);\r\n   return offset ? /** */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n onnxruntime.experimental.fbs.TensorDataType.UNDEFINED;\r\n   }\r\n\r\n   /**\r\n   * @param onnxruntime.experimental.fbs.TypeInfo= obj\r\n   * @returns onnxruntime.experimental.fbs.TypeInfo|null\r\n */\r\n   valueType(obj?: onnxruntime.experimental.fbs.TypeInfo): onnxruntime.experimental.fbs.TypeInfo|null {\r\n   let offset = this.bb!.__offset(this.bb_pos, 6);\r\n   return offset ? (obj || new onnxruntime.experimental.fbs.TypeInfo())\r\n   .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n   null;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   */\r\n   static startMapType(builder: flatbuffers.Builder) {\r\n   builder.startObject(2);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param onnxruntime.experimental.fbs.TensorDataType keyType\r\n   */\r\n static addKeyType(builder: flatbuffers.Builder, keyType: onnxruntime.experimental.fbs.TensorDataType) {\r\n builder.addFieldInt32(0, keyType, onnxruntime.experimental.fbs.TensorDataType.UNDEFINED);\r\n   }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset valueTypeOffset\r\n   */\r\n static addValueType(builder: flatbuffers.Builder, valueTypeOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, valueTypeOffset, 0);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n   */\r\n   static endMapType(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n   let offset = builder.endObject();\r\n   return offset;\r\n   }\r\n\r\n   static createMapType(\r\n   builder: flatbuffers.Builder, keyType: onnxruntime.experimental.fbs.TensorDataType,\r\n   valueTypeOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n   MapType.startMapType(builder);\r\n MapType.addKeyType(builder, keyType);\r\n   MapType.addValueType(builder, valueTypeOffset);\r\n   return MapType.endMapType(builder);\r\n   }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class SequenceType {\r\n   bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n   bb_pos = 0;\r\n   /**\r\n   * @param number i\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @returns SequenceType\r\n   */\r\n   __init(i: number, bb: flatbuffers.ByteBuffer): SequenceType {\r\n   this.bb_pos = i;\r\n   this.bb = bb;\r\n   return this;\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param SequenceType= obj\r\n   * @returns SequenceType\r\n   */\r\n   static getRootAsSequenceType(bb: flatbuffers.ByteBuffer, obj?: SequenceType): SequenceType {\r\n   return (obj || new SequenceType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n   /**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param SequenceType= obj\r\n   * @returns SequenceType\r\n   */\r\n   static getSizePrefixedRootAsSequenceType(bb: flatbuffers.ByteBuffer, obj?: SequenceType): SequenceType {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n   return (obj || new SequenceType()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n   }\r\n\r\n   /**\r\n   * @param onnxruntime.experimental.fbs.TypeInfo= obj\r\n   * @returns onnxruntime.experimental.fbs.TypeInfo|null\r\n

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*/\r\n    elemType(obj?: onnxruntime.experimental.fbs.TypeInfo): onnxruntime.experimental.fbs.TypeInfo|null {\r\n
   let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.TypeInfo())\r\n                        .__init(this.bb!.__indirect(this.bb_pos + offset),
this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static
startSequenceType(builder: flatbuffers.Builder) {\r\n      builder.startObject(1);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset elemTypeOffset\r\n     */\r\n    static
addElemType(builder: flatbuffers.Builder, elemTypeOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(0,
elemTypeOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns
flatbuffers.Offset\r\n     */\r\n    static endSequenceType(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let
offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createSequenceType(builder:
flatbuffers.Builder, elemTypeOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
SequenceType.startSequenceType(builder);\r\n      SequenceType.addElemType(builder, elemTypeOffset);\r\n
return SequenceType.endSequenceType(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport
namespace onnxruntime.experimental.fbs {\r\n  export class EdgeEnd {\r\n    bb: flatbuffers.ByteBuffer|null =
null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     *
@returns EdgeEnd\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): EdgeEnd {\r\n      this.bb_pos = i;\r\n
    this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodeIndex(): number
{\r\n      return this.bb!.readUint32(this.bb_pos);\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n
srcArgIndex(): number {\r\n      return this.bb!.readInt32(this.bb_pos + 4);\r\n    }\r\n\r\n    /**\r\n     * @returns
number\r\n     */\r\n    dstArgIndex(): number {\r\n      return this.bb!.readInt32(this.bb_pos + 8);\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     * @param number node_index\r\n     * @param number
src_arg_index\r\n     * @param number dst_arg_index\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createEdgeEnd(\r\n        builder: flatbuffers.Builder, node_index: number, src_arg_index: number,\r\n
dst_arg_index: number): flatbuffers.Offset {\r\n      builder.prep(4, 12);\r\n      builder.writeInt32(dst_arg_index);\r\n
    builder.writeInt32(src_arg_index);\r\n      builder.writeInt32(node_index);\r\n      return builder.offset();\r\n    }\r\n
}\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class
NodeEdge {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n
   * @param flatbuffers.ByteBuffer bb\r\n     * @returns NodeEdge\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): NodeEdge {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param NodeEdge= obj\r\n     * @returns NodeEdge\r\n
*/\r\n    static getRootAsNodeEdge(bb: flatbuffers.ByteBuffer, obj?: NodeEdge): NodeEdge {\r\n      return (obj ||
new NodeEdge()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param NodeEdge= obj\r\n     * @returns NodeEdge\r\n     */\r\n    static
getSizePrefixedRootAsNodeEdge(bb: flatbuffers.ByteBuffer, obj?: NodeEdge): NodeEdge {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
NodeEdge()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @returns
number\r\n     */\r\n    nodeIndex(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset
? this.bb!.readUint32(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.EdgeEnd= obj\r\n     * @returns onnxruntime.experimental.fbs.EdgeEnd\r\n     */\r\n
inputEdges(index: number, obj?: onnxruntime.experimental.fbs.EdgeEnd):
onnxruntime.experimental.fbs.EdgeEnd|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return
offset ? (obj || new onnxruntime.experimental.fbs.EdgeEnd())\r\n
.__init(this.bb!.__vector(this.bb_pos + offset) + index * 12, this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n
* @returns number\r\n     */\r\n    inputEdgesLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos,
6);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param number
index\r\n     * @param onnxruntime.experimental.fbs.EdgeEnd= obj\r\n     * @returns
onnxruntime.experimental.fbs.EdgeEnd\r\n     */\r\n    outputEdges(index: number, obj?:
onnxruntime.experimental.fbs.EdgeEnd): onnxruntime.experimental.fbs.EdgeEnd|null {\r\n      let offset =
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this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.EdgeEnd())\r\n
              .__init(this.bb!.__vector(this.bb_pos + offset) + index * 12, this.bb!) :\r\n                    null;\r\n    }\r\n\r\n
 /**\r\n     * @returns number\r\n     */\r\n    outputEdgesLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startNodeEdge(builder: flatbuffers.Builder) {\r\n
   builder.startObject(3);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param number
nodeIndex\r\n     */\r\n    static addNodeIndex(builder: flatbuffers.Builder, nodeIndex: number) {\r\n
builder.addFieldInt32(0, nodeIndex, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     *
@param flatbuffers.Offset inputEdgesOffset\r\n     */\r\n    static addInputEdges(builder: flatbuffers.Builder,
inputEdgesOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1, inputEdgesOffset, 0);\r\n    }\r\n\r\n    /**\r\n
   * @param flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startInputEdgesVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(12, numElems,
4);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset
outputEdgesOffset\r\n     */\r\n    static addOutputEdges(builder: flatbuffers.Builder, outputEdgesOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(2, outputEdgesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startOutputEdgesVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(12, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static endNodeEdge(builder:
flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n
static createNodeEdge(\r\n        builder: flatbuffers.Builder, nodeIndex: number, inputEdgesOffset:
flatbuffers.Offset,\r\n        outputEdgesOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
NodeEdge.startNodeEdge(builder);\r\n      NodeEdge.addNodeIndex(builder, nodeIndex);\r\n
NodeEdge.addInputEdges(builder, inputEdgesOffset);\r\n      NodeEdge.addOutputEdges(builder,
outputEdgesOffset);\r\n      return NodeEdge.endNodeEdge(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n
*/\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class Node {\r\n    bb: flatbuffers.ByteBuffer|null
= null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     *
@returns Node\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): Node {\r\n      this.bb_pos = i;\r\n
this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param
Node= obj\r\n     * @returns Node\r\n     */\r\n    static getRootAsNode(bb: flatbuffers.ByteBuffer, obj?: Node):
Node {\r\n      return (obj || new Node()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param Node= obj\r\n     * @returns Node\r\n     */\r\n
static getSizePrefixedRootAsNode(bb: flatbuffers.ByteBuffer, obj?: Node): Node {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
Node()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    name():
string|null;\r\n    name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
name(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    docString():
string|null;\r\n    docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
docString(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
  return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    domain():
string|null;\r\n    domain(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
domain(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 8);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @returns
number\r\n     */\r\n    sinceVersion(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 10);\r\n      return
offset ? this.bb!.readInt32(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n
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index(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ?
this.bb!.readUint32(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Encoding=
optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    opType(): string|null;\r\n
opType(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n    opType(optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 14);\r\n      return offset ?
this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @returns
onnxruntime.experimental.fbs.NodeType\r\n     */\r\n    type(): onnxruntime.experimental.fbs.NodeType {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 16);\r\n      return offset ? /**  */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n
                  onnxruntime.experimental.fbs.NodeType.Primitive;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n
executionProviderType(): string|null;\r\n    executionProviderType(optionalEncoding: flatbuffers.Encoding):
string|Uint8Array|null;\r\n    executionProviderType(optionalEncoding?: any): string|Uint8Array|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 18);\r\n      return offset ? this.bb!.__string(this.bb_pos + offset,
optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param flatbuffers.Encoding=
optionalEncoding\r\n     * @returns string|Uint8Array\r\n     */\r\n    inputs(index: number): string;\r\n
inputs(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n    inputs(index: number,
optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 20);\r\n      return
offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n    }\r\n\r\n
 /**\r\n     * @returns number\r\n     */\r\n    inputsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 20);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns
string|Uint8Array\r\n     */\r\n    outputs(index: number): string;\r\n    outputs(index: number, optionalEncoding:
flatbuffers.Encoding): string|Uint8Array;\r\n    outputs(index: number, optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 22);\r\n      return offset ?
this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    outputsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 22);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.Attribute= obj\r\n     * @returns
onnxruntime.experimental.fbs.Attribute\r\n     */\r\n    attributes(index: number, obj?:
onnxruntime.experimental.fbs.Attribute): onnxruntime.experimental.fbs.Attribute\r\n        |null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 24);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Attribute())\r\n
                .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n
null;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    attributesLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 24);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @returns number\r\n     */\r\n    inputArgCounts(index: number):
number|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 26);\r\n      return offset ?
this.bb!.readInt32(this.bb!.__vector(this.bb_pos + offset) + index * 4) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns
number\r\n     */\r\n    inputArgCountsLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 26);\r\n
return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns Int32Array\r\n
*/\r\n    inputArgCountsArray(): Int32Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 26);\r\n      return
offset ?\r\n          new Int32Array(\r\n              this.bb!.bytes().buffer, this.bb!.bytes().byteOffset +
this.bb!.__vector(this.bb_pos + offset),\r\n              this.bb!.__vector_len(this.bb_pos + offset)) :\r\n          null;\r\n
}\r\n\r\n    /**\r\n     * @param number index\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     *
@returns string|Uint8Array\r\n     */\r\n    implicitInputs(index: number): string;\r\n    implicitInputs(index: number,
optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n    implicitInputs(index: number, optionalEncoding?:
any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 28);\r\n      return offset ?
this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    implicitInputsLength(): number {\r\n      let offset =
```

this.bb!.__offset(this.bb_pos, 28);\r\n   return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   */\r\n static startNode(builder: flatbuffers.Builder) {\r\n   builder.startObject(13);\r\n }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset nameOffset\r\n   */\r\n static addName(builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(0, nameOffset, 0);\r\n }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset docStringOffset\r\n   */\r\n static addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(1, docStringOffset, 0);\r\n }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset domainOffset\r\n   */\r\n static addDomain(builder: flatbuffers.Builder, domainOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(2, domainOffset, 0);\r\n }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param number sinceVersion\r\n   */\r\n static addSinceVersion(builder: flatbuffers.Builder, sinceVersion: number) {\r\n   builder.addFieldInt32(3, sinceVersion, 0);\r\n }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param number index\r\n   */\r\n static addIndex(builder: flatbuffers.Builder, index: number) {\r\n   builder.addFieldInt32(4, index, 0);\r\n }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset opTypeOffset\r\n   */\r\n static addOpType(builder: flatbuffers.Builder, opTypeOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(5, opTypeOffset, 0);\r\n }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param onnxruntime.experimental.fbs.NodeType type\r\n   */\r\n static addType(builder: flatbuffers.Builder, type: onnxruntime.experimental.fbs.NodeType) {\r\n   builder.addFieldInt32(6, type, onnxruntime.experimental.fbs.NodeType.Primitive);\r\n }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset executionProviderTypeOffset\r\n   */\r\n static addExecutionProviderType(builder: flatbuffers.Builder, executionProviderTypeOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(7, executionProviderTypeOffset, 0);\r\n }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset inputsOffset\r\n   */\r\n static addInputs(builder: flatbuffers.Builder, inputsOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(8, inputsOffset, 0);\r\n }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param Array.<flatbuffers.Offset> data\r\n   * @returns flatbuffers.Offset\r\n   */\r\n static createInputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n   builder.startVector(4, data.length, 4);\r\n   for (let i = data.length - 1; i >= 0; i--) {\r\n   builder.addOffset(data[i]);\r\n   }\r\n   return builder.endVector();\r\n }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param number numElems\r\n   */\r\n static startInputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n   builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset outputsOffset\r\n   */\r\n static addOutputs(builder: flatbuffers.Builder, outputsOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(9, outputsOffset, 0);\r\n }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param Array.<flatbuffers.Offset> data\r\n   * @returns flatbuffers.Offset\r\n   */\r\n static createOutputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n   builder.startVector(4, data.length, 4);\r\n   for (let i = data.length - 1; i >= 0; i--) {\r\n   builder.addOffset(data[i]);\r\n   }\r\n   return builder.endVector();\r\n }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param number numElems\r\n   */\r\n static startOutputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n   builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset attributesOffset\r\n   */\r\n static addAttributes(builder: flatbuffers.Builder, attributesOffset: flatbuffers.Offset) {\r\n   builder.addFieldOffset(10, attributesOffset, 0);\r\n }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param Array.<flatbuffers.Offset> data\r\n   * @returns flatbuffers.Offset\r\n   */\r\n static createAttributesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n   builder.startVector(4, data.length, 4);\r\n   for (let i = data.length - 1; i >= 0; i--) {\r\n   builder.addOffset(data[i]);\r\n   }\r\n   return builder.endVector();\r\n }\r\n\r\n /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param number numElems\r\n   */\r\n static startAttributesVector(builder: flatbuffers.Builder, numElems: number) {\r\n   builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n   *

@param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset inputArgCountsOffset\r\n */\r\n static addInputArgCounts(builder: flatbuffers.Builder, inputArgCountsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(11, inputArgCountsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<number> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createInputArgCountsVector(builder: flatbuffers.Builder, data: number[]|Uint8Array): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addInt32(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startInputArgCountsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset implicitInputsOffset\r\n */\r\n static addImplicitInputs(builder: flatbuffers.Builder, implicitInputsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(12, implicitInputsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createImplicitInputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startImplicitInputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endNode(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createNode(\r\n builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset, docStringOffset: flatbuffers.Offset,\r\n domainOffset: flatbuffers.Offset, sinceVersion: number, index: number, opTypeOffset: flatbuffers.Offset,\r\n type: onnxruntime.experimental.fbs.NodeType, executionProviderTypeOffset: flatbuffers.Offset,\r\n inputsOffset: flatbuffers.Offset, outputsOffset: flatbuffers.Offset, attributesOffset: flatbuffers.Offset,\r\n inputArgCountsOffset: flatbuffers.Offset, implicitInputsOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n Node.startNode(builder);\r\n Node.addName(builder, nameOffset);\r\n Node.addDocString(builder, docStringOffset);\r\n Node.addDomain(builder, domainOffset);\r\n Node.addSinceVersion(builder, sinceVersion);\r\n Node.addIndex(builder, index);\r\n Node.addOpType(builder, opTypeOffset);\r\n Node.addType(builder, type);\r\n Node.addExecutionProviderType(builder, executionProviderTypeOffset);\r\n Node.addInputs(builder, inputsOffset);\r\n Node.addOutputs(builder, outputsOffset);\r\n Node.addAttributes(builder, attributesOffset);\r\n Node.addInputArgCounts(builder, inputArgCountsOffset);\r\n Node.addImplicitInputs(builder, implicitInputsOffset);\r\n return Node.endNode(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class ValueInfo {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns ValueInfo\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): ValueInfo {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param ValueInfo= obj\r\n * @returns ValueInfo\r\n */\r\n static getRootAsValueInfo(bb: flatbuffers.ByteBuffer, obj?: ValueInfo): ValueInfo {\r\n return (obj || new ValueInfo()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param ValueInfo= obj\r\n * @returns ValueInfo\r\n */\r\n static getSizePrefixedRootAsValueInfo(bb: flatbuffers.ByteBuffer, obj?: ValueInfo): ValueInfo {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new ValueInfo()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n name(): string|null;\r\n name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n name(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param

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flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    docString():
string|null;\r\n    docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
docString(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
  return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.TypeInfo= obj\r\n     * @returns onnxruntime.experimental.fbs.TypeInfo|null\r\n
*/\r\n    type(obj?: onnxruntime.experimental.fbs.TypeInfo): onnxruntime.experimental.fbs.TypeInfo|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.TypeInfo())\r\n                        .__init(this.bb!.__indirect(this.bb_pos + offset),
this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static
startValueInfo(builder: flatbuffers.Builder) {\r\n      builder.startObject(3);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset nameOffset\r\n     */\r\n    static addName(builder:
flatbuffers.Builder, nameOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, nameOffset, 0);\r\n    }\r\n\r\n
 /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset docStringOffset\r\n     */\r\n
static addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, docStringOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
* @param flatbuffers.Offset typeOffset\r\n     */\r\n    static addType(builder: flatbuffers.Builder, typeOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(2, typeOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static endValueInfo(builder:
flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n
static createValueInfo(\r\n        builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset, docStringOffset:
flatbuffers.Offset,\r\n        typeOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
ValueInfo.startValueInfo(builder);\r\n      ValueInfo.addName(builder, nameOffset);\r\n
ValueInfo.addDocString(builder, docStringOffset);\r\n      ValueInfo.addType(builder, typeOffset);\r\n      return
ValueInfo.endValueInfo(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n  export class TypeInfo {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n
bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @returns
TypeInfo\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): TypeInfo {\r\n      this.bb_pos = i;\r\n
this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param
TypeInfo= obj\r\n     * @returns TypeInfo\r\n     */\r\n    static getRootAsTypeInfo(bb: flatbuffers.ByteBuffer, obj?:
TypeInfo): TypeInfo {\r\n      return (obj || new TypeInfo()).__init(bb.readInt32(bb.position()) + bb.position(),
bb);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param TypeInfo= obj\r\n     * @returns
TypeInfo\r\n     */\r\n    static getSizePrefixedRootAsTypeInfo(bb: flatbuffers.ByteBuffer, obj?: TypeInfo):
TypeInfo {\r\n      bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
TypeInfo()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    denotation():
string|null;\r\n    denotation(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
denotation(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
   return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     *
@returns onnxruntime.experimental.fbs.TypeInfoValue\r\n     */\r\n    valueType():
onnxruntime.experimental.fbs.TypeInfoValue {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return
offset ? /**  */ (this.bb!.readUint8(this.bb_pos + offset)) :\r\n
onnxruntime.experimental.fbs.TypeInfoValue.NONE;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Table obj\r\n
  * @returns ?flatbuffers.Table\r\n     */\r\n    value<T extends flatbuffers.Table>(obj: T): T|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.__union(obj, this.bb_pos + offset) : null;\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startTypeInfo(builder:
flatbuffers.Builder) {\r\n      builder.startObject(3);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param flatbuffers.Offset denotationOffset\r\n     */\r\n    static addDenotation(builder:
flatbuffers.Builder, denotationOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, denotationOffset, 0);\r\n
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}\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param onnxruntime.experimental.fbs.TypeInfoValue valueType\r\n */\r\n static addValueType(builder: flatbuffers.Builder, valueType: onnxruntime.experimental.fbs.TypeInfoValue) {\r\n builder.addFieldInt8(1, valueType, onnxruntime.experimental.fbs.TypeInfoValue.NONE);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset valueOffset\r\n */\r\n static addValue(builder: flatbuffers.Builder, valueOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, valueOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endTypeInfo(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createTypeInfo(\r\n builder: flatbuffers.Builder, denotationOffset: flatbuffers.Offset,\r\n valueType: onnxruntime.experimental.fbs.TypeInfoValue, valueOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n TypeInfo.startTypeInfo(builder);\r\n TypeInfo.addDenotation(builder, denotationOffset);\r\n TypeInfo.addValueType(builder, valueType);\r\n TypeInfo.addValue(builder, valueOffset);\r\n return TypeInfo.endTypeInfo(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class OperatorSetId {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns OperatorSetId\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): OperatorSetId {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param OperatorSetId= obj\r\n * @returns OperatorSetId\r\n */\r\n static getRootAsOperatorSetId(bb: flatbuffers.ByteBuffer, obj?: OperatorSetId): OperatorSetId {\r\n return (obj || new OperatorSetId()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param OperatorSetId= obj\r\n * @returns OperatorSetId\r\n */\r\n static getSizePrefixedRootAsOperatorSetId(bb: flatbuffers.ByteBuffer, obj?: OperatorSetId): OperatorSetId {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new OperatorSetId()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n domain(): string|null;\r\n domain(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n domain(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @returns flatbuffers.Long\r\n */\r\n version(): flatbuffers.Long {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startOperatorSetId(builder: flatbuffers.Builder) {\r\n builder.startObject(2);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset domainOffset\r\n */\r\n static addDomain(builder: flatbuffers.Builder, domainOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, domainOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Long version\r\n */\r\n static addVersion(builder: flatbuffers.Builder, version: flatbuffers.Long) {\r\n builder.addFieldInt64(1, version, builder.createLong(0, 0));\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endOperatorSetId(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createOperatorSetId(\r\n builder: flatbuffers.Builder, domainOffset: flatbuffers.Offset, version: flatbuffers.Long): flatbuffers.Offset {\r\n OperatorSetId.startOperatorSetId(builder);\r\n OperatorSetId.addDomain(builder, domainOffset);\r\n OperatorSetId.addVersion(builder, version);\r\n return OperatorSetId.endOperatorSetId(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class Tensor {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns Tensor\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): Tensor {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param Tensor= obj\r\n * @returns Tensor\r\n */\r\n static getRootAsTensor(bb: flatbuffers.ByteBuffer, obj?: Tensor): Tensor {\r\n return (obj || new

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Tensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param Tensor= obj\r\n     * @returns Tensor\r\n     */\r\n    static
getSizePrefixedRootAsTensor(bb: flatbuffers.ByteBuffer, obj?: Tensor): Tensor {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
Tensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    name():
string|null;\r\n    name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
name(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    docString():
string|null;\r\n    docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
docString(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
  return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
number index\r\n     * @returns flatbuffers.Long\r\n     */\r\n    dims(index: number): flatbuffers.Long|null {\r\n
let offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.readInt64(this.bb!.__vector(this.bb_pos +
offset) + index * 8) :\r\n                        this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n
*/\r\n    dimsLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ?
this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns
onnxruntime.experimental.fbs.TensorDataType\r\n     */\r\n    dataType():
onnxruntime.experimental.fbs.TensorDataType {\r\n      let offset = this.bb!.__offset(this.bb_pos, 10);\r\n      return
offset ? /**  */ (this.bb!.readInt32(this.bb_pos + offset)) :\r\n
onnxruntime.experimental.fbs.TensorDataType.UNDEFINED;\r\n    }\r\n\r\n    /**\r\n     * @param number
index\r\n     * @returns number\r\n     */\r\n    rawData(index: number): number|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ? this.bb!.readUint8(this.bb!.__vector(this.bb_pos + offset) +
index) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    rawDataLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @returns Uint8Array\r\n     */\r\n    rawDataArray(): Uint8Array|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ?\r\n          new Uint8Array(\r\n              this.bb!.bytes().buffer,
this.bb!.bytes().byteOffset + this.bb!.__vector(this.bb_pos + offset),\r\n              this.bb!.__vector_len(this.bb_pos +
offset)) :\r\n          null;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param flatbuffers.Encoding=
optionalEncoding\r\n     * @returns string|Uint8Array\r\n     */\r\n    stringData(index: number): string;\r\n
stringData(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n    stringData(index:
number, optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 14);\r\n
 return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    stringDataLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 14);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startTensor(builder: flatbuffers.Builder) {\r\n
builder.startObject(6);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset nameOffset\r\n     */\r\n    static addName(builder: flatbuffers.Builder, nameOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, nameOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset docStringOffset\r\n     */\r\n    static
addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1,
docStringOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset dimsOffset\r\n     */\r\n    static addDims(builder: flatbuffers.Builder, dimsOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(2, dimsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param Array.<flatbuffers.Long> data\r\n     * @returns flatbuffers.Offset\r\n
*/\r\n    static createDimsVector(builder: flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n
builder.startVector(8, data.length, 8);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
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builder.addInt64(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startDimsVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(8, numElems, 8);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param onnxruntime.experimental.fbs.TensorDataType dataType\r\n
*/\r\n    static addDataType(builder: flatbuffers.Builder, dataType: onnxruntime.experimental.fbs.TensorDataType)
{\r\n      builder.addFieldInt32(3, dataType, onnxruntime.experimental.fbs.TensorDataType.UNDEFINED);\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset rawDataOffset\r\n
*/\r\n    static addRawData(builder: flatbuffers.Builder, rawDataOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(4, rawDataOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     *
@param Array.<number> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createRawDataVector(builder: flatbuffers.Builder, data: number[]|Uint8Array): flatbuffers.Offset {\r\n
builder.startVector(1, data.length, 1);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addInt8(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startRawDataVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(1, numElems, 1);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset stringDataOffset\r\n     */\r\n    static
addStringData(builder: flatbuffers.Builder, stringDataOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(5,
stringDataOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createStringDataVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startStringDataVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static endTensor(builder:
flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n
static createTensor(\r\n        builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset, docStringOffset:
flatbuffers.Offset,\r\n        dimsOffset: flatbuffers.Offset, dataType:
onnxruntime.experimental.fbs.TensorDataType,\r\n        rawDataOffset: flatbuffers.Offset, stringDataOffset:
flatbuffers.Offset): flatbuffers.Offset {\r\n      Tensor.startTensor(builder);\r\n      Tensor.addName(builder,
nameOffset);\r\n      Tensor.addDocString(builder, docStringOffset);\r\n      Tensor.addDims(builder,
dimsOffset);\r\n      Tensor.addDataType(builder, dataType);\r\n      Tensor.addRawData(builder,
rawDataOffset);\r\n      Tensor.addStringData(builder, stringDataOffset);\r\n      return
Tensor.endTensor(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n  export class SparseTensor {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n
bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @returns
SparseTensor\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): SparseTensor {\r\n      this.bb_pos = i;\r\n
  this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param
SparseTensor= obj\r\n     * @returns SparseTensor\r\n     */\r\n    static getRootAsSparseTensor(bb:
flatbuffers.ByteBuffer, obj?: SparseTensor): SparseTensor {\r\n      return (obj || new
SparseTensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param SparseTensor= obj\r\n     * @returns SparseTensor\r\n     */\r\n    static
getSizePrefixedRootAsSparseTensor(bb: flatbuffers.ByteBuffer, obj?: SparseTensor): SparseTensor {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
SparseTensor()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.Tensor= obj\r\n     * @returns onnxruntime.experimental.fbs.Tensor|null\r\n     */\r\n
values(obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n
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        .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     *
@param onnxruntime.experimental.fbs.Tensor= obj\r\n     * @returns onnxruntime.experimental.fbs.Tensor|null\r\n
  */\r\n    indices(obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.Tensor())\r\n                          .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!)
:\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @returns flatbuffers.Long\r\n
*/\r\n    dims(index: number): flatbuffers.Long|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 8);\r\n
return offset ? this.bb!.readInt64(this.bb!.__vector(this.bb_pos + offset) + index * 8) :\r\n
this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    dimsLength(): number {\r\n
let offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n
 }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startSparseTensor(builder:
flatbuffers.Builder) {\r\n      builder.startObject(3);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param flatbuffers.Offset valuesOffset\r\n     */\r\n    static addValues(builder: flatbuffers.Builder,
valuesOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, valuesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset indicesOffset\r\n     */\r\n    static
addIndices(builder: flatbuffers.Builder, indicesOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(1,
indicesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset
dimsOffset\r\n     */\r\n    static addDims(builder: flatbuffers.Builder, dimsOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(2, dimsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     *
@param Array.<flatbuffers.Long> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createDimsVector(builder: flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n
builder.startVector(8, data.length, 8);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addInt64(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startDimsVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(8, numElems, 8);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
endSparseTensor(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n
return offset;\r\n    }\r\n\r\n    static createSparseTensor(\r\n        builder: flatbuffers.Builder, valuesOffset:
flatbuffers.Offset, indicesOffset: flatbuffers.Offset,\r\n        dimsOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
SparseTensor.startSparseTensor(builder);\r\n      SparseTensor.addValues(builder, valuesOffset);\r\n
SparseTensor.addIndices(builder, indicesOffset);\r\n      SparseTensor.addDims(builder, dimsOffset);\r\n      return
SparseTensor.endSparseTensor(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n  export class Attribute {\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n
bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @returns
Attribute\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer): Attribute {\r\n      this.bb_pos = i;\r\n      this.bb
= bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param Attribute=
obj\r\n     * @returns Attribute\r\n     */\r\n    static getRootAsAttribute(bb: flatbuffers.ByteBuffer, obj?: Attribute):
Attribute {\r\n      return (obj || new Attribute()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n
  /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param Attribute= obj\r\n     * @returns Attribute\r\n
*/\r\n    static getSizePrefixedRootAsAttribute(bb: flatbuffers.ByteBuffer, obj?: Attribute): Attribute {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
Attribute()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    name():
string|null;\r\n    name(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
name(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    docString():
string|null;\r\n    docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
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docString(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
  return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @returns
onnxruntime.experimental.fbs.AttributeType\r\n     */\r\n    type(): onnxruntime.experimental.fbs.AttributeType {\r\n
    let offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? /**  */ (this.bb!.readInt32(this.bb_pos + offset))
:\r\n                    onnxruntime.experimental.fbs.AttributeType.UNDEFINED;\r\n    }\r\n\r\n    /**\r\n     * @returns
number\r\n     */\r\n    f(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 10);\r\n      return offset ?
this.bb!.readFloat32(this.bb_pos + offset) : 0.0;\r\n    }\r\n\r\n    /**\r\n     * @returns flatbuffers.Long\r\n     */\r\n
i(): flatbuffers.Long {\r\n      let offset = this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ?
this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    s(): string|null;\r\n
s(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n    s(optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 14);\r\n      return offset ?
this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.Tensor= obj\r\n     * @returns onnxruntime.experimental.fbs.Tensor|null\r\n     */\r\n
t(obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 16);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n
            .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     *
@param onnxruntime.experimental.fbs.Graph= obj\r\n     * @returns onnxruntime.experimental.fbs.Graph|null\r\n
*/\r\n    g(obj?: onnxruntime.experimental.fbs.Graph): onnxruntime.experimental.fbs.Graph|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 18);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Graph())\r\n
            .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     *
@param number index\r\n     * @returns number\r\n     */\r\n    floats(index: number): number|null {\r\n      let offset
= this.bb!.__offset(this.bb_pos, 20);\r\n      return offset ? this.bb!.readFloat32(this.bb!.__vector(this.bb_pos +
offset) + index * 4) : 0;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    floatsLength(): number {\r\n
let offset = this.bb!.__offset(this.bb_pos, 20);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) :
0;\r\n    }\r\n\r\n    /**\r\n     * @returns Float32Array\r\n     */\r\n    floatsArray(): Float32Array|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 20);\r\n      return offset ?\r\n          new Float32Array(\r\n
this.bb!.bytes().buffer, this.bb!.bytes().byteOffset + this.bb!.__vector(this.bb_pos + offset),\r\n
this.bb!.__vector_len(this.bb_pos + offset)) :\r\n          null;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n
* @returns flatbuffers.Long\r\n     */\r\n    ints(index: number): flatbuffers.Long|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 22);\r\n      return offset ? this.bb!.readInt64(this.bb!.__vector(this.bb_pos + offset) +
index * 8) :\r\n                    this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n
intsLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 22);\r\n      return offset ?
this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array\r\n     */\r\n    strings(index: number):
string;\r\n    strings(index: number, optionalEncoding: flatbuffers.Encoding): string|Uint8Array;\r\n    strings(index:
number, optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 24);\r\n
 return offset ? this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    stringsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 24);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.Tensor= obj\r\n     * @returns
onnxruntime.experimental.fbs.Tensor\r\n     */\r\n    tensors(index: number, obj?:
onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 26);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.Tensor())\r\n
            .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n
null;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    tensorsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 26);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.Graph= obj\r\n     * @returns
```

onnxruntime.experimental.fbs.Graph\r\n */\r\n graphs(index: number, obj?: onnxruntime.experimental.fbs.Graph): onnxruntime.experimental.fbs.Graph|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 28);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Graph())\r\n .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @returns number\r\n */\r\n graphsLength(): number {\r\n let offset = this.bb!.__offset(this.bb_pos, 28);\r\n return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startAttribute(builder: flatbuffers.Builder) {\r\n builder.startObject(13);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nameOffset\r\n */\r\n static addName(builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, nameOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset docStringOffset\r\n */\r\n static addDocString(builder: flatbuffers.Builder, docStringOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, docStringOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param onnxruntime.experimental.fbs.AttributeType type\r\n */\r\n static addType(builder: flatbuffers.Builder, type: onnxruntime.experimental.fbs.AttributeType) {\r\n builder.addFieldInt32(2, type, onnxruntime.experimental.fbs.AttributeType.UNDEFINED);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number f\r\n */\r\n static addF(builder: flatbuffers.Builder, f: number) {\r\n builder.addFieldFloat32(3, f, 0.0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Long i\r\n */\r\n static addI(builder: flatbuffers.Builder, i: flatbuffers.Long) {\r\n builder.addFieldInt64(4, i, builder.createLong(0, 0));\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset sOffset\r\n */\r\n static addS(builder: flatbuffers.Builder, sOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(5, sOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset tOffset\r\n */\r\n static addT(builder: flatbuffers.Builder, tOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(6, tOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset gOffset\r\n */\r\n static addG(builder: flatbuffers.Builder, gOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(7, gOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset floatsOffset\r\n */\r\n static addFloats(builder: flatbuffers.Builder, floatsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(8, floatsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<number> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createFloatsVector(builder: flatbuffers.Builder, data: number[]|Uint8Array): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addFloat32(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startFloatsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset intsOffset\r\n */\r\n static addInts(builder: flatbuffers.Builder, intsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(9, intsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Long> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createIntsVector(builder: flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n builder.startVector(8, data.length, 8);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addInt64(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startIntsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(8, numElems, 8);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset stringsOffset\r\n */\r\n static addStrings(builder: flatbuffers.Builder, stringsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(10, stringsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createStringsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n

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builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startStringsVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset tensorsOffset\r\n     */\r\n    static
addTensors(builder: flatbuffers.Builder, tensorsOffset: flatbuffers.Offset) {\r\n      builder.addFieldOffset(11,
tensorsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static createTensorsVector(builder:
flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n      builder.startVector(4, data.length, 4);\r\n
for (let i = data.length - 1; i >= 0; i--) {\r\n        builder.addOffset(data[i]);\r\n      }\r\n      return
builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param number
numElems\r\n     */\r\n    static startTensorsVector(builder: flatbuffers.Builder, numElems: number) {\r\n
builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     *
@param flatbuffers.Offset graphsOffset\r\n     */\r\n    static addGraphs(builder: flatbuffers.Builder, graphsOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(12, graphsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n
*/\r\n    static createGraphsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startGraphsVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static endAttribute(builder:
flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n
static createAttribute(\r\n        builder: flatbuffers.Builder, nameOffset: flatbuffers.Offset, docStringOffset:
flatbuffers.Offset,\r\n        type: onnxruntime.experimental.fbs.AttributeType, f: number, i: flatbuffers.Long, sOffset:
flatbuffers.Offset,\r\n        tOffset: flatbuffers.Offset, gOffset: flatbuffers.Offset, floatsOffset: flatbuffers.Offset,\r\n
   intsOffset: flatbuffers.Offset, stringsOffset: flatbuffers.Offset, tensorsOffset: flatbuffers.Offset,\r\n
graphsOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n      Attribute.startAttribute(builder);\r\n
Attribute.addName(builder, nameOffset);\r\n      Attribute.addDocString(builder, docStringOffset);\r\n
Attribute.addType(builder, type);\r\n      Attribute.addF(builder, f);\r\n      Attribute.addI(builder, i);\r\n
Attribute.addS(builder, sOffset);\r\n      Attribute.addT(builder, tOffset);\r\n      Attribute.addG(builder, gOffset);\r\n
   Attribute.addFloats(builder, floatsOffset);\r\n      Attribute.addInts(builder, intsOffset);\r\n
Attribute.addStrings(builder, stringsOffset);\r\n      Attribute.addTensors(builder, tensorsOffset);\r\n
Attribute.addGraphs(builder, graphsOffset);\r\n      return Attribute.endAttribute(builder);\r\n    }\r\n
}\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class Graph
{\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     *
@param flatbuffers.ByteBuffer bb\r\n     * @returns Graph\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): Graph {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n
   * @param flatbuffers.ByteBuffer bb\r\n     * @param Graph= obj\r\n     * @returns Graph\r\n     */\r\n    static
getRootAsGraph(bb: flatbuffers.ByteBuffer, obj?: Graph): Graph {\r\n      return (obj || new
Graph()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param Graph= obj\r\n     * @returns Graph\r\n     */\r\n    static
getSizePrefixedRootAsGraph(bb: flatbuffers.ByteBuffer, obj?: Graph): Graph {\r\n      bb.setPosition(bb.position()
+ flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new Graph()).__init(bb.readInt32(bb.position()) +
bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.Tensor= obj\r\n     * @returns onnxruntime.experimental.fbs.Tensor\r\n     */\r\n
initializers(index: number, obj?: onnxruntime.experimental.fbs.Tensor): onnxruntime.experimental.fbs.Tensor|null
{\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.Tensor())\r\n                    .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos
```

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+ offset) + index * 4), this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n
initializersLength(): number {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ?
this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.ValueInfo= obj\r\n     * @returns onnxruntime.experimental.fbs.ValueInfo\r\n
*/\r\n    nodeArgs(index: number, obj?: onnxruntime.experimental.fbs.ValueInfo):
onnxruntime.experimental.fbs.ValueInfo|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return
offset ? (obj || new onnxruntime.experimental.fbs.ValueInfo())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodeArgsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.Node= obj\r\n     * @returns
onnxruntime.experimental.fbs.Node\r\n     */\r\n    nodes(index: number, obj?: onnxruntime.experimental.fbs.Node):
onnxruntime.experimental.fbs.Node|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ?
(obj || new onnxruntime.experimental.fbs.Node())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodesLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 8);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    maxNodeIndex(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 10);\r\n      return offset ? this.bb!.readUint32(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.NodeEdge= obj\r\n     * @returns
onnxruntime.experimental.fbs.NodeEdge\r\n     */\r\n    nodeEdges(index: number, obj?:
onnxruntime.experimental.fbs.NodeEdge): onnxruntime.experimental.fbs.NodeEdge|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.NodeEdge())\r\n
                   .__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n
 null;\r\n    }\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    nodeEdgesLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 12);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns
string|Uint8Array\r\n     */\r\n    inputs(index: number): string;\r\n    inputs(index: number, optionalEncoding:
flatbuffers.Encoding): string|Uint8Array;\r\n    inputs(index: number, optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 14);\r\n      return offset ?
this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    inputsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 14);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param flatbuffers.Encoding= optionalEncoding\r\n     * @returns
string|Uint8Array\r\n     */\r\n    outputs(index: number): string;\r\n    outputs(index: number, optionalEncoding:
flatbuffers.Encoding): string|Uint8Array;\r\n    outputs(index: number, optionalEncoding?: any):
string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 16);\r\n      return offset ?
this.bb!.__string(this.bb!.__vector(this.bb_pos + offset) + index * 4, optionalEncoding) : null;\r\n    }\r\n\r\n
/**\r\n     * @returns number\r\n     */\r\n    outputsLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 16);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
  /**\r\n     * @param number index\r\n     * @param onnxruntime.experimental.fbs.SparseTensor= obj\r\n     *
@returns onnxruntime.experimental.fbs.SparseTensor\r\n     */\r\n    sparseInitializers(index: number, obj?:
onnxruntime.experimental.fbs.SparseTensor):\r\n        onnxruntime.experimental.fbs.SparseTensor|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 18);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.SparseTensor())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    sparseInitializersLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 18);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
```

/**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startGraph(builder: flatbuffers.Builder) {\r\n builder.startObject(8);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset initializersOffset\r\n */\r\n static addInitializers(builder: flatbuffers.Builder, initializersOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, initializersOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createInitializersVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startInitializersVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nodeArgsOffset\r\n */\r\n static addNodeArgs(builder: flatbuffers.Builder, nodeArgsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, nodeArgsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createNodeArgsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startNodeArgsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nodesOffset\r\n */\r\n static addNodes(builder: flatbuffers.Builder, nodesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, nodesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createNodesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startNodesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number maxNodeIndex\r\n */\r\n static addMaxNodeIndex(builder: flatbuffers.Builder, maxNodeIndex: number) {\r\n builder.addFieldInt32(3, maxNodeIndex, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset nodeEdgesOffset\r\n */\r\n static addNodeEdges(builder: flatbuffers.Builder, nodeEdgesOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(4, nodeEdgesOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createNodeEdgesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startNodeEdgesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset inputsOffset\r\n */\r\n static addInputs(builder: flatbuffers.Builder, inputsOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(5, inputsOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createInputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startInputsVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n *

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@param flatbuffers.Offset outputsOffset\r\n     */\r\n    static addOutputs(builder: flatbuffers.Builder, outputsOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(6, outputsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n
*/\r\n    static createOutputsVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startOutputsVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset sparseInitializersOffset\r\n     */\r\n    static
addSparseInitializers(builder: flatbuffers.Builder, sparseInitializersOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(7, sparseInitializersOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createSparseInitializersVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]):\r\n        flatbuffers.Offset {\r\n
  builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addOffset(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startSparseInitializersVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4,
numElems, 4);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns
flatbuffers.Offset\r\n     */\r\n    static endGraph(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n      let offset =
builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createGraph(\r\n        builder: flatbuffers.Builder,
initializersOffset: flatbuffers.Offset, nodeArgsOffset: flatbuffers.Offset,\r\n        nodesOffset: flatbuffers.Offset,
maxNodeIndex: number, nodeEdgesOffset: flatbuffers.Offset,\r\n        inputsOffset: flatbuffers.Offset,
outputsOffset: flatbuffers.Offset,\r\n        sparseInitializersOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
Graph.startGraph(builder);\r\n      Graph.addInitializers(builder, initializersOffset);\r\n
Graph.addNodeArgs(builder, nodeArgsOffset);\r\n      Graph.addNodes(builder, nodesOffset);\r\n
Graph.addMaxNodeIndex(builder, maxNodeIndex);\r\n      Graph.addNodeEdges(builder, nodeEdgesOffset);\r\n
Graph.addInputs(builder, inputsOffset);\r\n      Graph.addOutputs(builder, outputsOffset);\r\n
Graph.addSparseInitializers(builder, sparseInitializersOffset);\r\n      return Graph.endGraph(builder);\r\n    }\r\n
}\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class Model
{\r\n    bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     *
@param flatbuffers.ByteBuffer bb\r\n     * @returns Model\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): Model {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n
   * @param flatbuffers.ByteBuffer bb\r\n     * @param Model= obj\r\n     * @returns Model\r\n     */\r\n    static
getRootAsModel(bb: flatbuffers.ByteBuffer, obj?: Model): Model {\r\n      return (obj || new
Model()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param Model= obj\r\n     * @returns Model\r\n     */\r\n    static
getSizePrefixedRootAsModel(bb: flatbuffers.ByteBuffer, obj?: Model): Model {\r\n      bb.setPosition(bb.position()
+ flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new Model()).__init(bb.readInt32(bb.position()) +
bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @returns flatbuffers.Long\r\n     */\r\n    irVersion(): flatbuffers.Long
{\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? this.bb!.readInt64(this.bb_pos + offset) :
this.bb!.createLong(0, 0);\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.OperatorSetId= obj\r\n     * @returns onnxruntime.experimental.fbs.OperatorSetId\r\n
   */\r\n    opsetImport(index: number, obj?: onnxruntime.experimental.fbs.OperatorSetId):\r\n
onnxruntime.experimental.fbs.OperatorSetId|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n      return
offset ? (obj || new onnxruntime.experimental.fbs.OperatorSetId())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    opsetImportLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
```

/**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n producerName(): string|null;\r\n producerName(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n producerName(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n producerVersion(): string|null;\r\n producerVersion(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n producerVersion(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 10);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n domain(): string|null;\r\n domain(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n domain(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 12);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @returns flatbuffers.Long\r\n */\r\n modelVersion(): flatbuffers.Long {\r\n let offset = this.bb!.__offset(this.bb_pos, 14);\r\n return offset ? this.bb!.readInt64(this.bb_pos + offset) : this.bb!.createLong(0, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n docString(): string|null;\r\n docString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n docString(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 16);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.Graph= obj\r\n * @returns onnxruntime.experimental.fbs.Graph|null\r\n */\r\n graph(obj?: onnxruntime.experimental.fbs.Graph): onnxruntime.experimental.fbs.Graph|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 18);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Graph())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n graphDocString(): string|null;\r\n graphDocString(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n graphDocString(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 20);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startModel(builder: flatbuffers.Builder) {\r\n builder.startObject(9);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Long irVersion\r\n */\r\n static addIrVersion(builder: flatbuffers.Builder, irVersion: flatbuffers.Long) {\r\n builder.addFieldInt64(0, irVersion, builder.createLong(0, 0));\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset opsetImportOffset\r\n */\r\n static addOpsetImport(builder: flatbuffers.Builder, opsetImportOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, opsetImportOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param Array.<flatbuffers.Offset> data\r\n * @returns flatbuffers.Offset\r\n */\r\n static createOpsetImportVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]): flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startOpsetImportVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset producerNameOffset\r\n */\r\n static addProducerName(builder: flatbuffers.Builder, producerNameOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, producerNameOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset producerVersionOffset\r\n */\r\n static addProducerVersion(builder: flatbuffers.Builder, producerVersionOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(3, producerVersionOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset domainOffset\r\n */\r\n static addDomain(builder: flatbuffers.Builder, domainOffset:

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flatbuffers.Offset) {\r\n    builder.addFieldOffset(4, domainOffset, 0);\r\n  }\r\n\r\n  /**\r\n   * @param
flatbuffers.Builder builder\r\n   * @param flatbuffers.Long modelVersion\r\n   */\r\n  static
addModelVersion(builder: flatbuffers.Builder, modelVersion: flatbuffers.Long) {\r\n    builder.addFieldInt64(5,
modelVersion, builder.createLong(0, 0));\r\n  }\r\n\r\n  /**\r\n   * @param flatbuffers.Builder builder\r\n   *
@param flatbuffers.Offset docStringOffset\r\n   */\r\n  static addDocString(builder: flatbuffers.Builder,
docStringOffset: flatbuffers.Offset) {\r\n    builder.addFieldOffset(6, docStringOffset, 0);\r\n  }\r\n\r\n  /**\r\n
* @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset graphOffset\r\n   */\r\n  static
addGraph(builder: flatbuffers.Builder, graphOffset: flatbuffers.Offset) {\r\n    builder.addFieldOffset(7,
graphOffset, 0);\r\n  }\r\n\r\n  /**\r\n   * @param flatbuffers.Builder builder\r\n   * @param flatbuffers.Offset
graphDocStringOffset\r\n   */\r\n  static addGraphDocString(builder: flatbuffers.Builder, graphDocStringOffset:
flatbuffers.Offset) {\r\n    builder.addFieldOffset(8, graphDocStringOffset, 0);\r\n  }\r\n\r\n  /**\r\n   * @param
flatbuffers.Builder builder\r\n   * @returns flatbuffers.Offset\r\n   */\r\n  static endModel(builder:
flatbuffers.Builder): flatbuffers.Offset {\r\n    let offset = builder.endObject();\r\n    return offset;\r\n  }\r\n\r\n
static createModel(\r\n      builder: flatbuffers.Builder, irVersion: flatbuffers.Long, opsetImportOffset:
flatbuffers.Offset,\r\n      producerNameOffset: flatbuffers.Offset, producerVersionOffset: flatbuffers.Offset,\r\n
domainOffset: flatbuffers.Offset, modelVersion: flatbuffers.Long, docStringOffset: flatbuffers.Offset,\r\n
graphOffset: flatbuffers.Offset, graphDocStringOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
Model.startModel(builder);\r\n    Model.addIrVersion(builder, irVersion);\r\n    Model.addOpsetImport(builder,
opsetImportOffset);\r\n    Model.addProducerName(builder, producerNameOffset);\r\n
Model.addProducerVersion(builder, producerVersionOffset);\r\n    Model.addDomain(builder, domainOffset);\r\n
  Model.addModelVersion(builder, modelVersion);\r\n    Model.addDocString(builder, docStringOffset);\r\n
Model.addGraph(builder, graphOffset);\r\n    Model.addGraphDocString(builder, graphDocStringOffset);\r\n
return Model.endModel(builder);\r\n  }\r\n}\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace
onnxruntime.experimental.fbs {\r\n export class KernelCreateInfos {\r\n  bb: flatbuffers.ByteBuffer|null =
null;\r\n\r\n  bb_pos = 0;\r\n  /**\r\n   * @param number i\r\n   * @param flatbuffers.ByteBuffer bb\r\n   *
@returns KernelCreateInfos\r\n   */\r\n  __init(i: number, bb: flatbuffers.ByteBuffer): KernelCreateInfos {\r\n
this.bb_pos = i;\r\n    this.bb = bb;\r\n    return this;\r\n  }\r\n\r\n  /**\r\n   * @param flatbuffers.ByteBuffer
bb\r\n   * @param KernelCreateInfos= obj\r\n   * @returns KernelCreateInfos\r\n   */\r\n  static
getRootAsKernelCreateInfos(bb: flatbuffers.ByteBuffer, obj?: KernelCreateInfos): KernelCreateInfos {\r\n
return (obj || new KernelCreateInfos()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n  }\r\n\r\n
/**\r\n   * @param flatbuffers.ByteBuffer bb\r\n   * @param KernelCreateInfos= obj\r\n   * @returns
KernelCreateInfos\r\n   */\r\n  static getSizePrefixedRootAsKernelCreateInfos(bb: flatbuffers.ByteBuffer, obj?:
KernelCreateInfos):\r\n      KernelCreateInfos {\r\n    bb.setPosition(bb.position() +
flatbuffers.SIZE_PREFIX_LENGTH);\r\n    return (obj || new
KernelCreateInfos()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n  }\r\n\r\n  /**\r\n   * @param
number index\r\n   * @returns number\r\n   */\r\n  nodeIndices(index: number): number|null {\r\n    let offset =
this.bb!.__offset(this.bb_pos, 4);\r\n    return offset ? this.bb!.readUint32(this.bb!.__vector(this.bb_pos + offset) +
index * 4) : 0;\r\n  }\r\n\r\n  /**\r\n   * @returns number\r\n   */\r\n  nodeIndicesLength(): number {\r\n    let
offset = this.bb!.__offset(this.bb_pos, 4);\r\n    return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n
}\r\n\r\n  /**\r\n   * @returns Uint32Array\r\n   */\r\n  nodeIndicesArray(): Uint32Array|null {\r\n    let offset
= this.bb!.__offset(this.bb_pos, 4);\r\n    return offset ?\r\n        new Uint32Array(\r\n
this.bb!.bytes().buffer, this.bb!.bytes().byteOffset + this.bb!.__vector(this.bb_pos + offset),\r\n
this.bb!.__vector_len(this.bb_pos + offset)) :\r\n        null;\r\n  }\r\n\r\n  /**\r\n   * @param number index\r\n
* @returns flatbuffers.Long\r\n   */\r\n  kernelDefHashes(index: number): flatbuffers.Long|null {\r\n    let offset
= this.bb!.__offset(this.bb_pos, 6);\r\n    return offset ? this.bb!.readUint64(this.bb!.__vector(this.bb_pos + offset)
+ index * 8) :\r\n                    this.bb!.createLong(0, 0);\r\n  }\r\n\r\n  /**\r\n   * @returns number\r\n   */\r\n
kernelDefHashesLength(): number {\r\n    let offset = this.bb!.__offset(this.bb_pos, 6);\r\n    return offset ?
this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n  }\r\n\r\n  /**\r\n   * @param flatbuffers.Builder builder\r\n
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*/\r\n    static startKernelCreateInfos(builder: flatbuffers.Builder) {\r\n      builder.startObject(2);\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset nodeIndicesOffset\r\n     */\r\n
static addNodeIndices(builder: flatbuffers.Builder, nodeIndicesOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(0, nodeIndicesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
 * @param Array.<number> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createNodeIndicesVector(builder: flatbuffers.Builder, data: number[]|Uint8Array): flatbuffers.Offset {\r\n
builder.startVector(4, data.length, 4);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addInt32(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static startNodeIndicesVector(builder:
flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(4, numElems, 4);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset kernelDefHashesOffset\r\n     */\r\n    static
addKernelDefHashes(builder: flatbuffers.Builder, kernelDefHashesOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, kernelDefHashesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param Array.<flatbuffers.Long> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
createKernelDefHashesVector(builder: flatbuffers.Builder, data: flatbuffers.Long[]): flatbuffers.Offset {\r\n
builder.startVector(8, data.length, 8);\r\n      for (let i = data.length - 1; i >= 0; i--) {\r\n
builder.addInt64(data[i]);\r\n      }\r\n      return builder.endVector();\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param number numElems\r\n     */\r\n    static
startKernelDefHashesVector(builder: flatbuffers.Builder, numElems: number) {\r\n      builder.startVector(8,
numElems, 8);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @returns
flatbuffers.Offset\r\n     */\r\n    static endKernelCreateInfos(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n
let offset = builder.endObject();\r\n      return offset;\r\n    }\r\n\r\n    static createKernelCreateInfos(\r\n        builder:
flatbuffers.Builder, nodeIndicesOffset: flatbuffers.Offset,\r\n        kernelDefHashesOffset: flatbuffers.Offset):
flatbuffers.Offset {\r\n      KernelCreateInfos.startKernelCreateInfos(builder);\r\n
KernelCreateInfos.addNodeIndices(builder, nodeIndicesOffset);\r\n
KernelCreateInfos.addKernelDefHashes(builder, kernelDefHashesOffset);\r\n      return
KernelCreateInfos.endKernelCreateInfos(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport
namespace onnxruntime.experimental.fbs {\r\n  export class SubGraphSessionState {\r\n    bb:
flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @returns SubGraphSessionState\r\n     */\r\n    __init(i: number, bb:
flatbuffers.ByteBuffer): SubGraphSessionState {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n
}\r\n\r\n    /**\r\n     * @param flatbuffers.ByteBuffer bb\r\n     * @param SubGraphSessionState= obj\r\n     *
@returns SubGraphSessionState\r\n     */\r\n    static getRootAsSubGraphSessionState(bb: flatbuffers.ByteBuffer,
obj?: SubGraphSessionState): SubGraphSessionState {\r\n      return (obj || new
SubGraphSessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.ByteBuffer bb\r\n     * @param SubGraphSessionState= obj\r\n     * @returns
SubGraphSessionState\r\n     */\r\n    static getSizePrefixedRootAsSubGraphSessionState(bb:
flatbuffers.ByteBuffer, obj?: SubGraphSessionState):\r\n        SubGraphSessionState {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
SubGraphSessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     *
@param flatbuffers.Encoding= optionalEncoding\r\n     * @returns string|Uint8Array|null\r\n     */\r\n    graphId():
string|null;\r\n    graphId(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n
graphId(optionalEncoding?: any): string|Uint8Array|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 4);\r\n
return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.SessionState= obj\r\n     * @returns
onnxruntime.experimental.fbs.SessionState|null\r\n     */\r\n    sessionState(obj?:
onnxruntime.experimental.fbs.SessionState): onnxruntime.experimental.fbs.SessionState|null {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? (obj || new onnxruntime.experimental.fbs.SessionState())\r\n
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                    .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n
  * @param flatbuffers.Builder builder\r\n     */\r\n    static startSubGraphSessionState(builder: flatbuffers.Builder)
{\r\n      builder.startObject(2);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset graphIdOffset\r\n     */\r\n    static addGraphId(builder: flatbuffers.Builder, graphIdOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, graphIdOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset sessionStateOffset\r\n     */\r\n    static
addSessionState(builder: flatbuffers.Builder, sessionStateOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, sessionStateOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n
 * @returns flatbuffers.Offset\r\n     */\r\n    static endSubGraphSessionState(builder: flatbuffers.Builder):
flatbuffers.Offset {\r\n      let offset = builder.endObject();\r\n      builder.requiredField(offset, 4);  // graph_id\r\n
return offset;\r\n    }\r\n\r\n    static createSubGraphSessionState(\r\n        builder: flatbuffers.Builder, graphIdOffset:
flatbuffers.Offset,\r\n        sessionStateOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n
SubGraphSessionState.startSubGraphSessionState(builder);\r\n      SubGraphSessionState.addGraphId(builder,
graphIdOffset);\r\n      SubGraphSessionState.addSessionState(builder, sessionStateOffset);\r\n      return
SubGraphSessionState.endSubGraphSessionState(builder);\r\n    }\r\n  }\r\n}\r\n/**\r\n * @constructor\r\n
*/\r\nexport namespace onnxruntime.experimental.fbs {\r\n  export class SessionState {\r\n    bb:
flatbuffers.ByteBuffer|null = null;\r\n\r\n    bb_pos = 0;\r\n    /**\r\n     * @param number i\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @returns SessionState\r\n     */\r\n    __init(i: number, bb: flatbuffers.ByteBuffer):
SessionState {\r\n      this.bb_pos = i;\r\n      this.bb = bb;\r\n      return this;\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param SessionState= obj\r\n     * @returns SessionState\r\n     */\r\n    static
getRootAsSessionState(bb: flatbuffers.ByteBuffer, obj?: SessionState): SessionState {\r\n      return (obj || new
SessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.ByteBuffer bb\r\n     * @param SessionState= obj\r\n     * @returns SessionState\r\n     */\r\n    static
getSizePrefixedRootAsSessionState(bb: flatbuffers.ByteBuffer, obj?: SessionState): SessionState {\r\n
bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n      return (obj || new
SessionState()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n    }\r\n\r\n    /**\r\n     * @param
onnxruntime.experimental.fbs.KernelCreateInfos= obj\r\n     * @returns
onnxruntime.experimental.fbs.KernelCreateInfos|null\r\n     */\r\n    kernels(obj?:
onnxruntime.experimental.fbs.KernelCreateInfos): onnxruntime.experimental.fbs.KernelCreateInfos|null {\r\n      let
offset = this.bb!.__offset(this.bb_pos, 4);\r\n      return offset ? (obj || new
onnxruntime.experimental.fbs.KernelCreateInfos())\r\n                        .__init(this.bb!.__indirect(this.bb_pos +
offset), this.bb!) :\r\n                    null;\r\n    }\r\n\r\n    /**\r\n     * @param number index\r\n     * @param
onnxruntime.experimental.fbs.SubGraphSessionState= obj\r\n     * @returns
onnxruntime.experimental.fbs.SubGraphSessionState\r\n     */\r\n    subGraphSessionStates(index: number, obj?:
onnxruntime.experimental.fbs.SubGraphSessionState):\r\n
onnxruntime.experimental.fbs.SubGraphSessionState|null {\r\n      let offset = this.bb!.__offset(this.bb_pos, 6);\r\n
 return offset ? (obj || new onnxruntime.experimental.fbs.SubGraphSessionState())\r\n
.__init(this.bb!.__indirect(this.bb!.__vector(this.bb_pos + offset) + index * 4), this.bb!) :\r\n                    null;\r\n
}\r\n\r\n    /**\r\n     * @returns number\r\n     */\r\n    subGraphSessionStatesLength(): number {\r\n      let offset =
this.bb!.__offset(this.bb_pos, 6);\r\n      return offset ? this.bb!.__vector_len(this.bb_pos + offset) : 0;\r\n    }\r\n\r\n
/**\r\n     * @param flatbuffers.Builder builder\r\n     */\r\n    static startSessionState(builder: flatbuffers.Builder)
{\r\n      builder.startObject(2);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder builder\r\n     * @param
flatbuffers.Offset kernelsOffset\r\n     */\r\n    static addKernels(builder: flatbuffers.Builder, kernelsOffset:
flatbuffers.Offset) {\r\n      builder.addFieldOffset(0, kernelsOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param
flatbuffers.Builder builder\r\n     * @param flatbuffers.Offset subGraphSessionStatesOffset\r\n     */\r\n    static
addSubGraphSessionStates(builder: flatbuffers.Builder, subGraphSessionStatesOffset: flatbuffers.Offset) {\r\n
builder.addFieldOffset(1, subGraphSessionStatesOffset, 0);\r\n    }\r\n\r\n    /**\r\n     * @param flatbuffers.Builder
builder\r\n     * @param Array.<flatbuffers.Offset> data\r\n     * @returns flatbuffers.Offset\r\n     */\r\n    static
```

createSubGraphSessionStatesVector(builder: flatbuffers.Builder, data: flatbuffers.Offset[]):\r\n flatbuffers.Offset {\r\n builder.startVector(4, data.length, 4);\r\n for (let i = data.length - 1; i >= 0; i--) {\r\n builder.addOffset(data[i]);\r\n }\r\n return builder.endVector();\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param number numElems\r\n */\r\n static startSubGraphSessionStatesVector(builder: flatbuffers.Builder, numElems: number) {\r\n builder.startVector(4, numElems, 4);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endSessionState(builder: flatbuffers.Builder): flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n static createSessionState(\r\n builder: flatbuffers.Builder, kernelsOffset: flatbuffers.Offset,\r\n subGraphSessionStatesOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n SessionState.startSessionState(builder);\r\n SessionState.addKernels(builder, kernelsOffset);\r\n SessionState.addSubGraphSessionStates(builder, subGraphSessionStatesOffset);\r\n return SessionState.endSessionState(builder);\r\n }\r\n }\r\n}\r\n/**\r\n * @constructor\r\n */\r\nexport namespace onnxruntime.experimental.fbs {\r\n export class InferenceSession {\r\n bb: flatbuffers.ByteBuffer|null = null;\r\n\r\n bb_pos = 0;\r\n /**\r\n * @param number i\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns InferenceSession\r\n */\r\n __init(i: number, bb: flatbuffers.ByteBuffer): InferenceSession {\r\n this.bb_pos = i;\r\n this.bb = bb;\r\n return this;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param InferenceSession= obj\r\n * @returns InferenceSession\r\n */\r\n static getRootAsInferenceSession(bb: flatbuffers.ByteBuffer, obj?: InferenceSession): InferenceSession {\r\n return (obj || new InferenceSession()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @param InferenceSession= obj\r\n * @returns InferenceSession\r\n */\r\n static getSizePrefixedRootAsInferenceSession(bb: flatbuffers.ByteBuffer, obj?: InferenceSession): InferenceSession {\r\n bb.setPosition(bb.position() + flatbuffers.SIZE_PREFIX_LENGTH);\r\n return (obj || new InferenceSession()).__init(bb.readInt32(bb.position()) + bb.position(), bb);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.ByteBuffer bb\r\n * @returns boolean\r\n */\r\n static bufferHasIdentifier(bb: flatbuffers.ByteBuffer): boolean {\r\n return bb.__has_identifier('ORTM');\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Encoding= optionalEncoding\r\n * @returns string|Uint8Array|null\r\n */\r\n ortVersion(): string|null;\r\n ortVersion(optionalEncoding: flatbuffers.Encoding): string|Uint8Array|null;\r\n ortVersion(optionalEncoding?: any): string|Uint8Array|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 4);\r\n return offset ? this.bb!.__string(this.bb_pos + offset, optionalEncoding) : null;\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.Model= obj\r\n * @returns onnxruntime.experimental.fbs.Model|null\r\n */\r\n model(obj?: onnxruntime.experimental.fbs.Model): onnxruntime.experimental.fbs.Model|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 6);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.Model())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param onnxruntime.experimental.fbs.SessionState= obj\r\n * @returns onnxruntime.experimental.fbs.SessionState|null\r\n */\r\n sessionState(obj?: onnxruntime.experimental.fbs.SessionState): onnxruntime.experimental.fbs.SessionState|null {\r\n let offset = this.bb!.__offset(this.bb_pos, 8);\r\n return offset ? (obj || new onnxruntime.experimental.fbs.SessionState())\r\n .__init(this.bb!.__indirect(this.bb_pos + offset), this.bb!) :\r\n null;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n */\r\n static startInferenceSession(builder: flatbuffers.Builder) {\r\n builder.startObject(3);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset ortVersionOffset\r\n */\r\n static addOrtVersion(builder: flatbuffers.Builder, ortVersionOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(0, ortVersionOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset modelOffset\r\n */\r\n static addModel(builder: flatbuffers.Builder, modelOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(1, modelOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset sessionStateOffset\r\n */\r\n static addSessionState(builder: flatbuffers.Builder, sessionStateOffset: flatbuffers.Offset) {\r\n builder.addFieldOffset(2, sessionStateOffset, 0);\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @returns flatbuffers.Offset\r\n */\r\n static endInferenceSession(builder: flatbuffers.Builder):

flatbuffers.Offset {\r\n let offset = builder.endObject();\r\n return offset;\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset offset\r\n */\r\n static finishInferenceSessionBuffer(builder: flatbuffers.Builder, offset: flatbuffers.Offset) {\r\n builder.finish(offset, 'ORTM');\r\n }\r\n\r\n /**\r\n * @param flatbuffers.Builder builder\r\n * @param flatbuffers.Offset offset\r\n */\r\n static finishSizePrefixedInferenceSessionBuffer(builder: flatbuffers.Builder, offset: flatbuffers.Offset) {\r\n builder.finish(offset, 'ORTM', true);\r\n }\r\n\r\n static createInferenceSession(\r\n builder: flatbuffers.Builder, ortVersionOffset: flatbuffers.Offset, modelOffset: flatbuffers.Offset,\r\n sessionStateOffset: flatbuffers.Offset): flatbuffers.Offset {\r\n InferenceSession.startInferenceSession(builder);\r\n InferenceSession.addOrtVersion(builder, ortVersionOffset);\r\n InferenceSession.addModel(builder, modelOffset);\r\n InferenceSession.addSessionState(builder, sessionStateOffset);\r\n return InferenceSession.endInferenceSession(builder);\r\n }\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceSession, SessionHandler, Tensor} from 'onnxruntime-common';\r\nimport {Session} from './session';\r\nimport {Tensor as OnnxjsTensor} from './tensor';\r\n\r\nexport class OnnxjsSessionHandler implements SessionHandler {\r\n constructor(private session: Session) {\r\n this.inputNames = this.session.inputNames;\r\n this.outputNames = this.session.outputNames;\r\n }\r\n\r\n async dispose(): Promise<void> {}\r\n inputNames: readonly string[];\r\n outputNames: readonly string[];\r\n async run(\r\n feeds: SessionHandler.FeedsType, _fetches: SessionHandler.FetchesType,\r\n _options: InferenceSession.RunOptions): Promise<SessionHandler.ReturnType> {\r\n const inputMap = new Map<string, OnnxjsTensor>();\r\n for (const name in feeds) {\r\n if (Object.hasOwnProperty.call(feeds, name)) {\r\n const feed = feeds[name];\r\n inputMap.set(\r\n name,\r\n new OnnxjsTensor(\r\n feed.dims, feed.type as OnnxjsTensor.DataType, undefined, undefined,\r\n feed.data as OnnxjsTensor.NumberType));\r\n }\r\n }\r\n const outputMap = await this.session.run(inputMap);\r\n const output: SessionHandler.ReturnType = {};\r\n outputMap.forEach((tensor, name) => {\r\n output[name] = new Tensor(tensor.type, tensor.data, tensor.dims);\r\n });\r\n return output;\r\n }\r\n startProfiling(): void {\r\n this.session.startProfiling();\r\n }\r\n endProfiling(): void {\r\n this.session.endProfiling();\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {readFile} from 'fs';\r\nimport {promisify} from 'util';\r\n\r\nimport {resolveBackend, SessionHandlerType} from './backend';\r\nimport {ExecutionPlan} from './execution-plan';\r\nimport {Graph} from './graph';\r\nimport {Profiler} from './instrument';\r\nimport {Model} from './model';\r\nimport {Operator} from './operators';\r\nimport {Tensor} from './tensor';\r\n\r\nexport declare namespace Session {\r\n export interface Config {\r\n backendHint?: string;\r\n profiler?: Profiler.Config;\r\n }\r\n\r\n export interface Context {\r\n profiler: Readonly<Profiler>;\r\n graphInputTypes?: Tensor.DataType[];\r\n graphInputDims?: Array<readonly number[]>;\r\n }\r\n}\r\n\r\nexport class Session {\r\n constructor(config: Session.Config = {}) {\r\n this._initialized = false;\r\n this.backendHint = config.backendHint;\r\n this.profiler = Profiler.create(config.profiler);\r\n this.context = {profiler: this.profiler, graphInputTypes: [], graphInputDims: []};\r\n }\r\n\r\n get inputNames(): readonly string[] {\r\n return this._model.graph.getInputNames();\r\n }\r\n get outputNames(): readonly string[] {\r\n return this._model.graph.getOutputNames();\r\n }\r\n\r\n startProfiling() {\r\n this.profiler.start();\r\n }\r\n\r\n endProfiling() {\r\n this.profiler.stop();\r\n }\r\n\r\n async loadModel(uri: string): Promise<void>;\r\n async loadModel(buffer: ArrayBuffer, byteOffset?: number, length?: number): Promise<void>;\r\n async loadModel(buffer: Uint8Array): Promise<void>;\r\n async loadModel(arg: string|ArrayBuffer|Uint8Array, byteOffset?: number, length?: number): Promise<void> {\r\n await this.profiler.event('session', 'Session.loadModel', async () => {\r\n // resolve backend and session handler\r\n const backend = await resolveBackend(this.backendHint);\r\n this.sessionHandler = backend.createSessionHandler(this.context);\r\n\r\n this._model = new Model();\r\n if (typeof arg === 'string') {\r\n const isOrtFormat = arg.endsWith('.ort');\r\n if (typeof fetch === 'undefined') {\r\n // node\r\n const buf = await promisify(readFile)(arg);\r\n this.initialize(Buffer.from(buf), isOrtFormat);\r\n } else {\r\n // browser\r\n const response = await fetch(arg);\r\n const buf = await response.arrayBuffer();\r\n this.initialize(new Uint8Array(buf), isOrtFormat);\r\n }\r\n } else if (!ArrayBuffer.isView(arg)) {\r\n // load model from ArrayBuffer\r\n const arr = new Uint8Array(arg, byteOffset || 0, length || arg.byteLength);\r\n this.initialize(arr);\r\n } else {\r\n // load model from Uint8array\r\n this.initialize(arg);\r\n }\r\n });\r\n }\r\n\r\n private initialize(modelProtoBlob: Uint8Array, isOrtFormat?: boolean): void {\r\n if (this._initialized) {\r\n throw new Error('already initialized');\r\n }\r\n\r\n this.profiler.event('session', 'Session.initialize', () => {\r\n // load graph\r\n const graphInitializer =\r\n this.sessionHandler.transformGraph ? this.sessionHandler as Graph.Initializer : undefined;\r\n this._model.load(modelProtoBlob, graphInitializer, isOrtFormat);\r\n\r\n // graph is completely initialzied at this stage , let the interested handlers know\r\n if (this.sessionHandler.onGraphInitialized) {\r\n this.sessionHandler.onGraphInitialized(this._model.graph);\r\n }\r\n // initialize each operator in the graph\r\n this.initializeOps(this._model.graph);\r\n\r\n // instantiate an ExecutionPlan object to be used by the Session object\r\n this._executionPlan = new ExecutionPlan(this._model.graph, this._ops, this.profiler);\r\n });\r\n\r\n this._initialized = true;\r\n }\r\n\r\n async run(inputs: Map<string, Tensor>|Tensor[]): Promise<Map<string, Tensor>> {\r\n if (!this._initialized) {\r\n throw new Error('session not initialized yet');\r\n }\r\n\r\n return this.profiler.event('session', 'Session.run', async () => {\r\n const inputTensors = this.normalizeAndValidateInputs(inputs);\r\n\r\n const outputTensors = await this._executionPlan.execute(this.sessionHandler, inputTensors);\r\n\r\n return this.createOutput(outputTensors);\r\n });\r\n }\r\n\r\n private normalizeAndValidateInputs(inputs: Map<string, Tensor>|Tensor[]): Tensor[] {\r\n const modelInputNames = this._model.graph.getInputNames();\r\n\r\n // normalize inputs\r\n // inputs: Tensor[]\r\n if (Array.isArray(inputs)) {\r\n if (inputs.length !== modelInputNames.length) {\r\n throw new Error(`incorrect input array length: expected ${modelInputNames.length} but got ${inputs.length}`);\r\n }\r\n }\r\n // convert map to array\r\n // inputs: Map<string, Tensor>\r\n else {\r\n if (inputs.size !== modelInputNames.length) {\r\n throw new Error(`incorrect input map size: expected ${modelInputNames.length} but got ${inputs.size}`);\r\n }\r\n\r\n const sortedInputs = new Array<Tensor>(inputs.size);\r\n let sortedInputsIndex = 0;\r\n for (let i = 0; i < modelInputNames.length; ++i) {\r\n const tensor = inputs.get(modelInputNames[i]);\r\n if (!tensor) {\r\n throw new Error(`missing input tensor for: '${name}'`);\r\n }\r\n sortedInputs[sortedInputsIndex++] = tensor;\r\n }\r\n\r\n inputs = sortedInputs;\r\n }\r\n\r\n // validate dims requirements\r\n // First session run - graph input data is not cached for the session\r\n if (!this.context.graphInputTypes || this.context.graphInputTypes.length === 0 || !this.context.graphInputDims ||\r\n this.context.graphInputDims.length === 0) {\r\n const modelInputIndices = this._model.graph.getInputIndices();\r\n const modelValues = this._model.graph.getValues();\r\n\r\n const graphInputDims = new Array<readonly number[]>(modelInputIndices.length);\r\n\r\n for (let i = 0; i < modelInputIndices.length; ++i) {\r\n const graphInput = modelValues[modelInputIndices[i]];\r\n graphInputDims[i] = graphInput.type!.shape.dims;\r\n\r\n // cached for second and subsequent runs.\r\n // Some parts of the framework works on the assumption that the graph and types and shapes are static\r\n this.context.graphInputTypes!.push(graphInput.type!.tensorType);\r\n this.context.graphInputDims!.push(inputs[i].dims);\r\n }\r\n\r\n this.validateInputTensorDims(graphInputDims, inputs, true);\r\n }\r\n\r\n // Second and subsequent session runs - graph input data is cached for the session\r\n else {\r\n this.validateInputTensorDims(this.context.graphInputDims, inputs, false);\r\n }\r\n\r\n // validate types requirement\r\n this.validateInputTensorTypes(this.context.graphInputTypes!, inputs);\r\n\r\n return inputs;\r\n }\r\n\r\n private validateInputTensorTypes(graphInputTypes: Tensor.DataType[], givenInputs: Tensor[]) {\r\n for (let i = 0; i < givenInputs.length; i++) {\r\n const expectedType = graphInputTypes[i];\r\n const actualType = givenInputs[i].type;\r\n if (expectedType !== actualType) {\r\n throw new Error(`input tensor[${i}] check failed: expected type '${expectedType}' but got ${actualType}`);\r\n }\r\n }\r\n }\r\n\r\n private validateInputTensorDims(\r\n graphInputDims: Array<readonly number[]>, givenInputs: Tensor[], noneDimSupported: boolean) {\r\n for (let i = 0; i < givenInputs.length; i++) {\r\n const expectedDims =

graphInputDims[i];\r\n const actualDims = givenInputs[i].dims;\r\n if (!this.compareTensorDims(expectedDims, actualDims, noneDimSupported)) {\r\n throw new Error(`input tensor[${i}] check failed: expected shape '[${expectedDims.join(',')}]' but got [${\r\n actualDims.join(',')}]`);\r\n }\r\n }\r\n }\r\n\r\n private compareTensorDims(expectedDims: readonly number[], actualDims: readonly number[], noneDimSupported: boolean):\r\n boolean {\r\n if (expectedDims.length !== actualDims.length) {\r\n return false;\r\n }\r\n\r\n for (let i = 0; i < expectedDims.length; ++i) {\r\n if (expectedDims[i] !== actualDims[i] && (!noneDimSupported || expectedDims[i] !== 0)) {\r\n // data shape mis-match AND not a 'None' dimension.\r\n return false;\r\n }\r\n }\r\n\r\n return true;\r\n }\r\n\r\n private createOutput(outputTensors: Tensor[]): Map<string, Tensor> {\r\n const modelOutputNames = this._model.graph.getOutputNames();\r\n if (outputTensors.length !== modelOutputNames.length) {\r\n throw new Error('expected number of outputs do not match number of generated outputs');\r\n }\r\n\r\n const output = new Map<string, Tensor>();\r\n for (let i = 0; i < modelOutputNames.length; ++i) {\r\n output.set(modelOutputNames[i], outputTensors[i]);\r\n }\r\n\r\n return output;\r\n }\r\n\r\n private initializeOps(graph: Graph): void {\r\n const nodes = graph.getNodes();\r\n this._ops = new Array(nodes.length);\r\n\r\n for (let i = 0; i < nodes.length; i++) {\r\n this._ops[i] = this.sessionHandler.resolve(nodes[i], this._model.opsets, graph);\r\n }\r\n }\r\n\r\n private _model: Model;\r\n private _initialized: boolean;\r\n\r\n private _ops: Operator[];\r\n private _executionPlan: ExecutionPlan;\r\n\r\n private backendHint?: string;\r\n\r\n private sessionHandler: SessionHandlerType;\r\n private context: Session.Context;\r\n private profiler: Readonly<Profiler>;\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {Guid} from 'guid-typescript';\r\nimport Long from 'long';\r\nimport {onnx} from 'onnx-proto';\r\n\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\n\r\nimport ortFbs = onnxruntime.experimental.fbs;\r\n\r\nimport {ProtoUtil, ShapeUtil} from './util';\r\n\r\nexport declare namespace Tensor {\r\n export interface DataTypeMap {\r\n bool: Uint8Array;\r\n float32: Float32Array;\r\n float64: Float64Array;\r\n string: string[];\r\n int8: Int8Array;\r\n uint8: Uint8Array;\r\n int16: Int16Array;\r\n uint16: Uint16Array;\r\n int32: Int32Array;\r\n uint32: Uint32Array;\r\n }\r\n\r\n export type DataType = keyof DataTypeMap;\r\n\r\n export type StringType = Tensor.DataTypeMap['string'];\r\n export type BooleanType = Tensor.DataTypeMap['bool'];\r\n export type IntegerType = Tensor.DataTypeMap['int8']|Tensor.DataTypeMap['uint8']|Tensor.DataTypeMap['int16']|\r\n Tensor.DataTypeMap['uint16']|Tensor.DataTypeMap['int32']|Tensor.DataTypeMap['uint32'];\r\n export type FloatType = Tensor.DataTypeMap['float32']|Tensor.DataTypeMap['float64'];\r\n export type NumberType = BooleanType|IntegerType|FloatType;\r\n\r\n export type Id = Guid;\r\n}\r\n\r\ntype TensorData = Tensor.DataTypeMap[Tensor.DataType];\r\n\r\ntype DataProvider = (id: Tensor.Id) => TensorData;\r\ntype AsyncDataProvider = (id: Tensor.Id) => Promise<TensorData>;\r\n\r\nexport class Tensor {\r\n /**\r\n * get the underlying tensor data\r\n */\r\n get data(): TensorData {\r\n if (this.cache === undefined) {\r\n const data = this.dataProvider!(this.dataId);\r\n if (data.length !== this.size) {\r\n throw new Error('Length of data provided by the Data Provider is inconsistent with the dims of this Tensor.');\r\n }\r\n this.cache = data;\r\n }\r\n return this.cache;\r\n }\r\n\r\n /**\r\n * get the underlying string tensor data. Should only use when type is STRING\r\n */\r\n get stringData() {\r\n if (this.type !== 'string') {\r\n throw new TypeError('data type is not string');\r\n }\r\n\r\n return this.data as Tensor.StringType;\r\n }\r\n\r\n /**\r\n * get the underlying integer tensor data. Should only use when type is one of the following: (UINT8, INT8, UINT16,\r\n * INT16, INT32, UINT32, BOOL)\r\n */\r\n get integerData() {\r\n switch (this.type) {\r\n case 'uint8':\r\n case 'int8':\r\n case 'uint16':\r\n case 'int16':\r\n case 'int32':\r\n case 'uint32':\r\n case 'bool':\r\n return this.data as Tensor.IntegerType;\r\n\r\n default:\r\n throw new TypeError('data type is not integer (uint8, int8, uint16, int16, int32, uint32, bool)');\r\n }\r\n }\r\n\r\n /**\r\n * get the underlying float tensor data. Should only use when type is one of the following: (FLOAT, DOUBLE)\r\n */\r\n get floatData() {\r\n switch (this.type) {\r\n case 'float32':\r\n case 'float64':\r\n return this.data as Tensor.FloatType;\r\n\r\n default:\r\n throw new TypeError('data type is not float (float32, float64)');\r\n }\r\n }\r\n\r\n /**\r\n * get the underlying number tensor data. Should only use when type is one of the following: (UINT8, INT8, UINT16,\r\n * INT16, INT32, UINT32, BOOL, FLOAT, DOUBLE)\r\n */\r\n get numberData() {\r\n if (this.type !== 'string') {\r\n return this.data as Tensor.NumberType;\r\n }\r\n throw new TypeError('type cannot be non-number (string)');\r\n }\r\n\r\n /**\r\n * get value of an element at the given indices\r\n */\r\n get(indices: readonly number[]): Tensor.DataTypeMap[Tensor.DataType][number] {\r\n return this.data[ShapeUtil.indicesToOffset(indices, this.strides)];\r\n }\r\n\r\n /**\r\n * set value of an element at the given indices\r\n */\r\n set(indices: readonly number[], value: Tensor.DataTypeMap[Tensor.DataType][number]) {\r\n this.data[ShapeUtil.indicesToOffset(indices, this.strides)] = value;\r\n }\r\n\r\n /**\r\n * get the underlying tensor data asynchronously\r\n */\r\n async getData(): Promise<TensorData> {\r\n if (this.cache === undefined) {\r\n this.cache = await this.asyncDataProvider!(this.dataId);\r\n }\r\n return this.cache;\r\n }\r\n\r\n /**\r\n * get the number of elements in the tensor\r\n */\r\n public readonly size: number;\r\n\r\n private _strides: readonly number[];\r\n /**\r\n * get the strides for each dimension\r\n */\r\n get strides(): readonly number[] {\r\n if (!this._strides) {\r\n this._strides = ShapeUtil.computeStrides(this.dims);\r\n }\r\n return this._strides;\r\n }\r\n\r\n constructor(\r\n /**\r\n * get the dimensions of the tensor\r\n */\r\n public readonly dims: readonly number[],\r\n /**\r\n * get the type of the tensor\r\n */\r\n public readonly type: Tensor.DataType, private dataProvider?: DataProvider,\r\n private asyncDataProvider?: AsyncDataProvider, private cache?: TensorData,\r\n /**\r\n * get the data ID that used to map to a tensor data\r\n */\r\n public readonly dataId: Guid = Guid.create()) {\r\n this.size = ShapeUtil.validateDimsAndCalcSize(dims);\r\n const size = this.size;\r\n const empty = (dataProvider === undefined && asyncDataProvider === undefined && cache === undefined);\r\n\r\n if (cache !== undefined) {\r\n if (cache.length !== size) {\r\n throw new RangeError('Input dims doesn\\'t match data length.');\r\n }\r\n }\r\n\r\n if (type === 'string') {\r\n if (cache !== undefined && (!Array.isArray(cache) || !cache.every(i => typeof i === 'string'))) {\r\n throw new TypeError('cache should be a string array');\r\n }\r\n\r\n if (empty) {\r\n this.cache = new Array<string>(size);\r\n }\r\n } else {\r\n if (cache !== undefined) {\r\n const constructor = dataviewConstructor(type);\r\n if (!(cache instanceof constructor)) {\r\n throw new TypeError(`cache should be type ${constructor.name}`);\r\n }\r\n }\r\n\r\n if (empty) {\r\n const buf = new ArrayBuffer(size * sizeof(type));\r\n this.cache = createView(buf, type);\r\n }\r\n }\r\n }\r\n\r\n /**\r\n * Construct new Tensor from a ONNX Tensor object\r\n * @param tensorProto the ONNX Tensor\r\n */\r\n static fromProto(tensorProto: onnx.ITensorProto): Tensor {\r\n if (!tensorProto) {\r\n throw new Error('cannot construct Value from an empty tensor');\r\n }\r\n const type = ProtoUtil.tensorDataTypeFromProto(tensorProto.dataType!);\r\n const dims = ProtoUtil.tensorDimsFromProto(tensorProto.dims!);\r\n\r\n const value = new Tensor(dims, type);\r\n\r\n if (type === 'string') {\r\n // When it's STRING type, the value should always be stored in field\r\n // 'stringData'\r\n tensorProto.stringData!.forEach((str, i) => {\r\n const buf = Buffer.from(str.buffer, str.byteOffset, str.byteLength);\r\n value.data[i] = buf.toString();\r\n });\r\n\r\n } else if (\r\n tensorProto.rawData && typeof tensorProto.rawData.byteLength === 'number' &&\r\n tensorProto.rawData.byteLength > 0) {\r\n // NOT considering segment for now (IMPORTANT)\r\n\r\n // populate value from rawData\r\n const dataDest = value.data;\r\n const dataSource =\r\n new DataView(tensorProto.rawData.buffer, tensorProto.rawData.byteOffset, tensorProto.rawData.byteLength);\r\n const elementSize = sizeofProto(tensorProto.dataType!);\r\n const length = tensorProto.rawData.byteLength / elementSize;\r\n\r\n if (tensorProto.rawData.byteLength % elementSize !== 0) {\r\n throw new Error('invalid buffer length');\r\n }\r\n if (dataDest.length !== length) {\r\n throw new Error('buffer length mismatch');\r\n }\r\n\r\n for (let i = 0; i < length; i++) {\r\n const n = readProto(dataSource, tensorProto.dataType!, i * elementSize);\r\n dataDest[i] = n;\r\n }\r\n } else {\r\n // populate value from array\r\n let array: Array<number|Long>;\r\n switch (tensorProto.dataType) {\r\n case onnx.TensorProto.DataType.FLOAT:\r\n array = tensorProto.floatData!;\r\n break;\r\n case onnx.TensorProto.DataType.INT32:\r\n case onnx.TensorProto.DataType.INT16:\r\n case onnx.TensorProto.DataType.UINT16:\r\n case onnx.TensorProto.DataType.INT8:\r\n case onnx.TensorProto.DataType.UINT8:\r\n case onnx.TensorProto.DataType.BOOL:\r\n array =

tensorProto.int32Data!;\r\n break;\r\n case onnx.TensorProto.DataType.INT64:\r\n array = tensorProto.int64Data!;\r\n break;\r\n case onnx.TensorProto.DataType.DOUBLE:\r\n array = tensorProto.doubleData!;\r\n break;\r\n case onnx.TensorProto.DataType.UINT32:\r\n case onnx.TensorProto.DataType.UINT64:\r\n array = tensorProto.uint64Data!;\r\n break;\r\n default:\r\n // should never run here\r\n throw new Error('unspecific error');\r\n }\r\n\r\n if (array === null || array === undefined) {\r\n throw new Error('failed to populate data from a tensorproto value');\r\n }\r\n\r\n const data = value.data;\r\n if (data.length !== array.length) {\r\n throw new Error('array length mismatch');\r\n }\r\n\r\n for (let i = 0; i < array.length; i++) {\r\n const element = array[i];\r\n if (Long.isLong(element)) {\r\n data[i] = longToNumber(element, tensorProto.dataType);\r\n } else {\r\n data[i] = element;\r\n }\r\n }\r\n }\r\n\r\n return value;\r\n }\r\n\r\n /**\r\n * Construct new Tensor from raw data\r\n * @param data the raw data object. Should be a string array for 'string' tensor, and the corresponding typed array\r\n * for other types of tensor.\r\n * @param dims the dimensions of the tensor\r\n * @param type the type of the tensor\r\n */\r\n static fromData(data: Tensor.DataTypeMap[Tensor.DataType], dims: readonly number[], type: Tensor.DataType) {\r\n return new Tensor(dims, type, undefined, undefined, data);\r\n }\r\n\r\n static fromOrtTensor(ortTensor: ortFbs.Tensor) {\r\n if (!ortTensor) {\r\n throw new Error('cannot construct Value from an empty tensor');\r\n }\r\n const dims = ProtoUtil.tensorDimsFromORTFormat(ortTensor);\r\n const type = ProtoUtil.tensorDataTypeFromProto(ortTensor.dataType());\r\n\r\n const value = new Tensor(dims, type);\r\n\r\n if (type === 'string') {\r\n // When it's STRING type, the value should always be stored in field\r\n // 'stringData'\r\n for (let i = 0; i < ortTensor.stringDataLength(); i++) {\r\n value.data[i] = ortTensor.stringData(i);\r\n }\r\n\r\n } else if (\r\n ortTensor.rawDataArray() && typeof ortTensor.rawDataLength() === 'number' && ortTensor.rawDataLength() > 0) {\r\n // NOT considering segment for now (IMPORTANT)\r\n\r\n // populate value from rawData\r\n const dataDest = value.data;\r\n const dataSource = new DataView(\r\n ortTensor.rawDataArray()!.buffer, ortTensor.rawDataArray()!.byteOffset, ortTensor.rawDataLength());\r\n const elementSize = sizeofProto(ortTensor.dataType());\r\n const length = ortTensor.rawDataLength() / elementSize;\r\n\r\n if (ortTensor.rawDataLength() % elementSize !== 0) {\r\n throw new Error('invalid buffer length');\r\n }\r\n if (dataDest.length !== length) {\r\n throw new Error('buffer length mismatch');\r\n }\r\n\r\n for (let i = 0; i < length; i++) {\r\n const n = readProto(dataSource, ortTensor.dataType(), i * elementSize);\r\n dataDest[i] = n;\r\n }\r\n }\r\n return value;\r\n }\r\n}\r\n\r\nfunction sizeof(type: Tensor.DataType): number {\r\n switch (type) {\r\n case 'bool':\r\n case 'int8':\r\n case 'uint8':\r\n return 1;\r\n case 'int16':\r\n case 'uint16':\r\n return 2;\r\n case 'int32':\r\n case 'uint32':\r\n case 'float32':\r\n return 4;\r\n case 'float64':\r\n return 8;\r\n default:\r\n throw new Error(`cannot calculate sizeof() on type ${type}`);\r\n }\r\n}\r\n\r\nfunction sizeofProto(type: onnx.TensorProto.DataType|ortFbs.TensorDataType): number {\r\n switch (type) {\r\n case onnx.TensorProto.DataType.UINT8:\r\n case onnx.TensorProto.DataType.INT8:\r\n case onnx.TensorProto.DataType.BOOL:\r\n return 1;\r\n case onnx.TensorProto.DataType.UINT16:\r\n case onnx.TensorProto.DataType.INT16:\r\n return 2;\r\n case onnx.TensorProto.DataType.FLOAT:\r\n case onnx.TensorProto.DataType.INT32:\r\n case onnx.TensorProto.DataType.UINT32:\r\n return 4;\r\n case onnx.TensorProto.DataType.INT64:\r\n case onnx.TensorProto.DataType.DOUBLE:\r\n case onnx.TensorProto.DataType.UINT64:\r\n return 8;\r\n default:\r\n throw new Error(`cannot calculate sizeof() on type ${onnx.TensorProto.DataType[type]}`);\r\n }\r\n}\r\n\r\nfunction createView(dataBuffer: ArrayBuffer, type: Tensor.DataType) {\r\n return new (dataviewConstructor(type))(dataBuffer);\r\n}\r\n\r\nfunction dataviewConstructor(type: Tensor.DataType) {\r\n switch (type) {\r\n case 'bool':\r\n case 'uint8':\r\n return Uint8Array;\r\n case 'int8':\r\n return Int8Array;\r\n case 'int16':\r\n return Int16Array;\r\n case 'uint16':\r\n return Uint16Array;\r\n case 'int32':\r\n return Int32Array;\r\n case 'uint32':\r\n return Uint32Array;\r\n case 'float32':\r\n return Float32Array;\r\n case 'float64':\r\n return Float64Array;\r\n default:\r\n // should never run to here\r\n throw new Error('unspecified error');\r\n }\r\n}\r\n\r\n// convert a long number to a 32-bit integer (cast-down)\r\nfunction longToNumber(i: Long, type:

onnx.TensorProto.DataType|ortFbs.TensorDataType): number {\r\n // INT64, UINT32, UINT64\r\n if (type === onnx.TensorProto.DataType.INT64 || type === ortFbs.TensorDataType.INT64) {\r\n   if (i.greaterThanOrEqual(2147483648) || i.lessThan(-2147483648)) {\r\n   throw new TypeError('int64 is not supported');\r\n   }\r\n } else if (\r\n   type === onnx.TensorProto.DataType.UINT32 || type === ortFbs.TensorDataType.UINT32 ||\r\n   type === onnx.TensorProto.DataType.UINT64 || type === ortFbs.TensorDataType.UINT64) {\r\n   if (i.greaterThanOrEqual(4294967296) || i.lessThan(0)) {\r\n   throw new TypeError('uint64 is not supported');\r\n   }\r\n } else {\r\n   throw new TypeError(`not a LONG type: ${onnx.TensorProto.DataType[type]}`);\r\n }\r\n\r\n return i.toNumber();\r\n}\r\n\r\n// read one value from TensorProto\r\nfunction readProto(view: DataView, type: onnx.TensorProto.DataType|ortFbs.TensorDataType, byteOffset: number): number {\r\n switch (type) {\r\n   case onnx.TensorProto.DataType.BOOL:\r\n   case onnx.TensorProto.DataType.UINT8:\r\n   return view.getUint8(byteOffset);\r\n   case onnx.TensorProto.DataType.INT8:\r\n   return view.getInt8(byteOffset);\r\n   case onnx.TensorProto.DataType.UINT16:\r\n   return view.getUint16(byteOffset, true);\r\n   case onnx.TensorProto.DataType.INT16:\r\n   return view.getInt16(byteOffset, true);\r\n   case onnx.TensorProto.DataType.FLOAT:\r\n   return view.getFloat32(byteOffset, true);\r\n   case onnx.TensorProto.DataType.INT32:\r\n   return view.getInt32(byteOffset, true);\r\n   case onnx.TensorProto.DataType.UINT32:\r\n   return view.getUint32(byteOffset, true);\r\n   case onnx.TensorProto.DataType.INT64:\r\n   return longToNumber(\r\n Long.fromBits(view.getUint32(byteOffset, true), view.getUint32(byteOffset + 4, true), false), type);\r\n   case onnx.TensorProto.DataType.DOUBLE:\r\n   return view.getFloat64(byteOffset, true);\r\n   case onnx.TensorProto.DataType.UINT64:\r\n   return longToNumber(\r\n Long.fromBits(view.getUint32(byteOffset, true), view.getUint32(byteOffset + 4, true), true), type);\r\n   default:\r\n   throw new Error(`cannot read from DataView for type ${onnx.TensorProto.DataType[type]}`);\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {flatbuffers} from 'flatbuffers';\r\nimport Long from 'long';\r\nimport {onnx} from 'onnx-proto';\r\n\r\nimport {Graph} from './graph';\r\nimport {onnxruntime} from './ort-schema/ort-generated';\r\nimport {Tensor} from './tensor';\r\n\r\n// check the inputs shape before running an OP.\r\n// return true when the inputs pass the check\r\n// return false when the inputs do not fit the requirement\r\n// throw exception when fatal error or not implemented\r\nexport function checkInputsShape(inputs: Tensor[], ...expectedDimensions: number[]): boolean {\r\n if (!inputs || inputs.length !== expectedDimensions.length) {\r\n   return false;\r\n }\r\n for (let i = 0; i < inputs.length; i++) {\r\n   if (!inputs[i].dims || inputs[i].dims.length !== expectedDimensions[i]) {\r\n   return false;\r\n   }\r\n }\r\n return true;\r\n}\r\n\r\n// Evaluates the given expression and asserts error message if condition is unmet.\r\nexport function assert(expr: boolean, msg: () => string) {\r\n if (!expr) {\r\n   throw new Error(typeof msg === 'string' ? msg : msg());\r\n }\r\n}\r\n\r\nexport class ArrayUtil {\r\n /**\r\n   * Verifies if 2 input arrays contain the same elements.\r\n   * @param n1 Array 1\r\n   * @param n2 Array 2\r\n   * @returns Whether these 2 are equal\r\n   */\r\n static arraysEqual(\r\n   n1: readonly number[]|Int8Array|Uint8Array|Int16Array|Uint16Array|Int32Array|Uint32Array|Uint8ClampedArray|\r\n   Float32Array|Float64Array,\r\n   n2: readonly number[]|Int8Array|Uint8Array|Int16Array|Uint16Array|Int32Array|Uint32Array|Uint8ClampedArray|\r\n   Float32Array|Float64Array) {\r\n   if (n1.length !== n2.length) {\r\n   return false;\r\n   }\r\n   for (let i = 0; i < n1.length; i++) {\r\n   if (n1[i] !== n2[i]) {\r\n   return false;\r\n   }\r\n   }\r\n   return true;\r\n }\r\n}\r\n\r\nexport class MatMulUtil {\r\n /**\r\n   * Fix the input shapes for MatMul operation if they need fixing\r\n   * @param dimsA The shape of tensor A. Should be an array of positive integers\r\n   * @param dimsB The shape of tensor B. Should be an array of positive integers\r\n   * @returns A tuple containing the preprocessed input shapes as required by ONNX specifications\r\n   */\r\n static preprocessInputShapes(dimsA: readonly number[], dimsB: readonly number[]):\r\n   [readonly number[], readonly number[]] {\r\n   // If the first argument is 1-D, it is promoted to a matrix by prepending\r\n   // a 1 to its dimensions. After matrix multiplication the prepended 1 is\r\n   // removed.\r\n   const a = (dimsA.length === 1) ? [1, dimsA[0]] : dimsA;\r\n\r\n   // If the second argument is 1-D, it is promoted to a matrix by appending\r\n // a 1 to its dimensions. After matrix multiplication the appended 1 is\r\n // removed.\r\n const b = (dimsB.length === 1) ? [dimsB[0], 1] : dimsB;\r\n\r\n return [a, b];\r\n }\r\n\r\n /**\r\n * Fix the output shape computed for MatMul operation if it needs fixing\r\n * @param outputShape The computed outputShape. Should be an array (atleast of length 2) of positive integers.\r\n * This will be mutated.\r\n * @param aRank The rank of tensor A.\r\n * @param bRank The rank of tensor B.\r\n */\r\n static postprocessOutputShape(outputShape: number[], aRank: number, bRank: number) {\r\n // Remove prepended dimension if first input is 1d\r\n if (aRank === 1) {\r\n // outputShape = outputShape.slice(0, outputShape.length - 2).concat(outputShape.slice(outputShape.length - 1));\r\n outputShape.splice(outputShape.length - 2, 1);\r\n }\r\n // Remove appended dimension if second input is 1d\r\n if (bRank === 1) {\r\n outputShape.pop();\r\n }\r\n }\r\n\r\n /**\r\n * Calculate the expected shape when matrix multiplication\r\n * @param a The shape of tensor A. Should be a tuple of 2 positive integers\r\n * @param b The shape of tensor B. Should be a tuple of 2 positive integers\r\n * @returns The expected shape of the result, or undefined if N/A\r\n */\r\n static calcMatMulShape(a: [number, number], b: [number, number]): [number, number]|undefined {\r\n return (a[1] !== b[0]) ? undefined : [a[0], b[1]];\r\n }\r\n}\r\n\r\nexport class BroadcastUtil {\r\n /**\r\n * Calculate the expected shape when broadcasting 2 tensors\r\n * @param a The shape of tensor A. Should be an array of positive integers\r\n * @param b The shape of tensor B. Should be an array of positive integers\r\n * @param isMatMul Whether the operation is MatMul\r\n * @returns The expected shape of the result, or undefined if N/A\r\n */\r\n static calcShape(adims: readonly number[], bdims: readonly number[], isMatMul = false): readonly number[]|undefined {\r\n const arank = adims.length;\r\n const brank = bdims.length;\r\n if (arank === 0) {\r\n return bdims;\r\n }\r\n if (brank === 0) {\r\n return adims;\r\n }\r\n const crank = Math.max(adims.length, bdims.length);\r\n const cdims = new Array<number>(crank);\r\n\r\n // calculate the last 2 dimension if it is MatMul\r\n if (isMatMul) {\r\n if (arank < 2 || brank < 2) {\r\n return undefined;\r\n }\r\n const cShapeMatMul =\r\n MatMulUtil.calcMatMulShape([adims[arank - 2], adims[arank - 1]], [bdims[brank - 2], bdims[brank - 1]]);\r\n if (cShapeMatMul === undefined) {\r\n return undefined;\r\n }\r\n [cdims[crank - 2], cdims[crank - 1]] = cShapeMatMul;\r\n }\r\n\r\n for (let i = isMatMul ? 3 : 1; i <= crank; i++) {\r\n const aLen = arank - i < 0 ? 1 : adims[arank - i];\r\n const bLen = brank - i < 0 ? 1 : bdims[brank - i];\r\n\r\n if (aLen !== bLen && aLen > 1 && bLen > 1) {\r\n return undefined;\r\n }\r\n cdims[crank - i] = Math.max(aLen, bLen);\r\n }\r\n\r\n return cdims;\r\n }\r\n\r\n /**\r\n * Given the indices of a broadcasted tensor, calculate the original indices\r\n * @param broadcastedIndices The given indices of the broadcasted tensor.\r\n * @param originalShape The original shape of the tensor before broadcas\r\n * @returns The calculated indices that maps to the original tensor.\r\n */\r\n static index(broadcastedIndices: readonly number[], originalShape: readonly number[]): number[] {\r\n // NOTE 1: we assume the parameter broadcastedIndices is valid. ie. it should have the same\r\n // length as the broadcasted shape, and for each dimension the index should\r\n // not be out of range.\r\n const originalIndices = new Array(originalShape.length);\r\n BroadcastUtil.fillIndex(broadcastedIndices, originalShape, originalIndices);\r\n return originalIndices;\r\n }\r\n\r\n /**\r\n * Given the indices of a broadcasted tensor, calculate the original indices\r\n * @param broadcastedIndices The given indices of the broadcasted tensor.\r\n * @param originalShape The original shape of the tensor before broadcast\r\n * @param originalIndices The mapping of broadcastedIndices to the originalIndices (output parameter - will be\r\n * mutated).\r\n */\r\n static fillIndex(broadcastedIndices: readonly number[], originalShape: readonly number[], originalIndices: number[]) {\r\n // NOTE 1: we assume the parameter broadcastedIndices is valid. ie. it should have the same length as the\r\n // broadcasted shape, and for each dimension the index should not be out of range.\r\n // NOTE 2: we assume the parameter originalIndices has the same length as the originalShape\r\n const dimOffset = broadcastedIndices.length - originalShape.length;\r\n for (let i = 0; i < originalShape.length; i++) {\r\n originalIndices[i] = broadcastedIndices[dimOffset + i] % originalShape[i];\r\n }\r\n }\r\n\r\n /**\r\n * Perform the broadcasting operation on the specific operator\r\n * @param a The input tensor A\r\n * @param b The input tensor B\r\n * @param op The operator lambda function\r\n * @param inplace Whether to write the result back to A.\r\n * @returns The result tensor, or undefined if input not broadcastable.\r\n */\r\n static calc(\r\n a:

Tensor, b: Tensor, op: (a: string|number, b: string|number) => (string | number), inplace: boolean,\r\n resultType?: Tensor.DataType): Tensor|undefined {\r\n   const outputShape = BroadcastUtil.calcShape(a.dims, b.dims);\r\n\r\n   if (outputShape) {\r\n   if (inplace && !ShapeUtil.areEqual(outputShape, a.dims)) {\r\n   // B is not broadcastable to A, failed to calculate inplace.\r\n   return undefined;\r\n   }\r\n\r\n   const size = ShapeUtil.size(outputShape);\r\n   const c = inplace ? a : new Tensor(outputShape, resultType || a.type);\r\n\r\n   // both inputs are scalars\r\n   if (outputShape.length === 0) {\r\n   c.set([], op(a.get([]), b.get([])));\r\n   }\r\n\r\n   // atleast one input is a non-scalar\r\n   else {\r\n   const outputIndices = new Array<number>(outputShape.length);\r\n   const originalIndicesA = new Array(a.dims.length);\r\n   const originalIndicesB = new Array(b.dims.length);\r\n   let valA: string|number = 0;\r\n   let valB: string|number = 0;\r\n   let isAScalar = false;\r\n   let isBScalar = false;\r\n   if (a.dims.length === 0) {\r\n   valA = a.get([]);\r\n   isAScalar = true;\r\n   }\r\n   if (b.dims.length === 0) {\r\n   valB = b.get([]);\r\n   isBScalar = true;\r\n   }\r\n   let rest: number;\r\n   for (let i = 0; i < size; i++) {\r\n   // traversal indices\r\n   rest = i;\r\n   for (let j = outputShape.length - 1; j >= 0; j--) {\r\n   outputIndices[j] = rest % outputShape[j];\r\n   rest = Math.floor(rest / outputShape[j]);\r\n   }\r\n\r\n   if (!isAScalar) {\r\n   // map outputIndices (which is actually broadcasted) to the originalIndices\r\n   BroadcastUtil.fillIndex(outputIndices, a.dims, originalIndicesA);\r\n   valA = a.get(originalIndicesA);\r\n   }\r\n   if (!isBScalar) {\r\n   BroadcastUtil.fillIndex(outputIndices, b.dims, originalIndicesB);\r\n   valB = b.get(originalIndicesB);\r\n   }\r\n\r\n   c.set(outputIndices, op(valA, valB));\r\n   }\r\n   }\r\n\r\n   return c;\r\n   }\r\n\r\n   return undefined;\r\n }\r\n\r\n /**\r\n   * Determine if a shape is unidirectional broadcastable to another shape\r\n   * @param shape The input shape\r\n   * @param finalShape The desired shape after broadcasting\r\n   */\r\n static isValidBroadcast(shape: readonly number[], finalShape: readonly number[]): boolean {\r\n   // align shape to the right\r\n   const inputRank = shape.length;\r\n   const finalRank = finalShape.length;\r\n   if (inputRank > finalRank) {\r\n   return false;\r\n   }\r\n   for (let i = 1; i <= inputRank; i++) {\r\n   if (shape[inputRank - i] !== 1 && shape[inputRank - i] !== finalShape[finalRank - i]) {\r\n   return false;\r\n   }\r\n   }\r\n   return true;\r\n }\r\n\r\n /**\r\n   * Determine the broadcasted dims in input shape based on the given output shape.\r\n   * Note that this function only returns the broadcasted dims.\r\n   * @param inputShape The input shape\r\n   * @param outputShape The output shape\r\n   * @returns The broadcasted dims in input shape.\r\n   */\r\n static getBroadcastDims(inputShape: readonly number[], outputShape: readonly number[]): number[] {\r\n   const inRank = inputShape.length;\r\n   const dims: number[] = [];\r\n   for (let i = 0; i < inRank; i++) {\r\n   const dim = inRank - 1 - i;\r\n   const a = inputShape[dim] || 1;\r\n   const b = outputShape[outputShape.length - 1 - i] || 1;\r\n   if (b > 1 && a === 1) {\r\n   dims.unshift(dim);\r\n   }\r\n   }\r\n   return dims;\r\n }\r\n}\r\n\r\n// copy array helper\r\n// mimics memcpy as much as possible\r\nexport function arrayCopyHelper(\r\n   target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number, sourceIndex: number,\r\n   blockSize: number) {\r\n if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n   throw new Error('sourceIndex out of bounds');\r\n }\r\n if (targetIndex < 0 || targetIndex >= target.length) {\r\n   throw new Error('targetIndex out of bounds');\r\n }\r\n if (sourceIndex + blockSize > source.length) {\r\n   throw new Error('source indices to be copied are outside bounds');\r\n }\r\n if (targetIndex + blockSize > target.length) {\r\n   throw new Error('target array is too small to hold result');\r\n }\r\n\r\n for (let offset = 0; offset < blockSize; offset++) {\r\n   target[targetIndex + offset] = source[sourceIndex + offset];\r\n }\r\n}\r\n\r\nexport class GemmUtil {\r\n // will make sure input shapes are compatible for this op\r\n // and return back the shape of the output in the form of a tuple\r\n // will throw exception if the input shapes are not compatible\r\n static getShapeOfGemmResult(\r\n   leftShape: readonly number[], transLeft: boolean, rightShape: readonly number[], transRight: boolean,\r\n   biasShape?: readonly number[]): readonly number[] {\r\n   if (leftShape.length !== 2 || rightShape.length !== 2) {\r\n   throw new Error('shape need to be of size 2');\r\n   }\r\n\r\n   let M: number;\r\n   let K: number;\r\n   let N: number;\r\n\r\n   if (transLeft) {\r\n   M = leftShape[1];\r\n   K = leftShape[0];\r\n   } else {\r\n   M = leftShape[0];\r\n   K = leftShape[1];\r\n   }\r\n\r\n   let kDim = -1;\r\n\r\n   if (transRight) {\r\n   N = rightShape[0];\r\n   kDim = 1;\r\n   } else {\r\n   N = rightShape[1];\r\n   kDim = 0;\r\n   }\r\n\r\n   if (rightShape[kDim] !== K) {\r\n   throw new Error('dimension

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mismatch');\r\n    }\r\n\r\n    if (M <= 0 || N <= 0 || K <= 0) {\r\n      throw new Error('invalid shape specified');\r\n
}\r\n\r\n    if (biasShape && !BroadcastUtil.isValidBroadcast(biasShape, [M, N])) {\r\n      throw new Error('gemm:
invalid bias shape for broadcast');\r\n    }\r\n\r\n    return [M, N, K];\r\n  }\r\n}\r\n\r\nexport class ProtoUtil {\r\n
static tensorDataTypeFromProto(typeProto: onnx.TensorProto.DataType|\r\n
onnxruntime.experimental.fbs.TensorDataType): Tensor.DataType {\r\n    switch (typeProto) {\r\n      case
onnx.TensorProto.DataType.INT8:\r\n        return 'int8';\r\n      case onnx.TensorProto.DataType.UINT8:\r\n
return 'uint8';\r\n      case onnx.TensorProto.DataType.BOOL:\r\n        return 'bool';\r\n      case
onnx.TensorProto.DataType.INT16:\r\n        return 'int16';\r\n      case onnx.TensorProto.DataType.UINT16:\r\n
return 'uint16';\r\n      case onnx.TensorProto.DataType.INT32:\r\n        return 'int32';\r\n      case
onnx.TensorProto.DataType.UINT32:\r\n        return 'uint32';\r\n      case onnx.TensorProto.DataType.FLOAT:\r\n
   return 'float32';\r\n      case onnx.TensorProto.DataType.DOUBLE:\r\n        return 'float64';\r\n      case
onnx.TensorProto.DataType.STRING:\r\n        return 'string';\r\n\r\n      // For INT64/UINT64, reduce their value to
32-bits.\r\n      // Should throw exception when overflow\r\n      case onnx.TensorProto.DataType.INT64:\r\n
return 'int32';\r\n      case onnx.TensorProto.DataType.UINT64:\r\n        return 'uint32';\r\n\r\n      default:\r\n
throw new Error(`unsupported data type: ${onnx.TensorProto.DataType[typeProto]}`);\r\n    }\r\n  }\r\n\r\n  static
tensorDataTypeStringToEnum(type: string): onnx.TensorProto.DataType {\r\n    switch (type) {\r\n      case
'int8':\r\n        return onnx.TensorProto.DataType.INT8;\r\n      case 'uint8':\r\n        return
onnx.TensorProto.DataType.UINT8;\r\n      case 'bool':\r\n        return onnx.TensorProto.DataType.BOOL;\r\n
case 'int16':\r\n        return onnx.TensorProto.DataType.INT16;\r\n      case 'uint16':\r\n        return
onnx.TensorProto.DataType.UINT16;\r\n      case 'int32':\r\n        return onnx.TensorProto.DataType.INT32;\r\n
case 'uint32':\r\n        return onnx.TensorProto.DataType.UINT32;\r\n      case 'float32':\r\n        return
onnx.TensorProto.DataType.FLOAT;\r\n      case 'float64':\r\n        return
onnx.TensorProto.DataType.DOUBLE;\r\n      case 'string':\r\n        return onnx.TensorProto.DataType.STRING;\r\n
    case 'int64':\r\n        return onnx.TensorProto.DataType.INT64;\r\n      case 'uint64':\r\n        return
onnx.TensorProto.DataType.UINT64;\r\n\r\n      default:\r\n        throw new Error(`unsupported data type:
${type}`);\r\n    }\r\n  }\r\n\r\n  static tensorDimsFromProto(dims: Array<number|Long>): number[] {\r\n    // get rid
of Long type for dims\r\n    return dims.map(d => Long.isLong(d) ? d.toNumber() : d);\r\n  }\r\n\r\n  static
tensorValueTypeFromProto(valueType: onnx.TypeProto.ITensor): Graph.ValueType {\r\n    return {\r\n
tensorType: ProtoUtil.tensorDataTypeFromProto(valueType.elemType!),\r\n      shape: {dims:
ProtoUtil.tensorDimsFromProto(valueType.shape!.dim!.map(d => d.dimValue!))}\r\n    };\r\n  }\r\n\r\n  static
tensorDimsFromORTFormat(tensor: onnxruntime.experimental.fbs.Tensor) {\r\n    const dims = [];\r\n    for (let i =
0; i < tensor.dimsLength(); i++) {\r\n      dims.push(LongUtil.longToNumber(tensor.dims(i)!));\r\n    }\r\n    return
dims;\r\n  }\r\n\r\n  static tensorAttributesFromORTFormat(node: onnxruntime.experimental.fbs.Node) {\r\n    const
attributes = [];\r\n    for (let i = 0; i < node.attributesLength(); i++) {\r\n      attributes.push(node.attributes(i)!);\r\n
}\r\n    return attributes;\r\n  }\r\n}\r\n\r\nexport class LongUtil {\r\n  static longToNumber(n:
Long|flatbuffers.Long|number) {\r\n    if (Long.isLong(n)) {\r\n      return n.toNumber();\r\n    } else if (n instanceof
flatbuffers.Long) {\r\n      return Long.fromValue({low: n.low, high: n.high, unsigned: true}).toNumber();\r\n    }\r\n
  return n;\r\n  }\r\n  static isLong(n: unknown) {\r\n    return Long.isLong(n) || n instanceof flatbuffers.Long;\r\n
}\r\n}\r\n\r\nexport class ShapeUtil {\r\n  static size(dims: readonly number[]): number {\r\n    return
ShapeUtil.getSizeFromDimensionRange(dims, 0, dims.length);\r\n  }\r\n\r\n  // `axis` inclusive\r\n  static
sizeFromDimension(dims: readonly number[], axis: number): number {\r\n    if (axis < 0 || axis > dims.length) {\r\n
  throw new Error(`invalid dimension of ${axis} for sizeFromDimension as Tensor has ${dims.length}
dimensions.`);\r\n    }\r\n    return ShapeUtil.getSizeFromDimensionRange(dims, axis, dims.length);\r\n  }\r\n\r\n  //
`axis` exclusive\r\n  static sizeToDimension(dims: readonly number[], axis: number): number {\r\n    if (axis < 0 ||
axis > dims.length) {\r\n      throw new Error(`invalid dimension of ${axis} for sizeToDimension as Tensor has
${dims.length} dimensions.`);\r\n    }\r\n    return ShapeUtil.getSizeFromDimensionRange(dims, 0, axis);\r\n
}\r\n\r\n  static getSizeFromDimensionRange(dims: readonly number[], start: number, end: number): number {\r\n
let size = 1;\r\n    for (let i = start; i < end; i++) {\r\n      // safety check as this method is called by multiple other
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methods requiring size.\r\n // size cannot be 0 or negative.\r\n if (dims[i] <= 0) {\r\n throw new Error(\r\n // eslint-disable-next-line max-len\r\n 'cannot get valid size from specified dimension range. Most likely the range contains 0 or negative values in them.');\r\n }\r\n size *= dims[i];\r\n }\r\n return size;\r\n }\r\n\r\n static computeStrides(dims: readonly number[]): readonly number[] {\r\n const rank = dims.length;\r\n if (rank === 0) {\r\n return [];\r\n } else if (rank === 1) {\r\n return [1];\r\n }\r\n const strides = new Array(rank);\r\n strides[rank - 1] = 1;\r\n strides[rank - 2] = dims[rank - 1];\r\n for (let i = rank - 3; i >= 0; --i) {\r\n strides[i] = strides[i + 1] * dims[i + 1];\r\n }\r\n return strides;\r\n }\r\n\r\n static transpose(dims: readonly number[]): readonly number[] {\r\n const copy = dims.slice();\r\n return copy.reverse();\r\n }\r\n\r\n static indicesToOffset(indices: readonly number[], strides: readonly number[], axis?: number): number {\r\n if (axis === undefined) {\r\n axis = indices.length;\r\n }\r\n let offset = 0;\r\n for (let i = 0; i < axis; ++i) {\r\n offset += strides[i] * indices[i];\r\n }\r\n return offset;\r\n }\r\n\r\n static offsetToIndices(offset: number, strides: readonly number[]): readonly number[] {\r\n const rank = strides.length;\r\n if (rank === 0) {\r\n return [];\r\n } else if (rank === 1) {\r\n return [offset * strides[0]];\r\n }\r\n const indices: number[] = new Array(strides.length);\r\n for (let i = 0; i < indices.length - 1; ++i) {\r\n indices[i] = Math.floor(offset / strides[i]);\r\n offset -= indices[i] * strides[i];\r\n }\r\n indices[indices.length - 1] = offset;\r\n return indices;\r\n }\r\n\r\n /**\r\n * normailze axis of range [-r, r) into [0, r).\r\n */\r\n static normalizeAxis(axis: number, tensorRank: number): number {\r\n if (axis < -tensorRank && axis >= tensorRank) {\r\n throw new Error('unsupported axis for this operation.');\r\n }\r\n return axis < 0 ? axis + tensorRank : axis;\r\n }\r\n\r\n static normalizeAxes(axes: readonly number[], tensorRank: number): number[] {\r\n return axes.map(x => this.normalizeAxis(x, tensorRank));\r\n }\r\n\r\n // Increment an index into a tensor (in lexicographic\r\n // ordering), wrapping around the specified upper_bound.\r\n /**\r\n * Increment an index into a tensor (in lexicographic ordering), wrapping around the specified upper_bound.\r\n * @param index Given index to increment (Will be mutated)\r\n * @param dims The dimensions of the tensor for which the given index corresponds to\r\n * @param axisToIncrementOn The 1-indexed axis to increment on. If undefined, axisToIncrementOn == rank\r\n */\r\n static incrementIndex(index: number[], dims: readonly number[], axisToIncrementOn?: number) {\r\n if (dims.length === 0 || index.length === 0) {\r\n throw new Error('Index incrementing unsupported for scalar Tensor');\r\n }\r\n if (axisToIncrementOn === undefined) {\r\n axisToIncrementOn = dims.length;\r\n } else {\r\n if (axisToIncrementOn <= 0 || axisToIncrementOn > dims.length) {\r\n throw new Error('Incorrect axis to increment on');\r\n }\r\n }\r\n\r\n for (let k = axisToIncrementOn - 1; k >= 0; --k) {\r\n index[k]++;\r\n if (index[k] < dims[k]) {\r\n break;\r\n }\r\n index[k] = 0;\r\n }\r\n }\r\n\r\n /**\r\n * Produces a new dimensions array based on the values in the 'originalDimensions' and 'shape' array\r\n * Used in Reshape\r\n * @param originalDims Original Shape array\r\n * @param shapeHints array containing values to compute the new dimensions\r\n * For example:\r\n * originalDims = [2,2] and shapeHints = [0,-1] will return [2,2]\r\n * originalDims = [2,2] and shapeHints = [4] will return [4]\r\n * originalDims = [2,2] and shapeHints = [5] will throw an exception\r\n * https://github.com/onnx/onnx/blob/master/docs/Operators.md#Reshape\r\n */\r\n\r\n static calculateReshapedDims(originalDims: readonly number[], shapeHints: ArrayLike<number>): number[] {\r\n // reshape to a Scalar Tensor\r\n if (shapeHints.length === 0) {\r\n if (originalDims.length === 0 || ShapeUtil.size(originalDims) === 1) {\r\n return [];\r\n } else {\r\n throw new Error('cannot reshape to a scalar Tensor');\r\n }\r\n }\r\n\r\n const nDims = shapeHints.length;\r\n const reshapedDims = new Array<number>(nDims);\r\n let unknownDimension = -1;\r\n let newTensorSize = 1;\r\n for (let i = 0; i < nDims; i++) {\r\n if (shapeHints[i] < -1) {\r\n throw new Error('a dimension in shape hints cannot be less than -1');\r\n }\r\n if (shapeHints[i] === -1) {\r\n if (unknownDimension !== -1) {\r\n throw new Error('at most one dimension in shape hints can be -1');\r\n }\r\n unknownDimension = i;\r\n } else {\r\n if (shapeHints[i] === 0) {\r\n if (i >= originalDims.length) {\r\n throw new Error('the dimension with value zero exceeds the dimension size of the input tensor');\r\n }\r\n reshapedDims[i] = originalDims[i];\r\n } else {\r\n reshapedDims[i] = shapeHints[i];\r\n }\r\n newTensorSize *= reshapedDims[i];\r\n }\r\n }\r\n\r\n const oldTensorSize = ShapeUtil.size(originalDims);\r\n if

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(unknownDimension !== -1) {\r\n      if (oldTensorSize % newTensorSize !== 0) {\r\n        throw new Error(`the
input tensor cannot be reshaped to the requested shape. Input shape: [${\r\n            originalDims}] Output shape:
[${shapeHints}]`);\r\n      }\r\n      reshapedDims[unknownDimension] = oldTensorSize / newTensorSize;\r\n    }\r\n
  // validate sizes from originalDims and reshapedDims match\r\n    else {\r\n      if (newTensorSize !==
oldTensorSize) {\r\n        throw new Error('reshapedDims and originalDims don\\'t have matching sizes');\r\n
}\r\n    }\r\n    return reshapedDims;\r\n  }\r\n\r\n  /**\r\n   * Sorts a given array based on the indices in the Perm
array\r\n   * Used in Transpose\r\n   * @param a Array to be sorted such as dims or strides\r\n   * @param perm
Perm given; if null a will be reversed\r\n   */\r\n  static sortBasedOnPerm(a: readonly number[], perm?: readonly
number[]): readonly number[] {\r\n    if (perm) {\r\n      return perm.map((v) => a[v]);\r\n    } else {\r\n      return
a.slice().reverse();\r\n    }\r\n  }\r\n\r\n  /**\r\n   * Pads a given shape according to the padding values\r\n   *
@param dims shape of the Tensor to be padded\r\n   * @param pad pad values\r\n   */\r\n  static padShape(dims:
readonly number[], pad: readonly number[]): readonly number[] {\r\n    const rank = dims.length;\r\n    return
dims.map((v, i) => v + pad[i] + pad[i + rank]);\r\n  }\r\n\r\n  /**\r\n   * Determines if the two shapes are identical\r\n
 * @param shape1\r\n   * @param shape2\r\n   */\r\n  static areEqual(shape1: readonly number[], shape2: readonly
number[]): boolean {\r\n    if (shape1.length !== shape2.length) {\r\n      return false;\r\n    }\r\n    return
shape1.every((v, i) => v === shape2[i]);\r\n  }\r\n\r\n  /**\r\n   * Validates if the given `dims` or `shape` is valid in
ONNX.js context and returns data size\r\n   * @param dims - input `dims` that needs to be checked\r\n   */\r\n  static
validateDimsAndCalcSize(dims: readonly number[]): number {\r\n    if (dims.length > 6) {\r\n      throw new
TypeError('Only rank 0 to 6 is supported for tensor shape.');\r\n    }\r\n    let size = 1;\r\n    for (const n of dims) {\r\n
    if (!Number.isInteger(n)) {\r\n        throw new TypeError(`Invalid shape: ${n} is not an integer`);\r\n      }\r\n
if (n < 0 || n > 2147483647) {\r\n        throw new TypeError(`Invalid shape: length ${n} is not allowed`);\r\n      }\r\n
    size *= n;\r\n    }\r\n    return size;\r\n  }\r\n\r\n  /**\r\n   * Determines the shape of output tensor y = flatten(x,
axis)\r\n   * @param dims - shape of input tensor\r\n   * @param axis - flatten axis, in the range [-r, r]\r\n   */\r\n
static flattenShape(dims: readonly number[], axis: number): readonly number[] {\r\n    if (axis < 0) {\r\n      axis +=
dims.length;\r\n    }\r\n    const total = dims.reduce((x, y) => x * y, 1);\r\n    const right = dims.slice(axis).reduce((x,
y) => x * y, 1);\r\n    const outputDims = [total / right, right];\r\n\r\n    return outputDims;\r\n  }\r\n\r\n  /**\r\n   *
Determines the shape of output tensor y = squeeze(x, axes)\r\n   * @param dims - shape of input tensor\r\n   *
@param axes - squeeze axes\r\n   */\r\n  static squeezeShape(dims: readonly number[], axes: readonly number[]):
readonly number[] {\r\n    const outputDims = new Array<number>();\r\n\r\n    // sanity check\r\n    axes =
ShapeUtil.normalizeAxes(axes, dims.length);\r\n\r\n    for (let i = 0; i < dims.length; i++) {\r\n      const
inSqueezeList = axes.indexOf(i) >= 0;\r\n      if (inSqueezeList && dims[i] !== 1) {\r\n        throw new
Error('squeeze an axis of size different than 1');\r\n      }\r\n\r\n      if ((axes.length === 0 && dims[i] > 1) ||
(axes.length > 0 && !inSqueezeList)) {\r\n        outputDims.push(dims[i]);\r\n      }\r\n    }\r\n\r\n    return
outputDims;\r\n  }\r\n\r\n  /**\r\n   * Determines the shape of output tensor y = unsqueeze(x, axes)\r\n   * @param
dims - shape of input tensor\r\n   * @param axes - unsqueeze axes\r\n   */\r\n  static unsqueezeShape(dims: readonly
number[], axes: readonly number[]): readonly number[] {\r\n    const outputDims = new
Array<number>(dims.length + axes.length);\r\n\r\n    // initialize the array elements to 0\r\n
outputDims.fill(0);\r\n\r\n    // set all axes indices to 1 in outputDims and check for duplicates\r\n    for (let i = 0; i <
axes.length; i++) {\r\n      const axis = ShapeUtil.normalizeAxis(axes[i], dims.length);\r\n      if (axis >=
outputDims.length) {\r\n        throw new Error('\\'axes\\' has an out of range axis');\r\n      }\r\n      if
(outputDims[axis] !== 0) {\r\n        throw new Error('\\'axes\\' has a duplicate axis');\r\n      }\r\n\r\n
outputDims[axis] = 1;\r\n    }\r\n\r\n    // fill in the zero entries of outputDims with the input tensor's shape\r\n    let
inputDimsIterator = 0;\r\n    for (let i = 0; i < outputDims.length; i++) {\r\n      if (outputDims[i] === 0) {\r\n
outputDims[i] = dims[inputDimsIterator++];\r\n      }\r\n    }\r\n\r\n    // sanity check assertion.
'inputDimsIterator'\r\n    // should be equal to the length of 'dims'\r\n    if (inputDimsIterator !== dims.length) {\r\n
throw new Error('the unsqueezed dimension could not be established');\r\n    }\r\n\r\n    return outputDims;\r\n
}\r\n}\r\n\r\n// bunch of helper methods that do a variety of math operations\r\nexport class MathUtil {\r\n  // y =
(x*x) + y\r\n  static sqr(\r\n      target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType,
```

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targetIndex: number, sourceIndex: number,\r\n      blockSize: number) {\r\n    if (sourceIndex < 0 || sourceIndex >=
source.length) {\r\n      throw new Error('sourceIndex out of bounds');\r\n    }\r\n    if (targetIndex < 0 || targetIndex
>= target.length) {\r\n      throw new Error('targetIndex out of bounds');\r\n    }\r\n    if (sourceIndex + blockSize >
source.length) {\r\n      throw new Error('source indices to be copied are outside bounds');\r\n    }\r\n    if
(targetIndex + blockSize > target.length) {\r\n      throw new Error('target array is too small to hold result');\r\n
}\r\n\r\n    for (let offset = 0; offset < blockSize; offset++) {\r\n      target[targetIndex + offset] +=
Math.pow(source[sourceIndex + offset], 2);\r\n    }\r\n  }\r\n\r\n  // y = ax + y\r\n  static axpy(\r\n      target:
number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number, sourceIndex:
number,\r\n      blockSize: number, alpha: number) {\r\n    if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n
  throw new Error('sourceIndex out of bounds');\r\n    }\r\n    if (targetIndex < 0 || targetIndex >= target.length) {\r\n
  throw new Error('targetIndex out of bounds');\r\n    }\r\n    if (sourceIndex + blockSize > source.length) {\r\n
throw new Error('source indices to be copied are outside bounds');\r\n    }\r\n    if (targetIndex + blockSize >
target.length) {\r\n      throw new Error('target array is too small to hold result');\r\n    }\r\n\r\n    for (let offset = 0;
offset < blockSize; offset++) {\r\n      target[targetIndex + offset] += (alpha * source[sourceIndex + offset]);\r\n
}\r\n  }\r\n\r\n  // y = pow(x, b)\r\n  static powx(\r\n      target: number[]|Tensor.NumberType, source:
number[]|Tensor.NumberType, targetIndex: number, sourceIndex: number,\r\n      blockSize: number, b: number)
{\r\n    if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n      throw new Error('sourceIndex out of
bounds');\r\n    }\r\n    if (targetIndex < 0 || targetIndex >= target.length) {\r\n      throw new Error('targetIndex out of
bounds');\r\n    }\r\n    if (sourceIndex + blockSize > source.length) {\r\n      throw new Error('source indices to be
copied are outside bounds');\r\n    }\r\n    if (targetIndex + blockSize > target.length) {\r\n      throw new Error('target
array is too small to hold result');\r\n    }\r\n\r\n    for (let offset = 0; offset < blockSize; offset++) {\r\n
target[targetIndex + offset] = Math.pow(source[sourceIndex + offset], b);\r\n    }\r\n  }\r\n\r\n  // y = x * y\r\n  static
mul(\r\n      target: number[]|Tensor.NumberType, source: number[]|Tensor.NumberType, targetIndex: number,
sourceIndex: number,\r\n      blockSize: number) {\r\n    if (sourceIndex < 0 || sourceIndex >= source.length) {\r\n
throw new Error('sourceIndex out of bounds');\r\n    }\r\n    if (targetIndex < 0 || targetIndex >= target.length) {\r\n
throw new Error('targetIndex out of bounds');\r\n    }\r\n    if (sourceIndex + blockSize > source.length) {\r\n
throw new Error('source indices to be copied are outside bounds');\r\n    }\r\n    if (targetIndex + blockSize >
target.length) {\r\n      throw new Error('target array is too small to hold result');\r\n    }\r\n\r\n    for (let offset = 0;
offset < blockSize; offset++) {\r\n      target[targetIndex + offset] = (source[sourceIndex + offset] *
target[targetIndex + offset]);\r\n    }\r\n  }\r\n}\r\n\r\nexport class SplitUtil {\r\n  /**\r\n   * Calculates new Shapes
from existing one and the splits given along the axis provides\r\n   * @param dims Shape of the Tensor to be splitted
into two or more Shapes\r\n   * @param axis The dimension along which the Tensor will be split\r\n   * @param
splits Offsets for the start of each split\r\n   */\r\n  static splitShape(dims: readonly number[], axis: number, split:
number[], numOutputs?: number):\r\n      [number[][], number[]] {\r\n    if (split.length === 0) {\r\n      if
(!numOutputs) {\r\n        throw new Error('need to know number of outputs when the \\'split\\' attribute is not
specified');\r\n      }\r\n      SplitUtil.determineSplit(dims[axis], numOutputs, split);\r\n    }\r\n\r\n    const shapes:
number[][] = [];\r\n    const offsets = [0];\r\n    for (let i = 0; i < split.length; ++i) {\r\n      if (i !== 0) {\r\n
offsets.push(offsets[i - 1] + split[i - 1]);\r\n      }\r\n      const shape = dims.slice();\r\n      shape[axis] = split[i];\r\n
shapes.push(shape);\r\n    }\r\n    return [shapes, offsets];\r\n  }\r\n\r\n  static
determineSplit(numElementsAlongAxis: number, numOutputs: number, split: number[]) {\r\n    // If 'split' is not
specified by the user, we need to partition the number of elements equally among the outputs\r\n    if
(numElementsAlongAxis % numOutputs !== 0) {\r\n      throw new Error('cannot split tensor to equal sized
parts');\r\n    }\r\n    for (let i = 0; i < numOutputs; ++i) {\r\n      split.push(numElementsAlongAxis /
numOutputs);\r\n    }\r\n  }\r\n}\r\n\r\nexport class ReduceUtil {\r\n  /**\r\n   * Perform reduce operations on the
specific operator\r\n   * @param a Input tensor data\r\n   * @param axes The dimensions along which the Tensor
will be reduced\r\n   * @param keepdims If set to true, the axes which are reduced are left in the\r\n   *    result as
dimensions with size one.\r\n   * @param op1 The operation to be performed on each element in the tensor\r\n   *
@param op2 The operation to be performed between elements in the tensor\r\n   */\r\n  static calcReduce(\r\n      a:
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Tensor, axes: number[], keepdims: boolean, op1: (b: number) => number,\r\n      op2: (a: number, b: number) =>
number): Tensor {\r\n    const dims = a.dims.slice(0);\r\n    // if axes is not set, perform reduce on all axes\r\n    if
(axes.length === 0) {\r\n      dims.forEach((d, ind) => axes.push(ind));\r\n    }\r\n    // get a temporary broadcastable
output shape\r\n    const outputDims = ReduceUtil.calcReduceShape(dims, axes, true);\r\n\r\n    // loop through the
output and calculate result one by one\r\n    const size = ShapeUtil.size(outputDims);\r\n    const y = new
Tensor(outputDims, a.type);\r\n    const strides = ShapeUtil.computeStrides(outputDims);\r\n    const inputStrides =
ShapeUtil.computeStrides(dims);\r\n    const indicesY = new Array(dims.length);\r\n    for (let i = 0; i < size; i++)
{\r\n      const indices = ShapeUtil.offsetToIndices(i, strides);\r\n      // map index\r\n
BroadcastUtil.fillIndex(indices, dims, indicesY);\r\n      y.set(\r\n          indices,\r\n
ReduceUtil.calcReduceByAxis(\r\n              a.numberData, axes, dims, 0, ShapeUtil.indicesToOffset(indicesY,
inputStrides), op1, op2));\r\n    }\r\n\r\n    if (keepdims) {\r\n      return y;\r\n    } else {\r\n      // keepdims == 0,
calculate the expected shape\r\n      return new Tensor(\r\n          ReduceUtil.calcReduceShape(dims, axes,
keepdims), y.type, undefined, undefined, y.data, y.dataId);\r\n    }\r\n  }\r\n\r\n  /**\r\n   * Perform reduce operations
on the specific operator on specific axes\r\n   * @param a Input tensor data\r\n   * @param axes The dimensions
along which the Tensor will be reduced\r\n   * @param dims The input dimension.\r\n   * @param curAxisInd Index
in axes specifying the current dimension along\r\n   *      which the tensor will be reduced\r\n   * @param pos The
current index of element to perform operation\r\n   * @param op1 The operation to be performed on each element in
the tensor\r\n   * @param op2 The operation to be performed between elements in the tensor\r\n   */\r\n  static
calcReduceByAxis(\r\n      input: Tensor.NumberType, axes: number[], dims: number[], curAxisInd: number, pos:
number,\r\n      op1: (b: number) => number, op2: (a: number, b: number) => number): number {\r\n    let res =
0;\r\n    if (curAxisInd >= axes.length) {\r\n      return op1(input[pos]);\r\n    }\r\n    const axis =
axes[curAxisInd];\r\n    const step = axis >= dims.length ? 1 : ShapeUtil.size(dims.slice(axis + 1));\r\n    for (let i =
0; i < dims[axis]; i++) {\r\n      res = i === 0 ? ReduceUtil.calcReduceByAxis(input, axes, dims, curAxisInd + 1,
pos, op1, op2) :\r\n                      op2(res, ReduceUtil.calcReduceByAxis(input, axes, dims, curAxisInd + 1, pos,
op1, op2));\r\n      pos += step;\r\n    }\r\n    return res;\r\n  }\r\n\r\n  /**\r\n   * Calculate the expected shape of a
reduce operation\r\n   * @param dims The input tensor dimension\r\n   * @param axes The dimensions along which
the Tensor will be reduced\r\n   * @param keepdims If set to true, the axes which are reduced are left in the\r\n   *
result as dimensions with size one.\r\n   */\r\n  static calcReduceShape(dims: readonly number[], axes: readonly
number[], keepDims: boolean): number[] {\r\n    const outputDims = dims.slice();\r\n    for (let i = 0; i < axes.length;
i++) {\r\n      if (keepDims) {\r\n        outputDims[axes[i]] = 1;\r\n      } else {\r\n        outputDims[axes[i]] = 0;\r\n
}\r\n    }\r\n    return outputDims.filter(dim => dim !== 0);\r\n  }\r\n}\r\n\r\nexport class PoolConvUtil {\r\n  /**\r\n
* Adjust the kernel, strides, pads to correct rank. Set to default value if not present\r\n   * @param isGlobalOperator
If true, perform global pooling.\r\n   * @param inputDims The input tensor dimension.\r\n   * @param kernelShape
The size of the kernel along each axis.\r\n   * @param strides Stride along each axis.\r\n   * @param pads Padding
for the beginning and ending along each axis.\r\n   */\r\n  static adjustPoolAttributes(\r\n      isGlobalOperator:
boolean, inputDims: readonly number[], kernelShape: number[], strides: number[],\r\n      pads: number[]) {\r\n    if
(!isGlobalOperator && kernelShape.length !== inputDims.length - 2) {\r\n      throw new Error('length of specified
kernel shapes should be 2 less than length of input dimensions');\r\n    }\r\n\r\n    if (isGlobalOperator) {\r\n      //
adjust kernel shape to cover the input dims\r\n      for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n        if
(dim >= kernelShape.length) {\r\n          kernelShape.push(inputDims[dim + 2]);\r\n        } else {\r\n
kernelShape[dim] = inputDims[dim + 2];\r\n        }\r\n      }\r\n    }\r\n\r\n    // adjust strides length to match kernel
shape length\r\n    for (let dim = 0; dim < kernelShape.length; dim++) {\r\n      if (dim < strides.length) {\r\n        if
(strides[dim] < 0) {\r\n          throw new Error('strides should be greater than or equal to 1');\r\n        }\r\n      } else
{\r\n        strides.push(1);\r\n      }\r\n    }\r\n\r\n    // adjust pads length to match 2 * kernel shape length\r\n    for (let
dim = 0; dim < kernelShape.length * 2; dim++) {\r\n      if (dim < pads.length) {\r\n        if (pads[dim] < 0) {\r\n
throw new Error('pad should be greater than or equal to 1');\r\n        }\r\n      } else {\r\n        pads.push(0);\r\n
}\r\n    }\r\n\r\n    // sanity checks for values in kernel shapes and pads\r\n    for (let dim = 0; dim <
kernelShape.length; dim++) {\r\n      if (kernelShape[dim] <= 0) {\r\n        throw new Error('kernel shapes need to be
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greater than 0');\r\n   }\r\n\r\n   if (pads[dim] >= kernelShape[dim] || pads[dim + kernelShape.length] >= kernelShape[dim]) {\r\n   throw new Error('pads should be smaller than kernel');\r\n   }\r\n   }\r\n }\r\n\r\n // adjust pad values based on 'autoPad' attribute\r\n static adjustPadsBasedOnAutoPad(\r\n   inputDims: readonly number[], strides: readonly number[], dilations: readonly number[],\r\n   kernelShape: readonly number[], pads: number[], autoPad?: string) {\r\n   if (!autoPad) {\r\n   return;\r\n   }\r\n\r\n   if (pads.length !== 2 * (inputDims.length - 2)) {\r\n   throw new Error('length of pads should be twice the length of data dimensions');\r\n   }\r\n\r\n   if (strides.length !== (inputDims.length - 2)) {\r\n   throw new Error('length of strides should be the length of data dimensions');\r\n   }\r\n\r\n   if (kernelShape.length !== (inputDims.length - 2)) {\r\n   throw new Error('length of kernel shapes should be the length of data dimensions');\r\n   }\r\n\r\n   for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n   PoolConvUtil.adjustPadAndReturnShape(\r\n   inputDims[dim + 2], strides[dim], dilations[dim], kernelShape[dim], pads, dim, dim + inputDims.length - 2,\r\n   autoPad);\r\n   }\r\n }\r\n\r\n /**\r\n   * Calculate the output shape for Pool ops based on input attributes. (Should be used only for Pool ops)\r\n   * @param isGlobalOperator If true, perform global pooling.\r\n   * @param inputDims The input tensor dimension. (inputs[0].dims)\r\n   * @param strides Stride along each axis.\r\n   * @param kernelShape The size of the kernel along each axis.\r\n   * @param pads Padding for the beginning and ending along each axis.\r\n   * @param autoPad DEPRECATED attribute supported for legacy models. Specifies how to implicitly calculate pads in each\r\n   *   dimension. Can take values NOTSET, SAME_UPPER, SAME_LOWER, or VALID.\r\n   */\r\n static computePoolOutputShape(\r\n   isGlobalOperator: boolean, inputDims: readonly number[], strides: number[], kernelShape: number[], pads: number[],\r\n   autoPad?: string): number[] {\r\n   if (inputDims.length <= 0) {\r\n   throw new Error('input shape must be of size greater than 0');\r\n   }\r\n\r\n   // Add batch size and number of channels of output\r\n   const outputDims = [inputDims[0], inputDims[1]];\r\n\r\n   // TODO: support dilations for pool operators\r\n   const dilations = new Array<number>(kernelShape.length).fill(1);\r\n\r\n   PoolConvUtil.computeShapeHelper(\r\n   isGlobalOperator, inputDims, outputDims, strides, dilations, kernelShape, pads, autoPad);\r\n   return outputDims;\r\n }\r\n\r\n /**\r\n   * Calculate the output shape for Conv op based on input attributes. (Should be used only for Conv op)\r\n   * @param inputDims The input tensor dimension. (inputs[0].dims)\r\n   * @param filterDims The filter tensor dimension. (inputs[1].dims)\r\n   * @param strides Stride along each axis.\r\n   * @param kernelShape The size of the kernel along each axis.\r\n   * @param pads Padding for the beginning and ending along each axis.\r\n   * @param autoPad DEPRECATED attribute supported for legacy models. Specifies how to implicitly calculate pads in each\r\n   *   dimension. Can take values NOTSET, SAME_UPPER, SAME_LOWER, or VALID.\r\n   */\r\n static computeConvOutputShape(\r\n   inputDims: readonly number[], filterDims: readonly number[], strides: number[], dilations: number[],\r\n   kernelShape: number[], pads: number[], autoPad?: string): number[] {\r\n   if (inputDims.length <= 0 || filterDims.length <= 0) {\r\n   throw new Error('invalid input tensor dims or invalid filter tensor dims');\r\n   }\r\n\r\n   // Add batch size and number of channels of output\r\n   const outputDims = [inputDims[0], filterDims[0]];\r\n\r\n   PoolConvUtil.computeShapeHelper(false, inputDims, outputDims, strides, dilations, kernelShape, pads, autoPad);\r\n   return outputDims;\r\n }\r\n\r\n // will compute output shapes for data dimensions ONLY (i.e.) no batch size and channels\r\n // called by computePoolOutputShape() and computeConvOutputShape()\r\n // adjust pads based on 'autoPad' attribute prior to shape computation\r\n private static computeShapeHelper(\r\n   isGlobalOperator: boolean, inputDims: readonly number[], outputDims: number[], strides: readonly number[],\r\n   dilations: readonly number[], kernelShape: readonly number[], pads: number[], autoPad?: string) {\r\n   if (isGlobalOperator) {\r\n   for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n   outputDims.push(1);\r\n   }\r\n   } else {\r\n   for (let dim = 0; dim < inputDims.length - 2; dim++) {\r\n   outputDims.push(PoolConvUtil.adjustPadAndReturnShape(\r\n   inputDims[dim + 2], strides[dim], dilations[dim], kernelShape[dim], pads, dim, dim + inputDims.length - 2,\r\n   autoPad));\r\n   }\r\n   }\r\n }\r\n\r\n // helper for computeShapeHelper() and adjustPadsBasedOnAutoPad()\r\n // adjusts pad value for given 'autoPad' string and computes output shape along a particular dimension\r\n private static adjustPadAndReturnShape(\r\n   inSize: number, stride: number, dilation: number, kernel: number, pads: number[], padHeadIndex: number,\r\n   padTailIndex: number, autoPad?: string): number {\r\n   const dkernel =

dilation * (kernel - 1) + 1;\r\n if (autoPad && autoPad !== 'NOTSET') {\r\n switch (autoPad) {\r\n case 'VALID':\r\n pads[padHeadIndex] = 0;\r\n pads[padTailIndex] = 0;\r\n return Math.floor(((inSize - dkernel) / stride) + 1);\r\n case 'SAME_LOWER':\r\n case 'SAME_UPPER':\r\n if (dilation !== 1) {\r\n throw new Error('Dilation not supported for SAME_UPPER or SAME_LOWER');\r\n } else {\r\n const legacyTargetSize = (inSize + stride - 1) / stride;\r\n const padNeeded = (legacyTargetSize - 1) * stride + kernel - inSize;\r\n pads[padHeadIndex] =\r\n (autoPad === 'SAME_LOWER') ? Math.floor((padNeeded + 1) / 2) : Math.floor(padNeeded / 2);\r\n pads[padTailIndex] = padNeeded - pads[padHeadIndex];\r\n return Math.floor(((inSize + padNeeded - kernel) / stride) + 1);\r\n }\r\n default:\r\n throw new Error('Unsupported AutoPad type');\r\n }\r\n } else {\r\n return Math.floor(((inSize + pads[padHeadIndex] + pads[padTailIndex] - dkernel) / stride) + 1);\r\n }\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\ninterface ExtraOptionsHandler {\r\n (name: string, value: string): void;\r\n}\r\n\r\nexport const iterateExtraOptions =\r\n (options: Record<string, unknown>, prefix: string, seen: WeakSet<Record<string, unknown>>,\r\n handler: ExtraOptionsHandler): void => {\r\n if (typeof options == 'object' && options !== null) {\r\n if (seen.has(options)) {\r\n throw new Error('Circular reference in options');\r\n } else {\r\n seen.add(options);\r\n }\r\n }\r\n\r\n Object.entries(options).forEach(([key, value]) => {\r\n const name = (prefix) ? prefix + key : key;\r\n if (typeof value === 'object') {\r\n iterateExtraOptions(value as Record<string, unknown>, name + '.', seen, handler);\r\n } else if (typeof value === 'string' || typeof value === 'number') {\r\n handler(name, value.toString());\r\n } else if (typeof value === 'boolean') {\r\n handler(name, (value) ? '1' : '0');\r\n } else {\r\n throw new Error(`Can't handle extra config type: ${typeof value}`);\r\n }\r\n });\r\n };\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env, InferenceSession} from 'onnxruntime-common';\r\nimport {OrtWasmMessage, SerializableSessionMetadata, SerializableTensor} from './proxy-messages';\r\nimport * as core from './wasm-core-impl';\r\nimport {initializeWebAssembly} from './wasm-factory';\r\n\r\nconst isProxy = (): boolean => !!env.wasm.proxy && typeof document !== 'undefined';\r\nlet proxyWorker: Worker|undefined;\r\nlet initializing = false;\r\nlet initialized = false;\r\nlet aborted = false;\r\n\r\n// resolve; reject\r\ntype PromiseCallbacks<T = void> = [(result: T) => void, (reason: unknown) => void];\r\n\r\nlet initWasmCallbacks: PromiseCallbacks;\r\nlet initOrtCallbacks: PromiseCallbacks;\r\nconst createSessionCallbacks: Array<PromiseCallbacks<SerializableSessionMetadata>> = [];\r\nconst releaseSessionCallbacks: Array<PromiseCallbacks<void>> = [];\r\nconst runCallbacks: Array<PromiseCallbacks<SerializableTensor[]>> = [];\r\nconst endProfilingCallbacks: Array<PromiseCallbacks<void>> = [];\r\n\r\nconst ensureWorker = (): void => {\r\n if (initializing || !initialized || aborted || !proxyWorker) {\r\n throw new Error('worker not ready');\r\n }\r\n};\r\n\r\nconst onProxyWorkerMessage = (ev: MessageEvent<OrtWasmMessage>): void => {\r\n switch (ev.data.type) {\r\n case 'init-wasm':\r\n initializing = false;\r\n if (ev.data.err) {\r\n aborted = true;\r\n initWasmCallbacks[1](ev.data.err);\r\n } else {\r\n initialized = true;\r\n initWasmCallbacks[0]();\r\n }\r\n break;\r\n case 'init-ort':\r\n if (ev.data.err) {\r\n initOrtCallbacks[1](ev.data.err);\r\n } else {\r\n initOrtCallbacks[0]();\r\n }\r\n break;\r\n case 'create':\r\n if (ev.data.err) {\r\n createSessionCallbacks.shift()![1](ev.data.err);\r\n } else {\r\n createSessionCallbacks.shift()![0](ev.data.out!);\r\n }\r\n break;\r\n case 'release':\r\n if (ev.data.err) {\r\n releaseSessionCallbacks.shift()![1](ev.data.err);\r\n } else {\r\n releaseSessionCallbacks.shift()![0]();\r\n }\r\n break;\r\n case 'run':\r\n if (ev.data.err) {\r\n runCallbacks.shift()![1](ev.data.err);\r\n } else {\r\n runCallbacks.shift()![0](ev.data.out!);\r\n }\r\n break;\r\n case 'end-profiling':\r\n if (ev.data.err) {\r\n endProfilingCallbacks.shift()![1](ev.data.err);\r\n } else {\r\n endProfilingCallbacks.shift()![0]();\r\n }\r\n break;\r\n default:\r\n }\r\n};\r\n\r\nconst scriptSrc = typeof document !== 'undefined' ? (document?.currentScript as HTMLScriptElement)?.src : undefined;\r\n\r\nexport const initWasm = async(): Promise<void> => {\r\n if (isProxy()) {\r\n if (initialized) {\r\n return;\r\n }\r\n if (initializing) {\r\n throw new Error('multiple calls to \\'initWasm()\\' detected.');\r\n }\r\n if (aborted) {\r\n throw new Error('previous call to \\'initWasm()\\' failed.');\r\n }\r\n\r\n initializing = true;\r\n\r\n // overwrite

wasm filepaths\r\n   if (env.wasm.wasmPaths === undefined) {\r\n   if (scriptSrc && scriptSrc.indexOf('blob:') !== 0) {\r\n   env.wasm.wasmPaths = scriptSrc.substr(0, (scriptSrc as string).lastIndexOf('/') + 1);\r\n   }\r\n   }\r\n\r\n   return new Promise<void>((resolve, reject) => {\r\n   proxyWorker?.terminate();\r\n   // eslint-disable-next-line @typescript-eslint/no-var-requires, @typescript-eslint/no-require-imports\r\n   proxyWorker = require('worker-loader?inline=no-fallback!./proxy-worker/main').default() as Worker;\r\n   proxyWorker.onmessage = onProxyWorkerMessage;\r\n   initWasmCallbacks = [resolve, reject];\r\n   const message: OrtWasmMessage = {type: 'init-wasm', in : env.wasm};\r\n   proxyWorker.postMessage(message);\r\n   });\r\n\r\n } else {\r\n   return initializeWebAssembly(env.wasm);\r\n }\r\n};\r\n\r\nexport const initOrt = async(numThreads: number, loggingLevel: number): Promise<void> => {\r\n if (isProxy()) {\r\n   ensureWorker();\r\n   return new Promise<void>((resolve, reject) => {\r\n   initOrtCallbacks = [resolve, reject];\r\n   const message: OrtWasmMessage = {type: 'init-ort', in : {numThreads, loggingLevel}};\r\n   proxyWorker!.postMessage(message);\r\n   });\r\n } else {\r\n   core.initOrt(numThreads, loggingLevel);\r\n }\r\n};\r\n\r\nexport const createSession =\r\n   async(model: Uint8Array, options?: InferenceSession.SessionOptions): Promise<SerializableSessionMetadata> => {\r\n if (isProxy()) {\r\n   ensureWorker();\r\n   return new Promise<SerializableSessionMetadata>((resolve, reject) => {\r\n   createSessionCallbacks.push([resolve, reject]);\r\n   const message: OrtWasmMessage = {type: 'create', in : {model, options}};\r\n   proxyWorker!.postMessage(message, [model.buffer]);\r\n   });\r\n } else {\r\n   return core.createSession(model, options);\r\n }\r\n};\r\n\r\nexport const releaseSession = async(sessionId: number): Promise<void> => {\r\n if (isProxy()) {\r\n   ensureWorker();\r\n   return new Promise<void>((resolve, reject) => {\r\n   releaseSessionCallbacks.push([resolve, reject]);\r\n   const message: OrtWasmMessage = {type: 'release', in : sessionId};\r\n   proxyWorker!.postMessage(message);\r\n   });\r\n } else {\r\n   core.releaseSession(sessionId);\r\n }\r\n};\r\n\r\nexport const run = async(\r\n   sessionId: number, inputIndices: number[], inputs: SerializableTensor[], outputIndices: number[],\r\n   options: InferenceSession.RunOptions): Promise<SerializableTensor[]> => {\r\n if (isProxy()) {\r\n   ensureWorker();\r\n   return new Promise<SerializableTensor[]>((resolve, reject) => {\r\n   runCallbacks.push([resolve, reject]);\r\n   const message: OrtWasmMessage = {type: 'run', in : {sessionId, inputIndices, inputs, outputIndices, options}};\r\n   proxyWorker!.postMessage(message, core.extractTransferableBuffers(inputs));\r\n   });\r\n } else {\r\n   return core.run(sessionId, inputIndices, inputs, outputIndices, options);\r\n }\r\n};\r\n\r\nexport const endProfiling = async(sessionId: number): Promise<void> => {\r\n if (isProxy()) {\r\n   ensureWorker();\r\n   return new Promise<void>((resolve, reject) => {\r\n   endProfilingCallbacks.push([resolve, reject]);\r\n   const message: OrtWasmMessage = {type: 'end-profiling', in : sessionId};\r\n   proxyWorker!.postMessage(message);\r\n   });\r\n } else {\r\n   core.endProfiling(sessionId);\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceSession} from 'onnxruntime-common';\r\n\r\nimport {iterateExtraOptions} from './options-utils';\r\nimport {allocWasmString} from './string-utils';\r\nimport {getInstance} from './wasm-factory';\r\n\r\nexport const setRunOptions = (options: InferenceSession.RunOptions): [number, number[]] => {\r\n const wasm = getInstance();\r\n let runOptionsHandle = 0;\r\n const allocs: number[] = [];\r\n\r\n const runOptions: InferenceSession.RunOptions = options || {};\r\n\r\n try {\r\n   if (options?.logSeverityLevel === undefined) {\r\n   runOptions.logSeverityLevel = 2; // Default to warning\r\n   } else if (\r\n   typeof options.logSeverityLevel !== 'number' || !Number.isInteger(options.logSeverityLevel) ||\r\n   options.logSeverityLevel < 0 || options.logSeverityLevel > 4) {\r\n   throw new Error(`log serverity level is not valid: ${options.logSeverityLevel}`);\r\n   }\r\n\r\n   if (options?.logVerbosityLevel === undefined) {\r\n   runOptions.logVerbosityLevel = 0; // Default to 0\r\n   } else if (typeof options.logVerbosityLevel !== 'number' || !Number.isInteger(options.logVerbosityLevel)) {\r\n   throw new Error(`log verbosity level is not valid: ${options.logVerbosityLevel}`);\r\n   }\r\n\r\n   if (options?.terminate === undefined) {\r\n   runOptions.terminate = false;\r\n   }\r\n\r\n   let tagDataOffset = 0;\r\n   if (options?.tag !== undefined) {\r\n   tagDataOffset = allocWasmString(options.tag, allocs);\r\n   }\r\n\r\n   runOptionsHandle = wasm._OrtCreateRunOptions(\r\n   runOptions.logSeverityLevel!, runOptions.logVerbosityLevel!, !!runOptions.terminate!, tagDataOffset);\r\n   if (runOptionsHandle === 0) {\r\n   throw new Error('Can\\'t create

run options');\r\n }\r\n\r\n if (options?.extra !== undefined) {\r\n iterateExtraOptions(options.extra, '', new WeakSet<Record<string, unknown>>(), (key, value) => {\r\n const keyDataOffset = allocWasmString(key, allocs);\r\n const valueDataOffset = allocWasmString(value, allocs);\r\n\r\n if (wasm._OrtAddRunConfigEntry(runOptionsHandle, keyDataOffset, valueDataOffset) !== 0) {\r\n throw new Error(`Can't set a run config entry: ${key} - ${value}`);\r\n }\r\n });\r\n }\r\n\r\n return [runOptionsHandle, allocs];\r\n } catch (e) {\r\n if (runOptionsHandle !== 0) {\r\n wasm._OrtReleaseRunOptions(runOptionsHandle);\r\n }\r\n allocs.forEach(wasm._free);\r\n throw e;\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {env, InferenceSession, SessionHandler, Tensor} from 'onnxruntime-common';\r\n\r\nimport {createSession, endProfiling, initOrt, releaseSession, run} from './proxy-wrapper';\r\n\r\nlet ortInit: boolean;\r\n\r\n\r\nconst getLogLevel = (logLevel: 'verbose'|'info'|'warning'|'error'|'fatal'): number => {\r\n switch (logLevel) {\r\n case 'verbose':\r\n return 0;\r\n case 'info':\r\n return 1;\r\n case 'warning':\r\n return 2;\r\n case 'error':\r\n return 3;\r\n case 'fatal':\r\n return 4;\r\n default:\r\n throw new Error(`unsupported logging level: ${logLevel}`);\r\n }\r\n};\r\n\r\nexport class OnnxruntimeWebAssemblySessionHandler implements SessionHandler {\r\n private sessionId: number;\r\n\r\n inputNames: string[];\r\n outputNames: string[];\r\n\r\n async loadModel(model: Uint8Array, options?: InferenceSession.SessionOptions): Promise<void> {\r\n if (!ortInit) {\r\n await initOrt(env.wasm.numThreads!, getLogLevel(env.logLevel!));\r\n ortInit = true;\r\n }\r\n\r\n [this.sessionId, this.inputNames, this.outputNames] = await createSession(model, options);\r\n }\r\n\r\n async dispose(): Promise<void> {\r\n return releaseSession(this.sessionId);\r\n }\r\n\r\n async run(feeds: SessionHandler.FeedsType, fetches: SessionHandler.FetchesType, options: InferenceSession.RunOptions):\r\n Promise<SessionHandler.ReturnType> {\r\n const inputArray: Tensor[] = [];\r\n const inputIndices: number[] = [];\r\n Object.entries(feeds).forEach(kvp => {\r\n const name = kvp[0];\r\n const tensor = kvp[1];\r\n const index = this.inputNames.indexOf(name);\r\n if (index === -1) {\r\n throw new Error(`invalid input '${name}'`);\r\n }\r\n inputArray.push(tensor);\r\n inputIndices.push(index);\r\n });\r\n\r\n const outputIndices: number[] = [];\r\n Object.entries(fetches).forEach(kvp => {\r\n const name = kvp[0];\r\n // TODO: support pre-allocated output\r\n const index = this.outputNames.indexOf(name);\r\n if (index === -1) {\r\n throw new Error(`invalid output '${name}'`);\r\n }\r\n outputIndices.push(index);\r\n });\r\n\r\n const outputs =\r\n await run(this.sessionId, inputIndices, inputArray.map(t => [t.type, t.dims, t.data]), outputIndices, options);\r\n\r\n const result: SessionHandler.ReturnType = {};\r\n for (let i = 0; i < outputs.length; i++) {\r\n result[this.outputNames[outputIndices[i]]] = new Tensor(outputs[i][0], outputs[i][2], outputs[i][1]);\r\n }\r\n return result;\r\n }\r\n\r\n startProfiling(): void {\r\n // TODO: implement profiling\r\n }\r\n\r\n endProfiling(): void {\r\n void endProfiling(this.sessionId);\r\n }\r\n}\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT License.\r\n\r\nimport {InferenceSession} from 'onnxruntime-common';\r\n\r\nimport {iterateExtraOptions} from './options-utils';\r\nimport {allocWasmString} from './string-utils';\r\nimport {getInstance} from './wasm-factory';\r\n\r\nconst getGraphOptimzationLevel = (graphOptimizationLevel: string|unknown): number => {\r\n switch (graphOptimizationLevel) {\r\n case 'disabled':\r\n return 0;\r\n case 'basic':\r\n return 1;\r\n case 'extended':\r\n return 2;\r\n case 'all':\r\n return 99;\r\n default:\r\n throw new Error(`unsupported graph optimization level: ${graphOptimizationLevel}`);\r\n }\r\n};\r\n\r\nconst getExecutionMode = (executionMode: 'sequential'|'parallel'): number => {\r\n switch (executionMode) {\r\n case 'sequential':\r\n return 0;\r\n case 'parallel':\r\n return 1;\r\n default:\r\n throw new Error(`unsupported execution mode: ${executionMode}`);\r\n }\r\n};\r\n\r\nconst appendDefaultOptions = (options: InferenceSession.SessionOptions): void => {\r\n if (!options.extra) {\r\n options.extra = {};\r\n }\r\n if (!options.extra.session) {\r\n options.extra.session = {};\r\n }\r\n const session = options.extra.session as Record<string, string>;\r\n if (!session.use_ort_model_bytes_directly) {\r\n // eslint-disable-next-line camelcase\r\n session.use_ort_model_bytes_directly = '1';\r\n }\r\n};\r\n\r\nexport const setSessionOptions = (options?: InferenceSession.SessionOptions): [number, number[]] => {\r\n const wasm = getInstance();\r\n let sessionOptionsHandle = 0;\r\n const allocs: number[] = [];\r\n\r\n const sessionOptions:

InferenceSession.SessionOptions = options || {};\r\n appendDefaultOptions(sessionOptions);\r\n\r\n try {\r\n if
(options?.graphOptimizationLevel === undefined) {\r\n sessionOptions.graphOptimizationLevel = 'all';\r\n
}\r\n const graphOptimizationLevel =
getGraphOptimzationLevel(sessionOptions.graphOptimizationLevel!);\r\n\r\n if (options?.enableCpuMemArena
=== undefined) {\r\n sessionOptions.enableCpuMemArena = true;\r\n }\r\n\r\n if
(options?.enableMemPattern === undefined) {\r\n sessionOptions.enableMemPattern = true;\r\n }\r\n\r\n if
(options?.executionMode === undefined) {\r\n sessionOptions.executionMode = 'sequential';\r\n }\r\n const
executionMode = getExecutionMode(sessionOptions.executionMode!);\r\n\r\n let logIdDataOffset = 0;\r\n if
(options?.logId !== undefined) {\r\n logIdDataOffset = allocWasmString(options.logId, allocs);\r\n }\r\n\r\n
if (options?.logSeverityLevel === undefined) {\r\n sessionOptions.logSeverityLevel = 2; // Default to
warning\r\n } else if (\r\n typeof options.logSeverityLevel !== 'number' ||
!Number.isInteger(options.logSeverityLevel) ||\r\n options.logSeverityLevel < 0 || options.logSeverityLevel > 4)
{\r\n throw new Error(`log serverity level is not valid: ${options.logSeverityLevel}`);\r\n }\r\n\r\n if
(options?.logVerbosityLevel === undefined) {\r\n sessionOptions.logVerbosityLevel = 0; // Default to 0\r\n }
else if (typeof options.logVerbosityLevel !== 'number' || !Number.isInteger(options.logVerbosityLevel)) {\r\n
throw new Error(`log verbosity level is not valid: ${options.logVerbosityLevel}`);\r\n }\r\n\r\n if
(options?.enableProfiling === undefined) {\r\n sessionOptions.enableProfiling = false;\r\n }\r\n\r\n
sessionOptionsHandle = wasm._OrtCreateSessionOptions(\r\n graphOptimizationLevel,
!!sessionOptions.enableCpuMemArena!, !!sessionOptions.enableMemPattern!, executionMode,\r\n
!!sessionOptions.enableProfiling!, 0, logIdDataOffset, sessionOptions.logSeverityLevel!,\r\n
sessionOptions.logVerbosityLevel!);\r\n if (sessionOptionsHandle === 0) {\r\n throw new Error('Can\\'t create
session options');\r\n }\r\n\r\n if (options?.extra !== undefined) {\r\n iterateExtraOptions(options.extra, '', new
WeakSet<Record<string, unknown>>(), (key, value) => {\r\n const keyDataOffset = allocWasmString(key,
allocs);\r\n const valueDataOffset = allocWasmString(value, allocs);\r\n\r\n if
(wasm._OrtAddSessionConfigEntry(sessionOptionsHandle, keyDataOffset, valueDataOffset) !== 0) {\r\n
throw new Error(`Can't set a session config entry: ${key} - ${value}`);\r\n }\r\n });\r\n }\r\n\r\n return
[sessionOptionsHandle, allocs];\r\n } catch (e) {\r\n if (sessionOptionsHandle !== 0) {\r\n
wasm._OrtReleaseSessionOptions(sessionOptionsHandle);\r\n }\r\n allocs.forEach(wasm._free);\r\n throw
e;\r\n }\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {getInstance} from './wasm-factory';\r\n\r\nexport const allocWasmString = (data: string,
allocs: number[]): number => {\r\n const wasm = getInstance();\r\n\r\n const dataLength =
wasm.lengthBytesUTF8(data) + 1;\r\n const dataOffset = wasm._malloc(dataLength);\r\n
wasm.stringToUTF8(data, dataOffset, dataLength);\r\n allocs.push(dataOffset);\r\n\r\n return
dataOffset;\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {InferenceSession, Tensor} from 'onnxruntime-common';\r\nimport
{SerializableSessionMetadata, SerializableTensor} from './proxy-messages';\r\nimport {setRunOptions} from './run-
options';\r\nimport {setSessionOptions} from './session-options';\r\nimport {allocWasmString} from './string-
utils';\r\nimport {getInstance} from './wasm-factory';\r\n\r\n/**\r\n * initialize ORT environment.\r\n * @param
numThreads SetGlobalIntraOpNumThreads(numThreads)\r\n * @param loggingLevel
CreateEnv(static_cast<OrtLoggingLevel>(logging_level))\r\n */\r\nexport const initOrt = (numThreads: number,
loggingLevel: number): void => {\r\n const errorCode = getInstance()._OrtInit(numThreads, loggingLevel);\r\n if
(errorCode !== 0) {\r\n throw new Error(`Can't initialize onnxruntime. error code = ${errorCode}`);\r\n
}\r\n};\r\n\r\n/**\r\n * tuple elements are: InferenceSession ID; inputNamesUTF8Encoded;
outputNamesUTF8Encoded\r\n */\r\ntype SessionMetadata = [number, number[], number[]];\r\n\r\nconst
activeSessions: Array<SessionMetadata|undefined> = [];\r\n\r\n/**\r\n * create an instance of InferenceSession.\r\n
* @returns the metadata of InferenceSession. 0-value handle for failure.\r\n */\r\nexport const createSession =\r\n
(model: Uint8Array, options?: InferenceSession.SessionOptions): SerializableSessionMetadata => {\r\n const
wasm = getInstance();\r\n const modelDataOffset = wasm._malloc(model.byteLength);\r\n let sessionHandle

= 0;\r\n let sessionOptionsHandle = 0;\r\n let allocs: number[] = [];\r\n\r\n try {\r\n [sessionOptionsHandle, allocs] = setSessionOptions(options);\r\n\r\n wasm.HEAPU8.set(model, modelDataOffset);\r\n sessionHandle = wasm._OrtCreateSession(modelDataOffset, model.byteLength, sessionOptionsHandle);\r\n if (sessionHandle === 0) {\r\n throw new Error('Can\\'t create a session');\r\n }\r\n } finally {\r\n wasm._free(modelDataOffset);\r\n wasm._OrtReleaseSessionOptions(sessionOptionsHandle);\r\n allocs.forEach(wasm._free);\r\n }\r\n\r\n const inputCount = wasm._OrtGetInputCount(sessionHandle);\r\n const outputCount = wasm._OrtGetOutputCount(sessionHandle);\r\n\r\n const inputNames = [];\r\n const inputNamesUTF8Encoded = [];\r\n const outputNames = [];\r\n const outputNamesUTF8Encoded = [];\r\n for (let i = 0; i < inputCount; i++) {\r\n const name = wasm._OrtGetInputName(sessionHandle, i);\r\n if (name === 0) {\r\n throw new Error('Can\\'t get an input name');\r\n }\r\n inputNamesUTF8Encoded.push(name);\r\n inputNames.push(wasm.UTF8ToString(name));\r\n }\r\n for (let i = 0; i < outputCount; i++) {\r\n const name = wasm._OrtGetOutputName(sessionHandle, i);\r\n if (name === 0) {\r\n throw new Error('Can\\'t get an output name');\r\n }\r\n outputNamesUTF8Encoded.push(name);\r\n outputNames.push(wasm.UTF8ToString(name));\r\n }\r\n\r\n activeSessions.push([sessionHandle, inputNamesUTF8Encoded, outputNamesUTF8Encoded]);\r\n return [activeSessions.length - 1, inputNames, outputNames];\r\n };\r\n\r\nexport const releaseSession = (sessionId: number): void => {\r\n const wasm = getInstance();\r\n const session = activeSessions[sessionId];\r\n if (!session) {\r\n throw new Error('invalid session id');\r\n }\r\n const sessionHandle = session[0];\r\n const inputNamesUTF8Encoded = session[1];\r\n const outputNamesUTF8Encoded = session[2];\r\n\r\n inputNamesUTF8Encoded.forEach(wasm._OrtFree);\r\n outputNamesUTF8Encoded.forEach(wasm._OrtFree);\r\n wasm._OrtReleaseSession(sessionHandle);\r\n activeSessions[sessionId] = undefined;\r\n};\r\n\r\n/**\r\n * Copied from ONNX definition. Use this to drop dependency 'onnx_proto' to decrease compiled .js file size.\r\n */\r\nconst enum DataType {\r\n undefined = 0,\r\n float = 1,\r\n uint8 = 2,\r\n int8 = 3,\r\n uint16 = 4,\r\n int16 = 5,\r\n int32 = 6,\r\n int64 = 7,\r\n string = 8,\r\n bool = 9,\r\n float16 = 10,\r\n double = 11,\r\n uint32 = 12,\r\n uint64 = 13,\r\n complex64 = 14,\r\n complex128 = 15,\r\n bfloat16 = 16\r\n}\r\n\r\n\r\nconst tensorDataTypeStringToEnum = (type: string): DataType => {\r\n switch (type) {\r\n case 'int8':\r\n return DataType.int8;\r\n case 'uint8':\r\n return DataType.uint8;\r\n case 'bool':\r\n return DataType.bool;\r\n case 'int16':\r\n return DataType.int16;\r\n case 'uint16':\r\n return DataType.uint16;\r\n case 'int32':\r\n return DataType.int32;\r\n case 'uint32':\r\n return DataType.uint32;\r\n case 'float32':\r\n return DataType.float;\r\n case 'float64':\r\n return DataType.double;\r\n case 'string':\r\n return DataType.string;\r\n case 'int64':\r\n return DataType.int64;\r\n case 'uint64':\r\n return DataType.uint64;\r\n\r\n default:\r\n throw new Error(`unsupported data type: ${type}`);\r\n }\r\n};\r\n\r\nconst tensorDataTypeEnumToString = (typeProto: DataType): Tensor.Type => {\r\n switch (typeProto) {\r\n case DataType.int8:\r\n return 'int8';\r\n case DataType.uint8:\r\n return 'uint8';\r\n case DataType.bool:\r\n return 'bool';\r\n case DataType.int16:\r\n return 'int16';\r\n case DataType.uint16:\r\n return 'uint16';\r\n case DataType.int32:\r\n return 'int32';\r\n case DataType.uint32:\r\n return 'uint32';\r\n case DataType.float:\r\n return 'float32';\r\n case DataType.double:\r\n return 'float64';\r\n case DataType.string:\r\n return 'string';\r\n case DataType.int64:\r\n return 'int32';\r\n case DataType.uint64:\r\n return 'uint32';\r\n\r\n default:\r\n throw new Error(`unsupported data type: ${typeProto}`);\r\n }\r\n};\r\n\r\nconst numericTensorTypeToTypedArray = (type: Tensor.Type): Float32ArrayConstructor|Uint8ArrayConstructor|\r\n Int8ArrayConstructor|Uint16ArrayConstructor|Int16ArrayConstructor|Int32ArrayConstructor|BigInt64ArrayConstructor|\r\n Uint8ArrayConstructor|Float64ArrayConstructor|Uint32ArrayConstructor|BigUint64ArrayConstructor => {\r\n switch (type) {\r\n case 'float32':\r\n return Float32Array;\r\n case 'uint8':\r\n return Uint8Array;\r\n case 'int8':\r\n return Int8Array;\r\n case 'uint16':\r\n return Uint16Array;\r\n case 'int16':\r\n return Int16Array;\r\n case 'int32':\r\n return Int32Array;\r\n case 'bool':\r\n return Uint8Array;\r\n case 'float64':\r\n return Float64Array;\r\n case 'uint32':\r\n return

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Uint32Array;\r\n        case 'int64':\r\n          return BigInt64Array;\r\n        case 'uint64':\r\n          return
BigUint64Array;\r\n        default:\r\n          throw new Error(`unsupported type: ${type}`);\r\n      }\r\n
};\r\n\r\n/**\r\n * perform inference run\r\n */\r\nexport const run =\r\n    (sessionId: number, inputIndices:
number[], inputs: SerializableTensor[], outputIndices: number[],\r\n     options: InferenceSession.RunOptions):
SerializableTensor[] => {\r\n      const wasm = getInstance();\r\n      const session = activeSessions[sessionId];\r\n
if (!session) {\r\n        throw new Error('invalid session id');\r\n      }\r\n      const sessionHandle = session[0];\r\n
const inputNamesUTF8Encoded = session[1];\r\n      const outputNamesUTF8Encoded = session[2];\r\n\r\n      const
inputCount = inputIndices.length;\r\n      const outputCount = outputIndices.length;\r\n\r\n      let runOptionsHandle
= 0;\r\n      let runOptionsAllocs: number[] = [];\r\n\r\n      const inputValues: number[] = [];\r\n      const
inputAllocs: number[] = [];\r\n\r\n      try {\r\n        [runOptionsHandle, runOptionsAllocs] =
setRunOptions(options);\r\n\r\n        // create input tensors\r\n        for (let i = 0; i < inputCount; i++) {\r\n          const
dataType = inputs[i][0];\r\n          const dims = inputs[i][1];\r\n          const data = inputs[i][2];\r\n\r\n          let
dataOffset: number;\r\n          let dataByteLength: number;\r\n\r\n          if (Array.isArray(data)) {\r\n            // string
tensor\r\n            dataByteLength = 4 * data.length;\r\n            dataOffset = wasm._malloc(dataByteLength);\r\n
  inputAllocs.push(dataOffset);\r\n            let dataIndex = dataOffset / 4;\r\n            for (let i = 0; i < data.length; i++)
{\r\n              if (typeof data[i] !== 'string') {\r\n                throw new TypeError(`tensor data at index ${i} is not a
string`);\r\n              }\r\n              wasm.HEAPU32[dataIndex++] = allocWasmString(data[i], inputAllocs);\r\n
}\r\n          } else {\r\n            dataByteLength = data.byteLength;\r\n            dataOffset =
wasm._malloc(dataByteLength);\r\n            inputAllocs.push(dataOffset);\r\n            wasm.HEAPU8.set(new
Uint8Array(data.buffer, data.byteOffset, dataByteLength), dataOffset);\r\n          }\r\n\r\n          const stack =
wasm.stackSave();\r\n          const dimsOffset = wasm.stackAlloc(4 * dims.length);\r\n          try {\r\n            let
dimIndex = dimsOffset / 4;\r\n            dims.forEach(d => wasm.HEAP32[dimIndex++] = d);\r\n            const tensor
= wasm._OrtCreateTensor(\r\n                tensorDataTypeStringToEnum(dataType), dataOffset, dataByteLength,
dimsOffset, dims.length);\r\n            if (tensor === 0) {\r\n              throw new Error('Can\\'t create a tensor');\r\n
   }\r\n            inputValues.push(tensor);\r\n          } finally {\r\n            wasm.stackRestore(stack);\r\n          }\r\n
}\r\n\r\n        const beforeRunStack = wasm.stackSave();\r\n        const inputValuesOffset =
wasm.stackAlloc(inputCount * 4);\r\n        const inputNamesOffset = wasm.stackAlloc(inputCount * 4);\r\n
const outputValuesOffset = wasm.stackAlloc(outputCount * 4);\r\n        const outputNamesOffset =
wasm.stackAlloc(outputCount * 4);\r\n\r\n        try {\r\n          let inputValuesIndex = inputValuesOffset / 4;\r\n
let inputNamesIndex = inputNamesOffset / 4;\r\n          let outputValuesIndex = outputValuesOffset / 4;\r\n          let
outputNamesIndex = outputNamesOffset / 4;\r\n          for (let i = 0; i < inputCount; i++) {\r\n
wasm.HEAPU32[inputValuesIndex++] = inputValues[i];\r\n            wasm.HEAPU32[inputNamesIndex++] =
inputNamesUTF8Encoded[inputIndices[i]];\r\n          }\r\n          for (let i = 0; i < outputCount; i++) {\r\n
wasm.HEAPU32[outputValuesIndex++] = 0;\r\n            wasm.HEAPU32[outputNamesIndex++] =
outputNamesUTF8Encoded[outputIndices[i]];\r\n          }\r\n\r\n          // support RunOptions\r\n          let errorCode
= wasm._OrtRun(\r\n              sessionHandle, inputNamesOffset, inputValuesOffset, inputCount,
outputNamesOffset, outputCount,\r\n              outputValuesOffset, runOptionsHandle);\r\n\r\n          const output:
SerializableTensor[] = [];\r\n\r\n          if (errorCode === 0) {\r\n            for (let i = 0; i < outputCount; i++) {\r\n
    const tensor = wasm.HEAPU32[outputValuesOffset / 4 + i];\r\n\r\n              const beforeGetTensorDataStack =
wasm.stackSave();\r\n              // stack allocate 4 pointer value\r\n              const tensorDataOffset =
wasm.stackAlloc(4 * 4);\r\n\r\n              let type: Tensor.Type|undefined, dataOffset = 0;\r\n              try {\r\n
 errorCode = wasm._OrtGetTensorData(\r\n                    tensor, tensorDataOffset, tensorDataOffset + 4,
tensorDataOffset + 8, tensorDataOffset + 12);\r\n                if (errorCode !== 0) {\r\n                  throw new
Error(`Can't get a tensor data. error code = ${errorCode}`);\r\n                }\r\n                let tensorDataIndex =
tensorDataOffset / 4;\r\n                const dataType = wasm.HEAPU32[tensorDataIndex++];\r\n                dataOffset
= wasm.HEAPU32[tensorDataIndex++];\r\n                const dimsOffset = wasm.HEAPU32[tensorDataIndex++];\r\n
            const dimsLength = wasm.HEAPU32[tensorDataIndex++];\r\n                const dims = [];\r\n                for
(let i = 0; i < dimsLength; i++) {\r\n                  dims.push(wasm.HEAPU32[dimsOffset / 4 + i]);\r\n                }\r\n
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        wasm._OrtFree(dimsOffset);\r\n\r\n              const size = dims.length === 0 ? 1 : dims.reduce((a, b) => a *
b);\r\n              type = tensorDataTypeEnumToString(dataType);\r\n              if (type === 'string') {\r\n
const stringData: string[] = [];\r\n                let dataIndex = dataOffset / 4;\r\n                for (let i = 0; i < size; i++)
{\r\n                  const offset = wasm.HEAPU32[dataIndex++];\r\n                  const maxBytesToRead = i === size
- 1 ? undefined : wasm.HEAPU32[dataIndex] - offset;\r\n                  stringData.push(wasm.UTF8ToString(offset,
maxBytesToRead));\r\n                }\r\n                output.push([type, dims, stringData]);\r\n              } else {\r\n
        const typedArrayConstructor = numericTensorTypeToTypedArray(type);\r\n                const data = new
typedArrayConstructor(size);\r\n                new Uint8Array(data.buffer, data.byteOffset, data.byteLength)\r\n
        .set(wasm.HEAPU8.subarray(dataOffset, dataOffset + data.byteLength));\r\n                output.push([type,
dims, data]);\r\n              }\r\n            } finally {\r\n              wasm.stackRestore(beforeGetTensorDataStack);\r\n
          if (type === 'string' && dataOffset) {\r\n                wasm._free(dataOffset);\r\n              }\r\n
wasm._OrtReleaseTensor(tensor);\r\n            }\r\n          }\r\n        }\r\n\r\n        if (errorCode === 0) {\r\n
return output;\r\n        } else {\r\n          throw new Error(`failed to call OrtRun(). error code = ${errorCode}.`);\r\n
      }\r\n      } finally {\r\n        wasm.stackRestore(beforeRunStack);\r\n      }\r\n    } finally {\r\n
inputValues.forEach(wasm._OrtReleaseTensor);\r\n      inputAllocs.forEach(wasm._free);\r\n\r\n
wasm._OrtReleaseRunOptions(runOptionsHandle);\r\n      runOptionsAllocs.forEach(wasm._free);\r\n    }\r\n
};\r\n\r\n/**\r\n * end profiling\r\n */\r\nexport const endProfiling = (sessionId: number): void => {\r\n  const wasm
= getInstance();\r\n  const session = activeSessions[sessionId];\r\n  if (!session) {\r\n    throw new Error('invalid
session id');\r\n  }\r\n  const sessionHandle = session[0];\r\n\r\n  // profile file name is not used yet, but it must be
freed.\r\n  const profileFileName = wasm._OrtEndProfiling(sessionHandle);\r\n  if (profileFileName === 0) {\r\n
throw new Error('Can\\'t get an profile file name');\r\n  }\r\n  wasm._OrtFree(profileFileName);\r\n};\r\n\r\nexport
const extractTransferableBuffers = (tensors: readonly SerializableTensor[]): ArrayBufferLike[] => {\r\n  const
buffers: ArrayBufferLike[] = [];\r\n  for (const tensor of tensors) {\r\n    const data = tensor[2];\r\n    if
(!Array.isArray(data) && data.buffer) {\r\n      buffers.push(data.buffer);\r\n    }\r\n  }\r\n  return
buffers;\r\n};\r\n","// Copyright (c) Microsoft Corporation. All rights reserved.\r\n// Licensed under the MIT
License.\r\n\r\nimport {Env} from 'onnxruntime-common';\r\nimport * as path from 'path';\r\n\r\nimport
{OrtWasmModule} from './binding/ort-wasm';\r\nimport {OrtWasmThreadedModule} from './binding/ort-wasm-
threaded';\r\nimport ortWasmFactoryThreaded from './binding/ort-wasm-threaded.js';\r\nimport ortWasmFactory
from './binding/ort-wasm.js';\r\n\r\nlet wasm: OrtWasmModule|undefined;\r\nlet initialized = false;\r\nlet initializing
= false;\r\nlet aborted = false;\r\n\r\nconst isMultiThreadSupported = (): boolean => {\r\n  try {\r\n    // If
'SharedArrayBuffer' is not available, WebAssembly threads will not work.\r\n    if (typeof SharedArrayBuffer ===
'undefined') {\r\n      return false;\r\n    }\r\n\r\n    // Test for transferability of SABs (for browsers. needed for
Firefox)\r\n    //
https://groups.google.com/forum/#!msg/mozilla.dev.platform/IHkBZlHETpA/dwsMNchWEQAJ\r\n    if (typeof
MessageChannel !== 'undefined') {\r\n      new MessageChannel().port1.postMessage(new
SharedArrayBuffer(1));\r\n    }\r\n\r\n    // Test for WebAssembly threads capability (for both browsers and
Node.js)\r\n    // This typed array is a WebAssembly program containing threaded instructions.\r\n    return
WebAssembly.validate(new Uint8Array([\r\n      0, 97, 115, 109, 1, 0,  0,  0, 1, 4, 1,  96, 0,   0,  3, 2, 1,  0, 5,\r\n
4, 1,  3,   1,   1, 10, 11, 1, 9, 0, 65, 0,  254, 16, 2, 0, 26, 11\r\n    ]));\r\n  } catch (e) {\r\n    return false;\r\n
}\r\n};\r\n\r\nconst isSimdSupported = (): boolean => {\r\n  try {\r\n    // Test for WebAssembly SIMD capability
(for both browsers and Node.js)\r\n    // This typed array is a WebAssembly program containing SIMD
instructions.\r\n    return WebAssembly.validate(new Uint8Array(\r\n        [0, 97, 115, 109, 1, 0, 0, 0, 1, 4, 1, 96, 0,
0, 3, 2, 1, 0, 10, 9, 1, 7, 0, 65, 0, 253, 15, 26, 11]));\r\n  } catch (e) {\r\n    return false;\r\n  }\r\n};\r\n\r\nconst
getWasmFileName = (useSimd: boolean, useThreads: boolean) => {\r\n  if (useThreads) {\r\n    return useSimd ?
'ort-wasm-simd-threaded.wasm' : 'ort-wasm-threaded.wasm';\r\n  } else {\r\n    return useSimd ? 'ort-wasm-
simd.wasm' : 'ort-wasm.wasm';\r\n  }\r\n};\r\n\r\nexport const initializeWebAssembly = async(flags:
Env.WebAssemblyFlags): Promise<void> => {\r\n  if (initialized) {\r\n    return Promise.resolve();\r\n  }\r\n  if
(initializing) {\r\n    throw new Error('multiple calls to \\'initializeWebAssembly()\\' detected.');\r\n  }\r\n  if
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(aborted) {\r\n    throw new Error('previous call to \\'initializeWebAssembly()\\' failed.');\r\n  }\r\n\r\n  initializing =
true;\r\n\r\n  // wasm flags are already initialized\r\n  const timeout = flags.initTimeout!;\r\n  const numThreads =
flags.numThreads!;\r\n  const simd = flags.simd!;\r\n\r\n  const useThreads = numThreads > 1 &&
isMultiThreadSupported();\r\n  const useSimd = simd && isSimdSupported();\r\n\r\n  const wasmPrefixOverride =
typeof flags.wasmPaths === 'string' ? flags.wasmPaths : undefined;\r\n  const wasmFileName =
getWasmFileName(false, useThreads);\r\n  const wasmOverrideFileName = getWasmFileName(useSimd,
useThreads);\r\n  const wasmPathOverride = typeof flags.wasmPaths === 'object' ?
flags.wasmPaths[wasmOverrideFileName] : undefined;\r\n\r\n  let isTimeout = false;\r\n\r\n  const tasks:
Array<Promise<void>> = [];\r\n\r\n  // promise for timeout\r\n  if (timeout > 0) {\r\n    tasks.push(new
Promise((resolve) => {\r\n      setTimeout(() => {\r\n        isTimeout = true;\r\n        resolve();\r\n      }, timeout);\r\n
}));\r\n  }\r\n\r\n  // promise for module initialization\r\n  tasks.push(new Promise((resolve, reject) => {\r\n    const
factory = useThreads ? ortWasmFactoryThreaded : ortWasmFactory;\r\n    const config: Partial<OrtWasmModule>
= {\r\n      locateFile: (fileName: string, scriptDirectory: string) => {\r\n        if (fileName.endsWith('.worker.js') &&
typeof Blob !== 'undefined') {\r\n          return URL.createObjectURL(new Blob(\r\n              [\r\n                // This
require() function is handled by webpack to load file content of the corresponding .worker.js\r\n                // eslint-
disable-next-line @typescript-eslint/no-require-imports\r\n                require('./binding/ort-wasm-
threaded.worker.js')\r\n              ],\r\n              {type: 'text/javascript'}));\r\n        }\r\n\r\n        if (fileName ===
wasmFileName) {\r\n          const prefix: string = wasmPrefixOverride ?? scriptDirectory;\r\n          return
wasmPathOverride ?? prefix + wasmOverrideFileName;\r\n        }\r\n\r\n        return scriptDirectory + fileName;\r\n
   }\r\n    };\r\n\r\n    if (useThreads) {\r\n      if (typeof Blob === 'undefined') {\r\n        config.mainScriptUrlOrBlob
= path.join(__dirname, 'ort-wasm-threaded.js');\r\n      } else {\r\n        const scriptSourceCode =\r\n            `var
ortWasmThreaded=(function(){var _scriptDir;return ${ortWasmFactoryThreaded.toString()}})();`;\r\n
config.mainScriptUrlOrBlob = new Blob([scriptSourceCode], {type: 'text/javascript'});\r\n      }\r\n    }\r\n\r\n
factory(config).then(\r\n        // wasm module initialized successfully\r\n        module => {\r\n          initializing =
false;\r\n          initialized = true;\r\n          wasm = module;\r\n          resolve();\r\n        },\r\n        // wasm module
failed to initialize\r\n        (what) => {\r\n          initializing = false;\r\n          aborted = true;\r\n          reject(what);\r\n
      });\r\n  }));\r\n\r\n  await Promise.race(tasks);\r\n\r\n  if (isTimeout) {\r\n    throw new Error(`WebAssembly
backend initializing failed due to timeout: ${timeout}ms`);\r\n  }\r\n};\r\n\r\nexport const getInstance = ():
OrtWasmModule => {\r\n  if (initialized && wasm) {\r\n    return wasm;\r\n  }\r\n\r\n  throw new
Error('WebAssembly is not initialized yet.');\r\n};\r\n\r\nexport const dispose = (): void => {\r\n  if (initialized &&
!initializing && !aborted) {\r\n    initializing = true;\r\n\r\n    (wasm as
OrtWasmThreadedModule).PThread?.terminateAllThreads();\r\n    wasm = undefined;\r\n\r\n    initializing =
false;\r\n    initialized = false;\r\n    aborted = true;\r\n  }\r\n};\r\n","\nimport worker from
\"!!../../../node_modules/worker-loader/dist/runtime/inline.js\";\n\nexport default function Worker_fn() {\n  return
worker(\"/*!\\n* ONNX Runtime Web v1.9.0\\n* Copyright (c) Microsoft Corporation. All rights reserved.\\n*
Licensed under the MIT License.\\n*/\\n!function(){var e={474:function(e,t,n){var
_scriptDir,r=(_scriptDir=(_scriptDir=\\\"undefined\\\"!=typeof
document&&document.currentScript?document.currentScript.src:void 0)||\\\"/index.js\\\",function(e){function
t(){return R.buffer!=j&&Q(R.buffer),L}function r(){return R.buffer!=j&&Q(R.buffer),W}function a(){return
R.buffer!=j&&Q(R.buffer),H}function i(){return R.buffer!=j&&Q(R.buffer),Y}function o(){return
R.buffer!=j&&Q(R.buffer),z}var u,s,c;e=e||{},u||(u=void 0!==e?e:{}),u.ready=new
Promise((function(e,t){s=e,c=t}));var l,f={};for(l in u)u.hasOwnProperty(l)&&(f[l]=u[l]);var
p=\\\"./this.program\\\";function d(e,t){throw t}var m,h,g,b,y,v=\\\"object\\\"==typeof
window,_=\\\"function\\\"==typeof importScripts,w=\\\"object\\\"==typeof process&&\\\"object\\\"==typeof
process.versions&&\\\"string\\\"==typeof
process.versions.node,O=u.ENVIRONMENT_IS_PTHREAD||!1,A=\\\"\\\";function E(e){return
u.locateFile?u.locateFile(e,A):A+e}if(w){var S;A=_?n(908).dirname(A)+\\\"/\\\":\\\"//\\\",m=function(e,t){return
b||(b=n(384)),y||(y=n(908)),e=y.normalize(e),b.readFileSync(e,t?null:\\\"utf8\\\")},g=function(e){return(e=m(e,!0)).b
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uffer||(e=new
Uint8Array(e)),F(e.buffer),e},h=function(e,t,r){b||(b=n(384)),y||(y=n(908)),e=y.normalize(e),b.readFile(e,(function(
e,n){e?r(e):t(n.buffer)}))},1<process.argv.length&&(p=process.argv[1].replace(/\\\\\\\\/g,\\\"/\\\")),process.argv.slice(
2),process.on(\\\"uncaughtException\\\",(function(e){if(!(e instanceof Bt))throw
e})),process.on(\\\"unhandledRejection\\\",le),d=function(e,t){if(ae())throw
process.exitCode=e,t;process.exit(e)},u.inspect=function(){return\\\"[Emscripten Module
object]\\\"};try{S=n(925)}catch(e){throw console.error('The \\\"worker_threads\\\" module is not supported in this
node.js build - perhaps a newer version is
needed?'),e}n.g.Worker=S.Worker}else(v||_)&&(_?A=self.location.href:\\\"undefined\\\"!=typeof
document&&document.currentScript&&(A=document.currentScript.src),_scriptDir&&(A=_scriptDir),A=0!==A.in
dexOf(\\\"blob:\\\")?A.substr(0,A.lastIndexOf(\\\"/\\\")+1):\\\"\\\",w?(m=function(e,t){return
b||(b=n(384)),y||(y=n(908)),e=y.normalize(e),b.readFileSync(e,t?null:\\\"utf8\\\")},g=function(e){return(e=m(e,!0)).b
uffer||(e=new
Uint8Array(e)),F(e.buffer),e},h=function(e,t,r){b||(b=n(384)),y||(y=n(908)),e=y.normalize(e),b.readFile(e,(function(
e,n){e?r(e):t(n.buffer)}))}):(m=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.send(null),t.responseText},_&&(g=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.responseType=\\\"arraybuffer\\\",t.send(null),new
Uint8Array(t.response)}),h=function(e,t,n){var r=new
XMLHttpRequest;r.open(\\\"GET\\\",e,!0),r.responseType=\\\"arraybuffer\\\",r.onload=function(){200==r.status||0=
=r.status&&r.response?t(r.response):n()},r.onerror=n,r.send(null)}));w&&\\\"undefined\\\"==typeof
performance&&(n.g.performance=n(953).performance);var
T,M,k=u.print||console.log.bind(console),x=u.printErr||console.warn.bind(console);for(l in
f)f.hasOwnProperty(l)&&(u[l]=f[l]);f=null,u.thisProgram&&(p=u.thisProgram),u.quit&&(d=u.quit),u.wasmBinary
&&(M=u.wasmBinary);var D=u.noExitRuntime||!1;\\\"object\\\"!=typeof WebAssembly&&le(\\\"no native wasm
support detected\\\");var R,C,P,I=!1;function F(e,t){e||le(\\\"Assertion failed: \\\"+t)}function U(e){var t=new
TextDecoder(e);this.decode=function(e){return e.buffer instanceof SharedArrayBuffer&&(e=new
Uint8Array(e)),t.decode.call(t,e)}}var j,L,W,H,Y,z,B=\\\"undefined\\\"!=typeof TextDecoder?new
U(\\\"utf8\\\"):void 0;function G(e,t,n){var r=t+n;for(n=t;e[n]&&!(n>=r);)++n;if(16<n-t&&e.subarray&&B)return
B.decode(e.subarray(t,n));for(r=\\\"\\\";t<n;){var a=e[t++];if(128&a){var
i=63&e[t++];if(192==(224&a))r+=String.fromCharCode((31&a)<<6|i);else{var
o=63&e[t++];65536>(a=224==(240&a)?(15&a)<<12|i<<6|o:(7&a)<<18|i<<12|o<<6|63&e[t++])?r+=String.fromCh
arCode(a):(a-=65536,r+=String.fromCharCode(55296|a>>10,56320|1023&a))}}else
r+=String.fromCharCode(a)}return r}function N(e,t){return e?G(r(),e,t):\\\"\\\"}function q(e,t,n,r){if(!(0<r))return
0;var a=n;r=n+r-1;for(var i=0;i<e.length;++i){var
o=e.charCodeAt(i);if(55296<=o&&57343>=o&&(o=65536+((1023&o)<<10)|1023&e.charCodeAt(++i)),127>=o){i
f(n>=r)break;t[n++]=o}else{if(2047>=o){if(n+1>=r)break;t[n++]=192|o>>6}else{if(65535>=o){if(n+2>=r)break;t[
n++]=224|o>>12}else{if(n+3>=r)break;t[n++]=240|o>>18,t[n++]=128|o>>12&63}t[n++]=128|o>>6&63}t[n++]=1
28|63&o}}return t[n]=0,n-a}function V(e,t,n){return q(e,r(),t,n)}function X(e){for(var t=0,n=0;n<e.length;++n){var
r=e.charCodeAt(n);55296<=r&&57343>=r&&(r=65536+((1023&r)<<10)|1023&e.charCodeAt(++n)),127>=r?++t:t
=2047>=r?t+2:65535>=r?t+3:t+4}return t}function J(e){var n=X(e)+1,r=bt(n);return r&&q(e,t(),r,n),r}function
Q(e){j=e,u.HEAP8=L=new Int8Array(e),u.HEAP16=new Int16Array(e),u.HEAP32=H=new
Int32Array(e),u.HEAPU8=W=new Uint8Array(e),u.HEAPU16=new Uint16Array(e),u.HEAPU32=Y=new
Uint32Array(e),u.HEAPF32=new Float32Array(e),u.HEAPF64=z=new Float64Array(e)}\\\"undefined\\\"!=typeof
TextDecoder&&new U(\\\"utf-16le\\\"),O&&(j=u.buffer);var
Z=u.INITIAL_MEMORY||16777216;if(O)R=u.wasmMemory,j=u.buffer;else
if(u.wasmMemory)R=u.wasmMemory;else if(!((R=new
WebAssembly.Memory({initial:Z/65536,maximum:32768,shared:!0})).buffer instanceof SharedArrayBuffer))throw
x(\\\"requested a shared WebAssembly.Memory but the returned buffer is not a SharedArrayBuffer, indicating that
```

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while the browser has SharedArrayBuffer it does not have WebAssembly threads support - you may need to set a
flag\\\"),w&&console.log(\\\"(on node you may need: --experimental-wasm-threads --experimental-wasm-bulk-
memory and also use a recent version)\\\"),Error(\\\"bad memory\\\");R&&(j=R.buffer),Z=j.byteLength,Q(j);var
K,$=[],ee=[],te=[],ne=[],re=0;function ae(){return D||0<re}function ie(){var e=u.preRun.shift();$.unshift(e)}var
oe,ue=0,se=null,ce=null;function le(e){throw u.onAbort&&u.onAbort(e),F(!O),x(e),I=!0,P=1,e=new
WebAssembly.RuntimeError(\\\"abort(\\\"+e+\\\"). Build with -s ASSERTIONS=1 for more
info.\\\"),c(e),e}function fe(){return oe.startsWith(\\\"data:application/octet-stream;base64,\\\")}function pe(){var
e=oe;try{if(e==oe&&M)return new Uint8Array(M);if(g)return g(e);throw\\\"both async and sync fetching of the
wasm failed\\\"}catch(e){le(e)}}u.preloadedImages={},u.preloadedAudios={},oe=\\\"ort-wasm-
threaded.wasm\\\",fe()||(oe=E(oe));var de={973748:function(){throw\\\"Canceled!\\\"}};function
me(e){for(;0<e.length;){var t=e.shift();if(\\\"function\\\"==typeof t)t(u);else{var n=t.Nb;\\\"number\\\"==typeof
n?void 0===t.ib?K.get(n)():K.get(n)(t.ib):n(void 0===t.ib?null:t.ib)}}}function
he(e,n){if(0>=e||e>t().length||1&e||0>n)return-28;if(0==n)return 0;2147483647<=n&&(n=1/0);var
r=Atomics.load(a(),zt>>2),i=0;if(r==e&&Atomics.compareExchange(a(),zt>>2,r,0)==r&&(i=1,0>=--n))return
1;if(0<=(e=Atomics.notify(a(),e>>2,n)))return e+i;throw\\\"Atomics.notify returned an unexpected value
\\\"+e}function ge(e){if(O)throw\\\"Internal Error! cleanupThread() can only ever be called from main application
thread!\\\";if(!e)throw\\\"Internal Error! Null pthread_ptr in cleanupThread!\\\";var
t=ye.cb[e];t&&(a()[e+12>>2]=0,ye.sb(t.worker))}u._emscripten_futex_wake=he;var
be,ye={gb:[],fb:[],zb:[],xc:function(){},Rb:function(){for(var
e=bt(228),t=0;57>t;++t)i()[e/4+t]=0;a()[e+12>>2]=e,t=e+152,a()[t>>2]=t;var
n=bt(512);for(t=0;128>t;++t)i()[n/4+t]=0;Atomics.store(i(),e+100>>2,n),Atomics.store(i(),e+40>>2,e),Dt(e,!_,1),Ot
(e)},Sb:function(){ye.receiveObjectTransfer=ye.Xb,ye.threadInit=ye.hc,ye.threadCancel=ye.fc,ye.threadExit=ye.Hb
,ye.setExitStatus=ye.Zb},cb:{},yb:[],Eb:function(){for(;0<ye.yb.length;)ye.yb.pop()();Ct()},Fb:function(e,t){Atomi
cs.store(i(),e+56>>2,1),Atomics.store(i(),e+60>>2,0),ye.Eb(),Atomics.store(i(),e+4>>2,t),Atomics.store(i(),e+0>>2,
1),he(e+0,2147483647),Dt(0,0,0)},Zb:function(e){P=e},Hb:function(e){var
t=_t();t&&(ye.Fb(t,e),O&&postMessage({cmd:\\\"exit\\\"}))},fc:function(){ye.Fb(_t(),-
1),postMessage({cmd:\\\"cancelDone\\\"})},Gb:function(){for(var e in ye.cb){var
t=ye.cb[e];t&&t.worker&&ye.sb(t.worker)}for(ye.cb={},e=0;e<ye.gb.length;++e){var
n=ye.gb[e];n.terminate()}for(ye.gb=[],e=0;e<ye.fb.length;++e)t=(n=ye.fb[e]).bb,ye.xb(t),n.terminate();ye.fb=[]},xb:
function(e){if(e){if(e.eb){var
t=a()[e.eb+100>>2];a()[e.eb+100>>2]=0,vt(t),vt(e.eb)}e.eb=0,e.wb&&e.hb&&vt(e.hb),e.hb=0,e.worker&&(e.work
er.bb=null)}},sb:function(e){ye.Yb((function(){delete
ye.cb[e.bb.eb],ye.gb.push(e),ye.fb.splice(ye.fb.indexOf(e),1),ye.xb(e.bb),e.bb=void
0}))},Yb:function(e){a()[Yt>>2]=0;try{e()}finally{a()[Yt>>2]=1}},Xb:function(){},hc:function(){for(var e in
ye.zb)ye.zb[e]()},Ub:function(e,t){e.onmessage=function(n){var
r=n.data,o=r.cmd;if(e.bb&&(ye.Lb=e.bb.eb),r.targetThread&&r.targetThread!=_t()){var
u=ye.cb[r.Dc];u?u.worker.postMessage(n.data,r.transferList):x('Internal error! Worker sent a message \\\"'+o+'\\\" to
target pthread '+r.targetThread+\\\", but that thread no longer exists!\\\")}else
if(\\\"processQueuedMainThreadWork\\\"===o)St();else if(\\\"spawnThread\\\"===o)Oe(n.data);else
if(\\\"cleanupThread\\\"===o)ge(r.thread);else if(\\\"killThread\\\"===o){if(n=r.thread,O)throw\\\"Internal Error!
killThread() can only ever be called from main application thread!\\\";if(!n)throw\\\"Internal Error! Null pthread_ptr
in killThread!\\\";a()[n+12>>2]=0,r=ye.cb[n],delete
ye.cb[n],r.worker.terminate(),ye.xb(r),ye.fb.splice(ye.fb.indexOf(r.worker),1),r.worker.bb=void 0}else
if(\\\"cancelThread\\\"===o){if(n=r.thread,O)throw\\\"Internal Error! cancelThread() can only ever be called from
main application thread!\\\";if(!n)throw\\\"Internal Error! Null pthread_ptr in
cancelThread!\\\";ye.cb[n].worker.postMessage({cmd:\\\"cancel\\\"})}else
if(\\\"loaded\\\"===o)e.loaded=!0,t&&t(e),e.mb&&(e.mb(),delete e.mb);else if(\\\"print\\\"===o)k(\\\"Thread
\\\"+r.threadId+\\\": \\\"+r.text);else if(\\\"printErr\\\"===o)x(\\\"Thread \\\"+r.threadId+\\\": \\\"+r.text);else
```

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if(\\\"alert\\\"===o)alert(\\\"Thread \\\"+r.threadId+\\\": \\\"+r.text);else
if(\\\"exit\\\"===o)e.bb&&Atomics.load(i(),e.bb.eb+64>>2)&&ye.sb(e);else
if(\\\"exitProcess\\\"===o)try{Nt(r.returnCode)}catch(e){if(e instanceof Bt)return;throw
e}else\\\"cancelDone\\\"===o?ye.sb(e):\\\"objectTransfer\\\"!==o&&(\\\"setimmediate\\\"===n.data.target?e.postMe
ssage(n.data):x(\\\"worker sent an unknown command \\\"+o));ye.Lb=void 0},e.onerror=function(e){x(\\\"pthread
sent an error! \\\"+e.filename+\\\":\\\"+e.lineno+\\\":
\\\"+e.message)},w&&(e.on(\\\"message\\\",(function(t){e.onmessage({data:t})})),e.on(\\\"error\\\",(function(t){e.on
error(t)})),e.on(\\\"exit\\\",(function(){}))),e.postMessage({cmd:\\\"load\\\",urlOrBlob:u.mainScriptUrlOrBlob||_scri
ptDir,wasmMemory:R,wasmModule:C})},Ib:function(){var e=E(\\\"ort-wasm-
threaded.worker.js\\\");ye.gb.push(new Worker(e))},Ob:function(){return
0==ye.gb.length&&(ye.Ib(),ye.Ub(ye.gb[0])),ye.gb.pop()},nc:function(e){for(e=performance.now()+e;performance.
now()<e;);}};function ve(e,t){if(0===e)e=Date.now();else{if(1!==e&&4!==e)return a()[yt()>>2]=28,-
1;e=be()}return a()[t>>2]=e/1e3|0,a()[t+4>>2]=e%1e3*1e6|0,0}function _e(e,t){if(O)return
Ne(1,1,e,t);te.unshift({Nb:e,ib:t})}function we(e){this.lb=e-
16,this.dc=function(e){a()[this.lb+4>>2]=e},this.ac=function(e){a()[this.lb+8>>2]=e},this.bc=function(){a()[this.lb
>>2]=0},this.$b=function(){t()[this.lb+12>>0]=0},this.cc=function(){t()[this.lb+13>>0]=0},this.Pb=function(e,t){t
his.dc(e),this.ac(t),this.bc(),this.$b(),this.cc()}}function Oe(e){if(O)throw\\\"Internal Error! spawnThread() can only
ever be called from main application thread!\\\";var t=ye.Ob();if(!t)return 6;if(void 0!==t.bb)throw\\\"Internal
error!\\\";if(!e.rb)throw\\\"Internal error, no pthread ptr!\\\";ye.fb.push(t);for(var
n=bt(512),r=0;128>r;++r)a()[n+4*r>>2]=0;var
o=e.hb+e.jb,u=(r=ye.cb[e.rb]={worker:t,hb:e.hb,jb:e.jb,wb:e.wb,eb:e.rb}).eb>>2;Atomics.store(i(),u+16,e.detached)
,Atomics.store(i(),u+25,n),Atomics.store(i(),u+10,r.eb),Atomics.store(i(),u+20,e.jb),Atomics.store(i(),u+19,o),Atom
ics.store(i(),u+26,e.jb),Atomics.store(i(),u+28,o),Atomics.store(i(),u+29,e.detached),n=Rt()+40,Atomics.store(i(),u+
43,n),t.bb=r;var
s={cmd:\\\"run\\\",start_routine:e.ec,arg:e.ib,threadInfoStruct:e.rb,stackBase:e.hb,stackSize:e.jb};return
t.mb=function(){s.time=performance.now(),t.postMessage(s,e.mc)},t.loaded&&(t.mb(),delete t.mb),0}function
Ae(e,n,r){if(0>=e||e>t().length||1&e)return-28;if(v){if(Atomics.load(a(),e>>2)!=n)return-6;var
i=performance.now();for(r=i+r,Atomics.exchange(a(),zt>>2,e);;){if((i=performance.now())>r)return
Atomics.exchange(a(),zt>>2,0),-
73;if(0==(i=Atomics.exchange(a(),zt>>2,0)))break;if(St(),Atomics.load(a(),e>>2)!=n)return-
6;Atomics.exchange(a(),zt>>2,e)}return 0}if(\\\"timed-out\\\"===(e=Atomics.wait(a(),e>>2,n,r)))return-
73;if(\\\"not-equal\\\"===e)return-6;if(\\\"ok\\\"===e)return 0;throw\\\"Atomics.wait returned an unexpected value
\\\"+e}function Ee(){w||_||(T||(T={}),T[\\\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-thread\\\"]||(T[\\\"Blocking on the
main thread is very dangerous, see https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-
browser-thread\\\"]=1,x(\\\"Blocking on the main thread is very dangerous, see
https://emscripten.org/docs/porting/pthreads.html#blocking-on-the-main-browser-
thread\\\")))}u.establishStackSpace=function(e,t){Wt(e,t),jt(e)},u.invokeEntryPoint=function(e,t){return
K.get(e)(t)},be=w?function(){var e=process.hrtime();return 1e3*e[0]+e[1]/1e6}:O?function(){return
performance.now()-u.__performance_now_clock_drift}:function(){return performance.now()};var
Se={},Te=[null,[],[]];function Me(e,t){var n=Te[e];0===t||10===t?((1===e?k:x)(G(n,0)),n.length=0):n.push(t)}var
ke={};function xe(e,t){return O?Ne(2,1,e,t):(e=N(e),ke.rc(e,t))}function De(e,t,n){return O?Ne(3,1,e,t,n):0}function
Re(e,t){if(O)return Ne(4,1,e,t)}function Ce(e,t,n){if(O)return Ne(5,1,e,t,n)}function Pe(e,t,n){return
O?Ne(6,1,e,t,n):0}function Ie(e,t){if(O)return Ne(7,1,e,t)}function Fe(e,t){return
O?Ne(8,1,e,t):(e=N(e),ke.sc(e,t))}function Ue(e,t,n,a,i,o){if(O)t=Ne(9,1,e,t,n,a,i,o);else
if(o<<=12,0!=(16&a)&&0!=e%65536)t=-28;else if(0!=(32&a)){var
u=65536*Math.ceil(t/65536);(e=Ht(65536,u))?r().fill(0,e,e+u):e=0,e?(Se[e]={Wb:e,Tb:t,Jb:!0,fd:i,Ac:n,flags:a,offse
t:o},t=e):t=-48}else t=-52;return t}function je(e,t){if(O)e=Ne(10,1,e,t);else{var
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n=Se[e];0!==t&&n?(t===n.Tb&&(Se[e]=null,n.Jb&&vt(n.Wb)),e=0):e=-28}return e}function Le(e,t,n){if(O)return
Ne(11,1,e,t,n)}function We(e,t,n){return O?Ne(12,1,e,t,n):(e=N(e),ke.tc(e,t,n))}function He(e){if(O)return
Ne(13,1,e)}function Ye(e,t){if(O)return Ne(14,1,e,t)}function ze(e){if(O)return Ne(15,1,e)}function
Be(){if(O)return Ne(16,1);le()}var Ge=[];function Ne(e,t){for(var n=arguments.length-
2,r=Ut(),a=Lt(8*n),i=a>>3,u=0;u<n;u++){var s=arguments[2+u];o()[i+u]=s}return n=Tt(e,n,a,t),jt(r),n}var
qe=[],Ve=[0,\\\"undefined\\\"!=typeof document?document:0,\\\"undefined\\\"!=typeof window?window:0];function
Xe(e){return e=2<e?N(e):e,Ve[e]||(\\\"undefined\\\"!=typeof document?document.querySelector(e):void 0)}function
Je(e,t,n){var r=Xe(e);if(!r)return-
4;if(r.qb&&(a()[r.qb>>2]=t,a()[r.qb+4>>2]=n),!r.Db&&r.pc){if(r.qb){r=a()[r.qb+8>>2],e=e?N(e):\\\"\\\";var
i=Ut(),o=Lt(12),u=0;if(e){u=X(e)+1;var s=bt(u);V(e,s,u),u=s}return
a()[o>>2]=u,a()[o+4>>2]=t,a()[o+8>>2]=n,Mt(0,r,657457152,0,u,o),jt(i),1}return-4}return
r.Db&&(r=r.Db),e=!1,r.pb&&r.pb.ob&&(e=0===(e=r.pb.ob.getParameter(2978))[0]&&0===e[1]&&e[2]===r.widt
h&&e[3]===r.height),r.width=t,r.height=n,e&&r.pb.ob.viewport(0,0,t,n),0}function Qe(e,t,n){return
O?Ne(17,1,e,t,n):Je(e,t,n)}var Ze,Ke=[\\\"default\\\",\\\"low-power\\\",\\\"high-performance\\\"],$e={};function
et(){if(!Ze){var
e,t={USER:\\\"web_user\\\",LOGNAME:\\\"web_user\\\",PATH:\\\"/\\\",PWD:\\\"/\\\",HOME:\\\"/home/web_user\\\
",LANG:(\\\"object\\\"==typeof navigator&&navigator.languages&&navigator.languages[0]||\\\"C\\\").replace(\\\"-
\\\",\\\"_\\\")+\\\".UTF-8\\\",_:p||\\\"./this.program\\\"};for(e in $e)void 0===$e[e]?delete t[e]:t[e]=$e[e];var
n=[];for(e in t)n.push(e+\\\"=\\\"+t[e]);Ze=n}return Ze}function tt(e,n){if(O)return Ne(18,1,e,n);var r=0;return
et().forEach((function(i,o){var
u=n+r;for(o=a()[e+4*o>>2]=u,u=0;u<i.length;++u)t()[o++>>0]=i.charCodeAt(u);t()[o>>0]=0,r+=i.length+1})),0}fu
nction nt(e,t){if(O)return Ne(19,1,e,t);var n=et();a()[e>>2]=n.length;var r=0;return
n.forEach((function(e){r+=e.length+1})),a()[t>>2]=r,0}function rt(e){return O?Ne(20,1,e):0}function at(e,n){return
O?Ne(21,1,e,n):(e=1==e||2==e?2:le(),t()[n>>0]=e,0)}function it(e,t,n,r){return
O?Ne(22,1,e,t,n,r):(e=ke.vc(e),t=ke.uc(e,t,n),a()[r>>2]=t,0)}function ot(e,t,n,r,a){if(O)return
Ne(23,1,e,t,n,r,a)}function ut(e,t,n,i){if(O)return Ne(24,1,e,t,n,i);for(var o=0,u=0;u<n;u++){for(var
s=a()[t+8*u>>2],c=a()[t+(8*u+4)>>2],l=0;l<c;l++)Me(e,r()[s+l]);o+=c}return a()[i>>2]=o,0}function st(){function
e(e){return(e=e.toTimeString().match(/\\\\(([A-Za-z ]+)\\\\)$/))?e[1]:\\\"GMT\\\"}if(O)return
Ne(25,1);if(!st.Kb){st.Kb=!0;var t=(new Date).getFullYear(),n=new Date(t,0,1),r=new
Date(t,6,1);t=n.getTimezoneOffset();var
i=r.getTimezoneOffset(),o=Math.max(t,i);a()[Ft()>>2]=60*o,a()[It()>>2]=Number(t!=i),n=e(n),r=e(r),n=J(n),r=J(r),i
<t?(a()[Pt()>>2]=n,a()[Pt()+4>>2]=r):(a()[Pt()>>2]=r,a()[Pt()+4>>2]=n)}}function ct(e){return
0==e%4&&(0!=e%100||0==e%400)}function lt(e,t){for(var n=0,r=0;r<=t;n+=e[r++]);return n}var
ft=[31,29,31,30,31,30,31,31,30,31,30,31],pt=[31,28,31,30,31,30,31,31,30,31,30,31];function dt(e,t){for(e=new
Date(e.getTime());0<t;){var n=e.getMonth(),r=(ct(e.getFullYear())?ft:pt)[n];if(!(t>r-
e.getDate())){e.setDate(e.getDate()+t);break}t-=r-
e.getDate()+1,e.setDate(1),11>n?e.setMonth(n+1):(e.setMonth(0),e.setFullYear(e.getFullYear()+1))}return
e}function mt(e,n,r,i){function o(e,t,n){for(e=\\\"number\\\"==typeof
e?e.toString():e||\\\"\\\";e.length<t;)e=n[0]+e;return e}function u(e,t){return o(e,t,\\\"0\\\")}function s(e,t){function
n(e){return 0>e?-1:0<e?1:0}var r;return 0===(r=n(e.getFullYear()-t.getFullYear()))&&0===(r=n(e.getMonth()-
t.getMonth()))&&(r=n(e.getDate()-t.getDate())),r}function c(e){switch(e.getDay()){case 0:return new
Date(e.getFullYear()-1,11,29);case 1:return e;case 2:return new Date(e.getFullYear(),0,3);case 3:return new
Date(e.getFullYear(),0,2);case 4:return new Date(e.getFullYear(),0,1);case 5:return new Date(e.getFullYear()-
1,11,31);case 6:return new Date(e.getFullYear()-1,11,30)}}function l(e){e=dt(new Date(e.ab+1900,0,1),e.vb);var
t=new Date(e.getFullYear()+1,0,4),n=c(new Date(e.getFullYear(),0,4));return
t=c(t),0>=s(n,e)?0>=s(t,e)?e.getFullYear()+1:e.getFullYear():e.getFullYear()-1}var f=a()[i+40>>2];for(var p in
i={kc:a()[i>>2],jc:a()[i+4>>2],tb:a()[i+8>>2],nb:a()[i+12>>2],kb:a()[i+16>>2],ab:a()[i+20>>2],ub:a()[i+24>>2],vb
:a()[i+28>>2],Ec:a()[i+32>>2],ic:a()[i+36>>2],lc:f?N(f):\\\"\\\"},r=N(r),f={\\\"%c\\\":\\\"%a %b %d %H:%M:%S
```

```
%Y\\\",\\\"%D\\\":\\\"%m/%d/%y\\\",\\\"%F\\\":\\\"%Y-%m-%d\\\",\\\"%h\\\":\\\"%b\\\",\\\"%r\\\":\\\"%I:%M:%S
%p\\\",\\\"%R\\\":\\\"%H:%M\\\",\\\"%T\\\":\\\"%H:%M:%S\\\",\\\"%x\\\":\\\"%m/%d/%y\\\",\\\"%X\\\":\\\"%H:%M:
%S\\\",\\\"%Ec\\\":\\\"%c\\\",\\\"%EC\\\":\\\"%C\\\",\\\"%Ex\\\":\\\"%m/%d/%y\\\",\\\"%EX\\\":\\\"%H:%M:%S\\\",\\\
"%Ey\\\":\\\"%y\\\",\\\"%EY\\\":\\\"%Y\\\",\\\"%Od\\\":\\\"%d\\\",\\\"%Oe\\\":\\\"%e\\\",\\\"%OH\\\":\\\"%H\\\",\\\"%
OI\\\":\\\"%I\\\",\\\"%Om\\\":\\\"%m\\\",\\\"%OM\\\":\\\"%M\\\",\\\"%OS\\\":\\\"%S\\\",\\\"%Ou\\\":\\\"%u\\\",\\\"%O
U\\\":\\\"%U\\\",\\\"%OV\\\":\\\"%V\\\",\\\"%Ow\\\":\\\"%w\\\",\\\"%OW\\\":\\\"%W\\\",\\\"%Oy\\\":\\\"%y\\\"})r=r.re
place(new RegExp(p,\\\"g\\\"),f[p]);var d=\\\"Sunday Monday Tuesday Wednesday Thursday Friday
Saturday\\\".split(\\\" \\\"),m=\\\"January February March April May June July August September October
November December\\\".split(\\\" \\\");for(p in f={\\\"%a\\\":function(e){return
d[e.ub].substring(0,3)},\\\"%A\\\":function(e){return d[e.ub]},\\\"%b\\\":function(e){return
m[e.kb].substring(0,3)},\\\"%B\\\":function(e){return m[e.kb]},\\\"%C\\\":function(e){return
u((e.ab+1900)/100|0,2)},\\\"%d\\\":function(e){return u(e.nb,2)},\\\"%e\\\":function(e){return o(e.nb,2,\\\"
\\\")},\\\"%g\\\":function(e){return l(e).toString().substring(2)},\\\"%G\\\":function(e){return
l(e)},\\\"%H\\\":function(e){return u(e.tb,2)},\\\"%I\\\":function(e){return 0==(e=e.tb)?e=12:12<e&&(e-
=12),u(e,2)},\\\"%j\\\":function(e){return u(e.nb+lt(ct(e.ab+1900)?ft:pt,e.kb-1),3)},\\\"%m\\\":function(e){return
u(e.kb+1,2)},\\\"%M\\\":function(e){return
u(e.jc,2)},\\\"%n\\\":function(){return\\\"\\\\n\\\"},\\\"%p\\\":function(e){return
0<=e.tb&&12>e.tb?\\\"AM\\\":\\\"PM\\\"},\\\"%S\\\":function(e){return
u(e.kc,2)},\\\"%t\\\":function(){return\\\"\\\\t\\\"},\\\"%u\\\":function(e){return e.ub||7},\\\"%U\\\":function(e){var
t=new Date(e.ab+1900,0,1),n=0===t.getDay()?t:dt(t,7-t.getDay());return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(lt(ct(e.getFullYear())?ft:pt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%V\\\":function(e){var t=new
Date(e.ab+1901,0,4),n=c(new Date(e.ab+1900,0,4));t=c(t);var r=dt(new Date(e.ab+1900,0,1),e.vb);return
0>s(r,n)?\\\"53\\\":0>=s(t,r)?\\\"01\\\":u(Math.ceil((n.getFullYear()<e.ab+1900?e.vb+32-n.getDate():e.vb+1-
n.getDate())/7),2)},\\\"%w\\\":function(e){return e.ub},\\\"%W\\\":function(e){var t=new
Date(e.ab,0,1),n=1===t.getDay()?t:dt(t,0===t.getDay()?1:7-t.getDay()+1);return 0>s(n,e=new
Date(e.ab+1900,e.kb,e.nb))?u(Math.ceil((31-n.getDate()+(lt(ct(e.getFullYear())?ft:pt,e.getMonth()-1)-
31)+e.getDate())/7),2):0===s(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%y\\\":function(e){return(e.ab+1900).toString().substring(
2)},\\\"%Y\\\":function(e){return e.ab+1900},\\\"%z\\\":function(e){var t=0<=(e=e.ic);return
e=Math.abs(e)/60,(t?\\\"+\\\":\\\"-\\\")+String(\\\"0000\\\"+(e/60*100+e%60)).slice(-4)},\\\"%Z\\\":function(e){return
e.lc},\\\"%%\\\":function(){return\\\"%\\\"}})r.includes(p)&&(r=r.replace(new
RegExp(p,\\\"g\\\"),f[p](i)));return(p=function(e){var t=Array(X(e)+1);return
q(e,t,0,t.length),t}(r)).length>n?0:(function(e,n){t().set(e,n)}(p,e),p.length-1)}var
ht=[null,_e,xe,De,Re,Ce,Pe,Ie,Fe,Ue,je,Le,We,He,Ye,ze,Be,Qe,tt,nt,rt,at,it,ot,ut,st],gt={h:function(e,t,n,r){le(\\\"Ass
ertion failed: \\\"+N(e)+\\\", at: \\\"+[t?N(t):\\\"unknown filename\\\",n,r?N(r):\\\"unknown
function\\\"])},M:function(e,t){return ve(e,t)},b:function(e){return bt(e+16)+16},d:function(e,t){return
_e(e,t)},e:function(e,t){ye.yb.push((function(){K.get(e)(t)}))},c:function(e,t,n){throw new
we(e).Pb(t,n),e},Z:function(e,t,n,r){if(\\\"undefined\\\"==typeof SharedArrayBuffer)return x(\\\"Current
environment does not support SharedArrayBuffer, pthreads are not available!\\\"),6;if(!e)return x(\\\"pthread_create
called with a null thread pointer!\\\"),28;var o=[];if(O&&0===o.length)return Et(687865856,e,t,n,r);var
u=0,s=0;if(t&&-1!=t){var c=a()[t>>2];c+=81920,u=a()[t+8>>2],s=0!==a()[t+12>>2]}else
c=2097152;(t=0==u)?u=Ht(16,c):F(0<(u-=c));for(var l=bt(228),f=0;57>f;++f)i()[(l>>2)+f]=0;return
a()[e>>2]=l,a()[l+12>>2]=l,e=l+152,a()[e>>2]=e,n={hb:u,jb:c,wb:t,detached:s,ec:n,rb:l,ib:r,mc:o},O?(n.oc=\\\"spaw
nThread\\\",postMessage(n,o),0):Oe(n)},X:function(e){throw
O?ye.Hb(e):(ye.Eb(),Nt(e)),\\\"unwind\\\"},Y:function(e,t){return function(e,t){if(!e)return x(\\\"pthread_join
attempted on a null thread pointer!\\\"),71;if(O&&_t()==e)return x(\\\"PThread \\\"+e+\\\" is attempting to join to
itself!\\\"),16;if(!O&&At()==e)return x(\\\"Main thread \\\"+e+\\\" is attempting to join to
itself!\\\"),16;if(a()[e+12>>2]!==e)return x(\\\"pthread_join attempted on thread \\\"+e+\\\", which does not point to
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a valid thread, or does not exist anymore!\\\"),71;if(Atomics.load(i(),e+64>>2))return x(\\\"Attempted to join thread
\\\"+e+\\\", which was already detached!\\\"),28;for(Ee();;){var n=Atomics.load(i(),e+0>>2);if(1==n)return
n=Atomics.load(i(),e+4>>2),t&&(a()[t>>2]=n),Atomics.store(i(),e+64>>2,1),O?postMessage({cmd:\\\"cleanupThre
ad\\\",thread:e}):ge(e),0;kt(),O||St(),Ae(e+0,n,O?100:1)}}(e,t)},L:xe,s:De,S:Re,V:Ce,u:function(){return
42},F:Pe,Q:Ie,P:Fe,U:Ue,T:je,q:Le,K:We,N:He,v:Ye,O:ze,da:function(e,t){if(e==t)postMessage({cmd:\\\"processQ
ueuedMainThreadWork\\\"});else
if(O)postMessage({targetThread:e,cmd:\\\"processThreadQueue\\\"});else{if(!(e=(e=ye.cb[e])&&e.worker))return;e.
postMessage({cmd:\\\"processThreadQueue\\\"})}return 1},f:Be,w:ve,ga:function(e,t){return e-
t},A:function(){le(\\\"To use dlopen, you need to use Emscripten's linking support, see
https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},l:function(){le(\\\"To use dlopen, you need to use
Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},C:function(){le(\\\"To use dlopen, you need to use Emscripten's linking support,
see https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},z:function(){le(\\\"To use dlopen, you need to
use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},ea:function(e,t,n){var
i;for(Ge.length=0,n>>=2;i=r()[t++];)(i=105>i)&&1&n&&n++,Ge.push(i?o()[n++>>1]:a()[n]),++n;return
de[e].apply(null,Ge)},G:Ee,n:function(){},k:Ae,j:he,W:function(){return
2147483648},i:be,D:function(e,t,n){r().copyWithin(e,t,t+n)},o:function(){return
w?n(993).cpus().length:navigator.hardwareConcurrency},aa:function(e,t,n){qe.length=t,n>>=3;for(var
r=0;r<t;r++)qe[r]=o()[n+r];return(0>e?de[-e-1]:ht[e]).apply(null,qe)},E:function(e){var
t=r().length;if((e>>>=0)<=t||2147483648<e)return!1;for(var n=1;4>=n;n*=2){var
a=t*(1+.2/n);a=Math.min(a,e+100663296),0<(a=Math.max(e,a))%65536&&(a+=65536-
a%65536);e:{try{R.grow(Math.min(2147483648,a)-j.byteLength+65535>>>16),Q(R.buffer);var i=1;break
e}catch(e){}i=void 0}if(i)return!0}return!1},ba:function(e,t,n){return
Xe(e)?Je(e,t,n):Qe(e,t,n)},x:function(){},$:function(e,t,n){return re+=1,setTimeout((function(){--
re,function(e){if(!I){try{e()}catch(e){if(e instanceof Bt)return;if(\\\"unwind\\\"!==e)throw
e&&\\\"object\\\"==typeof e&&e.stack&&x(\\\"exception thrown:
\\\"+[e,e.stack]),e}if(!ae())try{O?xt(P):Nt(P)}catch(e){if(!(e instanceof Bt))throw
e}}}((function(){K.get(e)(n)}))}),t)},ca:function(e,t){t>>=2;var n=a()[t+6];return
t={alpha:!!a()[t],depth:!!a()[t+1],stencil:!!a()[t+2],antialias:!!a()[t+3],premultipliedAlpha:!!a()[t+4],preserveDrawin
gBuffer:!!a()[t+5],powerPreference:Ke[n],failIfMajorPerformanceCaveat:!!a()[t+7],Vb:a()[t+8],yc:a()[t+9],Bb:a()[t
+10],Mb:a()[t+11],Bc:a()[t+12],Cc:a()[t+13]},!(e=Xe(e))||t.Mb?0:function(e,t){e.Cb||(e.Cb=e.getContext,e.getConte
xt=function(t,n){return\\\"webgl\\\"==t==(n=e.Cb(t,n))instanceof WebGLRenderingContext?n:null});var
n=e.getContext(\\\"webgl\\\",t);return n?function(e,t){var n=bt(8);a()[n+4>>2]=_t();var
r={wc:n,attributes:t,version:t.Vb,ob:e};return e.canvas&&(e.canvas.pb=r),(void
0===t.Bb||t.Bb)&&function(e){if(e||(e=void 0),!e.Qb){e.Qb=!0;var t=e.ob;!function(e){var
t=e.getExtension(\\\"ANGLE_instanced_arrays\\\");t&&(e.vertexAttribDivisor=function(e,n){t.vertexAttribDivisor
ANGLE(e,n)},e.drawArraysInstanced=function(e,n,r,a){t.drawArraysInstancedANGLE(e,n,r,a)},e.drawElementsIns
tanced=function(e,n,r,a,i){t.drawElementsInstancedANGLE(e,n,r,a,i)})}(t),function(e){var
t=e.getExtension(\\\"OES_vertex_array_object\\\");t&&(e.createVertexArray=function(){return
t.createVertexArrayOES()},e.deleteVertexArray=function(e){t.deleteVertexArrayOES(e)},e.bindVertexArray=funct
ion(e){t.bindVertexArrayOES(e)},e.isVertexArray=function(e){return t.isVertexArrayOES(e)})}(t),function(e){var
t=e.getExtension(\\\"WEBGL_draw_buffers\\\");t&&(e.drawBuffers=function(e,n){t.drawBuffersWEBGL(e,n)})}(t
),t.qc=t.getExtension(\\\"EXT_disjoint_timer_query\\\"),t.zc=t.getExtension(\\\"WEBGL_multi_draw\\\"),(t.getSupp
ortedExtensions()||[]).forEach((function(e){e.includes(\\\"lose_context\\\")||e.includes(\\\"debug\\\")||t.getExtension(e
)}))}}(r),n}(n,t):0}(e,t)},I:tt,J:nt,m:rt,H:at,t:it,B:ot,p:ut,R:function(e){var t=Date.now();return
a()[e>>2]=t/1e3|0,a()[e+4>>2]=t%1e3*1e3|0,0},ha:function e(t,n){return t=new
Date(1e3*a()[t>>2]),a()[n>>2]=t.getUTCSeconds(),a()[n+4>>2]=t.getUTCMinutes(),a()[n+8>>2]=t.getUTCHours()
```

```
,a()[n+12>>2]=t.getUTCDate(),a()[n+16>>2]=t.getUTCMonth(),a()[n+20>>2]=t.getUTCFullYear()-
1900,a()[n+24>>2]=t.getUTCDay(),a()[n+36>>2]=0,a()[n+32>>2]=0,t=(t.getTime()-
Date.UTC(t.getUTCFullYear(),0,1,0,0,0,0))/864e5|0,a()[n+28>>2]=t,e.Ab||(e.Ab=J(\\\"GMT\\\")),a()[n+40>>2]=e.A
b,n},_:function(){ye.Rb()},r:function(e,t){st(),e=new
Date(1e3*a()[e>>2]),a()[t>>2]=e.getSeconds(),a()[t+4>>2]=e.getMinutes(),a()[t+8>>2]=e.getHours(),a()[t+12>>2]
=e.getDate(),a()[t+16>>2]=e.getMonth(),a()[t+20>>2]=e.getFullYear()-1900,a()[t+24>>2]=e.getDay();var n=new
Date(e.getFullYear(),0,1),r=(e.getTime()-n.getTime())/864e5|0;return a()[t+28>>2]=r,a()[t+36>>2]=-
60*e.getTimezoneOffset(),r=new
Date(e.getFullYear(),6,1).getTimezoneOffset(),e=0|(r!=(n=n.getTimezoneOffset())&&e.getTimezoneOffset()==Mat
h.min(n,r)),a()[t+32>>2]=e,e=a()[Pt()+(e?4:0)>>2],a()[t+40>>2]=e,t},a:R||u.wasmMemory,y:function(e){st();var
t=new
Date(a()[e+20>>2]+1900,a()[e+16>>2],a()[e+12>>2],a()[e+8>>2],a()[e+4>>2],a()[e>>2],0),n=a()[e+32>>2],r=t.get
TimezoneOffset(),i=new Date(t.getFullYear(),0,1),o=new
Date(t.getFullYear(),6,1).getTimezoneOffset(),u=i.getTimezoneOffset(),s=Math.min(u,o);return
0>n?a()[e+32>>2]=Number(o!=u&&s==r):0<n!=(s==r)&&(o=Math.max(u,o),t.setTime(t.getTime()+6e4*((0<n?s:o
)-r))),a()[e+24>>2]=t.getDay(),n=(t.getTime()-
i.getTime())/864e5|0,a()[e+28>>2]=n,a()[e>>2]=t.getSeconds(),a()[e+4>>2]=t.getMinutes(),a()[e+8>>2]=t.getHours
(),a()[e+12>>2]=t.getDate(),a()[e+16>>2]=t.getMonth(),t.getTime()/1e3|0},fa:mt,g:function(e,t,n,r){return
mt(e,t,n,r)}};!function(){function
e(e,t){u.asm=e.exports,K=u.asm.Ca,ee.unshift(u.asm.ia),ye.zb.push(u.asm.Ha),C=t,O||(ue--
,u.monitorRunDependencies&&u.monitorRunDependencies(ue),0==ue&&(null!==se&&(clearInterval(se),se=null),
ce&&(e=ce,ce=null,e())))}function t(t){e(t.instance,t.module)}function n(e){return
function(){if(!M&&(v||_)){if(\\\"function\\\"==typeof fetch&&!oe.startsWith(\\\"file://\\\"))return
fetch(oe,{credentials:\\\"same-origin\\\"}).then((function(e){if(!e.ok)throw\\\"failed to load wasm binary file at
'\\\"+oe+\\\"'\\\";return e.arrayBuffer()})).catch((function(){return pe()}));if(h)return new
Promise((function(e,t){h(oe,(function(t){e(new Uint8Array(t))}),t)}))}return
Promise.resolve().then((function(){return pe()}))}().then((function(e){return
WebAssembly.instantiate(e,r)})).then(e,(function(e){x(\\\"failed to asynchronously prepare wasm:
\\\"+e),le(e)}))}var
r={a:gt};if(O||(ue++,u.monitorRunDependencies&&u.monitorRunDependencies(ue)),u.instantiateWasm)try{return
u.instantiateWasm(r,e)}catch(e){return x(\\\"Module.instantiateWasm callback failed with error:
\\\"+e),!1}(M||\\\"function\\\"!=typeof
WebAssembly.instantiateStreaming||fe()||oe.startsWith(\\\"file://\\\")||\\\"function\\\"!=typeof
fetch?n(t):fetch(oe,{credentials:\\\"same-origin\\\"}).then((function(e){return
WebAssembly.instantiateStreaming(e,r).then(t,(function(e){return x(\\\"wasm streaming compile failed:
\\\"+e),x(\\\"falling back to ArrayBuffer
instantiation\\\"),n(t)}))}))).catch(c)}(),u.___wasm_call_ctors=function(){return(u.___wasm_call_ctors=u.asm.ia).a
pply(null,arguments)},u._OrtInit=function(){return(u._OrtInit=u.asm.ja).apply(null,arguments)},u._OrtCreateSessio
nOptions=function(){return(u._OrtCreateSessionOptions=u.asm.ka).apply(null,arguments)},u._OrtAddSessionConfi
gEntry=function(){return(u._OrtAddSessionConfigEntry=u.asm.la).apply(null,arguments)},u._OrtReleaseSessionO
ptions=function(){return(u._OrtReleaseSessionOptions=u.asm.ma).apply(null,arguments)},u._OrtCreateSession=fu
nction(){return(u._OrtCreateSession=u.asm.na).apply(null,arguments)},u._OrtReleaseSession=function(){return(u._
OrtReleaseSession=u.asm.oa).apply(null,arguments)},u._OrtGetInputCount=function(){return(u._OrtGetInputCount
=u.asm.pa).apply(null,arguments)},u._OrtGetOutputCount=function(){return(u._OrtGetOutputCount=u.asm.qa).app
ly(null,arguments)},u._OrtGetInputName=function(){return(u._OrtGetInputName=u.asm.ra).apply(null,arguments)
},u._OrtGetOutputName=function(){return(u._OrtGetOutputName=u.asm.sa).apply(null,arguments)},u._OrtFree=f
unction(){return(u._OrtFree=u.asm.ta).apply(null,arguments)},u._OrtCreateTensor=function(){return(u._OrtCreate
Tensor=u.asm.ua).apply(null,arguments)},u._OrtGetTensorData=function(){return(u._OrtGetTensorData=u.asm.va)
```

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.apply(null,arguments)},u._OrtReleaseTensor=function(){return(u._OrtReleaseTensor=u.asm.wa).apply(null,argum
ents)},u._OrtCreateRunOptions=function(){return(u._OrtCreateRunOptions=u.asm.xa).apply(null,arguments)},u._O
rtAddRunConfigEntry=function(){return(u._OrtAddRunConfigEntry=u.asm.ya).apply(null,arguments)},u._OrtRele
aseRunOptions=function(){return(u._OrtReleaseRunOptions=u.asm.za).apply(null,arguments)},u._OrtRun=function
(){return(u._OrtRun=u.asm.Aa).apply(null,arguments)},u._OrtEndProfiling=function(){return(u._OrtEndProfiling=
u.asm.Ba).apply(null,arguments)};var
bt=u._malloc=function(){return(bt=u._malloc=u.asm.Da).apply(null,arguments)},yt=u.___errno_location=function(
){return(yt=u.___errno_location=u.asm.Ea).apply(null,arguments)},vt=u._free=function(){return(vt=u._free=u.asm.
Fa).apply(null,arguments)},_t=u._pthread_self=function(){return(_t=u._pthread_self=u.asm.Ga).apply(null,argumen
ts)};u._emscripten_tls_init=function(){return(u._emscripten_tls_init=u.asm.Ha).apply(null,arguments)},u._emscript
en_current_thread_process_queued_calls=function(){return(u._emscripten_current_thread_process_queued_calls=u.
asm.Ia).apply(null,arguments)};var
wt,Ot=u._emscripten_register_main_browser_thread_id=function(){return(Ot=u._emscripten_register_main_brows
er_thread_id=u.asm.Ja).apply(null,arguments)},At=u._emscripten_main_browser_thread_id=function(){return(At=u
._emscripten_main_browser_thread_id=u.asm.Ka).apply(null,arguments)},Et=u._emscripten_sync_run_in_main_thr
ead_4=function(){return(Et=u._emscripten_sync_run_in_main_thread_4=u.asm.La).apply(null,arguments)},St=u._e
mscripten_main_thread_process_queued_calls=function(){return(St=u._emscripten_main_thread_process_queued_c
alls=u.asm.Ma).apply(null,arguments)},Tt=u._emscripten_run_in_main_runtime_thread_js=function(){return(Tt=u.
_emscripten_run_in_main_runtime_thread_js=u.asm.Na).apply(null,arguments)},Mt=u.__emscripten_call_on_threa
d=function(){return(Mt=u.__emscripten_call_on_thread=u.asm.Oa).apply(null,arguments)},kt=u._pthread_testcanc
el=function(){return(kt=u._pthread_testcancel=u.asm.Pa).apply(null,arguments)},xt=u._pthread_exit=function(){ret
urn(xt=u._pthread_exit=u.asm.Qa).apply(null,arguments)},Dt=u.__emscripten_thread_init=function(){return(Dt=u.
__emscripten_thread_init=u.asm.Ra).apply(null,arguments)},Rt=u._emscripten_get_global_libc=function(){return(
Rt=u._emscripten_get_global_libc=u.asm.Sa).apply(null,arguments)},Ct=u.___pthread_tsd_run_dtors=function(){re
turn(Ct=u.___pthread_tsd_run_dtors=u.asm.Ta).apply(null,arguments)},Pt=u.__get_tzname=function(){return(Pt=u.
__get_tzname=u.asm.Ua).apply(null,arguments)},It=u.__get_daylight=function(){return(It=u.__get_daylight=u.asm
.Va).apply(null,arguments)},Ft=u.__get_timezone=function(){return(Ft=u.__get_timezone=u.asm.Wa).apply(null,ar
guments)},Ut=u.stackSave=function(){return(Ut=u.stackSave=u.asm.Xa).apply(null,arguments)},jt=u.stackRestore
=function(){return(jt=u.stackRestore=u.asm.Ya).apply(null,arguments)},Lt=u.stackAlloc=function(){return(Lt=u.st
ackAlloc=u.asm.Za).apply(null,arguments)},Wt=u._emscripten_stack_set_limits=function(){return(Wt=u._emscript
en_stack_set_limits=u.asm._a).apply(null,arguments)},Ht=u._memalign=function(){return(Ht=u._memalign=u.asm.
$a).apply(null,arguments)},Yt=u.__emscripten_allow_main_runtime_queued_calls=973296,zt=u.__emscripten_mai
n_thread_futex=977204;function Bt(e){this.name=\\\"ExitStatus\\\",this.message=\\\"Program terminated with
exit(\\\"+e+\\\")\\\",this.status=e}function Gt(){function
e(){if(!wt&&(wt=!0,u.calledRun=!0,!I)&&(O||me(ee),s(u),u.onRuntimeInitialized&&u.onRuntimeInitialized(),!O))
{if(u.postRun)for(\\\"function\\\"==typeof u.postRun&&(u.postRun=[u.postRun]);u.postRun.length;){var
e=u.postRun.shift();ne.unshift(e)}me(ne)}}if(!(0<ue))if(O)s(u),O||me(ee),postMessage({cmd:\\\"loaded\\\"});else{if
(!O){if(u.preRun)for(\\\"function\\\"==typeof
u.preRun&&(u.preRun=[u.preRun]);u.preRun.length;)ie();me($)}0<ue||(u.setStatus?(u.setStatus(\\\"Running...\\\"),s
etTimeout((function(){setTimeout((function(){u.setStatus(\\\"\\\")}),1),e()}),1)):e())}}function
Nt(e){if(P=e,O)throw postMessage({cmd:\\\"exitProcess\\\",returnCode:e}),new
Bt(e);ae()||(ye.Gb(),O||(me(te),\\\"undefined\\\"!=typeof
_fflush&&_fflush(0),Te[1].length&&Me(1,10),Te[2].length&&Me(2,10))),P=e,ae()||(ye.Gb(),u.onExit&&u.onExit(
e),I=!0),d(e,new
Bt(e))}if(u.UTF8ToString=N,u.stringToUTF8=V,u.lengthBytesUTF8=X,u.keepRuntimeAlive=ae,u.PThread=ye,u.s
tackSave=Ut,u.stackRestore=jt,u.stackAlloc=Lt,u.PThread=ye,u.wasmMemory=R,u.ExitStatus=Bt,ce=function
e(){wt||Gt(),wt||(ce=e)},u.run=Gt,u.preInit)for(\\\"function\\\"==typeof
u.preInit&&(u.preInit=[u.preInit]);0<u.preInit.length;)u.preInit.pop()();return
```

```
O&&(D=!1,ye.Sb()),Gt(),e.ready});e.exports=r},118:function(e){\\\"use strict\\\";e.exports='\\\"use strict\\\";var
e={};if(\\\"object\\\"==typeof process&&\\\"object\\\"==typeof process.versions&&\\\"string\\\"==typeof
process.versions.node){var
a=require(\\\"worker_threads\\\"),t=a.parentPort;t.on(\\\"message\\\",(function(e){onmessage({data:e})}));var
r=require(\\\"fs\\\");Object.assign(global,{self:global,require:require,Module:e,location:{href:__filename},Worker:a.
Worker,importScripts:function(e){(0,eval)(r.readFileSync(e,\\\"utf8\\\"))},postMessage:function(e){t.postMessage(e
)},performance:global.performance||{now:function(){return Date.now()}}})}var s=function(){var
e=Array.prototype.slice.call(arguments).join(\\\" \\\");console.error(e)};self.alert=function(){var
a=Array.prototype.slice.call(arguments).join(\\\"
\\\");postMessage({cmd:\\\"alert\\\",text:a,threadId:e._pthread_self()})},e.instantiateWasm=function(a,t){var r=new
WebAssembly.Instance(e.wasmModule,a);return
t(r),e.wasmModule=null,r.exports},self.onmessage=function(a){try{if(\\\"load\\\"===a.data.cmd){if(e.wasmModule
=a.data.wasmModule,e.wasmMemory=a.data.wasmMemory,e.buffer=e.wasmMemory.buffer,e.ENVIRONMENT_I
S_PTHREAD=!0,\\\"string\\\"==typeof a.data.urlOrBlob)importScripts(a.data.urlOrBlob);else{var
t=URL.createObjectURL(a.data.urlOrBlob);importScripts(t),URL.revokeObjectURL(t)}ortWasmThreaded(e).then((
function(a){e=a}))}else if(\\\"objectTransfer\\\"===a.data.cmd)e.PThread.receiveObjectTransfer(a.data);else
if(\\\"run\\\"===a.data.cmd){e.__performance_now_clock_drift=performance.now()-
a.data.time,e.__emscripten_thread_init(a.data.threadInfoStruct,0,0);var
r=a.data.stackBase,o=a.data.stackBase+a.data.stackSize;e.establishStackSpace(o,r),e.PThread.receiveObjectTransfer
(a.data),e.PThread.threadInit();try{var
n=e.invokeEntryPoint(a.data.start_routine,a.data.arg);e.keepRuntimeAlive()?e.PThread.setExitStatus(n):e.PThread.t
hreadExit(n)}catch(a){if(\\\"Canceled!\\\"===a)e.PThread.threadCancel();else if(\\\"unwind\\\"!=a){if(!(a instanceof
e.ExitStatus))throw e.PThread.threadExit(-
2),a;e.keepRuntimeAlive()||e.PThread.threadExit(a.status)}}}else\\\"cancel\\\"===a.data.cmd?e._pthread_self()&&e
.PThread.threadCancel():\\\"setimmediate\\\"===a.data.target||(\\\"processThreadQueue\\\"===a.data.cmd?e._pthrea
d_self()&&e._emscripten_current_thread_process_queued_calls():(s(\\\"worker.js received unknown command
\\\"+a.data.cmd),s(a.data)))}catch(e){throw s(\\\"worker.js onmessage() captured an uncaught exception:
\\\"+e),e&&e.stack&&s(e.stack),e}};\\\\n'},932:function(e,t,n){var
_scriptDir,r=(_scriptDir=(_scriptDir=\\\"undefined\\\"!=typeof
document&&document.currentScript?document.currentScript.src:void 0)||\\\"/index.js\\\",function(e){var
t,r,a;e=e||{},t||(t=void 0!==e?e:{}),t.ready=new Promise((function(e,t){r=e,a=t}));var i,o={};for(i in
t)t.hasOwnProperty(i)&&(o[i]=t[i]);var u,s,c,l,f,p=\\\"./this.program\\\",d=\\\"object\\\"==typeof
window,m=\\\"function\\\"==typeof importScripts,h=\\\"object\\\"==typeof process&&\\\"object\\\"==typeof
process.versions&&\\\"string\\\"==typeof
process.versions.node,g=\\\"\\\";h?(g=m?n(908).dirname(g)+\\\"/\\\":\\\"//\\\",u=function(e,t){return
l||(l=n(384)),f||(f=n(908)),e=f.normalize(e),l.readFileSync(e,t?null:\\\"utf8\\\")},c=function(e){return(e=u(e,!0)).buff
er||(e=new Uint8Array(e)),e.buffer||B(\\\"Assertion failed:
undefined\\\"),e},s=function(e,t,r){l||(l=n(384)),f||(f=n(908)),e=f.normalize(e),l.readFile(e,(function(e,n){e?r(e):t(n.b
uffer)}))},1<process.argv.length&&(p=process.argv[1].replace(/\\\\\\\\/g,\\\"/\\\")),process.argv.slice(2),process.on(\\\
"uncaughtException\\\",(function(e){throw
e})),process.on(\\\"unhandledRejection\\\",B),t.inspect=function(){return\\\"[Emscripten Module
object]\\\"}):(d||m)&&(m?g=self.location.href:\\\"undefined\\\"!=typeof
document&&document.currentScript&&(g=document.currentScript.src),_scriptDir&&(g=_scriptDir),g=0!==g.inde
xOf(\\\"blob:\\\")?g.substr(0,g.lastIndexOf(\\\"/\\\")+1):\\\"\\\",u=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.send(null),t.responseText},m&&(c=function(e){var t=new XMLHttpRequest;return
t.open(\\\"GET\\\",e,!1),t.responseType=\\\"arraybuffer\\\",t.send(null),new
Uint8Array(t.response)}),s=function(e,t,n){var r=new
XMLHttpRequest;r.open(\\\"GET\\\",e,!0),r.responseType=\\\"arraybuffer\\\",r.onload=function(){200==r.status||0=
```

```
=r.status&&r.response?t(r.response):n()},r.onerror=n,r.send(null)});var
b,y=t.print||console.log.bind(console),v=t.printErr||console.warn.bind(console);for(i in
o)o.hasOwnProperty(i)&&(t[i]=o[i]);o=null,t.thisProgram&&(p=t.thisProgram),t.wasmBinary&&(b=t.wasmBinary)
,t.noExitRuntime,\\\"object\\\"!=typeof WebAssembly&&B(\\\"no native wasm support detected\\\");var
_,w,O,A,E,S=!1,T=\\\"undefined\\\"!=typeof TextDecoder?new TextDecoder(\\\"utf8\\\"):void 0;function
M(e,t,n){var r=t+n;for(n=t;e[n]&&!(n>=r);)++n;if(16<n-t&&e.subarray&&T)return
T.decode(e.subarray(t,n));for(r=\\\"\\\";t<n;){var a=e[t++];if(128&a){var
i=63&e[t++];if(192==(224&a))r+=String.fromCharCode((31&a)<<6|i);else{var
o=63&e[t++];65536>(a=224==(240&a)?(15&a)<<12|i<<6|o:(7&a)<<18|i<<12|o<<6|63&e[t++])?r+=String.fromCh
arCode(a):(a-=65536,r+=String.fromCharCode(55296|a>>10,56320|1023&a))}}else
r+=String.fromCharCode(a)}return r}function k(e,t){return e?M(A,e,t):\\\"\\\"}function x(e,t,n,r){if(!(0<r))return
0;var a=n;r=n+r-1;for(var i=0;i<e.length;++i){var
o=e.charCodeAt(i);if(55296<=o&&57343>=o&&(o=65536+((1023&o)<<10)|1023&e.charCodeAt(++i)),127>=o){i
f(n>=r)break;t[n++]=o}else{if(2047>=o){if(n+1>=r)break;t[n++]=192|o>>6}else{if(65535>=o){if(n+2>=r)break;t[
n++]=224|o>>12}else{if(n+3>=r)break;t[n++]=240|o>>18,t[n++]=128|o>>12&63}t[n++]=128|o>>6&63}t[n++]=1
28|63&o}}return t[n]=0,n-a}function D(e){for(var t=0,n=0;n<e.length;++n){var
r=e.charCodeAt(n);55296<=r&&57343>=r&&(r=65536+((1023&r)<<10)|1023&e.charCodeAt(++n)),127>=r?++t:t
=2047>=r?t+2:65535>=r?t+3:t+4}return t}function R(e){var t=D(e)+1,n=pe(t);return n&&x(e,O,n,t),n}function
C(){var e=_.buffer;w=e,t.HEAP8=O=new Int8Array(e),t.HEAP16=new Int16Array(e),t.HEAP32=E=new
Int32Array(e),t.HEAPU8=A=new Uint8Array(e),t.HEAPU16=new Uint16Array(e),t.HEAPU32=new
Uint32Array(e),t.HEAPF32=new Float32Array(e),t.HEAPF64=new Float64Array(e)}var
P,I=[],F=[],U=[],j=[];function L(){var e=t.preRun.shift();I.unshift(e)}var W,H=0,Y=null,z=null;function B(e){throw
t.onAbort&&t.onAbort(e),v(e),S=!0,e=new WebAssembly.RuntimeError(\\\"abort(\\\"+e+\\\"). Build with -s
ASSERTIONS=1 for more info.\\\"),a(e),e}function G(){return W.startsWith(\\\"data:application/octet-
stream;base64,\\\")}if(t.preloadedImages={},t.preloadedAudios={},W=\\\"ort-wasm.wasm\\\",!G()){var
N=W;W=t.locateFile?t.locateFile(N,g):g+N}function q(){var e=W;try{if(e==W&&b)return new
Uint8Array(b);if(c)return c(e);throw\\\"both async and sync fetching of the wasm failed\\\"}catch(e){B(e)}}function
V(e){for(;0<e.length;){var n=e.shift();if(\\\"function\\\"==typeof n)n(t);else{var r=n.Ea;\\\"number\\\"==typeof
r?void 0===n.xa?P.get(r)():P.get(r)(n.xa):r(void 0===n.xa?null:n.xa)}}}function X(e){this.ya=e-
16,this.Na=function(e){E[this.ya+4>>2]=e},this.Ka=function(e){E[this.ya+8>>2]=e},this.La=function(){E[this.ya>
>2]=0},this.Ja=function(){O[this.ya+12>>0]=0},this.Ma=function(){O[this.ya+13>>0]=0},this.Ga=function(e,t){thi
s.Na(e),this.Ka(t),this.La(),this.Ja(),this.Ma()}}var J,Q={},Z=[null,[],[]],K={};J=h?function(){var
e=process.hrtime();return 1e3*e[0]+e[1]/1e6}:function(){return performance.now()};var $,ee,te={};function
ne(){if(!$){var
e,t={USER:\\\"web_user\\\",LOGNAME:\\\"web_user\\\",PATH:\\\"/\\\",PWD:\\\"/\\\",HOME:\\\"/home/web_user\\\
",LANG:(\\\"object\\\"==typeof navigator&&navigator.languages&&navigator.languages[0]||\\\"C\\\").replace(\\\"-
\\\",\\\"_\\\")+\\\".UTF-8\\\",_:p||\\\"./this.program\\\"};for(e in te)void 0===te[e]?delete t[e]:t[e]=te[e];var n=[];for(e
in t)n.push(e+\\\"=\\\"+t[e]);$=n}return $}function re(){function e(e){return(e=e.toTimeString().match(/\\\\(([A-Za-z
]+)\\\\)$/))?e[1]:\\\"GMT\\\"}if(!ee){ee=!0;var t=(new Date).getFullYear(),n=new Date(t,0,1),r=new
Date(t,6,1);t=n.getTimezoneOffset();var
a=r.getTimezoneOffset(),i=Math.max(t,a);E[be()>>2]=60*i,E[ge()>>2]=Number(t!=a),n=e(n),r=e(r),n=R(n),r=R(r),
a<t?(E[he()>>2]=n,E[he()+4>>2]=r):(E[he()>>2]=r,E[he()+4>>2]=n)}}function ae(e){return
0==e%4&&(0!=e%100||0==e%400)}function ie(e,t){for(var n=0,r=0;r<=t;n+=e[r++]);return n}var
oe=[31,29,31,30,31,30,31,31,30,31,30,31],ue=[31,28,31,30,31,30,31,31,30,31,30,31];function se(e,t){for(e=new
Date(e.getTime());0<t;){var n=e.getMonth(),r=(ae(e.getFullYear())?oe:ue)[n];if(!(t>r-
e.getDate())){e.setDate(e.getDate()+t);break}t-=r-
e.getDate()+1,e.setDate(1),11>n?e.setMonth(n+1):(e.setMonth(0),e.setFullYear(e.getFullYear()+1))}return
e}function ce(e,t,n,r){function a(e,t,n){for(e=\\\"number\\\"==typeof
```

```
e?e.toString():e||\\\"\\\";e.length<t;)e=n[0]+e;return e}function i(e,t){return a(e,t,\\\"0\\\")}function o(e,t){function
n(e){return 0>e?-1:0<e?1:0}var r;return 0===(r=n(e.getFullYear()-t.getFullYear()))&&0===(r=n(e.getMonth()-
t.getMonth()))&&(r=n(e.getDate()-t.getDate())),r}function u(e){switch(e.getDay()){case 0:return new
Date(e.getFullYear()-1,11,29);case 1:return e;case 2:return new Date(e.getFullYear(),0,3);case 3:return new
Date(e.getFullYear(),0,2);case 4:return new Date(e.getFullYear(),0,1);case 5:return new Date(e.getFullYear()-
1,11,31);case 6:return new Date(e.getFullYear()-1,11,30)}}function s(e){e=se(new Date(e.va+1900,0,1),e.Ca);var
t=new Date(e.getFullYear()+1,0,4),n=u(new Date(e.getFullYear(),0,4));return
t=u(t),0>=o(n,e)?0>=o(t,e)?e.getFullYear()+1:e.getFullYear():e.getFullYear()-1}var c=E[r+40>>2];for(var l in
r={Qa:E[r>>2],Pa:E[r+4>>2],Aa:E[r+8>>2],za:E[r+12>>2],wa:E[r+16>>2],va:E[r+20>>2],Ba:E[r+24>>2],Ca:E[r+
28>>2],Ya:E[r+32>>2],Oa:E[r+36>>2],Ra:c?k(c):\\\"\\\"},n=k(n),c={\\\"%c\\\":\\\"%a %b %d %H:%M:%S
%Y\\\",\\\"%D\\\":\\\"%m/%d/%y\\\",\\\"%F\\\":\\\"%Y-%m-%d\\\",\\\"%h\\\":\\\"%b\\\",\\\"%r\\\":\\\"%I:%M:%S
%p\\\",\\\"%R\\\":\\\"%H:%M\\\",\\\"%T\\\":\\\"%H:%M:%S\\\",\\\"%x\\\":\\\"%m/%d/%y\\\",\\\"%X\\\":\\\"%H:%M:
%S\\\",\\\"%Ec\\\":\\\"%c\\\",\\\"%EC\\\":\\\"%C\\\",\\\"%Ex\\\":\\\"%m/%d/%y\\\",\\\"%EX\\\":\\\"%H:%M:%S\\\",\\\
"%Ey\\\":\\\"%y\\\",\\\"%EY\\\":\\\"%Y\\\",\\\"%Od\\\":\\\"%d\\\",\\\"%Oe\\\":\\\"%e\\\",\\\"%OH\\\":\\\"%H\\\",\\\"%
OI\\\":\\\"%I\\\",\\\"%Om\\\":\\\"%m\\\",\\\"%OM\\\":\\\"%M\\\",\\\"%OS\\\":\\\"%S\\\",\\\"%Ou\\\":\\\"%u\\\",\\\"%O
U\\\":\\\"%U\\\",\\\"%OV\\\":\\\"%V\\\",\\\"%Ow\\\":\\\"%w\\\",\\\"%OW\\\":\\\"%W\\\",\\\"%Oy\\\":\\\"%y\\\"})n=n.r
eplace(new RegExp(l,\\\"g\\\"),c[l]);var f=\\\"Sunday Monday Tuesday Wednesday Thursday Friday
Saturday\\\".split(\\\" \\\"),p=\\\"January February March April May June July August September October November
December\\\".split(\\\" \\\");for(l in c={\\\"%a\\\":function(e){return
f[e.Ba].substring(0,3)},\\\"%A\\\":function(e){return f[e.Ba]},\\\"%b\\\":function(e){return
p[e.wa].substring(0,3)},\\\"%B\\\":function(e){return p[e.wa]},\\\"%C\\\":function(e){return
i((e.va+1900)/100|0,2)},\\\"%d\\\":function(e){return i(e.za,2)},\\\"%e\\\":function(e){return a(e.za,2,\\\"
\\\")},\\\"%g\\\":function(e){return s(e).toString().substring(2)},\\\"%G\\\":function(e){return
s(e)},\\\"%H\\\":function(e){return i(e.Aa,2)},\\\"%I\\\":function(e){return 0==(e=e.Aa)?e=12:12<e&&(e-
=12),i(e,2)},\\\"%j\\\":function(e){return i(e.za+ie(ae(e.va+1900)?oe:ue,e.wa-1),3)},\\\"%m\\\":function(e){return
i(e.wa+1,2)},\\\"%M\\\":function(e){return
i(e.Pa,2)},\\\"%n\\\":function(){return\\\"\\\\n\\\"},\\\"%p\\\":function(e){return
0<=e.Aa&&12>e.Aa?\\\"AM\\\":\\\"PM\\\"},\\\"%S\\\":function(e){return
i(e.Qa,2)},\\\"%t\\\":function(){return\\\"\\\\t\\\"},\\\"%u\\\":function(e){return e.Ba||7},\\\"%U\\\":function(e){var
t=new Date(e.va+1900,0,1),n=0===t.getDay()?t:se(t,7-t.getDay());return 0>o(n,e=new
Date(e.va+1900,e.wa,e.za))?i(Math.ceil((31-n.getDate()+(ie(ae(e.getFullYear())?oe:ue,e.getMonth()-1)-
31)+e.getDate())/7),2):0===o(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%V\\\":function(e){var t=new
Date(e.va+1901,0,4),n=u(new Date(e.va+1900,0,4));t=u(t);var r=se(new Date(e.va+1900,0,1),e.Ca);return
0>o(r,n)?\\\"53\\\":0>=o(t,r)?\\\"01\\\":i(Math.ceil((n.getFullYear()<e.va+1900?e.Ca+32-n.getDate():e.Ca+1-
n.getDate())/7),2)},\\\"%w\\\":function(e){return e.Ba},\\\"%W\\\":function(e){var t=new
Date(e.va,0,1),n=1===t.getDay()?t:se(t,0===t.getDay()?1:7-t.getDay()+1);return 0>o(n,e=new
Date(e.va+1900,e.wa,e.za))?i(Math.ceil((31-n.getDate()+(ie(ae(e.getFullYear())?oe:ue,e.getMonth()-1)-
31)+e.getDate())/7),2):0===o(n,t)?\\\"01\\\":\\\"00\\\"},\\\"%y\\\":function(e){return(e.va+1900).toString().substring(
2)},\\\"%Y\\\":function(e){return e.va+1900},\\\"%z\\\":function(e){var t=0<=(e=e.Oa);return
e=Math.abs(e)/60,(t?\\\"+\\\":\\\"-\\\")+String(\\\"0000\\\"+(e/60*100+e%60)).slice(-4)},\\\"%Z\\\":function(e){return
e.Ra},\\\"%%\\\":function(){return\\\"%\\\"}})n.includes(l)&&(n=n.replace(new
RegExp(l,\\\"g\\\"),c[l](r)));return(l=function(e){var t=Array(D(e)+1);return
x(e,t,0,t.length),t}(n)).length>t?0:(O.set(l,e),l.length-1)}var le={a:function(e){return
pe(e+16)+16},c:function(e,t){U.unshift({Ea:e,xa:t})},d:function(e,t){U.unshift({Ea:e,xa:t})},b:function(e,t,n){thro
w new X(e).Ga(t,n),e},D:function(e,t){return e=k(e),K.Sa(e,t)},m:function(){return
0},I:function(){},L:function(){},o:function(){return 42},x:function(){return
0},H:function(){},G:function(e,t){return
e=k(e),K.Ta(e,t)},K:function(e,t,n,r,a,i){if(i<<=12,0!=(16&r)&&0!=e%65536)t=-28;else
```

```
if(0!=(32&r)){e=65536*Math.ceil(t/65536);var
o=we(65536,e);o?(A.fill(0,o,o+e),e=o):e=0,e?(Q[e]={Ia:e,Ha:t,Fa:!0,fd:a,Xa:n,flags:r,offset:i},t=e):t=-48}else t=-
52;return t},J:function(e,t){var n=Q[e];return 0!==t&&n?(t===n.Ha&&(Q[e]=null,n.Fa&&me(n.Ia)),e=0):e=-
28,e},j:function(){},C:function(e,t,n){return
e=k(e),K.Ua(e,t,n)},E:function(){},r:function(){},F:function(){},h:function(){B()},p:function(e,t){if(0===e)e=Date.
now();else{if(1!==e&&4!==e)return E[de()>>2]=28,-1;e=J()}return
E[t>>2]=e/1e3|0,E[t+4>>2]=e%1e3*1e6|0,0},s:function(e,t){return e-t},P:function(){B(\\\"To use dlopen, you need
to use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},g:function(){B(\\\"To use dlopen, you need to use Emscripten's linking support,
see https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},Q:function(){B(\\\"To use dlopen, you need to
use Emscripten's linking support, see https://github.com/emscripten-
core/emscripten/wiki/Linking\\\")},O:function(){B(\\\"To use dlopen, you need to use Emscripten's linking support,
see https://github.com/emscripten-core/emscripten/wiki/Linking\\\")},M:function(){return
2147483648},v:function(e,t,n){A.copyWithin(e,t,t+n)},i:function(e){var
t=A.length;if(2147483648<(e>>>=0))return!1;for(var n=1;4>=n;n*=2){var
r=t*(1+.2/n);r=Math.min(r,e+100663296),0<(r=Math.max(e,r))%65536&&(r+=65536-
r%65536);e:{try{_.grow(Math.min(2147483648,r)-w.byteLength+65535>>>16),C();var a=1;break
e}catch(e){}a=void 0}if(a)return!0}return!1},B:function(e){for(var t=J();J()-t<e;);},z:function(e,t){var n=0;return
ne().forEach((function(r,a){var
i=t+n;for(a=E[e+4*a>>2]=i,i=0;i<r.length;++i)O[a++>>0]=r.charCodeAt(i);O[a>>0]=0,n+=r.length+1})),0},A:func
tion(e,t){var n=ne();E[e>>2]=n.length;var r=0;return
n.forEach((function(e){r+=e.length+1})),E[t>>2]=r,0},f:function(){return 0},y:function(e,t){return
e=1==e||2==e?2:B(),O[t>>0]=e,0},n:function(e,t,n,r){return
e=K.Wa(e),t=K.Va(e,t,n),E[r>>2]=t,0},u:function(){},q:function(e,t,n,r){for(var a=0,i=0;i<n;i++){for(var
o=E[t+8*i>>2],u=E[t+(8*i+4)>>2],s=0;s<u;s++){var
c=A[o+s],l=Z[e];0===c||10===c?((1===e?y:v)(M(l,0)),l.length=0):l.push(c)}a+=u}return
E[r>>2]=a,0},w:function(e){var t=Date.now();return E[e>>2]=t/1e3|0,E[e+4>>2]=t%1e3*1e3|0,0},t:function
e(t,n){return t=new
Date(1e3*E[t>>2]),E[n>>2]=t.getUTCSeconds(),E[n+4>>2]=t.getUTCMinutes(),E[n+8>>2]=t.getUTCHours(),E[n
+12>>2]=t.getUTCDate(),E[n+16>>2]=t.getUTCMonth(),E[n+20>>2]=t.getUTCFullYear()-
1900,E[n+24>>2]=t.getUTCDay(),E[n+36>>2]=0,E[n+32>>2]=0,E[n+28>>2]=(t.getTime()-
Date.UTC(t.getUTCFullYear(),0,1,0,0,0,0))/864e5|0,e.Da||(e.Da=R(\\\"GMT\\\")),E[n+40>>2]=e.Da,n},l:function(e,
t){re(),e=new
Date(1e3*E[e>>2]),E[t>>2]=e.getSeconds(),E[t+4>>2]=e.getMinutes(),E[t+8>>2]=e.getHours(),E[t+12>>2]=e.get
Date(),E[t+16>>2]=e.getMonth(),E[t+20>>2]=e.getFullYear()-1900,E[t+24>>2]=e.getDay();var n=new
Date(e.getFullYear(),0,1);E[t+28>>2]=(e.getTime()-n.getTime())/864e5|0,E[t+36>>2]=-
60*e.getTimezoneOffset();var r=new Date(e.getFullYear(),6,1).getTimezoneOffset();return
e=0|(r!=(n=n.getTimezoneOffset())&&e.getTimezoneOffset()==Math.min(n,r)),E[t+32>>2]=e,e=E[he()+(e?4:0)>>2
],E[t+40>>2]=e,t},k:function(e){re();var t=new
Date(E[e+20>>2]+1900,E[e+16>>2],E[e+12>>2],E[e+8>>2],E[e+4>>2],E[e>>2],0),n=E[e+32>>2],r=t.getTimezon
eOffset(),a=new Date(t.getFullYear(),0,1),i=new
Date(t.getFullYear(),6,1).getTimezoneOffset(),o=a.getTimezoneOffset(),u=Math.min(o,i);return
0>n?E[e+32>>2]=Number(i!=o&&u==r):0<n!=(u==r)&&(i=Math.max(o,i),t.setTime(t.getTime()+6e4*((0<n?u:i)-
r))),E[e+24>>2]=t.getDay(),E[e+28>>2]=(t.getTime()-
a.getTime())/864e5|0,E[e>>2]=t.getSeconds(),E[e+4>>2]=t.getMinutes(),E[e+8>>2]=t.getHours(),E[e+12>>2]=t.ge
tDate(),E[e+16>>2]=t.getMonth(),t.getTime()/1e3|0},N:ce,e:function(e,t,n,r){return
ce(e,t,n,r)}};!function(){function e(e){t.asm=e.exports,_=t.asm.R,C(),P=t.asm.ua,F.unshift(t.asm.S),H--
,t.monitorRunDependencies&&t.monitorRunDependencies(H),0==H&&(null!==Y&&(clearInterval(Y),Y=null),z&
```

```
&(e=z,z=null,e()))}function n(t){e(t.instance)}function r(e){return
function(){if(!b&&(d||m)){if(\\\"function\\\"==typeof fetch&&!W.startsWith(\\\"file://\\\"))return
fetch(W,{credentials:\\\"same-origin\\\"}).then((function(e){if(!e.ok)throw\\\"failed to load wasm binary file at
'\\\"+W+\\\"'\\\";return e.arrayBuffer()})).catch((function(){return q()}));if(s)return new
Promise((function(e,t){s(W,(function(t){e(new Uint8Array(t))}),t)}))}return
Promise.resolve().then((function(){return q()}))}().then((function(e){return
WebAssembly.instantiate(e,i)})).then(e,(function(e){v(\\\"failed to asynchronously prepare wasm:
\\\"+e),B(e)}))}var
i={a:le};if(H++,t.monitorRunDependencies&&t.monitorRunDependencies(H),t.instantiateWasm)try{return
t.instantiateWasm(i,e)}catch(e){return v(\\\"Module.instantiateWasm callback failed with error:
\\\"+e),!1}(b||\\\"function\\\"!=typeof
WebAssembly.instantiateStreaming||G()||W.startsWith(\\\"file://\\\")||\\\"function\\\"!=typeof
fetch?r(n):fetch(W,{credentials:\\\"same-origin\\\"}).then((function(e){return
WebAssembly.instantiateStreaming(e,i).then(n,(function(e){return v(\\\"wasm streaming compile failed:
\\\"+e),v(\\\"falling back to ArrayBuffer
instantiation\\\"),r(n)}))}))).catch(a)}(),t.___wasm_call_ctors=function(){return(t.___wasm_call_ctors=t.asm.S).app
ly(null,arguments)},t._OrtInit=function(){return(t._OrtInit=t.asm.T).apply(null,arguments)},t._OrtCreateSessionOpt
ions=function(){return(t._OrtCreateSessionOptions=t.asm.U).apply(null,arguments)},t._OrtAddSessionConfigEntry
=function(){return(t._OrtAddSessionConfigEntry=t.asm.V).apply(null,arguments)},t._OrtReleaseSessionOptions=f
unction(){return(t._OrtReleaseSessionOptions=t.asm.W).apply(null,arguments)},t._OrtCreateSession=function(){ret
urn(t._OrtCreateSession=t.asm.X).apply(null,arguments)},t._OrtReleaseSession=function(){return(t._OrtReleaseSes
sion=t.asm.Y).apply(null,arguments)},t._OrtGetInputCount=function(){return(t._OrtGetInputCount=t.asm.Z).apply(
null,arguments)},t._OrtGetOutputCount=function(){return(t._OrtGetOutputCount=t.asm._).apply(null,arguments)},t
._OrtGetInputName=function(){return(t._OrtGetInputName=t.asm.$).apply(null,arguments)},t._OrtGetOutputName
=function(){return(t._OrtGetOutputName=t.asm.aa).apply(null,arguments)},t._OrtFree=function(){return(t._OrtFree
=t.asm.ba).apply(null,arguments)},t._OrtCreateTensor=function(){return(t._OrtCreateTensor=t.asm.ca).apply(null,a
rguments)},t._OrtGetTensorData=function(){return(t._OrtGetTensorData=t.asm.da).apply(null,arguments)},t._OrtR
eleaseTensor=function(){return(t._OrtReleaseTensor=t.asm.ea).apply(null,arguments)},t._OrtCreateRunOptions=fu
nction(){return(t._OrtCreateRunOptions=t.asm.fa).apply(null,arguments)},t._OrtAddRunConfigEntry=function(){re
turn(t._OrtAddRunConfigEntry=t.asm.ga).apply(null,arguments)},t._OrtReleaseRunOptions=function(){return(t._O
rtReleaseRunOptions=t.asm.ha).apply(null,arguments)},t._OrtRun=function(){return(t._OrtRun=t.asm.ia).apply(nul
l,arguments)},t._OrtEndProfiling=function(){return(t._OrtEndProfiling=t.asm.ja).apply(null,arguments)};var
fe,pe=t._malloc=function(){return(pe=t._malloc=t.asm.ka).apply(null,arguments)},de=t.___errno_location=function
(){return(de=t.___errno_location=t.asm.la).apply(null,arguments)},me=t._free=function(){return(me=t._free=t.asm.
ma).apply(null,arguments)},he=t.__get_tzname=function(){return(he=t.__get_tzname=t.asm.na).apply(null,argumen
ts)},ge=t.__get_daylight=function(){return(ge=t.__get_daylight=t.asm.oa).apply(null,arguments)},be=t.__get_timez
one=function(){return(be=t.__get_timezone=t.asm.pa).apply(null,arguments)},ye=t.stackSave=function(){return(ye
=t.stackSave=t.asm.qa).apply(null,arguments)},ve=t.stackRestore=function(){return(ve=t.stackRestore=t.asm.ra).ap
ply(null,arguments)},_e=t.stackAlloc=function(){return(_e=t.stackAlloc=t.asm.sa).apply(null,arguments)},we=t._m
emalign=function(){return(we=t._memalign=t.asm.ta).apply(null,arguments)};function Oe(){function
e(){if(!fe&&(fe=!0,t.calledRun=!0,!S)){if(V(F),r(t),t.onRuntimeInitialized&&t.onRuntimeInitialized(),t.postRun)for
(\\\"function\\\"==typeof t.postRun&&(t.postRun=[t.postRun]);t.postRun.length;){var
e=t.postRun.shift();j.unshift(e)}V(j)}}if(!(0<H)){if(t.preRun)for(\\\"function\\\"==typeof
t.preRun&&(t.preRun=[t.preRun]);t.preRun.length;)L();V(I),0<H||(t.setStatus?(t.setStatus(\\\"Running...\\\"),setTime
out((function(){setTimeout((function(){t.setStatus(\\\"\\\")}),1),e()}),1)):e())}}if(t.UTF8ToString=k,t.stringToUTF8
=function(e,t,n){return
x(e,A,t,n)},t.lengthBytesUTF8=D,t.stackSave=ye,t.stackRestore=ve,t.stackAlloc=_e,z=function
e(){fe||Oe(),fe||(z=e)},t.run=Oe,t.preInit)for(\\\"function\\\"==typeof
```

```
t.preInit&&(t.preInit=[t.preInit]);0<t.preInit.length;)t.preInit.pop()();return
Oe(),e.ready});e.exports=r},967:function(e,t){\\\"use strict\\\";var n=this&&this.__read||function(e,t){var
n=\\\"function\\\"==typeof Symbol&&e[Symbol.iterator];if(!n)return e;var r,a,i=n.call(e),o=[];try{for(;(void
0===t||t--
>0)&&!(r=i.next()).done;)o.push(r.value)}catch(e){a={error:e}}finally{try{r&&!r.done&&(n=i.return)&&n.call(i)}
finally{if(a)throw a.error}}return
o};Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.iterateExtraOptions=void
0,t.iterateExtraOptions=function(e,r,a,i){if(\\\"object\\\"==typeof e&&null!==e){if(a.has(e))throw new
Error(\\\"Circular reference in options\\\");a.add(e)}Object.entries(e).forEach((function(e){var
o=n(e,2),u=o[0],s=o[1],c=r?r+u:u;if(\\\"object\\\"==typeof s)t.iterateExtraOptions(s,c+\\\".\\\",a,i);else
if(\\\"string\\\"==typeof s||\\\"number\\\"==typeof s)i(c,s.toString());else{if(\\\"boolean\\\"!=typeof s)throw new
Error(\\\"Can't handle extra config type: \\\"+typeof s);i(c,s?\\\"1\\\":\\\"0\\\")}}))}},586:function(e,t,n){\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.setRunOptions=void 0;var
r=n(967),a=n(983),i=n(361);t.setRunOptions=function(e){var t=i.getInstance(),n=0,o=[],u=e||{};try{if(void
0===(null==e?void 0:e.logSeverityLevel))u.logSeverityLevel=2;else if(\\\"number\\\"!=typeof
e.logSeverityLevel||!Number.isInteger(e.logSeverityLevel)||e.logSeverityLevel<0||e.logSeverityLevel>4)throw new
Error(\\\"log serverity level is not valid: \\\"+e.logSeverityLevel);if(void 0===(null==e?void
0:e.logVerbosityLevel))u.logVerbosityLevel=0;else if(\\\"number\\\"!=typeof
e.logVerbosityLevel||!Number.isInteger(e.logVerbosityLevel))throw new Error(\\\"log verbosity level is not valid:
\\\"+e.logVerbosityLevel);void 0===(null==e?void 0:e.terminate)&&(u.terminate=!1);var s=0;if(void
0!==(null==e?void
0:e.tag)&&(s=a.allocWasmString(e.tag,o)),0===(n=t._OrtCreateRunOptions(u.logSeverityLevel,u.logVerbosityLev
el,!!u.terminate,s)))throw new Error(\\\"Can't create run options\\\");return void 0!==(null==e?void
0:e.extra)&&r.iterateExtraOptions(e.extra,\\\"\\\",new WeakSet,(function(e,r){var
i=a.allocWasmString(e,o),u=a.allocWasmString(r,o);if(0!==t._OrtAddRunConfigEntry(n,i,u))throw new
Error(\\\"Can't set a run config entry: \\\"+e+\\\" - \\\"+r)})),[n,o]}catch(e){throw
0!==n&&t._OrtReleaseRunOptions(n),o.forEach(t._free),e}}},919:function(e,t,n){\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.setSessionOptions=void 0;var
r=n(967),a=n(983),i=n(361);t.setSessionOptions=function(e){var
t=i.getInstance(),n=0,o=[],u=e||{};!function(e){e.extra||(e.extra={}),e.extra.session||(e.extra.session={});var
t=e.extra.session;t.use_ort_model_bytes_directly||(t.use_ort_model_bytes_directly=\\\"1\\\")}(u);try{void
0===(null==e?void 0:e.graphOptimizationLevel)&&(u.graphOptimizationLevel=\\\"all\\\");var
s=function(e){switch(e){case\\\"disabled\\\":return 0;case\\\"basic\\\":return 1;case\\\"extended\\\":return
2;case\\\"all\\\":return 99;default:throw new Error(\\\"unsupported graph optimization level:
\\\"+e)}}(u.graphOptimizationLevel);void 0===(null==e?void
0:e.enableCpuMemArena)&&(u.enableCpuMemArena=!0),void 0===(null==e?void
0:e.enableMemPattern)&&(u.enableMemPattern=!0),void 0===(null==e?void
0:e.executionMode)&&(u.executionMode=\\\"sequential\\\");var
c=function(e){switch(e){case\\\"sequential\\\":return 0;case\\\"parallel\\\":return 1;default:throw new
Error(\\\"unsupported execution mode: \\\"+e)}}(u.executionMode),l=0;if(void 0!==(null==e?void
0:e.logId)&&(l=a.allocWasmString(e.logId,o)),void 0===(null==e?void
0:e.logSeverityLevel))u.logSeverityLevel=2;else if(\\\"number\\\"!=typeof
e.logSeverityLevel||!Number.isInteger(e.logSeverityLevel)||e.logSeverityLevel<0||e.logSeverityLevel>4)throw new
Error(\\\"log serverity level is not valid: \\\"+e.logSeverityLevel);if(void 0===(null==e?void
0:e.logVerbosityLevel))u.logVerbosityLevel=0;else if(\\\"number\\\"!=typeof
e.logVerbosityLevel||!Number.isInteger(e.logVerbosityLevel))throw new Error(\\\"log verbosity level is not valid:
\\\"+e.logVerbosityLevel);if(void 0===(null==e?void
0:e.enableProfiling)&&(u.enableProfiling=!1),0===(n=t._OrtCreateSessionOptions(s,!!u.enableCpuMemArena,!!u.
```

```
enableMemPattern,c,!!u.enableProfiling,0,l,u.logSeverityLevel,u.logVerbosityLevel)))throw new Error(\\\"Can't
create session options\\\");return void 0!==(null==e?void 0:e.extra)&&r.iterateExtraOptions(e.extra,\\\"\\\",new
WeakSet,(function(e,r){var
i=a.allocWasmString(e,o),u=a.allocWasmString(r,o);if(0!==t._OrtAddSessionConfigEntry(n,i,u))throw new
Error(\\\"Can't set a session config entry: \\\"+e+\\\" - \\\"+r)})),[n,o]}catch(e){throw
0!==n&&t._OrtReleaseSessionOptions(n),o.forEach(t._free),e}}},983:function(e,t,n){\\\"use
strict\\\";Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.allocWasmString=void 0;var
r=n(361);t.allocWasmString=function(e,t){var n=r.getInstance(),a=n.lengthBytesUTF8(e)+1,i=n._malloc(a);return
n.stringToUTF8(e,i,a),t.push(i),i}},349:function(e,t,n){\\\"use strict\\\";var r=this&&this.__read||function(e,t){var
n=\\\"function\\\"==typeof Symbol&&e[Symbol.iterator];if(!n)return e;var r,a,i=n.call(e),o=[];try{for(;(void
0===t||t--
>0)&&!(r=i.next()).done;)o.push(r.value)}catch(e){a={error:e}}finally{try{r&&!r.done&&(n=i.return)&&n.call(i)}
finally{if(a)throw a.error}}return o},a=this&&this.__values||function(e){var t=\\\"function\\\"==typeof
Symbol&&Symbol.iterator,n=t&&e[t],r=0;if(n)return n.call(e);if(e&&\\\"number\\\"==typeof
e.length)return{next:function(){return e&&r>=e.length&&(e=void 0),{value:e&&e[r++],done:!e}}};throw new
TypeError(t?\\\"Object is not iterable.\\\":\\\"Symbol.iterator is not
defined.\\\")};Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.extractTransferableBuffers=t.endProfiling=t.r
un=t.releaseSession=t.createSession=t.initOrt=void 0;var
i=n(586),o=n(919),u=n(983),s=n(361);t.initOrt=function(e,t){var n=s.getInstance()._OrtInit(e,t);if(0!==n)throw new
Error(\\\"Can't initialize onnxruntime. error code = \\\"+n)};var c=[];t.createSession=function(e,t){var
n,a=s.getInstance(),i=a._malloc(e.byteLength),u=0,l=0,f=[];try{if(l=(n=r(o.setSessionOptions(t),2))[0],f=n[1],a.HE
APU8.set(e,i),0===(u=a._OrtCreateSession(i,e.byteLength,l)))throw new Error(\\\"Can't create a
session\\\")}finally{a._free(i),a._OrtReleaseSessionOptions(l),f.forEach(a._free)}for(var
p=a._OrtGetInputCount(u),d=a._OrtGetOutputCount(u),m=[],h=[],g=[],b=[],y=0;y<p;y++){var
v=a._OrtGetInputName(u,y);if(0===v)throw new Error(\\\"Can't get an input
name\\\");h.push(v),m.push(a.UTF8ToString(v))}for(y=0;y<d;y++){var
_=a._OrtGetOutputName(u,y);if(0===_)throw new Error(\\\"Can't get an output
name\\\");b.push(_),g.push(a.UTF8ToString(_))}return c.push([u,h,b]),[c.length-
1,m,g]},t.releaseSession=function(e){var t=s.getInstance(),n=c[e];if(!n)throw new Error(\\\"invalid session
id\\\");var r=n[0],a=n[1],i=n[2];a.forEach(t._OrtFree),i.forEach(t._OrtFree),t._OrtReleaseSession(r),c[e]=void 0};var
l=function(e){switch(e){case 3:return\\\"int8\\\";case 2:return\\\"uint8\\\";case 9:return\\\"bool\\\";case
5:return\\\"int16\\\";case 4:return\\\"uint16\\\";case 6:return\\\"int32\\\";case 12:return\\\"uint32\\\";case
1:return\\\"float32\\\";case 11:return\\\"float64\\\";case 8:return\\\"string\\\";case 7:return\\\"int32\\\";case
13:return\\\"uint32\\\";default:throw new Error(\\\"unsupported data type:
\\\"+e)}},f=function(e){switch(e){case\\\"float32\\\":return Float32Array;case\\\"uint8\\\":return
Uint8Array;case\\\"int8\\\":return Int8Array;case\\\"uint16\\\":return Uint16Array;case\\\"int16\\\":return
Int16Array;case\\\"int32\\\":return Int32Array;case\\\"bool\\\":return Uint8Array;case\\\"float64\\\":return
Float64Array;case\\\"uint32\\\":return Uint32Array;case\\\"int64\\\":return BigInt64Array;case\\\"uint64\\\":return
BigUint64Array;default:throw new Error(\\\"unsupported type: \\\"+e)}};t.run=function(e,t,n,a,o){var
p,d=s.getInstance(),m=c[e];if(!m)throw new Error(\\\"invalid session id\\\");var
h=m[0],g=m[1],b=m[2],y=t.length,v=a.length,_=0,w=[],O=[],A=[];try{_=(p=r(i.setRunOptions(o),2))[0],w=p[1];for
(var E=function(e){var t=n[e][0],r=n[e][1],a=n[e][2],i=void 0,o=void
0;if(Array.isArray(a)){o=4*a.length,i=d._malloc(o),A.push(i);for(var
s=i/4,c=0;c<a.length;c++){if(\\\"string\\\"!=typeof a[c])throw new TypeError(\\\"tensor data at index \\\"+c+\\\" is
not a string\\\");d.HEAPU32[s++]=u.allocWasmString(a[c],A)}}else
o=a.byteLength,i=d._malloc(o),A.push(i),d.HEAPU8.set(new Uint8Array(a.buffer,a.byteOffset,o),i);var
l=d.stackSave(),f=d.stackAlloc(4*r.length);try{var p=f/4;r.forEach((function(e){return d.HEAP32[p++]=e}));var
m=d._OrtCreateTensor(function(e){switch(e){case\\\"int8\\\":return 3;case\\\"uint8\\\":return
```

```
2;case\\\"bool\\\":return 9;case\\\"int16\\\":return 5;case\\\"uint16\\\":return 4;case\\\"int32\\\":return
6;case\\\"uint32\\\":return 12;case\\\"float32\\\":return 1;case\\\"float64\\\":return 11;case\\\"string\\\":return
8;case\\\"int64\\\":return 7;case\\\"uint64\\\":return 13;default:throw new Error(\\\"unsupported data type:
\\\"+e)}}(t),i,o,f,r.length);if(0===m)throw new Error(\\\"Can't create a
tensor\\\");O.push(m)}finally{d.stackRestore(l)}},S=0;S<y;S++)E(S);var
T=d.stackSave(),M=d.stackAlloc(4*y),k=d.stackAlloc(4*y),x=d.stackAlloc(4*v),D=d.stackAlloc(4*v);try{var
R=M/4,C=k/4,P=x/4,I=D/4;for(S=0;S<y;S++)d.HEAPU32[R++]=O[S],d.HEAPU32[C++]=g[t[S]];for(S=0;S<v;S+
+)d.HEAPU32[P++]=0,d.HEAPU32[I++]=b[a[S]];var
F=d._OrtRun(h,k,M,y,D,v,x,_),U=[];if(0===F)for(S=0;S<v;S++){var
j=d.HEAPU32[x/4+S],L=d.stackSave(),W=d.stackAlloc(16),H=void
0,Y=0;try{if(0!==(F=d._OrtGetTensorData(j,W,W+4,W+8,W+12)))throw new Error(\\\"Can't get a tensor data.
error code = \\\"+F);var z=W/4,B=d.HEAPU32[z++];Y=d.HEAPU32[z++];for(var
G=d.HEAPU32[z++],N=d.HEAPU32[z++],q=[],V=0;V<N;V++)q.push(d.HEAPU32[G/4+V]);d._OrtFree(G);var
X=0===q.length?1:q.reduce((function(e,t){return e*t}));if(\\\"string\\\"===(H=l(B))){for(var
J=[],Q=Y/4,Z=0;Z<X;Z++){var K=d.HEAPU32[Q++],$=Z===X-1?void 0:d.HEAPU32[Q]-
K;J.push(d.UTF8ToString(K,$))}U.push([H,q,J])}else{var ee=new(f(H))(X);new
Uint8Array(ee.buffer,ee.byteOffset,ee.byteLength).set(d.HEAPU8.subarray(Y,Y+ee.byteLength)),U.push([H,q,ee])
}}finally{d.stackRestore(L),\\\"string\\\"===H&&Y&&d._free(Y),d._OrtReleaseTensor(j)}}if(0===F)return
U;throw new Error(\\\"failed to call OrtRun(). error code =
\\\"+F+\\\".\\\")}finally{d.stackRestore(T)}}finally{O.forEach(d._OrtReleaseTensor),A.forEach(d._free),d._OrtRele
aseRunOptions(_),w.forEach(d._free)}},t.endProfiling=function(e){var t=s.getInstance(),n=c[e];if(!n)throw new
Error(\\\"invalid session id\\\");var r=n[0],a=t._OrtEndProfiling(r);if(0===a)throw new Error(\\\"Can't get an profile
file name\\\");t._OrtFree(a)},t.extractTransferableBuffers=function(e){var t,n,r=[];try{for(var
i=a(e),o=i.next();!o.done;o=i.next()){var
u=o.value[2];!Array.isArray(u)&&u.buffer&&r.push(u.buffer)}}catch(e){t={error:e}}finally{try{o&&!o.done&&(
n=i.return)&&n.call(i)}finally{if(t)throw t.error}}return r}},361:function(e,t,n){\\\"use strict\\\";var
r=this&&this.__createBinding||(Object.create?function(e,t,n,r){void
0===r&&(r=n),Object.defineProperty(e,r,{enumerable:!0,get:function(){return t[n]}})}:function(e,t,n,r){void
0===r&&(r=n),e[r]=t[n]}),a=this&&this.__setModuleDefault||(Object.create?function(e,t){Object.defineProperty(e,
\\\"default\\\",{enumerable:!0,value:t})}:function(e,t){e.default=t}),i=this&&this.__importStar||function(e){if(e&&e
.__esModule)return e;var t={};if(null!=e)for(var n in
e)\\\"default\\\"!==n&&Object.prototype.hasOwnProperty.call(e,n)&&r(t,e,n);return
a(t,e),t},o=this&&this.__awaiter||function(e,t,n,r){return new(n||(n=Promise))((function(a,i){function
o(e){try{s(r.next(e))}catch(e){i(e)}}function u(e){try{s(r.throw(e))}catch(e){i(e)}}function s(e){var
t;e.done?a(e.value):(t=e.value,t instanceof n?t:new
n((function(e){e(t)}))).then(o,u)}s((r=r.apply(e,t||[])).next())}))},u=this&&this.__generator||function(e,t){var
n,r,a,i,o={label:0,sent:function(){if(1&a[0])throw a[1];return a[1]},trys:[],ops:[]};return
i={next:u(0),throw:u(1),return:u(2)},\\\"function\\\"==typeof Symbol&&(i[Symbol.iterator]=function(){return
this}),i;function u(i){return function(u){return function(i){if(n)throw new TypeError(\\\"Generator is already
executing.\\\");for(;o;)try{if(n=1,r&&(a=2&i[0]?r.return:i[0]?r.throw||((a=r.return)&&a.call(r),0):r.next)&&!(a=a.ca
ll(r,i[1])).done)return a;switch(r=0,a&&(i=[2&i[0],a.value]),i[0]){case 0:case 1:a=i;break;case 4:return
o.label++,{value:i[1],done:!1};case 5:o.label++,r=i[1],i=[0];continue;case
7:i=o.ops.pop(),o.trys.pop();continue;default:if(!((a=(a=o.trys).length>0&&a[a.length-
1])||6!==i[0]&&2!==i[0])){o=0;continue}if(3===i[0]&&(!a||i[1]>a[0]&&i[1]<a[3])){o.label=i[1];break}if(6===i[0]
&&o.label<a[1]){o.label=a[1],a=i;break}if(a&&o.label<a[2]){o.label=a[2],o.ops.push(i);break}a[2]&&o.ops.pop(),
o.trys.pop();continue}i=t.call(e,o)}catch(e){i=[6,e],r=0}finally{n=a=0}if(5&i[0])throw
i[1];return{value:i[0]?i[1]:void 0,done:!0}}([i,u])}}}},s=this&&this.__importDefault||function(e){return
e&&e.__esModule?e:{default:e}};Object.defineProperty(t,\\\"__esModule\\\",{value:!0}),t.dispose=t.getInstance=t.i
```

```
nitializeWebAssembly=void 0;var c,l=i(n(449)),f=s(n(474)),p=s(n(932)),d=!1,m=!1,h=!1,g=function(e,t){return
t?e?\\\"ort-wasm-simd-threaded.wasm\\\":\\\"ort-wasm-threaded.wasm\\\":e?\\\"ort-wasm-simd.wasm\\\":\\\"ort-
wasm.wasm\\\"};t.initializeWebAssembly=function(e){return o(void 0,void 0,void 0,(function(){var
t,r,a,i,o,s,b,y,v,_,w;return u(this,(function(u){switch(u.label){case 0:if(d)return[2,Promise.resolve()];if(m)throw new
Error(\\\"multiple calls to 'initializeWebAssembly()' detected.\\\");if(h)throw new Error(\\\"previous call to
'initializeWebAssembly()' failed.\\\");return
m=!0,t=e.initTimeout,r=e.numThreads,a=e.simd,i=r>1&&function(){try{return\\\"undefined\\\"!=typeof
SharedArrayBuffer&&(\\\"undefined\\\"!=typeof MessageChannel&&(new
MessageChannel).port1.postMessage(new SharedArrayBuffer(1)),WebAssembly.validate(new
Uint8Array([0,97,115,109,1,0,0,0,1,4,1,96,0,0,3,2,1,0,5,4,1,3,1,1,10,11,1,9,0,65,0,254,16,2,0,26,11])))}catch(e){ret
urn!1}}(),o=a&&function(){try{return WebAssembly.validate(new
Uint8Array([0,97,115,109,1,0,0,0,1,4,1,96,0,0,3,2,1,0,10,9,1,7,0,65,0,253,15,26,11]))}catch(e){return!1}}(),s=\\\"str
ing\\\"==typeof e.wasmPaths?e.wasmPaths:void 0,b=g(!1,i),y=g(o,i),v=\\\"object\\\"==typeof
e.wasmPaths?e.wasmPaths[y]:void 0,_=!1,w=[],t>0&&w.push(new
Promise((function(e){setTimeout((function(){_=!0,e()}),t)}))),w.push(new Promise((function(e,t){var
r=i?f.default:p.default,a={locateFile:function(e,t){return e.endsWith(\\\".worker.js\\\")&&\\\"undefined\\\"!=typeof
Blob?URL.createObjectURL(new
Blob([n(118)],{type:\\\"text/javascript\\\"})):e===b?null!=v?v:(null!=s?s:t)+y:t+e}};if(i)if(\\\"undefined\\\"==typeof
Blob)a.mainScriptUrlOrBlob=l.join(\\\"/\\\",\\\"ort-wasm-threaded.js\\\");else{var o=\\\"var
ortWasmThreaded=(function(){var _scriptDir;return
\\\"+f.default.toString()+\\\"})();\\\";a.mainScriptUrlOrBlob=new
Blob([o],{type:\\\"text/javascript\\\"})}r(a).then((function(t){m=!1,d=!0,c=t,e()}),(function(e){m=!1,h=!0,t(e)}))}))
,[4,Promise.race(w)];case 1:if(u.sent(),_)throw new Error(\\\"WebAssembly backend initializing failed due to
timeout: \\\"+t+\\\"ms\\\");return[2]}}))}))},t.getInstance=function(){if(d&&c)return c;throw new
Error(\\\"WebAssembly is not initialized yet.\\\")},t.dispose=function(){var
e;!d||m||h||(m=!0,null===(e=c.PThread)||void 0===e||e.terminateAllThreads(),c=void
0,m=!1,d=!1,h=!0)}},384:function(){},993:function(){},908:function(){},953:function(){},925:function(){},449:fu
nction(){}},t={};function n(r){var a=t[r];if(void 0!==a)return a.exports;var i=t[r]={exports:{}};return
e[r].call(i.exports,i,i.exports,n),i.exports}n.g=function(){if(\\\"object\\\"==typeof globalThis)return
globalThis;try{return this||new Function(\\\"return this\\\")()}catch(e){if(\\\"object\\\"==typeof window)return
window}}(),function(){\\\"use strict\\\";var
e=n(349),t=n(361);self.onmessage=function(n){switch(n.data.type){case\\\"init-
wasm\\\":t.initializeWebAssembly(n.data.in).then((function(){return postMessage({type:\\\"init-
wasm\\\"})}),(function(e){return postMessage({type:\\\"init-wasm\\\",err:e})}));break;case\\\"init-ort\\\":try{var
r=n.data.in,a=r.numThreads,i=r.loggingLevel;e.initOrt(a,i),postMessage({type:\\\"init-
ort\\\"})}catch(e){postMessage({type:\\\"init-ort\\\",err:e})}break;case\\\"create\\\":try{var
o=n.data.in,u=o.model,s=o.options,c=e.createSession(u,s);postMessage({type:\\\"create\\\",out:c})}catch(e){postMe
ssage({type:\\\"create\\\",err:e})}break;case\\\"release\\\":try{var
l=n.data.in;e.releaseSession(l),postMessage({type:\\\"release\\\"})}catch(e){postMessage({type:\\\"release\\\",err:e})
}break;case\\\"run\\\":try{var
f=n.data.in,p=f.sessionId,d=f.inputIndices,m=f.inputs,h=f.outputIndices,g=(s=f.options,e.run(p,d,m,h,s));postMessa
ge({type:\\\"run\\\",out:g},e.extractTransferableBuffers(g))}catch(e){postMessage({type:\\\"run\\\",err:e})}break;cas
e\\\"end-profiling\\\":try{l=n.data.in,e.endProfiling(l),postMessage({type:\\\"end-
profiling\\\"})}catch(e){postMessage({type:\\\"end-profiling\\\",err:e})}}}}()}();\\n\", \"Worker\", undefined,
undefined);\n}\n","\"use strict\";\n\n/* eslint-env browser */\n\n/* eslint-disable no-undef, no-use-before-define,
new-cap */\nmodule.exports = function (content, workerConstructor, workerOptions, url) {\n  var globalScope = self
|| window;\n\n  try {\n    try {\n      var blob;\n\n      try {\n        // New API\n        blob = new
globalScope.Blob([content]);\n      } catch (e) {\n        // BlobBuilder = Deprecated, but widely implemented\n
```

var BlobBuilder = globalScope.BlobBuilder || globalScope.WebKitBlobBuilder || globalScope.MozBlobBuilder || globalScope.MSBlobBuilder;\n   blob = new BlobBuilder();\n   blob.append(content);\n   blob = blob.getBlob();\n   }\n\n   var URL = globalScope.URL || globalScope.webkitURL;\n   var objectURL = URL.createObjectURL(blob);\n   var worker = new globalScope[workerConstructor](objectURL, workerOptions);\n   URL.revokeObjectURL(objectURL);\n   return worker;\n   } catch (e) {\n   return new globalScope[workerConstructor](\"data:application/javascript,\".concat(encodeURIComponent(content)), workerOptions);\n   }\n } catch (e) {\n   if (!url) {\n   throw Error(\"Inline worker is not supported\");\n   }\n\n   return new globalScope[workerConstructor](url, workerOptions);\n }\n};","// The module cache\nvar __webpack_module_cache__ = {};\n\n// The require function\nfunction __webpack_require__(moduleId) {\n\t// Check if module is in cache\n\tvar cachedModule = __webpack_module_cache__[moduleId];\n\tif (cachedModule !== undefined) {\n\t\treturn cachedModule.exports;\n\t}\n\t// Create a new module (and put it into the cache)\n\tvar module = __webpack_module_cache__[moduleId] = {\n\t\t// no module.id needed\n\t\t// no module.loaded needed\n\t\texports: {}\n\t};\n\n\t// Execute the module function\n\t__webpack_modules__[moduleId].call(module.exports, module, module.exports, __webpack_require__);\n\n\t// Return the exports of the module\n\treturn module.exports;\n}\n\n","// getDefaultExport function for compatibility with non-harmony modules\n__webpack_require__.n = function(module) {\n\tvar getter = module && module.__esModule ?\n\t\tfunction() { return module['default']; } :\n\t\tfunction() { return module; };\n\t__webpack_require__.d(getter, { a: getter });\n\treturn getter;\n};","// define getter functions for harmony exports\n__webpack_require__.d = function(exports, definition) {\n\tfor(var key in definition) {\n\t\tif(__webpack_require__.o(definition, key) && !__webpack_require__.o(exports, key)) {\n\t\t\tObject.defineProperty(exports, key, { enumerable: true, get: definition[key] });\n\t\t}\n\t}\n};","__webpack_require__.g = (function() {\n\tif (typeof globalThis === 'object') return globalThis;\n\ttry {\n\t\treturn this || new Function('return this')();\n\t} catch (e) {\n\t\tif (typeof window === 'object') return window;\n\t}\n})();","__webpack_require__.o = function(obj, prop) { return Object.prototype.hasOwnProperty.call(obj, prop); }","// define __esModule on exports\n__webpack_require__.r = function(exports) {\n\tif(typeof Symbol !== 'undefined' && Symbol.toStringTag) {\n\t\tObject.defineProperty(exports, Symbol.toStringTag, { value: 'Module' });\n\t}\n\tObject.defineProperty(exports, '__esModule', { value: true });\n};","// startup\n// Load entry module and return exports\n// This entry module is referenced by other modules so it can't be inlined\nvar __webpack_exports__ = __webpack_require__(6018);\n"],"sourceRoot":""}

Found in path(s):
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/dist/ort.min.js.map
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* ONNX Runtime Web v1.9.0
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Found in path(s):
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/dist/ort-web.js
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/dist/ort.es6.js
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/dist/ort-web.es6.js
* /opt/cola/permits/1284063477_1646773394.53/0/onnxruntime-web-1-9-0-tgz/package/dist/ort.js

1.3 ladon-ts 2.6.3

1.3.1 Available under license :

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* WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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* =============================================================================
*/
```

Found in path(s):
* /opt/cola/permits/1283997322_1646780024.54/0/ladon-ts-2-6-3-tar-gz/ladon-ts-2.6.3/example/style.css

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```
/*!
* ONNX Runtime Web v1.9.0
* Copyright (c) Microsoft Corporation. All rights reserved.
* Licensed under the MIT License.
*/
```

Found in path(s):
* /opt/cola/permits/1283997322_1646780024.54/0/ladon-ts-2-6-3-tar-gz/ladon-ts-2.6.3/example/wasm/ort-wasm-threaded.js
* /opt/cola/permits/1283997322_1646780024.54/0/ladon-ts-2-6-3-tar-gz/ladon-ts-2.6.3/example/wasm/ort-wasm-threaded.worker.js

1.4 libcxx 6599cac0965be8e5a835ab7a5684bbef033d5ad0

1.4.1 Available under license :

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===

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Christopher Seymour <chris.j.seymour@hotmail.com>
David Coeurjolly <david.coeurjolly@liris.cnrs.fr>
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Eugene Zhuk <eugene.zhuk@gmail.com>
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Paul Redmond <paul.redmond@gmail.com>
Pierre Phaneuf <pphaneuf@google.com>
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Yusuke Suzuki <utatane.tea@gmail.com>
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