OPTIX API REFERENCE

v3.7

API Reference Manual

1 OptiX Components

An extensive description of OptiX framework components and their features can be found in the document *OptiX_Programming_Guide.pdf* shipped with the SDK.

Components API Reference

OptiX - a scalable framework for building ray tracing applications.

See OptiX API Reference for details .

OptiXpp - C++ wrapper around OptiX objects and handling functions.

See OptiXpp wrapper for details .

OptiXu - simple API for performing raytracing queries using OptiX or the CPU. Also includes the rtuTraversal API subset for ray/triangle intersection.

See CUDA C Reference and rtu API for details .

OptiX Prime - high performance API for intersecting a set of rays against a set of triangles.

See OptiX Prime API Reference for details .

OptiX Prime++ - C++ wrapper around OptiX Prime objects and handling functions.

See OptiX Prime++ wrapper for details .

2 Module Documentation

2.1 OptiX API Reference

2.1.1 Detailed Description

OptiX API functions.

Modules

- Context handling functions
- GeometryGroup handling functions
- GroupNode functions
- SelectorNode functions
- TransformNode functions
- Acceleration functions
- GeometryInstance functions
- Geometry functions
- Material functions
- Program functions
- Buffer functions
- TextureSampler functions
- Variable functions
- Context-free functions
- CUDA C Reference
- OptiXpp wrapper
- rtu API

2.2 Context handling functions

2.2.1 Detailed Description

Functions related to an OptiX context.

Modules

- rtContextLaunch functions

Functions

- RTresult RTAPI rtContextSetD3D10Device (RTcontext context, ID3D10Device ∗device)
- RTresult RTAPI rtContextSetD3D11Device (RTcontext context, ID3D11Device ∗device)
- RTresult RTAPI rtContextSetD3D9Device (RTcontext context, IDirect3DDevice9 ∗device)
- RTresult RTAPI rtContextCreate (RTcontext ∗context)
- RTresult RTAPI rtContextDestroy (RTcontext context)
- RTresult RTAPI rtContextValidate (RTcontext context)
- void RTAPI rtContextGetErrorString (RTcontext context, RTresult code, const char ∗∗return_string)
- RTresult RTAPI rtContextSetAttribute (RTcontext context, RTcontextattribute attrib, RTsize size, void ∗p)
- RTresult RTAPI rtContextGetAttribute (RTcontext context, RTcontextattribute attrib, RTsize size, void ∗p)
- RTresult RTAPI rtContextSetDevices (RTcontext context, unsigned int count, const int ∗devices)
- RTresult RTAPI rtContextGetDevices (RTcontext context, int ∗devices)
- RTresult RTAPI rtContextGetDeviceCount (RTcontext context, unsigned int ∗count)
- RTresult RTAPI rtContextSetStackSize (RTcontext context, RTsize stack_size_bytes)
- RTresult RTAPI rtContextGetStackSize (RTcontext context, RTsize ∗stack_size_bytes)
- RTresult RTAPI rtContextSetTimeoutCallback (RTcontext context, RTtimeoutcallback callback, double min_polling_seconds)
- RTresult RTAPI rtContextSetEntryPointCount (RTcontext context, unsigned int num_entry_points)
- RTresult RTAPI rtContextGetEntryPointCount (RTcontext context, unsigned int ∗num_entry_points)
- RTresult RTAPI rtContextSetRayGenerationProgram (RTcontext context, unsigned int entry_point_index, RTprogram program)
- RTresult RTAPI rtContextGetRayGenerationProgram (RTcontext context, unsigned int entry_point_index, RTprogram ∗program)
- RTresult RTAPI rtContextSetExceptionProgram (RTcontext context, unsigned int entry_point_index, RTprogram program)
- RTresult RTAPI rtContextGetExceptionProgram (RTcontext context, unsigned int entry_point_index, RTprogram ∗program)
- RTresult RTAPI rtContextSetExceptionEnabled (RTcontext context, RTexception exception, int enabled)
- RTresult RTAPI rtContextGetExceptionEnabled (RTcontext context, RTexception exception, int ∗enabled)
- RTresult RTAPI rtContextSetRayTypeCount (RTcontext context, unsigned int num_ray_types)
- RTresult RTAPI rtContextGetRayTypeCount (RTcontext context, unsigned int ∗num_ray_types)
- RTresult RTAPI rtContextSetMissProgram (RTcontext context, unsigned int ray_type_index, RTprogram program)
- RTresult RTAPI rtContextGetMissProgram (RTcontext context, unsigned int ray_type_index, RTprogram ∗program)
- RTresult RTAPI rtContextGetTextureSamplerFromId (RTcontext context, int sampler_id, RTtexturesampler ∗sampler)
- RTresult RTAPI rtContextCompile (RTcontext context)
- RTresult RTAPI rtContextGetRunningState (RTcontext context, int ∗running)
- RTresult RTAPI rtContextSetPrintEnabled (RTcontext context, int enabled)
- RTresult RTAPI rtContextGetPrintEnabled (RTcontext context, int ∗enabled)
- RTresult RTAPI rtContextSetPrintBufferSize (RTcontext context, RTsize buffer_size_bytes)
- RTresult RTAPI rtContextGetPrintBufferSize (RTcontext context, RTsize ∗buffer_size_bytes)

- RTresult RTAPI rtContextSetPrintLaunchIndex (RTcontext context, int x, int y, int z)
- RTresult RTAPI rtContextGetPrintLaunchIndex (RTcontext context, int ∗x, int ∗y, int ∗z)
- RTresult RTAPI rtContextDeclareVariable (RTcontext context, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtContextQueryVariable (RTcontext context, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtContextRemoveVariable (RTcontext context, RTvariable v)
- RTresult RTAPI rtContextGetVariableCount (RTcontext context, unsigned int ∗count)
- RTresult RTAPI rtContextGetVariable (RTcontext context, unsigned int index, RTvariable ∗v)

2.2.2 Function Documentation

2.2.2.1 RTresult RTAPI rtContextCompile (RTcontext *context*)

Compiles a context object.

Description

rtContextCompile creates a final computation kernel from the given context's programs and scene hierarchy. This kernel will be executed upon subsequent invocations of rtContextLaunch.

Calling rtContextCompile is not strictly necessary since any changes to the scene specification or programs will cause an internal compilation upon the next rtContextLaunch functions call. rtContextCompile allows the application to control when the compilation work occurs.

Conversely, if no changes to the scene specification or programs have occurred since the last compilation, rtContextCompile and rtContextLaunch will not perform a recompilation.

Parameters

`in`	*context*	The context to be compiled

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_INVALID_SOURCE

History

rtContextCompile was introduced in OptiX 1.0.

See also rtContextLaunch functions

2.2.2.2 RTresult RTAPI rtContextCreate (RTcontext ∗ *context*)

Creates a new context object.

Description

rtContextCreate allocates and returns a handle to a new context object. Returns RT_ERROR_INVALID_VALUE if passed a *NULL* pointer.

Parameters

`out`	*context*	Handle to context for return value

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_NO_DEVICE

- RT_ERROR_INVALID_VALUE

History

rtContextCreate was introduced in OptiX 1.0.

See also

2.2.2.3 RTresult RTAPI rtContextDeclareVariable (RTcontext *context,* const char ∗ *name,* RTvariable ∗ *v*)

Declares a new named variable associated with this context.

Description

rtContextDeclareVariable - Declares a new variable named *name* and associated with this context. Only a single variable of a given name can exist for a given context and any attempt to create multiple variables with the same name will cause a failure with a return value of RT_ERROR_VARIABLE_REDECLARED. Returns RT_ERROR_INVALID_VALUE if passed a *NULL* pointer. Return RT_ERROR_ILLEGAL_SYMBOL if *name* is not syntactically valid.

Parameters

`in`	*context*	The context node to which the variable will be attached
`in`	*name*	The name that identifies the variable to be queried
`out`	*v*	Pointer to variable handle used to return the new object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_VARIABLE_REDECLARED

History

rtContextDeclareVariable was introduced in OptiX 1.0.

See also rtGeometryDeclareVariable, rtGeometryInstanceDeclareVariable, rtMaterialDeclareVariable, rtProgramDeclareVariable, rtSelectorDeclareVariable, rtContextGetVariable, rtContextGetVariableCount, rtContextQueryVariable, rtContextRemoveVariable

2.2.2.4 RTresult RTAPI rtContextDestroy (RTcontext *context*)

Destroys a context and frees all associated resources.

Description

rtContextDestroy frees all resources, including OptiX objects, associated with this object. Returns RT_ERROR_INVALID_VALUE if passed a *NULL* context. RT_ERROR_LAUNCH_FAILED may be returned if a previous call to rtContextLaunch failed.

Parameters

`in`	*context*	Handle of the context to destroy

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_LAUNCH_FAILED

History

rtContextDestroy was introduced in OptiX 1.0.

See also rtContextCreate

2.2.2.5 RTresult RTAPI rtContextGetAttribute (RTcontext *context,* RTcontextattribute *attrib,* RTsize *size,* void ∗ *p*)

Returns an attribute specific to an OptiX context.

Description

rtContextGetAttribute returns in *p* the value of the per context attribute specified by *attrib*.

Each attribute can have a different size. The sizes are given in the following list:

- RT_CONTEXT_ATTRIBUTE_MAX_TEXTURE_COUNT sizeof(int)
- RT_CONTEXT_ATTRIBUTE_CPU_NUM_THREADS sizeof(int)
- RT_CONTEXT_ATTRIBUTE_USED_HOST_MEMORY sizeof(RTsize)
- RT_CONTEXT_ATTRIBUTE_GPU_PAGING_ACTIVE sizeof(int)
- RT_CONTEXT_ATTRIBUTE_GPU_PAGING_FORCED_OFF sizeof(int)
- RT_CONTEXT_ATTRIBUTE_AVAILABLE_DEVICE_MEMORY sizeof(RTsize)

RT_CONTEXT_ATTRIBUTE_MAX_TEXTURE_COUNT queries the maximum number of textures handled by OptiX. For OptiX versions below 2.5 this value depends on the number of textures supported by CUDA.

RT_CONTEXT_ATTRIBUTE_CPU_NUM_THREADS queries the number of host CPU threads OptiX can use for various tasks.

RT_CONTEXT_ATTRIBUTE_USED_HOST_MEMORY queries the amount of host memory allocated by OptiX.

RT_CONTEXT_ATTRIBUTE_GPU_PAGING_ACTIVE queries if software paging of device memory has been turned on by the context. The returned value is a boolean, where 1 means that paging is currently active.

RT_CONTEXT_ATTRIBUTE_GPU_PAGING_FORCED_OFF queries if software paging has been prohibited by the user. The returned value is a boolean, where 0 means that OptiX is allowed to activate paging if necessary, 1 means that paging is always off.

RT_CONTEXT_ATTRIBUTE_AVAILABLE_DEVICE_MEMORY queries the amount of free device memory.

Some attributes are used to get per device information. In constrast to rtDeviceGetAttribute, these attributes are determined by the context and are therefore queried through the context. This is done by summing the attribute with the OptiX ordinal number when querying the attribute. The following are per device attributes.

RT_CONTEXT_ATTRIBUTE_AVAILABLE_DEVICE_MEMORY

Parameters

in	*context*	The context object to be queried
in	*attrib*	Attribute to query
in	*size*	Size of the attribute being queried. Parameter *p* must have at least this much memory backing it
out	*p*	Return pointer where the value of the attribute will be copied into. This must point to at least *size* bytes of memory

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE - Can be returned if *size* does not match the proper size of the attribute, if *p* is *NULL*, or if *attribute+ordinal* does not correspond to an OptiX device

History

rtContextGetAttribute was introduced in OptiX 2.0.

See also rtContextGetDeviceCount, rtContextSetAttribute, rtDeviceGetAttribute

2.2.2.6 RTresult RTAPI rtContextGetDeviceCount (RTcontext *context,* unsigned int ∗ *count*)

Query the number of devices currently being used.

Description

rtContextGetDeviceCount - Query the number of devices currently being used.

Parameters

`in`	*context*	The context containing the devices
`out`	*count*	Return parameter for the device count

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

rtContextGetDeviceCount was introduced in OptiX 2.0.

See also rtContextSetDevices, rtContextGetDevices

2.2.2.7 RTresult RTAPI rtContextGetDevices (RTcontext *context,* int ∗ *devices*)

Retrieve a list of hardware devices being used by the kernel.

Description

rtContextGetDevices retrieves a list of hardware devices used during execution of the subsequent trace kernels.

Parameters

`in`	*context*	The context to which the hardware list is applied
`out`	*devices*	Return parameter for the list of devices. The memory must be able to hold entries numbering least the number of devices as returned by rtContextGetDeviceCount

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

rtContextGetDevices was introduced in OptiX 2.0.

See also rtContextSetDevices, rtContextGetDeviceCount

2.2.2.8 RTresult RTAPI rtContextGetEntryPointCount (RTcontext *context,* unsigned int ∗ *num_entry_points*)

Query the number of entry points for this context.

Description

rtContextGetEntryPointCount passes back the number of entry points associated with this context in *num_entry_points*. Returns RT_ERROR_INVALID_VALUE if passed a *NULL* pointer.

Parameters

in	*context*	The context node to be queried
out	*num_entry_points*	Return parameter for passing back the entry point count

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextGetEntryPointCount was introduced in OptiX 1.0.

See also rtContextSetEntryPointCount

2.2.2.9 void RTAPI rtContextGetErrorString (**RTcontext** *context,* **RTresult** *code,* const char $**$ *return_string*)

Returns the error string associated with a given error.

Description

rtContextGetErrorString return a descriptive string given an error code. If *context* is valid and additional information is available from the last OptiX failure, it will be appended to the generic error code description. *return_string* will be set to point to this string. The memory *return_string* points to will be valid until the next API call that returns a string.

Parameters

in	*context*	The context object to be queried, or *NULL*
in	*code*	The error code to be converted to string
out	*return_string*	The return parameter for the error string

Return values

rtContextGetErrorString does not return a value

History

rtContextGetErrorString was introduced in OptiX 1.0.

See also

2.2.2.10 RTresult RTAPI rtContextGetExceptionEnabled (**RTcontext** *context,* **RTexception** *exception,* int $*$ *enabled*)

Query whether a specified exception is enabled.

Description

rtContextGetExceptionEnabled passes back *1* in the location pointed to by *enabled* if the given exception is enabled, *0* otherwise. *exception* specifies the type of exception to be queried. For a list of available types, see rtContextSetExceptionEnabled. If *exception* is RT_EXCEPTION_ALL, *enabled* is set to *1* only if all possible exceptions are enabled.

Parameters

in	*context*	The context to be queried
in	*exception*	The exception of which to query the state

out	*enabled*	Return parameter to store whether the exception is enabled

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextGetExceptionEnabled was introduced in OptiX 1.1.

See also rtContextSetExceptionEnabled, rtContextSetExceptionProgram, rtContextGetExceptionProgram, rtGetExceptionCode, rtThrow, rtPrintExceptionDetails

2.2.2.11 RTresult RTAPI rtContextGetExceptionProgram (RTcontext *context,* unsigned int *entry_point_index,* RTprogram ∗ *program*)

Queries the exception program associated with the given context and entry point.

Description

rtContextGetExceptionProgram passes back the exception program associated with the given context and entry point. This program is set via rtContextSetExceptionProgram. Returns RT_ERROR_INVALID_VALUE if given an invalid entry point index or *NULL* pointer.

Parameters

in	*context*	The context node associated with the exception program
in	*en-try_point_index*	The entry point index for the desired exception program
out	*program*	Return parameter to store the exception program

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextGetExceptionProgram was introduced in OptiX 1.0.

See also rtContextSetExceptionProgram, rtContextSetEntryPointCount, rtContextSetExceptionEnabled, rtContextGetExceptionEnabled, rtGetExceptionCode, rtThrow, rtPrintExceptionDetails

2.2.2.12 RTresult RTAPI rtContextGetMissProgram (RTcontext *context,* unsigned int *ray_type_index,* RTprogram ∗ *program*)

Queries the miss program associated with the given context and ray type.

Description

rtContextGetMissProgram passes back the miss program associated with the given context and ray type. This program is set via rtContextSetMissProgram. Returns RT_ERROR_INVALID_VALUE if given a *NULL* pointer or *ray_type_index* is outside of the range [*0*, rtContextGetRayTypeCount *-1*].

Parameters

in	*context*	The context node associated with the miss program
in	*ray_type_index*	The ray type index for the desired miss program
out	*program*	Return parameter to store the miss program

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextGetMissProgram was introduced in OptiX 1.0.

See also rtContextSetMissProgram, rtContextGetRayTypeCount

2.2.2.13 RTresult RTAPI rtContextGetPrintBufferSize (RTcontext *context,* RTsize ∗ *buffer_size_bytes*)

Get the current size of the print buffer.

Description

rtContextGetPrintBufferSize is used to query the buffer size available to hold data generated by rtPrintf functions. Returns RT_ERROR_INVALID_VALUE if passed a *NULL* pointer.

Parameters

in	*context*	The context from which to query the print buffer size
out	*buffer_size_bytes*	The returned print buffer size in bytes

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextGetPrintBufferSize was introduced in OptiX 1.0.

See also rtPrintf functions, rtContextSetPrintEnabled, rtContextGetPrintEnabled, rtContextSetPrintBufferSize, rt-ContextSetPrintLaunchIndex, rtContextGetPrintLaunchIndex

2.2.2.14 RTresult RTAPI rtContextGetPrintEnabled (RTcontext *context,* int ∗ *enabled*)

Query whether text printing from programs is enabled.

Description

rtContextGetPrintEnabled passes back *1* if text printing from programs through rtPrintf functions is currently enabled for this context; *0* otherwise. Returns RT_ERROR_INVALID_VALUE if passed a *NULL* pointer.

Parameters

in	*context*	The context to be queried
out	*enabled*	Return parameter to store whether printing is enabled

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextGetPrintEnabled was introduced in OptiX 1.0.

See also rtPrintf functions, rtContextSetPrintEnabled, rtContextSetPrintBufferSize, rtContextGetPrintBufferSize, rtContextSetPrintLaunchIndex, rtContextGetPrintLaunchIndex

2.2.2.15 RTresult RTAPI rtContextGetPrintLaunchIndex (RTcontext *context*, int ∗ *x*, int ∗ *y*, int ∗ *z*)

Gets the active print launch index.

Description

rtContextGetPrintLaunchIndex is used to query for which launch indices rtPrintf functions generates output. The initial value of (x,y,z) is (*-1*,*-1*,*-1*), which generates output for all indices.

Parameters

in	*context*	The context from which to query the print launch index
out	*x*	Returns the launch index in the x dimension to which the output of rtPrintf functions invocations is limited. Will not be written to if a *NULL* pointer is passed
out	*y*	Returns the launch index in the y dimension to which the output of rtPrintf functions invocations is limited. Will not be written to if a *NULL* pointer is passed
out	*z*	Returns the launch index in the z dimension to which the output of rtPrintf functions invocations is limited. Will not be written to if a *NULL* pointer is passed

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextGetPrintLaunchIndex was introduced in OptiX 1.0.

See also rtPrintf functions, rtContextGetPrintEnabled, rtContextSetPrintEnabled, rtContextSetPrintBufferSize, rtContextGetPrintBufferSize, rtContextSetPrintLaunchIndex

2.2.2.16 RTresult RTAPI rtContextGetRayGenerationProgram (RTcontext *context*, unsigned int *entry_point_index*, RTprogram ∗ *program*)

Queries the ray generation program associated with the given context and entry point.

Description

rtContextGetRayGenerationProgram passes back the ray generation program associated with the given context and entry point. This program is set via rtContextSetRayGenerationProgram. Returns RT_ERROR_INVALID_VALUE if given an invalid entry point index or *NULL* pointer.

Parameters

in	*context*	The context node associated with the ray generation program
in	*entry_point_index*	The entry point index for the desired ray generation program
out	*program*	Return parameter to store the ray generation program

Return values

Relevant return values:

- RT_SUCCESS

- RT_ERROR_INVALID_VALUE

History

rtContextGetRayGenerationProgram was introduced in OptiX 1.0.

See also rtContextSetRayGenerationProgram

2.2.2.17 RTresult RTAPI rtContextGetRayTypeCount (RTcontext *context*, unsigned int ∗ *num_ray_types*)

Query the number of ray types associated with this context.

Description

rtContextGetRayTypeCount passes back the number of entry points associated with this context in *num_ray_types*. Returns RT_ERROR_INVALID_VALUE if passed a *NULL* pointer.

Parameters

in	*context*	The context node to be queried
out	*num_ray_types*	Return parameter to store the number of ray types

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextGetRayTypeCount was introduced in OptiX 1.0.

See also rtContextSetRayTypeCount

2.2.2.18 RTresult RTAPI rtContextGetRunningState (RTcontext *context*, int ∗ *running*)

Query whether the given context is currently running.

Description

This function is currently unimplemented and it is provided as a placeholder for a future implementation.

Parameters

in	*context*	The context node to be queried
out	*running*	Return parameter to store the running state

Return values

Since unimplemented, this function will always throw an assertion failure.

History

rtContextGetRunningState was introduced in OptiX 1.0.

See also rtContextLaunch1D, rtContextLaunch2D, rtContextLaunch3D

2.2.2.19 RTresult RTAPI rtContextGetStackSize (RTcontext *context*, RTsize ∗ *stack_size_bytes*)

Query the stack size for this context.

Description

rtContextGetStackSize passes back the stack size associated with this context in *stack_size_bytes*. Returns RT_ERROR_INVALID_VALUE if passed a *NULL* pointer.

Parameters

in	*context*	The context node to be queried
out	*stack_size_bytes*	Return parameter to store the size of the stack

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextGetStackSize was introduced in OptiX 1.0.

See also rtContextSetStackSize

2.2.2.20 RTresult RTAPI rtContextGetTextureSamplerFromId (RTcontext *context,* int *sampler_id,* RTtexturesampler ∗ *sampler*)

Gets an RTtexturesampler corresponding to the texture id.

Description

rtTextureSamplerGetId returns a handle to the texture sampler in ∗*sampler* corresponding to the *sampler_id* supplied. If *sampler_id* does not map to a valid texture handle, ∗*sampler* is *NULL* or if *context* is invalid, the call will return RT_ERROR_INVALID_VALUE.

Parameters

in	*context*	The context the sampler should be originated from
in	*sampler_id*	The ID of the sampler to query
out	*sampler*	The return handle for the sampler object corresponding to the sampler_id

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextGetTextureSamplerFromId was introduced in OptiX 3.5.

See also rtTextureSamplerGetId

2.2.2.21 RTresult RTAPI rtContextGetVariable (RTcontext *context,* unsigned int *index,* RTvariable ∗ *v*)

Queries an indexed variable associated with this context.

Description

rtContextGetVariable queries the variable at position *index* in the variable array from *context* and stores the result in the parameter *v*. A variable has to be declared first with rtContextDeclareVariable and *index* has to be in the range [*0*, rtContextGetVariableCount *-1*].

Parameters

in	*context*	The context node to be queried for an indexed variable
in	*index*	The index that identifies the variable to be queried

out	*v*	Return value to store the queried variable

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextGetVariable was introduced in OptiX 1.0.

See also rtGeometryGetVariable, rtGeometryInstanceGetVariable, rtMaterialGetVariable, rtProgramGetVariable, rtSelectorGetVariable, rtContextDeclareVariable, rtContextGetVariableCount, rtContextQueryVariable, rtContextRemoveVariable

2.2.2.22 RTresult RTAPI rtContextGetVariableCount (RTcontext *context*, unsigned int ∗ *count*)

Returns the number of variables associated with this context.

Description

rtContextGetVariableCount returns the number of variables that are currently attached to *context*. Returns RT_ERROR_INVALID_VALUE if passed a *NULL* pointer.

Parameters

in	*context*	The context to be queried for number of attached variables
out	*count*	Return parameter to store the number of variables

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextGetVariableCount was introduced in OptiX 1.0.

See also rtGeometryGetVariableCount, rtGeometryInstanceGetVariableCount, rtMaterialGetVariableCount, rtProgramGetVariableCount, rtSelectorGetVariable, rtContextDeclareVariable, rtContextGetVariable, rtContextQueryVariable, rtContextRemoveVariable

2.2.2.23 RTresult RTAPI rtContextQueryVariable (RTcontext *context*, const char ∗ *name*, RTvariable ∗ *v*)

Returns a named variable associated with this context.

Description

rtContextQueryVariable queries a variable identified by the string *name* from *context* and stores the result in the parameter *v*. A variable has to be declared first with rtContextDeclareVariable before it can be queried. The return parameter *v* will be set to *0* if no variable exists with the given name. RT_ERROR_INVALID_VALUE will be returned if *name* is *NULL*.

Parameters

in	*context*	The context node to query a variable from
in	*name*	The name that identifies the variable to be queried

out	*v*	Return value to store the queried variable

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextQueryVariable was introduced in OptiX 1.0.

See also rtGeometryQueryVariable, rtGeometryInstanceQueryVariable, rtMaterialQueryVariable, rtProgramQuery-Variable, rtSelectorQueryVariable, rtContextDeclareVariable, rtContextGetVariableCount, rtContextGetVariable, rt-ContextRemoveVariable

2.2.2.24 RTresult RTAPI rtContextRemoveVariable (RTcontext *context,* RTvariable *v*)

Removes a variable from the given context.

Description

rtContextRemoveVariable removes variable *v* from *context* if present. Returns RT_ERROR_VARIABLE_NOT_FOUND if the variable is not attached to this context. Returns RT_ERROR_INVALID_VALUE if passed an invalid variable.

Parameters

in	*context*	The context node from which to remove a variable
in	*v*	The variable to be removed

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_VARIABLE_NOT_FOUND

History

rtContextRemoveVariable was introduced in OptiX 1.0.

See also rtGeometryRemoveVariable, rtGeometryInstanceRemoveVariable, rtMaterialRemoveVariable, rtProgram-RemoveVariable, rtSelectorRemoveVariable, rtContextDeclareVariable, rtContextGetVariable, rtContextGetVari-ableCount, rtContextQueryVariable,

2.2.2.25 RTresult RTAPI rtContextSetAttribute (RTcontext *context,* RTcontextattribute *attrib,* RTsize *size,* void $*$ *p*)

Set an attribute specific to an OptiX context.

Description

rtContextSetAttribute sets *p* as the value of the per context attribute specified by *attrib*.

Each attribute can have a different size. The sizes are given in the following list:

- RT_CONTEXT_ATTRIBUTE_CPU_NUM_THREADS sizeof(int)
- RT_CONTEXT_ATTRIBUTE_GPU_PAGING_FORCED_OFF sizeof(int)

RT_CONTEXT_ATTRIBUTE_CPU_NUM_THREADS sets the number of host CPU threads OptiX can use for various tasks.

RT_CONTEXT_ATTRIBUTE_GPU_PAGING_FORCED_OFF prohibits software paging of device memory. A value of 0 means that OptiX is allowed to activate paging if necessary, 1 means that paging is always off. Note that currently paging cannot be disabled once it has been activated.

Parameters

in	*context*	The context object to be modified
in	*attrib*	Attribute to set
in	*size*	Size of the attribute being set
in	*p*	Pointer to where the value of the attribute will be copied from. This must point to at least *size* bytes of memory

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE - Can be returned if *size* does not match the proper size of the attribute, or if *p* is *NULL*

History

rtContextSetAttribute was introduced in OptiX 2.5.

See also rtContextGetAttribute

2.2.2.26 RTresult RTAPI rtContextSetD3D10Device (RTcontext *context*, ID3D10Device ∗ *device*)

Binds a D3D10 device to a context and enables interop.

Description

rtContextSetD3D10Device binds *device* to *context* and enables D3D10 interop capabilities in *context*. This function must be executed once for *context* before any call to rtBufferCreateFromD3D10Resource or rtTextureSamplerCreateFromD3D10Resource can take place. A context can only be bound to one device. Once *device* is bound to *context*, the binding is immutable and remains upon destruction of *context*.

Parameters

in	*context*	The context to bind the device with
in	*device*	The D3D10 device to be used for interop with the associated context

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT

History

rtContextSetD3D10Device was introduced in OptiX 2.0.

See also rtBufferCreateFromD3D10Resource, rtTextureSamplerCreateFromD3D10Resource

2.2.2.27 RTresult RTAPI rtContextSetD3D11Device (RTcontext *context*, ID3D11Device ∗ *device*)

Binds a D3D11 device to a context and enables interop.

Description

rtContextSetD3D11Device binds *device* to *context* and enables D3D11 interop capabilities in *context*. This function must be executed once for *context* before any call to rtBufferCreateFromD3D11Resource or rtTextureSamplerCreateFromD3D11Resource can take place. A context can only be bound to one device. Once *device* is bound to *context*, the binding is immutable and remains upon destruction of *context*.

Parameters

in	*context*	The context to bind the device with
in	*device*	The D3D11 device to be used for interop with the associated context

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT

History

rtContextSetD3D11Device was introduced in OptiX 2.0.

See also rtBufferCreateFromD3D11Resource, rtTextureSamplerCreateFromD3D11Resource

2.2.2.28 RTresult RTAPI rtContextSetD3D9Device (RTcontext *context,* IDirect3DDevice9 ∗ *device*)

Binds a D3D9 device to a context and enables interop.

Description

rtContextSetD3D9Device binds *device* to *context* and enables D3D9 interop capabilities in *context*. This function must be executed once for *context* before any call to rtBufferCreateFromD3D9Resource or rtTextureSamplerCreateFromD3D9Resource can take place. A context can only be bound to one device. Once *device* is bound to *context*, the binding is immutable and remains upon destruction of *context*.

Parameters

in	*context*	The context to bind the device with
in	*device*	The D3D9 device to be used for interop with the associated context

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT

History

rtContextSetD3D9Device was introduced in OptiX 2.0.

See also rtBufferCreateFromD3D9Resource, rtTextureSamplerCreateFromD3D9Resource

2.2.2.29 RTresult RTAPI rtContextSetDevices (RTcontext *context,* unsigned int *count,* const int ∗ *devices*)

Specify a list of hardware devices to be used by the kernel.

Description

rtContextSetDevices specifies a list of hardware devices to be used during execution of the subsequent trace kernels.

Parameters

in	*context*	The context to which the hardware list is applied

in	*count*	The number of devices in the list
in	*devices*	The list of devices

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_NO_DEVICE
- RT_ERROR_INVALID_DEVICE

History

rtContextSetDevices was introduced in OptiX 1.0.

See also rtContextGetDevices, rtContextGetDeviceCount

2.2.2.30 RTresult RTAPI rtContextSetEntryPointCount (RTcontext *context,* unsigned int *num_entry_points*)

Set the number of entry points for a given context.

Description

rtContextSetEntryPointCount sets the number of entry points associated with the given context to *num_entry_points*.

Parameters

in	*context*	The context to be modified
in	*num_entry_points*	The number of entry points to use

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextSetEntryPointCount was introduced in OptiX 1.0.

See also rtContextGetEntryPointCount

2.2.2.31 RTresult RTAPI rtContextSetExceptionEnabled (RTcontext *context,* RTexception *exception,* int *enabled*)

Enable or disable an exception.

Description

rtContextSetExceptionEnabled is used to enable or disable specific exceptions. If an exception is enabled, the exception condition is checked for at runtime, and the exception program is invoked if the condition is met. The exception program can query the type of the caught exception by calling rtGetExceptionCode. *exception* may take one of the following values:

- RT_EXCEPTION_TEXTURE_ID_INVALID
- RT_EXCEPTION_BUFFER_ID_INVALID
- RT_EXCEPTION_INDEX_OUT_OF_BOUNDS
- RT_EXCEPTION_STACK_OVERFLOW
- RT_EXCEPTION_BUFFER_INDEX_OUT_OF_BOUNDS
- RT_EXCEPTION_INVALID_RAY

- RT_EXCEPTION_INTERNAL_ERROR
- RT_EXCEPTION_USER
- RT_EXCEPTION_ALL

RT_EXCEPTION_TEXTURE_ID_INVALID verifies that every access of a texture id is valid, including use of RT_TEXTURE_ID_NULL and IDs out of bounds.

RT_EXCEPTION_BUFFER_ID_INVALID verifies that every access of a buffer id is valid, including use of RT_BUFFER_ID_NULL and IDs out of bounds.

RT_EXCEPTION_INDEX_OUT_OF_BOUNDS checks that rtIntersectChild and rtReportIntersection are called with a valid index.

RT_EXCEPTION_STACK_OVERFLOW checks the runtime stack against overflow. The most common cause for an overflow is a too deep rtTrace recursion tree.

RT_EXCEPTION_BUFFER_INDEX_OUT_OF_BOUNDS checks every read and write access to rtBuffer objects to be within valid bounds.

RT_EXCEPTION_INVALID_RAY checks the each ray's origin and direction values against *NaNs* and *infinity* values.

RT_EXCEPTION_INTERNAL_ERROR indicates an unexpected internal error in the runtime.

RT_EXCEPTION_USER is used to enable or disable all user-defined exceptions. The reserved range of exception codes for user-defined exceptions starts at RT_EXCEPTION_USER (*0x400*) and ends at *0xFFFF*. See rtThrow for more information.

RT_EXCEPTION_ALL is a placeholder value which can be used to enable or disable all possible exceptions with a single call to rtContextSetExceptionEnabled.

By default, RT_EXCEPTION_STACK_OVERFLOW is enabled and all other exceptions are disabled.

Parameters

`in`	*context*	The context for which the exception is to be enabled or disabled
`in`	*exception*	The exception which is to be enabled or disabled
`in`	*enabled*	Nonzero to enable the exception, *0* to disable the exception

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextSetExceptionEnabled was introduced in OptiX 1.1.

See also rtContextGetExceptionEnabled, rtContextSetExceptionProgram, rtContextGetExceptionProgram, rtGetExceptionCode, rtThrow, rtPrintExceptionDetails

2.2.2.32 RTresult RTAPI rtContextSetExceptionProgram (RTcontext *context,* unsigned int *entry_point_index,* RTprogram *program*)

Specifies the exception program for a given context entry point.

Description

rtContextSetExceptionProgram sets *context's* exception program at entry point *entry_point_index*. RT_ERROR_INVALID_VALUE is returned if *entry_point_index* is outside of the range [*0*, rtContextGetEntryPointCount *-1*].

Parameters

in	*context*	The context node to which the exception program will be added
in	*entry_point_index*	The entry point the program will be associated with
in	*program*	The exception program

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_TYPE_MISMATCH

History

rtContextSetExceptionProgram was introduced in OptiX 1.0.

See also rtContextGetEntryPointCount, rtContextGetExceptionProgram rtContextSetExceptionEnabled, rtContextGetExceptionEnabled, rtGetExceptionCode, rtThrow, rtPrintExceptionDetails

2.2.2.33 RTresult RTAPI rtContextSetMissProgram (RTcontext *context*, unsigned int *ray_type_index*, RTprogram *program*)

Specifies the miss program for a given context ray type.

Description

rtContextSetMissProgram sets *context's* miss program associated with ray type *ray_type_index*. RT_ERROR_INVALID_VALUE is returned if *ray_type_index* is outside of the range [*0*, rtContextGetRayTypeCount *-1*].

Parameters

in	*context*	The context node to which the miss program will be added
in	*ray_type_index*	The ray type the program will be associated with
in	*program*	The miss program

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_TYPE_MISMATCH

History

rtContextSetMissProgram was introduced in OptiX 1.0.

See also rtContextGetRayTypeCount, rtContextGetMissProgram

2.2.2.34 RTresult RTAPI rtContextSetPrintBufferSize (RTcontext *context*, RTsize *buffer_size_bytes*)

Set the size of the print buffer.

Description

rtContextSetPrintBufferSize is used to set the buffer size available to hold data generated by rtPrintf functions. The default size is 65536 bytes.

Parameters

in	*context*	The context for which to set the print buffer size
in	*buffer_size_bytes*	The print buffer size in bytes

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextSetPrintBufferSize was introduced in OptiX 1.0.

See also rtPrintf functions, rtContextSetPrintEnabled, rtContextGetPrintEnabled, rtContextGetPrintBufferSize, rtContextSetPrintLaunchIndex, rtContextGetPrintLaunchIndex

2.2.2.35 RTresult RTAPI rtContextSetPrintEnabled (RTcontext *context*, int *enabled*)

Enable or disable text printing from programs.

Description

rtContextSetPrintEnabled is used to control whether text printing in programs through rtPrintf functions is currently enabled for this context.

Parameters

in	*context*	The context for which printing is to be enabled or disabled
in	*enabled*	Setting this parameter to a nonzero value enables printing, *0* disables printing

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextSetPrintEnabled was introduced in OptiX 1.0.

See also rtPrintf functions, rtContextGetPrintEnabled, rtContextSetPrintBufferSize, rtContextGetPrintBufferSize, rtContextSetPrintLaunchIndex, rtContextGetPrintLaunchIndex

2.2.2.36 RTresult RTAPI rtContextSetPrintLaunchIndex (RTcontext *context*, int *x*, int *y*, int *z*)

Sets the active launch index to limit text output.

Description

rtContextSetPrintLaunchIndex is used to control for which launch indices rtPrintf functions generates output. The initial value of (x,y,z) is (*-1*,*-1*,*-1*), which generates output for all indices.

Parameters

in	*context*	The context for which to set the print launch index
in	*x*	The launch index in the x dimension to which to limit the output of rtPrintf functions invocations. If set to *-1*, output is generated for all launch indices in the x dimension

in	*y*	The launch index in the y dimension to which to limit the output of rtPrintf functions invocations. If set to *-1*, output is generated for all launch indices in the y dimension
in	*z*	The launch index in the z dimension to which to limit the output of rtPrintf functions invocations. If set to *-1*, output is generated for all launch indices in the z dimension

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextSetPrintLaunchIndex was introduced in OptiX 1.0.

See also rtPrintf functions, rtContextGetPrintEnabled, rtContextSetPrintEnabled, rtContextSetPrintBufferSize, rtContextGetPrintBufferSize, rtContextGetPrintLaunchIndex

2.2.2.37 RTresult RTAPI rtContextSetRayGenerationProgram (RTcontext *context,* unsigned int *entry_point_index,* RTprogram *program*)

Specifies the ray generation program for a given context entry point.

Description

rtContextSetRayGenerationProgram sets *context's* ray generation program at entry point *entry_point_index*. RT_ERROR_INVALID_VALUE is returned if *entry_point_index* is outside of the range [*0*, rtContextGetEntryPointCount *-1*].

Parameters

in	*context*	The context node to which the exception program will be added
in	*entry_point_index*	The entry point the program will be associated with
in	*program*	The ray generation program

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_TYPE_MISMATCH

History

rtContextSetRayGenerationProgram was introduced in OptiX 1.0.

See also rtContextGetEntryPointCount, rtContextGetRayGenerationProgram

2.2.2.38 RTresult RTAPI rtContextSetRayTypeCount (RTcontext *context,* unsigned int *num_ray_types*)

Sets the number of ray types for a given context.

Description

rtContextSetRayTypeCount Sets the number of ray types associated with the given context.

Parameters

in	*context*	The context node
in	*num_ray_types*	The number of ray types to be used

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextSetRayTypeCount was introduced in OptiX 1.0.

See also rtContextGetRayTypeCount

2.2.2.39 RTresult RTAPI rtContextSetStackSize (RTcontext *context,* RTsize *stack_size_bytes*)

Set the stack size for a given context.

Description

rtContextSetStackSize sets the stack size for the given context to *stack_size_bytes* bytes. Returns RT_ERROR_INVALID_VALUE if context is not valid.

Parameters

in	*context*	The context node to be modified
in	*stack_size_bytes*	The desired stack size in bytes

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextSetStackSize was introduced in OptiX 1.0.

See also rtContextGetStackSize

2.2.2.40 RTresult RTAPI rtContextSetTimeoutCallback (RTcontext *context,* RTtimeoutcallback *callback,* double *min_polling_seconds*)

Side timeout callback function.

Description

rtContextSetTimeoutCallback sets an application-side callback function *callback* and a time interval *min_polling_seconds* in seconds. Long-running OptiX API calls such as rtContextCompile and rtContextLaunch functions call the callback function about every *min_polling_seconds* seconds. The core purpose of a timeout callback function is to give the application a chance to do whatever it might need to do frequently, such as handling GUI events.

If the callback function returns true, the API call tries to abort, leaving the context in a clean but unfinished state. Output buffers are left in an unpredictable state. In case an OptiX API call is terminated by a callback function, it returns RT_TIMEOUT_CALLBACK.

As a side effect, timeout functions also help control the OptiX kernel run-time. This can in some cases prevent OptiX kernel launches from running so long that they cause driver timeouts. For example, if *min_polling_seconds* is 0.5 seconds then once the kernel has been running for 0.5 seconds it won't start any new launch indices (calls to a ray generation program). Thus, if the driver's timeout is 2 seconds (the default on Windows), then a launch index may take up to 1.5 seconds without triggering a driver timeout.

RTtimeoutcallback is defined as *int* (∗RTtimeoutcallback)(void).

To unregister a callback function, *callback* needs to be set to *NULL* and *min_polling_seconds* to 0.

Only one timeout callback function can be specified at any time.

Returns RT_ERROR_INVALID_VALUE if *context* is not valid, if *min_polling_seconds* is negative, if *callback* is *NULL* but *min_polling_seconds* is not 0, or if *callback* is not *NULL* but *min_polling_seconds* is 0.

Parameters

in	*context*	The context node to be modified
in	*callback*	The function to be called
in	*min_polling_seconds*	The timeout interval after which the function is called

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextSetTimeoutCallback was introduced in OptiX 2.5.

See also rtContextCompile, rtContextLaunch functions

2.2.2.41 RTresult RTAPI rtContextValidate (RTcontext *context*)

Checks the given context for valid internal state.

Description

rtContextValidate checks the the given context and all of its associated OptiX objects for a valid state. These checks include tests for presence of necessary programs (eg. an intersection program for a geometry node), invalid internal state such as *NULL* children in graph nodes, and presence of variables required by all specified programs. rtContextGetErrorString can be used to retrieve a description of a validation failure.

Parameters

in	*context*	The context to be validated

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_SOURCE

History

rtContextValidate was introduced in OptiX 1.0.

See also rtContextGetErrorString

2.3 rtContextLaunch functions

2.3.1 Detailed Description

Functions designed to launch OptiX ray tracing.

Functions

- RTresult RTAPI rtContextLaunch1D (RTcontext context, unsigned int entry_point_index, RTsize image_width)
- RTresult RTAPI rtContextLaunch2D (RTcontext context, unsigned int entry_point_index, RTsize image_width, RTsize image_height)
- RTresult RTAPI rtContextLaunch3D (RTcontext context, unsigned int entry_point_index, RTsize image_width, RTsize image_height, RTsize image_depth)

2.3.2 Function Documentation

2.3.2.1 RTresult RTAPI rtContextLaunch1D (RTcontext *context,* unsigned int *entry_point_index,* RTsize *image_width*)

Executes the computation kernel for a given context.

Description

rtContextLaunch functions execute the computation kernel associated with the given context. If the context has not yet been compiled, or if the context has been modified since the last compile, rtContextLaunch will recompile the kernel internally. Acceleration structures of the context which are marked dirty will be updated and their dirty flags will be cleared. Similarly, validation will occur if necessary. The ray generation program specified by *entry_point_index* will be invoked once for every element (pixel or voxel) of the computation grid specified by *image_width*, *image_height*, and *image_depth*.

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_INVALID_SOURCE
- RT_ERROR_LAUNCH_FAILED

History

rtContextLaunch was introduced in OptiX 1.0.

See also rtContextGetRunningState, rtContextCompile, rtContextValidate

Parameters

`in`	*context*	The context to be executed
`in`	*entry_point_index*	The initial entry point into kernel
`in`	*image_width*	Width of the computation grid

2.3.2.2 RTresult RTAPI rtContextLaunch2D (RTcontext *context,* unsigned int *entry_point_index,* RTsize *image_width,* RTsize *image_height*)

Parameters

in	*context*	The context to be executed
in	*entry_point_index*	The initial entry point into kernel
in	*image_width*	Width of the computation grid
in	*image_height*	Height of the computation grid

2.3.2.3 RTresult RTAPI rtContextLaunch3D (RTcontext *context,* unsigned int *entry_point_index,* RTsize *image_width,* RTsize *image_height,* RTsize *image_depth*)

Parameters

in	*context*	The context to be executed
in	*entry_point_index*	The initial entry point into kernel
in	*image_width*	Width of the computation grid
in	*image_height*	Height of the computation grid
in	*image_depth*	Depth of the computation grid

2.4 GeometryGroup handling functions

2.4.1 Detailed Description

Functions related to an OptiX Geometry Group node.

Functions

- RTresult RTAPI rtGeometryGroupCreate (RTcontext context, RTgeometrygroup ∗geometrygroup)
- RTresult RTAPI rtGeometryGroupDestroy (RTgeometrygroup geometrygroup)
- RTresult RTAPI rtGeometryGroupValidate (RTgeometrygroup geometrygroup)
- RTresult RTAPI rtGeometryGroupGetContext (RTgeometrygroup geometrygroup, RTcontext ∗context)
- RTresult RTAPI rtGeometryGroupSetAcceleration (RTgeometrygroup geometrygroup, RTacceleration acceleration)
- RTresult RTAPI rtGeometryGroupGetAcceleration (RTgeometrygroup geometrygroup, RTacceleration ∗acceleration)
- RTresult RTAPI rtGeometryGroupSetChildCount (RTgeometrygroup geometrygroup, unsigned int count)
- RTresult RTAPI rtGeometryGroupGetChildCount (RTgeometrygroup geometrygroup, unsigned int ∗count)
- RTresult RTAPI rtGeometryGroupSetChild (RTgeometrygroup geometrygroup, unsigned int index, RTgeometryinstance geometryinstance)
- RTresult RTAPI rtGeometryGroupGetChild (RTgeometrygroup geometrygroup, unsigned int index, RTgeometryinstance ∗geometryinstance)

2.4.2 Function Documentation

2.4.2.1 RTresult RTAPI rtGeometryGroupCreate (RTcontext *context,* RTgeometrygroup ∗ *geometrygroup*)

Creates a new geometry group.

Description

rtGeometryGroupCreate creates a new geometry group within a context. *context* specifies the target context, and should be a value returned by rtContextCreate. After the call, ∗*geometrygroup* shall be set to the handle of a newly created group within *context*.

Parameters

`in`	*context*	Specifies a context within which to create a new geometry group
`out`	*geometrygroup*	Returns a newly created geometry group

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryGroupCreate was introduced in OptiX 1.0.

See also rtGeometryGroupDestroy, rtContextCreate

2.4.2.2 RTresult RTAPI rtGeometryGroupDestroy (RTgeometrygroup *geometrygroup*)

Destroys a geometry group node.

Description

rtGeometryGroupDestroy removes *geometrygroup* from its context and deletes it. *geometrygroup* should be a value returned by rtGeometryGroupCreate. No child graph nodes are destroyed. After the call, *geometrygroup* is no longer a valid handle.

Parameters

in	*geometrygroup*	Handle of the geometry group node to destroy

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryGroupDestroy was introduced in OptiX 1.0.

See also rtGeometryGroupCreate

2.4.2.3 RTresult RTAPI rtGeometryGroupGetAcceleration (RTgeometrygroup *geometrygroup,* RTacceleration ∗ *acceleration*)

Returns the acceleration structure attached to a geometry group.

Description

rtGeometryGroupGetAcceleration returns the acceleration structure attached to a geometry group using rtGeometryGroupSetAcceleration. If no acceleration structure has previously been set, ∗*acceleration* is not written to, and RT_ERROR_INVALID_VALUE is returned.

Parameters

in	*geometrygroup*	The geometry group handle
out	*acceleration*	The returned acceleration structure object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryGroupGetAcceleration was introduced in OptiX 1.0.

See also rtGeometryGroupSetAcceleration, rtAccelerationCreate

2.4.2.4 RTresult RTAPI rtGeometryGroupGetChild (RTgeometrygroup *geometrygroup,* unsigned int *index,* RTgeometryinstance ∗ *geometryinstance*)

Returns a child node of a geometry group.

Description

rtGeometryGroupGetChild returns the child geometry instance at slot *index* of the parent *geometrygroup*. If no child has been assigned to the given slot, ∗*child* is not written to and RT_ERROR_INVALID_VALUE is returned.

Parameters

in	*geometrygroup*	The parent geometry group handle
in	*index*	The index of the child slot to query
out	*geometryinstance*	The returned child geometry instance

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryGroupGetChild was introduced in OptiX 1.0.

See also rtGeometryGroupSetChild, rtGeometryGroupSetChildCount, rtGeometryGroupGetChildCount,

2.4.2.5 RTresult RTAPI rtGeometryGroupGetChildCount (RTgeometrygroup *geometrygroup,* unsigned int ∗ *count*)

Returns the number of child slots for a group.

Description

rtGeometryGroupGetChildCount returns the number of child slots allocated using rtGeometryGroupSetChildCount. This includes empty slots which may not yet have actual children assigned by rtGeometryGroupSetChild.

Parameters

in	*geometrygroup*	The parent geometry group handle
out	*count*	Returned number of child slots

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryGroupGetChildCount was introduced in OptiX 1.0.

See also rtGeometryGroupSetChild, rtGeometryGroupGetChild, rtGeometryGroupSetChildCount

2.4.2.6 RTresult RTAPI rtGeometryGroupGetContext (RTgeometrygroup *geometrygroup,* RTcontext ∗ *context*)

Returns the context associated with a geometry group.

Description

rtGeometryGroupGetContext queries a geometry group for its associated context. *geometrygroup* specifies the geometry group to query, and must be a value returned by rtGeometryGroupCreate. After the call, ∗*context* shall be set to the context associated with *geometrygroup*.

Parameters

`in`	*geometrygroup*	Specifies the geometry group to query
`out`	*context*	Returns the context associated with the geometry group

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryGroupGetContext was introduced in OptiX 1.0.

See also rtContextCreate, rtGeometryGroupCreate

2.4.2.7 RTresult RTAPI rtGeometryGroupSetAcceleration (RTgeometrygroup *geometrygroup,* RTacceleration *acceleration*)

Set the acceleration structure for a group.

Description

rtGeometryGroupSetAcceleration attaches an acceleration structure to a geometry group. The acceleration structure must have been previously created using rtAccelerationCreate. Every geometry group is required to have an acceleration structure assigned in order to pass validation. The acceleration structure will be built over the primitives contained in all children of the geometry group. This enables a single acceleration structure to be built over primitives of multiple geometry instances. Note that it is legal to attach a single RTacceleration object to multiple geometry groups, as long as the underlying geometry of all children is the same. This corresponds to attaching an acceleration structure to multiple groups at higher graph levels using rtGroupSetAcceleration.

Parameters

`in`	*geometrygroup*	The geometry group handle
`in`	*acceleration*	The acceleration structure to attach to the geometry group

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryGroupSetAcceleration was introduced in OptiX 1.0.

See also rtGeometryGroupGetAcceleration, rtAccelerationCreate, rtGroupSetAcceleration

2.4.2.8 RTresult RTAPI rtGeometryGroupSetChild (RTgeometrygroup *geometrygroup,* unsigned int *index,* RTgeometryinstance *geometryinstance*)

Attaches a child node to a geometry group.

Description

rtGeometryGroupSetChild attaches a new child node *geometryinstance* to the parent node *geometrygroup*. *index* specifies the number of the slot where the child node gets attached. The index value must be lower than the number previously set by rtGeometryGroupSetChildCount.

Parameters

in	*geometrygroup*	The parent geometry group handle
in	*index*	The index in the parent's child slot array
in	*geometryinstance*	The child node to be attached

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryGroupSetChild was introduced in OptiX 1.0.

See also rtGeometryGroupSetChildCount, rtGeometryGroupGetChildCount, rtGeometryGroupGetChild

2.4.2.9 RTresult RTAPI rtGeometryGroupSetChildCount (RTgeometrygroup *geometrygroup,* unsigned int *count*)

Sets the number of child nodes to be attached to the group.

Description

rtGeometryGroupSetChildCount specifies the number of child slots in this geometry group. Potentially existing links to children at indices greater than *count-1* are removed. If the call increases the number of slots, the newly created slots are empty and need to be filled using rtGeometryGroupSetChild before validation.

Parameters

in	*geometrygroup*	The parent geometry group handle
in	*count*	Number of child slots to allocate for the geometry group

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryGroupSetChildCount was introduced in OptiX 1.0.

See also rtGeometryGroupGetChild, rtGeometryGroupGetChildCount rtGeometryGroupSetChild

2.4.2.10 RTresult RTAPI rtGeometryGroupValidate (RTgeometrygroup *geometrygroup*)

Validates the state of the geometry group.

Description

rtGeometryGroupValidate checks *geometrygroup* for completeness. If *geometrygroup* or any of the objects attached to *geometrygroup* are not valid, the call will return RT_ERROR_INVALID_VALUE.

Parameters

in	*geometrygroup*	Specifies the geometry group to be validated

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryGroupValidate was introduced in OptiX 1.0.

See also rtGeometryGroupCreate

2.5 GroupNode functions

2.5.1 Detailed Description

Functions related to an OptiX Group node.

Functions

- RTresult RTAPI rtGroupCreate (RTcontext context, RTgroup ∗group)
- RTresult RTAPI rtGroupDestroy (RTgroup group)
- RTresult RTAPI rtGroupValidate (RTgroup group)
- RTresult RTAPI rtGroupGetContext (RTgroup group, RTcontext ∗context)
- RTresult RTAPI rtGroupSetAcceleration (RTgroup group, RTacceleration acceleration)
- RTresult RTAPI rtGroupGetAcceleration (RTgroup group, RTacceleration ∗acceleration)
- RTresult RTAPI rtGroupSetChildCount (RTgroup group, unsigned int count)
- RTresult RTAPI rtGroupGetChildCount (RTgroup group, unsigned int ∗count)
- RTresult RTAPI rtGroupSetChild (RTgroup group, unsigned int index, RTobject child)
- RTresult RTAPI rtGroupGetChild (RTgroup group, unsigned int index, RTobject ∗child)
- RTresult RTAPI rtGroupGetChildType (RTgroup group, unsigned int index, RTobjecttype ∗type)

2.5.2 Function Documentation

2.5.2.1 RTresult RTAPI rtGroupCreate (RTcontext *context,* RTgroup ∗ *group*)

Creates a new group.

Description

rtGroupCreate creates a new group within a context. *context* specifies the target context, and should be a value returned by rtContextCreate. After the call, ∗*group* shall be set to the handle of a newly created group within *context*.

Parameters

`in`	*context*	Specifies a context within which to create a new group
`out`	*group*	Returns a newly created group

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

rtGroupCreate was introduced in OptiX 1.0.

See also rtGroupDestroy, rtContextCreate

2.5.2.2 RTresult RTAPI rtGroupDestroy (RTgroup *group*)

Destroys a group node.

Description

rtGroupDestroy removes *group* from its context and deletes it. *group* should be a value returned by rtGroupCreate. No child graph nodes are destroyed. After the call, *group* is no longer a valid handle.

Parameters

in	*group*	Handle of the group node to destroy

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

rtGroupDestroy was introduced in OptiX 1.0.

See also rtGroupCreate

2.5.2.3 RTresult RTAPI rtGroupGetAcceleration (RTgroup *group*, RTacceleration ∗ *acceleration*)

Returns the acceleration structure attached to a group.

Description

rtGroupGetAcceleration returns the acceleration structure attached to a group using rtGroupSetAcceleration. If no acceleration structure has previously been set, ∗*acceleration* is not written to, and RT_ERROR_INVALID_VALUE is returned.

Parameters

in	*group*	The group handle
out	*acceleration*	The returned acceleration structure object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtGroupGetAcceleration was introduced in OptiX 1.0.

See also rtGroupSetAcceleration, rtAccelerationCreate

2.5.2.4 RTresult RTAPI rtGroupGetChild (RTgroup *group*, unsigned int *index*, RTobject ∗ *child*)

Returns a child node of a group.

Description

rtGroupGetChild returns the child object at slot *index* of the parent *group*. If no child has been assigned to the given slot, ∗*child* is not written to and RT_ERROR_INVALID_VALUE is returned.

Parameters

in	*group*	The parent group handle
in	*index*	The index of the child slot to query
out	*child*	The returned child object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtGroupGetChild was introduced in OptiX 1.0.

See also rtGroupSetChild, rtGroupSetChildCount, rtGroupGetChildCount, rtGroupGetChildType

2.5.2.5 RTresult RTAPI rtGroupGetChildCount (RTgroup *group*, unsigned int ∗ *count*)

Returns the number of child slots for a group.

Description

rtGroupGetChildCount returns the number of child slots allocated using rtGroupSetChildCount. This includes empty slots which may not yet have actual children assigned by rtGroupSetChild.

Parameters

`in`	*group*	The parent group handle
`out`	*count*	Returned number of child slots

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtGroupGetChildCount was introduced in OptiX 1.0.

See also rtGroupSetChild, rtGroupGetChild, rtGroupSetChildCount, rtGroupGetChildType

2.5.2.6 RTresult RTAPI rtGroupGetChildType (RTgroup *group*, unsigned int *index*, RTobjecttype ∗ *type*)

Get the type of a group child.

Description

rtGroupGetChildType returns the type of the group child at slot *index*. If no child is associated with the given index, *type* is not written to and RT_ERROR_INVALID_VALUE is returned.

Parameters

`in`	*group*	The parent group handle
`in`	*index*	The index of the child slot to query
`out`	*type*	The returned child type

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtGroupGetChildType was introduced in OptiX 1.0.

See also rtGroupSetChild, rtGroupGetChild, rtGroupSetChildCount, rtGroupGetChildCount

2.5.2.7 RTresult RTAPI rtGroupGetContext (RTgroup *group*, RTcontext ∗ *context*)

Returns the context associated with a group.

Description

rtGroupGetContext queries a group for its associated context. *group* specifies the group to query, and must be a value returned by rtGroupCreate. After the call, ∗*context* shall be set to the context associated with *group*.

Parameters

in	*group*	Specifies the group to query
out	*context*	Returns the context associated with the group

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtGroupGetContext was introduced in OptiX 1.0.

See also rtContextCreate, rtGroupCreate

2.5.2.8 RTresult RTAPI rtGroupSetAcceleration (RTgroup *group,* RTacceleration *acceleration*)

Set the acceleration structure for a group.

Description

rtGroupSetAcceleration attaches an acceleration structure to a group. The acceleration structure must have been previously created using rtAccelerationCreate. Every group is required to have an acceleration structure assigned in order to pass validation. The acceleration structure will be built over the children of the group. For example, if an acceleration structure is attached to a group that has a selector, a geometry group, and a transform child, the acceleration structure will be built over the bounding volumes of these three objects.

Note that it is legal to attach a single RTacceleration object to multiple groups, as long as the underlying bounds of the children are the same. For example, if another group has three children which are known to have the same bounding volumes as the ones in the example above, the two groups can share an acceleration structure, thus saving build time. This is true even if the details of the children, such as the actual type of a node or its geometry content, differ from the first set of group children. All that is required is for a child node at a given index to have the same bounds as the other group's child node at the same index.

Sharing an acceleration structure this way corresponds to attaching an acceleration structure to multiple geometry groups at lower graph levels using rtGeometryGroupSetAcceleration.

Parameters

in	*group*	The group handle
in	*acceleration*	The acceleration structure to attach to the group

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtGroupSetAcceleration was introduced in OptiX 1.0.

See also rtGroupGetAcceleration, rtAccelerationCreate, rtGeometryGroupSetAcceleration

2.5.2.9 RTresult RTAPI rtGroupSetChild (RTgroup *group,* unsigned int *index,* RTobject *child*)

Attaches a child node to a group.

Description

Attaches a new child node *child* to the parent node *group*. *index* specifies the number of the slot where the child node gets attached. A sufficient number of slots must be allocated using rtGroupSetChildCount. Legal child node types are RTgroup, RTselector, RTgeometrygroup, and RTtransform.

Parameters

in	*group*	The parent group handle
in	*index*	The index in the parent's child slot array
in	*child*	The child node to be attached. Can be of type {RTgroup, RTselector, RTgeometrygroup, RTtransform}

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

rtGroupSetChild was introduced in OptiX 1.0.

See also rtGroupSetChildCount, rtGroupGetChildCount, rtGroupGetChild, rtGroupGetChildType

2.5.2.10 RTresult RTAPI rtGroupSetChildCount (RTgroup *group*, unsigned int *count*)

Sets the number of child nodes to be attached to the group.

Description

rtGroupSetChildCount specifies the number of child slots in this group. Potentially existing links to children at indices greater than *count-1* are removed. If the call increases the number of slots, the newly created slots are empty and need to be filled using rtGroupSetChild before validation.

Parameters

in	*group*	The parent group handle
in	*count*	Number of child slots to allocate for the group

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtGroupSetChildCount was introduced in OptiX 1.0.

See also rtGroupGetChild, rtGroupGetChildCount, rtGroupGetChildType, rtGroupSetChild

2.5.2.11 RTresult RTAPI rtGroupValidate (RTgroup *group*)

Verifies the state of the group.

Description

rtGroupValidate checks *group* for completeness. If *group* or any of the objects attached to *group* are not valid, the call will return RT_ERROR_INVALID_VALUE.

Parameters

in	*group*	Specifies the group to be validated

Return values

Relevant return values:

- RT_SUCCESS

- RT_ERROR_INVALID_VALUE

History

rtGroupValidate was introduced in OptiX 1.0.

See also rtGroupCreate

2.6 SelectorNode functions

2.6.1 Detailed Description

Functions related to an OptiX Selector node.

Functions

- RTresult RTAPI rtSelectorCreate (RTcontext context, RTselector ∗selector)
- RTresult RTAPI rtSelectorDestroy (RTselector selector)
- RTresult RTAPI rtSelectorValidate (RTselector selector)
- RTresult RTAPI rtSelectorGetContext (RTselector selector, RTcontext ∗context)
- RTresult RTAPI rtSelectorSetVisitProgram (RTselector selector, RTprogram program)
- RTresult RTAPI rtSelectorGetVisitProgram (RTselector selector, RTprogram ∗program)
- RTresult RTAPI rtSelectorSetChildCount (RTselector selector, unsigned int count)
- RTresult RTAPI rtSelectorGetChildCount (RTselector selector, unsigned int ∗count)
- RTresult RTAPI rtSelectorSetChild (RTselector selector, unsigned int index, RTobject child)
- RTresult RTAPI rtSelectorGetChild (RTselector selector, unsigned int index, RTobject ∗child)
- RTresult RTAPI rtSelectorGetChildType (RTselector selector, unsigned int index, RTobjecttype ∗type)
- RTresult RTAPI rtSelectorDeclareVariable (RTselector selector, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtSelectorQueryVariable (RTselector selector, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtSelectorRemoveVariable (RTselector selector, RTvariable v)
- RTresult RTAPI rtSelectorGetVariableCount (RTselector selector, unsigned int ∗count)
- RTresult RTAPI rtSelectorGetVariable (RTselector selector, unsigned int index, RTvariable ∗v)

2.6.2 Function Documentation

2.6.2.1 RTresult RTAPI rtSelectorCreate (RTcontext *context,* RTselector ∗ *selector*)

Creates a Selector node.

Description

Creates a new Selector node within the given context. After calling rtSelectorCreate the new node is in a "raw" state. For the node to be functional, a visit program has to be assigned using rtSelectorSetVisitProgram. Furthermore, a number of (zero or more) children can be attached by using rtSelectorSetChildCount and rtSelectorSetChild.

Parameters

`in`	*context*	Specifies the rendering context of the Selector node
`out`	*selector*	New Selector node handle

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtSelectorCreate was introduced in OptiX 1.0.

See also rtSelectorDestroy, rtSelectorValidate, rtSelectorGetContext, rtSelectorSetVisitProgram, rtSelectorSetChildCount, rtSelectorSetChild

2.6.2.2 RTresult RTAPI rtSelectorDeclareVariable (RTselector *selector,* const char ∗ *name,* RTvariable ∗ *v*)

Declares a variable associated with a Selector node.

Description

Declares a new variable identified by *name*, and associates it with the Selector node *selector*. The new variable handle is returned in *v*. After declaration, a variable does not have a type until its value is set by an *rtVariableSet{...}* function. Once a variable type has been set, it cannot be changed, i.e., only *rtVariableSet{...}* functions of the same type can be used to change the value of the variable.

Parameters

in	*selector*	Selector node handle
in	*name*	Variable identifier
out	*v*	New variable handle

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_VARIABLE_REDECLARED
- RT_ERROR_ILLEGAL_SYMBOL

History

rtSelectorDeclareVariable was introduced in OptiX 1.0.

See also rtSelectorQueryVariable, rtSelectorRemoveVariable, rtSelectorGetVariableCount, rtSelectorGetVariable, Variable setters{...}

2.6.2.3 RTresult RTAPI rtSelectorDestroy (RTselector *selector*)

Destroys a selector node.

Description

rtSelectorDestroy removes *selector* from its context and deletes it. *selector* should be a value returned by rtSelectorCreate. Associated variables declared via rtSelectorDeclareVariable are destroyed, but no child graph nodes are destroyed. After the call, *selector* is no longer a valid handle.

Parameters

in	*selector*	Handle of the selector node to destroy

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtSelectorDestroy was introduced in OptiX 1.0.

See also rtSelectorCreate, rtSelectorValidate, rtSelectorGetContext

2.6.2.4 RTresult RTAPI rtSelectorGetChild (RTselector *selector,* unsigned int *index,* RTobject ∗ *child*)

Returns a child node that is attached to a Selector node.

Description

rtSelectorGetChild returns in *child* a handle of the child node currently attached to *selector* at slot *index*. The index value must be lower than the number previously set by rtSelectorSetChildCount, thus it has to be in the range from *0* to rtSelectorGetChildCount - 1. The returned pointer is of generic type RTobject and needs to be cast to the actual child type, which can be RTgroup, RTselector, RTgeometrygroup, or RTtransform. The actual type of *child* can be queried using rtSelectorGetChildType;

Parameters

in	*selector*	Selector node handle
in	*index*	Child node index
out	*child*	Child node handle. Can be {RTgroup, RTselector, RTgeometrygroup, RTtransform}

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtSelectorGetChild was introduced in OptiX 1.0.

See also rtSelectorSetChildCount, rtSelectorGetChildCount, rtSelectorSetChild, rtSelectorGetChildType

2.6.2.5 RTresult RTAPI rtSelectorGetChildCount (RTselector *selector,* unsigned int ∗ *count*)

Returns the number of child node slots of a Selector node.

Description

rtSelectorGetChildCount returns in *count* the number of child node slots that have been previously reserved for the Selector node *selector* by rtSelectorSetChildCount. The value of *count* does not reflect the actual number of child nodes that have so far been attached to the Selector node using rtSelectorSetChild.

Parameters

in	*selector*	Selector node handle
out	*count*	Number of child node slots reserved for *selector*

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtSelectorGetChildCount was introduced in OptiX 1.0.

See also rtSelectorSetChildCount, rtSelectorSetChild, rtSelectorGetChild, rtSelectorGetChildType

2.6.2.6 RTresult RTAPI rtSelectorGetChildType (RTselector *selector,* unsigned int *index,* RTobjecttype ∗ *type*)

Returns type information about a Selector child node.

Description

rtSelectorGetChildType queries the type of the child node attached to *selector* at slot *index*. The index value has to be in the range from *0* to rtSelectorGetChildCount - 1. The returned type is one of:

RT_OBJECTTYPE_GROUP RT_OBJECTTYPE_GEOMETRY_GROUP RT_OBJECTTYPE_TRANSFORM RT_OBJECTTYPE_SELECTOR

Parameters

in	*selector*	Selector node handle
in	*index*	Child node index
out	*type*	Type of the child node

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtSelectorGetChildType was introduced in OptiX 1.0.

See also rtSelectorSetChildCount, rtSelectorGetChildCount, rtSelectorSetChild, rtSelectorGetChild

2.6.2.7 RTresult RTAPI rtSelectorGetContext (RTselector *selector,* RTcontext ∗ *context*)

Returns the context of a Selector node.

Description

rtSelectorGetContext returns in *context* the rendering context in which the Selector node *selector* has been created.

Parameters

in	*selector*	Selector node handle
out	*context*	The context, *selector* belongs to

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtSelectorGetContext was introduced in OptiX 1.0.

See also rtSelectorCreate, rtSelectorDestroy, rtSelectorValidate

2.6.2.8 RTresult RTAPI rtSelectorGetVariable (RTselector *selector,* unsigned int *index,* RTvariable ∗ *v*)

Returns a variable associated with a Selector node.

Description

Returns in *v* a handle to the variable located at position *index* in the Selectors's variable array. *index* is a sequential number depending on the order of variable declarations. The index has to be in the range from *0* to rtSelector-GetVariableCount - 1. The current value of a variable can be retrieved from its handle by using an appropriate *rtVariableGet{...}* function matching the variable's type.

Parameters

`in`	*selector*	Selector node handle
`in`	*index*	Variable index
`out`	*v*	Variable handle

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtSelectorGetVariable was introduced in OptiX 1.0.

See also rtSelectorDeclareVariable, rtSelectorQueryVariable, rtSelectorRemoveVariable, rtSelectorGetVariable-Count, *rtVariableGet{...}*

2.6.2.9 RTresult RTAPI rtSelectorGetVariableCount (RTselector *selector,* unsigned int ∗ *count*)

Returns the number of variables attached to a Selector node.

Description

rtSelectorGetVariableCount returns in *count* the number of variables that are currently attached to the Selector node *selector*.

Parameters

`in`	*selector*	Selector node handle
`out`	*count*	Number of variables associated with *selector*

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtSelectorGetVariableCount was introduced in OptiX 1.0.

See also rtSelectorDeclareVariable, rtSelectorQueryVariable, rtSelectorRemoveVariable, rtSelectorGetVariable

2.6.2.10 RTresult RTAPI rtSelectorGetVisitProgram (RTselector *selector,* RTprogram ∗ *program*)

Returns the currently assigned visit program.

Description

rtSelectorGetVisitProgram returns in *program* a handle of the visit program curently bound to *selector*.

Parameters

in	*selector*	Selector node handle
out	*program*	Current visit progam assigned to *selector*

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtSelectorGetVisitProgram was introduced in OptiX 1.0.

See also rtSelectorSetVisitProgram

2.6.2.11 RTresult RTAPI rtSelectorQueryVariable (RTselector *selector,* const char ∗ *name,* RTvariable ∗ *v*)

Returns a variable associated with a Selector node.

Description

Returns in *v* a handle to the variable identified by *name*, which is associated with the Selector node *selector*. The current value of a variable can be retrieved from its handle by using an appropriate *rtVariableGet{...}* function matching the variable's type.

Parameters

in	*selector*	Selector node handle
in	*name*	Variable identifier
out	*v*	Variable handle

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtSelectorQueryVariable was introduced in OptiX 1.0.

See also rtSelectorDeclareVariable, rtSelectorRemoveVariable, rtSelectorGetVariableCount, rtSelectorGetVariable, *rtVariableGet{...}*

2.6.2.12 RTresult RTAPI rtSelectorRemoveVariable (RTselector *selector,* RTvariable *v*)

Removes a variable from a Selector node.

Description

rtSelectorRemoveVariable removes the variable *v* from the Selector node *selector* and deletes it. The handle *v* must be considered invalid afterwards.

Parameters

in	*selector*	Selector node handle
in	*v*	Variable handle

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_VARIABLE_NOT_FOUND

History

rtSelectorRemoveVariable was introduced in OptiX 1.0.

See also rtSelectorDeclareVariable, rtSelectorQueryVariable, rtSelectorGetVariableCount, rtSelectorGetVariable

2.6.2.13 RTresult RTAPI rtSelectorSetChild (RTselector *selector,* unsigned int *index,* RTobject *child*)

Attaches a child node to a Selector node.

Description

Attaches a new child node *child* to the parent node *selector*. *index* specifies the number of the slot where the child node gets attached. The index value must be lower than the number previously set by rtSelectorSetChildCount, thus it has to be in the range from *0* to rtSelectorGetChildCount *-1*. Legal child node types are RTgroup, RTselector, RTgeometrygroup, and RTtransform.

Parameters

in	*selector*	Selector node handle
in	*index*	Index of the parent slot the node *child* gets attached to
in	*child*	Child node to be attached. Can be {RTgroup, RTselector, RTgeometrygroup, RTtransform}

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtSelectorSetChild was introduced in OptiX 1.0.

See also rtSelectorSetChildCount, rtSelectorGetChildCount, rtSelectorGetChild, rtSelectorGetChildType

2.6.2.14 RTresult RTAPI rtSelectorSetChildCount (RTselector *selector*, unsigned int *count*)

Specifies the number of child nodes to be attached to a Selector node.

Description

rtSelectorSetChildCount allocates a number of children slots, i.e., it pre-defines the exact number of child nodes the parent Selector node *selector* will have. Child nodes have to be attached to the Selector node using rtSelectorSetChild. Empty slots will cause a validation error.

Parameters

in	*selector*	Selector node handle
in	*count*	Number of child nodes to be attached to *selector*

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtSelectorSetChildCount was introduced in OptiX 1.0.

See also rtSelectorValidate, rtSelectorGetChildCount, rtSelectorSetChild, rtSelectorGetChild, rtSelectorGetChildType

2.6.2.15 RTresult RTAPI rtSelectorSetVisitProgram (RTselector *selector*, RTprogram *program*)

Assigns a visit program to a Selector node.

Description

rtSelectorSetVisitProgram specifies a visit program that is executed when the Selector node *selector* gets visited by a ray during traversal of the model graph. A visit program steers how traversal of the Selectors's children is performed. It usually chooses only a single child to continue traversal, but is also allowed to process zero or multiple children. Programs can be created from PTX files using rtProgramCreateFromPTXFile.

Parameters

in	*selector*	Selector node handle
in	*program*	Program handle associated with a visit program

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_TYPE_MISMATCH

History

rtSelectorSetVisitProgram was introduced in OptiX 1.0.

See also rtSelectorGetVisitProgram, rtProgramCreateFromPTXFile

2.6.2.16 RTresult RTAPI rtSelectorValidate (RTselector *selector*)

Checks a Selector node for internal consistency.

Description

rtSelectorValidate recursively checks consistency of the Selector node *selector* and its children, i.e., it tries to validate the whole model sub-tree with *selector* as root. For a Selector node to be valid, it must be assigned a visit program, and the number of its children must match the number specified by rtSelectorSetChildCount.

Parameters

in	*selector*	Selector root node of a model sub-tree to be validated

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtSelectorValidate was introduced in OptiX 1.0.

See also rtSelectorCreate, rtSelectorDestroy, rtSelectorGetContext, rtSelectorSetVisitProgram, rtSelectorSetChildCount, rtSelectorSetChild

2.7 TransformNode functions

2.7.1 Detailed Description

Functions related to an OptiX Transform node.

Functions

- RTresult RTAPI rtTransformCreate (RTcontext context, RTtransform ∗transform)
- RTresult RTAPI rtTransformDestroy (RTtransform transform)
- RTresult RTAPI rtTransformValidate (RTtransform transform)
- RTresult RTAPI rtTransformGetContext (RTtransform transform, RTcontext ∗context)
- RTresult RTAPI rtTransformSetMatrix (RTtransform transform, int transpose, const float ∗matrix, const float ∗inverse_matrix)
- RTresult RTAPI rtTransformGetMatrix (RTtransform transform, int transpose, float ∗matrix, float ∗inverse_matrix)
- RTresult RTAPI rtTransformSetChild (RTtransform transform, RTobject child)
- RTresult RTAPI rtTransformGetChild (RTtransform transform, RTobject ∗child)
- RTresult RTAPI rtTransformGetChildType (RTtransform transform, RTobjecttype ∗type)

2.7.2 Function Documentation

2.7.2.1 RTresult RTAPI rtTransformCreate (RTcontext *context*, RTtransform ∗ *transform*)

Creates a new Transform node.

Description

Creates a new Transform node within the given context. For the node to be functional, a child node has to be attached using rtTransformSetChild. A transformation matrix can be associated with the transform node with rtTransformSetMatrix.

Parameters

in	*context*	Specifies the rendering context of the Transform node
out	*transform*	New Transform node handle

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTransformCreate was introduced in OptiX 1.0.

See also rtTransformDestroy, rtTransformValidate, rtTransformGetContext, rtTransformSetMatrix, rtTransformGetMatrix, rtTransformSetChild, rtTransformGetChild, rtTransformGetChildType

2.7.2.2 RTresult RTAPI rtTransformDestroy (RTtransform *transform*)

Destroys a transform node.

Description

rtTransformDestroy removes *transform* from its context and deletes it. *transform* should be a value returned by rtTransformCreate. No child graph nodes are destroyed. After the call, *transform* is no longer a valid handle.

Parameters

in	*transform*	Handle of the transform node to destroy

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTransformDestroy was introduced in OptiX 1.0.

See also rtTransformCreate, rtTransformValidate, rtTransformGetContext

2.7.2.3 RTresult RTAPI rtTransformGetChild (RTtransform *transform,* RTobject ∗ *child*)

Returns the child node that is attached to a Transform node.

Description

rtTransformGetChild returns in *child* a handle of the child node currently attached to *transform*. The returned pointer is of generic type RTobject and needs to be cast to the actual child type, which can be RTgroup, RTselector, RTgeometrygroup, or RTtransform. The actual type of *child* can be queried using rtTransformGetChildType.

Parameters

in	*transform*	Transform node handle
out	*child*	Child node handle. Can be {RTgroup, RTselector, RTgeometrygroup, RTtransform}

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTransformGetChild was introduced in OptiX 1.0.

See also rtTransformSetChild, rtTransformGetChildType

2.7.2.4 RTresult RTAPI rtTransformGetChildType (RTtransform *transform,* RTobjecttype ∗ *type*)

Returns type information about a Transform child node.

Description

rtTransformGetChildType queries the type of the child node attached to *selector*. The returned type is one of:

- RT_OBJECTTYPE_GROUP
- RT_OBJECTTYPE_GEOMETRY_GROUP
- RT_OBJECTTYPE_TRANSFORM
- RT_OBJECTTYPE_SELECTOR

Parameters

`in`	*transform*	Transform node handle
`out`	*type*	Type of the child node

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTransformGetChildType was introduced in OptiX 1.0.

See also rtTransformSetChild, rtTransformGetChild

2.7.2.5 RTresult RTAPI rtTransformGetContext (RTtransform *transform,* RTcontext ∗ *context*)

Returns the context of a Transform node.

Description

rtTransformGetContext queries a transform node for its associated context. *transform* specifies the transform node to query, and should be a value returned by rtTransformCreate. After the call, ∗*context* shall be set to the context associated with *transform*.

Parameters

`in`	*transform*	Transform node handle
`out`	*context*	The context associated with *transform*

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTransformGetContext was introduced in OptiX 1.0.

See also rtTransformCreate, rtTransformDestroy, rtTransformValidate

2.7.2.6 RTresult RTAPI rtTransformGetMatrix (RTtransform *transform,* int *transpose,* float ∗ *matrix,* float ∗ *inverse_matrix*)

Returns the affine matrix and its inverse associated with a Transform node.

Description

rtTransformGetMatrix returns in *matrix* the affine matrix that is currently used to perform a transformation of the geometry contained in the sub-tree with *transform* as root. The corresponding inverse matrix will be retured in *inverse_matrix*. One or both pointers are allowed to be *NULL*. If *transpose* is *0*, matrices are returned in row-major format, i.e., matrix rows are contiguously laid out in memory. If *transpose* is non-zero, matrices are returned in column-major format. If non-*NULL*, matrix pointers must point to a float array of at least 16 elements.

Parameters

in	*transform*	Transform node handle
in	*transpose*	Flag indicating whether *matrix* and *inverse_matrix* should be transposed
out	*matrix*	Affine matrix (4x4 float array)
out	*inverse_matrix*	Inverted form of *matrix*

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTransformGetMatrix was introduced in OptiX 1.0.

See also rtTransformSetMatrix

2.7.2.7 RTresult RTAPI rtTransformSetChild (RTtransform *transform,* RTobject *child*)

Attaches a child node to a Transform node.

Description

Attaches a child node *child* to the parent node *transform*. Legal child node types are RTgroup, RTselector, RTgeometrygroup, and RTtransform. A transform node must have exactly one child. If a tranformation matrix has been attached to *transform* with rtTransformSetMatrix, it is effective on the model sub-tree with *child* as root node.

Parameters

in	*transform*	Transform node handle
in	*child*	Child node to be attached. Can be {RTgroup, RTselector, RTgeometrygroup, RTtransform}

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTransformSetChild was introduced in OptiX 1.0.

See also rtTransformSetMatrix, rtTransformGetChild, rtTransformGetChildType

2.7.2.8 RTresult RTAPI rtTransformSetMatrix (RTtransform *transform,* int *transpose,* const float ∗ *matrix,* const float ∗ *inverse_matrix*)

Associates an affine transformation matrix with a Transform node.

Description

rtTransformSetMatrix associates a 4x4 matrix with the Transform node *transform*. The provided transformation matrix results in a corresponding affine transformation of all geometry contained in the sub-tree with *transform* as root. At least one of the pointers *matrix* and *inverse_matrix* must be non-*NULL*. If exactly one pointer is valid, the other matrix will be computed. If both are valid, the matrices will be used as-is. If *transpose* is *0*, source matrices are expected to be in row-major format, i.e., matrix rows are contiguously laid out in memory:

float matrix[4∗4] = { a11, a12, a13, a14, a21, a22, a23, a24, a31, a32, a33, a34, a41, a42, a43, a44 };

Here, the translational elements *a14*, *a24*, and *a34* are at the 4th, 8th, and 12th position the matrix array. If the supplied matrices are in column-major format, a non-0 *transpose* flag can be used to trigger an automatic transpose of the input matrices.

Parameters

`in`	*transform*	Transform node handle
`in`	*transpose*	Flag indicating whether *matrix* and *inverse_matrix* should be transposed
`in`	*matrix*	Affine matrix (4x4 float array)
`in`	*inverse_matrix*	Inverted form of *matrix*

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTransformSetMatrix was introduced in OptiX 1.0.

See also rtTransformGetMatrix

2.7.2.9 RTresult RTAPI rtTransformValidate (RTtransform *transform*)

Checks a Transform node for internal consistency.

Description

rtTransformValidate recursively checks consistency of the Transform node *transform* and its child, i.e., it tries to validate the whole model sub-tree with *transform* as root. For a Transform node to be valid, it must have a child node attached. It is, however, not required to explicitly set a transformation matrix. Without a specified transformation matrix, the identity matrix is applied.

Parameters

`in`	*transform*	Transform root node of a model sub-tree to be validated

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTransformValidate was introduced in OptiX 1.0.

See also rtTransformCreate, rtTransformDestroy, rtTransformGetContext, rtTransformSetMatrix, rtTransform-SetChild

2.8 Acceleration functions

2.8.1 Detailed Description

Functions related to an OptiX Acceleration Structure node.

Functions

- RTresult RTAPI rtAccelerationCreate (RTcontext context, RTacceleration ∗acceleration)
- RTresult RTAPI rtAccelerationDestroy (RTacceleration acceleration)
- RTresult RTAPI rtAccelerationValidate (RTacceleration acceleration)
- RTresult RTAPI rtAccelerationGetContext (RTacceleration acceleration, RTcontext ∗context)
- RTresult RTAPI rtAccelerationSetBuilder (RTacceleration acceleration, const char ∗builder)
- RTresult RTAPI rtAccelerationGetBuilder (RTacceleration acceleration, const char ∗∗return_string)
- RTresult RTAPI rtAccelerationSetTraverser (RTacceleration acceleration, const char ∗traverser)
- RTresult RTAPI rtAccelerationGetTraverser (RTacceleration acceleration, const char ∗∗return_string)
- RTresult RTAPI rtAccelerationSetProperty (RTacceleration acceleration, const char ∗name, const char ∗value)
- RTresult RTAPI rtAccelerationGetProperty (RTacceleration acceleration, const char ∗name, const char ∗∗return_string)
- RTresult RTAPI rtAccelerationGetDataSize (RTacceleration acceleration, RTsize ∗size)
- RTresult RTAPI rtAccelerationGetData (RTacceleration acceleration, void ∗data)
- RTresult RTAPI rtAccelerationSetData (RTacceleration acceleration, const void ∗data, RTsize size)
- RTresult RTAPI rtAccelerationMarkDirty (RTacceleration acceleration)
- RTresult RTAPI rtAccelerationIsDirty (RTacceleration acceleration, int ∗dirty)

2.8.2 Function Documentation

2.8.2.1 RTresult RTAPI rtAccelerationCreate (RTcontext *context,* RTacceleration ∗ *acceleration*)

Creates a new acceleration structure.

Description

rtAccelerationCreate creates a new ray tracing acceleration structure within a context. An acceleration structure is used by attaching it to a group or geometry group by calling rtGroupSetAcceleration or rtGeometryGroupSetAcceleration. Note that an acceleration structure can be shared by attaching it to multiple groups or geometry groups if the underlying geometric structures are the same, see rtGroupSetAcceleration and rtGeometryGroupSetAcceleration for more details. A newly created acceleration structure is initially in dirty state.

Parameters

`in`	*context*	Specifies a context within which to create a new acceleration structure
`out`	*acceleration*	Returns the newly created acceleration structure

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

rtAccelerationCreate was introduced in OptiX 1.0.

See also rtAccelerationDestroy, rtContextCreate, rtAccelerationMarkDirty, rtAccelerationIsDirty, rtGroupSetAcceleration, rtGeometryGroupSetAcceleration

2.8.2.2 RTresult RTAPI rtAccelerationDestroy (RTacceleration *acceleration*)

Destroys an acceleration structure object.

Description

rtAccelerationDestroy removes *acceleration* from its context and deletes it. *acceleration* should be a value returned by rtAccelerationCreate. After the call, *acceleration* is no longer a valid handle.

Parameters

in	*acceleration*	Handle of the acceleration structure to destroy

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

rtAccelerationDestroy was introduced in OptiX 1.0.

See also rtAccelerationCreate

2.8.2.3 RTresult RTAPI rtAccelerationGetBuilder (RTacceleration *acceleration,* const char ** *return_string*)

Query the current builder from an acceleration structure.

Description

rtAccelerationGetBuilder returns the name of the builder currently used in the acceleration structure *acceleration*. If no builder has been set for *acceleration*, an empty string is returned. *return_string* will be set to point to the returned string. The memory *return_string* points to will be valid until the next API call that returns a string.

Parameters

in	*acceleration*	The acceleration structure handle
out	*return_string*	Return string buffer

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtAccelerationGetBuilder was introduced in OptiX 1.0.

See also rtAccelerationSetBuilder

2.8.2.4 RTresult RTAPI rtAccelerationGetContext (RTacceleration *acceleration,* RTcontext * *context*)

Returns the context associated with an acceleration structure.

Description

rtAccelerationGetContext queries an acceleration structure for its associated context. The context handle is returned in the location pointed to by *context*.

Parameters

in	*acceleration*	The acceleration structure handle
out	*context*	Returns the context associated with the acceleration structure

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtAccelerationGetContext was introduced in OptiX 1.0.

See also rtAccelerationCreate

2.8.2.5 RTresult RTAPI rtAccelerationGetData (RTacceleration *acceleration,* void ∗ *data*)

Retrieves acceleration structure data.

Description

rtAccelerationGetData retrieves the full state of the *acceleration* object, and copies it to the memory region pointed to by *data*. Sufficient memory must be available starting at that location to hold the entire state. To query the required memory size, rtAccelerationGetDataSize should be used.

The returned *data* from this call is valid input data for rtAccelerationSetData.

If *acceleration* is marked dirty, this call is invalid and will return RT_ERROR_INVALID_VALUE.

Parameters

in	*acceleration*	The acceleration structure handle
out	*data*	Pointer to a memory region to be filled with the state of *acceleration*

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtAccelerationGetData was introduced in OptiX 1.0.

See also rtAccelerationSetData, rtAccelerationGetDataSize

2.8.2.6 RTresult RTAPI rtAccelerationGetDataSize (RTacceleration *acceleration,* RTsize ∗ *size*)

Returns the size of the data to be retrieved from an acceleration structure.

Description

rtAccelerationGetDataSize queries the size of the data that will be returned on a subsequent call to rtAccelerationGetData. The size in bytes will be written to the location pointed to by *size*. The returned value is guaranteed to be valid only if no other function using the handle *acceleration* is made before rtAccelerationGetData.

If *acceleration* is marked dirty, this call is invalid and will return RT_ERROR_INVALID_VALUE.

Parameters

in	*acceleration*	The acceleration structure handle
out	*size*	The returned size of the data in bytes

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtAccelerationGetDataSize was introduced in OptiX 1.0.

See also rtAccelerationGetData, rtAccelerationSetData

2.8.2.7 RTresult RTAPI rtAccelerationGetProperty (RTacceleration *acceleration,* const char ∗ *name,* const char ∗∗ *return_string*)

Queries an acceleration structure property.

Description

rtAccelerationGetProperty returns the value of the acceleration structure property *name*. See rtAccelerationSetProperty for a list of supported properties. If the property name is not found, an empty string is returned. *return_string* will be set to point to the returned string. The memory *return_string* points to will be valid until the next API call that returns a string.

Parameters

in	*acceleration*	The acceleration structure handle
in	*name*	The name of the property to be queried
out	*return_string*	Return string buffer

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtAccelerationGetProperty was introduced in OptiX 1.0.

See also rtAccelerationSetProperty, rtAccelerationSetBuilder, rtAccelerationSetTraverser

2.8.2.8 RTresult RTAPI rtAccelerationGetTraverser (RTacceleration *acceleration,* const char ∗∗ *return_string*)

Query the current traverser from an acceleration structure.

Description

rtAccelerationGetTraverser returns the name of the traverser currently used in the acceleration structure *acceleration*. If no traverser has been set for *acceleration*, an empty string is returned. *return_string* will be set to point to the returned string. The memory *return_string* points to will be valid until the next API call that returns a string.

Parameters

in	*acceleration*	The acceleration structure handle
out	*return_string*	Return string buffer

Return values

Relevant return values:

- RT_SUCCESS

- RT_ERROR_INVALID_VALUE

History

rtAccelerationGetTraverser was introduced in OptiX 1.0.

See also rtAccelerationSetTraverser

2.8.2.9 RTresult RTAPI rtAccelerationIsDirty (RTacceleration *acceleration,* int ∗ *dirty*)

Returns the dirty flag of an acceleration structure.

Description

rtAccelerationIsDirty returns whether the acceleration structure is currently marked dirty. If the flag is set, a nonzero value will be returned in the location pointed to by *dirty*. Otherwise, zero is returned.

Any acceleration structure which is marked dirty will be rebuilt on a call to one of the rtContextLaunch functions, and its dirty flag will be reset. The dirty flag will also be reset on a sucessful call to rtAccelerationSetData.

An acceleration structure which is not marked dirty will never be rebuilt, even if associated groups, geometry, properties, or any other values have changed.

Initially after creation, acceleration structures are marked dirty.

Parameters

in	*acceleration*	The acceleration structure handle
out	*dirty*	Returned dirty flag

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtAccelerationIsDirty was introduced in OptiX 1.0.

See also rtAccelerationMarkDirty, rtAccelerationSetData, rtContextLaunch functions

2.8.2.10 RTresult RTAPI rtAccelerationMarkDirty (RTacceleration *acceleration*)

Marks an acceleration structure as dirty.

Description

rtAccelerationMarkDirty sets the dirty flag for *acceleration*.

Any acceleration structure which is marked dirty will be rebuilt on a call to one of the rtContextLaunch functions, and its dirty flag will be reset. The dirty flag will also be reset on a sucessful call to rtAccelerationSetData.

An acceleration structure which is not marked dirty will never be rebuilt, even if associated groups, geometry, properties, or any other values have changed.

Initially after creation, acceleration structures are marked dirty.

Parameters

in	*acceleration*	The acceleration structure handle

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtAccelerationMarkDirty was introduced in OptiX 1.0.

See also rtAccelerationIsDirty, rtAccelerationSetData, rtContextLaunch functions

2.8.2.11 RTresult RTAPI rtAccelerationSetBuilder (RTacceleration *acceleration,* const char * *builder*)

Specifies the builder to be used for an acceleration structure.

Description

rtAccelerationSetBuilder specifies the method used to construct the ray tracing acceleration structure represented by *acceleration*. A builder has to be set for the acceleration structure to pass validation. The current builder can be changed at any time, including after a call to rtContextLaunch. In this case, data previously computed for the acceleration structure is invalidated and the acceleration will be marked dirty.

An acceleration structure is only valid with a correct pair of builder and traverser. The traverser type is specified using rtAccelerationSetTraverser. For a list of valid combinations of builders and traversers, see below. For a description of the individual traversers, see rtAccelerationSetTraverser.

builder can take one of the following values:

- "NoAccel": Specifies that no acceleration structure is explicitly built. Traversal linearly loops through the list of primitives to intersect. This can be useful e.g. for higher level groups with only few children, where managing a more complex structure introduces unnecessary overhead. Valid traverser types: "NoAccel".
- "Bvh": A standard bounding volume hierarchy, useful for most types of graph levels and geometry. Medium build speed, good ray tracing performance. Valid traverser types: "Bvh", "BvhCompact".
- "Sbvh": A high quality BVH variant for maximum ray tracing performance. Slower build speed and slightly higher memory footprint than "Bvh". Valid traverser types: "Bvh", "BvhCompact".
- "MedianBvh": A medium quality bounding volume hierarchy with quick build performance. Useful for dynamic and semi-dynamic content. Valid traverser types: "Bvh", "BvhCompact".
- "Lbvh": A simple bounding volume hierarchy with very fast build performance. Useful for dynamic content. Valid traverser types: "Bvh", "BvhCompact".
- "Trbvh": High quality similar to Sbvh but with fast build performance similar to Lbvh. Valid traverser types: "Bvh". Temporarily, the Trbvh builder uses about three times the size of the final BVH for scratch space. OptiX Commercial includes a CPU-based Trbvh builder that does not have the memory constraints, and an optional automatic fallback to the CPU version when out of GPU memory. See details in section 3.5 of the programming guide.
- "TriangleKdTree": A high quality kd-tree builder, for triangle geometry only. This may provide better ray tracing performance than the BVH builders for some scenarios. Valid traverser types: "KdTree".

Parameters

in	*acceleration*	The acceleration structure handle
in	*builder*	String value specifying the builder type

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtAccelerationSetBuilder was introduced in OptiX 1.0.

See also rtAccelerationGetBuilder, rtAccelerationSetTraverser, rtAccelerationSetProperty

2.8.2.12 RTresult RTAPI rtAccelerationSetData (RTacceleration *acceleration,* const void ∗ *data,* RTsize *size*)

Sets the state of an acceleration structure.

Description

rtAccelerationSetData sets the full state of the *acceleration* object, including builder and traverser type as well as properties, as defined by *data*. The memory pointed to by *data* must be unaltered values previously retrieved from a (potentially different) acceleration structure handle. This mechanism is useful for implementing caching mechanisms, especially when using high quality structures which are expensive to build.

Note that no check is performed on whether the contents of *data* match the actual underlying geometry on which the acceleration structure is used. If the children of associated groups or geometry groups differ in number of children, layout of bounding boxes, or geometry, then behavior after this call is undefined.

This call returns RT_ERROR_VERSION_MISMATCH if the specified data was retrieved from a different, incompatible version of OptiX. In this case, the state of *acceleration* is not changed.

If the call is successful, the dirty flag of *acceleration* will be cleared.

Parameters

`in`	*acceleration*	The acceleration structure handle
`in`	*data*	Pointer to data containing the serialized state
`in`	*size*	The size in bytes of the buffer pointed to by *data*

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_VERSION_MISMATCH

History

rtAccelerationSetData was introduced in OptiX 1.0.

See also rtAccelerationGetData, rtAccelerationGetDataSize

2.8.2.13 RTresult RTAPI rtAccelerationSetProperty (RTacceleration *acceleration,* const char ∗ *name,* const char ∗ *value*)

Sets an acceleration structure property.

Description

rtAccelerationSetProperty sets a named property value for an acceleration structure. Properties can be used to fine tune the way an acceleration structure is built, in order to achieve faster build times or better ray tracing performance. Properties are evaluated and applied by the acceleration structure during build time, and different builders recognize different properties. Setting a property will never fail as long as *acceleration* is a valid handle. Properties that are not recognized by an acceleration structure will be ignored.

The following is a list of the properties used by the individual builders:

- "NoAccel": No properties are available for this builder.
- "Bvh": **refit** is an integer value specifying whether the BVH should be refitted or rebuilt from scratch when a valid BVH over similar geometry is already existent. The value indicates how many frames are to pass before forcing a rebuild, the exception being a value of 1, which will always refit (never rebuild if possible). A value of 0 will never refit (always rebuild). Regardless of the refit value, if the number of primitives changes from the last frame, a rebuild is forced. Refitting is much faster than a full rebuild, and usually yields good ray tracing performance if deformations to the underlying geometry are not too large. The default is 0. refit is only supported on SM_20 (Fermi) class GPUs and later. Older devices will simply ignore the refit property, effectively rebuilding any time the structure is marked dirty. **refine** can be used in combination with refit, and will apply tree rotations to the existing BVH to attempt to improve the quality for faster traversal. Like refit, tree

rotations are much faster than a full rebuild. The value indicates how many rotation passes over the tree to perform per frame. With **refine** on, the quality of the tree degrades much less rapidly than with just refit, and can increase the number of frames between rebuilds before traversal performance suffers. In some cases, it can eliminate the need for rebuilds entirely. The default is 0. refine is only supported on SM_20 (Fermi) class GPUs and later.

- "Sbvh": The SBVH can be used for any type of geometry, but especially efficient structures can be built for triangles. For this case, the following properties are used in order to provide the necessary geometry information to the acceleration object: **vertex_buffer_name** specifies the name of the vertex buffer variable for underlying geometry, containing float3 vertices. **vertex_buffer_stride** is used to define the offset between two vertices in the buffer, given in bytes. The default stride is zero, which assumes that the vertices are tightly packed. **index_buffer_name** specifies the name of the index buffer variable for underlying geometry (if any). The entries in this buffer are indices of type int, where each index refers to one entry in the vertex buffer. A sequence of three indices represent one triangle. **index_buffer_stride** can be used analog to **vertex_buffer_stride** to describe interleaved arrays.
- "MedianBvh": **refit** (see **refit** flag for "Bvh" above). **refine**, (see **refine** flag for "Bvh" above).
- "Lbvh": **refit** (see **refit** flag for "Bvh" above). **refine**, (see refine flag for "Bvh" above), with one important difference: for "Lbvh", **refine** can be used alone, and does not require **refit**. If used without **refit**, tree rotations will be applied after the Lbvh build. The default is 0.
- "Trbvh": Similar in quality to Sbvh but builds much faster. Builds on the GPU and is subject to GPU memory constraints, including, temporarily, requiring scratch space about three times as large as the final data structure. See section 3.5 of the programming guide for details. See Sbvh for a description of the relevant properties (**vertex_buffer_name**, **index_buffer_name**, **vertex_buffer_stride**, and **index_buffer_stride**).
- "TriangleKdTree": Since the kd-tree can build its acceleration structure over triangles only, the geometry data and its format must be made available to the acceleration object. See Sbvh for a description of the relevant properties (**vertex_buffer_name**, **index_buffer_name**, **vertex_buffer_stride**, and **index_buffer_stride**).

Parameters

in	*acceleration*	The acceleration structure handle
in	*name*	String value specifying the name of the property
in	*value*	String value specifying the value of the property

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtAccelerationSetProperty was introduced in OptiX 1.0.

See also rtAccelerationGetProperty, rtAccelerationSetBuilder, rtAccelerationSetTraverser

2.8.2.14 RTresult RTAPI rtAccelerationSetTraverser (RTacceleration *acceleration,* const char ∗ *traverser*)

Specifies the traverser to be used for an acceleration structure.

Description

rtAccelerationSetTraverser specifies the method used to traverse the ray tracing acceleration structure represented by *acceleration*. A traverser has to be set for the acceleration structure to pass validation. The current active traverser can be changed at any time.

An acceleration structure is only valid with a correct pair of builder and traverser. The builder type is specified using rtAccelerationSetBuilder. For a list of valid combinations of builders and traversers, see below. For a description of the individual builders, see rtAccelerationSetBuilder.

traverser can take one of the following values:

- "NoAccel": Linearly loops through the list of primitives to intersect. This is highly inefficient in all but the most trivial scenarios (but there it can provide good performance due to very little overhead). Valid builder types: "NoAccel".
- "Bvh": Optimized traversal of generic bounding volume hierarchies. Valid builder types: "Trbvh", "Sbvh", "Bvh", "MedianBvh", "Lbvh".
- "BvhCompact": Optimized traversal of bounding volume hierarchies for large datasets when virtual memory is turned on. It compresses the BVH data in 4 times before uploading to the device. And decompress the BVH data in real-time during traversal of a bounding volume hierarchy. Valid builder types: "Sbvh", "Bvh", "MedianBvh", "Lbvh".
- "KdTree": Standard traversal for kd-trees. Valid builder types: "TriangleKdTree".

Parameters

`in`	*acceleration*	The acceleration structure handle
`in`	*traverser*	String value specifying the traverser type

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtAccelerationSetTraverser was introduced in OptiX 1.0.

See also rtAccelerationGetTraverser, rtAccelerationSetBuilder, rtAccelerationSetProperty

2.8.2.15 RTresult RTAPI rtAccelerationValidate (RTacceleration *acceleration*)

Validates the state of an acceleration structure.

Description

rtAccelerationValidate checks *acceleration* for completeness. If *acceleration* is not valid, the call will return RT_ERROR_INVALID_VALUE.

Parameters

`in`	*acceleration*	The acceleration structure handle

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtAccelerationValidate was introduced in OptiX 1.0.

See also rtAccelerationCreate

2.9 GeometryInstance functions

2.9.1 Detailed Description

Functions related to an OptiX Geometry Instance node.

Functions

- RTresult RTAPI rtGeometryInstanceCreate (RTcontext context, RTgeometryinstance ∗geometryinstance)
- RTresult RTAPI rtGeometryInstanceDestroy (RTgeometryinstance geometryinstance)
- RTresult RTAPI rtGeometryInstanceValidate (RTgeometryinstance geometryinstance)
- RTresult RTAPI rtGeometryInstanceGetContext (RTgeometryinstance geometryinstance, RTcontext ∗context)
- RTresult RTAPI rtGeometryInstanceSetGeometry (RTgeometryinstance geometryinstance, RTgeometry geometry)
- RTresult RTAPI rtGeometryInstanceGetGeometry (RTgeometryinstance geometryinstance, RTgeometry ∗geometry)
- RTresult RTAPI rtGeometryInstanceSetMaterialCount (RTgeometryinstance geometryinstance, unsigned int count)
- RTresult RTAPI rtGeometryInstanceGetMaterialCount (RTgeometryinstance geometryinstance, unsigned int ∗count)
- RTresult RTAPI rtGeometryInstanceSetMaterial (RTgeometryinstance geometryinstance, unsigned int idx, RTmaterial material)
- RTresult RTAPI rtGeometryInstanceGetMaterial (RTgeometryinstance geometryinstance, unsigned int idx, RTmaterial ∗material)
- RTresult RTAPI rtGeometryInstanceDeclareVariable (RTgeometryinstance geometryinstance, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtGeometryInstanceQueryVariable (RTgeometryinstance geometryinstance, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtGeometryInstanceRemoveVariable (RTgeometryinstance geometryinstance, RTvariable v)
- RTresult RTAPI rtGeometryInstanceGetVariableCount (RTgeometryinstance geometryinstance, unsigned int ∗count)
- RTresult RTAPI rtGeometryInstanceGetVariable (RTgeometryinstance geometryinstance, unsigned int index, RTvariable ∗v)

2.9.2 Function Documentation

2.9.2.1 RTresult RTAPI rtGeometryInstanceCreate (RTcontext *context,* RTgeometryinstance ∗ *geometryinstance*)

Creates a new geometry instance node.

Description

rtGeometryInstanceCreate creates a new geometry instance node within a context. *context* specifies the target context, and should be a value returned by rtContextCreate. After the call, ∗*geometryinstance* shall be set to the handle of a newly created geometry instance node within *context*.

Parameters

`in`	*context*	Specifies the rendering context of the GeometryInstance node
`out`	*geometryinstance*	New GeometryInstance node handle

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT

- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryInstanceCreate was introduced in OptiX 1.0.

See also rtGeometryInstanceDestroy, rtGeometryInstanceDestroy, rtGeometryInstanceGetContext

2.9.2.2 RTresult RTAPI rtGeometryInstanceDeclareVariable (RTgeometryinstance *geometryinstance,* const char ∗ *name,* RTvariable ∗ *v*)

Declares a new named variable associated with a geometry node.

Description

rtGeometryInstanceDeclareVariable declares a new variable associated with a geometry instance node. *geometryinstance* specifies the target geometry node, and should be a value returned by rtGeometryInstanceCreate. *name* specifies the name of the variable, and should be a *NULL-terminated* string. If there is currently no variable associated with *geometryinstance* named *name*, a new variable named *name* will be created and associated with *geometryinstance*. After the call, ∗*v* will be set to the handle of the newly-created variable. Otherwise, ∗*v* will be set to *NULL*. After declaration, the variable can be queried with rtGeometryInstanceQueryVariable or rtGeometryInstanceGetVariable. A declared variable does not have a type until its value is set with one of the Variable setters functions. Once a variable is set, its type cannot be changed anymore.

Parameters

`in`	*geometryinstance*	Specifies the associated GeometryInstance node
`in`	*name*	The name that identifies the variable
`out`	*v*	Returns a handle to a newly declared variable

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryInstanceDeclareVariable was introduced in OptiX 1.0.

See also Variable functions, rtGeometryInstanceQueryVariable, rtGeometryInstanceGetVariable, rtGeometryInstanceRemoveVariable

2.9.2.3 RTresult RTAPI rtGeometryInstanceDestroy (RTgeometryinstance *geometryinstance*)

Destroys a geometry instance node.

Description

rtGeometryInstanceDestroy removes *geometryinstance* from its context and deletes it. *geometryinstance* should be a value returned by rtGeometryInstanceCreate. Associated variables declared via rtGeometryInstanceDeclareVariable are destroyed, but no child graph nodes are destroyed. After the call, *geometryinstance* is no longer a valid handle.

Parameters

`in`	*geometryinstance*	Handle of the geometry instance node to destroy

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryInstanceDestroy was introduced in OptiX 1.0.

See also rtGeometryInstanceCreate

2.9.2.4 RTresult RTAPI rtGeometryInstanceGetContext (RTgeometryinstance *geometryinstance*, RTcontext ∗ *context*)

Returns the context associated with a geometry instance node.

Description

rtGeometryInstanceGetContext queries a geometry instance node for its associated context. *geometryinstance* specifies the geometry node to query, and should be a value returned by rtGeometryInstanceCreate. After the call, ∗*context* shall be set to the context associated with *geometryinstance*.

Parameters

`in`	*geometryinstance*	Specifies the geometry instance
`out`	*context*	Handle for queried context

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryInstanceGetContext was introduced in OptiX 1.0.

See also rtGeometryInstanceGetContext

2.9.2.5 RTresult RTAPI rtGeometryInstanceGetGeometry (RTgeometryinstance *geometryinstance*, RTgeometry ∗ *geometry*)

Returns the attached Geometry node.

Description

rtGeometryInstanceGetGeometry sets *geometry* to the handle of the attached Geometry node. If no Geometry node is attached, RT_ERROR_INVALID_VALUE is returned, else RT_SUCCESS.

Parameters

`in`	*geometryinstance*	GeometryInstance node handle to query geometry
`out`	*geometry*	Handle to attached Geometry node

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryInstanceGetGeometry was introduced in OptiX 1.0.

See also rtGeometryInstanceCreate, rtGeometryInstanceDestroy, rtGeometryInstanceValidate, rtGeometryInstanceSetGeometry

2.9.2.6 RTresult RTAPI rtGeometryInstanceGetMaterial (RTgeometryinstance *geometryinstance,* unsigned int *idx,* RTmaterial ∗ *material*)

Returns a material handle.

Description

rtGeometryInstanceGetMaterial returns handle *material* for the Material node at position *idx* in the material list of *geometryinstance*. *idx* must be in the range of *0* to rtGeometryInstanceGetMaterialCount - 1.

Parameters

`in`	*geometryinstance*	GeometryInstance node handle to query material
`in`	*idx*	Index of material
`out`	*material*	Handle to material

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryInstanceGetMaterial was introduced in OptiX 1.0.

See also rtGeometryInstanceGetMaterialCount, rtGeometryInstanceSetMaterial

2.9.2.7 RTresult RTAPI rtGeometryInstanceGetMaterialCount (RTgeometryinstance *geometryinstance,* unsigned int ∗ *count*)

Returns the number of attached materials.

Description

rtGeometryInstanceGetMaterialCount returns for *geometryinstance* the number of attached Material nodes *count*. The number of materies can be set with rtGeometryInstanceSetMaterialCount.

Parameters

`in`	*geometryinstance*	GeometryInstance node to query from the number of materials
`out`	*count*	Number of attached materials

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

rtGeometryInstanceGetMaterialCount was introduced in OptiX 1.0.

See also rtGeometryInstanceSetMaterialCount

2.9.2.8 RTresult RTAPI rtGeometryInstanceGetVariable (RTgeometryinstance *geometryinstance,* unsigned int *index,* RTvariable ∗ *v*)

Returns a handle to an indexed variable of a geometry instance node.

Description

rtGeometryInstanceGetVariable queries the handle of a geometry instance's indexed variable. *geometryinstance* specifies the target geometry instance and should be a value returned by rtGeometryInstanceCreate. *index* specifies the index of the variable, and should be a value less than rtGeometryInstanceGetVariableCount. If *index* is the index of a variable attached to *geometryinstance*, ∗*v* will be a handle to that variable after the call. Otherwise, ∗*v* will be *NULL* after the call. ∗*v* has to be declared first with rtGeometryInstanceDeclareVariable before it can be queried.

Parameters

`in`	*geometryinstance*	The GeometryInstance node from which to query a variable
`in`	*index*	The index that identifies the variable to be queried
`out`	*v*	Returns handle to indexed variable

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_VARIABLE_NOT_FOUND

History

rtGeometryInstanceGetVariable was introduced in OptiX 1.0.

See also rtGeometryDeclareVariable, rtGeometryGetVariableCount, rtGeometryRemoveVariable, rtGeometryQueryVariable

2.9.2.9 RTresult RTAPI rtGeometryInstanceGetVariableCount (RTgeometryinstance *geometryinstance,* unsigned int ∗ *count*)

Returns the number of attached variables.

Description

rtGeometryInstanceGetVariableCount queries the number of variables attached to a geometry instance. *geometryinstance* specifies the geometry instance, and should be a value returned by rtGeometryInstanceCreate. After the call, the number of variables attached to *geometryinstance* is returned to ∗*count*.

Parameters

in	*geometryinstance*	The GeometryInstance node to query from the number of attached variables
out	*count*	Returns the number of attached variables

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryInstanceGetVariableCount was introduced in OptiX 1.0.

See also rtGeometryInstanceGetVariableCount, rtGeometryInstanceDeclareVariable, rtGeometryInstanceRemoveVariable

2.9.2.10 RTresult RTAPI rtGeometryInstanceQueryVariable (RTgeometryinstance *geometryinstance*, const char ∗ *name*, RTvariable ∗ *v*)

Returns a handle to a named variable of a geometry node.

Description

rtGeometryInstanceQueryVariable queries the handle of a geometry instance node's named variable. *geometryinstance* specifies the target geometry node and should be a value returned by rtGeometryInstanceCreate. *name* specifies the name of the variable, and should be a *NULL-terminated* string. If *name* is the name of a variable attached to *geometryinstance*, ∗*v* will be a handle to that variable after the call. Otherwise, ∗*v* will be *NULL* after the call. Geometry instance variables have to be declared with rtGeometryInstanceDeclareVariable before they can be queried.

Parameters

in	*geometryinstance*	The GeometryInstance node to query from a variable
in	*name*	The name that identifies the variable to be queried
out	*v*	Returns the named variable

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryInstanceQueryVariable was introduced in OptiX 1.0.

See also rtGeometryInstanceDeclareVariable, rtGeometryInstanceRemoveVariable, rtGeometryInstanceGetVariableCount, rtGeometryInstanceGetVariable

2.9.2.11 RTresult RTAPI rtGeometryInstanceRemoveVariable (RTgeometryinstance *geometryinstance,* RTvariable *v*)

Removes a named variable from a geometry instance node.

Description

rtGeometryInstanceRemoveVariable removes a named variable from a geometry instance. The target geometry instance is specified by *geometryinstance*, which should be a value returned by rtGeometryInstanceCreate. The variable to be removed is specified by *v*, which should be a value returned by rtGeometryInstanceDeclareVariable. Once a variable has been removed from this geometry instance, another variable with the same name as the removed variable may be declared.

Parameters

`in`	*geometryinstance*	The GeometryInstance node from which to remove a variable
`in`	*v*	The variable to be removed

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_VARIABLE_NOT_FOUND

History

rtGeometryInstanceRemoveVariable was introduced in OptiX 1.0.

See also rtContextRemoveVariable, rtGeometryInstanceDeclareVariable

2.9.2.12 RTresult RTAPI rtGeometryInstanceSetGeometry (RTgeometryinstance *geometryinstance,* RTgeometry *geometry*)

Attaches a Geometry node.

Description

rtGeometryInstanceSetGeometry attaches a Geometry node to a GeometryInstance. Only *one* Geometry node can be attached to a GeometryInstance. However, it is at any time possible to attach a different Geometry node.

Parameters

`in`	*geometryinstance*	GeometryInstance node handle to attach geometry
`in`	*geometry*	Geometry handle to attach to *geometryinstance*

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryInstanceSetGeometry was introduced in OptiX 1.0.

See also rtGeometryInstanceGetGeometry

2.9.2.13 RTresult RTAPI rtGeometryInstanceSetMaterial (RTgeometryinstance *geometryinstance,* unsigned int *idx,* RTmaterial *material*)

Sets a material.

Description

rtGeometryInstanceSetMaterial attaches *material* to *geometryinstance* at position *idx* in its internal Material node list. *idx* has to be in the range *0* to rtGeometryInstanceGetMaterialCount - 1.

Parameters

in	*geometryinstance*	GeometryInstance node for which to set a material
in	*idx*	Index into the material list
in	*material*	Material handle to attach to *geometryinstance*

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryInstanceSetMaterial was introduced in OptiX 1.0.

See also rtGeometryInstanceGetMaterialCount, rtGeometryInstanceSetMaterialCount

2.9.2.14 RTresult RTAPI rtGeometryInstanceSetMaterialCount (RTgeometryinstance *geometryinstance,* unsigned int *count*)

Sets the number of materials.

Description

rtGeometryInstanceSetMaterialCount sets the number of materials *count* that will be attached to *geometryinstance*. The number of attached materials can be changed at any time. Increasing the number of materials will not modify already assigned materials. Decreasing the number of materials will not modify the remaining already assigned materials.

Parameters

in	*geometryinstance*	GeometryInstance node to set number of materials
in	*count*	Number of materials to be set

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryInstanceSetMaterialCount was introduced in OptiX 1.0.

See also rtGeometryInstanceGetMaterialCount

2.9.2.15 RTresult RTAPI rtGeometryInstanceValidate (RTgeometryinstance *geometryinstance*)

Checks a GeometryInstance node for internal consistency.

Description

rtGeometryInstanceValidate checks *geometryinstance* for completeness. If *geomertryinstance* or any of the objects attached to *geometry* are not valid, the call will return RT_ERROR_INVALID_VALUE.

Parameters

in	*geometryin-stance*	GeometryInstance node of a model sub-tree to be validated

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryInstanceValidate was introduced in OptiX 1.0.

See also rtGeometryInstanceCreate

2.10 Geometry functions

2.10.1 Detailed Description

Functions related to an OptiX Geometry node.

Functions

- RTresult RTAPI rtGeometryCreate (RTcontext context, RTgeometry ∗geometry)
- RTresult RTAPI rtGeometryDestroy (RTgeometry geometry)
- RTresult RTAPI rtGeometryValidate (RTgeometry geometry)
- RTresult RTAPI rtGeometryGetContext (RTgeometry geometry, RTcontext ∗context)
- RTresult RTAPI rtGeometrySetPrimitiveCount (RTgeometry geometry, unsigned int num_primitives)
- RTresult RTAPI rtGeometryGetPrimitiveCount (RTgeometry geometry, unsigned int ∗num_primitives)
- RTresult RTAPI rtGeometrySetPrimitiveIndexOffset (RTgeometry geometry, unsigned int index_offset)
- RTresult RTAPI rtGeometryGetPrimitiveIndexOffset (RTgeometry geometry, unsigned int ∗index_offset)
- RTresult RTAPI rtGeometrySetBoundingBoxProgram (RTgeometry geometry, RTprogram program)
- RTresult RTAPI rtGeometryGetBoundingBoxProgram (RTgeometry geometry, RTprogram ∗program)
- RTresult RTAPI rtGeometrySetIntersectionProgram (RTgeometry geometry, RTprogram program)
- RTresult RTAPI rtGeometryGetIntersectionProgram (RTgeometry geometry, RTprogram ∗program)
- RTresult RTAPI rtGeometryMarkDirty (RTgeometry geometry)
- RTresult RTAPI rtGeometryIsDirty (RTgeometry geometry, int ∗dirty)
- RTresult RTAPI rtGeometryDeclareVariable (RTgeometry geometry, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtGeometryQueryVariable (RTgeometry geometry, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtGeometryRemoveVariable (RTgeometry geometry, RTvariable v)
- RTresult RTAPI rtGeometryGetVariableCount (RTgeometry geometry, unsigned int ∗count)
- RTresult RTAPI rtGeometryGetVariable (RTgeometry geometry, unsigned int index, RTvariable ∗v)

2.10.2 Function Documentation

2.10.2.1 RTresult RTAPI rtGeometryCreate (RTcontext *context*, RTgeometry ∗ *geometry*)

Creates a new geometry node.

Description

rtGeometryCreate creates a new geometry node within a context. *context* specifies the target context, and should be a value returned by rtContextCreate. After the call, ∗*geometry* shall be set to the handle of a newly created geometry node within *context*.

Parameters

`in`	*context*	Specifies the rendering context of the Geometry node
`out`	*geometry*	New Geometry node handle

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryCreate was introduced in OptiX 1.0.

See also rtGeometryDestroy, rtGeometrySetBoundingBoxProgram, rtGeometrySetIntersectionProgram

2.10.2.2 RTresult RTAPI rtGeometryDeclareVariable (RTgeometry *geometry,* const char ∗ *name,* RTvariable ∗ *v*)

Declares a new named variable associated with a geometry instance.

Description

rtGeometryDeclareVariable declares a new variable associated with a geometry node. *geometry* specifies the target geometry node, and should be a value returned by rtGeometryCreate. *name* specifies the name of the variable, and should be a *NULL-terminated* string. If there is currently no variable associated with *geometry* named *name*, a new variable named *name* will be created and associated with *geometry*. After the call, $*v$ will be set to the handle of the newly-created variable. Otherwise, $*v$ will be set to *NULL*. After declaration, the variable can be queried with rtGeometryQueryVariable or rtGeometryGetVariable. A declared variable does not have a type until its value is set with one of the Variable setters functions. Once a variable is set, its type cannot be changed anymore.

Parameters

in	*geometry*	Specifies the associated Geometry node
in	*name*	The name that identifies the variable
out	*v*	Returns a handle to a newly declared variable

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_VARIABLE_REDECLARED
- RT_ERROR_ILLEGAL_SYMBOL

History

rtGeometryDeclareVariable was introduced in OptiX 1.0.

See also Variable functions, rtGeometryQueryVariable, rtGeometryGetVariable, rtGeometryRemoveVariable

2.10.2.3 RTresult RTAPI rtGeometryDestroy (RTgeometry *geometry*)

Destroys a geometry node.

Description

rtGeometryDestroy removes *geometry* from its context and deletes it. *geometry* should be a value returned by rtGeometryCreate. Associated variables declared via rtGeometryDeclareVariable are destroyed, but no child graph nodes are destroyed. After the call, *geometry* is no longer a valid handle.

Parameters

in	*geometry*	Handle of the geometry node to destroy

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryDestroy was introduced in OptiX 1.0.

See also rtGeometryCreate, rtGeometrySetPrimitiveCount, rtGeometryGetPrimitiveCount

2.10.2.4 RTresult RTAPI rtGeometryGetBoundingBoxProgram (RTgeometry *geometry,* RTprogram ∗ *program*)

Returns the attached bounding box program.

Description

rtGeometryGetBoundingBoxProgram returns the handle *program* for the attached bounding box program of *geometry*.

Parameters

in	*geometry*	Geometry node handle from which to query program
out	*program*	Handle to attached bounding box program

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryGetBoundingBoxProgram was introduced in OptiX 1.0.

See also rtGeometrySetBoundingBoxProgram

2.10.2.5 RTresult RTAPI rtGeometryGetContext (RTgeometry *geometry,* RTcontext ∗ *context*)

Returns the context associated with a geometry node.

Description

rtGeometryGetContext queries a geometry node for its associated context. *geometry* specifies the geometry node to query, and should be a value returned by rtGeometryCreate. After the call, ∗*context* shall be set to the context associated with *geometry*.

Parameters

in	*geometry*	Specifies the geometry to query
out	*context*	The context associated with *geometry*

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryGetContext was introduced in OptiX 1.0.

See also rtGeometryCreate

2.10.2.6 RTresult RTAPI rtGeometryGetIntersectionProgram (RTgeometry *geometry,* RTprogram ∗ *program*)

Returns the attached intersection program.

Description

rtGeometryGetIntersectionProgram returns in *program* a handle of the attached intersection program.

Parameters

in	*geometry*	Geometry node handle to query program
out	*program*	Handle to attached intersection program

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryGetIntersectionProgram was introduced in OptiX 1.0.

See also rtGeometrySetIntersectionProgram, rtProgramCreateFromPTXFile, rtProgramCreateFromPTXString

2.10.2.7 RTresult RTAPI rtGeometryGetPrimitiveCount (RTgeometry *geometry,* unsigned int ∗ *num_primitives*)

Returns the number of primitives.

Description

rtGeometryGetPrimitiveCount returns for *geometry* the number of set primitives. The number of primitvies can be set with rtGeometryGetPrimitiveCount.

Parameters

in	*geometry*	Geometry node to query from the number of primitives
out	*num_primitives*	Number of primitives

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryGetPrimitiveCount was introduced in OptiX 1.0.

See also rtGeometrySetPrimitiveCount

2.10.2.8 RTresult RTAPI rtGeometryGetPrimitiveIndexOffset (RTgeometry *geometry,* unsigned int ∗ *index_offset*)

Returns the current primitive index offset.

Description

rtGeometryGetPrimitiveIndexOffset returns for *geometry* the primitive index offset. The primitive index offset can be set with rtGeometrySetPrimitiveIndexOffset.

Parameters

in	*geometry*	Geometry node to query for the primitive index offset
out	*index_offset*	Primitive index offset

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

rtGeometryGetPrimitiveIndexOffset was introduced in OptiX 3.5.

See also rtGeometrySetPrimitiveIndexOffset

2.10.2.9 RTresult RTAPI rtGeometryGetVariable (RTgeometry *geometry*, unsigned int *index*, RTvariable ∗ *v*)

Returns a handle to an indexed variable of a geometry node.

Description

rtGeometryGetVariable queries the handle of a geometry node's indexed variable. *geometry* specifies the target geometry and should be a value returned by rtGeometryCreate. *index* specifies the index of the variable, and should be a value less than rtGeometryGetVariableCount. If *index* is the index of a variable attached to *geometry*, ∗*v* will be a handle to that variable after the call. Otherwise, ∗*v* will be *NULL* after the call. ∗*v* has to be declared first with rtGeometryDeclareVariable before it can be queried.

Parameters

in	*geometry*	The geometry node from which to query a variable
in	*index*	The index that identifies the variable to be queried
out	*v*	Returns handle to indexed variable

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_VARIABLE_NOT_FOUND

History

rtGeometryGetVariable was introduced in OptiX 1.0.

See also rtGeometryDeclareVariable, rtGeometryGetVariableCount, rtGeometryRemoveVariable, rtGeometry-QueryVariable

2.10.2.10 RTresult RTAPI rtGeometryGetVariableCount (RTgeometry *geometry*, unsigned int ∗ *count*)

Returns the number of attached variables.

Description

rtGeometryGetVariableCount queries the number of variables attached to a geometry node. *geometry* specifies the geometry node, and should be a value returned by rtGeometryCreate. After the call, the number of variables attached to *geometry* is returned to ∗*count*.

Parameters

in	*geometry*	The Geometry node to query from the number of attached variables
out	*count*	Returns the number of attached variables

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryGetVariableCount was introduced in OptiX 1.0.

See also rtGeometryGetVariableCount, rtGeometryDeclareVariable, rtGeometryRemoveVariable

2.10.2.11 RTresult RTAPI rtGeometryIsDirty (RTgeometry *geometry*, int ∗ *dirty*)

Returns the dirty flag.

Description

rtGeometryIsDirty returns the dirty flag of *geometry*. The dirty flag for geometry nodes can be set with rtGeometry-MarkDirty. By default the flag is *1* for a new geometry node, indicating dirty. After a call to rtContextLaunch the flag is automatically set to *0*. When the dirty flag is set, the geometry data is uploaded automatically to the device while a rtContextLaunch call.

Parameters

in	*geometry*	The geometry node to query from the dirty flag
out	*dirty*	Dirty flag

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryIsDirty was introduced in OptiX 1.0.

See also rtContextLaunch functions, rtGeometryMarkDirty

2.10.2.12 RTresult RTAPI rtGeometryMarkDirty (RTgeometry *geometry*)

Sets the dirty flag.

Description

rtGeometryMarkDirty sets for *geometry* the dirty flag. By default the dirty flag is set for a new Geometry node. After a call to rtContextLaunch the flag is automatically cleared. When the dirty flag is set, the geometry data is uploaded automatically to the device while a rtContextLaunch call.

Parameters

in	*geometry*	The geometry node to mark as dirty

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryMarkDirty was introduced in OptiX 1.0.

See also rtGeometryIsDirty

2.10.2.13 RTresult RTAPI rtGeometryQueryVariable (RTgeometry *geometry,* const char ∗ *name,* RTvariable ∗ *v*)

Returns a handle to a named variable of a geometry node.

Description

rtGeometryQueryVariable queries the handle of a geometry node's named variable. *geometry* specifies the target geometry node and should be a value returned by rtGeometryCreate. *name* specifies the name of the variable, and should be a *NULL-terminated* string. If *name* is the name of a variable attached to *geometry*, $*v$ will be a handle to that variable after the call. Otherwise, $*v$ will be *NULL* after the call. Geometry variables have to be declared with rtGeometryDeclareVariable before they can be queried.

Parameters

in	*geometry*	The geometry node to query from a variable
in	*name*	The name that identifies the variable to be queried
out	*v*	Returns the named variable

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_VARIABLE_NOT_FOUND

History

rtGeometryQueryVariable was introduced in OptiX 1.0.

See also rtGeometryDeclareVariable, rtGeometryRemoveVariable, rtGeometryGetVariableCount, rtGeometryGet-Variable

2.10.2.14 RTresult RTAPI rtGeometryRemoveVariable (RTgeometry *geometry,* RTvariable *v*)

Removes a named variable from a geometry node.

Description

rtGeometryRemoveVariable removes a named variable from a geometry node. The target geometry is specified by *geometry*, which should be a value returned by rtGeometryCreate. The variable to remove is specified by *v*, which should be a value returned by rtGeometryDeclareVariable. Once a variable has been removed from this geometry node, another variable with the same name as the removed variable may be declared.

Parameters

in	*geometry*	The geometry node from which to remove a variable
in	*v*	The variable to be removed

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_VARIABLE_NOT_FOUND

History

rtGeometryRemoveVariable was introduced in OptiX 1.0.

See also rtContextRemoveVariable

2.10.2.15 RTresult RTAPI rtGeometrySetBoundingBoxProgram (RTgeometry *geometry,* RTprogram *program*)

Sets the bounding box program.

Description

rtGeometrySetBoundingBoxProgram sets for *geometry* the *program* that computes an axis aligned bounding box for each attached primitive to *geometry*. RTprogram's can be either generated with rtProgramCreateFromPTXFile or rtProgramCreateFromPTXString. A bounding box program is mandatory for every geometry node.

Parameters

in	*geometry*	The geometry node for which to set the bounding box program
in	*program*	Handle to the bounding box program

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_TYPE_MISMATCH

History

rtGeometrySetBoundingBoxProgram was introduced in OptiX 1.0.

See also rtGeometryGetBoundingBoxProgram, rtProgramCreateFromPTXFile, rtProgramCreateFromPTXString

2.10.2.16 RTresult RTAPI rtGeometrySetIntersectionProgram (RTgeometry *geometry,* RTprogram *program*)

Sets the intersection program.

Description

rtGeometrySetIntersectionProgram sets for *geometry* the *program* that performs ray primitive intersections. RTprogram's can be either generated with rtProgramCreateFromPTXFile or rtProgramCreateFromPTXString. An intersection program is mandatory for every geometry node.

Parameters

`in`	*geometry*	The geometry node for which to set the intersection program
`in`	*program*	A handle to the ray primitive intersection program

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_TYPE_MISMATCH

History

rtGeometrySetIntersectionProgram was introduced in OptiX 1.0.

See also rtGeometryGetIntersectionProgram, rtProgramCreateFromPTXFile, rtProgramCreateFromPTXString

2.10.2.17 RTresult RTAPI rtGeometrySetPrimitiveCount (RTgeometry *geometry*, unsigned int *num_primitives*)

Sets the number of primitives.

Description

rtGeometrySetPrimitiveCount sets the number of primitives *num_primitives* in *geometry*.

Parameters

`in`	*geometry*	The geometry node for which to set the number of primitives
`in`	*num_primitives*	The number of primitives

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometrySetPrimitiveCount was introduced in OptiX 1.0.

See also rtGeometryGetPrimitiveCount

2.10.2.18 RTresult RTAPI rtGeometrySetPrimitiveIndexOffset (RTgeometry *geometry*, unsigned int *index_offset*)

Sets the primitive index offset.

Description

rtGeometrySetPrimitiveIndexOffset sets the primitive index offset *index_offset* in *geometry*. In the past, a Geometry functions object's primitive index range always started at zero (e.g., a Geometry with *N* primitives would have a primitive index range of [0,N-1]). The index offset is used to allow Geometry functions objects to have primitive index ranges starting at non-zero positions (e.g., a Geometry with *N* primtives and and index offset of *M* would have a primitive index range of [M,M+N-1]). This feature enables the sharing of vertex index buffers between multiple Geometry functions objects.

Parameters

in	*geometry*	The geometry node for which to set the primitive index offset
in	*index_offset*	The primitive index offset

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

rtGeometrySetPrimitiveIndexOffset was introduced in OptiX 3.5.

See also rtGeometryGetPrimitiveIndexOffset

2.10.2.19 RTresult RTAPI rtGeometryValidate (RTgeometry *geometry*)

Validates the geometry nodes integrity.

Description

rtGeometryValidate checks *geometry* for completeness. If *geomertry* or any of the objects attached to *geometry* are not valid, the call will return RT_ERROR_INVALID_VALUE.

Parameters

in	*geometry*	The geometry node to be validated

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtGeometryValidate was introduced in OptiX 1.0.

See also rtContextValidate

2.11 Material functions

2.11.1 Detailed Description

Functions related to an OptiX Material.

Functions

- RTresult RTAPI rtMaterialCreate (RTcontext context, RTmaterial ∗material)
- RTresult RTAPI rtMaterialDestroy (RTmaterial material)
- RTresult RTAPI rtMaterialValidate (RTmaterial material)
- RTresult RTAPI rtMaterialGetContext (RTmaterial material, RTcontext ∗context)
- RTresult RTAPI rtMaterialSetClosestHitProgram (RTmaterial material, unsigned int ray_type_index, RTprogram program)
- RTresult RTAPI rtMaterialGetClosestHitProgram (RTmaterial material, unsigned int ray_type_index, RTprogram ∗program)
- RTresult RTAPI rtMaterialSetAnyHitProgram (RTmaterial material, unsigned int ray_type_index, RTprogram program)
- RTresult RTAPI rtMaterialGetAnyHitProgram (RTmaterial material, unsigned int ray_type_index, RTprogram ∗program)
- RTresult RTAPI rtMaterialDeclareVariable (RTmaterial material, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtMaterialQueryVariable (RTmaterial material, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtMaterialRemoveVariable (RTmaterial material, RTvariable v)
- RTresult RTAPI rtMaterialGetVariableCount (RTmaterial material, unsigned int ∗count)
- RTresult RTAPI rtMaterialGetVariable (RTmaterial material, unsigned int index, RTvariable ∗v)

2.11.2 Function Documentation

2.11.2.1 RTresult RTAPI rtMaterialCreate (RTcontext *context*, RTmaterial ∗ *material*)

Creates a new material.

Description

rtMaterialCreate creates a new material within a context. *context* specifies the target context, and should be a value returned by rtContextCreate. After the call, if *material* is not *NULL*, ∗*material* shall be set to the handle of a newly created material within *context*. Otherwise, this call has no effect and returns RT_ERROR_INVALID_VALUE.

Parameters

`in`	*context*	Specifies a context within which to create a new material
`out`	*material*	Returns a newly created material

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtMaterialCreate was introduced in OptiX 1.0.

See also rtMaterialDestroy, rtContextCreate

2.11.2.2 RTresult RTAPI rtMaterialDeclareVariable (RTmaterial *material,* const char ∗ *name,* RTvariable ∗ *v*)

Declares a new named variable to be associated with a material.

Description

rtMaterialDeclareVariable declares a new variable to be associated with a material. *material* specifies the target material, and should be a value returned by rtMaterialCreate. *name* specifies the name of the variable, and should be a *NULL-terminated* string. If there is currently no variable associated with *material* named *name*, and *variable* is not *NULL*, a new variable named *name* will be created and associated with *material*. After the call, ∗*variable* shall be set to the handle of the newly-created variable. Otherwise, this call has no effect and shall return either RT_ERROR_INVALID_VALUE if either *name* or *variable* is equal to *NULL* or RT_ERROR_VARIABLE_REDECLARED if *name* is the name of an existing variable associated with the material.

Parameters

in	*material*	Specifies the material to modify
in	*name*	Specifies the name of the variable
out	*v*	Returns a handle to a newly declared variable

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_VARIABLE_REDECLARED
- RT_ERROR_ILLEGAL_SYMBOL

History

rtMaterialDeclareVariable was introduced in OptiX 1.0.

See also rtMaterialGetVariable, rtMaterialQueryVariable, rtMaterialCreate

2.11.2.3 RTresult RTAPI rtMaterialDestroy (RTmaterial *material*)

Destroys a material object.

Description

rtMaterialDestroy removes *material* from its context and deletes it. *material* should be a value returned by rtMaterialCreate. Associated variables declared via rtMaterialDeclareVariable are destroyed, but no child graph nodes are destroyed. After the call, *material* is no longer a valid handle.

Parameters

in	*material*	Handle of the material node to destroy

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

rtMaterialDestroy was introduced in OptiX 1.0.

See also rtMaterialCreate

2.11.2.4 RTresult RTAPI rtMaterialGetAnyHitProgram (RTmaterial *material,* unsigned int *ray_type_index,* RTprogram ∗ *program*)

Returns the any hit program associated with a (material, ray type) tuple.

Description

rtMaterialGetAnyHitProgram queries the any hit program associated with a (material, ray type) tuple. *material* specifies the material of interest and should be a value returned by rtMaterialCreate. *ray_type_index* specifies the target ray type and should be a value less than the value returned by rtContextGetRayTypeCount. After the call, if all parameters are valid, ∗*program* shall be set to the handle of the any hit program associated with the tuple (*material*, *ray_type_index*). Otherwise, the call has no effect and returns RT_ERROR_INVALID_VALUE.

Parameters

`in`	*material*	Specifies the material of the (material, ray type) tuple to query
`in`	*ray_type_index*	Specifies the type of ray of the (material, ray type) tuple to query
`out`	*program*	Returns the any hit program associated with the (material, ray type) tuple

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtMaterialGetAnyHitProgram was introduced in OptiX 1.0.

See also rtMaterialSetAnyHitProgram, rtMaterialCreate, rtContextGetRayTypeCount

2.11.2.5 RTresult RTAPI rtMaterialGetClosestHitProgram (RTmaterial *material,* unsigned int *ray_type_index,* RTprogram ∗ *program*)

Returns the closest hit program associated with a (material, ray type) tuple.

Description

rtMaterialGetClosestHitProgram queries the closest hit program associated with a (material, ray type) tuple. *material* specifies the material of interest and should be a value returned by rtMaterialCreate. *ray_type_index* specifies the target ray type and should be a value less than the value returned by rtContextGetRayTypeCount. After the call, if all parameters are valid, ∗*program* shall be set to the handle of the any hit program associated with the tuple (*material*, *ray_type_index*). Otherwise, the call has no effect and returns RT_ERROR_INVALID_VALUE.

Parameters

`in`	*material*	Specifies the material of the (material, ray type) tuple to query
`in`	*ray_type_index*	Specifies the type of ray of the (material, ray type) tuple to query
`out`	*program*	Returns the closest hit program associated with the (material, ray type) tuple

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtMaterialGetClosestHitProgram was introduced in OptiX 1.0.

See also rtMaterialSetClosestHitProgram, rtMaterialCreate, rtContextGetRayTypeCount

2.11.2.6 RTresult RTAPI rtMaterialGetContext (RTmaterial *material,* RTcontext ∗ *context*)

Returns the context associated with a material.

Description

rtMaterialGetContext queries a material for its associated context. *material* specifies the material to query, and should be a value returned by rtMaterialCreate. After the call, if both parameters are valid, ∗*context* shall be set to the context associated with *material*. Otherwise, the call has no effect and returns RT_ERROR_INVALID_VALUE.

Parameters

in	*material*	Specifies the material to query
out	*context*	Returns the context associated with the material

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

rtMaterialGetContext was introduced in OptiX 1.0.

See also rtMaterialCreate

2.11.2.7 RTresult RTAPI rtMaterialGetVariable (RTmaterial *material,* unsigned int *index,* RTvariable ∗ *v*)

Returns a handle to an indexed variable of a material.

Description

rtMaterialGetVariable queries the handle of a material's indexed variable. *material* specifies the target material and should be a value returned by rtMaterialCreate. *index* specifies the index of the variable, and should be a value less than rtMaterialGetVariableCount. If *material* is a valid material and *index* is the index of a variable attached to *material*, ∗*variable* shall be set to a handle to that variable after the call. Otherwise, ∗*variable* shall be set to *NULL* and either RT_ERROR_INVALID_VALUE or RT_ERROR_VARIABLE_NOT_FOUND shall be returned depending on the validity of *material*, or *index*, respectively.

Parameters

in	*material*	Specifies the material to query
in	*index*	Specifies the index of the variable to query
out	*v*	Returns the indexed variable

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_VARIABLE_NOT_FOUND

History

rtMaterialGetVariable was introduced in OptiX 1.0.

See also rtMaterialQueryVariable, rtMaterialGetVariableCount, rtMaterialCreate

2.11.2.8 RTresult RTAPI rtMaterialGetVariableCount (RTmaterial *material,* unsigned int ∗ *count*)

Returns the number of variables attached to a material.

Description

rtMaterialGetVariableCount queries the number of variables attached to a material. *material* specifies the material, and should be a value returned by rtMaterialCreate. After the call, if both parameters are valid, the number of variables attached to *material* is returned to ∗*count*. Otherwise, the call has no effect and returns RT_ERROR_INVALID_VALUE.

Parameters

in	*material*	Specifies the material to query
out	*count*	Returns the number of variables

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

rtMaterialGetVariableCount was introduced in OptiX 1.0.

See also rtMaterialCreate

2.11.2.9 RTresult RTAPI rtMaterialQueryVariable (RTmaterial *material,* const char ∗ *name,* RTvariable ∗ *v*)

Queries for the existence of a named variable of a material.

Description

rtMaterialQueryVariable queries for the existence of a material's named variable. *material* specifies the target material and should be a value returned by rtMaterialCreate. *name* specifies the name of the variable, and should be a *NULL-terminated* string. If *material* is a valid material and *name* is the name of a variable attached to *material*, ∗*variable* shall be set to a handle to that variable after the call. Otherwise, ∗*variable* shall be set to *NULL*. If *material* is not a valid material, RT_ERROR_INVALID_VALUE shall be returned.

Parameters

in	*material*	Specifies the material to query
in	*name*	Specifies the name of the variable to query
out	*v*	Returns a the named variable, if it exists

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtMaterialQueryVariable was introduced in OptiX 1.0.

See also rtMaterialGetVariable, rtMaterialCreate

2.11.2.10 RTresult RTAPI rtMaterialRemoveVariable (RTmaterial *material,* RTvariable *v*)

Removes a variable from a material.

Description

rtMaterialRemoveVariable removes a variable from a material. The material of interest is specified by *material*, which should be a value returned by rtMaterialCreate. The variable to remove is specified by *variable*, which should be a value returned by rtMaterialDeclareVariable. Once a variable has been removed from this material, another variable with the same name as the removed variable may be declared. If *material* does not refer to a valid material, this call has no effect and returns RT_ERROR_INVALID_VALUE. If *variable* is not a valid variable or does not belong to *material*, this call has no effect and returns RT_ERROR_INVALID_VALUE or RT_ERROR_VARIABLE_NOT_FOUND, respectively.

Parameters

in	*material*	Specifies the material to modify
in	*v*	Specifies the variable to remove

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_VARIABLE_NOT_FOUND

History

rtMaterialRemoveVariable was introduced in OptiX 1.0.

See also rtMaterialDeclareVariable, rtMaterialCreate

2.11.2.11 RTresult RTAPI rtMaterialSetAnyHitProgram (RTmaterial *material,* unsigned int *ray_type_index,* RTprogram *program*)

Sets the any hit program associated with a (material, ray type) tuple.

Description

rtMaterialSetAnyHitProgram specifies an any hit program to associate with a (material, ray type) tuple. *material* specifies the target material and should be a value returned by rtMaterialCreate. *ray_type_index* specifies the type of ray to which the program applies and should be a value less than the value returned by rtContextGetRayTypeCount. *program* specifies the target any hit program which shall apply to the tuple (*material*, *ray_type_index*) and should be a value returned by either rtProgramCreateFromPTXString or rtProgramCreateFromPTXFile.

Parameters

in	*material*	Specifies the material of the (material, ray type) tuple to modify
in	*ray_type_index*	Specifies the type of ray of the (material, ray type) tuple to modify
in	*program*	Specifies the any hit program to associate with the (material, ray type) tuple

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_TYPE_MISMATCH

History

rtMaterialSetAnyHitProgram was introduced in OptiX 1.0.

See also rtMaterialGetAnyHitProgram, rtMaterialCreate, rtContextGetRayTypeCount, rtProgramCreateFromPTXString, rtProgramCreateFromPTXFile

2.11.2.12 RTresult RTAPI rtMaterialSetClosestHitProgram (RTmaterial *material*, unsigned int *ray_type_index*, RTprogram *program*)

Sets the closest hit program associated with a (material, ray type) tuple.

Description

rtMaterialSetClosestHitProgram specifies a closest hit program to associate with a (material, ray type) tuple. *material* specifies the material of interest and should be a value returned by rtMaterialCreate. *ray_type_index* specifies the type of ray to which the program applies and should be a value less than the value returned by rtContextGetRayTypeCount. *program* specifies the target closest hit program which shall apply to the tuple (*material*, *ray_type_index*) and should be a value returned by either rtProgramCreateFromPTXString or rtProgramCreateFromPTXFile.

Parameters

in	*material*	Specifies the material of the (material, ray type) tuple to modify
in	*ray_type_index*	Specifies the ray type of the (material, ray type) tuple to modify
in	*program*	Specifies the closest hit program to associate with the (material, ray type) tuple

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_TYPE_MISMATCH

History

rtMaterialSetClosestHitProgram was introduced in OptiX 1.0.

See also rtMaterialGetClosestHitProgram, rtMaterialCreate, rtContextGetRayTypeCount, rtProgramCreateFromPTXString, rtProgramCreateFromPTXFile

2.11.2.13 RTresult RTAPI rtMaterialValidate (RTmaterial *material*)

Verifies the state of a material.

Description

rtMaterialValidate checks *material* for completeness. If *material* or any of the objects attached to *material* are not valid, the call will return RT_ERROR_INVALID_VALUE.

Parameters

in	*material*	Specifies the material to be validated

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtMaterialValidate was introduced in OptiX 1.0.

See also rtMaterialCreate

2.12 Program functions

2.12.1 Detailed Description

Functions related to an OptiX program.

Functions

- RTresult RTAPI rtProgramCreateFromPTXString (RTcontext context, const char ∗ptx, const char ∗program_name, RTprogram ∗program)
- RTresult RTAPI rtProgramCreateFromPTXFile (RTcontext context, const char ∗filename, const char ∗program_name, RTprogram ∗program)
- RTresult RTAPI rtProgramDestroy (RTprogram program)
- RTresult RTAPI rtProgramValidate (RTprogram program)
- RTresult RTAPI rtProgramGetContext (RTprogram program, RTcontext ∗context)
- RTresult RTAPI rtProgramDeclareVariable (RTprogram program, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtProgramQueryVariable (RTprogram program, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtProgramRemoveVariable (RTprogram program, RTvariable v)
- RTresult RTAPI rtProgramGetVariableCount (RTprogram program, unsigned int ∗count)
- RTresult RTAPI rtProgramGetVariable (RTprogram program, unsigned int index, RTvariable ∗v)
- RTresult RTAPI rtProgramGetId (RTprogram program, int ∗program_id)
- RTresult RTAPI rtContextGetProgramFromId (RTcontext context, int program_id, RTprogram ∗program)

2.12.2 Function Documentation

2.12.2.1 RTresult RTAPI rtContextGetProgramFromId (RTcontext *context,* int *program_id,* RTprogram ∗ *program*)

Gets an RTprogram corresponding to the program id.

Description

rtContextGetProgramFromId returns a handle to the program in ∗*program* corresponding to the *program_id* supplied. If *program_id* does not map to a valid program handle, ∗*program* is *NULL* or if *context* is invalid, the call will return RT_ERROR_INVALID_VALUE.

Parameters

in	*context*	The context the program should be originated from
in	*program_id*	The ID of the program to query
out	*program*	The return handle for the program object corresponding to the program_id

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextGetProgramFromId was introduced in OptiX 3.6.

See also rtProgramGetId

2.12.2.2 RTresult RTAPI rtProgramCreateFromPTXFile (RTcontext *context,* const char ∗ *filename,* const char ∗ *program_name,* RTprogram ∗ *program*)

Creates a new program object.

Description

rtProgramCreateFromPTXFile allocates and returns a handle to a new program object. The program is created from PTX code held in *filename* from function *program_name*.

Parameters

in	*context*	The context to create the program in
in	*filename*	Path to the file containing the PTX code
in	*program_name*	The name of the PTX function to create the program from
in	*program*	Handle to the program to be created

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_INVALID_SOURCE
- RT_ERROR_FILE_NOT_FOUND

History

rtProgramCreateFromPTXFile was introduced in OptiX 1.0.

See also RT_PROGRAM, rtProgramCreateFromPTXString, rtProgramDestroy

2.12.2.3 RTresult RTAPI rtProgramCreateFromPTXString (RTcontext *context,* const char ∗ *ptx,* const char ∗ *program_name,* RTprogram ∗ *program*)

Creates a new program object.

Description

rtProgramCreateFromPTXString allocates and returns a handle to a new program object. The program is created from PTX code held in the *NULL-terminated* string *ptx* from function *program_name*.

Parameters

in	*context*	The context to create the program in
in	*ptx*	The string containing the PTX code
in	*program_name*	The name of the PTX function to create the program from
in	*program*	Handle to the program to be created

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_INVALID_SOURCE

History

rtProgramCreateFromPTXString was introduced in OptiX 1.0.

See also RT_PROGRAM, rtProgramCreateFromPTXFile, rtProgramDestroy

2.12.2.4 RTresult RTAPI rtProgramDeclareVariable (RTprogram *program,* const char ∗ *name,* RTvariable ∗ *v*)

Declares a new named variable associated with a program.

Description

rtProgramDeclareVariable declares a new variable, *name*, and associates it with the program. A variable can only be declared with the same name once on the program. Any attempt to declare multiple variables with the same name will cause the call to fail and return RT_ERROR_VARIABLE_REDECLARED. If *v* is *NULL* the call will return RT_ERROR_INVALID_VALUE.

Parameters

in	*program*	The program the declared variable will be attached to
in	*name*	The name of the variable to be created
out	*v*	Return handle to the variable to be created

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_VARIABLE_REDECLARED
- RT_ERROR_ILLEGAL_SYMBOL

History

rtProgramDeclareVariable was introduced in OptiX 1.0.

See also rtProgramRemoveVariable, rtProgramGetVariable, rtProgramGetVariableCount, rtProgramQueryVariable

2.12.2.5 RTresult RTAPI rtProgramDestroy (RTprogram *program*)

Destroys a program object.

Description

rtProgramDestroy removes *program* from its context and deletes it. *program* should be a value returned by *rtProgramCreate*∗. Associated variables declared via rtProgramDeclareVariable are destroyed. After the call, *program* is no longer a valid handle.

Parameters

in	*program*	Handle of the program to destroy

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtProgramDestroy was introduced in OptiX 1.0.

See also rtProgramCreateFromPTXFile, rtProgramCreateFromPTXString

2.12.2.6 RTresult RTAPI rtProgramGetContext (RTprogram *program,* RTcontext ∗ *context*)

Gets the context object that created a program.

Description

rtProgramGetContext returns a handle to the context object that was used to create *program*. If *context* is *NULL*, the call will return RT_ERROR_INVALID_VALUE.

Parameters

in	*program*	The program to be queried for its context object
out	*context*	The return handle for the requested context object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtProgramGetContext was introduced in OptiX 1.0.

See also rtContextCreate

2.12.2.7 RTresult RTAPI rtProgramGetId (RTprogram *program,* int ∗ *program_id*)

Returns the ID for the Program object.

Description

rtProgramGetId returns an ID for the provided program. The returned ID is used to reference *program* from device code. If ∗*program_id* is *NULL* or the *program* is not a valid RTprogram, the call will return RT_ERROR_INVALID_VALUE. RT_PROGRAM_ID_NULL can be used as a sentinal for a non-existent program, since this value will never be returned as a valid program id.

Parameters

in	*program*	The program to be queried for its id
out	*program_id*	The returned ID of the program.

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtProgramGetId was introduced in OptiX 3.6.

See also rtContextGetProgramFromId

2.12.2.8 RTresult RTAPI rtProgramGetVariable (RTprogram *program,* unsigned int *index,* RTvariable ∗ *v*)

Returns a handle to a variable attached to a program by index.

Description

rtProgramGetVariable returns a handle to a variable in ∗*v* attached to *program* with rtProgramDeclareVariable by *index*. *index* must be between 0 and one less than the value returned by rtProgramGetVariableCount. The order in which variables are enumerated is not constant and may change as variables are attached and removed from the program object.

Parameters

in	*program*	The program to be queried for the indexed variable object
in	*index*	The index of the variable to return
out	*v*	Return handle to the variable object specified by the index

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_VARIABLE_NOT_FOUND

History

rtProgramGetVariable was introduced in OptiX 1.0.

See also rtProgramDeclareVariable, rtProgramRemoveVariable, rtProgramGetVariableCount, rtProgramQueryVariable

2.12.2.9 RTresult RTAPI rtProgramGetVariableCount (**RTprogram** *program,* unsigned int ∗ *count*)

Returns the number of variables attached to a program.

Description

rtProgramGetVariableCount returns, in ∗*count*, the number of variable objects that have been attached to *program*.

Parameters

in	*program*	The program to be queried for its variable count
out	*count*	The return handle for the number of variables attached to this program

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtProgramGetVariableCount was introduced in OptiX 1.0.

See also rtProgramDeclareVariable, rtProgramRemoveVariable, rtProgramGetVariable, rtProgramQueryVariable

2.12.2.10 RTresult RTAPI rtProgramQueryVariable (**RTprogram** *program,* const char ∗ *name,* **RTvariable** ∗ *v*)

Returns a handle to the named variable attached to a program.

Description

rtProgramQueryVariable returns a handle to a variable object, in ∗*v*, attached to *program* referenced by the *NULL-terminated* string *name*. If *name* is not the name of a variable attached to *program*, ∗*v* will be *NULL* after the call.

Parameters

in	*program*	The program to be queried for the named variable
in	*name*	The name of the program to be queried for
out	*v*	The return handle to the variable object
	program	Handle to the program to be created

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtProgramQueryVariable was introduced in OptiX 1.0.

See also rtProgramDeclareVariable, rtProgramRemoveVariable, rtProgramGetVariable, rtProgramGetVariable-Count

2.12.2.11 RTresult RTAPI rtProgramRemoveVariable (RTprogram *program*, RTvariable *v*)

Removes the named variable from a program.

Description

rtProgramRemoveVariable removes variable *v* from the *program* object. Once a variable has been removed from this program, another variable with the same name as the removed variable may be declared.

Parameters

in	*program*	The program to remove the variable from
in	*v*	The variable to remove

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_VARIABLE_NOT_FOUND

History

rtProgramRemoveVariable was introduced in OptiX 1.0.

See also rtProgramDeclareVariable, rtProgramGetVariable, rtProgramGetVariableCount, rtProgramQueryVariable

2.12.2.12 RTresult RTAPI rtProgramValidate (RTprogram *program*)

Validates the state of a program.

Description

rtProgramValidate checks *program* for completeness. If *program* or any of the objects attached to program are not valid, the call will return RT_ERROR_INVALID_CONTEXT.

Parameters

`in`	*program*	The program to be validated

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtProgramValidate was introduced in OptiX 1.0.

See also rtProgramCreateFromPTXFile, rtProgramCreateFromPTXString

2.13 Buffer functions

2.13.1 Detailed Description

Functions related to an OptiX Buffer.

Functions

- RTresult RTAPI rtBufferCreateForCUDA (RTcontext context, unsigned int bufferdesc, RTbuffer ∗buffer)
- RTresult RTAPI rtBufferGetDevicePointer (RTbuffer buffer, unsigned int optix_device_number, void ∗∗device_pointer)
- RTresult RTAPI rtBufferMarkDirty (RTbuffer buffer)
- RTresult RTAPI rtBufferSetDevicePointer (RTbuffer buffer, unsigned int optix_device_number, CUdeviceptr device_pointer)
- RTresult RTAPI rtBufferCreateFromD3D10Resource (RTcontext context, unsigned int bufferdesc, ID3D10Resource ∗resource, RTbuffer ∗buffer)
- RTresult RTAPI rtBufferGetD3D10Resource (RTbuffer buffer, ID3D10Resource ∗∗resource)
- RTresult RTAPI rtBufferD3D10Register (RTbuffer buffer)
- RTresult RTAPI rtBufferD3D10Unregister (RTbuffer buffer)
- RTresult RTAPI rtBufferCreateFromD3D11Resource (RTcontext context, unsigned int bufferdesc, ID3D11Resource ∗resource, RTbuffer ∗buffer)
- RTresult RTAPI rtBufferGetD3D11Resource (RTbuffer buffer, ID3D11Resource ∗∗resource)
- RTresult RTAPI rtBufferD3D11Register (RTbuffer buffer)
- RTresult RTAPI rtBufferD3D11Unregister (RTbuffer buffer)
- RTresult RTAPI rtBufferCreateFromD3D9Resource (RTcontext context, unsigned int bufferdesc, IDirect3DResource9 ∗resource, RTbuffer ∗buffer)
- RTresult RTAPI rtBufferGetD3D9Resource (RTbuffer buffer, IDirect3DResource9 ∗∗resource)
- RTresult RTAPI rtBufferD3D9Register (RTbuffer buffer)
- RTresult RTAPI rtBufferD3D9Unregister (RTbuffer buffer)
- RTresult RTAPI rtBufferCreateFromGLBO (RTcontext context, unsigned int bufferdesc, unsigned int glId, RTbuffer ∗buffer)
- RTresult RTAPI rtTextureSamplerCreateFromGLImage (RTcontext context, unsigned int glId, RTgltarget target, RTtexturesampler ∗textureSampler)
- RTresult RTAPI rtBufferGetGLBOId (RTbuffer buffer, unsigned int ∗glId)
- RTresult RTAPI rtTextureSamplerGetGLImageId (RTtexturesampler textureSampler, unsigned int ∗glId)
- RTresult RTAPI rtBufferGLRegister (RTbuffer buffer)
- RTresult RTAPI rtBufferGLUnregister (RTbuffer buffer)
- RTresult RTAPI rtTextureSamplerGLRegister (RTtexturesampler textureSampler)
- RTresult RTAPI rtTextureSamplerGLUnregister (RTtexturesampler textureSampler)
- RTresult RTAPI rtDeviceGetWGLDevice (int ∗device, HGPUNV gpu)
- RTresult RTAPI rtBufferCreate (RTcontext context, unsigned int bufferdesc, RTbuffer ∗buffer)
- RTresult RTAPI rtBufferDestroy (RTbuffer buffer)
- RTresult RTAPI rtBufferValidate (RTbuffer buffer)
- RTresult RTAPI rtBufferGetContext (RTbuffer buffer, RTcontext ∗context)
- RTresult RTAPI rtBufferSetFormat (RTbuffer buffer, RTformat format)
- RTresult RTAPI rtBufferGetFormat (RTbuffer buffer, RTformat ∗format)
- RTresult RTAPI rtBufferSetElementSize (RTbuffer buffer, RTsize size_of_element)
- RTresult RTAPI rtBufferGetElementSize (RTbuffer buffer, RTsize ∗size_of_element)
- RTresult RTAPI rtBufferSetSize1D (RTbuffer buffer, RTsize width)
- RTresult RTAPI rtBufferGetSize1D (RTbuffer buffer, RTsize ∗width)
- RTresult RTAPI rtBufferSetSize2D (RTbuffer buffer, RTsize width, RTsize height)
- RTresult RTAPI rtBufferGetSize2D (RTbuffer buffer, RTsize ∗width, RTsize ∗height)
- RTresult RTAPI rtBufferSetSize3D (RTbuffer buffer, RTsize width, RTsize height, RTsize depth)
- RTresult RTAPI rtBufferGetSize3D (RTbuffer buffer, RTsize ∗width, RTsize ∗height, RTsize ∗depth)
- RTresult RTAPI rtBufferSetSizev (RTbuffer buffer, unsigned int dimensionality, const RTsize ∗dims)

- RTresult RTAPI rtBufferGetSizev (RTbuffer buffer, unsigned int dimensionality, RTsize ∗dims)
- RTresult RTAPI rtBufferGetDimensionality (RTbuffer buffer, unsigned int ∗dimensionality)
- RTresult RTAPI rtBufferMap (RTbuffer buffer, void ∗∗user_pointer)
- RTresult RTAPI rtBufferUnmap (RTbuffer buffer)
- RTresult RTAPI rtBufferGetId (RTbuffer buffer, int ∗buffer_id)
- RTresult RTAPI rtContextGetBufferFromId (RTcontext context, int buffer_id, RTbuffer ∗buffer)

2.13.2 Function Documentation

2.13.2.1 RTresult RTAPI rtBufferCreate (RTcontext *context,* unsigned int *bufferdesc,* RTbuffer ∗ *buffer*)

Creates a new buffer object.

Description

rtBufferCreate allocates and returns a new handle to a new buffer object in ∗*buffer* associated with *context*. The backing storage of the buffer is managed by OptiX. A buffer is specified by a bitwise *or* combination of a *type* and *flags* in *bufferdesc*. The supported types are:

- RT_BUFFER_INPUT
- RT_BUFFER_OUTPUT
- RT_BUFFER_INPUT_OUTPUT

The type values are used to specify the direction of data flow from the host to the OptiX devices. RT_BUFFER_INPUT specifies that the host may only write to the buffer and the device may only read from the buffer. RT_BUFFER_OUTPUT specifies the opposite, read only access on the host and write only access on the device. Devices and the host may read and write from buffers of type RT_BUFFER_INPUT_OUTPUT. Reading or writing to a buffer of the incorrect type (e.g., the host writing to a buffer of type RT_BUFFER_OUTPUT) is undefined.

The supported flags are:

- RT_BUFFER_GPU_LOCAL
- RT_BUFFER_COPY_ON_DIRTY

Flags can be used to optimize data transfers between the host and its devices. The flag RT_BUFFER_GPU_LOCAL can only be used in combination with RT_BUFFER_INPUT_OUTPUT. RT_BUFFER_INPUT_OUTPUT and RT_BUFFER_GPU_LOCAL used together specify a buffer that allows the host to *only* write, and the device to read *and* write data. The written data will never be visible on the host side and will generally not be visible or other devices.

If rtBufferSetDevicePointer or rtBufferGetDevicePointer have been called for a single device for a given buffer, the user can change the buffer's content on that device. The new buffer contents must be synchronized to all devices. These synchronization copies occur at every rtContextLaunch, unless the buffer is declared with RT_BUFFER_COPY_ON_DIRTY. In this case, use rtBufferMarkDirty to notify OptiX that the buffer has been dirtied and must be synchronized.

Parameters

`in`	*context*	The context to create the buffer in
`in`	*bufferdesc*	Bitwise *or* combination of the *type* and *flags* of the new buffer
`out`	*buffer*	The return handle for the buffer object

Return values

Relevant return values:

- RT_SUCCESS

- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferCreate was introduced in OptiX 1.0.

RT_BUFFER_GPU_LOCAL was introduced in OptiX 2.0.

See also rtBufferCreateFromGLBO, rtBufferDestroy, rtBufferMarkDirty

2.13.2.2 RTresult RTAPI rtBufferCreateForCUDA (RTcontext *context,* unsigned int *bufferdesc,* RTbuffer ∗ *buffer*)

Creates a new buffer object that will later rely on user-side CUDA allocation.

Description

rtBufferCreateForCUDA allocates and returns a new handle to a new buffer object in ∗*buffer* associated with *context*. This buffer will function like a normal OptiX buffer created with rtBufferCreate, except OptiX will not allocate or upload data for it.

After a buffer object has been created with rtBufferCreateForCUDA, the user needs to call rtBufferSetDevicePointer to provide one or more device pointers to the buffer data. When the user provides a single device's data pointer for a buffer prior to calling rtContextLaunch, OptiX will allocate memory on the other devices and copy the data there. Setting pointers for more than one but fewer than all devices is not supported.

If rtBufferSetDevicePointer or rtBufferGetDevicePointer have been called for a single device for a given buffer, the user can change the buffer's content on that device. OptiX must then synchronize the new buffer contents to all devices. These synchronization copies occur at every rtContextLaunch, unless the buffer is declared with RT_BUFFER_COPY_ON_DIRTY. In this case, use rtBufferMarkDirty to notify OptiX that the buffer has been dirtied and must be synchronized.

The backing storage of the buffer is managed by OptiX. A buffer is specified by a bitwise *or* combination of a *type* and *flags* in *bufferdesc*. The supported types are:

- RT_BUFFER_INPUT
- RT_BUFFER_OUTPUT
- RT_BUFFER_INPUT_OUTPUT

The type values are used to specify the direction of data flow from the host to the OptiX devices. RT_BUFFER_INPUT specifies that the host may only write to the buffer and the device may only read from the buffer. RT_BUFFER_OUTPUT specifies the opposite, read only access on the host and write only access on the device. Devices and the host may read and write from buffers of type RT_BUFFER_INPUT_OUTPUT. Reading or writing to a buffer of the incorrect type (e.g., the host writing to a buffer of type RT_BUFFER_OUTPUT) is undefined.

The supported flags are:

- RT_BUFFER_GPU_LOCAL
- RT_BUFFER_COPY_ON_DIRTY

Flags can be used to optimize data transfers between the host and its devices. The flag RT_BUFFER_GPU_LOCAL can only be used in combination with RT_BUFFER_INPUT_OUTPUT. RT_BUFFER_INPUT_OUTPUT and RT_BUFFER_GPU_LOCAL used together specify a buffer that allows the host to **only** write, and the device to read **and** write data. The written data will be never visible on the host side.

Parameters

in	*context*	The context to create the buffer in
in	*bufferdesc*	Bitwise *or* combination of the *type* and *flags* of the new buffer
out	*buffer*	The return handle for the buffer object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferCreateForCUDA was introduced in OptiX 3.0.

See also rtBufferCreate, rtBufferSetDevicePointer, rtBufferMarkDirty, rtBufferDestroy

2.13.2.3 RTresult RTAPI rtBufferCreateFromD3D10Resource (RTcontext *context,* unsigned int *bufferdesc,* ID3D10Resource ∗ *resource,* RTbuffer ∗ *buffer*)

Creates a new buffer object from a D3D10 resource.

Description

rtBufferCreateFromD3D10Resource allocates and returns a handle to a new buffer object in ∗*buffer* associated with *context*. If the allocated size of the D3D resource is *0*, RT_ERROR_MEMORY_ALLOCATION_FAILED will be returned. Supported D3D10 buffer types are:

- ID3D10Buffer

These buffers can be used to share data with D3D10; changes of the content in *buffer*, either done by D3D10 or OptiX, will be reflected automatically in both APIs. If the size, or format, of a D3D10 buffer is changed, appropriate OptiX calls have to be used to update *buffer* accordingly. OptiX keeps only a reference to D3D10 data, when *buffer* is destroyed, the state of *resource* is unaltered.

The *type* of this buffer is specified by one of the following values in *bufferdesc:*

- RT_BUFFER_INPUT
- RT_BUFFER_OUTPUT
- RT_BUFFER_INPUT_OUTPUT

The type values are used to specify the direction of data flow from the host to the OptiX devices. RT_BUFFER_INPUT specifies that the host may only write to the buffer and the device may only read from the buffer. RT_BUFFER_OUTPUT specifies the opposite, read only access on the host and write only access on the device. Devices and the host may read and write from buffers of type RT_BUFFER_INPUT_OUTPUT. Reading or writing to a buffer of the incorrect type (e.g., the host writing to a buffer of type RT_BUFFER_OUTPUT) is undefined.

Flags can be used to optimize data transfers between the host and it's devices. Currently no *flags* are supported for interop buffers.

Parameters

in	*context*	The context to create the buffer in
in	*bufferdesc*	Bitwise *or* combination of the *type* and *flags* of the new buffer
in	*resource*	The D3D10 resource handle for use in OptiX
out	*buffer*	The return handle for the buffer object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferCreateFromD3D10Resource was introduced in OptiX 2.0.

See also rtBufferCreate, rtBufferDestroy

2.13.2.4 RTresult RTAPI rtBufferCreateFromD3D11Resource (RTcontext *context,* unsigned int *bufferdesc,* ID3D11Resource ∗ *resource,* RTbuffer ∗ *buffer*)

Creates a new buffer object from a D3D11 resource.

Description

rtBufferCreateFromD3D11Resource allocates and returns a handle to a new buffer object in ∗*buffer* associated with *context*. If the allocated size of the D3D resource is *0*, RT_ERROR_MEMORY_ALLOCATION_FAILED will be returned. Supported D3D11 buffer types are:

- ID3D11Buffer

These buffers can be used to share data with D3D11; changes of the content in *buffer*, either done by D3D11 or OptiX, will be reflected automatically in both APIs. If the size, or format, of a D3D11 buffer is changed, appropriate OptiX calls have to be used to update *buffer* accordingly. OptiX keeps only a reference to D3D11 data, when *buffer* is destroyed, the state of *resource* is unaltered.

The *type* of this buffer is specified by one of the following values in *bufferdesc:*

- RT_BUFFER_INPUT
- RT_BUFFER_OUTPUT
- RT_BUFFER_INPUT_OUTPUT

The type values are used to specify the direction of data flow from the host to the OptiX devices. RT_BUFFER_INPUT specifies that the host may only write to the buffer and the device may only read from the buffer. RT_BUFFER_OUTPUT specifies the opposite, read only access on the host and write only access on the device. Devices and the host may read and write from buffers of type RT_BUFFER_INPUT_OUTPUT. Reading or writing to a buffer of the incorrect type (e.g., the host writing to a buffer of type RT_BUFFER_OUTPUT) is undefined.

Flags can be used to optimize data transfers between the host and it's devices. Currently no *flags* are supported for interop buffers.

Parameters

in	*context*	The context to create the buffer in
in	*bufferdesc*	Bitwise *or* combination of the *type* and *flags* of the new buffer
in	*resource*	The D3D11 resource handle for use in OptiX
out	*buffer*	The return handle for the buffer object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferCreateFromD3D11Resource was introduced in OptiX 2.0.

See also rtBufferCreate, rtBufferDestroy

2.13.2.5 RTresult RTAPI rtBufferCreateFromD3D9Resource (RTcontext *context*, unsigned int *bufferdesc*, IDirect3DResource9 ∗ *resource*, RTbuffer ∗ *buffer*)

Creates a new buffer object from a D3D9 resource.

Description

rtBufferCreateFromD3D9Resource allocates and returns a handle to a new buffer object in ∗*buffer* associated with *context*. If the allocated size of the D3D resource is *0*, RT_ERROR_MEMORY_ALLOCATION_FAILED will be returned. Supported D3D9 buffer types are:

- IDirect3DVertexBuffer9
- IDirect3DIndexBuffer9

These buffers can be used to share data with D3D9; changes of the content in *buffer*, either done by D3D9 or OptiX, will be reflected automatically in both APIs. If the size, or format, of a D3D9 buffer is changed, appropriate OptiX calls have to be used to update *buffer* accordingly. OptiX keeps only a reference to D3D9 data, when *buffer* is destroyed, the state of *resource* is unaltered.

The *type* of this buffer is specified by one of the following values in *bufferdesc:*

- RT_BUFFER_INPUT
- RT_BUFFER_OUTPUT
- RT_BUFFER_INPUT_OUTPUT

The type values are used to specify the direction of data flow from the host to the OptiX devices. RT_BUFFER_INPUT specifies that the host may only write to the buffer and the device may only read from the buffer. RT_BUFFER_OUTPUT specifies the opposite, read only access on the host and write only access on the device. Devices and the host may read and write from buffers of type RT_BUFFER_INPUT_OUTPUT. Reading or writing to a buffer of the incorrect type (e.g., the host writing to a buffer of type RT_BUFFER_OUTPUT) is undefined.

Flags can be used to optimize data transfers between the host and it's devices. Currently no *flags* are supported for interop buffers.

Parameters

`in`	*context*	The context to create the buffer in
`in`	*bufferdesc*	Bitwise *or* combination of the *type* and *flags* of the new buffer
`in`	*resource*	The D3D9 resource handle for use in OptiX
`out`	*buffer*	The return handle for the buffer object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferCreateFromD3D9Resource was introduced in OptiX 2.0.

See also rtBufferCreate, rtBufferDestroy

2.13.2.6 RTresult RTAPI rtBufferCreateFromGLBO (RTcontext *context,* unsigned int *bufferdesc,* unsigned int *glId,* RTbuffer ∗ *buffer*)

Creates a new buffer object from an OpenGL buffer object.

Description

rtBufferCreateFromGLBO allocates and returns a handle to a new buffer object in ∗*buffer* associated with *context*. Supported OpenGL buffer types are:

- Pixel Buffer Objects
- Vertex Buffer Objects

These buffers can be used to share data with OpenGL; changes of the content in *buffer*, either done by OpenGL or OptiX, will be reflected automatically in both APIs. If the size, or format, of an OpenGL buffer is changed, appropriate OptiX calls have to be used to update *buffer* accordingly. OptiX keeps only a reference to OpenGL data, when *buffer* is destroyed, the state of the *gl_id* object is unaltered.

The *type* of this buffer is specified by one of the following values in *bufferdesc:*

- RT_BUFFER_INPUT
- RT_BUFFER_OUTPUT
- RT_BUFFER_INPUT_OUTPUT

The type values are used to specify the direction of data flow from the host to the OptiX devices. RT_BUFFER_INPUT specifies that the host may only write to the buffer and the device may only read from the buffer. RT_BUFFER_OUTPUT specifies the opposite, read only access on the host and write only access on the device. Devices and the host may read and write from buffers of type RT_BUFFER_INPUT_OUTPUT. Reading or writing to a buffer of the incorrect type (e.g., the host writing to a buffer of type RT_BUFFER_OUTPUT) is undefined.

Flags can be used to optimize data transfers between the host and it's devices. Currently no *flags* are supported for interop buffers.

Parameters

in	*context*	The context to create the buffer in
in	*bufferdesc*	Bitwise *or* combination of the *type* and *flags* of the new buffer
in	*glId*	The OpenGL image object resource handle for use in OptiX
out	*buffer*	The return handle for the buffer object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferCreateFromGLBO was introduced in OptiX 1.0.

See also rtBufferCreate, rtBufferDestroy

2.13.2.7 RTresult RTAPI rtBufferD3D10Register (RTbuffer *buffer*)

Declares a D3D10 buffer as immutable and accessible by OptiX.

Description

An OptiX buffer in an unregistered state can be registered to OptiX again via rtBufferD3D10Register. Once registered, properties like the size of the original D3D10 resource cannot be modified anymore. Calls to the corresponding D3D10 functions will return with an error code. However, the data of the D3D10 resource can still be read and written by the appropriate D3D10 commands. When a buffer is already in a registered state rtBufferD3D10Register will return RT_ERROR_RESOURCE_ALREADY_REGISTERED. A resource must be registered in order to be used by OptiX. If a resource is not registered RT_ERROR_INVALID_VALUE will be returned.

Parameters

in	*buffer*	The handle for the buffer object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_RESOURCE_ALREADY_REGISTERED

History

rtBufferD3D10Register was introduced in OptiX 2.0.

See also rtBufferCreateFromD3D11Resource

2.13.2.8 RTresult RTAPI rtBufferD3D10Unregister (RTbuffer *buffer*)

Declares a D3D10 buffer as mutable and inaccessible by OptiX.

Description

An OptiX buffer in a registered state can be unregistered via rtBufferD3D10Register. Once unregistered, properties like the size of the original D3D10 resource can be changed. As long as a resource is unregistered, OptiX will not be able to access the data and will fail with RT_ERROR_INVALID_VALUE. When a buffer is already in an unregistered state rtBufferD3D10Unregister will return RT_ERROR_RESOURCE_NOT_REGISTERED.

Parameters

in	*buffer*	The handle for the buffer object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_RESOURCE_NOT_REGISTERED

History

rtBufferD3D10Unregister was introduced in OptiX 2.0.

See also rtBufferCreateFromD3D11Resource

2.13.2.9 RTresult RTAPI rtBufferD3D11Register (RTbuffer *buffer*)

Declares a D3D11 buffer as immutable and accessible by OptiX.

Description

An OptiX buffer in an unregistered state can be registered to OptiX again via rtBufferD3D11Register. Once registered, properties like the size of the original D3D11 resource cannot be modified anymore. Calls to the corresponding D3D11 functions will return with an error code. However, the data of the D3D11 resource can still be read and written by the appropriate D3D11 commands. When a buffer is already in a registered state rtBufferD3D11Register will return RT_ERROR_RESOURCE_ALREADY_REGISTERED. A resource must be registered in order to be used by OptiX. If a resource is not registered RT_ERROR_INVALID_VALUE will be returned.

Parameters

in	*buffer*	The handle for the buffer object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_RESOURCE_ALREADY_REGISTERED

History

rtBufferD3D11Register was introduced in OptiX 2.0.

See also rtBufferCreateFromD3D11Resource

2.13.2.10 RTresult RTAPI rtBufferD3D11Unregister (RTbuffer *buffer*)

Declares a D3D11 buffer as mutable and inaccessible by OptiX.

Description

An OptiX buffer in a registered state can be unregistered via rtBufferD3D11Register. Once unregistered, properties like the size of the original D3D11 resource can be changed. As long as a resource is unregistered, OptiX will not be able to access the data and will fail with RT_ERROR_INVALID_VALUE. When a buffer is already in an unregistered state rtBufferD3D11Unregister will return RT_ERROR_RESOURCE_NOT_REGISTERED.

Parameters

in	*buffer*	The handle for the buffer object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_RESOURCE_NOT_REGISTERED

History

rtBufferD3D11Unregister was introduced in OptiX 2.0.

See also rtBufferCreateFromD3D11Resource

2.13.2.11 RTresult RTAPI rtBufferD3D9Register (RTbuffer *buffer*)

Declares a D3D9 buffer as immutable and accessible by OptiX.

Description

An OptiX buffer in an unregistered state can be registered to OptiX again via rtBufferD3D9Register. Once registered, properties like the size of the original D3D9 resource cannot be modified anymore. Calls to the corresponding D3D9 functions will return with an error code. However, the data of the D3D9 resource can still be read and written by the appropriate D3D9 commands. When a buffer is already in a registered state rtBufferD3D9Register will return RT_ERROR_RESOURCE_ALREADY_REGISTERED. A resource must be registered in order to be used by OptiX. If a resource is not registered RT_ERROR_INVALID_VALUE will be returned.

Parameters

in	*buffer*	The handle for the buffer object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_RESOURCE_ALREADY_REGISTERED

History

rtBufferD3D9Register was introduced in OptiX 2.0.

See also rtBufferCreateFromD3D11Resource

2.13.2.12 RTresult RTAPI rtBufferD3D9Unregister (RTbuffer *buffer*)

Declares a D3D9 buffer as mutable and inaccessible by OptiX.

Description

An OptiX buffer in a registered state can be unregistered via rtBufferD3D9Register. Once unregistered, properties like the size of the original D3D9 resource can be changed. As long as a resource is unregistered, OptiX will not be able to access the data and will fail with RT_ERROR_INVALID_VALUE. When a buffer is already in an unregistered state rtBufferD3D9Unregister will return RT_ERROR_RESOURCE_NOT_REGISTERED.

Parameters

in	*buffer*	The handle for the buffer object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_RESOURCE_NOT_REGISTERED

History

rtBufferD3D9Unregister was introduced in OptiX 2.0.

See also rtBufferCreateFromD3D11Resource

2.13.2.13 RTresult RTAPI rtBufferDestroy (RTbuffer *buffer*)

Destroys a buffer object.

Description

rtBufferDestroy removes *buffer* from its context and deletes it. *buffer* should be a value returned by rtBufferCreate. After the call, *buffer* is no longer a valid handle. Any API object that referenced *buffer* will have its reference invalidated.

Parameters

in	*buffer*	Handle of the buffer to destroy

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferDestroy was introduced in OptiX 1.0.

See also rtBufferCreate, rtBufferCreateFromGLBO

2.13.2.14 RTresult RTAPI rtBufferGetContext (RTbuffer *buffer,* RTcontext $*$ *context*)

Returns the context object that created this buffer.

Description

rtBufferGetContext returns a handle to the context that created *buffer* in $*$*context*. If $*$*context* is *NULL*, the call will return RT_ERROR_INVALID_VALUE.

Parameters

in	*buffer*	The buffer to be queried for its context

out	*context*	The return handle for the buffer's context

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferGetContext was introduced in OptiX 1.0.

See also rtContextCreate

2.13.2.15 RTresult RTAPI rtBufferGetD3D10Resource (RTbuffer *buffer,* ID3D10Resource ** *resource*)

Gets the D3D10 resource associated with this buffer.

Description

rtBufferGetD3D10Resource stores the D3D10 resource pointer in ***resource* if *buffer* was created with rtBufferCreateFromD3D10Resource. If *buffer* was not created from a D3D10 resource ***resource* will be *0* after the call and RT_ERROR_INVALID_VALUE is returned.

Parameters

in	*buffer*	The buffer to be queried for its D3D10 resource
out	*resource*	The return handle for the resource

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT

History

rtBufferGetD3D10Resource was introduced in OptiX 2.0.

See also rtBufferCreateFromD3D10Resource

2.13.2.16 RTresult RTAPI rtBufferGetD3D11Resource (RTbuffer *buffer,* ID3D11Resource ** *resource*)

Gets the D3D11 resource associated with this buffer.

Description

rtBufferGetD3D11Resource stores the D3D11 resource pointer in ***resource* if *buffer* was created with rtBufferCreateFromD3D11Resource. If *buffer* was not created from a D3D11 resource ***resource* will be *0* after the call and RT_ERROR_INVALID_VALUE is returned.

Parameters

in	*buffer*	The buffer to be queried for its D3D11 resource

out	*resource*	The return handle for the resource

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT

History

rtBufferGetD3D11Resource was introduced in OptiX 2.0.

See also rtBufferCreateFromD3D11Resource

2.13.2.17 RTresult RTAPI rtBufferGetD3D9Resource (RTbuffer *buffer*, IDirect3DResource9 ** *resource*)

Gets the D3D9 resource associated with this buffer.

Description

rtBufferGetD3D9Resource stores the D3D9 resource pointer in ***resource* if *buffer* was created with rtBufferCreateFromD3D9Resource. If *buffer* was not created from a D3D9 resource ***resource* will be *0* after the call and RT_ERROR_INVALID_VALUE is returned.

Parameters

in	*buffer*	The buffer to be queried for its D3D9 resource
out	*resource*	The return handle for the resource

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT

History

rtBufferGetD3D9Resource was introduced in OptiX 2.0.

See also rtBufferCreateFromD3D9Resource

2.13.2.18 RTresult RTAPI rtBufferGetDevicePointer (RTbuffer *buffer*, unsigned int *optix_device_number*, void ** *device_pointer*)

Gets the pointer to the buffer's data on the given device.

Description

rtBufferGetDevicePointer returns the pointer to the data of *buffer* on device *optix_device_number* in ***device_pointer*.

If rtBufferGetDevicePointer has been called for a single device for a given buffer, the user can change the buffer's content on that device. OptiX must then synchronize the new buffer contents to all devices. These synchronization copies occur at every rtContextLaunch, unless the buffer is declared with RT_BUFFER_COPY_ON_DIRTY. In this case, use rtBufferMarkDirty to notify OptiX that the buffer has been dirtied and must be synchronized.

Parameters

in	*buffer*	The buffer to be queried for its device pointer
in	*op-tix_device_number*	The number of OptiX device
out	*device_pointer*	The return handle to the buffer's device pointer

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

rtBufferGetDevicePointer was introduced in OptiX 3.0.

See also rtBufferMarkDirty, rtBufferSetDevicePointer

2.13.2.19 RTresult RTAPI rtBufferGetDimensionality (RTbuffer *buffer,* unsigned int ∗ *dimensionality*)

Gets the dimensionality of this buffer object.

Description

rtBufferGetDimensionality returns the dimensionality of *buffer* in ∗*dimensionality*. The value returned will be one of 1, 2 or 3, corresponding to 1D, 2D and 3D buffers, respectively.

Parameters

in	*buffer*	The buffer to be queried for its dimensionality
out	*dimensionality*	The return handle for the buffer's dimensionality

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferGetDimensionality was introduced in OptiX 1.0.

See also *rtBufferSetSize{1-2-3}D*

2.13.2.20 RTresult RTAPI rtBufferGetElementSize (RTbuffer *buffer,* RTsize ∗ *size_of_element*)

Returns the size of a buffer's individual elements.

Description

rtBufferGetElementSize queries the size of a buffer's elements. The target buffer is specified by *buffer*, which should be a value returned by rtBufferCreate. After the call, the size, in bytes, of the buffer's individual elements shall be returned in ∗*element_size_return*, if it is not *NULL*. Otherwise, this call has no effect.

Parameters

in	*buffer*	Specifies the buffer to be queried
out	*size_of_element*	Returns the size of the buffer's individual elements

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_UNKNOWN

History

rtBufferGetElementSize was introduced in OptiX 1.0.

See also rtBufferSetElementSize, rtBufferCreate

2.13.2.21 RTresult RTAPI rtBufferGetFormat (RTbuffer *buffer,* RTformat ∗ *format*)

Gets the format of this buffer.

Description

rtBufferGetFormat returns, in ∗*format*, the format of *buffer*. See rtBufferSetFormat for a listing of RTbuffer values.

Parameters

in	*buffer*	The buffer to be queried for its format
out	*format*	The return handle for the buffer's format

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferGetFormat was introduced in OptiX 1.0.

See also rtBufferSetFormat, rtBufferGetFormat

2.13.2.22 RTresult RTAPI rtBufferGetGLBOId (RTbuffer *buffer,* unsigned int ∗ *glId*)

Gets the OpenGL Buffer Object ID associated with this buffer.

Description

rtBufferGetGLBOId stores the OpenGL buffer object id in ∗*gl_id* if *buffer* was created with rtBufferCreate-FromGLBO. If *buffer* was not created from an OpenGL Buffer Object ∗*gl_id* will be 0 after the call and RT_ERROR_INVALID_VALUE is returned.

Parameters

in	*buffer*	The buffer to be queried for its OpenGL buffer object id

in	*glId*	The return handle for the id

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferGetGLBOId was introduced in OptiX 1.0.

See also rtBufferCreateFromGLBO

2.13.2.23 RTresult RTAPI rtBufferGetId (RTbuffer *buffer,* int ∗ *buffer_id*)

Gets an id suitable for use with buffers of buffers.

Description

rtBufferGetId returns an ID for the provided buffer. The returned ID is used on the device to reference the buffer. It needs to be copied into a buffer of type RT_FORMAT_BUFFER_ID or used in a rtBufferId object.. If ∗*buffer_id* is *NULL* or the *buffer* is not a valid RTbuffer, the call will return RT_ERROR_INVALID_VALUE. RT_BUFFER_ID_NULL can be used as a sentinal for a non-existent buffer, since this value will never be returned as a valid buffer id.

Parameters

in	*buffer*	The buffer to be queried for its id
out	*buffer_id*	The returned ID of the buffer

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtBufferGetId was introduced in OptiX 3.5.

See also rtContextGetBufferFromId

2.13.2.24 RTresult RTAPI rtBufferGetSize1D (RTbuffer *buffer,* RTsize ∗ *width*)

Get the width of this buffer.

Description

rtBufferGetSize1D stores the width of *buffer* in ∗*width*.

Parameters

in	*buffer*	The buffer to be queried for its dimensions
out	*width*	The return handle for the buffer's width

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT

- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferGetSize1D was introduced in OptiX 1.0.

See also rtBufferSetSize1D, rtBufferSetSize2D, rtBufferSetSize3D, rtBufferSetSizev, rtBufferGetSize2D, rtBuffer-GetSize3D, rtBufferGetSizev

2.13.2.25 RTresult RTAPI rtBufferGetSize2D (RTbuffer *buffer,* RTsize ∗ *width,* RTsize ∗ *height*)

Gets the width and height of this buffer.

Description

rtBufferGetSize2D stores the width and height of *buffer* in ∗*width* and ∗*height*, respectively.

Parameters

in	*buffer*	The buffer to be queried for its dimensions
out	*width*	The return handle for the buffer's width
out	*height*	The return handle for the buffer's height

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferGetSize2D was introduced in OptiX 1.0.

See also rtBufferSetSize1D, rtBufferSetSize2D, rtBufferSetSize3D, rtBufferSetSizev, rtBufferGetSize1D, rtBuffer-GetSize3D, rtBufferGetSizev

2.13.2.26 RTresult RTAPI rtBufferGetSize3D (RTbuffer *buffer,* RTsize ∗ *width,* RTsize ∗ *height,* RTsize ∗ *depth*)

Gets the width, height and depth of this buffer.

Description

rtBufferGetSize3D stores the width, height and depth of *buffer* in ∗*width*, ∗*height* and ∗*depth*, respectively.

Parameters

in	*buffer*	The buffer to be queried for its dimensions
out	*width*	The return handle for the buffer's width
out	*height*	The return handle for the buffer's height
out	*depth*	The return handle for the buffer's depth

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferGetSize3D was introduced in OptiX 1.0.

See also rtBufferSetSize1D, rtBufferSetSize2D, rtBufferSetSize3D, rtBufferSetSizev, rtBufferGetSize1D, rtBuffer-GetSize2D, rtBufferGetSizev

2.13.2.27 RTresult RTAPI rtBufferGetSizev (RTbuffer *buffer,* unsigned int *dimensionality,* RTsize ∗ *dims*)

Gets the dimensions of this buffer.

Description

rtBufferGetSizev stores the dimensions of *buffer* in ∗*dims*. The number of dimensions returned is specified by *dimensionality*. The storage at *dims* must be large enough to hold the number of requested buffer dimensions.

Parameters

in	*buffer*	The buffer to be queried for its dimensions
in	*dimensionality*	The number of requested dimensions
out	*dims*	The array of dimensions the call will store to

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferGetSizev was introduced in OptiX 1.0.

See also rtBufferGetDimensionality

2.13.2.28 RTresult RTAPI rtBufferGLRegister (RTbuffer *buffer*)

Declares an OpenGL buffer as immutable and accessible by OptiX.

Description

An OptiX buffer in an unregistered state can be registered to OptiX again via rtBufferGLRegister. Once registered, properties like the size of the original GL resource cannot be modified anymore. Calls to the corresponding GL functions will return with an error code. However, the data of the GL resource can still be read and written by the appropriate GL commands. When a buffer is already in a registered state rtBufferGLRegister will return RT_ERROR_RESOURCE_ALREADY_REGISTERED. A resource must be registered in order to be used by OptiX. If a resource is not registered RT_ERROR_INVALID_VALUE will be returned.

Parameters

in	*buffer*	The handle for the buffer object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_RESOURCE_ALREADY_REGISTERED

History

rtBufferGLRegister was introduced in OptiX 2.0.

See also rtBufferCreateFromGLBO, rtBufferGLUnregister

2.13.2.29 RTresult RTAPI rtBufferGLUnregister (RTbuffer *buffer*)

Declares an OpenGL buffer as mutable and inaccessible by OptiX.

Description

An OptiX buffer in a registered state can be unregistered via rtBufferGLRegister. Once unregistered, properties like the size of the original GL resource can be changed. As long as a resource is unregistered, OptiX will not be able to access the data and will fail with RT_ERROR_INVALID_VALUE. When a buffer is already in an unregistered state rtBufferGLUnregister will return RT_ERROR_RESOURCE_NOT_REGISTERED.

Parameters

in	*buffer*	The handle for the buffer object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_RESOURCE_NOT_REGISTERED

History

rtBufferGLUnregister was introduced in OptiX 2.0.

See also rtBufferCreateFromGLBO, rtBufferGLRegister

2.13.2.30 RTresult RTAPI rtBufferMap (RTbuffer *buffer,* void $**$ *user_pointer*)

Maps a buffer object to the host.

Description

rtBufferMap returns a pointer, accessible by the host, in $*$*user_pointer* that contains a mapped copy of the contents of *buffer*. The memory pointed to by $*$*user_pointer* can be written to or read from, depending on the type of *buffer*. For example, this code snippet demonstrates creating and filling an input buffer with floats.

```
RTbuffer buffer;
float* data;
rtBufferCreate(context, RT_BUFFER_INPUT, &buffer);
rtBufferSetFormat(buffer, RT_FORMAT_FLOAT);
rtBufferSetSize1D(buffer, 10);
rtBufferMap(buffer, (void*)&data);
for(int i = 0; i < 10; ++i)
  data[i] = 4.f * i;
rtBufferUnmap(buffer);
```

If *buffer* has already been mapped, the call will return RT_ERROR_ALREADY_MAPPED.

Parameters

in	*buffer*	The buffer to be mapped
out	*user_pointer*	Return handle to a user pointer where the buffer will be mapped to

Return values

Relevant return values:

- RT_SUCCESS

- RT_ERROR_ALREADY_MAPPED
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferMap was introduced in OptiX 1.0.

See also rtBufferUnmap

2.13.2.31 RTresult RTAPI rtBufferMarkDirty (RTbuffer *buffer*)

Sets a buffer as dirty.

Description

If rtBufferSetDevicePointer or rtBufferGetDevicePointer have been called for a single device for a given buffer, the user can change the buffer's content on that device. OptiX must then synchronize the new buffer contents to all devices. These synchronization copies occur at every rtContextLaunch, unless the buffer is declared with RT_BUFFER_COPY_ON_DIRTY. In this case, use rtBufferMarkDirty to notify OptiX that the buffer has been dirtied and must be synchronized.

Note that RT_BUFFER_COPY_ON_DIRTY currently only applies to CUDA Interop buffers (buffers for which the application has a device pointer).

Parameters

in	*buffer*	The buffer to be marked dirty

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtBufferMarkDirty was introduced in OptiX 3.0.

See also rtBufferGetDevicePointer, rtBufferSetDevicePointer, RT_BUFFER_COPY_ON_DIRTY

2.13.2.32 RTresult RTAPI rtBufferSetDevicePointer (RTbuffer *buffer*, unsigned int *optix_device_number*, CUdeviceptr *device_pointer*)

Sets the pointer to the buffer's data on the given device.

Description

rtBufferSetDevicePointer sets the pointer to the data of *buffer* on device *optix_device_number* to *device_pointer*.

The buffer needs to be allocated with rtBufferCreateForCUDA in order for the call to rtBufferSetDevicePointer to be valid. Likewise, before providing a device pointer for the buffer, the application must first specify the size and format of the buffer.

If rtBufferSetDevicePointer has been called for a single device for a given buffer, the user can change the buffer's content on that device. OptiX must then synchronize the new buffer contents to all devices. These synchronization copies occur at every rtContextLaunch, unless the buffer is declared with RT_BUFFER_COPY_ON_DIRTY. In this case, use rtBufferMarkDirty to notify OptiX that the buffer has been dirtied and must be synchronized.

Parameters

in	*buffer*	The buffer for which the device pointer is to be set
in	*op-tix_device_number*	The number of OptiX device
in	*device_pointer*	The pointer to the data on the specified device

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT

History

rtBufferSetDevicePointer was introduced in OptiX 3.0.

See also rtBufferMarkDirty, rtBufferGetDevicePointer

2.13.2.33 RTresult RTAPI rtBufferSetElementSize (RTbuffer *buffer,* RTsize *size_of_element*)

Modifies the size in bytes of a buffer's individual elements.

Description

rtBufferSetElementSize modifies the size in bytes of a buffer's user-formatted elements. The target buffer is specified by *buffer*, which should be a value returned by rtBufferCreate and should have format RT_FORMAT_USER. The new size of the buffer's individual elements is specified by *element_size* and should be a value not equal to 0. If the buffer has format RT_FORMAT_USER, and *element_size* is not equal to 0, then after the call, the buffer's individual elements shall have size equal to *element_size* and all storage associated with the buffer shall be reset. Otherwise, this call has no effect and returns either RT_ERROR_TYPE_MISMATCH if the buffer does not have format RT_FORMAT_USER or RT_ERROR_INVALID_VALUE if the buffer has format RT_FORMAT_USER but *element_size* is equal to 0.

Parameters

in	*buffer*	Specifies the buffer to be modified
in	*size_of_element*	Specifies the new size in bytes of the buffer's individual elements

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_TYPE_MISMATCH

History

rtBufferSetElementSize was introduced in OptiX 1.0.

See also rtBufferGetElementSize, rtBufferCreate

2.13.2.34 RTresult RTAPI rtBufferSetFormat (RTbuffer *buffer,* RTformat *format*)

Sets the format of this buffer.

Description

rtBufferSetFormat changes the *format* of *buffer* to the specified value. The data elements of the buffer will have the specified type and can either be vector formats, or a user-defined type whose size is specified with rtBufferSetElementSize. Possible values for *format* are:

- RT_FORMAT_FLOAT
- RT_FORMAT_FLOAT2
- RT_FORMAT_FLOAT3
- RT_FORMAT_FLOAT4
- RT_FORMAT_BYTE
- RT_FORMAT_BYTE2
- RT_FORMAT_BYTE3
- RT_FORMAT_BYTE4
- RT_FORMAT_UNSIGNED_BYTE
- RT_FORMAT_UNSIGNED_BYTE2
- RT_FORMAT_UNSIGNED_BYTE3
- RT_FORMAT_UNSIGNED_BYTE4
- RT_FORMAT_SHORT
- RT_FORMAT_SHORT2
- RT_FORMAT_SHORT3
- RT_FORMAT_SHORT4
- RT_FORMAT_UNSIGNED_SHORT
- RT_FORMAT_UNSIGNED_SHORT2
- RT_FORMAT_UNSIGNED_SHORT3
- RT_FORMAT_UNSIGNED_SHORT4
- RT_FORMAT_INT
- RT_FORMAT_INT2
- RT_FORMAT_INT3
- RT_FORMAT_INT4
- RT_FORMAT_UNSIGNED_INT
- RT_FORMAT_UNSIGNED_INT2
- RT_FORMAT_UNSIGNED_INT3
- RT_FORMAT_UNSIGNED_INT4
- RT_FORMAT_USER

Parameters

`in`	*buffer*	The buffer to have its format set
`in`	*format*	The target format of the buffer

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT

- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferSetFormat was introduced in OptiX 1.0.

See also rtBufferSetFormat, rtBufferGetFormat, rtBufferGetFormat, rtBufferGetElementSize, rtBufferSetElementSize

2.13.2.35 RTresult RTAPI rtBufferSetSize1D (RTbuffer *buffer*, RTsize *width*)

Sets the width and dimensionality of this buffer.

Description

rtBufferSetSize1D sets the dimensionality of *buffer* to 1 and sets its width to *width*.

Parameters

in	*buffer*	The buffer to be resized
in	*width*	The width of the resized buffer

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_ALREADY_MAPPED
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferSetSize1D was introduced in OptiX 1.0.

See also rtBufferSetSize2D, rtBufferSetSize3D, rtBufferSetSizev, rtBufferGetSize1D, rtBufferGetSize2D, rtBufferGetSize3D, rtBufferGetSizev

2.13.2.36 RTresult RTAPI rtBufferSetSize2D (RTbuffer *buffer*, RTsize *width*, RTsize *height*)

Sets the width, height and dimensionality of this buffer.

Description

rtBufferSetSize2D sets the dimensionality of *buffer* to 2 and sets its width and height to *width* and *height*, respectively. If *width* or *height* is zero, they both must be zero.

Parameters

in	*buffer*	The buffer to be resized
in	*width*	The width of the resized buffer
in	*height*	The height of the resized buffer

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_ALREADY_MAPPED
- RT_ERROR_INVALID_CONTEXT

- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferSetSize2D was introduced in OptiX 1.0.

See also rtBufferSetSize1D, rtBufferSetSize3D, rtBufferSetSizev, rtBufferGetSize1D, rtBufferGetSize2D, rtBuffer-GetSize3D, rtBufferGetSizev

2.13.2.37 RTresult RTAPI rtBufferSetSize3D (RTbuffer *buffer*, RTsize *width*, RTsize *height*, RTsize *depth*)

Sets the width, height, depth and dimensionality of a buffer.

Description

rtBufferSetSize3D sets the dimensionality of *buffer* to 3 and sets its width, height and depth to *width*, *height* and *depth*, respectively. If *width*, *height* or *depth* is zero, they all must be zero.

Parameters

in	*buffer*	The buffer to be resized
in	*width*	The width of the resized buffer
in	*height*	The height of the resized buffer
in	*depth*	The depth of the resized buffer

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_ALREADY_MAPPED
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferSetSize3D was introduced in OptiX 1.0.

See also rtBufferSetSize2D, rtBufferSetSize3D, rtBufferSetSizev, rtBufferGetSize1D, rtBufferGetSize2D, rtBuffer-GetSize3D, rtBufferGetSizev

2.13.2.38 RTresult RTAPI rtBufferSetSizev (RTbuffer *buffer*, unsigned int *dimensionality*, const RTsize ∗ *dims*)

Sets the dimensionality and dimensions of a buffer.

Description

rtBufferSetSizev sets the dimensionality of *buffer* to *dimensionality* and sets the dimensions of the buffer to the values stored at ∗*dims*, which must contain a number of values equal to *dimensionality*. If any of values of *dims* is zero they must all be zero.

Parameters

in	*buffer*	The buffer to be resized
in	*dimensionality*	The dimensionality the buffer will be resized to
in	*dims*	The array of sizes for the dimension of the resize

Return values

Relevant return values:

- RT_SUCCESS

- RT_ERROR_ALREADY_MAPPED
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferSetSizev was introduced in OptiX 1.0.

See also rtBufferSetSize1D, rtBufferSetSize2D, rtBufferSetSize3D, rtBufferGetSize1D, rtBufferGetSize2D, rtBuffer-GetSize3D, rtBufferGetSizev

2.13.2.39 RTresult RTAPI rtBufferUnmap (RTbuffer *buffer*)

Unmaps a buffer's storage from the host.

Description

rtBufferUnmap unmaps a buffer from the host after a call to rtBufferMap. rtContextLaunch cannot be called while buffers are still mapped to the host. A call to rtBufferUnmap that does not follow a matching rtBufferMap call will return RT_ERROR_INVALID_VALUE.

Parameters

in	*buffer*	The buffer to unmap

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferUnmap was introduced in OptiX 1.0.

See also rtBufferMap

2.13.2.40 RTresult RTAPI rtBufferValidate (RTbuffer *buffer*)

Validates the state of a buffer.

Description

rtBufferValidate checks *buffer* for completeness. If *buffer* has not had its dimensionality, size or format set, this call will return RT_ERROR_INVALID_CONTEXT.

Parameters

in	*buffer*	The buffer to validate

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtBufferValidate was introduced in OptiX 1.0.

See also rtBufferCreate, rtBufferCreateFromGLBO rtContextValidate

2.13.2.41 RTresult RTAPI rtContextGetBufferFromId (RTcontext *context,* int *buffer_id,* RTbuffer ∗ *buffer*)

Gets an RTbuffer corresponding to the buffer id.

Description

rtContextGetBufferFromId returns a handle to the buffer in ∗*buffer* corresponding to the *buffer_id* supplied. If *buffer_id* does not map to a valid buffer handle, ∗*buffer* is *NULL* or if *context* is invalid, the call will return RT_ERROR_INVALID_VALUE.

Parameters

in	*context*	The context the buffer should be originated from
in	*buffer_id*	The ID of the buffer to query
out	*buffer*	The return handle for the buffer object corresponding to the buffer_id

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtContextGetBufferFromId was introduced in OptiX 3.5.

See also rtBufferGetId

2.13.2.42 RTresult RTAPI rtDeviceGetWGLDevice (int ∗ *device,* HGPUNV *gpu*)

returns the OptiX device number associated with the specified GPU

Description

rtDeviceGetWGLDevice returns in *device* the OptiX device ID of the GPU represented by *gpu*. *gpu* is returned from *WGL_NV_gpu_affinity*, an OpenGL extension. This enables OptiX to create a context on the same GPU that OpenGL commands will be sent to, improving OpenGL interoperation efficiency.

Parameters

out	*device*	A handle to the memory location where the OptiX device ordinal associated with *gpu* will be stored
in	*gpu*	A handle to a GPU as returned from the *WGL_NV_gpu_affinity* OpenGL extension

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtDeviceGetWGLDevice was introduced in OptiX 1.0.

See also rtDeviceGetDeviceCount, *WGL_NV_gpu_affinity*

2.13.2.43 RTresult RTAPI rtTextureSamplerCreateFromGLImage (RTcontext *context,* unsigned int *glId,* RTgltarget *target,* RTtexturesampler ∗ *textureSampler*)

Creates a new texture sampler object from an OpenGL image.

Description

rtTextureSamplerCreateFromGLImage allocates and returns a handle to a new texture sampler object in ∗ *texture-sampler* associated with *context*. If the allocated size of the GL texture is 0, RT_ERROR_MEMORY_ALLOCATION_FAILED will be returned. Supported OpenGL image types are:

Renderbuffers

- GL_TEXTURE_2D
- GL_TEXTURE_2D_RECT
- GL_TEXTURE_3D

These types are reflected by *target:*

- RT_TARGET_GL_RENDER_BUFFER
- RT_TARGET_GL_TEXTURE_2D
- RT_TARGET_GL_TEXTURE_RECTANGLE
- RT_TARGET_GL_TEXTURE_3D

Supported attachment points for renderbuffers are:

- GL_COLOR_ATTACHMENT<NUM>

These texture samplers can be used to share data with OpenGL; changes of the content and size of *texturesampler* done by OpenGL will be reflected automatically in OptiX. Currently texture sampler data are read only in OptiX programs. OptiX keeps only a reference to OpenGL data, when *texturesampler* is destroyed, the state of the *gl_id* image is unaltered.

The array size and number of mipmap levels can't be changed for texture samplers that encapsulate a GL image. Furthermore no buffer objects can be queried.

Currently OptiX supports only a limited number of internal OpenGL texture formats. Texture formats with an internal type of float, e.g. *GL_RGBA32F*, and many integer formats are supported. Depth formats as well as multisample buffers are also currently not supported. Please refer to the OptiX Interoperability Types section for a complete list of supported texture formats.

Parameters

`in`	*context*	The context to create the buffer in
`in`	*glId*	The OpenGL image object resoure handle for use in OptiX
`in`	*target*	The OpenGL target
`out`	*textureSampler*	The return handle for the texture sampler object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerCreateFromGLImage was introduced in OptiX 2.0.

See also rtTextureSamplerCreate, rtTextureSamplerDestroy

2.13.2.44 RTresult RTAPI rtTextureSamplerGetGLImageId (RTtexturesampler *textureSampler,* unsigned int ∗ *glId*)

Gets the OpenGL image object id associated with this texture sampler.

Description

rtTextureSamplerGetGLImageId stores the OpenGL image object id in ∗*gl_id* if *textureSampler* was created with rtTextureSamplerCreateFromGLImage. If *textureSampler* was not created from an OpenGL image object *gl_id* will be 0 after the call and RT_ERROR_INVALID_VALUE is returned.

Parameters

`in`	*textureSampler*	The texture sampler to be queried for its OpenGL buffer object id
`in`	*glId*	The return handle for the id

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerGetGLImageId was introduced in OptiX 2.0.

See also rtTextureSamplerCreateFromGLImage

2.13.2.45 RTresult RTAPI rtTextureSamplerGLRegister (RTtexturesampler *textureSampler*)

Declares an OpenGL texture as immutable and accessible by OptiX.

Description

An OptiX texture sampler in an unregistered state can be registered to OptiX again via rtTextureSamplerGLRegister. Once registered, properties like the size of the original GL resource cannot be modified anymore. Calls to the corresponding GL functions will return with an error code. However, the data of the GL resource can still be read and written by the appropriate GL commands. When a texture sampler is already in a registered state rtTextureSamplerGLRegister will return RT_ERROR_RESOURCE_ALREADY_REGISTERED. A resource must be registered in order to be used by OptiX. If a resource is not registered RT_ERROR_INVALID_VALUE will be returned.

Parameters

`in`	*textureSampler*	The handle for the texture object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_RESOURCE_ALREADY_REGISTERED

History

rtTextureSamplerGLRegister was introduced in OptiX 2.0.

See also rtTextureSamplerCreateFromGLImage, rtTextureSamplerGLUnregister

2.13.2.46 RTresult RTAPI rtTextureSamplerGLUnregister (RTtexturesampler *textureSampler*)

Declares an OpenGL texture as mutable and inaccessible by OptiX.

Description

An OptiX texture sampler in a registered state can be unregistered via rtTextureSamplerGLUnregister. Once unregistered, properties like the size of the original GL resource can be changed. As long as a resource is unregistered, OptiX will not be able to access the data and will fail with RT_ERROR_INVALID_VALUE. When a buffer is already in an unregistered state rtBufferGLUnregister will return *T_ERROR_RESOURCE_NOT_REGISTERED*.

Parameters

`in`	*textureSampler*	The handle for the texture object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_RESOURCE_NOT_REGISTERED

History

rtTextureSamplerGLUnregister was introduced in OptiX 2.0.

See also rtTextureSamplerCreateFromGLImage, rtTextureSamplerGLRegister

2.14 TextureSampler functions

2.14.1 Detailed Description

Functions related to an OptiX Texture Sampler.

Functions

- RTresult RTAPI rtTextureSamplerCreateFromD3D10Resource (RTcontext context, ID3D10Resource ∗resource, RTtexturesampler ∗textureSampler)
- RTresult RTAPI rtTextureSamplerGetD3D10Resource (RTtexturesampler textureSampler, ID3D10Resource ∗∗resource)
- RTresult RTAPI rtTextureSamplerD3D10Register (RTtexturesampler textureSampler)
- RTresult RTAPI rtTextureSamplerD3D10Unregister (RTtexturesampler textureSampler)
- RTresult RTAPI rtTextureSamplerCreateFromD3D11Resource (RTcontext context, ID3D11Resource ∗resource, RTtexturesampler ∗textureSampler)
- RTresult RTAPI rtTextureSamplerGetD3D11Resource (RTtexturesampler textureSampler, ID3D11Resource ∗∗resource)
- RTresult RTAPI rtTextureSamplerD3D11Register (RTtexturesampler textureSampler)
- RTresult RTAPI rtTextureSamplerD3D11Unregister (RTtexturesampler textureSampler)
- RTresult RTAPI rtTextureSamplerCreateFromD3D9Resource (RTcontext context, IDirect3DResource9 ∗resource, RTtexturesampler ∗textureSampler)
- RTresult RTAPI rtTextureSamplerGetD3D9Resource (RTtexturesampler textureSampler, IDirect3DResource9 ∗∗pResource)
- RTresult RTAPI rtTextureSamplerD3D9Register (RTtexturesampler textureSampler)
- RTresult RTAPI rtTextureSamplerD3D9Unregister (RTtexturesampler textureSampler)
- RTresult RTAPI rtTextureSamplerCreate (RTcontext context, RTtexturesampler ∗texturesampler)
- RTresult RTAPI rtTextureSamplerDestroy (RTtexturesampler texturesampler)
- RTresult RTAPI rtTextureSamplerValidate (RTtexturesampler texturesampler)
- RTresult RTAPI rtTextureSamplerGetContext (RTtexturesampler texturesampler, RTcontext ∗context)
- RTresult RTAPI rtTextureSamplerSetMipLevelCount (RTtexturesampler texturesampler, unsigned int num_mip_levels)
- RTresult RTAPI rtTextureSamplerGetMipLevelCount (RTtexturesampler texturesampler, unsigned int ∗num_mip_levels)
- RTresult RTAPI rtTextureSamplerSetArraySize (RTtexturesampler texturesampler, unsigned int num_textures_in_array)
- RTresult RTAPI rtTextureSamplerGetArraySize (RTtexturesampler texturesampler, unsigned int ∗num_textures_in_array)
- RTresult RTAPI rtTextureSamplerSetWrapMode (RTtexturesampler texturesampler, unsigned int dimension, RTwrapmode wrapmode)
- RTresult RTAPI rtTextureSamplerGetWrapMode (RTtexturesampler texturesampler, unsigned int dimension, RTwrapmode ∗wrapmode)
- RTresult RTAPI rtTextureSamplerSetFilteringModes (RTtexturesampler texturesampler, RTfiltermode minification, RTfiltermode magnification, RTfiltermode mipmapping)
- RTresult RTAPI rtTextureSamplerGetFilteringModes (RTtexturesampler texturesampler, RTfiltermode ∗minification, RTfiltermode ∗magnification, RTfiltermode ∗mipmapping)
- RTresult RTAPI rtTextureSamplerSetMaxAnisotropy (RTtexturesampler texturesampler, float value)
- RTresult RTAPI rtTextureSamplerGetMaxAnisotropy (RTtexturesampler texturesampler, float ∗value)
- RTresult RTAPI rtTextureSamplerSetReadMode (RTtexturesampler texturesampler, RTtexturereadmode readmode)
- RTresult RTAPI rtTextureSamplerGetReadMode (RTtexturesampler texturesampler, RTtexturereadmode ∗readmode)
- RTresult RTAPI rtTextureSamplerSetIndexingMode (RTtexturesampler texturesampler, RTtextureindexmode indexmode)
- RTresult RTAPI rtTextureSamplerGetIndexingMode (RTtexturesampler texturesampler, RTtextureindexmode ∗indexmode)
- RTresult RTAPI rtTextureSamplerSetBuffer (RTtexturesampler texturesampler, unsigned int texture_array_idx, unsigned int mip_level, RTbuffer buffer)

- RTresult RTAPI rtTextureSamplerGetBuffer (RTtexturesampler texturesampler, unsigned int texture_array_idx, unsigned int mip_level, RTbuffer ∗buffer)
- RTresult RTAPI rtTextureSamplerGetId (RTtexturesampler texturesampler, int ∗texture_id)

2.14.2 Function Documentation

2.14.2.1 RTresult RTAPI rtTextureSamplerCreate (RTcontext *context,* RTtexturesampler ∗ *texturesampler*)

Creates a new texture sampler object.

Description

rtTextureSamplerCreate allocates and returns a new handle to a texture sampler object, in ∗*texturesampler*, and associates it with *context*.

Parameters

`in`	*context*	The context the texture sampler object will be created in
`out`	*texturesampler*	The return handle to the new texture sampler object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerCreate was introduced in OptiX 1.0.

See also rtTextureSamplerDestroy

2.14.2.2 RTresult RTAPI rtTextureSamplerCreateFromD3D10Resource (RTcontext *context,* ID3D10Resource ∗ *resource,* RTtexturesampler ∗ *textureSampler*)

Creates a new texture sampler object from a D3D10 resource.

Description

rtTextureSamplerCreateFromD3D10Resource allocates and returns a handle to a new texture sampler object in ∗*texturesampler* associated with *context*. If the allocated size of the D3D resource is *0*, RT_ERROR_MEMORY_ALLOCATION_FAILED will be returned. Supported D3D10 texture types are:

- ID3D10Texture1D
- ID3D10Texture2D
- ID3D10Texture3D

These texture samplers can be used to share data with D3D10; changes of the content and size of *texturesampler* done by D3D10 will be reflected automatically in OptiX. Currently texture sampler data are read only in OptiX programs. OptiX keeps only a reference to D3D10 data, when *texturesampler* is destroyed, the state of the *resource* is unaltered.

The array size and number of mipmap levels can't be changed for texture samplers that encapsulate a D3D10 resource. Furthermore no buffer objects can be queried. Please refer to the OptiX Interoperability Types for a complete list of supported texture formats.

Parameters

in	*context*	The context to create the texture sampler in
in	*resource*	The D3D10 resource handle for use in OptiX
out	*textureSampler*	The return handle for the texture sampler object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerCreateFromD3D10Resource was introduced in OptiX 2.0.

See also rtTextureSamplerCreate, rtTextureSamplerDestroy

2.14.2.3 RTresult RTAPI rtTextureSamplerCreateFromD3D11Resource (RTcontext *context,* ID3D11Resource ∗ *resource,* RTtexturesampler ∗ *textureSampler*)

Creates a new texture sampler object from a D3D11 resource.

Description

rtTextureSamplerCreateFromD3D11Resource allocates and returns a handle to a new texture sampler object in ∗*texturesampler* associated with *context*. If the allocated size of the D3D resource is *0*, RT_ERROR_MEMORY_ALLOCATION_FAILED will be returned. Supported D3D11 texture types are:

- ID3D11Texture1D
- ID3D11Texture2D
- ID3D11Texture3D

These texture samplers can be used to share data with D3D11; changes of the content and size of *texturesampler* done by D3D11 will be reflected automatically in OptiX. Currently texture sampler data are read only in OptiX programs. OptiX keeps only a reference to D3D11 data, when *texturesampler* is destroyed, the state of the *resource* is unaltered.

The array size and number of mipmap levels can't be changed for texture samplers that encapsulate a D3D11 resource. Furthermore no buffer objects can be queried. Please refer to the OptiX Interoperability Types for a complete list of supported texture formats.

Parameters

in	*context*	The context to create the texture sampler in
in	*resource*	The D3D11 resource handle for use in OptiX
out	*textureSampler*	The return handle for the texture sampler object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerCreateFromD3D11Resource was introduced in OptiX 2.0.

See also rtTextureSamplerCreate, rtTextureSamplerDestroy

2.14.2.4 RTresult RTAPI rtTextureSamplerCreateFromD3D9Resource (RTcontext *context,* IDirect3DResource9 ∗ *resource,* RTtexturesampler ∗ *textureSampler*)

Creates a new texture sampler object from a D3D9 resource.

Description

rtTextureSamplerCreateFromD3D9Resource allocates and returns a handle to a new texture sampler object in ∗*texturesampler* associated with *context*. If the allocated size of the D3D resource is *0*, RT_ERROR_MEMORY_ALLOCATION_FAILED will be returned. Supported D3D9 texture types are:

- IDirect3DSurface9
- (derivatives of) IDirect3DBaseTexture9

These texture samplers can be used to share data with D3D9; changes of the content and size of *texturesampler* done by D3D9 will be reflected automatically in OptiX. Currently texture sampler data are read only in OptiX programs. OptiX keeps only a reference to D3D9 data, when *texturesampler* is destroyed, the state of the *resource* is unaltered.

The array size and number of mipmap levels can't be changed for texture samplers that encapsulate a D3D9 resource. Furthermore no buffer objects can be queried. Please refer to the OptiX Interoperability Types for a complete list of supported texture formats.

Parameters

in	*context*	The context to create the texture sampler in
in	*resource*	The D3D9 resource handle for use in OptiX
out	*textureSampler*	The return handle for the texture sampler object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerCreateFromD3D9Resource was introduced in OptiX 2.0.

See also rtTextureSamplerCreate, rtTextureSamplerDestroy

2.14.2.5 RTresult RTAPI rtTextureSamplerD3D10Register (RTtexturesampler *textureSampler*)

Declares a D3D10 texture as immutable and accessible by OptiX.

Description

An OptiX texture sampler in an unregistered state can be registered to OptiX again via rtTextureSamplerD3D10Register. Once registered, properties like the size of the original D3D10 resource cannot be modified anymore. Calls to the corresponding D3D10 functions will return with an error code. However, the data of the D3D10 resource can still be read and written by the appropriate D3D10 commands. When a texture sampler is already in a registered state rtTextureSamplerD3D10Register will return RT_ERROR_RESOURCE_ALREADY_REGISTERED. A resource must be registered in order to be used by OptiX. If a resource is not registered RT_ERROR_INVALID_VALUE will be returned.

Parameters

in	*textureSampler*	The handle for the texture object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_RESOURCE_ALREADY_REGISTERED

History

rtTextureSamplerD3D10Register was introduced in OptiX 2.0.

See also rtTextureSamplerCreateFromD3D10Resource

2.14.2.6 RTresult RTAPI rtTextureSamplerD3D10Unregister (RTtexturesampler *textureSampler*)

Declares a D3D10 texture as mutable and inaccessible by OptiX.

Description

An OptiX texture sampler in a registered state can be unregistered via rtTextureSamplerD3D10Unregister. Once unregistered, properties like the size of the original D3D10 resource can be changed. As long as a resource is unregistered, OptiX will not be able to access the data and will fail with RT_ERROR_INVALID_VALUE. When a buffer is already in an unregistered state rtBufferD3D10Unregister will return RT_ERROR_RESOURCE_NOT_REGISTERED.

Parameters

in	*textureSampler*	The handle for the texture object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_RESOURCE_NOT_REGISTERED

History

rtTextureSamplerD3D10Unregister was introduced in OptiX 2.0.

See also rtTextureSamplerCreateFromD3D10Resource

2.14.2.7 RTresult RTAPI rtTextureSamplerD3D11Register (RTtexturesampler *textureSampler*)

Declares a D3D11 texture as immutable and accessible by OptiX.

Description

An OptiX texture sampler in an unregistered state can be registered to OptiX again via rtTextureSamplerD3D11Register. Once registered, properties like the size of the original D3D11 resource cannot be modified anymore. Calls to the corresponding D3D11 functions will return with an error code. However, the data of the D3D11 resource can still be read and written by the appropriate D3D11 commands. When a texture sampler is already in a registered state rtTextureSamplerD3D11Register will return RT_ERROR_RESOURCE_ALREADY_REGISTERED. A resource must be registered in order to be used by OptiX. If a resource is not registered RT_ERROR_INVALID_VALUE will be returned.

Parameters

in	*textureSampler*	The handle for the texture object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_RESOURCE_ALREADY_REGISTERED

History

rtTextureSamplerD3D11Register was introduced in OptiX 2.0.

See also rtTextureSamplerCreateFromD3D11Resource

2.14.2.8 RTresult RTAPI rtTextureSamplerD3D11Unregister (RTtexturesampler *textureSampler*)

Declares a D3D11 texture as mutable and inaccessible by OptiX.

Description

An OptiX texture sampler in a registered state can be unregistered via rtTextureSamplerD3D11Unregister. Once unregistered, properties like the size of the original D3D11 resource can be changed. As long as a resource is unregistered, OptiX will not be able to access the data and will fail with RT_ERROR_INVALID_VALUE. When a buffer is already in an unregistered state rtBufferD3D11Unregister will return RT_ERROR_RESOURCE_NOT_REGISTERED.

Parameters

in	*textureSampler*	The handle for the texture object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_RESOURCE_NOT_REGISTERED

History

rtTextureSamplerD3D11Unregister was introduced in OptiX 2.0.

See also rtTextureSamplerCreateFromD3D11Resource

2.14.2.9 RTresult RTAPI rtTextureSamplerD3D9Register (RTtexturesampler *textureSampler*)

Declares a D3D9 texture as immutable and accessible by OptiX.

Description

An OptiX texture sampler in an unregistered state can be registered to OptiX again via rtTextureSamplerD3D9Register. Once registered, properties like the size of the original D3D9 resource cannot be modified anymore. Calls to the corresponding D3D9 functions will return with an error code. However, the data of the D3D9 resource can still be read and written by the appropriate D3D9 commands. When a texture sampler is already in a registered state rtTextureSamplerD3D9Register will return RT_ERROR_RESOURCE_ALREADY_REGISTERED. A resource must be registered in order to be used by OptiX. If a resource is not registered RT_ERROR_INVALID_VALUE will be returned.

Parameters

in	*textureSampler*	The handle for the texture object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_RESOURCE_ALREADY_REGISTERED

History

rtTextureSamplerD3D9Register was introduced in OptiX 2.0.

See also rtTextureSamplerCreateFromD3D9Resource

2.14.2.10 RTresult RTAPI rtTextureSamplerD3D9Unregister (RTtexturesampler *textureSampler*)

Declares a D3D9 texture as mutable and inaccessible by OptiX.

Description

An OptiX texture sampler in a registered state can be unregistered via rtTextureSamplerD3D9Unregister. Once unregistered, properties like the size of the original D3D9 resource can be changed. As long as a resource is unregistered, OptiX will not be able to access the data and will fail with RT_ERROR_INVALID_VALUE. When a buffer is already in an unregistered state rtBufferD3D9Unregister will return RT_ERROR_RESOURCE_NOT_REGISTERED.

Parameters

in	*textureSampler*	The handle for the texture object

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_RESOURCE_NOT_REGISTERED

History

rtTextureSamplerD3D9Unregister was introduced in OptiX 2.0.

See also rtTextureSamplerCreateFromD3D9Resource

2.14.2.11 RTresult RTAPI rtTextureSamplerDestroy (RTtexturesampler *texturesampler*)

Destroys a texture sampler object.

Description

rtTextureSamplerDestroy removes *texturesampler* from its context and deletes it. *texturesampler* should be a value returned by rtTextureSamplerCreate. After the call, *texturesampler* is no longer a valid handle. Any API object that referenced *texturesampler* will have its reference invalidated.

Parameters

in	*texturesampler*	Handle of the texture sampler to destroy

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerDestroy was introduced in OptiX 1.0.

See also rtTextureSamplerCreate

2.14.2.12 RTresult RTAPI rtTextureSamplerGetArraySize (RTtexturesampler *texturesampler,* unsigned int ∗ *num_textures_in_array*)

Gets the number of array slices present in a texture sampler.

Description

rtTextureSamplerGetArraySize gets the number of texture array slices in *texturesampler* and stores it in ∗*num_textures_in_array*.

Parameters

in	*texturesampler*	The texture sampler object to be queried
out	*num_textures_in_array*	The return handle for the number of texture slices the texture sampler

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerGetArraySize was introduced in OptiX 1.0.

See also rtTextureSamplerSetArraySize

2.14.2.13 RTresult RTAPI rtTextureSamplerGetBuffer (RTtexturesampler *texturesampler,* unsigned int *texture_array_idx,* unsigned int *mip_level,* RTbuffer ∗ *buffer*)

Gets a buffer object handle from a texture sampler.

Description

rtTextureSamplerGetBuffer gets a buffer object from *texturesampler* from the specified MIP level and array slice and stores it in ∗*buffer*. *mip_level* and *texture_array_idx* specify the MIP level and array slice, respectively.

Parameters

in	*texturesampler*	The texture sampler object to be queried for the buffer
in	*tex-ture_array_idx*	The array slice index the buffer will be queried from
in	*mip_level*	The MIP level the buffer will be queried from
out	*buffer*	The return handle to the buffer attached to the texture sampler

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerGetBuffer was introduced in OptiX 1.0.

See also rtTextureSamplerSetBuffer

2.14.2.14 RTresult RTAPI rtTextureSamplerGetContext (RTtexturesampler *texturesampler,* RTcontext ∗ *context*)

Gets the context object that created this texture sampler.

Description

rtTextureSamplerGetContext returns a handle to the context object that was used to create *texturesampler*. If *context* is *NULL*, the call will return RT_ERROR_INVALID_VALUE.

Parameters

in	*texturesampler*	The texture sampler object to be queried for its context
out	*context*	The return handle for the context object of the texture sampler

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerGetContext was introduced in OptiX 1.0.

See also rtContextCreate

2.14.2.15 RTresult RTAPI rtTextureSamplerGetD3D10Resource (RTtexturesampler *textureSampler,* ID3D10Resource ∗∗ *resource*)

Gets the D3D10 resource associated with this texture sampler.

Description

rtTextureSamplerGetD3D10Resource stores the D3D10 resource pointer in ∗∗*resource* if *sampler* was created with rtTextureSamplerGetD3D10Resource. If *sampler* was not created from a D3D10 resource *resource* will be 0 after the call and RT_ERROR_INVALID_VALUE is returned

Parameters

in	*textureSampler*	The texture sampler to be queried for its D3D10 resource
out	*resource*	The return handle for the resource

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT

History

rtTextureSamplerGetD3D10Resource was introduced in OptiX 2.0.

See also rtBufferCreateFromD3D10Resource

2.14.2.16 RTresult RTAPI rtTextureSamplerGetD3D11Resource (RTtexturesampler *textureSampler,* ID3D11Resource ∗∗ *resource*)

Gets the D3D11 resource associated with this texture sampler.

Description

rtTextureSamplerGetD3D11Resource stores the D3D11 resource pointer in ∗∗*resource* if *sampler* was created with rtTextureSamplerGetD3D11Resource. If *sampler* was not created from a D3D11 resource *resource* will be 0 after the call and RT_ERROR_INVALID_VALUE is returned

Parameters

in	*textureSampler*	The texture sampler to be queried for its D3D11 resource
out	*resource*	The return handle for the resource

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT

History

rtTextureSamplerGetD3D11Resource was introduced in OptiX 2.0.

See also rtBufferCreateFromD3D11Resource

2.14.2.17 RTresult RTAPI rtTextureSamplerGetD3D9Resource (RTtexturesampler *textureSampler,* IDirect3DResource9 ∗∗ *pResource*)

Gets the D3D9 resource associated with this texture sampler.

Description

rtTextureSamplerGetD3D9Resource stores the D3D9 resource pointer in ∗∗*resource* if *sampler* was created with rtTextureSamplerGetD3D9Resource. If *sampler* was not created from a D3D9 resource *resource* will be 0 after the call and RT_ERROR_INVALID_VALUE is returned

Parameters

`in`	*textureSampler*	The texture sampler to be queried for its D3D9 resource
`out`	*pResource*	The return handle for the resource

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_INVALID_CONTEXT

History

rtTextureSamplerGetD3D9Resource was introduced in OptiX 2.0.

See also rtBufferCreateFromD3D9Resource

2.14.2.18 RTresult RTAPI rtTextureSamplerGetFilteringModes (RTtexturesampler *texturesampler,* RTfiltermode ∗ *minification,* RTfiltermode ∗ *magnification,* RTfiltermode ∗ *mipmapping*)

Gets the filtering modes of a texture sampler.

Description

rtTextureSamplerGetFilteringModes gets the minification, magnification and MIP mapping filtering modes from *texturesampler* and stores them in ∗*minification*, ∗*magnification* and ∗*mipmapping*, respectively. See rtTextureSamplerSetFilteringModes for the values RTfiltermode may take.

Parameters

`in`	*texturesampler*	The texture sampler object to be queried
`out`	*minification*	The return handle for the minification filtering mode of the texture sampler
`out`	*magnification*	The return handle for the magnification filtering mode of the texture sampler
`out`	*mipmapping*	The return handle for the MIP mapping filtering mode of the texture sampler

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerGetFilteringModes was introduced in OptiX 1.0.

See also rtTextureSamplerSetFilteringModes

2.14.2.19 RTresult RTAPI rtTextureSamplerGetId (RTtexturesampler *texturesampler,* int ∗ *texture_id*)

Returns the texture ID of this texture sampler.

Description

rtTextureSamplerGetId returns a handle to the texture sampler *texturesampler* to be used in OptiX programs on the device to reference the associated texture. The returned ID cannot be used on the host side. If *texture_id* is *NULL*, the call will return RT_ERROR_INVALID_VALUE.

Parameters

in	*texturesampler*	The texture sampler object to be queried for its ID
out	*texture_id*	The returned device-side texture ID of the texture sampler

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtTextureSamplerGetId was introduced in OptiX 3.0.

See also rtTextureSamplerCreate

2.14.2.20 RTresult RTAPI rtTextureSamplerGetIndexingMode (RTtexturesampler *texturesampler,* RTtextureindexmode ∗ *indexmode*)

Gets the indexing mode of a texture sampler.

Description

rtTextureSamplerGetIndexingMode gets the indexing mode of *texturesampler* and stores it in ∗*indexmode*. See rtTextureSamplerSetIndexingMode for the values RTtextureindexmode may take.

Parameters

in	*texturesampler*	The texture sampler object to be queried
out	*indexmode*	The return handle for the indexing mode of the texture sampler

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerGetIndexingMode was introduced in OptiX 1.0.

See also rtTextureSamplerSetIndexingMode

2.14.2.21 RTresult RTAPI rtTextureSamplerGetMaxAnisotropy (RTtexturesampler *texturesampler,* float ∗ *value*)

Gets the maximum anisotropy level for a texture sampler.

Description

rtTextureSamplerGetMaxAnisotropy gets the maximum anisotropy level for *texturesampler* and stores it in ∗*value*.

Parameters

in	*texturesampler*	The texture sampler object to be queried
out	*value*	The return handle for the maximum anisotropy level of the texture sampler

Return values

Relevant return values:

- RT_SUCCESS

- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerGetMaxAnisotropy was introduced in OptiX 1.0.

See also rtTextureSamplerSetMaxAnisotropy

2.14.2.22 RTresult RTAPI rtTextureSamplerGetMipLevelCount (RTtexturesampler *texturesampler,* unsigned int ∗ *num_mip_levels*)

Gets the number of MIP levels in a texture sampler.

Description

rtTextureSamplerGetMipLevelCount gets the number of MIP levels contained in *texturesampler* and stores it in ∗*num_mip_levels*.

Parameters

`in`	*texturesampler*	The texture sampler object to be queried
`out`	*num_mip_levels*	The return handle for the number of MIP levels in the texture sampler

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerGetMipLevelCount was introduced in OptiX 1.0.

See also rtTextureSamplerSetMipLevelCount

2.14.2.23 RTresult RTAPI rtTextureSamplerGetReadMode (RTtexturesampler *texturesampler,* RTtexturereadmode ∗ *readmode*)

Gets the read mode of a texture sampler.

Description

rtTextureSamplerGetReadMode gets the read mode of *texturesampler* and stores it in ∗*readmode*. See rtTexture-SamplerSetReadMode for a list of values RTtexturereadmode can take.

Parameters

`in`	*texturesampler*	The texture sampler object to be queried
`out`	*readmode*	The return handle for the read mode of the texture sampler

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerGetReadMode was introduced in OptiX 1.0.

See also rtTextureSamplerSetReadMode

2.14.2.24 RTresult RTAPI rtTextureSamplerGetWrapMode (RTtexturesampler *texturesampler,* unsigned int *dimension,* RTwrapmode ∗ *wrapmode*)

Gets the wrap mode of a texture sampler.

Description

rtTextureSamplerGetWrapMode gets the texture wrapping mode of *texturesampler* and stores it in ∗*wrapmode*. See rtTextureSamplerSetWrapMode for a list of values RTwrapmode can take.

Parameters

in	*texturesampler*	The texture sampler object to be queried
in	*dimension*	Dimension for the wrapping
out	*wrapmode*	The return handle for the wrap mode of the texture sampler

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerGetWrapMode was introduced in OptiX 1.0.

See also rtTextureSamplerSetWrapMode

2.14.2.25 RTresult RTAPI rtTextureSamplerSetArraySize (RTtexturesampler *texturesampler,* unsigned int *num_textures_in_array*)

Sets the array size of a texture sampler.

Description

rtTextureSamplerSetArraySize specifies the number of texture array slices present in *texturesampler* as *num_textures_in_array*. After changing the number of slices in the array, buffers must be reassociated with *texturesampler* via rtTextureSamplerSetBuffer.

Parameters

in	*texturesampler*	The texture sampler object to be changed
in	*num_textures_in_array*	The new number of array slices of the texture sampler

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerSetArraySize was introduced in OptiX 1.0.

See also rtTextureSamplerGetArraySize

2.14.2.26 RTresult RTAPI rtTextureSamplerSetBuffer (RTtexturesampler *texturesampler,* unsigned int *texture_array_idx,* unsigned int *mip_level,* RTbuffer *buffer*)

Attaches a buffer object to a texture sampler.

Description

rtTextureSamplerSetBuffer attaches *buffer* to *texturesampler* at the specified array slice and MIP level. The array slice and MIP level are specified by *texture_array_idx* and *mip_level*, respectively.

Parameters

`in`	*texturesampler*	The texture sampler object that will contain the buffer
`in`	*tex-ture_array_idx*	The array slice index the buffer will be attached to
`in`	*mip_level*	The MIP level the buffer will be attached to
`in`	*buffer*	The buffer to be attached to the texture sampler

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerSetBuffer was introduced in OptiX 1.0.

See also rtTextureSamplerGetBuffer

2.14.2.27 RTresult RTAPI rtTextureSamplerSetFilteringModes (RTtexturesampler *texturesampler,* RTfiltermode *minification,* RTfiltermode *magnification,* RTfiltermode *mipmapping*)

Sets the filtering modes of a texture sampler.

Description

rtTextureSamplerSetFilteringModes sets the minification, magnification and MIP mapping filter modes for *texturesampler*. RTfiltermode must be one of the following values:

- RT_FILTER_NEAREST
- RT_FILTER_LINEAR
- RT_FILTER_NONE

These filter modes specify how the texture sampler will interpolate buffer data that has been attached to it. *minification* and *magnification* must be one of RT_FILTER_NEAREST or RT_FILTER_LINEAR. *mipmapping* may be any of the three values but must be RT_FILTER_NONE if the texture sampler contains only a single MIP level or one of RT_FILTER_NEAREST or RT_FILTER_LINEAR if the texture sampler contains more than one MIP level.

Parameters

in	*texturesampler*	The texture sampler object to be changed
in	*minification*	The new minification filter mode of the texture sampler
in	*magnification*	The new magnification filter mode of the texture sampler
in	*mipmapping*	The new MIP mapping filter mode of the texture sampler

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerSetFilteringModes was introduced in OptiX 1.0.

See also rtTextureSamplerGetFilteringModes

2.14.2.28 RTresult RTAPI rtTextureSamplerSetIndexingMode (RTtexturesampler *texturesampler,* RTtextureindexmode *indexmode*)

Sets whether texture coordinates for this texture sampler are normalized.

Description

rtTextureSamplerSetIndexingMode sets the indexing mode of *texturesampler* to *indexmode*. *indexmode* can take on one of the following values:

- RT_TEXTURE_INDEX_NORMALIZED_COORDINATES,
- RT_TEXTURE_INDEX_ARRAY_INDEX

These values are used to control the interpretation of texture coordinates. If the index mode is set to RT_TEXTURE_INDEX_NORMALIZED_COORDINATES, the texture is parameterized over [0,1]. If the index mode is set to RT_TEXTURE_INDEX_ARRAY_INDEX then texture coordinates are interpreted as array indices into the contents of the underlying buffer objects.

Parameters

in	*texturesampler*	The texture sampler object to be changed
in	*indexmode*	The new indexing mode of the texture sampler

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerSetIndexingMode was introduced in OptiX 1.0.

See also rtTextureSamplerGetIndexingMode

2.14.2.29 RTresult RTAPI rtTextureSamplerSetMaxAnisotropy (RTtexturesampler *texturesampler*, float *value*)

Sets the maximum anisotropy of a texture sampler.

Description

rtTextureSamplerSetMaxAnisotropy sets the maximum anisotropy of *texturesampler* to *value*. A float value greater than 0 will enable anisotropic filtering at the specified value.

Parameters

in	*texturesampler*	The texture sampler object to be changed
in	*value*	The new maximum anisotropy level of the texture sampler

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerSetMaxAnisotropy was introduced in OptiX 1.0.

See also rtTextureSamplerGetMaxAnisotropy

2.14.2.30 RTresult RTAPI rtTextureSamplerSetMipLevelCount (RTtexturesampler *texturesampler*, unsigned int *num_mip_levels*)

Sets the number of MIP levels in a texture sampler.

Description

rtTextureSamplerSetMipLevelCount sets the number of MIP levels in *texturesampler* to *num_mip_levels*.

Parameters

in	*texturesampler*	The texture sampler object to be changed
in	*num_mip_levels*	The new number of MIP levels of the texture sampler

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerSetMipLevelCount was introduced in OptiX 1.0.

See also rtTextureSamplerGetMipLevelCount

2.14.2.31 RTresult RTAPI rtTextureSamplerSetReadMode (RTtexturesampler *texturesampler*, RTtexturereadmode *readmode*)

Sets the read mode of a texture sampler.

Description

rtTextureSamplerSetReadMode sets the data read mode of *texturesampler* to *readmode*. *readmode* can take one of the following values:

- RT_TEXTURE_READ_ELEMENT_TYPE
- RT_TEXTURE_READ_NORMALIZED_FLOAT

readmode controls the returned value of the texture sampler when it is used to sample textures. RT_TEXTURE_READ_ELEMENT_TY will return data of the type of the underlying buffer objects. RT_TEXTURE_READ_NORMALIZED_FLOAT will return floating point values normalized by the range of the underlying type. If the underlying type is floating point, RT_TEXTURE_READ_NORMALIZED_FLOAT and RT_TEXTURE_READ_ELEMENT_TYPE are equivalent, always returning the unmodified floating point value.

For example, a texture sampler that samples a buffer of type RT_FORMAT_UNSIGNED_BYTE with a read mode of RT_TEXTURE_READ_NORMALIZED_FLOAT will convert integral values from the range [0,255] to floating point values in the range [0,1] automatically as the buffer is sampled from.

Parameters

in	*texturesampler*	The texture sampler object to be changed
in	*readmode*	The new read mode of the texture sampler

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerSetReadMode was introduced in OptiX 1.0.

See also rtTextureSamplerGetReadMode

2.14.2.32 RTresult RTAPI rtTextureSamplerSetWrapMode (RTtexturesampler *texturesampler,* unsigned int *dimension,* RTwrapmode *wrapmode*)

Sets the wrapping mode of a texture sampler.

Description

rtTextureSamplerSetWrapMode sets the wrapping mode of *texturesampler* to *wrapmode* for the texture dimension specified by *dimension*. *wrapmode* can take one of the following values:

- RT_WRAP_REPEAT
- RT_WRAP_CLAMP_TO_EDGE
- RT_WRAP_MIRROR
- RT_WRAP_CLAMP_TO_BORDER

The wrapping mode controls the behavior of the texture sampler as texture coordinates wrap around the range specified by the indexing mode. These values mirror the CUDA behavior of textures. See CUDA programming guide for details.

Parameters

in	*texturesampler*	The texture sampler object to be changed
in	*dimension*	Dimension of the texture
in	*wrapmode*	The new wrap mode of the texture sampler

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerSetWrapMode was introduced in OptiX 1.0. RT_WRAP_MIRROR and RT_WRAP_CLAMP_TO_BORDER were introduced in OptiX 3.0.

See also rtTextureSamplerGetWrapMode

2.14.2.33 RTresult RTAPI rtTextureSamplerValidate (RTtexturesampler *texturesampler*)

Validates the state of a texture sampler.

Description

rtTextureSamplerValidate checks *texturesampler* for completeness. If *texturesampler* does not have buffers attached to all of its MIP levels and array slices or if the filtering modes are incompatible with the current MIP level and array slice configuration then the call will return RT_ERROR_INVALID_CONTEXT.

Parameters

in	*texturesampler*	The texture sampler to be validated

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtTextureSamplerValidate was introduced in OptiX 1.0.

See also rtContextValidate

2.15 Variable functions

2.15.1 Detailed Description

Functions related to variable handling.

Modules

- Variable setters
- Variable getters

Functions

- RTresult RTAPI rtVariableSetObject (RTvariable v, RTobject object)
- RTresult RTAPI rtVariableSetUserData (RTvariable v, RTsize size, const void ∗ptr)
- RTresult RTAPI rtVariableGetObject (RTvariable v, RTobject ∗object)
- RTresult RTAPI rtVariableGetUserData (RTvariable v, RTsize size, void ∗ptr)
- RTresult RTAPI rtVariableGetName (RTvariable v, const char ∗∗name_return)
- RTresult RTAPI rtVariableGetAnnotation (RTvariable v, const char ∗∗annotation_return)
- RTresult RTAPI rtVariableGetType (RTvariable v, RTobjecttype ∗type_return)
- RTresult RTAPI rtVariableGetContext (RTvariable v, RTcontext ∗context)
- RTresult RTAPI rtVariableGetSize (RTvariable v, RTsize ∗size)

2.15.2 Function Documentation

2.15.2.1 RTresult RTAPI rtVariableGetAnnotation (RTvariable *v*, const char ∗∗ *annotation_return*)

Queries the annotation string of a program variable.

Description

rtVariableGetAnnotation queries a program variable's annotation string. A pointer to the string containing the annotation shall be returned to the location pointed to by the pointer *annotation_return*. If *v* is not a valid variable, this call sets ∗*annotation_return* to *NULL* and returns RT_ERROR_INVALID_VALUE. ∗*annotation_return* will point to valid memory until another API function that returns a string is called.

Parameters

in	*v*	Specifies the program variable to be queried
out	*annotation_return*	Returns the program variable's annotation string

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtVariableGetAnnotation was introduced in OptiX 1.0.

See also rtDeclareVariable, rtDeclareAnnotation

2.15.2.2 RTresult RTAPI rtVariableGetContext (RTvariable *v*, RTcontext ∗ *context*)

Returns the context associated with a program variable.

Description

rtVariableGetContext queries the context associated with a program variable. The target variable is specified by *variable*. The context of the program variable is returned to ∗*context* if the pointer *context* is not *NULL*. If *variable* is not a valid variable, ∗*context* is set to *NULL* and RT_ERROR_INVALID_VALUE is returned.

Parameters

in	*v*	Specifies the program variable to be queried
out	*context*	Returns the context associated with the program variable

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

rtVariableGetContext was introduced in OptiX 1.0.

See also rtContextDeclareVariable

2.15.2.3 RTresult RTAPI rtVariableGetName (RTvariable *v*, const char ∗∗ *name_return*)

Queries the name of a program variable.

Description

Queries a program variable's name. The variable of interest is specified by *variable*, which should be a value returned by rtContextDeclareVariable. A pointer to the string containing the name of the variable shall be returned to the location pointed to by the pointer *name_return*. If *variable* is not a valid variable, this call sets ∗*name_return* to *NULL* and returns RT_ERROR_INVALID_VALUE. ∗*name_return* will point to valid memory until another API function that returns a string is called.

Parameters

in	*v*	Specifies the program variable to be queried
out	*name_return*	Returns the program variable's name

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED

History

rtVariableGetName was introduced in OptiX 1.0.

See also rtContextDeclareVariable

2.15.2.4 RTresult RTAPI rtVariableGetObject (RTvariable *v*, RTobject ∗ *object*)

Returns the value of a OptiX object program variable.

Description

rtVariableGetObject queries the value of a program variable whose data type is a OptiX object. The target variable is specified by *variable*. The value of the program variable is returned in the location pointed to by *object*. The concrete type of the program variable can be queried using rtVariableGetType, and the RTobject handle returned by rtVariableGetObject may safely be cast to an OptiX handle of corresponding type. If *variable* is not a valid variable, this call sets the location pointed to by *object* to *NULL* and returns RT_ERROR_INVALID_VALUE.

Parameters

`in`	*v*	Specifies the program variable to be queried
`out`	*object*	Returns the value of the program variable

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE
- RT_ERROR_TYPE_MISMATCH

History

rtVariableGetObject was introduced in OptiX 1.0.

See also rtVariableSetObject, rtVariableGetType, rtContextDeclareVariable

2.15.2.5 RTresult RTAPI rtVariableGetSize (RTvariable *v*, RTsize ∗ *size*)

Queries the size, in bytes, of a variable.

Description

rtVariableGetSize queries a declared program variable for its size in bytes. This is most often used to query the size of a variable that has a user-defined type. Builtin types (int, float, unsigned int, etc.) may be queried, but object typed variables, such as buffers, texture samplers and graph nodes, cannot be queried and will return RT_ERROR_INVALID_VALUE.

Parameters

`in`	*v*	Specifies the program variable to be queried
`out`	*size*	Specifies a pointer where the size of the variable, in bytes, will be returned

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

rtVariableGetSize was introduced in OptiX 1.0.

See also rtVariableGetUserData, rtContextDeclareVariable

2.15.2.6 RTresult RTAPI rtVariableGetType (RTvariable *v*, RTobjecttype ∗ *type_return*)

Returns type information about a program variable.

Description

rtVariableGetType queries a program variable's type. The variable of interest is specified by *variable*. The enumeration identifying the type of the program variable shall be returned to the location pointed to by *type_return*, if it is not equal to *NULL*. In this case, after rtVariableGetType, the location pointed to by *type_return* shall be one of the following:

- RT_OBJECTTYPE_UNKNOWN
- RT_OBJECTTYPE_GROUP
- RT_OBJECTTYPE_GEOMETRY_GROUP
- RT_OBJECTTYPE_TRANSFORM
- RT_OBJECTTYPE_SELECTOR
- RT_OBJECTTYPE_GEOMETRY_INSTANCE
- RT_OBJECTTYPE_BUFFER
- RT_OBJECTTYPE_TEXTURE_SAMPLER
- RT_OBJECTTYPE_OBJECT
- RT_OBJECTTYPE_MATRIX_FLOAT2x2
- RT_OBJECTTYPE_MATRIX_FLOAT2x3
- RT_OBJECTTYPE_MATRIX_FLOAT2x4
- RT_OBJECTTYPE_MATRIX_FLOAT3x2
- RT_OBJECTTYPE_MATRIX_FLOAT3x3
- RT_OBJECTTYPE_MATRIX_FLOAT3x4
- RT_OBJECTTYPE_MATRIX_FLOAT4x2
- RT_OBJECTTYPE_MATRIX_FLOAT4x3
- RT_OBJECTTYPE_MATRIX_FLOAT4x4
- RT_OBJECTTYPE_FLOAT
- RT_OBJECTTYPE_FLOAT2
- RT_OBJECTTYPE_FLOAT3
- RT_OBJECTTYPE_FLOAT4
- RT_OBJECTTYPE_INT
- RT_OBJECTTYPE_INT2
- RT_OBJECTTYPE_INT3
- RT_OBJECTTYPE_INT4
- RT_OBJECTTYPE_UNSIGNED_INT
- RT_OBJECTTYPE_UNSIGNED_INT2
- RT_OBJECTTYPE_UNSIGNED_INT3
- RT_OBJECTTYPE_UNSIGNED_INT4
- RT_OBJECTTYPE_USER

If *variable* is not valid, this call returns RT_ERROR_INVALID_VALUE.

Parameters

in	*v*	Specifies the program variable to be queried
out	*type_return*	Returns the type of the program variable

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

rtVariableGetType was introduced in OptiX 1.0.

See also rtContextDeclareVariable

2.15.2.7 RTresult RTAPI rtVariableGetUserData (RTvariable *v*, RTsize *size*, void ∗ *ptr*)

Defined.

Description

rtVariableGetUserData queries the value of a program variable whose data type is user-defined. The variable of interest is specified by *variable*. The size of the variable's value must match the value given by the parameter *size*. The value of the program variable is copied to the memory region pointed to by *ptr*. The storage at location *ptr* must be large enough to accomodate all of the program variable's value data. If *variable* is not a valid variable, this call has no effect and returns RT_ERROR_INVALID_VALUE.

Parameters

in	*v*	Specifies the program variable to be queried
in	*size*	Specifies the size of the program variable, in bytes
out	*ptr*	The target memory location where to copy the value of the variable

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

rtVariableGetUserData was introduced in OptiX 1.0.

See also rtVariableSetUserData, rtContextDeclareVariable

2.15.2.8 RTresult RTAPI rtVariableSetObject (RTvariable *v*, RTobject *object*)

Sets a program variable value to a OptiX object.

Description

rtVariableSetObject sets a program variable to an OptiX object value. The target variable is specified by *variable*. The new value of the program variable is specified by *object*. The concrete type of *object* can be one of RTbuffer, RTtexturesampler, RTgroup, RTprogram, RTselector, RTgeometrygroup, or RTtransform. If *variable* is not a valid variable or *object* is not a valid OptiX object, this call has no effect and returns RT_ERROR_INVALID_VALUE.

Parameters

in	*v*	Specifies the program variable to be set
in	*object*	Specifies the new value of the program variable

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_TYPE_MISMATCH

History

rtVariableSetObject was introduced in OptiX 1.0. The ability to bind an RTprogram to a variable was intrduced in OptiX 3.0.

See also rtVariableGetObject, rtContextDeclareVariable

2.15.2.9 RTresult RTAPI rtVariableSetUserData (RTvariable *v*, RTsize *size*, const void ∗ *ptr*)

Defined.

Description

rtVariableSetUserData modifies the value of a program variable whose data type is user-defined. The value copied into the variable is defined by an arbitrary region of memory, pointed to by *ptr*. The size of the memory region is given by *size*. The target variable is specified by *variable*. If *variable* is not a valid variable, this call has no effect and returns RT_ERROR_INVALID_VALUE.

Parameters

in	*v*	Specifies the program variable to be modified
in	*size*	Specifies the size of the new value, in bytes
in	*ptr*	Specifies a pointer to the new value of the program variable

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE
- RT_ERROR_MEMORY_ALLOCATION_FAILED
- RT_ERROR_TYPE_MISMATCH

History

rtVariableSetUserData was introduced in OptiX 1.0.

See also rtVariableGetUserData, rtContextDeclareVariable

2.16 Variable setters

2.16.1 Detailed Description

Functions designed to modify the value of a program variable.

- RTresult RTAPI rtVariableSet1f (RTvariable v, float f1)
- RTresult RTAPI rtVariableSet2f (RTvariable v, float f1, float f2)
- RTresult RTAPI rtVariableSet3f (RTvariable v, float f1, float f2, float f3)
- RTresult RTAPI rtVariableSet4f (RTvariable v, float f1, float f2, float f3, float f4)
- RTresult RTAPI rtVariableSet1fv (RTvariable v, const float ∗f)
- RTresult RTAPI rtVariableSet2fv (RTvariable v, const float ∗f)
- RTresult RTAPI rtVariableSet3fv (RTvariable v, const float ∗f)
- RTresult RTAPI rtVariableSet4fv (RTvariable v, const float ∗f)
- RTresult RTAPI rtVariableSet1i (RTvariable v, int i1)
- RTresult RTAPI rtVariableSet2i (RTvariable v, int i1, int i2)
- RTresult RTAPI rtVariableSet3i (RTvariable v, int i1, int i2, int i3)
- RTresult RTAPI rtVariableSet4i (RTvariable v, int i1, int i2, int i3, int i4)
- RTresult RTAPI rtVariableSet1iv (RTvariable v, const int ∗i)
- RTresult RTAPI rtVariableSet2iv (RTvariable v, const int ∗i)
- RTresult RTAPI rtVariableSet3iv (RTvariable v, const int ∗i)
- RTresult RTAPI rtVariableSet4iv (RTvariable v, const int ∗i)
- RTresult RTAPI rtVariableSet1ui (RTvariable v, unsigned int u1)
- RTresult RTAPI rtVariableSet2ui (RTvariable v, unsigned int u1, unsigned int u2)
- RTresult RTAPI rtVariableSet3ui (RTvariable v, unsigned int u1, unsigned int u2, unsigned int u3)
- RTresult RTAPI rtVariableSet4ui (RTvariable v, unsigned int u1, unsigned int u2, unsigned int u3, unsigned int u4)
- RTresult RTAPI rtVariableSet1uiv (RTvariable v, const unsigned int ∗u)
- RTresult RTAPI rtVariableSet2uiv (RTvariable v, const unsigned int ∗u)
- RTresult RTAPI rtVariableSet3uiv (RTvariable v, const unsigned int ∗u)
- RTresult RTAPI rtVariableSet4uiv (RTvariable v, const unsigned int ∗u)
- RTresult RTAPI rtVariableSetMatrix2x2fv (RTvariable v, int transpose, const float ∗m)
- RTresult RTAPI rtVariableSetMatrix2x3fv (RTvariable v, int transpose, const float ∗m)
- RTresult RTAPI rtVariableSetMatrix2x4fv (RTvariable v, int transpose, const float ∗m)
- RTresult RTAPI rtVariableSetMatrix3x2fv (RTvariable v, int transpose, const float ∗m)
- RTresult RTAPI rtVariableSetMatrix3x3fv (RTvariable v, int transpose, const float ∗m)
- RTresult RTAPI rtVariableSetMatrix3x4fv (RTvariable v, int transpose, const float ∗m)
- RTresult RTAPI rtVariableSetMatrix4x2fv (RTvariable v, int transpose, const float ∗m)
- RTresult RTAPI rtVariableSetMatrix4x3fv (RTvariable v, int transpose, const float ∗m)
- RTresult RTAPI rtVariableSetMatrix4x4fv (RTvariable v, int transpose, const float ∗m)

2.16.2 Function Documentation

2.16.2.1 RTresult RTAPI rtVariableSet1f (RTvariable *v*, float *f1*)

Functions designed to modify the value of a program variable.

Description

Variable setters functions modify the value of a program variable or variable array. The target variable is specificed by *variable*, which should be a value returned by rtContextGetVariable.

The commands *rtVariableSet{1-2-3-4}{f-i-ui}v* are used to modify the value of a program variable specified by *variable* using the values passed as arguments. The number specified in the command should match the number of components in the data type of the specified program variable (e.g., 1 for float, int, unsigned int; 2 for float2, int2, uint2, etc.). The suffix *f* indicates that *variable* has floating point type, the suffix *i* indicates that *variable* has integral type, and the suffix *ui* indicates that that *variable* has unsigned integral type. The *v* variants of this function should be used to load the program variable's value from the array specified by parameter *v*. In this case, the array *v* should contain as many elements as there are program variable components.

The commands *rtVariableSetMatrix{2-3-4}x{2-3-4}fv* are used to modify the value of a program variable whose data type is a matrix. The numbers in the command names are the number of rows and columns, respectively. For example, *2x4* indicates a matrix with 2 rows and 4 columns (i.e., 8 values). If *transpose* is *0*, the matrix is specified in row-major order, otherwise in column-major order or, equivalently, as a matrix with the number of rows and columns swapped in row-major order.

If *variable* is not a valid variable, these calls have no effect and return RT_ERROR_INVALID_VALUE

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

Variable setters were introduced in OptiX 1.0.

See also Variable getters, Variable setters, rtDeclareVariable

Parameters

in	*v*	Specifies the program variable to be modified
in	*f1*	Specifies the new float value of the program variable

2.16.2.2 RTresult RTAPI rtVariableSet1fv (RTvariable *v*, const float ∗ *f*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*f*	Array of float values to set the variable to

2.16.2.3 RTresult RTAPI rtVariableSet1i (RTvariable *v*, int *i1*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*i1*	Specifies the new integer value of the program variable

2.16.2.4 RTresult RTAPI rtVariableSet1iv (RTvariable *v*, const int ∗ *i*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*i*	Array of integer values to set the variable to

2.16.2.5 RTresult RTAPI rtVariableSet1ui (RTvariable *v*, unsigned int *u1*)

Parameters

in	*v*	Specifies the program variable to be modified

in	*u1*	Specifies the new unsigned integer value of the program variable

2.16.2.6 RTresult RTAPI rtVariableSet1uiv (RTvariable *v*, const unsigned int ∗ *u*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*u*	Array of unsigned integer values to set the variable to

2.16.2.7 RTresult RTAPI rtVariableSet2f (RTvariable *v*, float *f1*, float *f2*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*f1*	Specifies the new float value of the program variable
in	*f2*	Specifies the new float value of the program variable

2.16.2.8 RTresult RTAPI rtVariableSet2fv (RTvariable *v*, const float ∗ *f*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*f*	Array of float values to set the variable to

2.16.2.9 RTresult RTAPI rtVariableSet2i (RTvariable *v*, int *i1*, int *i2*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*i1*	Specifies the new integer value of the program variable
in	*i2*	Specifies the new integer value of the program variable

2.16.2.10 RTresult RTAPI rtVariableSet2iv (RTvariable *v*, const int ∗ *i*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*i*	Array of integer values to set the variable to

2.16.2.11 RTresult RTAPI rtVariableSet2ui (RTvariable *v*, unsigned int *u1*, unsigned int *u2*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*u1*	Specifies the new unsigned integer value of the program variable
in	*u2*	Specifies the new unsigned integer value of the program variable

2.16.2.12 RTresult RTAPI rtVariableSet2uiv (RTvariable *v*, const unsigned int ∗ *u*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*u*	Array of unsigned integer values to set the variable to

2.16.2.13 RTresult RTAPI rtVariableSet3f (RTvariable *v*, float *f1*, float *f2*, float *f3*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*f1*	Specifies the new float value of the program variable
in	*f2*	Specifies the new float value of the program variable
in	*f3*	Specifies the new float value of the program variable

2.16.2.14 RTresult RTAPI rtVariableSet3fv (RTvariable *v*, const float ∗ *f*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*f*	Array of float values to set the variable to

2.16.2.15 RTresult RTAPI rtVariableSet3i (RTvariable *v*, int *i1*, int *i2*, int *i3*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*i1*	Specifies the new integer value of the program variable
in	*i2*	Specifies the new integer value of the program variable
in	*i3*	Specifies the new integer value of the program variable

2.16.2.16 RTresult RTAPI rtVariableSet3iv (RTvariable *v*, const int ∗ *i*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*i*	Array of integer values to set the variable to

2.16.2.17 RTresult RTAPI rtVariableSet3ui (RTvariable *v*, unsigned int *u1*, unsigned int *u2*, unsigned int *u3*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*u1*	Specifies the new unsigned integer value of the program variable
in	*u2*	Specifies the new unsigned integer value of the program variable
in	*u3*	Specifies the new unsigned integer value of the program variable

2.16.2.18 RTresult RTAPI rtVariableSet3uiv (RTvariable *v*, const unsigned int ∗ *u*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*u*	Array of unsigned integer values to set the variable to

2.16.2.19 RTresult RTAPI rtVariableSet4f (RTvariable *v*, float *f1*, float *f2*, float *f3*, float *f4*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*f1*	Specifies the new float value of the program variable
in	*f2*	Specifies the new float value of the program variable

in	*f3*	Specifies the new float value of the program variable
in	*f4*	Specifies the new float value of the program variable

2.16.2.20 RTresult RTAPI rtVariableSet4fv (RTvariable *v*, const float ∗ *f*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*f*	Array of float values to set the variable to

2.16.2.21 RTresult RTAPI rtVariableSet4i (RTvariable *v*, int *i1*, int *i2*, int *i3*, int *i4*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*i1*	Specifies the new integer value of the program variable
in	*i2*	Specifies the new integer value of the program variable
in	*i3*	Specifies the new integer value of the program variable
in	*i4*	Specifies the new integer value of the program variable

2.16.2.22 RTresult RTAPI rtVariableSet4iv (RTvariable *v*, const int ∗ *i*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*i*	Array of integer values to set the variable to

2.16.2.23 RTresult RTAPI rtVariableSet4ui (RTvariable *v*, unsigned int *u1*, unsigned int *u2*, unsigned int *u3*, unsigned int *u4*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*u1*	Specifies the new unsigned integer value of the program variable
in	*u2*	Specifies the new unsigned integer value of the program variable
in	*u3*	Specifies the new unsigned integer value of the program variable
in	*u4*	Specifies the new unsigned integer value of the program variable

2.16.2.24 RTresult RTAPI rtVariableSet4uiv (RTvariable *v*, const unsigned int ∗ *u*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*u*	Array of unsigned integer values to set the variable to

2.16.2.25 RTresult RTAPI rtVariableSetMatrix2x2fv (RTvariable *v*, int *transpose*, const float ∗ *m*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*transpose*	Specifies row-major or column-major order
in	*m*	Array of float values to set the matrix to

2.16.2.26 RTresult RTAPI rtVariableSetMatrix2x3fv (RTvariable *v*, int *transpose*, const float ∗ *m*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*transpose*	Specifies row-major or column-major order
in	*m*	Array of float values to set the matrix to

2.16.2.27 RTresult RTAPI rtVariableSetMatrix2x4fv (RTvariable *v*, int *transpose*, const float ∗ *m*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*transpose*	Specifies row-major or column-major order
in	*m*	Array of float values to set the matrix to

2.16.2.28 RTresult RTAPI rtVariableSetMatrix3x2fv (RTvariable *v*, int *transpose*, const float ∗ *m*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*transpose*	Specifies row-major or column-major order
in	*m*	Array of float values to set the matrix to

2.16.2.29 RTresult RTAPI rtVariableSetMatrix3x3fv (RTvariable *v*, int *transpose*, const float ∗ *m*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*transpose*	Specifies row-major or column-major order
in	*m*	Array of float values to set the matrix to

2.16.2.30 RTresult RTAPI rtVariableSetMatrix3x4fv (RTvariable *v*, int *transpose*, const float ∗ *m*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*transpose*	Specifies row-major or column-major order
in	*m*	Array of float values to set the matrix to

2.16.2.31 RTresult RTAPI rtVariableSetMatrix4x2fv (RTvariable *v*, int *transpose*, const float ∗ *m*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*transpose*	Specifies row-major or column-major order
in	*m*	Array of float values to set the matrix to

2.16.2.32 RTresult RTAPI rtVariableSetMatrix4x3fv (RTvariable *v*, int *transpose*, const float ∗ *m*)

Parameters

in	*v*	Specifies the program variable to be modified
in	*transpose*	Specifies row-major or column-major order
in	*m*	Array of float values to set the matrix to

2.16.2.33 RTresult RTAPI rtVariableSetMatrix4x4fv (RTvariable *v*, int *transpose*, const float ∗ *m*)

Parameters

`in`	*v*	Specifies the program variable to be modified
`in`	*transpose*	Specifies row-major or column-major order
`in`	*m*	Array of float values to set the matrix to

2.17 Variable getters

2.17.1 Detailed Description

Functions designed to modify the value of a program variable.

- RTresult RTAPI rtVariableGet1f (RTvariable v, float ∗f1)
- RTresult RTAPI rtVariableGet2f (RTvariable v, float ∗f1, float ∗f2)
- RTresult RTAPI rtVariableGet3f (RTvariable v, float ∗f1, float ∗f2, float ∗f3)
- RTresult RTAPI rtVariableGet4f (RTvariable v, float ∗f1, float ∗f2, float ∗f3, float ∗f4)
- RTresult RTAPI rtVariableGet1fv (RTvariable v, float ∗f)
- RTresult RTAPI rtVariableGet2fv (RTvariable v, float ∗f)
- RTresult RTAPI rtVariableGet3fv (RTvariable v, float ∗f)
- RTresult RTAPI rtVariableGet4fv (RTvariable v, float ∗f)
- RTresult RTAPI rtVariableGet1i (RTvariable v, int ∗i1)
- RTresult RTAPI rtVariableGet2i (RTvariable v, int ∗i1, int ∗i2)
- RTresult RTAPI rtVariableGet3i (RTvariable v, int ∗i1, int ∗i2, int ∗i3)
- RTresult RTAPI rtVariableGet4i (RTvariable v, int ∗i1, int ∗i2, int ∗i3, int ∗i4)
- RTresult RTAPI rtVariableGet1iv (RTvariable v, int ∗i)
- RTresult RTAPI rtVariableGet2iv (RTvariable v, int ∗i)
- RTresult RTAPI rtVariableGet3iv (RTvariable v, int ∗i)
- RTresult RTAPI rtVariableGet4iv (RTvariable v, int ∗i)
- RTresult RTAPI rtVariableGet1ui (RTvariable v, unsigned int ∗u1)
- RTresult RTAPI rtVariableGet2ui (RTvariable v, unsigned int ∗u1, unsigned int ∗u2)
- RTresult RTAPI rtVariableGet3ui (RTvariable v, unsigned int ∗u1, unsigned int ∗u2, unsigned int ∗u3)
- RTresult RTAPI rtVariableGet4ui (RTvariable v, unsigned int ∗u1, unsigned int ∗u2, unsigned int ∗u3, unsigned int ∗u4)
- RTresult RTAPI rtVariableGet1uiv (RTvariable v, unsigned int ∗u)
- RTresult RTAPI rtVariableGet2uiv (RTvariable v, unsigned int ∗u)
- RTresult RTAPI rtVariableGet3uiv (RTvariable v, unsigned int ∗u)
- RTresult RTAPI rtVariableGet4uiv (RTvariable v, unsigned int ∗u)
- RTresult RTAPI rtVariableGetMatrix2x2fv (RTvariable v, int transpose, float ∗m)
- RTresult RTAPI rtVariableGetMatrix2x3fv (RTvariable v, int transpose, float ∗m)
- RTresult RTAPI rtVariableGetMatrix2x4fv (RTvariable v, int transpose, float ∗m)
- RTresult RTAPI rtVariableGetMatrix3x2fv (RTvariable v, int transpose, float ∗m)
- RTresult RTAPI rtVariableGetMatrix3x3fv (RTvariable v, int transpose, float ∗m)
- RTresult RTAPI rtVariableGetMatrix3x4fv (RTvariable v, int transpose, float ∗m)
- RTresult RTAPI rtVariableGetMatrix4x2fv (RTvariable v, int transpose, float ∗m)
- RTresult RTAPI rtVariableGetMatrix4x3fv (RTvariable v, int transpose, float ∗m)
- RTresult RTAPI rtVariableGetMatrix4x4fv (RTvariable v, int transpose, float ∗m)

2.17.2 Function Documentation

2.17.2.1 RTresult RTAPI rtVariableGet1f (RTvariable *v*, float ∗ *f1*)

Functions designed to modify the value of a program variable.

Description

Variable getters functions return the value of a program variable or variable array. The target variable is specificed by *variable*.

The commands *rtVariableGet{1-2-3-4}{f-i-ui}v* are used to query the value of a program variable specified by *variable* using the pointers passed as arguments as return locations for each component of the vector-typed variable. The number specified in the command should match the number of components in the data type of the specified program variable (e.g., 1 for float, int, unsigned int; 2 for float2, int2, uint2, etc.). The suffix *f* indicates that floating-point values are expected to be returned, the suffix *i* indicates that integer values are expected, and the suffix *ui* indicates that unsigned integer values are expected, and this type should also match the data type of the specified program variable. The *f* variants of this function should be used to query values for program variables defined as float, float2, float3, float4, or arrays of these. The *i* variants of this function should be used to query values for program variables defined as int, int2, int3, int4, or arrays of these. The *ui* variants of this function should be used to query values for program variables defined as unsigned int, uint2, uint3, uint4, or arrays of these. The *v* variants of this function should be used to return the program variable's value to the array specified by parameter *v*. In this case, the array *v* should be large enough to accomodate all of the program variable's components.

The commands *rtVariableGetMatrix{2-3-4}x{2-3-4}fv* are used to query the value of a program variable whose data type is a matrix. The numbers in the command names are interpreted as the dimensionality of the matrix. For example, *2x4* indicates a 2 x 4 matrix with 2 columns and 4 rows (i.e., 8 values). If *transpose* is *0*, the matrix is returned in row major order, otherwise in column major order.

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_CONTEXT
- RT_ERROR_INVALID_VALUE

History

Variable getters were introduced in OptiX 1.0.

See also Variable setters, rtVariableGetType, rtContextDeclareVariable

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*f1*	Float value to be returned

2.17.2.2 RTresult RTAPI rtVariableGet1fv (RTvariable *v*, float ∗ *f*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*f*	Array of float value(s) to be returned

2.17.2.3 RTresult RTAPI rtVariableGet1i (RTvariable *v*, int ∗ *i1*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*i1*	Integer value to be returned

2.17.2.4 RTresult RTAPI rtVariableGet1iv (RTvariable *v*, int ∗ *i*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*i*	Array of integer values to be returned

2.17.2.5 RTresult RTAPI rtVariableGet1ui (RTvariable *v*, unsigned int ∗ *u1*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*u1*	Unsigned integer value to be returned

2.17.2.6 RTresult RTAPI rtVariableGet1uiv (RTvariable *v*, unsigned int ∗ *u*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*u*	Array of unsigned integer values to be returned

2.17.2.7 RTresult RTAPI rtVariableGet2f (RTvariable *v*, float ∗ *f1*, float ∗ *f2*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*f1*	Float value to be returned
in	*f2*	Float value to be returned

2.17.2.8 RTresult RTAPI rtVariableGet2fv (RTvariable *v*, float ∗ *f*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*f*	Array of float value(s) to be returned

2.17.2.9 RTresult RTAPI rtVariableGet2i (RTvariable *v*, int ∗ *i1*, int ∗ *i2*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*i1*	Integer value to be returned
in	*i2*	Integer value to be returned

2.17.2.10 RTresult RTAPI rtVariableGet2iv (RTvariable *v*, int ∗ *i*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*i*	Array of integer values to be returned

2.17.2.11 RTresult RTAPI rtVariableGet2ui (RTvariable *v*, unsigned int ∗ *u1*, unsigned int ∗ *u2*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*u1*	Unsigned integer value to be returned
in	*u2*	Unsigned integer value to be returned

2.17.2.12 RTresult RTAPI rtVariableGet2uiv (RTvariable *v*, unsigned int ∗ *u*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*u*	Array of unsigned integer values to be returned

2.17.2.13 RTresult RTAPI rtVariableGet3f (RTvariable *v*, float ∗ *f1*, float ∗ *f2*, float ∗ *f3*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*f1*	Float value to be returned
in	*f2*	Float value to be returned
in	*f3*	Float value to be returned

2.17.2.14 RTresult RTAPI rtVariableGet3fv (RTvariable *v*, float ∗ *f*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*f*	Array of float value(s) to be returned

2.17.2.15 RTresult RTAPI rtVariableGet3i (RTvariable *v*, int ∗ *i1*, int ∗ *i2*, int ∗ *i3*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*i1*	Integer value to be returned
in	*i2*	Integer value to be returned
in	*i3*	Integer value to be returned

2.17.2.16 RTresult RTAPI rtVariableGet3iv (RTvariable *v*, int ∗ *i*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*i*	Array of integer values to be returned

2.17.2.17 RTresult RTAPI rtVariableGet3ui (RTvariable *v*, unsigned int ∗ *u1*, unsigned int ∗ *u2*, unsigned int ∗ *u3*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*u1*	Unsigned integer value to be returned
in	*u2*	Unsigned integer value to be returned
in	*u3*	Unsigned integer value to be returned

2.17.2.18 RTresult RTAPI rtVariableGet3uiv (RTvariable *v*, unsigned int ∗ *u*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*u*	Array of unsigned integer values to be returned

2.17.2.19 RTresult RTAPI rtVariableGet4f (RTvariable *v*, float ∗ *f1*, float ∗ *f2*, float ∗ *f3*, float ∗ *f4*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*f1*	Float value to be returned
in	*f2*	Float value to be returned
in	*f3*	Float value to be returned
in	*f4*	Float value to be returned

2.17.2.20 RTresult RTAPI rtVariableGet4fv (RTvariable *v*, float ∗ *f*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*f*	Array of float value(s) to be returned

2.17.2.21 RTresult RTAPI rtVariableGet4i (RTvariable *v*, int ∗ *i1*, int ∗ *i2*, int ∗ *i3*, int ∗ *i4*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*i1*	Integer value to be returned
in	*i2*	Integer value to be returned
in	*i3*	Integer value to be returned
in	*i4*	Integer value to be returned

2.17.2.22 RTresult RTAPI rtVariableGet4iv (RTvariable *v*, int ∗ *i*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*i*	Array of integer values to be returned

2.17.2.23 RTresult RTAPI rtVariableGet4ui (RTvariable *v*, unsigned int ∗ *u1*, unsigned int ∗ *u2*, unsigned int ∗ *u3*, unsigned int ∗ *u4*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*u1*	Unsigned integer value to be returned
in	*u2*	Unsigned integer value to be returned
in	*u3*	Unsigned integer value to be returned
in	*u4*	Unsigned integer value to be returned

2.17.2.24 RTresult RTAPI rtVariableGet4uiv (RTvariable *v*, unsigned int ∗ *u*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*u*	Array of unsigned integer values to be returned

2.17.2.25 RTresult RTAPI rtVariableGetMatrix2x2fv (RTvariable *v*, int *transpose*, float ∗ *m*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*transpose*	Specify(ies) row-major or column-major order
in	*m*	Array of float values to be returned

2.17.2.26 RTresult RTAPI rtVariableGetMatrix2x3fv (RTvariable *v*, int *transpose*, float ∗ *m*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*transpose*	Specify(ies) row-major or column-major order
in	*m*	Array of float values to be returned

2.17.2.27 RTresult RTAPI rtVariableGetMatrix2x4fv (RTvariable *v*, int *transpose*, float ∗ *m*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*transpose*	Specify(ies) row-major or column-major order
in	*m*	Array of float values to be returned

2.17.2.28 RTresult RTAPI rtVariableGetMatrix3x2fv (RTvariable *v*, int *transpose*, float ∗ *m*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*transpose*	Specify(ies) row-major or column-major order
in	*m*	Array of float values to be returned

2.17.2.29 RTresult RTAPI rtVariableGetMatrix3x3fv (RTvariable *v*, int *transpose*, float ∗ *m*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*transpose*	Specify(ies) row-major or column-major order
in	*m*	Array of float values to be returned

2.17.2.30 RTresult RTAPI rtVariableGetMatrix3x4fv (RTvariable *v*, int *transpose*, float ∗ *m*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*transpose*	Specify(ies) row-major or column-major order
in	*m*	Array of float values to be returned

2.17.2.31 RTresult RTAPI rtVariableGetMatrix4x2fv (RTvariable *v*, int *transpose*, float ∗ *m*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*transpose*	Specify(ies) row-major or column-major order
in	*m*	Array of float values to be returned

2.17.2.32 RTresult RTAPI rtVariableGetMatrix4x3fv (RTvariable *v*, int *transpose*, float ∗ *m*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*transpose*	Specify(ies) row-major or column-major order
in	*m*	Array of float values to be returned

2.17.2.33 RTresult RTAPI rtVariableGetMatrix4x4fv (RTvariable *v*, int *transpose*, float ∗ *m*)

Parameters

in	*v*	Specifies the program variable whose value is to be returned
in	*transpose*	Specify(ies) row-major or column-major order
in	*m*	Array of float values to be returned

2.18 Context-free functions

2.18.1 Detailed Description

Functions that don't pertain to an OptiX context to be called.

Functions

- RTresult RTAPI rtDeviceGetD3D10Device (int ∗device, IDXGIAdapter ∗pAdapter)
- RTresult RTAPI rtDeviceGetD3D11Device (int ∗device, IDXGIAdapter ∗pAdapter)
- RTresult RTAPI rtDeviceGetD3D9Device (int ∗device, const char ∗pszAdapterName)
- RTresult RTAPI rtGetVersion (unsigned int ∗version)
- RTresult RTAPI rtDeviceGetDeviceCount (unsigned int ∗count)
- RTresult RTAPI rtDeviceGetAttribute (int ordinal, RTdeviceattribute attrib, RTsize size, void ∗p)

2.18.2 Function Documentation

2.18.2.1 RTresult RTAPI rtDeviceGetAttribute (int *ordinal,* RTdeviceattribute *attrib,* RTsize *size,* void ∗ *p*)

Returns an attribute specific to an OptiX device.

Description

rtDeviceGetAttribute returns in *p* the value of the per device attribute specified by *attrib* for device *ordinal*.

Each attribute can have a different size. The sizes are given in the following list:

- RT_DEVICE_ATTRIBUTE_MAX_THREADS_PER_BLOCK sizeof(int)
- RT_DEVICE_ATTRIBUTE_CLOCK_RATE sizeof(int)
- RT_DEVICE_ATTRIBUTE_MULTIPROCESSOR_COUNT sizeof(int)
- RT_DEVICE_ATTRIBUTE_EXECUTION_TIMEOUT_ENABLED sizeof(int)
- RT_DEVICE_ATTRIBUTE_MAX_HARDWARE_TEXTURE_COUNT sizeof(int)
- RT_DEVICE_ATTRIBUTE_NAME up to size-1
- RT_DEVICE_ATTRIBUTE_COMPUTE_CAPABILITY sizeof(int2)
- RT_DEVICE_ATTRIBUTE_TOTAL_MEMORY sizeof(RTsize)
- RT_DEVICE_ATTRIBUTE_TCC_DRIVER sizeof(int)
- RT_DEVICE_ATTRIBUTE_CUDA_DEVICE_ORDINAL sizeof(int)

Parameters

`in`	*ordinal*	OptiX device ordinal
`in`	*attrib*	Attribute to query
`in`	*size*	Size of the attribute being queried. Parameter *p* must have at least this much memory backing it
`out`	*p*	Return pointer where the value of the attribute will be copied into. This must point to at least *size* bytes of memory

Return values

Relevant return values:

- RT_SUCCESS

- RT_ERROR_INVALID_VALUE - Can be returned if size does not match the proper size of the attribute, if *p* is *NULL*, or if *ordinal* does not correspond to an OptiX device

History

rtDeviceGetAttribute was introduced in OptiX 2.0. RT_DEVICE_ATTRIBUTE_TCC_DRIVER was introduced in OptiX 3.0. RT_DEVICE_ATTRIBUTE_CUDA_DEVICE_ORDINAL was introduced in OptiX 3.0.

See also rtDeviceGetDeviceCount, rtContextGetAttribute

2.18.2.2 RTresult RTAPI rtDeviceGetD3D10Device (int ∗ *device*, IDXGIAdapter ∗ *pAdapter*)

Returns the OptiX device number associated with the pointer to a D3D10 adapter.

Description

rtDeviceGetD3D10Device returns in *device* the OptiX device ID of the adapter represented by *d3d10Device*. *d3d10Device* is a pointer returned from *D3D10CreateDeviceAndSwapChain*. In combination with rtContextSetDevices, this function can be used to restrict OptiX to use only one device. The same device the D3D10 commands will be sent to.

This function is only supported on Windows platforms.

Parameters

in	*device*	A handle to the memory location where the OptiX device ordinal associated with *d3d10Device* will be stored
out	*pAdapter*	A pointer to an *ID3D10Device* as returned from *D3D10CreateDeviceAndSwapChain*

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtDeviceGetD3D10Device was introduced in OptiX 2.5.

See also rtDeviceGetDeviceCount

2.18.2.3 RTresult RTAPI rtDeviceGetD3D11Device (int ∗ *device*, IDXGIAdapter ∗ *pAdapter*)

Returns the OptiX device number associated with the pointer to a D3D11 adapter.

Description

rtDeviceGetD3D11Device returns in *device* the OptiX device ID of the adapter represented by *D3D11Device*. *D3D11Device* is a pointer returned from *D3D11CreateDeviceAndSwapChain*. In combination with rtContextSetDevices, this function can be used to restrict OptiX to use only one device. The same device the D3D11 commands will be sent to.

This function is only supported on Windows platforms.

Parameters

in	*device*	A handle to the memory location where the OptiX device ordinal associated with *D3D11Device* will be stored
in	*pAdapter*	A pointer to an *ID3D11Device* as returned from *D3D11CreateDeviceAndSwapChain*

Return values

Relevant return values:

- RT_SUCCESS

- RT_ERROR_INVALID_VALUE

History

rtDeviceGetD3D11Device was introduced in OptiX 2.5.

See also rtDeviceGetDeviceCount

2.18.2.4 RTresult RTAPI rtDeviceGetD3D9Device (int ∗ *device,* const char ∗ *pszAdapterName*)

Returns the OptiX device number associated with the specified name of a D3D9 adapter.

Description

rtDeviceGetD3D9Device returns in *device* the OptiX device ID of the adapter represented by *pszAdapterName*. *pszAdapterName* is the DeviceName field in the *D3DADAPTER_IDENTIFIER9* struct. In combination with rtContextSetDevices, this function can be used to restrict OptiX to use only one device. The same device the D3D9 commands will be sent to.

This function is only supported on Windows platforms.

Parameters

in	*device*	A handle to the memory location where the OptiX device ordinal associated with *pszAdapterName* will be stored
out	*pszAdapter-Name*	The name of an adapter as can be found in the DeviceName field in the *D3DADAPTER_IDENTIFIER9* struct

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtDeviceGetD3D9Device was introduced in OptiX 2.5.

See also rtDeviceGetDeviceCount

2.18.2.5 RTresult RTAPI rtDeviceGetDeviceCount (unsigned int ∗ *count*)

Returns the number of OptiX capable devices.

Description

rtDeviceGetDeviceCount returns in *count* the number of compute devices that are available in the host system and will be used by OptiX.

Parameters

out	*count*	Number devices available for OptiX

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtDeviceGetDeviceCount was introduced in OptiX 1.0.

See also rtGetVersion

2.18.2.6 RTresult RTAPI rtGetVersion (unsigned int ∗ *version*)

Returns the current OptiX version.

Description

rtGetVersion returns in *version* a numerically comparable version number of the current OptiX library.

Parameters

out	*version*	OptiX version number

Return values

Relevant return values:

- RT_SUCCESS
- RT_ERROR_INVALID_VALUE

History

rtGetVersion was introduced in OptiX 1.0.

See also rtDeviceGetDeviceCount

2.19 CUDA C Reference

2.19.1 Detailed Description

OptiX Functions related to host and device code.

Modules

- OptiX CUDA C declarations
- OptiX basic types
- OptiX CUDA C functions

2.20 OptiX CUDA C declarations

2.20.1 Detailed Description

Functions designed to declare programs and types used by OptiX device code.

Macros

- #define rtDeclareVariable(type, name, semantic, annotation)
- #define rtDeclareAnnotation(variable, annotation)
- #define rtCallableProgram(return_type, function_name, parameter_list)
- #define RT_PROGRAM __global__
- #define rtCallableProgramId optix::callableProgramId
- #define rtCallableProgramX optix::boundCallableProgramId

2.20.2 Macro Definition Documentation

2.20.2.1 #define RT_PROGRAM __global__

Define an OptiX program.

Description

RT_PROGRAM defines a program **program_name** with the specified arguments and return value. This function can be bound to a specific program object using rtProgramCreateFromPTXString or rtProgramCreateFromPTXFile, which will subsequently get bound to different programmable binding points.

All programs should have a "void" return type. Bounding box programs will have an argument for the primitive index and the bounding box reference return value (type **nvrt::AAbb&**). Intersection programs will have a single int primitiveIndex argument. All other programs take zero arguments.

History

RT_PROGRAM was introduced in OptiX 1.0.

See also RT_PROGRAM rtProgramCreateFromPTXFile rtProgramCreateFromPTXString

2.20.2.2 #define rtCallableProgram(*return_type*, *function_name*, *parameter_list*)

Value:

```
namespace rti_internal_typeinfo {                                          \
    __device__ ::rti_internal_typeinfo::rti_typeinfo function_name = {
      ::rti_internal_typeinfo::_OPTIX_VARIABLE, rtCallableProgramSizeofWrapper<return_type>::value }
      ; \
  }                                                                          \
  namespace rti_internal_typename {                                          \
    __device__ char function_name[] = #return_type;                          \
  }                                                                          \
  namespace rti_internal_semantic {                                          \
    __device__ char function_name[] = ""; /* used to be rt_call, but not needed anymore */ \
  }                                                                          \
  namespace rti_internal_annotation {                                        \
    __device__ char function_name[] = #parameter_list;                       \
  }                                                                          \
  __noinline__ __device__ return_type function_name parameter_list { typedef return_type localtype; return
      localtype(); }
```

Callable Program Declaration.

Description

rtCallableProgram declares callable program *name*, which will appear to be a callable function with the specified return type and list of arguments. This callable program must be matched against a variable declared on the API object using rtVariableSetObject.

Unless compatibility with SM_10 is needed, new code should #define RT_USE_TEMPLATED_RTCALLABLEPROGRAM and rely on the new templated version of rtCallableProgram.

Example(s):

```
rtCallableProgram(float3, modColor, (float3, float));
```

Parameters

in	*return_type*	Return type of the callable program
in	*function_name*	Name of the callable program
in	*parameter_list*	Parameter_List of the callable program

History

rtCallableProgram was introduced in OptiX 3.0.

See also rtDeclareVariable rtCallableProgramId rtCallableProgramX

2.20.2.3 #define rtCallableProgramId optix::callableProgramId

Callable Program ID Declaration.

Description

rtCallableProgramId declares callable program *name*, which will appear to be a callable function with the specified return type and list of arguments. This callable program must be matched against a variable declared on the API object of type int.

Example(s):

```
rtDeclareVariable(rtCallableProgramId<float3(float3, float)>, modColor);
rtBuffer<rtCallableProgramId<float3(float3, float)>, 1> modColors;
```

History

rtCallableProgramId was introduced in OptiX 3.6.

See also rtCallableProgram rtCallableProgramX rtDeclareVariable

2.20.2.4 #define rtCallableProgramX optix::boundCallableProgramId

Callable Program X Declaration.

Description

rtCallableProgramX declares callable program *name*, which will appear to be a callable function with the specified return type and list of arguments. This callable program must be matched against a variable declared on the API object using rtVariableSetObject.

Unless compatibility with SM_10 is needed, new code should #define RT_USE_TEMPLATED_RTCALLABLEPROGRAM and rely on the new templated version of rtCallableProgram instead of directly using rtCallableProgramX.

Example(s):

```
rtDeclareVariable(rtCallableProgramX<float3(float3, float)>, modColor);
// With RT_USE_TEMPLATED_RTCALLABLEPROGRAM defined
rtDeclareVariable(rtCallableProgram<float3(float3, float)>, modColor);
```

History

rtCallableProgramX was introduced in OptiX 3.6.

See also rtCallableProgram rtCallableProgramId rtDeclareVariable

2.20.2.5 #define rtDeclareAnnotation(*variable*, *annotation*)

Value:

```
namespace rti_internal_annotation { \
    __device__ char variable[] = #annotation; \
  }
```

Annotation declaration.

Description

rtDeclareAnnotation sets the annotation *annotation* of the given variable *name*. Typically annotations are declared using an argument to rtDeclareVariable, but variables of type rtBuffer and rtTextureSampler are declared using templates, so separate annotation attachment is required.

OptiX does not attempt to interpret the annotation in any way. It is considered metadata for the application to query and interpret in its own way.

Valid annotations

The macro rtDeclareAnnotation uses the C pre-processor's "stringification" feature to turn the literal text of the annotation argument into a string constant. The pre-processor will backslash-escape quotes and backslashes within the text of the annotation. Leading and trailing whitespace will be ignored, and sequences of whitespace in the middle of the text is converted to a single space character in the result. The only restriction the C-PP places on the text is that it may not contain a comma character unless it is either quoted or contained within parens: "," or (,).

Example(s):

```
rtDeclareAnnotation( tex, this is a test );
annotation = "this is a test"

rtDeclareAnnotation( tex, "this is a test" );
annotation = "\"this is a test\""

rtDeclareAnnotation( tex, float3 a = {1, 2, 3} );
--> Compile Error, no unquoted commas may be present in the annotation

rtDeclareAnnotation( tex, "float3 a = {1, 2, 3}" );
annotation = "\"float3 a = {1, 2, 3}\""

rtDeclareAnnotation( tex, string UIWidget = "slider";
                          float UIMin = 0.0;
                          float UIMax = 1.0; );
annotation = "string UIWidget = \"slider\"; float UIMin = 0.0; float UIMax = 1.0;"
```

Parameters

in	*variable*	Variable to annotate
in	*annotation*	Annotation metadata

History

rtDeclareAnnotation was introduced in OptiX 1.0.

See also rtDeclareVariable, rtVariableGetAnnotation

2.20.2.6 #define rtDeclareVariable(*type, name, semantic, annotation*)

Value:

```
namespace rti_internal_typeinfo { \
    __device__ ::rti_internal_typeinfo::rti_typeinfo name = { ::rti_internal_typeinfo::_OPTIX_VARIABLE,
      sizeof(type)}; \
  } \
  namespace rti_internal_typename { \
    __device__ char name[] = #type; \
  } \
  namespace rti_internal_typeenum { \
    __device__ int name =
      ::rti_internal_typeinfo::rti_typeenum<type>::m_typeenum
      ; \
  } \
  namespace rti_internal_semantic { \
    __device__ char name[] = #semantic; \
  } \
  namespace rti_internal_annotation { \
    __device__ char name[] = #annotation; \
  } \
  __device__ type name
```

Variable declaration.

Description

rtDeclareVariable declares variable *name* of the specified *type*. By default, the variable name will be matched against a variable declared on the API object using the lookup hierarchy for the current program. Using the semanticName, this variable can be bound to internal state, to the payload associated with a ray, or to attributes that are communicated between intersection and material programs. An additional optional annotation can be used to associate application-specific metadata with the variable as well.

type may be a primitive type or a user-defined struct (See rtVariableSetUserData). Except for the ray payload and attributes, the declared variable will be read-only. The variable will be visible to all of the cuda functions defined in the current file. The binding of variables to values on API objects is allowed to vary from one instance to another.

Valid semanticNames

- **rtLaunchIndex** - The launch invocation index. Type must be one of *unsigned* int, *uint2*, *uint3*, *int*, *int2*, *int3* and is read-only.
- **rtLaunchDim** - The size of each dimension of the launch. The values range from 1 to the launch size in that dimension. Type must be one of *unsigned* int, *uint2*, *uint3*, *int*, *int2*, *int3* and is read-only.
- **rtCurrentRay** - The currently active ray, valid only when a call to rtTrace is active. Type must be *optix::Ray* and is read-only.
- **rtIntersectionDistance** - The current closest hit distance, valid only when a call to rtTrace is active. Type must be *float* and is read-only.
- **rtRayPayload** - The struct passed into the most recent rtTrace call and is read-write.
- **attribute** *name* - A named attribute passed from the intersection program to a closest-hit or any-hit program. The types must match in both sets of programs. This variable is read-only in the closest-hit or any-hit program and is written in the intersection program.

Parameters

in	*type*	Type of the variable
in	*name*	Name of the variable
in	*semantic*	Semantic name
in	*annotation*	Annotation for this variable

History

- rtDeclareVariable was introduced in OptiX 1.0.
- *rtLaunchDim* was introduced in OptiX 2.0.

See also rtDeclareAnnotation, rtVariableGetAnnotation, rtContextDeclareVariable, rtProgramDeclareVariable, rtSelectorDeclareVariable, rtGeometryInstanceDeclareVariable, rtGeometryDeclareVariable, rtMaterialDeclareVariable

2.21 OptiX basic types

2.21.1 Detailed Description

Basic types used in OptiX.

Classes

- struct Ray
- struct rtObject
- class optix::Aabb
- class optix::Matrix< M, N >

Macros

- #define rtBuffer __device__ optix::buffer
- #define rtBufferId optix::bufferId
- #define rtTextureSampler texture

2.21.2 Macro Definition Documentation

2.21.2.1 #define rtBuffer __device__ optix::buffer

Declare a reference to a buffer object.

Description

```
rtBuffer<Type, Dim> name;
```

rtBuffer declares a buffer of type *Type* and dimensionality *Dim*. *Dim* must be between 1 and 4 inclusive and defaults to 1 if not specified. The resulting object provides access to buffer data through the [] indexing operator, where the index is either unsigned int, uint2, uint3, or uint4 for 1, 2, 3 or 4-dimensional buffers (respectively). This operator can be used to read from or write to the resulting buffer at the specified index.

The named buffer obeys the runtime name lookup semantics as described in rtDeclareVariable. A compile error will result if the named buffer is not bound to a buffer object, or is bound to a buffer object of the incorrect type or dimension. The behavior of writing to a read-only buffer is undefined. Reading from a write-only buffer is well defined only if a value has been written previously by the same thread.

This declaration must appear at the file scope (not within a function), and will be visible to all RT_PROGRAM instances within the same compilation unit.

An annotation may be associated with the buffer variable by using the rtDeclareAnnotation macro.

History

rtBuffer was introduced in OptiX 1.0.

See also rtDeclareAnnotation, rtDeclareVariable, rtBufferCreate, rtTextureSampler, rtVariableSetObject rtBufferId

2.21.2.2 #define rtBufferId optix::bufferId

A class that wraps buffer access functionality when using a buffer id.

Description

The rtBufferId provides an interface similar to rtBuffer when using a buffer id obtained through rtBufferGetId. Unlike rtBuffer, this class can be passed to functions or stored in other data structures such as the ray payload. It should be noted, however, doing so can limit the extent that OptiX can optimize the generated code.

There is also a version of rtBufferId that can be used by the host code, so that types can exist in both host and device code. See the documetation for rtBufferId found in the optix C++ API header.

History

rtBufferId was introduced in OptiX 3.5.

See also

rtBuffer rtBufferGetId

2.21.2.3 #define rtTextureSampler texture

Declares a reference to a texture sampler object.

Description

rtTextureSampler declares a texture of type *Type* and dimensionality *Dim*. *Dim* must be between 1 and 3 inclusive and defaults to 1 if not specified. The resulting object provides access to texture data through the tex1D, tex2D and tex3D functions. These functions can be used only to read the data.

Texture filtering and wrapping modes, specified in *ReadMode* will be dependent on the state of the texture sampler object created with rtTextureSamplerCreate.

An annotation may be associated with the texture sampler variable by using the rtDeclareAnnotation macro.

History

rtTextureSampler was introduced in OptiX 1.0.

See also rtDeclareAnnotation, rtTextureSamplerCreate

2.22 OptiX CUDA C functions

2.22.1 Detailed Description

OptiX Functions designed to operate on device side. Some of them can also be included explicitly in host code if desired.

Modules

- Texture fetch functions
- rtPrintf functions

Functions

- template<class T >
  static __device__ void rtTrace (rtObject topNode, optix::Ray ray, T &prd)
- static __device__ bool rtPotentialIntersection (float tmin)
- static __device__ bool rtReportIntersection (unsigned int material)
- static __device__ void rtIgnoreIntersection ()
- static __device__ void rtTerminateRay ()
- static __device__ void rtIntersectChild (unsigned int index)
- static __device__ float3 rtTransformPoint (RTtransformkind kind, const float3 &p)
- static __device__ float3 rtTransformVector (RTtransformkind kind, const float3 &v)
- static __device__ float3 rtTransformNormal (RTtransformkind kind, const float3 &n)
- static __device__ void rtGetTransform (RTtransformkind kind, float matrix[16])
- static __device__ void rtThrow (unsigned int code)
- static __device__ unsigned int rtGetExceptionCode ()
- static __device__ void rtPrintExceptionDetails ()

2.22.2 Function Documentation

2.22.2.1 static __device__ unsigned int rtGetExceptionCode ( ) `[inline], [static]`

Retrieves the type of a caught exception.

Description

rtGetExceptionCode can be called from an exception program to query which type of exception was caught. The returned code is equivalent to one of the RTexception constants passed to rtContextSetExceptionEnabled, RT_EXCEPTION_ALL excluded. For user-defined exceptions, the code is equivalent to the argument passed to rtThrow.

Return values

unsigned	int Returned exception code

History

rtGetExceptionCode was introduced in OptiX 1.1.

See also rtContextSetExceptionEnabled, rtContextGetExceptionEnabled, rtContextSetExceptionProgram, rtContextGetExceptionProgram, rtThrow, rtPrintExceptionDetails

2.22.2.2 static __device__ void rtGetTransform (RTtransformkind *kind,* float *matrix[16]*) `[inline], [static]`

Get requested transform.

Description

rtGetTransform returns the requested transform in the return parameter *matrix*. The type of transform to be retrieved is specified with the *kind* parameter. *kind* is an enumerated value that can be either RT_OBJECT_TO_WORLD or

RT_WORLD_TO_OBJECT and must be a constant literal. During traversal, intersection and any-hit programs, the current ray will be located in object space. During ray generation, closest-hit and miss programs, the current ray will be located in world space.

There may be significant performance overhead associated with a call to rtGetTransform compared to a call to rtTransformPoint, rtTransformVector, or rtTransformNormal.

Parameters

in	*kind*	The type of transform to retrieve
out	*matrix*	Return parameter for the requested transform

Return values

void	void return value

History

rtGetTransform was introduced in OptiX 1.0.

See also rtTransformCreate, rtTransformPoint, rtTransformVector, rtTransformNormal

2.22.2.3 static __device__ void rtIgnoreIntersection ( ) [inline], [static]

Cancels the potential intersection with current ray.

Description

rtIgnoreIntersection causes the current potential intersection to be ignored. This intersection will not become the new closest hit associated with the ray. This function does not return, so values affecting the per-ray data should be applied before calling rtIgnoreIntersection. rtIgnoreIntersection is valid only within an any-hit program.

rtIgnoreIntersection can be used to implement alpha-mapped transparency by ignoring intersections that hit the geometry but are labeled as transparent in a texture. Since any-hit programs are called frequently during intersection, care should be taken to make them as efficient as possible.

Return values

void	void return value

History

rtIgnoreIntersection was introduced in OptiX 1.0.

See also rtTerminateRay, rtPotentialIntersection

2.22.2.4 static __device__ void rtIntersectChild (unsigned int *index*) [inline], [static]

Visit child of selector.

Description

rtIntersectChild will perform intersection on the specified child for the current active ray. This is used in a selector visit program to traverse one of the selector's children. The *index* specifies which of the children to be visited. As the child is traversed, intersection programs will be called and any-hit programs will be called for positive intersections. When this process is complete, rtIntersectChild will return unless one of the any-hit programs calls rtTerminateRay, in which case this function will never return. Multiple children can be visited during a single selector visit call by calling this function multiple times.

index matches the index used in rtSelectorSetChild on the host. rtIntersectChild is valid only within a selector visit program.

Parameters

in	*index*	Specifies the child to perform intersection on

Return values

void	void return value

History

rtIntersectChild was introduced in OptiX 1.0.

See also rtSelectorSetVisitProgram, rtSelectorCreate, rtTerminateRay

2.22.2.5 static __device__ bool rtPotentialIntersection (float *tmin*) [inline], [static]

Determine whether a computed intersection is potentially valid.

Description

Reporting an intersection from a geometry program is a two-stage process. If the geometry program computes that the ray intersects the geometry, it will first call rtPotentialIntersection. rtPotentialIntersection will determine whether the reported hit distance is within the valid interval associated with the ray, and return true if the intersection is valid. Subsequently, the geometry program will compute the attributes (normal, texture coordinates, etc.) associated with the intersection before calling rtReportIntersection. When rtReportIntersection is called, the any-hit program associated with the material is called. If the any-hit program does not ignore the intersection then the **t** value will stand as the new closest intersection.

If rtPotentialIntersection returns true, then rtReportIntersection should **always** be called after computing the attributes. Furthermore, attributes variables should only be written after a successful return from rtPotentialIntersection.

rtPotentialIntersection is passed the material index associated with the reported intersection. Objects with a single material should pass an index of zero.

rtReportIntersection and rtPotentialIntersection are valid only within a geometry intersection program.

Parameters

in	*tmin*	t value of the ray to be checked

Return values

bool	Returns whether the intersection is valid or not

History

rtPotentialIntersection was introduced in OptiX 1.0.

See also rtGeometrySetIntersectionProgram, rtReportIntersection, rtIgnoreIntersection

2.22.2.6 static __device__ void rtPrintExceptionDetails ( ) [inline], [static]

Print information on a caught exception.

Description

rtGetExceptionCode can be called from an exception program to provide information on the caught exception to the user. The function uses rtPrintf functions to output details depending on the type of the exception. It is necessary to have printing enabled using rtContextSetPrintEnabled for this function to have any effect.

Return values

void	void return type

History

rtPrintExceptionDetails was introduced in OptiX 1.1.

See also rtContextSetExceptionEnabled, rtContextGetExceptionEnabled, rtContextSetExceptionProgram, rtContextGetExceptionProgram, rtContextSetPrintEnabled, rtGetExceptionCode, rtThrow, rtPrintf functions

2.22.2.7 static __device__ bool rtReportIntersection (unsigned int *material*) [inline], [static]

Report an intersection with the current object and the specified material.

Description

rtReportIntersection reports an intersection of the current ray with the current object, and specifies the material associated with the intersection. rtReportIntersection should only be used in conjunction with rtPotentialIntersection as described in rtPotentialIntersection.

Parameters

in	*material*	Material associated with the intersection

Return values

bool	return value, this is set to *false* if the intersection is, for some reason, ignored **History**

rtReportIntersection was introduced in OptiX 1.0.

See also rtPotentialIntersection, rtIgnoreIntersection

2.22.2.8 static __device__ void rtTerminateRay ( ) [inline], [static]

Terminate traversal associated with the current ray.

Description

rtTerminateRay causes the traversal associated with the current ray to immediately terminate. After termination, the closest-hit program associated with the ray will be called. This function does not return, so values affecting the per-ray data should be applied before calling rtTerminateRay. rtTerminateRay is valid only within an any-hit program. The value of rtIntersectionDistance is undefined when rtTerminateRay is used.

Return values

void	void return value

History

rtTerminateRay was introduced in OptiX 1.0.

See also rtIgnoreIntersection, rtPotentialIntersection

2.22.2.9 static __device__ void rtThrow (unsigned int *code*) [inline], [static]

Throw a user exception.

Description

rtThrow is used to trigger user defined exceptions which behave like built-in exceptions. That is, upon invocation, ray processing for the current launch index is immediately aborted and the corresponding exception program is executed. rtThrow does not return.

The *code* passed as argument must be within the range reserved for user exceptions, which starts at RT_EXCEPTION_USER (*0x400*) and ends at *0xFFFF*. The code can be queried within the exception program using rtGetExceptionCode.

rtThrow may be called from within any program type except exception programs. Calls to rtThrow will be silently ignored unless user exceptions are enabled using rtContextSetExceptionEnabled.

History

rtThrow was introduced in OptiX 1.1.

See also rtContextSetExceptionEnabled, rtContextGetExceptionEnabled, rtContextSetExceptionProgram, rtContextGetExceptionProgram, rtGetExceptionCode, rtPrintExceptionDetails

2.22.2.10 template<class T > static __device__ void rtTrace (rtObject *topNode*, optix::Ray *ray*, T & *prd*) [inline], [static]

Traces a ray.

Description

rtTrace traces *ray* against object *topNode*. A reference to *prd*, the per-ray data, will be passed to all of the closest-hit and any-hit programs that are executed during this invocation of trace. *topNode* must refer to an OptiX object of type RTgroup, RTselector, RTgeometrygroup or RTtransform.

Parameters

`in`	*topNode*	Top node object where to start the traversal
`in`	*ray*	Ray to be traced
`in`	*prd*	Per-ray custom data

Return values

void	void return value

History

rtTrace was introduced in OptiX 1.0.

See also rtObject Ray

2.22.2.11 static __device__ float3 rtTransformNormal (**RTtransformkind** *kind,* const float3 & *n*) `[inline]`, `[static]`

Apply the current transformation to a normal.

Description

rtTransformNormal transforms *n* as a normal using the current active transformation stack (the inverse transpose). During traversal, intersection and any-hit programs, the current ray will be located in object space. During ray generation, closest-hit and miss programs, the current ray will be located in world space. This function can be used to transform values between object and world space.

kind is an enumerated value that can be either RT_OBJECT_TO_WORLD or RT_WORLD_TO_OBJECT and must be a constant literal. For ray generation and miss programs, the transform will always be the identity transform. For traversal, intersection, any-hit and closest-hit programs, the transform will be dependent on the set of active transform nodes for the current state.

Parameters

`in`	*kind*	Type of the transform
`in`	*n*	Normal to transform

Return values

float3	Transformed normal

History

rtTransformNormal was introduced in OptiX 1.0.

See also rtTransformCreate, rtTransformPoint, rtTransformVector

2.22.2.12 static __device__ float3 rtTransformPoint (**RTtransformkind** *kind,* const float3 & *p*) `[inline]`, `[static]`

Apply the current transformation to a point.

Description

rtTransformPoint transforms *p* as a point using the current active transformation stack. During traversal, intersection and any-hit programs, the current ray will be located in object space. During ray generation, closest-hit and miss programs, the current ray will be located in world space. This function can be used to transform the ray origin and other points between object and world space.

kind is an enumerated value that can be either RT_OBJECT_TO_WORLD or RT_WORLD_TO_OBJECT and must be a constant literal. For ray generation and miss programs, the transform will always be the identity transform. For traversal, intersection, any-hit and closest-hit programs, the transform will be dependent on the set of active transform nodes for the current state.

Parameters

in	*kind*	Type of the transform
in	*p*	Point to transform

Return values

float3	Transformed point

History

rtTransformPoint was introduced in OptiX 1.0.

See also rtTransformCreate, rtTransformVector, rtTransformNormal

2.22.2.13 static __device__ float3 rtTransformVector (**RTtransformkind** *kind,* const float3 & *v*) `[inline]`, `[static]`

Apply the current transformation to a vector.

Description

rtTransformVector transforms *v* as a vector using the current active transformation stack. During traversal, intersection and any-hit programs, the current ray will be located in object space. During ray generation, closest-hit and miss programs, the current ray will be located in world space. This function can be used to transform the ray direction and other vectors between object and world space.

kind is an enumerated value that can be either RT_OBJECT_TO_WORLD or RT_WORLD_TO_OBJECT and must be a constant literal. For ray generation and miss programs, the transform will always be the identity transform. For traversal, intersection, any-hit and closest-hit programs, the transform will be dependent on the set of active transform nodes for the current state.

Parameters

in	*kind*	Type of the transform
in	*v*	Vector to transform

Return values

float3	Transformed vector

History

rtTransformVector was introduced in OptiX 1.0.

See also rtTransformCreate, rtTransformPoint, rtTransformNormal

2.23 Texture fetch functions

2.23.1 Detailed Description

- template<typename T >
  __device__ T optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ float4 optix::rtTex1D (rtTextureId id, float x)
- __device__ void optix::rtTex1D (unsigned char *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (char *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (unsigned short *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (short *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (unsigned int *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (int *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (uchar1 *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (char1 *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (ushort1 *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (short1 *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (uint1 *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (int1 *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (float *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (uchar2 *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (char2 *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (ushort2 *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (short2 *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (uint2 *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (int2 *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (float2 *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (uchar4 *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (char4 *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (ushort4 *retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (short4 *retVal, rtTextureId id, float x)
- template<typename T >
  __device__ T optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ float4 optix::rtTex2D (rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (unsigned char *retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (char *retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (unsigned short *retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (short *retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (unsigned int *retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (int *retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (uchar1 *retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (char1 *retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (ushort1 *retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (short1 *retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (uint1 *retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (int1 *retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (float *retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (uchar2 *retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (char2 *retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (ushort2 *retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (short2 *retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (uint2 *retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (int2 *retVal, rtTextureId id, float x, float y)

- __device__ void optix::rtTex2D (float2 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (uchar4 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (char4 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (ushort4 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (short4 ∗retVal, rtTextureId id, float x, float y)
- template<typename T >
  __device__ T optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ float4 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (unsigned char ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (char ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (unsigned short ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (short ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (unsigned int ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (int ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (uchar1 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (char1 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (ushort1 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (short1 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (uint1 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (int1 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (float ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (uchar2 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (char2 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (ushort2 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (short2 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (uint2 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (int2 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (float2 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (uchar4 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (char4 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (ushort4 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (short4 ∗retVal, rtTextureId id, float x, float y, float z)

2.23.2 Function Documentation

2.23.2.1 template<typename T > __device__ T optix::rtTex1D (rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.2 template<> __device__ float4 optix::rtTex1D (rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.3 __device__ void optix::rtTex1D (unsigned char ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.4 __device__ void optix::rtTex1D (char ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.5 __device__ void optix::rtTex1D (unsigned short ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.6 __device__ void optix::rtTex1D (short ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.7 __device__ void optix::rtTex1D (unsigned int ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.8 __device__ void optix::rtTex1D (int ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.9 __device__ void optix::rtTex1D (uchar1 ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.10 __device__ void optix::rtTex1D (char1 ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.11 __device__ void optix::rtTex1D (ushort1 ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.12 __device__ void optix::rtTex1D (short1 ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.13 __device__ void optix::rtTex1D (uint1 ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.14 __device__ void optix::rtTex1D (int1 ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.15 __device__ void optix::rtTex1D (float ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.16 __device__ void optix::rtTex1D (uchar2 ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.17 __device__ void optix::rtTex1D (char2 ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.18 __device__ void optix::rtTex1D (ushort2 ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.19 __device__ void optix::rtTex1D (short2 ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.20 __device__ void optix::rtTex1D (uint2 ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.21 __device__ void optix::rtTex1D (int2 ∗ *retVal*, rtTextureId *id*, float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.22 __device__ void optix::rtTex1D (float2 ∗ *retVal*, rtTextureId *id*, float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.23 __device__ void optix::rtTex1D (uchar4 ∗ *retVal*, rtTextureId *id*, float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.24 __device__ void optix::rtTex1D (char4 ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.25 __device__ void optix::rtTex1D (ushort4 ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.26 __device__ void optix::rtTex1D (short4 ∗ *retVal,* rtTextureId *id,* float *x*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.27 template<typename T > __device__ T optix::rtTex2D (rtTextureId *id,* float *x,* float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.28 template<> __device__ float4 optix::rtTex2D (rtTextureId *id,* float *x,* float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.29 __device__ void optix::rtTex2D (unsigned char ∗ *retVal,* rtTextureId *id,* float *x,* float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.30 __device__ void optix::rtTex2D (char ∗ *retVal,* rtTextureId *id,* float *x,* float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.31 __device__ void optix::rtTex2D (unsigned short ∗ *retVal,* rtTextureId *id,* float *x,* float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.32 __device__ void optix::rtTex2D (short * *retVal,* rtTextureId *id,* float *x,* float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.33 __device__ void optix::rtTex2D (unsigned int * *retVal,* rtTextureId *id,* float *x,* float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.34 __device__ void optix::rtTex2D (int * *retVal,* rtTextureId *id,* float *x,* float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.35 __device__ void optix::rtTex2D (uchar1 * *retVal*, rtTextureId *id*, float *x*, float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.36 __device__ void optix::rtTex2D (char1 * *retVal*, rtTextureId *id*, float *x*, float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.37 __device__ void optix::rtTex2D (ushort1 * *retVal*, rtTextureId *id*, float *x*, float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.38 __device__ void optix::rtTex2D (short1 * *retVal*, rtTextureId *id*, float *x*, float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.39 __device__ void optix::rtTex2D (uint1 ∗ *retVal*, rtTextureId *id*, float *x*, float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.40 __device__ void optix::rtTex2D (int1 ∗ *retVal*, rtTextureId *id*, float *x*, float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.41 __device__ void optix::rtTex2D (float ∗ *retVal*, rtTextureId *id*, float *x*, float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.42 __device__ void optix::rtTex2D (uchar2 ∗ *retVal*, rtTextureId *id*, float *x*, float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.43 __device__ void optix::rtTex2D (char2 ∗ *retVal,* rtTextureId *id,* float *x,* float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.44 __device__ void optix::rtTex2D (ushort2 ∗ *retVal,* rtTextureId *id,* float *x,* float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.45 __device__ void optix::rtTex2D (short2 ∗ *retVal,* rtTextureId *id,* float *x,* float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.46 __device__ void optix::rtTex2D (uint2 ∗ *retVal,* rtTextureId *id,* float *x,* float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.47 __device__ void optix::rtTex2D (int2 ∗ *retVal,* rtTextureId *id,* float *x,* float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.48 __device__ void optix::rtTex2D (float2 ∗ *retVal,* rtTextureId *id,* float *x,* float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.49 __device__ void optix::rtTex2D (uchar4 ∗ *retVal,* rtTextureId *id,* float *x,* float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.50 __device__ void optix::rtTex2D (char4 ∗ *retVal,* rtTextureId *id,* float *x,* float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.51 __device__ void optix::rtTex2D (ushort4 ∗ *retVal,* rtTextureId *id,* float *x,* float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.52 __device__ void optix::rtTex2D (short4 ∗ *retVal,* rtTextureId *id,* float *x,* float *y*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.53 template<typename T > __device__ T optix::rtTex3D (rtTextureId *id,* float *x,* float *y,* float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.54 template<> __device__ float4 optix::rtTex3D (rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.55 __device__ void optix::rtTex3D (unsigned char ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.56 __device__ void optix::rtTex3D (char ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.57 __device__ void optix::rtTex3D (unsigned short ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.58 __device__ void optix::rtTex3D (short ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.59 __device__ void optix::rtTex3D (unsigned int ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.60 __device__ void optix::rtTex3D (int ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.61 __device__ void optix::rtTex3D (uchar1 ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.62 __device__ void optix::rtTex3D (char1 ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.63 __device__ void optix::rtTex3D (ushort1 ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.64 __device__ void optix::rtTex3D (short1 ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.65 __device__ void optix::rtTex3D (uint1 ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.66 __device__ void optix::rtTex3D (int1 ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.67 __device__ void optix::rtTex3D (float ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.68 __device__ void optix::rtTex3D (uchar2 ∗ *retVal,* rtTextureId *id,* float *x,* float *y,* float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.69 __device__ void optix::rtTex3D (char2 ∗ *retVal,* rtTextureId *id,* float *x,* float *y,* float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.70 __device__ void optix::rtTex3D (ushort2 ∗ *retVal,* rtTextureId *id,* float *x,* float *y,* float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.71 __device__ void optix::rtTex3D (short2 ∗ *retVal,* rtTextureId *id,* float *x,* float *y,* float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.72 __device__ void optix::rtTex3D (uint2 ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.73 __device__ void optix::rtTex3D (int2 ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.74 __device__ void optix::rtTex3D (float2 ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.75 __device__ void optix::rtTex3D (uchar4 ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.76 __device__ void optix::rtTex3D (char4 ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.77 __device__ void optix::rtTex3D (ushort4 ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.23.2.78 __device__ void optix::rtTex3D (short4 ∗ *retVal*, rtTextureId *id*, float *x*, float *y*, float *z*) [inline]

Similar to CUDA C's texture functions, OptiX programs can access textures in a bindless way.

Description

rtTex1D, **rtTex2D** and **rtTex3D** fetch the texture referenced by the *id* with texture coordinate *x*, *y* and *z*. The texture sampler *id* can be obtained on the host side using rtTextureSamplerGetId function. There are also C++ template and C-style additional declarations for other texture types (char1, uchar1, char2, uchar2 ...):

```
template<> uchar2 rtTex1D(rtTextureId id, float x)
void rtTex1D(ushort2 *retVal, rtTextureId id, float x)
```

History

rtTex1D, **rtTex2D** and **rtTex3D** were introduced in OptiX 3.0.

See also rtTextureSamplerGetId

2.24 rtPrintf functions

2.24.1 Detailed Description

- static __device__ void rtPrintf (const char ∗fmt)
- template<typename T1 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1)
- template<typename T1 , typename T2 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2)
- template<typename T1 , typename T2 , typename T3 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3)
- template<typename T1 , typename T2 , typename T3 , typename T4 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3, T4 arg4)
- template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3, T4 arg4, T5 arg5)
- template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3, T4 arg4, T5 arg5, T6 arg6)
- template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 , typename T7 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3, T4 arg4, T5 arg5, T6 arg6, T7 arg7)
- template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 , typename T7 , typename T8 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3, T4 arg4, T5 arg5, T6 arg6, T7 arg7, T8 arg8)
- template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 , typename T7 , typename T8 , typename T9 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3, T4 arg4, T5 arg5, T6 arg6, T7 arg7, T8 arg8, T9 arg9)
- template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 , typename T7 , typename T8 , typename T9 , typename T10 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3, T4 arg4, T5 arg5, T6 arg6, T7 arg7, T8 arg8, T9 arg9, T10 arg10)
- template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 , typename T7 , typename T8 , typename T9 , typename T10 , typename T11 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3, T4 arg4, T5 arg5, T6 arg6, T7 arg7, T8 arg8, T9 arg9, T10 arg10, T11 arg11)
- template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 , typename T7 , typename T8 , typename T9 , typename T10 , typename T11 , typename T12 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3, T4 arg4, T5 arg5, T6 arg6, T7 arg7, T8 arg8, T9 arg9, T10 arg10, T11 arg11, T12 arg12)

2.24.2 Function Documentation

2.24.2.1 static __device__ void rtPrintf (const char ∗ *fmt*) [inline], [static]

Prints text to the standard output.

Description

rtPrintf functions is used to output text from within user programs. Arguments are passed as for the standard C *printf* function, and the same format strings are employed. The only exception is the "%s" format specifier, which will generate an error if used. Text printed using rtPrintf functions is accumulated in a buffer and printed to the standard output when rtContextLaunch finishes. The buffer size can be configured using rtContextSetPrintBufferSize. Output can optionally be restricted to certain launch indices using rtContextSetPrintLaunchIndex. Printing must be enabled using rtContextSetPrintEnabled, otherwise rtPrintf functions invocations will be silently ignored.

History

rtPrintf functions was introduced in OptiX 1.0.

See also rtContextSetPrintEnabled, rtContextGetPrintEnabled, rtContextSetPrintBufferSize, rtContextGetPrintBufferSize, rtContextSetPrintLaunchIndex, rtContextSetPrintLaunchIndex

2.24.2.2 template< typename T1 > static __device__ void rtPrintf (const char * *fmt,* T1 *arg1*) `[inline]`, `[static]`

Prints text to the standard output.

Description

rtPrintf functions is used to output text from within user programs. Arguments are passed as for the standard C *printf* function, and the same format strings are employed. The only exception is the "%s" format specifier, which will generate an error if used. Text printed using rtPrintf functions is accumulated in a buffer and printed to the standard output when rtContextLaunch finishes. The buffer size can be configured using rtContextSetPrintBufferSize. Output can optionally be restricted to certain launch indices using rtContextSetPrintLaunchIndex. Printing must be enabled using rtContextSetPrintEnabled, otherwise rtPrintf functions invocations will be silently ignored.

History

rtPrintf functions was introduced in OptiX 1.0.

See also rtContextSetPrintEnabled, rtContextGetPrintEnabled, rtContextSetPrintBufferSize, rtContextGetPrintBufferSize, rtContextSetPrintLaunchIndex, rtContextSetPrintLaunchIndex

2.24.2.3 template< typename T1 , typename T2 > static __device__ void rtPrintf (const char * *fmt,* T1 *arg1,* T2 *arg2*) `[inline]`, `[static]`

Prints text to the standard output.

Description

rtPrintf functions is used to output text from within user programs. Arguments are passed as for the standard C *printf* function, and the same format strings are employed. The only exception is the "%s" format specifier, which will generate an error if used. Text printed using rtPrintf functions is accumulated in a buffer and printed to the standard output when rtContextLaunch finishes. The buffer size can be configured using rtContextSetPrintBufferSize. Output can optionally be restricted to certain launch indices using rtContextSetPrintLaunchIndex. Printing must be enabled using rtContextSetPrintEnabled, otherwise rtPrintf functions invocations will be silently ignored.

History

rtPrintf functions was introduced in OptiX 1.0.

See also rtContextSetPrintEnabled, rtContextGetPrintEnabled, rtContextSetPrintBufferSize, rtContextGetPrintBufferSize, rtContextSetPrintLaunchIndex, rtContextSetPrintLaunchIndex

2.24.2.4 template< typename T1 , typename T2 , typename T3 > static __device__ void rtPrintf (const char * *fmt,* T1 *arg1,* T2 *arg2,* T3 *arg3*) `[inline]`, `[static]`

Prints text to the standard output.

Description

rtPrintf functions is used to output text from within user programs. Arguments are passed as for the standard C *printf* function, and the same format strings are employed. The only exception is the "%s" format specifier, which will generate an error if used. Text printed using rtPrintf functions is accumulated in a buffer and printed to the standard output when rtContextLaunch finishes. The buffer size can be configured using rtContextSetPrintBufferSize. Output can optionally be restricted to certain launch indices using rtContextSetPrintLaunchIndex. Printing must be enabled using rtContextSetPrintEnabled, otherwise rtPrintf functions invocations will be silently ignored.

History

rtPrintf functions was introduced in OptiX 1.0.

See also rtContextSetPrintEnabled, rtContextGetPrintEnabled, rtContextSetPrintBufferSize, rtContextGetPrintBufferSize, rtContextSetPrintLaunchIndex, rtContextSetPrintLaunchIndex

2.24.2.5 template<typename T1 , typename T2 , typename T3 , typename T4 > static __device__ void rtPrintf (const char * *fmt,* T1 *arg1,* T2 *arg2,* T3 *arg3,* T4 *arg4*) [inline], [static]

Prints text to the standard output.

Description

rtPrintf functions is used to output text from within user programs. Arguments are passed as for the standard C *printf* function, and the same format strings are employed. The only exception is the "%s" format specifier, which will generate an error if used. Text printed using rtPrintf functions is accumulated in a buffer and printed to the standard output when rtContextLaunch finishes. The buffer size can be configured using rtContextSetPrintBufferSize. Output can optionally be restricted to certain launch indices using rtContextSetPrintLaunchIndex. Printing must be enabled using rtContextSetPrintEnabled, otherwise rtPrintf functions invocations will be silently ignored.

History

rtPrintf functions was introduced in OptiX 1.0.

See also rtContextSetPrintEnabled, rtContextGetPrintEnabled, rtContextSetPrintBufferSize, rtContextGetPrint-BufferSize, rtContextSetPrintLaunchIndex, rtContextSetPrintLaunchIndex

2.24.2.6 template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 > static __device__ void rtPrintf (const char * *fmt,* T1 *arg1,* T2 *arg2,* T3 *arg3,* T4 *arg4,* T5 *arg5*) [inline], [static]

Prints text to the standard output.

Description

rtPrintf functions is used to output text from within user programs. Arguments are passed as for the standard C *printf* function, and the same format strings are employed. The only exception is the "%s" format specifier, which will generate an error if used. Text printed using rtPrintf functions is accumulated in a buffer and printed to the standard output when rtContextLaunch finishes. The buffer size can be configured using rtContextSetPrintBufferSize. Output can optionally be restricted to certain launch indices using rtContextSetPrintLaunchIndex. Printing must be enabled using rtContextSetPrintEnabled, otherwise rtPrintf functions invocations will be silently ignored.

History

rtPrintf functions was introduced in OptiX 1.0.

See also rtContextSetPrintEnabled, rtContextGetPrintEnabled, rtContextSetPrintBufferSize, rtContextGetPrint-BufferSize, rtContextSetPrintLaunchIndex, rtContextSetPrintLaunchIndex

2.24.2.7 template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 > static __device__ void rtPrintf (const char * *fmt,* T1 *arg1,* T2 *arg2,* T3 *arg3,* T4 *arg4,* T5 *arg5,* T6 *arg6*) [inline], [static]

Prints text to the standard output.

Description

rtPrintf functions is used to output text from within user programs. Arguments are passed as for the standard C *printf* function, and the same format strings are employed. The only exception is the "%s" format specifier, which will generate an error if used. Text printed using rtPrintf functions is accumulated in a buffer and printed to the standard output when rtContextLaunch finishes. The buffer size can be configured using rtContextSetPrintBufferSize. Output can optionally be restricted to certain launch indices using rtContextSetPrintLaunchIndex. Printing must be enabled using rtContextSetPrintEnabled, otherwise rtPrintf functions invocations will be silently ignored.

History

rtPrintf functions was introduced in OptiX 1.0.

See also rtContextSetPrintEnabled, rtContextGetPrintEnabled, rtContextSetPrintBufferSize, rtContextGetPrint-BufferSize, rtContextSetPrintLaunchIndex, rtContextSetPrintLaunchIndex

2.24.2.8 template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 , typename T7 > static __device__ void rtPrintf (const char ∗ *fmt,* T1 *arg1,* T2 *arg2,* T3 *arg3,* T4 *arg4,* T5 *arg5,* T6 *arg6,* T7 *arg7*) [inline], [static]

Prints text to the standard output.

Description

rtPrintf functions is used to output text from within user programs. Arguments are passed as for the standard C *printf* function, and the same format strings are employed. The only exception is the "%s" format specifier, which will generate an error if used. Text printed using rtPrintf functions is accumulated in a buffer and printed to the standard output when rtContextLaunch finishes. The buffer size can be configured using rtContextSetPrintBufferSize. Output can optionally be restricted to certain launch indices using rtContextSetPrintLaunchIndex. Printing must be enabled using rtContextSetPrintEnabled, otherwise rtPrintf functions invocations will be silently ignored.

History

rtPrintf functions was introduced in OptiX 1.0.

See also rtContextSetPrintEnabled, rtContextGetPrintEnabled, rtContextSetPrintBufferSize, rtContextGetPrint-BufferSize, rtContextSetPrintLaunchIndex, rtContextSetPrintLaunchIndex

2.24.2.9 template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 , typename T7 , typename T8 > static __device__ void rtPrintf (const char ∗ *fmt,* T1 *arg1,* T2 *arg2,* T3 *arg3,* T4 *arg4,* T5 *arg5,* T6 *arg6,* T7 *arg7,* T8 *arg8*) [inline], [static]

Prints text to the standard output.

Description

rtPrintf functions is used to output text from within user programs. Arguments are passed as for the standard C *printf* function, and the same format strings are employed. The only exception is the "%s" format specifier, which will generate an error if used. Text printed using rtPrintf functions is accumulated in a buffer and printed to the standard output when rtContextLaunch finishes. The buffer size can be configured using rtContextSetPrintBufferSize. Output can optionally be restricted to certain launch indices using rtContextSetPrintLaunchIndex. Printing must be enabled using rtContextSetPrintEnabled, otherwise rtPrintf functions invocations will be silently ignored.

History

rtPrintf functions was introduced in OptiX 1.0.

See also rtContextSetPrintEnabled, rtContextGetPrintEnabled, rtContextSetPrintBufferSize, rtContextGetPrint-BufferSize, rtContextSetPrintLaunchIndex, rtContextSetPrintLaunchIndex

2.24.2.10 template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 , typename T7 , typename T8 , typename T9 > static __device__ void rtPrintf (const char ∗ *fmt,* T1 *arg1,* T2 *arg2,* T3 *arg3,* T4 *arg4,* T5 *arg5,* T6 *arg6,* T7 *arg7,* T8 *arg8,* T9 *arg9*) [inline], [static]

Prints text to the standard output.

Description

rtPrintf functions is used to output text from within user programs. Arguments are passed as for the standard C *printf* function, and the same format strings are employed. The only exception is the "%s" format specifier, which will generate an error if used. Text printed using rtPrintf functions is accumulated in a buffer and printed to the standard output when rtContextLaunch finishes. The buffer size can be configured using rtContextSetPrintBufferSize. Output can optionally be restricted to certain launch indices using rtContextSetPrintLaunchIndex. Printing must be enabled using rtContextSetPrintEnabled, otherwise rtPrintf functions invocations will be silently ignored.

History

rtPrintf functions was introduced in OptiX 1.0.

See also rtContextSetPrintEnabled, rtContextGetPrintEnabled, rtContextSetPrintBufferSize, rtContextGetPrint-BufferSize, rtContextSetPrintLaunchIndex, rtContextSetPrintLaunchIndex

2.24.2.11 template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 , typename T7 , typename T8 , typename T9 , typename T10 > static __device__ void rtPrintf (const char ∗ *fmt,* T1 *arg1,* T2 *arg2,* T3 *arg3,* T4 *arg4,* T5 *arg5,* T6 *arg6,* T7 *arg7,* T8 *arg8,* T9 *arg9,* T10 *arg10*) [inline], [static]

Prints text to the standard output.

Description

rtPrintf functions is used to output text from within user programs. Arguments are passed as for the standard C *printf* function, and the same format strings are employed. The only exception is the "%s" format specifier, which will generate an error if used. Text printed using rtPrintf functions is accumulated in a buffer and printed to the standard output when rtContextLaunch finishes. The buffer size can be configured using rtContextSetPrintBufferSize. Output can optionally be restricted to certain launch indices using rtContextSetPrintLaunchIndex. Printing must be enabled using rtContextSetPrintEnabled, otherwise rtPrintf functions invocations will be silently ignored.

History

rtPrintf functions was introduced in OptiX 1.0.

See also rtContextSetPrintEnabled, rtContextGetPrintEnabled, rtContextSetPrintBufferSize, rtContextGetPrint-BufferSize, rtContextSetPrintLaunchIndex, rtContextSetPrintLaunchIndex

2.24.2.12 template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 , typename T7 , typename T8 , typename T9 , typename T10 , typename T11 > static __device__ void rtPrintf (const char ∗ *fmt,* T1 *arg1,* T2 *arg2,* T3 *arg3,* T4 *arg4,* T5 *arg5,* T6 *arg6,* T7 *arg7,* T8 *arg8,* T9 *arg9,* T10 *arg10,* T11 *arg11*) [inline], [static]

Prints text to the standard output.

Description

rtPrintf functions is used to output text from within user programs. Arguments are passed as for the standard C *printf* function, and the same format strings are employed. The only exception is the "%s" format specifier, which will generate an error if used. Text printed using rtPrintf functions is accumulated in a buffer and printed to the standard output when rtContextLaunch finishes. The buffer size can be configured using rtContextSetPrintBufferSize. Output can optionally be restricted to certain launch indices using rtContextSetPrintLaunchIndex. Printing must be enabled using rtContextSetPrintEnabled, otherwise rtPrintf functions invocations will be silently ignored.

History

rtPrintf functions was introduced in OptiX 1.0.

See also rtContextSetPrintEnabled, rtContextGetPrintEnabled, rtContextSetPrintBufferSize, rtContextGetPrint-BufferSize, rtContextSetPrintLaunchIndex, rtContextSetPrintLaunchIndex

2.24.2.13 template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 , typename T7 , typename T8 , typename T9 , typename T10 , typename T11 , typename T12 > static __device__ void rtPrintf (const char ∗ *fmt,* T1 *arg1,* T2 *arg2,* T3 *arg3,* T4 *arg4,* T5 *arg5,* T6 *arg6,* T7 *arg7,* T8 *arg8,* T9 *arg9,* T10 *arg10,* T11 *arg11,* T12 *arg12*) [inline], [static]

Prints text to the standard output.

Description

rtPrintf functions is used to output text from within user programs. Arguments are passed as for the standard C *printf* function, and the same format strings are employed. The only exception is the "%s" format specifier, which will generate an error if used. Text printed using rtPrintf functions is accumulated in a buffer and printed to the standard output when rtContextLaunch finishes. The buffer size can be configured using rtContextSetPrintBufferSize. Output can optionally be restricted to certain launch indices using rtContextSetPrintLaunchIndex. Printing must be enabled using rtContextSetPrintEnabled, otherwise rtPrintf functions invocations will be silently ignored.

History

rtPrintf functions was introduced in OptiX 1.0.

See also rtContextSetPrintEnabled, rtContextGetPrintEnabled, rtContextSetPrintBufferSize, rtContextGetPrint-BufferSize, rtContextSetPrintLaunchIndex, rtContextSetPrintLaunchIndex

2.25 OptiXpp wrapper

2.25.1 Detailed Description

Classes

- class optix::Handle< T >
- class optix::Exception
- class optix::APIObj
- class optix::DestroyableObj
- class optix::ScopedObj
- class optix::VariableObj
- class optix::ContextObj
- class optix::ProgramObj
- class optix::GroupObj
- class optix::GeometryGroupObj
- class optix::TransformObj
- class optix::SelectorObj
- class optix::AccelerationObj
- class optix::GeometryInstanceObj
- class optix::GeometryObj
- class optix::MaterialObj
- class optix::TextureSamplerObj
- class optix::BufferObj

- typedef Handle< AccelerationObj > optix::Acceleration
- typedef Handle< BufferObj > optix::Buffer
- typedef Handle< ContextObj > optix::Context
- typedef Handle< GeometryObj > optix::Geometry
- typedef Handle< GeometryGroupObj > optix::GeometryGroup
- typedef Handle
  < GeometryInstanceObj > optix::GeometryInstance
- typedef Handle< GroupObj > optix::Group
- typedef Handle< MaterialObj > optix::Material
- typedef Handle< ProgramObj > optix::Program
- typedef Handle< SelectorObj > optix::Selector
- typedef Handle< TextureSamplerObj > optix::TextureSampler
- typedef Handle< TransformObj > optix::Transform
- typedef Handle< VariableObj > optix::Variable

2.25.2 Typedef Documentation

2.25.2.1 typedef Handle<VariableObj> **optix::Variable**

Use this to manipulate RTvariable objects.

2.26 rtu API

2.26.1 Detailed Description

The rtu API provides a simple interface for intersecting a set of rays against a set of triangles. It has been superseded by OptiX Prime.

Modules

- rtu Traversal API

Functions

- RTresult RTAPI rtuNameForType (RTobjecttype type, char ∗buffer, RTsize bufferSize)
- RTresult RTAPI rtuGetSizeForRTformat (RTformat format, size_t ∗size)
- RTresult RTAPI rtuCUDACompileString (const char ∗source, const char ∗∗preprocessorArguments, unsigned int numPreprocessorArguments, RTsize ∗resultSize, RTsize ∗errorSize)
- RTresult RTAPI rtuCUDACompileFile (const char ∗filename, const char ∗∗preprocessorArguments, unsigned int numPreprocessorArguments, RTsize ∗resultSize, RTsize ∗errorSize)
- RTresult RTAPI rtuCUDAGetCompileResult (char ∗result, char ∗error)
- RTresult RTAPI rtuCreateClusteredMesh (RTcontext context, unsigned int usePTX32InHost64, RTgeometry ∗mesh, unsigned int num_verts, const float ∗verts, unsigned int num_tris, const unsigned ∗indices, const unsigned ∗mat_indices)
- RTresult RTAPI rtuCreateClusteredMeshExt (RTcontext context, unsigned int usePTX32InHost64, RTgeometry ∗mesh, unsigned int num_verts, const float ∗verts, unsigned int num_tris, const unsigned ∗indices, const unsigned ∗mat_indices, RTbuffer norms, const unsigned ∗norm_indices, RTbuffer tex_coords, const unsigned ∗tex_indices)

- RTU_INLINE RTresult rtuGroupAddChild (RTgroup group, RTobject child, unsigned int ∗index)
- RTU_INLINE RTresult rtuSelectorAddChild (RTselector selector, RTobject child, unsigned int ∗index)
- RTU_INLINE RTresult rtuGeometryGroupAddChild (RTgeometrygroup geometrygroup, RTgeometryinstance child, unsigned int ∗index)

- RTU_INLINE RTresult rtuTransformSetChild (RTtransform transform, RTobject child)

- RTU_INLINE RTresult rtuTransformGetChild (RTtransform transform, RTobject ∗type)
- RTU_INLINE RTresult rtuTransformGetChildType (RTtransform transform, RTobjecttype ∗type)

- RTU_INLINE RTresult rtuGroupRemoveChild (RTgroup group, RTobject child)
- RTU_INLINE RTresult rtuSelectorRemoveChild (RTselector selector, RTobject child)
- RTU_INLINE RTresult rtuGeometryGroupRemoveChild (RTgeometrygroup geometrygroup, RTgeometryinstance child)

- RTU_INLINE RTresult rtuGroupRemoveChildByIndex (RTgroup group, unsigned int index)
- RTU_INLINE RTresult rtuSelectorRemoveChildByIndex (RTselector selector, unsigned int index)
- RTU_INLINE RTresult rtuGeometryGroupRemoveChildByIndex (RTgeometrygroup geometrygroup, unsigned int index)

- RTU_INLINE RTresult rtuGroupGetChildIndex (RTgroup group, RTobject child, unsigned int ∗index)
- RTU_INLINE RTresult rtuSelectorGetChildIndex (RTselector selector, RTobject child, unsigned int ∗index)
- RTU_INLINE RTresult rtuGeometryGroupGetChildIndex (RTgeometrygroup geometrygroup, RTgeometryinstance child, unsigned int ∗index)

2.26.2 Function Documentation

2.26.2.1 RTresult RTAPI rtuCreateClusteredMesh (RTcontext *context,* unsigned int *usePTX32InHost64,* RTgeometry ∗ *mesh,* unsigned int *num_verts,* const float ∗ *verts,* unsigned int *num_tris,* const unsigned ∗ *indices,* const unsigned ∗ *mat_indices*)

Create clustered triangle mesh for good memory coherence with paging on. Vertex, index and material buffers are created and attached to the mesh. Cluster's bounding box and intersection programs are attached to the mesh. The intersection program has the following attributes:

- rtDeclareVariable(int, primitive_id, attribute primitive_id,);
- rtDeclareVariable(float3, texcoord, attribute texcoord,); It is always zero
- rtDeclareVariable(float3, geometric_normal, attribute geometric_normal,);
- rtDeclareVariable(float3, shading_normal, attribute shading_normal,); It is equal to geometric_normal

Created RTgeometry mesh expects there to be placed into a RTgeometryinstance where the mat_indices specified map into materials attached to the RTgeometryinstance

In the event of an error, please query the error string from the RTcontext.

Parameters

context	Context
usePTX32InHost64	Use 32bit PTX bounding box and intersection programs in 64bit application. Takes effect only with 64bit host.
mesh	Output geometry
num_verts	Vertex count
verts	Vertices (num_verts∗float∗3) [v1_x, v1_y, v1_z, v2.x, ...]
num_tris	Triangle count
indices	Vertex indices (num_tris∗unsigned∗3) [tri1_index1, tr1_index2, ...]
mat_indices	Indices of materials (num_tris∗unsigned) [tri1_mat_index, tri2_mat_index, ...]

2.26.2.2 RTresult RTAPI rtuCreateClusteredMeshExt (RTcontext *context,* unsigned int *usePTX32InHost64,* RTgeometry ∗ *mesh,* unsigned int *num_verts,* const float ∗ *verts,* unsigned int *num_tris,* const unsigned ∗ *indices,* const unsigned ∗ *mat_indices,* RTbuffer *norms,* const unsigned ∗ *norm_indices,* RTbuffer *tex_coords,* const unsigned ∗ *tex_indices*)

Create clustered triangle mesh for good memory coherence with paging on. Buffers for vertices, indices, normals, indices of normals, texture coordinates, indices of texture coordinates and materials are created and attached to the mesh. Cluster's bounding box and intersection programs are attached to the mesh. The intersection program has the following attributes:

- rtDeclareVariable(int, primitive_id, attribute primitive_id,);
- rtDeclareVariable(float3, texcoord, attribute texcoord,);
- rtDeclareVariable(float3, geometric_normal, attribute geometric_normal,);
- rtDeclareVariable(float3, shading_normal, attribute shading_normal,);

Created RTgeometry mesh expects there to be placed into a RTgeometryinstance where the mat_indices specified map into materials attached to the RTgeometryinstance

Vertex, normal and texture coordinate buffers can be shared between many geometry objects

In the event of an error, please query the error string from the RTcontext.

Parameters

context	Context
usePTX32InHost64	Use 32bit PTX bounding box and intersection programs in 64bit application. Takes effect only with 64bit host.
mesh	Output geometry
num_verts	Vertex count
verts	Vertices (num_verts∗float∗3) [v1_x, v1_y, v1_z, v2.x, ...]
num_tris	Triangle count
indices	Vertex indices (num_tris∗unsigned∗3) [tri1_index1, tr1_index2, ...]
mat_indices	Indices of materials (num_tris∗unsigned) [tri1_mat_index, tri2_mat_index, ...]
norms	Normals (num_norms∗float∗3) [v1_x, v1_y, v1_z, v2.x, ...]
norm_indices	Indices of vertex normals (num_tris∗unsigned∗3) [tri1_norm_index1, tri1_norm_index2 ...]
tex_coords	Texture uv coords (num_tex_coords∗float∗2) [t1_u, t1_v, t2_u ...]
tex_indices	Indices of texture uv (num_tris∗unsigned∗3) [tri1_tex_index1, tri1_tex_index2 ...]

2.26.2.3 RTresult RTAPI rtuCUDACompileFile (const char ∗ *filename,* const char ∗∗ *preprocessorArguments,* unsigned int *numPreprocessorArguments,* RTsize ∗ *resultSize,* RTsize ∗ *errorSize*)

Compile a cuda source file.

Parameters

`in`	*filename*	source code file name
`in`	*preprocessorArguments*	list of preprocessor arguments
`in`	*numPreprocessorArguments*	number of preprocessor arguments
`out`	*resultSize*	size required to hold compiled result string
`out`	*errorSize*	size required to hold error string

Return values

RTresult	Return code

2.26.2.4 RTresult RTAPI rtuCUDACompileString (const char ∗ *source,* const char ∗∗ *preprocessorArguments,* unsigned int *numPreprocessorArguments,* RTsize ∗ *resultSize,* RTsize ∗ *errorSize*)

Compile a cuda source string.

Parameters

`in`	*source*	source code string
`in`	*preprocessorArguments*	list of preprocessor arguments
`in`	*numPreprocessorArguments*	number of preprocessor arguments
`out`	*resultSize*	size required to hold compiled result string
`out`	*errorSize*	size required to hold error string

Return values

RTresult	Return code

2.26.2.5 RTresult RTAPI rtuCUDAGetCompileResult (char ∗ *result,* char ∗ *error*)

Get the result of the most recent call to one of the above compile functions. The 'result' and 'error' parameters must point to memory large enough to hold the respective strings, as returned by the compile function.

Parameters

out	*result*	compiled result string
out	*error*	error string

Return values

RTresult	Return code

2.26.2.6 RTU_INLINE RTresult rtuGeometryGroupAddChild (RTgeometrygroup *geometrygroup,* RTgeometryinstance *child,* unsigned int ∗ *index*)

Add an entry to the end of the child array. Fills 'index' with the index of the added child, if the pointer is non-NULL.

2.26.2.7 RTU_INLINE RTresult rtuGeometryGroupGetChildIndex (RTgeometrygroup *geometrygroup,* RTgeometryinstance *child,* unsigned int ∗ *index*)

Use a linear search to find the child in the child array, and return its index. Returns RT_SUCCESS if the child was found, RT_ERROR_INVALID_VALUE otherwise.

2.26.2.8 RTU_INLINE RTresult rtuGeometryGroupRemoveChild (RTgeometrygroup *geometrygroup,* RTgeometryinstance *child*)

Find the given child using a linear search in the child array and remove it. If it's not the last entry in the child array, the last entry in the array will replace the deleted entry, in order to shrink the array size by one.

2.26.2.9 RTU_INLINE RTresult rtuGeometryGroupRemoveChildByIndex (RTgeometrygroup *geometrygroup,* unsigned int *index*)

Remove the child at the given index in the child array. If it's not the last entry in the child array, the last entry in the array will replace the deleted entry, in order to shrink the array size by one.

2.26.2.10 RTresult RTAPI rtuGetSizeForRTformat (RTformat *format,* size_t ∗ *size*)

Return the size of a given RTformat. RT_FORMAT_USER and RT_FORMAT_UNKNOWN return *0*. Returns RT_ERROR_INVALID_VALUE if the format isn't recognized, RT_SUCCESS otherwise.

Parameters

in	*format*	OptiX format
out	*size*	Size of the format

Return values

RTresult	Return code

2.26.2.11 RTU_INLINE RTresult rtuGroupAddChild (RTgroup *group,* RTobject *child,* unsigned int ∗ *index*)

Add an entry to the end of the child array. Fills 'index' with the index of the added child, if the pointer is non-NULL.

2.26.2.12 RTU_INLINE RTresult rtuGroupGetChildIndex (RTgroup *group,* RTobject *child,* unsigned int ∗ *index*)

Use a linear search to find the child in the child array, and return its index. Returns RT_SUCCESS if the child was found, RT_ERROR_INVALID_VALUE otherwise.

2.26.2.13 RTU_INLINE RTresult rtuGroupRemoveChild (RTgroup *group,* RTobject *child*)

Find the given child using a linear search in the child array and remove it. If it's not the last entry in the child array, the last entry in the array will replace the deleted entry, in order to shrink the array size by one.

2.26.2.14 RTU_INLINE RTresult rtuGroupRemoveChildByIndex (RTgroup *group,* unsigned int *index*)

Remove the child at the given index in the child array. If it's not the last entry in the child array, the last entry in the array will replace the deleted entry, in order to shrink the array size by one.

2.26.2.15 RTresult RTAPI rtuNameForType (RTobjecttype *type,* char * *buffer,* RTsize *bufferSize*)

Get the name string of a given type. See RTobjecttype for more information.

Parameters

in	*type*	Type requested
out	*buffer*	Buffer to output the name string
in	*bufferSize*	Size of the provided buffer

Return values

RTresult	Return code

2.26.2.16 RTU_INLINE RTresult rtuSelectorAddChild (RTselector *selector,* RTobject *child,* unsigned int * *index*)

Add an entry to the end of the child array. Fills 'index' with the index of the added child, if the pointer is non-NULL.

2.26.2.17 RTU_INLINE RTresult rtuSelectorGetChildIndex (RTselector *selector,* RTobject *child,* unsigned int * *index*)

Use a linear search to find the child in the child array, and return its index. Returns RT_SUCCESS if the child was found, RT_ERROR_INVALID_VALUE otherwise.

2.26.2.18 RTU_INLINE RTresult rtuSelectorRemoveChild (RTselector *selector,* RTobject *child*)

Find the given child using a linear search in the child array and remove it. If it's not the last entry in the child array, the last entry in the array will replace the deleted entry, in order to shrink the array size by one.

2.26.2.19 RTU_INLINE RTresult rtuSelectorRemoveChildByIndex (RTselector *selector,* unsigned int *index*)

Remove the child at the given index in the child array. If it's not the last entry in the child array, the last entry in the array will replace the deleted entry, in order to shrink the array size by one.

2.26.2.20 RTU_INLINE RTresult rtuTransformGetChild (RTtransform *transform,* RTobject * *type*)

Wrap rtTransformGetChild and rtTransformGetChildType in order to provide a type-safe version for C++.

2.26.2.21 RTU_INLINE RTresult rtuTransformGetChildType (RTtransform *transform,* RTobjecttype * *type*)

Wrap rtTransformGetChild and rtTransformGetChildType in order to provide a type-safe version for C++.

2.26.2.22 RTU_INLINE RTresult rtuTransformSetChild (RTtransform *transform,* RTobject *child*)

Wrap rtTransformSetChild in order to provide a type-safe version for C++.

2.27 rtu Traversal API

2.27.1 Detailed Description

Classes

- struct RTUtraversalresult

Typedefs

- typedef struct RTUtraversal_api ∗ RTUtraversal

Enumerations

- enum RTUquerytype {
  RTU_QUERY_TYPE_ANY_HIT = 0,
  RTU_QUERY_TYPE_CLOSEST_HIT,
  RTU_QUERY_TYPE_COUNT }
- enum RTUrayformat {
  RTU_RAYFORMAT_ORIGIN_DIRECTION_TMIN_TMAX_INTERLEAVED = 0,
  RTU_RAYFORMAT_ORIGIN_DIRECTION_INTERLEAVED,
  RTU_RAYFORMAT_COUNT }
- enum RTUtriformat {
  RTU_TRIFORMAT_MESH = 0,
  RTU_TRIFORMAT_TRIANGLE_SOUP,
  RTU_TRIFORMAT_COUNT }
- enum RTUinitoptions {
  RTU_INITOPTION_NONE = 0,
  RTU_INITOPTION_GPU_ONLY = 1 << 0,
  RTU_INITOPTION_CPU_ONLY = 1 << 1,
  RTU_INITOPTION_CULL_BACKFACE = 1 << 2 }
- enum RTUoutput {
  RTU_OUTPUT_NONE = 0,
  RTU_OUTPUT_NORMAL = 1 << 0,
  RTU_OUTPUT_BARYCENTRIC = 1 << 1,
  RTU_OUTPUT_BACKFACING = 1 << 2 }
- enum RTUoption { RTU_OPTION_INT_NUM_THREADS =0 }

Functions

- RTresult RTAPI rtuTraversalCreate (RTUtraversal ∗traversal, RTUquerytype query_type, RTUrayformat ray_format, RTUtriformat tri_format, unsigned int outputs, unsigned int options, RTcontext context)
- RTresult RTAPI rtuTraversalGetErrorString (RTUtraversal traversal, RTresult code, const char ∗∗return_string)
- RTresult RTAPI rtuTraversalSetOption (RTUtraversal traversal, RTUoption option, void ∗value)
- RTresult RTAPI rtuTraversalSetMesh (RTUtraversal traversal, unsigned int num_verts, const float ∗verts, unsigned int num_tris, const unsigned ∗indices)
- RTresult RTAPI rtuTraversalSetTriangles (RTUtraversal traversal, unsigned int num_tris, const float ∗tris)
- RTresult RTAPI rtuTraversalSetAccelData (RTUtraversal traversal, const void ∗data, RTsize data_size)
- RTresult RTAPI rtuTraversalGetAccelDataSize (RTUtraversal traversal, RTsize ∗data_size)
- RTresult RTAPI rtuTraversalGetAccelData (RTUtraversal traversal, void ∗data)
- RTresult RTAPI rtuTraversalMapRays (RTUtraversal traversal, unsigned int num_rays, float ∗∗rays)
- RTresult RTAPI rtuTraversalUnmapRays (RTUtraversal traversal)
- RTresult RTAPI rtuTraversalPreprocess (RTUtraversal traversal)
- RTresult RTAPI rtuTraversalTraverse (RTUtraversal traversal)
- RTresult RTAPI rtuTraversalMapResults (RTUtraversal traversal, RTUtraversalresult ∗∗results)

- RTresult RTAPI rtuTraversalUnmapResults (RTUtraversal traversal)
- RTresult RTAPI rtuTraversalMapOutput (RTUtraversal traversal, RTUoutput which, void ∗∗output)
- RTresult RTAPI rtuTraversalUnmapOutput (RTUtraversal traversal, RTUoutput which)
- RTresult RTAPI rtuTraversalDestroy (RTUtraversal traversal)

2.27.2 Typedef Documentation

2.27.2.1 typedef struct RTUtraversal_api∗ RTUtraversal

Opaque type. Note that the ∗_api types should never be used directly. Only the typedef target names will be guaranteed to remain unchanged.

2.27.3 Enumeration Type Documentation

2.27.3.1 enum RTUinitoptions

Initialization options (static across life of traversal object).

The rtuTraverse API supports both running on the CPU and GPU. When RTU_INITOPTION_NONE is specified GPU context creation is attempted. If that fails (such as when there isn't an NVIDIA GPU part present, the CPU code path is automatically chosen. Specifying RTU_INITOPTION_GPU_ONLY or RTU_INITOPTION_CPU_ONLY will only use the GPU or CPU modes without automatic transitions from one to the other.

RTU_INITOPTION_CULL_BACKFACE will enable back face culling during intersection.

Enumerator

RTU_INITOPTION_NONE	No option
RTU_INITOPTION_GPU_ONLY	GPU only
RTU_INITOPTION_CPU_ONLY	CPU only
RTU_INITOPTION_CULL_BACKFACE	Back face culling

2.27.3.2 enum RTUoption

Runtime options (can be set multiple times for a given traversal object).

Enumerator

RTU_OPTION_INT_NUM_THREADS	Number of threads

2.27.3.3 enum RTUoutput

RTUoutput requested.

Enumerator

RTU_OUTPUT_NONE	Output None
RTU_OUTPUT_NORMAL	float3 [x, y, z]
RTU_OUTPUT_BARYCENTRIC	float2 [alpha, beta] (gamma implicit)
RTU_OUTPUT_BACKFACING	char [1 | 0]

2.27.3.4 enum RTUquerytype

The type of ray query to be performed.

See OptiX Programming Guide for explanation of any vs. closest hit queries. Note that in the case of RTU_QUERY_TYPE_ANY_HIT, the prim_id and t intersection values in RTUtraversalresult will correspond to the first successful intersection. These values may not be indicative of the closest intersection, only that there was at least one.

Enumerator

- ***RTU_QUERY_TYPE_ANY_HIT*** Perform any hit calculation
- ***RTU_QUERY_TYPE_CLOSEST_HIT*** Perform closest hit calculation
- ***RTU_QUERY_TYPE_COUNT*** Query type count

2.27.3.5 enum RTUrayformat

The input format of the ray vector.

Enumerator

- ***RTU_RAYFORMAT_ORIGIN_DIRECTION_TMIN_TMAX_INTERLEAVED*** Origin Direction Tmin Tmax interleaved
- ***RTU_RAYFORMAT_ORIGIN_DIRECTION_INTERLEAVED*** Origin Direction interleaved
- ***RTU_RAYFORMAT_COUNT*** Ray format count

2.27.3.6 enum RTUtriformat

The input format of the triangles.

TRIANGLE_SOUP implies future use of rtuTraversalSetTriangles while MESH implies use of rtuTraversalSetMesh.

Enumerator

- ***RTU_TRIFORMAT_MESH*** Triangle format mesh
- ***RTU_TRIFORMAT_TRIANGLE_SOUP*** Triangle 'soup' format
- ***RTU_TRIFORMAT_COUNT*** Triangle format count

2.27.4 Function Documentation

2.27.4.1 RTresult RTAPI rtuTraversalCreate (RTUtraversal ∗ *traversal*, RTUquerytype *query_type*, RTUrayformat *ray_format*, RTUtriformat *tri_format*, unsigned int *outputs*, unsigned int *options*, RTcontext *context*)

Create a traversal state and associate a context with it. If context is a null pointer a new context will be created internally. The context should also not be used for any other launch commands from the OptiX host API, nor attached to multiple RTUtraversal objects at one time.

Parameters

`out`	*traversal*	Return pointer for traverse state handle
	query_type	Ray query type
	ray_format	Ray format
	tri_format	Triangle format
	outputs	OR'ed mask of requested RTUoutput
	options	Bit vector of or'ed RTUinitoptions
	context	RTcontext used for internal object creation

2.27.4.2 RTresult RTAPI rtuTraversalDestroy (RTUtraversal *traversal*)

Clean up any internal memory associated with *rtuTraversal*∗ operations. Includes destruction of result buffers returned via rtuTraversalGetErrorString. Invalidates traversal object.

Parameters

traversal	Traversal state handle

2.27.4.3 RTresult RTAPI rtuTraversalGetAccelData (RTUtraversal *traversal,* void ∗ *data*)

Retrieve acceleration data for current geometry. Will force acceleration build if necessary. The data parameter should be preallocated and its length should match return value of rtuTraversalGetAccelDataSize.

Parameters

	traversal	Traversal state handle
out	*data*	Acceleration data

2.27.4.4 RTresult RTAPI rtuTraversalGetAccelDataSize (RTUtraversal *traversal,* RTsize ∗ *data_size*)

Retrieve acceleration data size for current geometry. Will force acceleration build if necessary.

Parameters

	traversal	Traversal state handle
out	*data_size*	Size of acceleration data

2.27.4.5 RTresult RTAPI rtuTraversalGetErrorString (RTUtraversal *traversal,* RTresult *code,* const char ∗∗ *return_string*)

Returns the string associated with the error code and any additional information from the last error. If traversal is non-NULL return_string only remains valid while traversal is live.

For a list of associated error codes that this function might inspect take a look at RTresult .

Parameters

out	*return_string*	Pointer to string with error message in it
	traversal	Traversal state handle. Can be NULL
	code	Error code from last error

2.27.4.6 RTresult RTAPI rtuTraversalMapOutput (RTUtraversal *traversal,* RTUoutput *which,* void ∗∗ *output*)

Retrieve user-specified output from last rtuTraversalTraverse call. Output can be copied from the pointer returned by rtuTraversalMapOutput and will have length *'num_rays'* from as prescribed from the previous call to rtuTraversalMapRays. For each RTUoutput, a single rtuTraversalMapOutput pointers can be outstanding. rtuTraversalUnmapOutput should be called when finished reading the output.

If requested output type was not turned on with a previous call to rtuTraversalCreate an error will be returned. See RTUoutput enum for description of output data formats for various outputs.

Parameters

	traversal	Traversal state handle
	which	Output type to be specified
out	*output*	Pointer to output from last traverse

2.27.4.7 RTresult RTAPI rtuTraversalMapRays (RTUtraversal *traversal,* unsigned int *num_rays,* float ∗∗ *rays*)

Specify set of rays to be cast upon next call to rtuTraversalTraverse. rtuTraversalMapRays obtains a pointer which can be used to copy the ray data into. Rays should be packed in the format described in rtuTraversalCreate call. When copying is completed rtuTraversalUnmapRays should be called. Note that this call invalidates any existing results buffers until rtuTraversalTraverse is called again.

Parameters

traversal	Traversal state handle
num_rays	Number of rays to be traced
rays	Pointer to ray data

2.27.4.8 RTresult RTAPI rtuTraversalMapResults (RTUtraversal *traversal,* RTUtraversalresult ∗∗ *results*)

Retrieve results of last rtuTraversal call. Results can be copied from the pointer returned by rtuTraversalMapResults and will have length *'num_rays'* as prescribed from the previous call to rtuTraversalMapRays. rtuTraversalUnmapResults should be called when finished reading the results. Returned primitive ID of -1 indicates a ray miss.

Parameters

	traversal	Traversal state handle
`out`	*results*	Pointer to results of last traverse

2.27.4.9 RTresult RTAPI rtuTraversalPreprocess (RTUtraversal *traversal*)

Perform any necessary preprocessing (eg, acceleration structure building, optix context compilation). It is not necessary to call this function as rtuTraversalTraverse will call this internally as necessary.

Parameters

traversal	Traversal state handle

2.27.4.10 RTresult RTAPI rtuTraversalSetAccelData (RTUtraversal *traversal,* const void ∗ *data,* RTsize *data_size*)

Specify acceleration data for current geometry. Input acceleration data should be result of rtuTraversalGetAccelData or rtAccelerationGetData call.

Parameters

traversal	Traversal state handle
data	Acceleration data
data_size	Size of acceleration data

2.27.4.11 RTresult RTAPI rtuTraversalSetMesh (RTUtraversal *traversal,* unsigned int *num_verts,* const float ∗ *verts,* unsigned int *num_tris,* const unsigned ∗ *indices*)

Specify triangle mesh to be intersected by the next call to rtuTraversalTraverse. Only one geometry set may be active at a time. Subsequent calls to rtuTraversalSetTriangles or rtuTraversalSetMesh will override any previously specified geometry. No internal copies of the mesh data are made. The user should ensure that the mesh data remains valid until after rtuTraversalTraverse has been called. Counter-clockwise winding is assumed for normal and backfacing computations.

Parameters

traversal	Traversal state handle
num_verts	Vertex count
verts	Vertices [v1_x, v1_y, v1_z, v2.x, ...]
num_tris	Triangle count
indices	Indices [tri1_index1, tr1_index2, ...]

2.27.4.12 RTresult RTAPI rtuTraversalSetOption (RTUtraversal *traversal,* RTUoption *option,* void ∗ *value*)

Set a runtime option. Unlike initialization options, these options may be set more than once for a given RTUtraversal instance.

Parameters

traversal	Traversal state handle
option	The option to be set
value	Value of the option

2.27.4.13 RTresult RTAPI rtuTraversalSetTriangles (RTUtraversal *traversal*, unsigned int *num_tris*, const float ∗ *tris*)

Specify triangle soup to be intersected by the next call to rtuTraversalLaunch. Only one geometry set may be active at a time. Subsequent calls to rtuTraversalSetTriangles or rtuTraversalSetMesh will override any previously specified geometry. No internal copies of the triangle data are made. The user should ensure that the triangle data remains valid until after rtuTraversalTraverse has been called. Counter-clockwise winding is assumed for normal and backfacing computations.

Parameters

traversal	Traversal state handle
num_tris	Triangle count
tris	Triangles [tri1_v1.x, tri1_v1.y, tr1_v1.z, tri1_v2.x, ...]

2.27.4.14 RTresult RTAPI rtuTraversalTraverse (RTUtraversal *traversal*)

Perform any necessary preprocessing (eg, acceleration structure building and kernel compilation) and cast current rays against current geometry.

Parameters

traversal	Traversal state handle

2.27.4.15 RTresult RTAPI rtuTraversalUnmapOutput (RTUtraversal *traversal*, RTUoutput *which*)

See rtuTraversalMapOutput .

2.27.4.16 RTresult RTAPI rtuTraversalUnmapRays (RTUtraversal *traversal*)

See rtuTraversalMapRays .

2.27.4.17 RTresult RTAPI rtuTraversalUnmapResults (RTUtraversal *traversal*)

See rtuTraversalMapResults .

2.28 OptiX Prime API Reference

2.28.1 Detailed Description

Modules

- Context
- Query
- Model
- Buffer descriptor
- Miscellaneous functions
- OptiX Prime++ wrapper

2.29 Context

2.29.1 Detailed Description

Functions

- RTPresult RTPAPI rtpContextCreate (RTPcontexttype type, RTPcontext ∗context)
- RTPresult RTPAPI rtpContextSetCudaDeviceNumbers (RTPcontext context, unsigned deviceCount, const unsigned ∗deviceNumbers)
- RTPresult RTPAPI rtpContextSetCpuThreads (RTPcontext context, unsigned numThreads)
- RTPresult RTPAPI rtpContextDestroy (RTPcontext context)
- RTPresult RTPAPI rtpContextGetLastErrorString (RTPcontext context, const char ∗∗return_string)

2.29.2 Function Documentation

2.29.2.1 RTPresult RTPAPI rtpContextCreate (RTPcontexttype *type,* RTPcontext ∗ *context*)

Creates an OptiX Prime context.

By default, a context created with type RTP_CONTEXT_TYPE_CUDA will use all available CUDA devices. Specific devices can be selected using rtpContextSetCudaDeviceNumbers. One device will be selected as the *primary device* and will be set as the current device when the function returns. If no available device has compute capability 2.0 or greater the created context will not be able to build acceleration structures.

Parameters

in	*type*	The type of context to create
out	*context*	Pointer to the new OptiX Prime context

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_OBJECT_CREATION_FAILED
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_MEMORY_ALLOCATION_FAILED

Example Usage:

```
RTPcontext context;
if(rtpContextCreate( RTP_CONTEXT_TYPE_CUDA, &context ) == RTP_SUCCESS ) {
  int deviceNumbers[] = {0,1};
  rtpContextSetCudaDeviceNumbers( 2, deviceNumbers );
}
else
  rtpContextCreate( RTP_CONTEXT_TYPE_CPU, &context ); // Fallback to CPU
```

2.29.2.2 RTPresult RTPAPI rtpContextDestroy (RTPcontext *context*)

Destroys an OptiX Prime context.

Ongoing work is finished before *context* is destroyed. All OptiX Prime objects associated with *context* are aslo destroyed when *context* is destroyed.

Parameters

in	*context*	OptiX Prime context to destroy

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.29.2.3 RTPresult RTPAPI rtpContextGetLastErrorString (RTPcontext *context*, const char $**$ *return_string*)

Returns a string describing last error encountered.

This function returns an error string for the last error encountered in *context* that may contain invocation-specific details beyond the simple RTPresult error code. Note that this function may return errors from previous asynchronous launches or from calls by other threads.

Parameters

in	*context*	OptiX Prime context
out	*return_string*	String with error details

Return values

Relevant return values:

- RTP_SUCCESS

See also rtpGetErrorString

2.29.2.4 RTPresult RTPAPI rtpContextSetCpuThreads (RTPcontext *context*, unsigned *numThreads*)

Sets the number of CPU threads used by a CPU context.

This function will return an error if the provided *context* is not of type RTP_CONTEXT_TYPE_CPU.

By default, one ray tracing thread is created per CPU core.

Parameters

in	*context*	OptiX Prime context
in	*numThreads*	Number of threads used for the CPU context

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.29.2.5 RTPresult RTPAPI rtpContextSetCudaDeviceNumbers (RTPcontext *context*, unsigned *deviceCount*, const unsigned $*$ *deviceNumbers*)

Sets the CUDA devices used by a context.

The first device provided in deviceNumbers will be used as the *primary device*. Acceleration structures will be built on the primary device and copied to the others. To build the acceleration structures the primary device must be of compute capability 2.0 or greater. The current device will be set to the primary device when this function returns.

If *deviceCount==0*, then the primary device is selected automatically and all available devices are selected for use. *deviceNumbers* is ignored.

Parameters

in	*context*	OptiX Prime context
in	*deviceCount*	Number of devices supplied in *deviceNumbers* or 0
in	*deviceNumbers*	Array of integer device indices, or NULL if *deviceCount==0*

This function will return an error if the provided context is not of type RTP_CONTEXT_TYPE_CUDA

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.30 Query

2.30.1 Detailed Description

Functions

- RTPresult RTPAPI rtpQueryCreate (RTPmodel model, RTPquerytype queryType, RTPquery ∗query)
- RTPresult RTPAPI rtpQueryGetContext (RTPquery query, RTPcontext ∗context)
- RTPresult RTPAPI rtpQuerySetRays (RTPquery query, RTPbufferdesc rays)
- RTPresult RTPAPI rtpQuerySetHits (RTPquery query, RTPbufferdesc hits)
- RTPresult RTPAPI rtpQueryExecute (RTPquery query, unsigned hints)
- RTPresult RTPAPI rtpQueryFinish (RTPquery query)
- RTPresult RTPAPI rtpQueryGetFinished (RTPquery query, int ∗isFinished)
- RTPresult RTPAPI rtpQuerySetCudaStream (RTPquery query, cudaStream_t stream)
- RTPresult RTPAPI rtpQueryDestroy (RTPquery query)

2.30.2 Function Documentation

2.30.2.1 RTPresult RTPAPI rtpQueryCreate (RTPmodel *model*, RTPquerytype *queryType*, RTPquery ∗ *query*)

Creates a query on a model.

If the model to which a query is bound destroyed with rtpModelDestroy() the query will be destroyed as well.

Parameters

in	*model*	Model to use for this query
in	*queryType*	Type of the query
out	*query*	Pointer to the new query

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.30.2.2 RTPresult RTPAPI rtpQueryDestroy (RTPquery *query*)

Destroys a query.

The query is finished before it is destroyed

Parameters

in	*query*	Query to be destroyed

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.30.2.3 RTPresult RTPAPI rtpQueryExecute (RTPquery *query,* unsigned *hints*)

Executes a raytracing query.

If the flag RTP_QUERY_HINT_ASYNC is specified, rtpQueryExecute may return before the query is actually finished. rtpQueryFinish can be called to block the current thread until the query is finished, or rtpQueryGetFinished can be used to poll until the query is finished.

Parameters

in	*query*	Query
in	*hints*	A combination of flags from RTPqueryhint

Once the query has finished all of the hits are guaranteed to have been returned, and it is safe to modify the ray buffer.

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

Example Usage:

```
RTPquery query;
rtpQueryCreate(model, RTP_QUERY_TYPE_CLOSEST, &query);
rtpQuerySetRays(query, raysBD);
rtpQuerySetHits(hits, hitsBD);
rtpQueryExecute(query, 0);
// safe to modify ray buffer and process hits
```

2.30.2.4 RTPresult RTPAPI rtpQueryFinish (RTPquery *query*)

Blocks current thread until query is finished.

This function can be called multiple times. It will return immediately if the query has already finished.

Parameters

in	*query*	Query

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.30.2.5 RTPresult RTPAPI rtpQueryGetContext (RTPquery *query*, RTPcontext ∗ *context*)

Gets the context object associated with a query.

Parameters

in	*query*	Query to obtain the context from
out	*context*	Returned context

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.30.2.6 RTPresult RTPAPI rtpQueryGetFinished (RTPquery *query*, int ∗ *isFinished*)

Polls the status of a query.

Parameters

`in`	*query*	Query
`out`	*isFinished*	Returns finished status

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.30.2.7 RTPresult RTPAPI rtpQuerySetCudaStream (RTPquery *query*, cudaStream_t *stream*)

Sets a sync stream for a query.

Specify a Cuda stream used for synchronization. If no stream is specified, the default 0-stream is used. A stream can only be specified for contexts with type RTP_CONTEXT_TYPE_CUDA.

Parameters

`in`	*query*	Query
`in`	*stream*	A cuda stream

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.30.2.8 RTPresult RTPAPI rtpQuerySetHits (RTPquery *query*, RTPbufferdesc *hits*)

Sets the hits buffer for a query.

A hit is reported for every ray in the query. Therefore the size of the range in the hit buffer must match that of the ray buffer.

Parameters

`in`	*query*	Query
`in`	*hits*	Buffer descriptor for hits

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.30.2.9 RTPresult RTPAPI rtpQuerySetRays (RTPquery *query*, RTPbufferdesc *rays*)

Sets the rays buffer for a query.

The rays buffer is not accessed until rtpQueryExecute() is called.

Parameters

`in`	*query*	Query
`in`	*rays*	Buffer descriptor for rays

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.31 Model

2.31.1 Detailed Description

Functions

- RTPresult RTPAPI rtpModelCreate (RTPcontext context, RTPmodel ∗model)
- RTPresult RTPAPI rtpModelGetContext (RTPmodel model, RTPcontext ∗context)
- RTPresult RTPAPI rtpModelSetTriangles (RTPmodel model, RTPbufferdesc indices, RTPbufferdesc vertices)
- RTPresult RTPAPI rtpModelSetInstances (RTPmodel model, RTPbufferdesc instances, RTPbufferdesc transforms)
- RTPresult RTPAPI rtpModelUpdate (RTPmodel model, unsigned hints)
- RTPresult RTPAPI rtpModelFinish (RTPmodel model)
- RTPresult RTPAPI rtpModelGetFinished (RTPmodel model, int ∗isFinished)
- RTPresult RTPAPI rtpModelCopy (RTPmodel model, RTPmodel srcModel)
- RTPresult RTPAPI rtpModelSetBuilderParameter (RTPmodel model_api, RTPbuilderparam param, RTPsize size, void ∗ptr)
- RTPresult RTPAPI rtpModelDestroy (RTPmodel model)

2.31.2 Function Documentation

2.31.2.1 RTPresult RTPAPI rtpModelCopy (RTPmodel *model,* RTPmodel *srcModel*)

Copies one model to another.

This function copies a model from one OptiX Prime context to another for user-managed multi-GPU operation where one context is allocated per device. Only triangle models can be copied, not instance models. Furthermore, when a *srcModel* has the RTP_BUILDER_PARAM_USE_CALLER_TRIANGLES build parameter set to 1, and it is intended that the triangle data is automatically transfered to the other context, the destination (*model*) should have the build parameter set to 0 before the copy call. If the destination model has the build parameter set to 1 too, it is necessary to specify the triangles of the destination model by calling rtpModelSetTriangles with buffer descriptors that refer to triangle data on the device of the descriptors model context.

Parameters

`in`	*model*	Destination model
`in`	*srcModel*	Source model

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.31.2.2 RTPresult RTPAPI rtpModelCreate (RTPcontext *context,* RTPmodel ∗ *model*)

Creates a model.

Parameters

`in`	*context*	OptiX Prime context
`out`	*model*	Pointer to the new model

Return values

Relevant return values:

- RTP_SUCCESS

- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.31.2.3 RTPresult RTPAPI rtpModelDestroy (RTPmodel *model*)

Destroys a model.

Any queries created on the model are also destroyed with the model. The queries are allowed to finish before they are destroyed.

Parameters

`in`	*model*	Model

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.31.2.4 RTPresult RTPAPI rtpModelFinish (RTPmodel *model*)

Blocks current thread until model update is finished.

This function can be called multiple times. It will return immediately if the previous update has already finished.

Parameters

`in`	*model*	Model

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.31.2.5 RTPresult RTPAPI rtpModelGetContext (RTPmodel *model,* RTPcontext ∗ *context*)

Gets the context object associated with the model.

Parameters

`in`	*model*	Model to obtain the context from
`out`	*context*	Returned context

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.31.2.6 RTPresult RTPAPI rtpModelGetFinished (RTPmodel *model,* int ∗ *isFinished*)

Polls the status of a model update.

Parameters

in	*model*	Model
out	*isFinished*	Returns finished status

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.31.2.7 RTPresult RTPAPI rtpModelSetBuilderParameter (RTPmodel *model_api*, RTPbuilderparam *param*, RTPsize *size*, void ∗ *ptr*)

Specifies a builder parameter for a model.

The following builder parameters are supported:

RTP_BUILDER_PARAM_USE_CALLER_TRIANGLES : *int*

If the value for RTP_BUILDER_PARAM_USE_CALLER_TRIANGLES is set to 0 (default), Prime uses an internal representation for triangles (which requires additional memory) to improve query performance and does not reference the user's vertex buffer during a query. If set to 1, Prime uses the provided triangle data as-is, which may result in slower query performance, but reduces memory usage.

RTP_BUILDER_PARAM_CHUNK_SIZE : *RTPsize*

Acceleration structures are built in chunks to reduce the amount of scratch memory needed. The size of the scratch memory chunk is specified in bytes by RTP_BUILDER_PARAM_CHUNK_SIZE. If set to -1, the chunk size has no limit. If set to 0 (default) the chunk size is chosen automatically, currently as 10% of the total available video memory for GPU builds and 512MB for CPU builds.

Parameters

in	*model_api*	Model
in	*param*	Builder parameter to set
in	*size*	Size in bytes of the parameter being set
in	*ptr*	Pointer to where the value of the attribute will be copied from. This must point to at least *size* bytes of memory

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.31.2.8 RTPresult RTPAPI rtpModelSetInstances (RTPmodel *model*, RTPbufferdesc *instances*, RTPbufferdesc *transforms*)

Sets the instance data for a model.

The *instances* buffer specifies a list of model instances, and the *transforms* buffer holds a transformation matrix for each instance. The instance buffer type must be RTP_BUFFER_TYPE_HOST.

Instance buffers must be of format RTP_BUFFER_FORMAT_INSTANCE_MODEL, and transform buffers of format RTP_BUFFER_FORMAT_TRANSFORM_FLOAT4x4 or RTP_BUFFER_FORMAT_TRANSFORM_FLOAT4x3. If a stride is specified for the transformations, it must be a multiple of 16 bytes. Furthermore, the matrices must be stored in row-major order. Only affine transformations are supported, and the last row is always assumed to be [0.0, 0.0, 0.0, 1.0].

All instance models in the *instances* buffer must belong to the same context as the model itself. Additionally, the build parameter RTP_BUILDER_PARAM_USE_CALLER_TRIANGLES must be the same for all models (if applied). Setting RTP_BUILDER_PARAM_USE_CALLER_TRIANGLES for a model which contains instances has no effect.

The buffers are not used until rtpModelUpdate is called.

Parameters

`in`	*model*	Model
`in`	*instances*	Buffer descriptor for instances
`in`	*transforms*	Buffer descriptor for 4x4 transform matrices

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.31.2.9 RTPresult RTPAPI rtpModelSetTriangles (RTPmodel *model,* RTPbufferdesc *indices,* RTPbufferdesc *vertices*)

Sets the triangle data for a model.

The index buffer specifies triplet of vertex indices. If the index buffer descriptor is not specified (e.g. indices==NULL), the vertex buffer is considered to be a flat list of triangles, with every three vertices forming a triangle. The buffers are not used until rtpModelUpdate is called.

Parameters

`in`	*model*	Model
`in`	*indices*	Buffer descriptor for triangle vertex indices, or NULL
`in`	*vertices*	Buffer descriptor for triangle vertices

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.31.2.10 RTPresult RTPAPI rtpModelUpdate (RTPmodel *model,* unsigned *hints*)

Updates data, or creates an acceleration structure over triangles or instances.

Depending on the specified hints, rtpModelUpdate performs different operations:

If the flag RTP_MODEL_HINT_ASYNC is specified, some or all of the acceleration structure update may run asynchronously and rtpModelUpdate may return before the update is finished. In the case of RTP_MODEL_HINT_NONE, the acceleration structure build is blocking. It is important that buffers specified in rtpModelSetTriangles and rtpModelSetInstances not be modified until the update has finished. rtpModelFinish blocks the current thread until the update is finished. rtpModelGetFinished can be used to poll until the update is finished. Once the update has finished the input buffers can be modified.

The acceleration structure build performed by rtpModelUpdate uses a fast, high quality algorithm, but has the cost of requiring additional working memory. The amount of working memory is controlled by RTP_BUILDER_PARAM_CHUNK_SIZE.

The flag RTP_MODEL_HINT_MASK_UPDATE should be used to inform Prime when visibility mask data changed (after calling rtpModelSetTriangles with the updated values), e.g. when the indices format

RTP_BUFFER_FORMAT_INDICES_INT3_MASK_INT is used. RTP_MODEL_HINT_MASK_UPDATE can be combined with RTP_MODEL_HINT_ASYNC to perform asynchronous data updates.

Hint RTP_MODEL_HINT_USER_TRIANGLES_AFTER_COPY_SET should be used when a triangle model has been copied (with the user triangle build flag set), and new user triangles have been set (by calling rtpModelSet-Triangles again with the updated values). RTP_MODEL_HINT_USER_TRIANGLES_AFTER_COPY_SET can be combined with RTP_MODEL_HINT_ASYNC to perform asynchronous data updates.

Parameters

in	*model*	Model
in	*hints*	A combination of flags from RTPmodelhint

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

Example Usage:

```
RTPmodel model;
rtpModelCreate(context, &model);
rtpModelSetTriangles(model, 0, vertsBD);
rtpModelUpdate(model, RTP_MODEL_HINT_ASYNC);

// ... do useful work on CPU while GPU is busy

rtpModelFinish(model);

// It is now safe to modify vertex buffer
```

2.32 Buffer descriptor

2.32.1 Detailed Description

Functions

- RTPresult RTPAPI rtpBufferDescCreate (RTPcontext context, RTPbufferformat format, RTPbuffertype type, void ∗buffer, RTPbufferdesc ∗desc)
- RTPresult RTPAPI rtpBufferDescGetContext (RTPbufferdesc desc, RTPcontext ∗context)
- RTPresult RTPAPI rtpBufferDescSetRange (RTPbufferdesc desc, RTPsize begin, RTPsize end)
- RTPresult RTPAPI rtpBufferDescSetStride (RTPbufferdesc desc, unsigned strideBytes)
- RTPresult RTPAPI rtpBufferDescSetCudaDeviceNumber (RTPbufferdesc desc, unsigned deviceNumber)
- RTPresult RTPAPI rtpBufferDescDestroy (RTPbufferdesc desc)

2.32.2 Function Documentation

2.32.2.1 RTPresult RTPAPI rtpBufferDescCreate (RTPcontext *context,* RTPbufferformat *format,* RTPbuffertype *type,* void ∗ *buffer,* RTPbufferdesc ∗ *desc*)

Create a buffer descriptor.

This function creates a buffer descriptor with the specified element format and buffertype. A buffer of type RTP_BUFFER_TYPE_CUDA_LINEAR is assumed to reside on the current device. The device number can be changed by calling rtpBufferDescSetCudaDeviceNumber.

Parameters

in	*context*	OptiX Prime context
in	*format*	Format of the buffer
in	*type*	Type of the buffer
in	*buffer*	Pointer to buffer data
out	*desc*	Pointer to the new buffer descriptor

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

Example Usage:

```
RTPbufferdesc verticesBD;
rtpBufferDescCreate(context, RTP_BUFFER_FORMAT_VERTEX_FLOAT3, RTP_BUFFER_TYPE_HOST, vertices, &verticesBD);
```

2.32.2.2 RTPresult RTPAPI rtpBufferDescDestroy (RTPbufferdesc *desc*)

Destroys a buffer descriptor.

Buffer descriptors can be destroyed immediately after it is used as a function parameter. The buffer contents associated with a buffer descriptor, however, must remain valid until they are no longer used by any OptiX Prime objects.

Parameters

in	*desc*	Buffer descriptor

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.32.2.3 RTPresult RTPAPI rtpBufferDescGetContext (RTPbufferdesc *desc*, RTPcontext ∗ *context*)

Gets the context object associated with the provided buffer descriptor.

Parameters

in	*desc*	Buffer descriptor
out	*context*	Returned context

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.32.2.4 RTPresult RTPAPI rtpBufferDescSetCudaDeviceNumber (RTPbufferdesc *desc*, unsigned *deviceNumber*)

Sets the CUDA device number for a buffer.

A buffer of type RTP_BUFFER_TYPE_CUDA_LINEAR is assumed to reside on the device that was current when its buffer descriptor was created unless otherwise specified using this function.

Parameters

in	*desc*	Buffer descriptor
in	*deviceNumber*	CUDA device number

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.32.2.5 RTPresult RTPAPI rtpBufferDescSetRange (RTPbufferdesc *desc*, RTPsize *begin*, RTPsize *end*)

Sets the element range of a buffer to use.

The range is specified in terms of number of elements. By default, the range for a buffer is 0 to the number of elements in the buffer.

Parameters

in	*desc*	Buffer descriptor
in	*begin*	Start index of the range
in	*end*	End index of the range (exclusive, one past the index of the last element)

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

2.32.2.6 RTPresult RTPAPI rtpBufferDescSetStride (RTPbufferdesc *desc*, unsigned *strideBytes*)

Sets the stride for elements in a buffer.

This function is only valid for buffers of format RTP_BUFFER_FORMAT_VERTEX_FLOAT3. This function is useful for vertex buffers that contain interleaved vertex attributes. For buffers that are transferred between the host and a device it is recommended that only buffers with default stride be used to avoid transferring data that will not be used.

Parameters

in	*desc*	Buffer descriptor
in	*strideBytes*	Stride in bytes. The default value of 0 indicates that elements are contiguous in memory.

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE
- RTP_ERROR_UNKNOWN

Example Usage:

```
struct Vertex {
   float3 pos, normal, color;
};
...
RTPbufferdesc vertsBD;
rtpBufferDescCreate(context, RTP_BUFFER_FORMAT_VERTEX_FLOAT3, RTP_BUFFER_TYPE_HOST, verts, &vertsBD);
rtpBufferDescSetRange(vertsBD, 0, numVerts);
rtpBufferDescSetStride(vertsBD, sizeof(Vertex));
```

2.33 Miscellaneous functions

2.33.1 Detailed Description

Functions

- RTPresult RTPAPI rtpHostBufferLock (void ∗buffer, RTPsize size)
- RTPresult RTPAPI rtpHostBufferUnlock (void ∗buffer)
- RTPresult RTPAPI rtpGetErrorString (RTPresult errorCode, const char ∗∗errorString)
- RTPresult RTPAPI rtpGetVersion (unsigned int ∗version)
- RTPresult RTPAPI rtpGetVersionString (const char ∗∗versionString)

2.33.2 Function Documentation

2.33.2.1 RTPresult RTPAPI rtpGetErrorString (RTPresult *errorCode,* const char ∗∗ *errorString*)

Translates an RTPresult error code to a string.

Translates an RTPresult error code to a string describing the error.

Parameters

`in`	*errorCode*	Error code to be translated
`out`	*errorString*	Returned error string

Return values

Relevant return values:

- RTP_SUCCESS

See also rtpContextGetLastErrorString

2.33.2.2 RTPresult RTPAPI rtpGetVersion (unsigned int ∗ *version*)

Gets OptiX Prime version number.

The encoding for the version number is major∗1000 + minor∗10 + micro. For example, for version 3.5.1 this function would return 3051.

Parameters

`out`	*version*	Returned version

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE

2.33.2.3 RTPresult RTPAPI rtpGetVersionString (const char ∗∗ *versionString*)

Gets OptiX Prime version string.

Returns OptiX Prime version string and other information in a human-readable format.

Parameters

in	*versionString*	Returned version information

Return values

Relevant return values:

- RTP_SUCCESS

2.33.2.4 RTPresult RTPAPI rtpHostBufferLock (void * *buffer*, RTPsize *size*)

Page-locks a host buffer.

Transfers between the host and device are faster if the host buffers are page-locked. However, page-locked memory is a limited resource and should be used judiciously.

Parameters

in	*buffer*	Buffer on the host
in	*size*	Size of the buffer

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE

2.33.2.5 RTPresult RTPAPI rtpHostBufferUnlock (void * *buffer*)

Unlocks a previously page-locked host buffer.

Transfers between the host and device are faster if the host buffers are page-locked. However, page-locked memory is a limited resource and should be used judiciously. Use this function on buffers previous page-locked with rtpHostBufferLock.

Parameters

in	*buffer*	Buffer on the host

Return values

Relevant return values:

- RTP_SUCCESS
- RTP_ERROR_INVALID_VALUE

2.34 OptiX Prime++ wrapper

2.34.1 Detailed Description

Classes

- class optix::prime::ContextObj
- class optix::prime::BufferDescObj
- class optix::prime::ModelObj
- class optix::prime::QueryObj
- class optix::prime::Exception

- typedef Handle< BufferDescObj > optix::prime::BufferDesc
- typedef Handle< ContextObj > optix::prime::Context
- typedef Handle< ModelObj > optix::prime::Model
- typedef Handle< QueryObj > optix::prime::Query

2.34.2 Typedef Documentation

2.34.2.1 typedef Handle<QueryObj> **optix::prime::Query**

Use this to manipulate RTPquery objects.

2.35 OptiX Interoperability Types

2.35.1 Detailed Description

This section lists OpenGL and Direct3D texture formats that are currently supported for interoperability with OptiX.

Modules

- OpenGL Texture Formats
- Direct3D Texture Formats
- DXGI Texture Formats

2.36 OpenGL Texture Formats

The following OpenGL texture formats are available for interoperability with OptiX.

R8I
R8UI
RG8I
RG8UI
RGBA8
RGBA8I
RGBA8UI
R16I
R16UI
RG16I
RG16UI
RGBA16
RGBA16I
RGBA16UI
R32I
R32UI
RG32I
RG32UI
RGBA32I
RGBA32UI
R32F
RG32F
RGBA32F

2.37 Direct3D Texture Formats

The following Direct3D texture formats are available for interoperability with OptiX.

L8
A8
A8L8
V8U8
A8R8G8B8
X8R8G8B8
A8B8G8R8
X8B8G8R8
Q8W8V8U8
L16
G16R16
V16U16
A16B16G16R16
Q16W16V16U16
R32F
G32R32F
A32B32G32R32F

2.38 DXGI Texture Formats

The following DXGI texture formats are available for interoperability with OptiX.

R8_SINT
R8_SNORM
R8_UINT
R8_UNORM
R16_SINT
R16_SNORM
R16_UINT
R16_UNORM
R32_SINT
R32_UINT
R32_FLOAT
R8G8_SINT
R8G8_SNORM
R8G8_UINT
R8G8_UNORM
R16G16_SINT
R16G16_SNORM
R16G16_UINT
R16G16_UNORM
R32G32_SINT
R32G32_UINT
R32G32_FLOAT
R8G8B8A8_SINT
R8G8B8A8_SNORM
R8G8B8A8_UINT
R8G8B8A8_UNORM
R16G16B16A16_SINT
R16G16B16A16_SNORM
R16G16B16A16_UINT
R16G16B16A16_UNORM
R32G32B32A32_SINT
R32G32B32A32_UINT
R32G32B32A32_FLOAT

3 Class Documentation

3.1 optix::Aabb Class Reference

3.1.1 Detailed Description

Axis-aligned bounding box.

Description

Aabb is a utility class for computing and manipulating axis-aligned bounding boxes (aabbs). Aabb is primarily useful in the bounding box program associated with geometry objects. Aabb may also be useful in other computation and can be used in both host and device code.

History

Aabb was introduced in OptiX 1.0.

See also RT_PROGRAM, rtGeometrySetBoundingBoxProgram

Public Member Functions

- RT_HOSTDEVICE Aabb ()
- RT_HOSTDEVICE Aabb (const float3 &min, const float3 &max)
- RT_HOSTDEVICE Aabb (const float3 &v0, const float3 &v1, const float3 &v2)
- RT_HOSTDEVICE bool operator== (const Aabb &other) const
- RT_HOSTDEVICE float3 & operator[] (int i)
- RT_HOSTDEVICE const float3 & operator[] (int i) const
- RT_HOSTDEVICE void set (const float3 &min, const float3 &max)
- RT_HOSTDEVICE void set (const float3 &v0, const float3 &v1, const float3 &v2)
- RT_HOSTDEVICE void invalidate ()
- RT_HOSTDEVICE bool valid () const
- RT_HOSTDEVICE bool contains (const float3 &p) const
- RT_HOSTDEVICE bool contains (const Aabb &bb) const
- RT_HOSTDEVICE void include (const float3 &p)
- RT_HOSTDEVICE void include (const Aabb &other)
- RT_HOSTDEVICE void include (const float3 &min, const float3 &max)
- RT_HOSTDEVICE float3 center () const
- RT_HOSTDEVICE float center (int dim) const
- RT_HOSTDEVICE float3 extent () const
- RT_HOSTDEVICE float extent (int dim) const
- RT_HOSTDEVICE float volume () const
- RT_HOSTDEVICE float area () const
- RT_HOSTDEVICE float halfArea () const
- RT_HOSTDEVICE int longestAxis () const
- RT_HOSTDEVICE float maxExtent () const
- RT_HOSTDEVICE bool intersects (const Aabb &other) const
- RT_HOSTDEVICE void intersection (const Aabb &other)
- RT_HOSTDEVICE void enlarge (float amount)
- RT_HOSTDEVICE bool isFlat () const
- RT_HOSTDEVICE float distance (const float3 &x) const
- RT_HOSTDEVICE float distance2 (const float3 &x) const
- RT_HOSTDEVICE float signedDistance (const float3 &x) const

Public Attributes

- float3 m_min
- float3 m_max

3.1.2 Constructor & Destructor Documentation

3.1.2.1 OPTIXU_INLINE RT_HOSTDEVICE optix::Aabb::Aabb ( )

Construct an invalid box

3.1.2.2 OPTIXU_INLINE RT_HOSTDEVICE optix::Aabb::Aabb (const float3 & *min*, const float3 & *max*)

Construct from min and max vectors

3.1.2.3 OPTIXU_INLINE RT_HOSTDEVICE optix::Aabb::Aabb (const float3 & *v0*, const float3 & *v1*, const float3 & *v2*)

Construct from three points (e.g. triangle)

3.1.3 Member Function Documentation

3.1.3.1 OPTIXU_INLINE RT_HOSTDEVICE float optix::Aabb::area ( ) const

Compute the surface area of the box

3.1.3.2 OPTIXU_INLINE RT_HOSTDEVICE float3 optix::Aabb::center ( ) const

Compute the box center

3.1.3.3 OPTIXU_INLINE RT_HOSTDEVICE float optix::Aabb::center (int *dim*) const

Compute the box center in the given dimension

3.1.3.4 OPTIXU_INLINE RT_HOSTDEVICE bool optix::Aabb::contains (const float3 & *p*) const

Check if the point is in the box

3.1.3.5 OPTIXU_INLINE RT_HOSTDEVICE bool optix::Aabb::contains (const Aabb & *bb*) const

Check if the box is fully contained in the box

3.1.3.6 OPTIXU_INLINE RT_HOSTDEVICE float optix::Aabb::distance (const float3 & *x*) const

Compute the minimum Euclidean distance from a point on the surface of this Aabb to the point of interest

3.1.3.7 OPTIXU_INLINE RT_HOSTDEVICE float optix::Aabb::distance2 (const float3 & *x*) const

Compute the minimum squared Euclidean distance from a point on the surface of this Aabb to the point of interest

3.1.3.8 OPTIXU_INLINE RT_HOSTDEVICE void optix::Aabb::enlarge (float *amount*)

Enlarge the box by moving both min and max by 'amount'

3.1.3.9 OPTIXU_INLINE RT_HOSTDEVICE float3 optix::Aabb::extent ( ) const

Compute the box extent

3.1.3.10 OPTIXU_INLINE RT_HOSTDEVICE float optix::Aabb::extent (int *dim*) const

Compute the box extent in the given dimension

3.1.3.11 OPTIXU_INLINE RT_HOSTDEVICE float optix::Aabb::halfArea ( ) const

Compute half the surface area of the box

3.1.3.12 OPTIXU_INLINE RT_HOSTDEVICE void optix::Aabb::include (const float3 & *p*)

Extend the box to include the given point

3.1.3.13 OPTIXU_INLINE RT_HOSTDEVICE void optix::Aabb::include (const Aabb & *other*)

Extend the box to include the given box

3.1.3.14 OPTIXU_INLINE RT_HOSTDEVICE void optix::Aabb::include (const float3 & *min,* const float3 & *max*)

Extend the box to include the given box

3.1.3.15 OPTIXU_INLINE RT_HOSTDEVICE void optix::Aabb::intersection (const Aabb & *other*)

Make the current box be the intersection between this one and another one

3.1.3.16 OPTIXU_INLINE RT_HOSTDEVICE bool optix::Aabb::intersects (const Aabb & *other*) const

Check for intersection with another box

3.1.3.17 OPTIXU_INLINE RT_HOSTDEVICE void optix::Aabb::invalidate ( )

Invalidate the box

3.1.3.18 OPTIXU_INLINE RT_HOSTDEVICE bool optix::Aabb::isFlat ( ) const

Check if the box is flat in at least one dimension

3.1.3.19 OPTIXU_INLINE RT_HOSTDEVICE int optix::Aabb::longestAxis ( ) const

Get the index of the longest axis

3.1.3.20 OPTIXU_INLINE RT_HOSTDEVICE float optix::Aabb::maxExtent ( ) const

Get the extent of the longest axis

3.1.3.21 OPTIXU_INLINE RT_HOSTDEVICE bool optix::Aabb::operator== (const Aabb & *other*) const

Exact equality

3.1.3.22 OPTIXU_INLINE RT_HOSTDEVICE float3 & optix::Aabb::operator[] (int *i*)

Array access

3.1.3.23 OPTIXU_INLINE RT_HOSTDEVICE const float3 & optix::Aabb::operator[] (int *i*) const

Const array access

3.1.3.24 OPTIXU_INLINE RT_HOSTDEVICE void optix::Aabb::set (const float3 & *min,* const float3 & *max*)

Set using two vectors

3.1.3.25 OPTIXU_INLINE RT_HOSTDEVICE void optix::Aabb::set (const float3 & *v0,* const float3 & *v1,* const float3 & *v2*)

Set using three points (e.g. triangle)

3.1.3.26 OPTIXU_INLINE RT_HOSTDEVICE float optix::Aabb::signedDistance (const float3 & *x*) const

Compute the minimum Euclidean distance from a point on the surface of this Aabb to the point of interest. If the point of interest lies inside this Aabb, the result is negative

3.1.3.27 OPTIXU_INLINE RT_HOSTDEVICE bool optix::Aabb::valid ( ) const

Check if the box is valid

3.1.3.28 OPTIXU_INLINE RT_HOSTDEVICE float optix::Aabb::volume ( ) const

Compute the volume of the box

3.1.4 Member Data Documentation

3.1.4.1 float3 optix::Aabb::m_max

Max bound

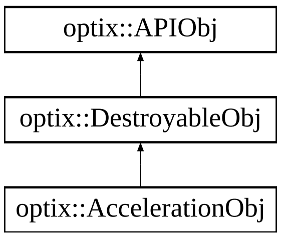
3.1.4.2 float3 optix::Aabb::m_min

Min bound

3.2 optix::AccelerationObj Class Reference

3.2.1 Detailed Description

Acceleration wraps the OptiX C API RTacceleration opaque type and its associated function set. Inheritance diagram for optix::AccelerationObj:



Public Member Functions

- void destroy ()
- void validate ()
- Context getContext () const
- RTacceleration get ()

- void markDirty ()
- bool isDirty () const

- void setProperty (const std::string &name, const std::string &value)
- std::string getProperty (const std::string &name) const
- void setBuilder (const std::string &builder)
- std::string getBuilder () const
- void setTraverser (const std::string &traverser)
- std::string getTraverser () const

- RTsize getDataSize () const
- void getData (void ∗data) const
- void setData (const void ∗data, RTsize size)

Friends

- class **Handle**< **AccelerationObj** >

Additional Inherited Members

3.2.2 Member Function Documentation

3.2.2.1 RTsize optix::AccelerationObj::getDataSize ( ) const `[inline]`

Query the size of the marshalled acceleration data. See rtAccelerationGetDataSize.

3.2.2.2 std::string optix::AccelerationObj::getProperty (const std::string & *name*) const `[inline]`

Query properties specifying Acceleration builder/traverser behavior. See rtAccelerationGetProperty.

3.2.2.3 void optix::AccelerationObj::markDirty ( ) `[inline]`

Mark the acceleration as needing a rebuild. See rtAccelerationMarkDirty.

3.2.2.4 void optix::AccelerationObj::setProperty (const std::string & *name,* const std::string & *value*) `[inline]`

Set properties specifying Acceleration builder/traverser behavior. See rtAccelerationSetProperty.

3.3 optix::APIObj Class Reference

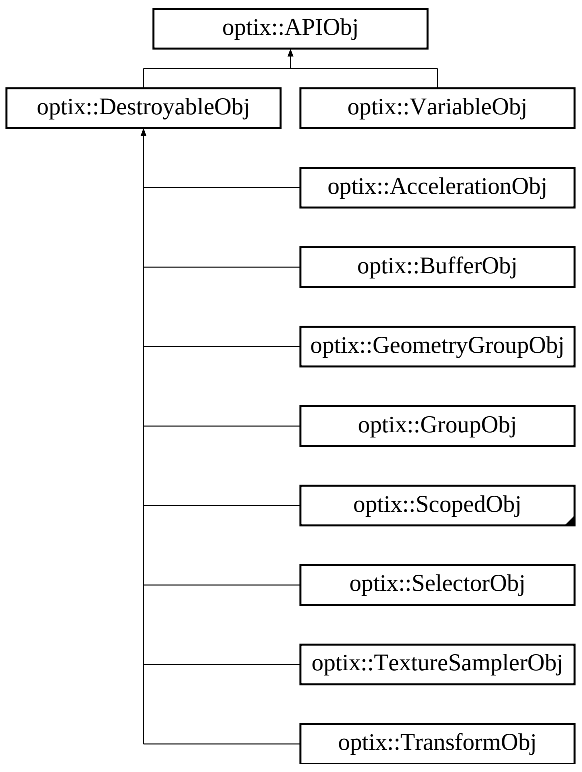
3.3.1 Detailed Description

Base class for all reference counted wrappers around OptiX C API opaque types.

Wraps:

- RTcontext
- RTbuffer
- RTgeometry
- RTgeometryinstance
- RTgeometrygroup
- RTgroup
- RTmaterial
- RTprogram
- RTselector
- RTtexturesampler
- RTtransform
- RTvariable

Inheritance diagram for optix::APIObj:



Public Member Functions

- void addReference ()
- int removeReference ()
- virtual Context getContext () const =0
- virtual void checkError (RTresult code) const
- virtual void **checkError** (RTresult code, Context context) const
- void **checkErrorNoGetContext** (RTresult code) const

Static Public Member Functions

- static Exception makeException (RTresult code, RTcontext context)

3.3.2 Member Function Documentation

3.3.2.1 void optix::APIObj::checkError (**RTresult** ***code***) const [inline], [virtual]

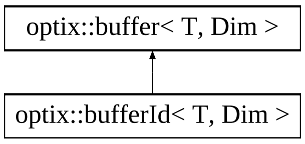
Check the given result code and throw an error with appropriate message if the code is not RTsuccess

Reimplemented in optix::ContextObj.

3.4 optix::boundCallableProgramId< T > Singleton Reference

3.5 optix::buffer< T, Dim > Struct Template Reference

Inheritance diagram for optix::buffer< T, Dim >:



Classes

- struct type

Public Types

- typedef VectorTypes< size_t, Dim > **WrapperType**
- typedef VectorTypes< size_t,
  Dim >::Type **IndexType**

Public Member Functions

- __device__ __forceinline__
  IndexType **size** () const
- __device__ __forceinline__ T & **operator[]** (IndexType i)

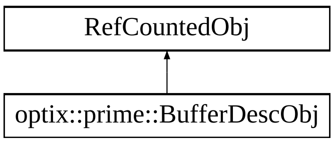
Static Protected Member Functions

- __inline__ static __device__
  size_t4 **make_index** (size_t v0)
- __inline__ static __device__
  size_t4 **make_index** (size_t2 v0)
- __inline__ static __device__
  size_t4 **make_index** (size_t3 v0)
- __inline__ static __device__
  size_t4 **make_index** (size_t4 v0)
- template<typename T2 >
  __device__ static
  __forceinline__ void ∗ **create** (type< T2 >, void ∗v)
- template<typename T2 , int Dim2>
  __device__ static
  __forceinline__ void ∗ **create** (type< bufferId< T2, Dim2 > >, void ∗v)

3.6 optix::prime::BufferDescObj Class Reference

3.6.1 Detailed Description

Encapsulates an OptiX Prime buffer descriptor. The purpose of a buffer descriptor is to provide information about a buffer's type, format, and location. It also describes the region of the buffer to use. Inheritance diagram for optix::prime::BufferDescObj:



Public Member Functions

- Context getContext ()
- void setRange (RTPsize begin, RTPsize end)
- void setStride (unsigned strideBytes)
- void setCudaDeviceNumber (unsigned deviceNumber)
- RTPbufferdesc getRTPbufferdesc ()

Friends

- class **ContextObj**
- class **ModelObj**
- class **QueryObj**

3.7 optix::bufferId< T, Dim > Struct Template Reference

3.7.1 Detailed Description

template<typename T, int Dim = 1>struct optix::bufferId< T, Dim >

bufferId is a host version of the device side bufferId.

Use bufferId to define types that can be included from both the host and device code. This class provides a container that can be used to transport the buffer id back and forth between host and device code. The bufferId class is useful, because it can take a buffer id obtained from rtBufferGetId and provide accessors similar to the buffer class.

"bindless_type.h" used by both host and device code:

```
#include <optix_world.h>
struct BufInfo {
  int val;
  rtBufferId<int, 1> data;
};
```

Host code:

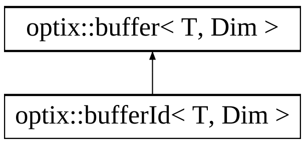
```
#include "bindless_type.h"
BufInfo input_buffer_info;
input_buffer_info.val = 0;
input_buffer_info.data = rtBufferId<int,1>(inputBuffer0->getId());
context["input_buffer_info"]->setUserData(sizeof(BufInfo), &input_buffer_info);
```

Device code:

```
#include "bindless_type.h"
rtBuffer<int,1> result;
rtDeclareVariable(BufInfo, input_buffer_info, ,);

RT_PROGRAM void bindless()
{
  int value = input_buffer_info.data[input_buffer_info.val];
  result[0] = value;
}
```

Inheritance diagram for optix::bufferId< T, Dim >:



Public Types

- typedef buffer< T, Dim >
  ::WrapperType **WrapperType**
- typedef buffer< T, Dim >::IndexType **IndexType**

Public Member Functions

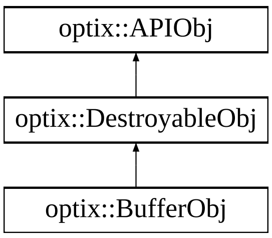
- __device__ __forceinline__ **bufferId** (RTbufferidnull nullid)
- __device__ __forceinline__ **bufferId** (int id)
- __device__ __forceinline__
  bufferId & **operator=** (RTbufferidnull nullid)
- __device__ __forceinline__
  IndexType **size** () const
- __device__ __forceinline__ T & **operator[]** (IndexType i) const
- __device__ __forceinline__ int **getId** () const
- __device__ __forceinline__ **operator bool** () const
- **bufferId** (int id)
- int **getId** () const

Additional Inherited Members

3.8 optix::BufferObj Class Reference

3.8.1 Detailed Description

Buffer wraps the OptiX C API RTbuffer opaque type and its associated function set. Inheritance diagram for optix::BufferObj:



Public Member Functions

- void destroy ()
- void validate ()
- Context getContext () const
- RTbuffer get ()

- void setFormat (RTformat format)
- RTformat getFormat () const
- void setElementSize (RTsize size_of_element)
- RTsize getElementSize () const
- void getDevicePointer (unsigned int optix_device_number, CUdeviceptr ∗device_pointer)
- CUdeviceptr getDevicePointer (unsigned int optix_device_number)
- void setDevicePointer (unsigned int optix_device_number, CUdeviceptr device_pointer)
- void markDirty ()
- void setSize (RTsize width)

- void getSize (RTsize &width) const
- void setSize (RTsize width, RTsize height)
- void getSize (RTsize &width, RTsize &height) const
- void setSize (RTsize width, RTsize height, RTsize depth)
- void getSize (RTsize &width, RTsize &height, RTsize &depth) const
- void setSize (unsigned int dimensionality, const RTsize ∗dims)
- void getSize (unsigned int dimensionality, RTsize ∗dims) const
- unsigned int getDimensionality () const

- int getId () const

- unsigned int getGLBOId () const
- void registerGLBuffer ()
- void unregisterGLBuffer ()

- void registerD3D9Buffer ()
- void registerD3D10Buffer ()
- void registerD3D11Buffer ()
- void unregisterD3D9Buffer ()
- void unregisterD3D10Buffer ()
- void unregisterD3D11Buffer ()
- IDirect3DResource9 ∗ getD3D9Resource ()
- ID3D10Resource ∗ getD3D10Resource ()
- ID3D11Resource ∗ getD3D11Resource ()

- void ∗ map ()
- void unmap ()

Friends

- class **Handle**< **BufferObj** >

Additional Inherited Members

3.8.2 Member Function Documentation

3.8.2.1 CUdeviceptr optix::BufferObj::getDevicePointer (unsigned int *optix_device_number*) [inline]

Set the data format for the buffer. See rtBufferSetFormat.

3.8.2.2 unsigned int optix::BufferObj::getGLBOId ( ) const [inline]

Queries the OpenGL Buffer Object ID associated with this buffer. See rtBufferGetGLBOId.

3.8.2.3 int optix::BufferObj::getId ( ) const [inline]

Queries an id suitable for referencing the buffer in an another buffer. See rtBufferGetId.

3.8.2.4 void ∗ optix::BufferObj::map ( ) [inline]

Maps a buffer object for host access. See rtBufferMap.

3.8.2.5 void optix::BufferObj::registerD3D9Buffer ( ) [inline]

Declare the texture's buffer as mutable and inaccessible by OptiX. See rtBufferD3D9Register.

3.8.2.6 void optix::BufferObj::setFormat (**RTformat** *format*) [inline]

Set the data format for the buffer. See rtBufferSetFormat.

3.8.2.7 void optix::BufferObj::setSize (RTsize *width*, RTsize *height*, RTsize *depth*) [inline]

Set buffer dimensionality to three and buffer dimensions to specified width,height,depth. See rtBufferSetSize3D.

3.9 RTPinternals_3070::BvhNode Struct Reference

Public Attributes

- float **bbmin0** [3]
- float **bbmax0** [3]
- int **index0** [2]
- float **bbmin1** [3]
- float **bbmax1** [3]
- int **index1** [2]

3.10 optix::callableProgramId< T > Singleton Reference

3.11 rti_internal_callableprogram::callableProgramIdBase< ReturnT, Arg0T, Arg1T, Arg2T, Arg3T, Arg4T, Arg5T, Arg6T, Arg7T, Arg8T, Arg9T > Class Template Reference

Public Member Functions

- __device__ __forceinline__ ReturnT **operator()** ()
- __device__ __forceinline__ ReturnT **operator()** (Arg0T arg0)
- __device__ __forceinline__ ReturnT **operator()** (Arg0T arg0, Arg1T arg1)
- __device__ __forceinline__ ReturnT **operator()** (Arg0T arg0, Arg1T arg1, Arg2T arg2)
- __device__ __forceinline__ ReturnT **operator()** (Arg0T arg0, Arg1T arg1, Arg2T arg2, Arg3T arg3)
- __device__ __forceinline__ ReturnT **operator()** (Arg0T arg0, Arg1T arg1, Arg2T arg2, Arg3T arg3, Arg4T arg4)
- __device__ __forceinline__ ReturnT **operator()** (Arg0T arg0, Arg1T arg1, Arg2T arg2, Arg3T arg3, Arg4T arg4, Arg5T arg5)
- __device__ __forceinline__ ReturnT **operator()** (Arg0T arg0, Arg1T arg1, Arg2T arg2, Arg3T arg3, Arg4T arg4, Arg5T arg5, Arg6T arg6)
- __device__ __forceinline__ ReturnT **operator()** (Arg0T arg0, Arg1T arg1, Arg2T arg2, Arg3T arg3, Arg4T arg4, Arg5T arg5, Arg6T arg6, Arg7T arg7)
- __device__ __forceinline__ ReturnT **operator()** (Arg0T arg0, Arg1T arg1, Arg2T arg2, Arg3T arg3, Arg4T arg4, Arg5T arg5, Arg6T arg6, Arg7T arg7, Arg8T arg8)
- __device__ __forceinline__ ReturnT **operator()** (Arg0T arg0, Arg1T arg1, Arg2T arg2, Arg3T arg3, Arg4T arg4, Arg5T arg5, Arg6T arg6, Arg7T arg7, Arg8T arg8, Arg9T arg9)

Protected Attributes

- int **m_id**

3.12 rti_internal_callableprogram::check_is_CPArgVoid< Condition, Dummy > Struct Template Reference

Public Types

- typedef bool **result**

3.13 rti_internal_callableprogram::check_is_CPArgVoid< false, IntentionalError > Struct Template Reference

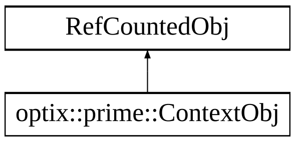
Public Types

- typedef
  IntentionalError::does_not_exist **result**

3.14 optix::prime::ContextObj Class Reference

3.14.1 Detailed Description

Wraps the OptiX Prime C API RTPcontext opaque type and its associated function set representing an OptiX Prime context. Inheritance diagram for optix::prime::ContextObj:



Public Member Functions

- BufferDesc createBufferDesc (RTPbufferformat format, RTPbuffertype type, void ∗buffer)
- Model createModel ()
- void setCudaDeviceNumbers (const std::vector< unsigned > &deviceNumbers)
- void setCudaDeviceNumbers (unsigned deviceCount, const unsigned ∗deviceNumbers)
- void setCpuThreads (unsigned numThreads)
- std::string getLastErrorString ()
- RTPcontext getRTPcontext ()

Static Public Member Functions

- static Context create (RTPcontexttype type)

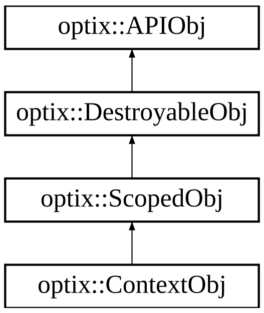
Friends

- class **QueryObj**
- class **ModelObj**
- class **BufferDescObj**

3.15 optix::ContextObj Class Reference

3.15.1 Detailed Description

Context object wraps the OptiX C API RTcontext opaque type and its associated function set. Inheritance diagram for optix::ContextObj:



Public Member Functions

- void destroy ()
- void validate ()
- Context getContext () const
- void compile ()
- int getRunningState () const
- RTcontext get ()

- void checkError (RTresult code) const
- std::string getErrorString (RTresult code) const

- Acceleration createAcceleration (const char ∗builder, const char ∗traverser)
- Buffer createBuffer (unsigned int type)
- Buffer createBuffer (unsigned int type, RTformat format)
- Buffer createBuffer (unsigned int type, RTformat format, RTsize width)
- Buffer createBuffer (unsigned int type, RTformat format, RTsize width, RTsize height)
- Buffer createBuffer (unsigned int type, RTformat format, RTsize width, RTsize height, RTsize depth)
- Buffer createBufferForCUDA (unsigned int type)
- Buffer createBufferForCUDA (unsigned int type, RTformat format)
- Buffer createBufferForCUDA (unsigned int type, RTformat format, RTsize width)
- Buffer createBufferForCUDA (unsigned int type, RTformat format, RTsize width, RTsize height)
- Buffer createBufferForCUDA (unsigned int type, RTformat format, RTsize width, RTsize height, RTsize depth)
- Buffer createBufferFromGLBO (unsigned int type, unsigned int vbo)
- TextureSampler createTextureSamplerFromGLImage (unsigned int id, RTgltarget target)
- Buffer createBufferFromD3D9Resource (unsigned int type, IDirect3DResource9 ∗pResource)
- Buffer createBufferFromD3D10Resource (unsigned int type, ID3D10Resource ∗pResource)
- Buffer createBufferFromD3D11Resource (unsigned int type, ID3D11Resource ∗pResource)
- TextureSampler createTextureSamplerFromD3D9Resource (IDirect3DResource9 ∗pResource)
- TextureSampler createTextureSamplerFromD3D10Resource (ID3D10Resource ∗pResource)
- TextureSampler createTextureSamplerFromD3D11Resource (ID3D11Resource ∗pResource)
- Buffer getBufferFromId (int buffer_id)
- Program getProgramFromId (int program_id)
- TextureSampler getTextureSamplerFromId (int sampler_id)
- Geometry createGeometry ()
- GeometryInstance createGeometryInstance ()
- template<class Iterator >
  GeometryInstance createGeometryInstance (Geometry geometry, Iterator matlbegin, Iterator matlend)
- Group createGroup ()
- template<class Iterator >
  Group createGroup (Iterator childbegin, Iterator childend)
- GeometryGroup createGeometryGroup ()
- template<class Iterator >
  GeometryGroup createGeometryGroup (Iterator childbegin, Iterator childend)

- Transform createTransform ()
- Material createMaterial ()
- Program createProgramFromPTXFile (const std::string &ptx, const std::string &program_name)
- Program createProgramFromPTXString (const std::string &ptx, const std::string &program_name)
- Selector createSelector ()
- TextureSampler createTextureSampler ()

- template<class Iterator >
  void setDevices (Iterator begin, Iterator end)
- void setD3D9Device (IDirect3DDevice9 *device)
- void setD3D10Device (ID3D10Device *device)
- void setD3D11Device (ID3D11Device *device)
- std::vector< int > getEnabledDevices () const
- unsigned int getEnabledDeviceCount () const

- int getMaxTextureCount () const
- int getCPUNumThreads () const
- RTsize getUsedHostMemory () const
- int getGPUPagingActive () const
- int getGPUPagingForcedOff () const
- RTsize getAvailableDeviceMemory (int ordinal) const

- void setCPUNumThreads (int cpu_num_threads)
- void setGPUPagingForcedOff (int gpu_paging_forced_off)
- template<class T >
  void setAttribute (RTcontextattribute attribute, const T &val)

- void setStackSize (RTsize stack_size_bytes)
- RTsize getStackSize () const
- void setTimeoutCallback (RTtimeoutcallback callback, double min_polling_seconds)
- void setEntryPointCount (unsigned int num_entry_points)
- unsigned int getEntryPointCount () const
- void setRayTypeCount (unsigned int num_ray_types)
- unsigned int getRayTypeCount () const

- void setRayGenerationProgram (unsigned int entry_point_index, Program program)
- Program getRayGenerationProgram (unsigned int entry_point_index) const
- void setExceptionProgram (unsigned int entry_point_index, Program program)
- Program getExceptionProgram (unsigned int entry_point_index) const
- void setExceptionEnabled (RTexception exception, bool enabled)
- bool getExceptionEnabled (RTexception exception) const
- void setMissProgram (unsigned int ray_type_index, Program program)
- Program getMissProgram (unsigned int ray_type_index) const

- void launch (unsigned int entry_point_index, RTsize image_width)
- void launch (unsigned int entry_point_index, RTsize image_width, RTsize image_height)
- void launch (unsigned int entry_point_index, RTsize image_width, RTsize image_height, RTsize image_depth)

- void setPrintEnabled (bool enabled)
- bool getPrintEnabled () const
- void setPrintBufferSize (RTsize buffer_size_bytes)
- RTsize getPrintBufferSize () const
- void setPrintLaunchIndex (int x, int y=-1, int z=-1)

- optix::int3 getPrintLaunchIndex () const

- Variable declareVariable (const std::string &name)
- Variable queryVariable (const std::string &name) const
- void removeVariable (Variable v)
- unsigned int getVariableCount () const
- Variable getVariable (unsigned int index) const

Static Public Member Functions

- static unsigned int getDeviceCount ()
- static std::string getDeviceName (int ordinal)
- static void getDeviceAttribute (int ordinal, RTdeviceattribute attrib, RTsize size, void ∗p)
- static Context create ()

Friends

- class **Handle**< **ContextObj** >

3.15.2 Member Function Documentation

3.15.2.1 void optix::ContextObj::checkError (**RTresult** *code*) const `[inline]`, `[virtual]`

See APIObj::checkError

Reimplemented from optix::APIObj.

3.15.2.2 **Acceleration** optix::ContextObj::createAcceleration (const char ∗ *builder,* const char ∗ *traverser*) `[inline]`

See rtAccelerationCreate

3.15.2.3 **Buffer** optix::ContextObj::createBuffer (unsigned int *type,* **RTformat** *format,* RTsize *width*) `[inline]`

Create a buffer with given RTbuffertype, RTformat and dimension. See rtBufferCreate, rtBufferSetFormat and rtBufferSetSize1D.

3.15.2.4 **Buffer** optix::ContextObj::createBuffer (unsigned int *type,* **RTformat** *format,* RTsize *width,* RTsize *height*) `[inline]`

Create a buffer with given RTbuffertype, RTformat and dimension. See rtBufferCreate, rtBufferSetFormat and rtBufferSetSize2D.

3.15.2.5 **Buffer** optix::ContextObj::createBuffer (unsigned int *type,* **RTformat** *format,* RTsize *width,* RTsize *height,* RTsize *depth*) `[inline]`

Create a buffer with given RTbuffertype, RTformat and dimension. See rtBufferCreate, rtBufferSetFormat and rtBufferSetSize3D.

3.15.2.6 **Buffer** optix::ContextObj::createBufferForCUDA (unsigned int *type,* **RTformat** *format,* RTsize *width*) `[inline]`

Create a buffer for CUDA with given RTbuffertype, RTformat and dimension. See rtBufferCreate, rtBufferSetFormat and rtBufferSetSize1D.

3.15.2.7 **Buffer** optix::ContextObj::createBufferForCUDA (unsigned int *type,* **RTformat** *format,* RTsize *width,* RTsize *height*) `[inline]`

Create a buffer for CUDA with given RTbuffertype, RTformat and dimension. See rtBufferCreate, rtBufferSetFormat and rtBufferSetSize2D.

3.15.2.8 Buffer optix::ContextObj::createBufferForCUDA (unsigned int *type,* RTformat *format,* RTsize *width,* RTsize *height,* RTsize *depth*) [inline]

Create a buffer for CUDA with given RTbuffertype, RTformat and dimension. See rtBufferCreate, rtBufferSetFormat and rtBufferSetSize3D.

3.15.2.9 template<class Iterator > GeometryGroup optix::ContextObj::createGeometryGroup (Iterator *childbegin,* Iterator *childend*) [inline]

Create a GeometryGroup with a set of child nodes. See rtGeometryGroupCreate, rtGeometryGroupSetChildCount and rtGeometryGroupSetChild

3.15.2.10 template<class Iterator > GeometryInstance optix::ContextObj::createGeometryInstance (Geometry *geometry,* Iterator *matlbegin,* Iterator *matlend*)

Create a geometry instance with a Geometry object and a set of associated materials. See rtGeometryInstance-Create, rtGeometryInstanceSetMaterialCount, and rtGeometryInstanceSetMaterial

3.15.2.11 template<class Iterator > Group optix::ContextObj::createGroup (Iterator *childbegin,* Iterator *childend*) [inline]

Create a Group with a set of child nodes. See rtGroupCreate, rtGroupSetChildCount and rtGroupSetChild

3.15.2.12 Variable optix::ContextObj::declareVariable (const std::string & *name*) [inline], [virtual]

Declare a variable associated with this object. See rt[ObjectType]DeclareVariable. Note that this function is wrapped by the convenience function Handle::operator[].

Implements optix::ScopedObj.

3.15.2.13 Buffer optix::ContextObj::getBufferFromId (int *buffer_id*) [inline]

Queries the Buffer object from a given buffer id obtained from a previous call to BufferObj::getId. See Buffer-Obj::getId and rtContextGetBufferFromId.

3.15.2.14 Context optix::ContextObj::getContext ( ) const [inline], [virtual]

Retrieve the Context object associated with this APIObject. In this case, simply returns itself.

Implements optix::APIObj.

3.15.2.15 unsigned int optix::ContextObj::getEnabledDeviceCount ( ) const [inline]

See rtContextGetDeviceCount. As opposed to getDeviceCount, this returns only the number of enabled devices.

3.15.2.16 int optix::ContextObj::getMaxTextureCount ( ) const [inline]

See rtContextGetAttribute

3.15.2.17 Program optix::ContextObj::getProgramFromId (int *program_id*) [inline]

Queries the Program object from a given program id obtained from a previous call to ProgramObj::getId. See ProgramObj::getId and rtContextGetProgramFromId.

3.15.2.18 TextureSampler optix::ContextObj::getTextureSamplerFromId (int *sampler_id*) [inline]

Queries the TextureSampler object from a given sampler id obtained from a previous call to TextureSampler-Obj::getId. See TextureSamplerObj::getId and rtContextGetTextureSamplerFromId.

3.15.2.19 unsigned int optix::ContextObj::getVariableCount ( ) const [inline], [virtual]

Query the number of variables associated with this object. Used along with ScopedObj::getVariable to iterate over variables in an object. See rt[ObjectType]GetVariableCount

Implements optix::ScopedObj.

3.15.2.20 void optix::ContextObj::launch (unsigned int *entry_point_index*, RTsize *image_width*) [inline]

See rtContextLaunch

3.15.2.21 Variable optix::ContextObj::queryVariable (const std::string & *name*) const [inline], [virtual]

Query a variable associated with this object by name. See rt[ObjectType]QueryVariable. Note that this function is wrapped by the convenience function Handle::operator[].

Implements optix::ScopedObj.

3.15.2.22 void optix::ContextObj::setCPUNumThreads (int *cpu_num_threads*) [inline]

See rtContextSetAttribute

3.15.2.23 template<class Iterator > void optix::ContextObj::setDevices (Iterator *begin*, Iterator *end*) [inline]

See rtContextSetDevices

3.15.2.24 void optix::ContextObj::setPrintEnabled (bool *enabled*) [inline]

See rtContextSetPrintEnabled

3.15.2.25 void optix::ContextObj::setRayGenerationProgram (unsigned int *entry_point_index*, Program *program*) [inline]

See rtContextSetRayGenerationProgram

3.15.2.26 void optix::ContextObj::setStackSize (RTsize *stack_size_bytes*) [inline]

See rtContextSetStackSize

3.15.2.27 void optix::ContextObj::setTimeoutCallback (RTtimeoutcallback *callback*, double *min_polling_seconds*) [inline]

See rtContextSetTimeoutCallback RTtimeoutcallback is defined as typedef int (∗RTtimeoutcallback)(void).

3.16 rti_internal_callableprogram::CPArgVoid Class Reference

3.17 optix::DestroyableObj Class Reference

3.17.1 Detailed Description

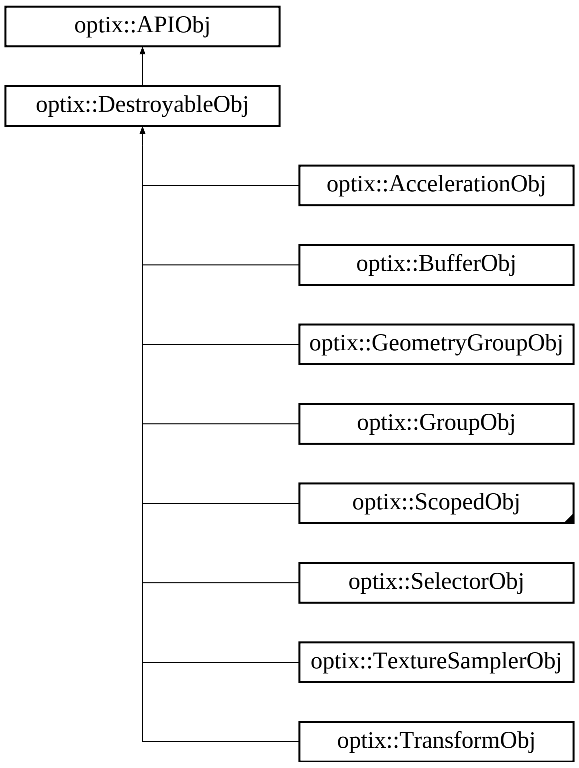
Base class for all wrapper objects which can be destroyed and validated.

Wraps:

- RTcontext
- RTgeometry
- RTgeometryinstance
- RTgeometrygroup
- RTgroup

- RTmaterial
- RTprogram
- RTselector
- RTtexturesampler
- RTtransform

Inheritance diagram for optix::DestroyableObj:



Public Member Functions

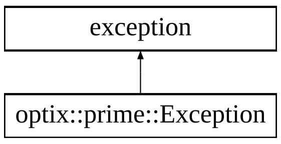
- virtual void destroy ()=0
- virtual void validate ()=0

Additional Inherited Members

3.18 optix::prime::Exception Class Reference

3.18.1 Detailed Description

Encapsulates an OptiX Prime exception. Inheritance diagram for optix::prime::Exception:



Public Member Functions

- RTPresult getErrorCode () const
- const std::string & getErrorString () const
- virtual const char * **what** () const throw ()

Static Public Member Functions

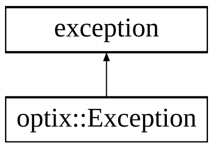
- static Exception makeException (RTPresult code, RTPcontext context)

3.19 optix::Exception Class Reference

3.19.1 Detailed Description

Exception class for error reporting from the OptiXpp API.

Encapsulates an error message, often the direct result of a failed OptiX C API function call and subsequent rtContextGetErrorString call. Inheritance diagram for optix::Exception:



Public Member Functions

- Exception (const std::string &message, RTresult error_code=RT_ERROR_UNKNOWN)
- virtual ∼Exception () throw ()
- const std::string & getErrorString () const
- RTresult getErrorCode () const
- virtual const char * what () const throw ()

Static Public Member Functions

- static Exception makeException (RTresult code, RTcontext context)

3.19.2 Constructor & Destructor Documentation

3.19.2.1 virtual optix::Exception::∼Exception ( ) throw) [inline], [virtual]

Virtual destructor (needed for virtual function calls inherited from std::exception).

3.19.3 Member Function Documentation

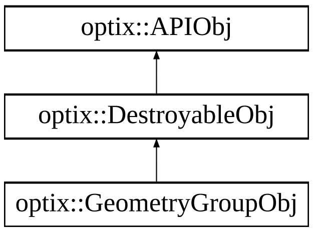
3.19.3.1 Exception optix::Exception::makeException (RTresult *code,* RTcontext *context*) [inline], [static]

Helper for creating exceptions from an RTresult code origination from an OptiX C API function call.

3.20 optix::GeometryGroupObj Class Reference

3.20.1 Detailed Description

GeometryGroup wraps the OptiX C API RTgeometrygroup opaque type and its associated function set. Inheritance diagram for optix::GeometryGroupObj:



Public Member Functions

- void destroy ()
- void validate ()
- Context getContext () const
- RTgeometrygroup get ()

- void setAcceleration (Acceleration acceleration)
- Acceleration getAcceleration () const

- void setChildCount (unsigned int count)
- unsigned int getChildCount () const
- void setChild (unsigned int index, GeometryInstance geometryinstance)
- GeometryInstance getChild (unsigned int index) const
- unsigned int addChild (GeometryInstance child)
- unsigned int removeChild (GeometryInstance child)
- void removeChild (int index)
- void removeChild (unsigned int index)
- unsigned int getChildIndex (GeometryInstance child) const

Friends

- class **Handle**< **GeometryGroupObj** >

Additional Inherited Members

3.20.2 Member Function Documentation

3.20.2.1 unsigned int optix::GeometryGroupObj::removeChild (**GeometryInstance** ***child***) `[inline]`

Remove a child in this group and returns the index to the deleted element in case of success. Throws RT_ERROR_INVALID_VALUE if the parameter is invalid. Note: this function shifts down all the elements next to the removed one.

3.20.2.2 void optix::GeometryGroupObj::removeChild (int *index*) `[inline]`

Remove a child in this group by its index. Throws RT_ERROR_INVALID_VALUE if the parameter is invalid. Note: this function shifts down all the elements next to the removed one.

3.20.2.3 void optix::GeometryGroupObj::removeChild (unsigned int *index*) [inline]

Set the number of children for this group. See rtGeometryGroupSetChildCount.

3.20.2.4 void optix::GeometryGroupObj::setAcceleration (Acceleration *acceleration*) [inline]

Set the Acceleration structure for this group. See rtGeometryGroupSetAcceleration.

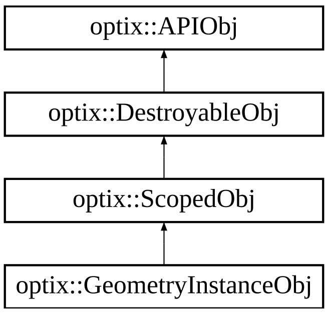
3.20.2.5 void optix::GeometryGroupObj::setChildCount (unsigned int *count*) [inline]

Set the number of children for this group. See rtGeometryGroupSetChildCount.

3.21 optix::GeometryInstanceObj Class Reference

3.21.1 Detailed Description

GeometryInstance wraps the OptiX C API RTgeometryinstance acceleration opaque type and its associated function set. Inheritance diagram for optix::GeometryInstanceObj:



Public Member Functions

- void destroy ()
- void validate ()
- Context getContext () const
- RTgeometryinstance get ()

- void setGeometry (Geometry geometry)
- Geometry getGeometry () const
- void setMaterialCount (unsigned int count)
- unsigned int getMaterialCount () const
- void setMaterial (unsigned int idx, Material material)
- Material getMaterial (unsigned int idx) const
- unsigned int addMaterial (Material material)

- Variable declareVariable (const std::string &name)
- Variable queryVariable (const std::string &name) const
- void removeVariable (Variable v)
- unsigned int getVariableCount () const
- Variable getVariable (unsigned int index) const

Friends

- class **Handle**< **GeometryInstanceObj** >

Additional Inherited Members

3.21.2 Member Function Documentation

3.21.2.1 Variable optix::GeometryInstanceObj::declareVariable (const std::string & *name*) `[inline]`, `[virtual]`

Declare a variable associated with this object. See rt[ObjectType]DeclareVariable. Note that this function is wrapped by the convenience function Handle::operator[].

Implements optix::ScopedObj.

3.21.2.2 unsigned int optix::GeometryInstanceObj::getVariableCount ( ) const `[inline]`, `[virtual]`

Query the number of variables associated with this object. Used along with ScopedObj::getVariable to iterate over variables in an object. See rt[ObjectType]GetVariableCount

Implements optix::ScopedObj.

3.21.2.3 Variable optix::GeometryInstanceObj::queryVariable (const std::string & *name*) const `[inline]`, `[virtual]`

Query a variable associated with this object by name. See rt[ObjectType]QueryVariable. Note that this function is wrapped by the convenience function Handle::operator[].

Implements optix::ScopedObj.

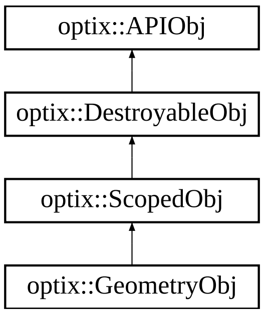
3.21.2.4 void optix::GeometryInstanceObj::setGeometry (Geometry *geometry*) `[inline]`

Set the geometry object associated with this instance. See rtGeometryInstanceSetGeometry.

3.22 optix::GeometryObj Class Reference

3.22.1 Detailed Description

Geometry wraps the OptiX C API RTgeometry opaque type and its associated function set. Inheritance diagram for optix::GeometryObj:



Public Member Functions

- void destroy ()
- void validate ()
- Context getContext () const
- RTgeometry get ()

- void markDirty ()
- bool isDirty () const

- void setPrimitiveCount (unsigned int num_primitives)
- unsigned int getPrimitiveCount () const

- void setPrimitiveIndexOffset (unsigned int index_offset)
- unsigned int getPrimitiveIndexOffset () const

- void setBoundingBoxProgram (Program program)
- Program getBoundingBoxProgram () const
- void setIntersectionProgram (Program program)
- Program getIntersectionProgram () const

- Variable declareVariable (const std::string &name)
- Variable queryVariable (const std::string &name) const
- void removeVariable (Variable v)
- unsigned int getVariableCount () const
- Variable getVariable (unsigned int index) const

Friends

- class **Handle**< **GeometryObj** >

Additional Inherited Members

3.22.2 Member Function Documentation

3.22.2.1 Variable optix::GeometryObj::declareVariable (const std::string & *name*) `[inline]`, `[virtual]`

Declare a variable associated with this object. See rt[ObjectType]DeclareVariable. Note that this function is wrapped by the convenience function Handle::operator[].

Implements optix::ScopedObj.

3.22.2.2 unsigned int optix::GeometryObj::getPrimitiveCount ( ) const `[inline]`

Query the number of primitives in this geometry object (eg, number of triangles in mesh). See rtGeometryGetPrimitiveCount

3.22.2.3 unsigned int optix::GeometryObj::getPrimitiveIndexOffset ( ) const `[inline]`

Query the primitive index offset for this geometry object. See rtGeometryGetPrimitiveIndexOffset

3.22.2.4 unsigned int optix::GeometryObj::getVariableCount ( ) const `[inline]`, `[virtual]`

Query the number of variables associated with this object. Used along with ScopedObj::getVariable to iterate over variables in an object. See rt[ObjectType]GetVariableCount

Implements optix::ScopedObj.

3.22.2.5 void optix::GeometryObj::markDirty ( ) `[inline]`

Mark this geometry as dirty, causing rebuild of parent groups acceleration. See rtGeometryMarkDirty.

3.22.2.6 Variable optix::GeometryObj::queryVariable (const std::string & *name*) const `[inline]`, `[virtual]`

Query a variable associated with this object by name. See rt[ObjectType]QueryVariable. Note that this function is wrapped by the convenience function Handle::operator[].

Implements optix::ScopedObj.

3.22.2.7 void optix::GeometryObj::setBoundingBoxProgram (**Program** *program*) [inline]

Set the bounding box program for this geometry. See rtGeometrySetBoundingBoxProgram.

3.22.2.8 void optix::GeometryObj::setPrimitiveCount (unsigned int *num_primitives*) [inline]

Set the number of primitives in this geometry object (eg, number of triangles in mesh). See rtGeometrySetPrimitiveCount

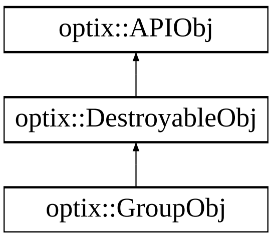
3.22.2.9 void optix::GeometryObj::setPrimitiveIndexOffset (unsigned int *index_offset*) [inline]

Set the primitive index offset for this geometry object. See rtGeometrySetPrimitiveIndexOffset

3.23 optix::GroupObj Class Reference

3.23.1 Detailed Description

Group wraps the OptiX C API RTgroup opaque type and its associated function set. Inheritance diagram for optix::GroupObj:



Public Member Functions

- void destroy ()
- void validate ()
- Context getContext () const
- RTgroup get ()

- void setAcceleration (Acceleration acceleration)
- Acceleration getAcceleration () const

- void setChildCount (unsigned int count)
- unsigned int getChildCount () const
- template<typename T >
  void setChild (unsigned int index, T child)
- template<typename T >
  T getChild (unsigned int index) const
- RTobjecttype getChildType (unsigned int index) const
- template<typename T >
  unsigned int addChild (T child)
- template<typename T >
  unsigned int removeChild (T child)
- void removeChild (int index)
- void removeChild (unsigned int index)
- template<typename T >
  unsigned int getChildIndex (T child) const

Friends

- class **Handle< GroupObj >**

Additional Inherited Members

3.23.2 Member Function Documentation

3.23.2.1 template<typename T > unsigned int optix::GroupObj::removeChild (T *child*) `[inline]`

Remove a child in this group. Note: this function shifts down all the elements next to the removed one. Returns the position of the removed element if succeeded. Throws RT_ERROR_INVALID_VALUE if the parameter is invalid.

3.23.2.2 void optix::GroupObj::removeChild (int *index*) `[inline]`

Remove a child in this group by its index. Note: this function shifts down all the elements next to the removed one. Throws RT_ERROR_INVALID_VALUE if the parameter is invalid.

3.23.2.3 void optix::GroupObj::removeChild (unsigned int *index*) `[inline]`

Set the number of children for this group. See rtGroupSetChildCount.

3.23.2.4 void optix::GroupObj::setAcceleration (Acceleration *acceleration*) `[inline]`

Set the Acceleration structure for this group. See rtGroupSetAcceleration.

3.23.2.5 void optix::GroupObj::setChildCount (unsigned int *count*) `[inline]`

Set the number of children for this group. See rtGroupSetChildCount.

3.24 optix::Handle< T > Class Template Reference

3.24.1 Detailed Description

template<class T>class optix::Handle< T >

The Handle class is a reference counted handle class used to manipulate API objects.

All interaction with API objects should be done via these handles and the associated typedefs rather than direct usage of the objects.

Public Member Functions

- Handle ()
- Handle (T ∗ptr)
- template<class U >
  Handle (U ∗ptr)
- Handle (const Handle< T > &copy)
- template<class U >
  Handle (const Handle< U > &copy)
- Handle< T > & operator= (const Handle< T > &copy)
- template<class U >
  Handle< T > & operator= (const Handle< U > &copy)
- ∼Handle ()
- T ∗ operator-> ()
- const T ∗ **operator->** () const
- T ∗ get ()

- const T ∗ **get** () const
- operator bool () const
- Handle< VariableObj > operator[] (const std::string &varname)
- Handle< VariableObj > operator[] (const char ∗varname)

Static Public Member Functions

- static Handle< T > take (typename T::api_t p)
- static Handle< T > take (RTobject p)
- static Handle< T > create ()
- static unsigned int getDeviceCount ()

3.24.2 Member Function Documentation

3.24.2.1 template<class T > Handle< VariableObj > optix::Handle< T >::operator[] (const std::string & *varname*)

Variable access operator. This operator will query the API object for a variable with the given name, creating a new variable instance if necessary. Only valid for ScopedObjs.

3.24.2.2 template<class T > Handle< VariableObj > optix::Handle< T >::operator[] (const char ∗ *varname*)

Variable access operator. Identical to operator[](const std::string& varname)

Explicitly define char∗ version to avoid ambiguities between builtin operator[](int, char∗) and Handle::operator[](std::string). The problem lies in that a Handle can be cast to a bool then to an int which implies that:

```
Context context;
context["var"];
```

can be interpreted as either

```
1["var"]; // Strange but legal way to index into a string (same as "var"[1] )
```

or

```
context[ std::string("var") ];
```

3.24.2.3 template<class T> static Handle<T> optix::Handle< T >::take (RTobject *p*) [inline], [static]

Special version that takes an RTobject which must be cast up to the appropriate OptiX API opaque type.

3.25 rti_internal_callableprogram::is_CPArgVoid< T1 > Struct Template Reference

Static Public Attributes

- static const bool **result** = false

3.26 rti_internal_callableprogram::is_CPArgVoid< CPArgVoid > Struct Template Reference

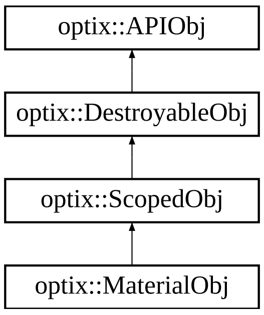
Static Public Attributes

- static const bool **result** = true

3.27 optix::MaterialObj Class Reference

3.27.1 Detailed Description

Material wraps the OptiX C API RTmaterial opaque type and its associated function set. Inheritance diagram for optix::MaterialObj:



Public Member Functions

- void destroy ()
- void validate ()
- Context getContext () const
- RTmaterial get ()

- void setClosestHitProgram (unsigned int ray_type_index, Program program)
- Program getClosestHitProgram (unsigned int ray_type_index) const
- void setAnyHitProgram (unsigned int ray_type_index, Program program)
- Program getAnyHitProgram (unsigned int ray_type_index) const

- Variable declareVariable (const std::string &name)
- Variable queryVariable (const std::string &name) const
- void removeVariable (Variable v)
- unsigned int getVariableCount () const
- Variable getVariable (unsigned int index) const

Friends

- class **Handle**< **MaterialObj** >

Additional Inherited Members

3.27.2 Member Function Documentation

3.27.2.1 Variable optix::MaterialObj::declareVariable (const std::string & *name*) [inline], [virtual]

Declare a variable associated with this object. See rt[ObjectType]DeclareVariable. Note that this function is wrapped by the convenience function Handle::operator[].

Implements optix::ScopedObj.

3.27.2.2 unsigned int optix::MaterialObj::getVariableCount ( ) const [inline], [virtual]

Query the number of variables associated with this object. Used along with ScopedObj::getVariable to iterate over variables in an object. See rt[ObjectType]GetVariableCount

Implements optix::ScopedObj.

3.27.2.3 Variable optix::MaterialObj::queryVariable (const std::string & *name*) const [inline], [virtual]

Query a variable associated with this object by name. See rt[ObjectType]QueryVariable. Note that this function is wrapped by the convenience function Handle::operator[].

Implements optix::ScopedObj.

3.27.2.4 void optix::MaterialObj::setClosestHitProgram (unsigned int *ray_type_index,* Program *program*) [inline]

Set closest hit program for this material at the given *ray_type* index. See rtMaterialSetClosestHitProgram.

3.28 optix::Matrix< M, N > Class Template Reference

3.28.1 Detailed Description

template<unsigned int M, unsigned int N>class optix::Matrix< M, N >

A matrix with M rows and N columns.

Description

Matrix provides a utility class for small-dimension floating-point matrices, such as transformation matrices. Matrix may also be useful in other computation and can be used in both host and device code. Typedefs are provided for 2x2 through 4x4 matrices.

History

Matrix was introduced in OptiX 1.0.

See also *rtVariableSetMatrix∗*

Public Types

- typedef VectorDim< N >::VectorType **floatN**
- typedef VectorDim< M >::VectorType floatM

Public Member Functions

- RT_HOSTDEVICE Matrix ()
- RT_HOSTDEVICE Matrix (const float data[M ∗N])
- RT_HOSTDEVICE Matrix (const Matrix &m)
- RT_HOSTDEVICE Matrix & operator= (const Matrix &b)
- RT_HOSTDEVICE float operator[] (unsigned int i) const
- RT_HOSTDEVICE float & operator[] (unsigned int i)
- RT_HOSTDEVICE floatN getRow (unsigned int m) const
- RT_HOSTDEVICE floatM getCol (unsigned int n) const
- RT_HOSTDEVICE float ∗ getData ()
- RT_HOSTDEVICE const float ∗ getData () const
- RT_HOSTDEVICE void setRow (unsigned int m, const floatN &r)
- RT_HOSTDEVICE void setCol (unsigned int n, const floatM &c)
- RT_HOSTDEVICE Matrix< N, M > transpose () const
- RT_HOSTDEVICE Matrix< 4, 4 > inverse () const
- RT_HOSTDEVICE float det () const
- RT_HOSTDEVICE bool operator< (const Matrix< M, N > &rhs) const
- template<>
  OPTIXU_INLINE RT_HOSTDEVICE float **det** () const
- template<>
  OPTIXU_INLINE RT_HOSTDEVICE float **det** () const

- template<>
  OPTIXU_INLINE RT_HOSTDEVICE
  Matrix< 4, 4 > **inverse** () const
- template<>
  OPTIXU_INLINE RT_HOSTDEVICE
  Matrix< 4, 4 > **rotate** (const float radians, const float3 &axis)
- template<>
  OPTIXU_INLINE RT_HOSTDEVICE
  Matrix< 4, 4 > **translate** (const float3 &vec)
- template<>
  OPTIXU_INLINE RT_HOSTDEVICE
  Matrix< 4, 4 > **scale** (const float3 &vec)

Static Public Member Functions

- static RT_HOSTDEVICE Matrix< 4, 4 > rotate (const float radians, const float3 &axis)
- static RT_HOSTDEVICE Matrix< 4, 4 > translate (const float3 &vec)
- static RT_HOSTDEVICE Matrix< 4, 4 > scale (const float3 &vec)
- static RT_HOSTDEVICE Matrix< N, N > identity ()

3.28.2 Constructor & Destructor Documentation

3.28.2.1 template<unsigned int M, unsigned int N> OPTIXU_INLINE RT_HOSTDEVICE optix::Matrix< M, N >::Matrix ( )

A column of the matrix.

Create an unitialized matrix

3.28.2.2 template<unsigned int M, unsigned int N> RT_HOSTDEVICE optix::Matrix< M, N >::Matrix (const float *data[M *N]*) `[inline]`, `[explicit]`

Create a matrix from the specified float array

3.28.2.3 template<unsigned int M, unsigned int N> OPTIXU_INLINE RT_HOSTDEVICE optix::Matrix< M, N >::Matrix (const Matrix< M, N > & *m*)

Copy the matrix

3.28.3 Member Function Documentation

3.28.3.1 template<unsigned int M, unsigned int N> RT_HOSTDEVICE float optix::Matrix< M, N >::det ( ) const

Returns the determinant of the matrix

3.28.3.2 template<unsigned int M, unsigned int N> OPTIXU_INLINE RT_HOSTDEVICE Matrix< M, N >::floatM optix::Matrix< M, N >::getCol (unsigned int *n*) const

Access the specified column 0..N. Returns float, float2, float3 or float4 depending on the matrix size

3.28.3.3 template<unsigned int M, unsigned int N> OPTIXU_INLINE RT_HOSTDEVICE float * optix::Matrix< M, N >::getData ( )

Returns a pointer to the internal data array. The data array is stored in row-major order.

3.28.3.4 template<unsigned int M, unsigned int N> OPTIXU_INLINE RT_HOSTDEVICE const float * optix::Matrix< M, N >::getData ( ) const

Returns a const pointer to the internal data array. The data array is stored in row-major order.

3.28.3.5 template<unsigned int M, unsigned int N> OPTIXU_INLINE RT_HOSTDEVICE Matrix< M, N >::floatN optix::Matrix< M, N >::getRow (unsigned int *m*) const

Access the specified row 0..M. Returns float, float2, float3 or float4 depending on the matrix size

3.28.3.6 template<unsigned int M, unsigned int N> OPTIXU_INLINE RT_HOSTDEVICE Matrix< N, N > optix::Matrix< M, N >::identity ( ) `[static]`

Returns the identity matrix

3.28.3.7 template<unsigned int M, unsigned int N> RT_HOSTDEVICE Matrix<4,4> optix::Matrix< M, N >::inverse ( ) const

Returns the inverse of the matrix

3.28.3.8 template<unsigned int M, unsigned int N> OPTIXU_INLINE RT_HOSTDEVICE bool optix::Matrix< M, N >::operator< (const Matrix< M, N > & *rhs*) const

Ordered comparison operator so that the matrix can be used in an STL container

3.28.3.9 template<unsigned int M, unsigned int N> OPTIXU_INLINE RT_HOSTDEVICE Matrix< M, N > & optix::Matrix< M, N >::operator= (const Matrix< M, N > & *b*)

Assignment operator

3.28.3.10 template<unsigned int M, unsigned int N> RT_HOSTDEVICE float optix::Matrix< M, N >::operator[] (unsigned int *i*) const `[inline]`

Access the specified element 0..N∗M-1

3.28.3.11 template<unsigned int M, unsigned int N> RT_HOSTDEVICE float& optix::Matrix< M, N >::operator[] (unsigned int *i*) `[inline]`

Access the specified element 0..N∗M-1

3.28.3.12 template<unsigned int M, unsigned int N> static RT_HOSTDEVICE Matrix<4,4> optix::Matrix< M, N >::rotate (const float *radians,* const float3 & *axis*) `[static]`

Returns a rotation matrix

3.28.3.13 template<unsigned int M, unsigned int N> static RT_HOSTDEVICE Matrix<4,4> optix::Matrix< M, N >::scale (const float3 & *vec*) `[static]`

Returns a scale matrix

3.28.3.14 template<unsigned int M, unsigned int N> OPTIXU_INLINE RT_HOSTDEVICE void optix::Matrix< M, N >::setCol (unsigned int *n,* const floatM & *c*)

Assign the specified column 0..N. Takes a float, float2, float3 or float4 depending on the matrix size

3.28.3.15 template<unsigned int M, unsigned int N> OPTIXU_INLINE RT_HOSTDEVICE void optix::Matrix< M, N >::setRow (unsigned int *m,* const floatN & *r*)

Assign the specified row 0..M. Takes a float, float2, float3 or float4 depending on the matrix size

3.28.3.16 template<unsigned int M, unsigned int N> static RT_HOSTDEVICE Matrix<4,4> optix::Matrix< M, N >::translate (const float3 & *vec*) `[static]`

Returns a translation matrix

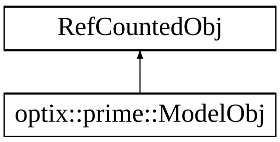
3.28.3.17 template< unsigned int M, unsigned int N > OPTIXU_INLINE RT_HOSTDEVICE Matrix< N, M > optix::Matrix< M, N >::transpose ( ) const

Returns the transpose of the matrix

3.29 optix::prime::ModelObj Class Reference

3.29.1 Detailed Description

Encapsulates an OptiX Prime model. The purpose of a model is to represent a set of triangles and an acceleration structure. Inheritance diagram for optix::prime::ModelObj:



Public Member Functions

- Query createQuery (RTPquerytype queryType)
- Context getContext ()
- void finish ()
- int isFinished ()
- void update (unsigned hints)
- void copy (const Model &srcModel)
- void setTriangles (RTPsize triCount, RTPbuffertype type, const void ∗vertPtr, unsigned stride=0)
- void setTriangles (RTPsize triCount, RTPbuffertype type, const void ∗indexPtr, RTPsize vertCount, RTPbuffertype vertType, const void ∗vertPtr, unsigned stride=0)
- void setTriangles (const BufferDesc &vertices)
- void setTriangles (const BufferDesc &indices, const BufferDesc &vertices)
- void setInstances (const BufferDesc &instances, const BufferDesc &transforms)
- void setBuilderParameter (RTPbuilderparam param, RTPsize size, void ∗p)
- template< typename T >
  void setBuilderParameter (RTPbuilderparam param, T val)
- RTPmodel getRTPmodel ()

Friends

- class **ContextObj**
- class **QueryObj**

3.29.2 Member Function Documentation

3.29.2.1 void optix::prime::ModelObj::setBuilderParameter (RTPbuilderparam *param*, RTPsize *size*, void ∗ *p*) [inline]

Sets a model build parameter See rtpModelSetBuilderParameter for additional information

3.29.2.2 template< typename T > void optix::prime::ModelObj::setBuilderParameter (RTPbuilderparam *param*, T *val*)

Sets a model build parameter See rtpModelSetBuilderParameter for additional information

3.29.2.3 void optix::prime::ModelObj::setInstances (const **BufferDesc** & *instances*, const **BufferDesc** & *transforms*)

Sets the instance data for a model using the supplied buffer descriptors. See rtpModelSetInstances for additional information

3.29.2.4 void optix::prime::ModelObj::setTriangles (RTPsize *triCount*, **RTPbuffertype** *type*, const void ∗ *vertPtr*, unsigned *stride* = 0) [inline]

Sets the triangle data for a model. This function creates a buffer descriptor of the specified type, populates it with the supplied data and assigns it to the model. The list of vertices is assumed to be a flat list of triangles and each three vertices shape a single triangle. See rtpModelSetTriangles for additional information

3.29.2.5 void optix::prime::ModelObj::setTriangles (RTPsize *triCount*, **RTPbuffertype** *type*, const void ∗ *indexPtr*, RTPsize *vertCount*, **RTPbuffertype** *vertType*, const void ∗ *vertPtr*, unsigned *stride* = 0) [inline]

Sets the triangle data for a model. This function creates a buffer descriptor of the specified type, populates it with the supplied data and assigns it to the model. The list of vertices uses the indices list to determine the triangles. See rtpModelSetTriangles for additional information

3.29.2.6 void optix::prime::ModelObj::setTriangles (const **BufferDesc** & *vertices*) [inline]

Sets the triangle data for a model using the supplied buffer descriptor of vertices. The list of vertices is assumed to be a flat list of triangles and each three vertices shape a single triangle. See rtpModelSetTriangles for additional information

3.29.2.7 void optix::prime::ModelObj::setTriangles (const **BufferDesc** & *indices*, const **BufferDesc** & *vertices*) [inline]

Sets the triangle data for a model using the supplied buffer descriptor of vertices. The list of vertices uses the indices list to determine the triangles. See rtpModelSetTriangles for additional information

3.30 optix::Onb Struct Reference

3.30.1 Detailed Description

Orthonormal basis

Public Member Functions

- OPTIXU_INLINE RT_HOSTDEVICE **Onb** (const float3 &normal)
- OPTIXU_INLINE RT_HOSTDEVICE void **inverse_transform** (float3 &p) const

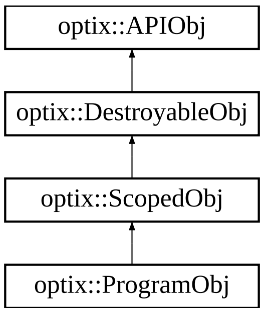
Public Attributes

- float3 **m_tangent**
- float3 **m_binormal**
- float3 **m_normal**

3.31 optix::ProgramObj Class Reference

3.31.1 Detailed Description

Program object wraps the OptiX C API RTprogram opaque type and its associated function set. Inheritance diagram for optix::ProgramObj:



Public Member Functions

- void destroy ()
- void validate ()
- Context getContext () const
- Variable declareVariable (const std::string &name)
- Variable queryVariable (const std::string &name) const
- void removeVariable (Variable v)
- unsigned int getVariableCount () const
- Variable getVariable (unsigned int index) const
- RTprogram **get** ()

- int getId () const

Friends

- class **Handle**< **ProgramObj** >

Additional Inherited Members

3.31.2 Member Function Documentation

3.31.2.1 Variable optix::ProgramObj::declareVariable (const std::string & *name*) [inline], [virtual]

Declare a variable associated with this object. See rt[ObjectType]DeclareVariable. Note that this function is wrapped by the convenience function Handle::operator[].

Implements optix::ScopedObj.

3.31.2.2 int optix::ProgramObj::getId ( ) const [inline]

Returns the device-side ID of this program object. See rtProgramGetId

3.31.2.3 unsigned int optix::ProgramObj::getVariableCount ( ) const [inline], [virtual]

Query the number of variables associated with this object. Used along with ScopedObj::getVariable to iterate over variables in an object. See rt[ObjectType]GetVariableCount

Implements optix::ScopedObj.

3.31.2.4 Variable optix::ProgramObj::queryVariable (const std::string & *name*) const [inline], [virtual]

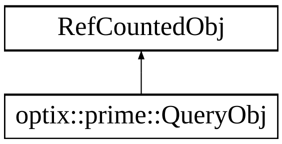
Query a variable associated with this object by name. See rt[ObjectType]QueryVariable. Note that this function is wrapped by the convenience function Handle::operator[].

Implements optix::ScopedObj.

3.32 optix::prime::QueryObj Class Reference

3.32.1 Detailed Description

Encapsulates an OptiX Prime query. The purpose of a query is to coordinate the intersection of rays with a model. Inheritance diagram for optix::prime::QueryObj:



Public Member Functions

- Context getContext ()
- void finish ()
- int isFinished ()
- void setCudaStream (cudaStream_t stream)
- void setRays (RTPsize count, RTPbufferformat format, RTPbuffertype type, void ∗rays)
- void setRays (const BufferDesc &rays)
- void setHits (RTPsize count, RTPbufferformat format, RTPbuffertype type, void ∗hits)
- void setHits (const BufferDesc &hits)
- void execute (unsigned hint)
- RTPquery getRTPquery ()

Friends

- class **ContextObj**
- class **ModelObj**

3.33 Ray Struct Reference

3.33.1 Detailed Description

Ray class.

Description

Ray is an encapsulation of a ray mathematical entity. The origin and direction members specify the ray, while the ray_type member specifies which closest-hit/any-hit pair will be used when the ray hits a geometry object. The tmin/tmax members specify the interval over which the ray is valid.

To avoid numerical range problems, the value RT_DEFAULT_MAX can be used to specify an infinite extent.

During C++ compilation, Ray is contained within the *optix::* namespace but has global scope during C compilation. Ray's constructors are not available during C compilation.

Members

```
// The origin of the ray
float3 origin;

// The direction of the ray
float3 direction;

// The ray type associated with this ray
unsigned int ray_type;

// The min and max extents associated with this ray
float tmin;
float tmax;
```

Constructors

```
// Create a Ray with undefined member values
Ray( void );

// Create a Ray copied from an exemplar
Ray( const Ray &r );

// Create a ray with a specified origin, direction, ray_type, and min/max extents.
// When tmax is not given, it defaults to @ref RT_DEFAULT_MAX.
Ray( float3 origin, float3 direction, unsigned int ray_type,
     float tmin, float tmax = RT_DEFAULT_MAX);
```

Functions

```
// Create a ray with a specified origin, direction, ray type, and min/max extents.
Ray make_Ray( float3 origin,
              float3 direction,
              unsigned int ray_type,
              float tmin,
              float tmax );
```

History

Ray was introduced in OptiX 1.0.

See also rtContextSetRayTypeCount, rtMaterialSetAnyHitProgram, rtMaterialSetClosestHitProgram

Public Attributes

- float3 origin
- float3 direction
- unsigned int ray_type
- float tmin
- float tmax

3.33.2 Member Data Documentation

3.33.2.1 float3 Ray::direction

The direction of the ray

3.33.2.2 float3 Ray::origin

The origin of the ray

3.33.2.3 unsigned int Ray::ray_type

The ray type associated with this ray

3.33.2.4 float Ray::tmax

The max extent associated with this ray

3.33.2.5 float Ray::tmin

The min extent associated with this ray

3.34 optix::rt_print_t< T > Struct Template Reference

Static Public Attributes

- static const int **desc** = 0

3.35 optix::rt_print_t< double > Struct Template Reference

Static Public Attributes

- static const int **desc** = 3

3.36 optix::rt_print_t< float > Struct Template Reference

Static Public Attributes

- static const int **desc** = 2

3.37 optix::rt_print_t< long long > Struct Template Reference

Static Public Attributes

- static const int **desc** = 1

3.38 optix::rt_print_t< unsigned long long > Struct Template Reference

Static Public Attributes

- static const int **desc** = 1

3.39 rtCallableProgramSizeofWrapper< T > Struct Template Reference

Static Public Attributes

- static const size_t **value** = sizeof(T)

3.40 rtCallableProgramSizeofWrapper< void > Struct Template Reference

Static Public Attributes

- static const size_t **value** = 0

3.41 rti_internal_typeinfo::rti_typeenum< T > Struct Template Reference

Static Public Attributes

- static const int **m_typeenum** = _OPTIX_TYPE_ENUM_UNKNOWN

3.42 rti_internal_typeinfo::rti_typeenum< optix::boundCallableProgramId< T > > Struct Template Reference

Static Public Attributes

- static const int **m_typeenum** = _OPTIX_TYPE_ENUM_PROGRAM_AS_ID

3.43 rti_internal_typeinfo::rti_typeenum< optix::callableProgramId< T > > Struct Template Reference

Static Public Attributes

- static const int **m_typeenum** = _OPTIX_TYPE_ENUM_PROGRAM_ID

3.44 rti_internal_typeinfo::rti_typeinfo Struct Reference

Public Attributes

- unsigned int **kind**
- unsigned int **size**

3.45 rtObject Struct Reference

3.45.1 Detailed Description

Opaque handle to a OptiX object.

Description

rtObject is an opaque handle to an OptiX object of any type. To set or query the variable value, use rtVariableSetObject and rtVariableGetObject.

Depending on how exacly the variable is used, only certain concrete types may make sense. For example, when used as an argument to rtTrace, the variable must be set to any OptiX type of RTgroup, RTselector, RTgeometrygroup, or RTtransform.

Note that for certain OptiX types, there are more specialized handles available to access a variable. For example, to access an OptiX object of type RTtexturesampler, a handle of type rtTextureSampler provides more functionality than one of the generic type rtObject.

History

rtObject was introduced in OptiX 1.0.

See also rtVariableSetObject, rtVariableGetObject, rtTrace, rtTextureSampler, rtBuffer

3.46 RTPinternals_3070 Struct Reference

Classes

- struct BvhNode
- struct WoopTriangle

Public Attributes

- int **numNodes**
- int **numEntities**
- BvhNode $*$ **nodes**
- int $*$ **remap**
- WoopTriangle $*$ **triangles**
- int **indexStride**
- int **vertexStride**
- int $*$ **indices**
- float $*$ **vertices**
- int **matrixStride**
- float $*$ **invMatrices**
- int $*$ **instanceToModelmodelId**

3.47 RTUtraversalresult Struct Reference

3.47.1 Detailed Description

Traversal API allowing batch raycasting queries utilizing either OptiX or the CPU.

The OptiX traversal API is demonstrated in the traversal sample within the OptiX SDK.

Structure encapsulating the result of a single ray query

Public Attributes

- int prim_id
- float t

3.47.2 Member Data Documentation

3.47.2.1 int RTUtraversalresult::prim_id

Index of the interesected triangle, -1 for miss

3.47.2.2 float RTUtraversalresult::t

Ray t parameter of hit point

3.48 optix::ScopedObj Class Reference

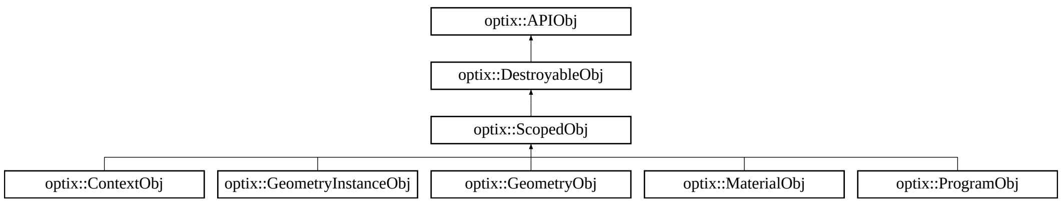
3.48.1 Detailed Description

Base class for all objects which are OptiX variable containers.

Wraps:

- RTcontext
- RTgeometry
- RTgeometryinstance
- RTmaterial
- RTprogram

Inheritance diagram for optix::ScopedObj:



Public Member Functions

- virtual Variable declareVariable (const std::string &name)=0
- virtual Variable queryVariable (const std::string &name) const =0
- virtual void removeVariable (Variable v)=0
- virtual unsigned int getVariableCount () const =0
- virtual Variable getVariable (unsigned int index) const =0

Additional Inherited Members

3.48.2 Member Function Documentation

3.48.2.1 virtual Variable optix::ScopedObj::declareVariable (const std::string & *name*) [pure virtual]

Declare a variable associated with this object. See rt[ObjectType]DeclareVariable. Note that this function is wrapped by the convenience function Handle::operator[].

Implemented in optix::MaterialObj, optix::GeometryObj, optix::GeometryInstanceObj, optix::ProgramObj, and optix::ContextObj.

3.48.2.2 virtual unsigned int optix::ScopedObj::getVariableCount ( ) const [pure virtual]

Query the number of variables associated with this object. Used along with ScopedObj::getVariable to iterate over variables in an object. See rt[ObjectType]GetVariableCount

Implemented in optix::MaterialObj, optix::GeometryObj, optix::GeometryInstanceObj, optix::ProgramObj, and optix::ContextObj.

3.48.2.3 virtual Variable optix::ScopedObj::queryVariable (const std::string & *name*) const [pure virtual]

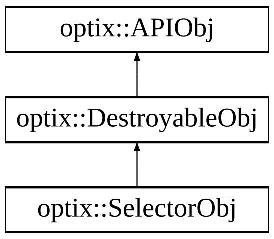
Query a variable associated with this object by name. See rt[ObjectType]QueryVariable. Note that this function is wrapped by the convenience function Handle::operator[].

Implemented in optix::MaterialObj, optix::GeometryObj, optix::GeometryInstanceObj, optix::ProgramObj, and optix::ContextObj.

3.49 optix::SelectorObj Class Reference

3.49.1 Detailed Description

Selector wraps the OptiX C API RTselector opaque type and its associated function set. Inheritance diagram for optix::SelectorObj:



Public Member Functions

- void destroy ()
- void validate ()
- Context getContext () const
- RTselector get ()

- void setVisitProgram (Program program)
- Program getVisitProgram () const

- void setChildCount (unsigned int count)
- unsigned int getChildCount () const
- template<typename T >
  void setChild (unsigned int index, T child)

- template<typename T >
  T getChild (unsigned int index) const
- RTobjecttype getChildType (unsigned int index) const
- template<typename T >
  unsigned int addChild (T child)
- template<typename T >
  unsigned int removeChild (T child)
- void removeChild (int index)
- void removeChild (unsigned int index)
- template<typename T >
  unsigned int getChildIndex (T child) const

- Variable **declareVariable** (const std::string &name)
- Variable **queryVariable** (const std::string &name) const
- void **removeVariable** (Variable v)
- unsigned int **getVariableCount** () const
- Variable **getVariable** (unsigned int index) const

Friends

- class **Handle**< **SelectorObj** >

Additional Inherited Members

3.49.2 Member Function Documentation

3.49.2.1 template<typename T > unsigned int optix::SelectorObj::removeChild (T *child*) [inline]

Remove a child in this group and returns the index to the deleted element in case of success. Throws RT_ERROR_INVALID_VALUE if the parameter is invalid. Note: this function shifts down all the elements next to the removed one.

3.49.2.2 void optix::SelectorObj::removeChild (int *index*) [inline]

Remove a child in this group by its index. Throws RT_ERROR_INVALID_VALUE if the parameter is invalid. Note: this function shifts down all the elements next to the removed one.

3.49.2.3 void optix::SelectorObj::removeChild (unsigned int *index*) [inline]

Set the number of children for this group. See rtSelectorSetChildCount.

3.49.2.4 void optix::SelectorObj::setChildCount (unsigned int *count*) [inline]

Set the number of children for this group. See rtSelectorSetChildCount.

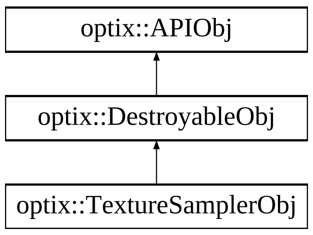
3.49.2.5 void optix::SelectorObj::setVisitProgram (**Program** *program*) [inline]

Set the visitor program for this selector. See rtSelectorSetVisitProgram

3.50 optix::TextureSamplerObj Class Reference

3.50.1 Detailed Description

TextureSampler wraps the OptiX C API RTtexturesampler opaque type and its associated function set. Inheritance diagram for optix::TextureSamplerObj:



Public Member Functions

- void destroy ()
- void validate ()
- Context getContext () const
- RTtexturesampler get ()

- void setMipLevelCount (unsigned int num_mip_levels)
- unsigned int getMipLevelCount () const
- void setArraySize (unsigned int num_textures_in_array)
- unsigned int getArraySize () const
- void setWrapMode (unsigned int dim, RTwrapmode wrapmode)
- RTwrapmode getWrapMode (unsigned int dim) const
- void setFilteringModes (RTfiltermode minification, RTfiltermode magnification, RTfiltermode mipmapping)
- void getFilteringModes (RTfiltermode &minification, RTfiltermode &magnification, RTfiltermode &mipmapping) const
- void setMaxAnisotropy (float value)
- float getMaxAnisotropy () const
- void setReadMode (RTtexturereadmode readmode)
- RTtexturereadmode getReadMode () const
- void setIndexingMode (RTtextureindexmode indexmode)
- RTtextureindexmode getIndexingMode () const

- int getId () const

- void setBuffer (unsigned int texture_array_idx, unsigned int mip_level, Buffer buffer)
- Buffer getBuffer (unsigned int texture_array_idx, unsigned int mip_level) const

- void registerGLTexture ()
- void unregisterGLTexture ()

- void registerD3D9Texture ()
- void registerD3D10Texture ()
- void registerD3D11Texture ()
- void unregisterD3D9Texture ()
- void unregisterD3D10Texture ()
- void unregisterD3D11Texture ()

Friends

- class **Handle**$<$ **TextureSamplerObj** $>$

Additional Inherited Members

3.50.2 Member Function Documentation

3.50.2.1 int optix::TextureSamplerObj::getId ( ) const [inline]

Returns the device-side ID of this sampler. See rtTextureSamplerGetId

3.50.2.2 void optix::TextureSamplerObj::registerD3D9Texture ( ) [inline]

Declare the texture's buffer as immutable and accessible by OptiX. See rtTextureSamplerD3D9Register.

3.50.2.3 void optix::TextureSamplerObj::registerGLTexture ( ) [inline]

Declare the texture's buffer as immutable and accessible by OptiX. See rtTextureSamplerGLRegister.

3.50.2.4 void optix::TextureSamplerObj::setBuffer (unsigned int *texture_array_idx,* unsigned int *mip_level,* Buffer *buffer*) [inline]

Set the underlying buffer used for texture storage. See rtTextureSamplerSetBuffer.

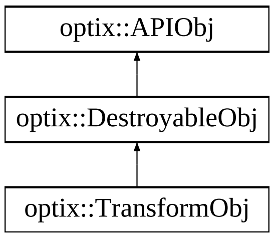
3.50.2.5 void optix::TextureSamplerObj::setMipLevelCount (unsigned int *num_mip_levels*) [inline]

Set the number of mip levels for this sampler. See rtTextureSamplerSetMipLevelCount.

3.51 optix::TransformObj Class Reference

3.51.1 Detailed Description

Transform wraps the OptiX C API RTtransform opaque type and its associated function set. Inheritance diagram for optix::TransformObj:



Public Member Functions

- void destroy ()
- void validate ()
- Context getContext () const
- RTtransform get ()

- template<typename T >
  void setChild (T child)
- template<typename T >
  T getChild () const
- RTobjecttype getChildType () const

- void setMatrix (bool transpose, const float ∗matrix, const float ∗inverse_matrix)
- void getMatrix (bool transpose, float ∗matrix, float ∗inverse_matrix) const

Friends

- class **Handle**< **TransformObj** >

Additional Inherited Members

3.51.2 Member Function Documentation

3.51.2.1 template<typename T > void optix::TransformObj::setChild (T *child*) [inline]

Set the child node of this transform. See rtTransformSetChild.

3.51.2.2 void optix::TransformObj::setMatrix (bool *transpose,* const float ∗ *matrix,* const float ∗ *inverse_matrix*) [inline]

Set the transform matrix for this node. See rtTransformSetMatrix.

3.52 optix::buffer< T, Dim >::type< T2 > Struct Template Reference

3.53 optix::VariableObj Class Reference

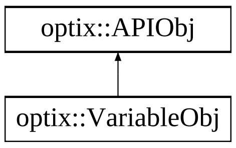
3.53.1 Detailed Description

Variable object wraps OptiX C API RTvariable type and its related function set.

See OptiX API Reference for complete description of the usage and behavior of RTvariable objects. Creation and querying of Variables can be performed via the Handle::operator[] function of the scope object associated with the variable. For example:

```
my_context["new_variable"]->setFloat( 1.0f );
```

will create a variable named `new_variable` on the object `my_context` if it does not already exist. It will then set the value of that variable to be a float 1.0f. Inheritance diagram for optix::VariableObj:



Public Member Functions

- Context getContext () const
- std::string getName () const
- std::string getAnnotation () const
- RTobjecttype getType () const
- RTvariable get ()
- RTsize getSize () const

Float setters

Set variable to have a float value.

- void setFloat (float f1)
- void setFloat (optix::float2 f)
- void setFloat (float f1, float f2)

- void setFloat (optix::float3 f)
- void setFloat (float f1, float f2, float f3)
- void setFloat (optix::float4 f)
- void setFloat (float f1, float f2, float f3, float f4)
- void set1fv (const float ∗f)
- void set2fv (const float ∗f)
- void set3fv (const float ∗f)
- void set4fv (const float ∗f)

Int setters

Set variable to have an int value.

- void **setInt** (int i1)
- void **setInt** (int i1, int i2)
- void **setInt** (optix::int2 i)
- void **setInt** (int i1, int i2, int i3)
- void **setInt** (optix::int3 i)
- void **setInt** (int i1, int i2, int i3, int i4)
- void **setInt** (optix::int4 i)
- void **set1iv** (const int ∗i)
- void **set2iv** (const int ∗i)
- void **set3iv** (const int ∗i)
- void **set4iv** (const int ∗i)

Unsigned int setters

Set variable to have an unsigned int value.

- void **setUint** (unsigned int u1)
- void **setUint** (unsigned int u1, unsigned int u2)
- void **setUint** (unsigned int u1, unsigned int u2, unsigned int u3)
- void **setUint** (unsigned int u1, unsigned int u2, unsigned int u3, unsigned int u4)
- void **setUint** (optix::uint2 u)
- void **setUint** (optix::uint3 u)
- void **setUint** (optix::uint4 u)
- void **set1uiv** (const unsigned int ∗u)
- void **set2uiv** (const unsigned int ∗u)
- void **set3uiv** (const unsigned int ∗u)
- void **set4uiv** (const unsigned int ∗u)

Matrix setters

Set variable to have a Matrix value

- void **setMatrix2x2fv** (bool transpose, const float ∗m)
- void **setMatrix2x3fv** (bool transpose, const float ∗m)
- void **setMatrix2x4fv** (bool transpose, const float ∗m)
- void **setMatrix3x2fv** (bool transpose, const float ∗m)
- void **setMatrix3x3fv** (bool transpose, const float ∗m)
- void **setMatrix3x4fv** (bool transpose, const float ∗m)
- void **setMatrix4x2fv** (bool transpose, const float ∗m)
- void **setMatrix4x3fv** (bool transpose, const float ∗m)
- void **setMatrix4x4fv** (bool transpose, const float ∗m)

Numeric value getters

Query value of a variable with numeric value

- float **getFloat** () const
- optix::float2 **getFloat2** () const
- optix::float3 **getFloat3** () const
- optix::float4 **getFloat4** () const
- void **getFloat** (float &f1) const
- void **getFloat** (float &f1, float &f2) const

- void **getFloat** (float &f1, float &f2, float &f3) const
- void **getFloat** (float &f1, float &f2, float &f3, float &f4) const
- unsigned **getUint** () const
- optix::uint2 **getUint2** () const
- optix::uint3 **getUint3** () const
- optix::uint4 **getUint4** () const
- void **getUint** (unsigned &u1) const
- void **getUint** (unsigned &u1, unsigned &u2) const
- void **getUint** (unsigned &u1, unsigned &u2, unsigned &u3) const
- void **getUint** (unsigned &u1, unsigned &u2, unsigned &u3, unsigned &u4) const
- int **getInt** () const
- optix::int2 **getInt2** () const
- optix::int3 **getInt3** () const
- optix::int4 **getInt4** () const
- void **getInt** (int &i1) const
- void **getInt** (int &i1, int &i2) const
- void **getInt** (int &i1, int &i2, int &i3) const
- void **getInt** (int &i1, int &i2, int &i3, int &i4) const
- void **getMatrix2x2** (bool transpose, float ∗m) const
- void **getMatrix2x3** (bool transpose, float ∗m) const
- void **getMatrix2x4** (bool transpose, float ∗m) const
- void **getMatrix3x2** (bool transpose, float ∗m) const
- void **getMatrix3x3** (bool transpose, float ∗m) const
- void **getMatrix3x4** (bool transpose, float ∗m) const
- void **getMatrix4x2** (bool transpose, float ∗m) const
- void **getMatrix4x3** (bool transpose, float ∗m) const
- void **getMatrix4x4** (bool transpose, float ∗m) const

OptiX API object setters

Set variable to have an OptiX API object as its value

- void **setBuffer** (Buffer buffer)
- void **set** (Buffer buffer)
- void **setTextureSampler** (TextureSampler texturesample)
- void **set** (TextureSampler texturesample)
- void **set** (GeometryGroup group)
- void **set** (Group group)
- void **set** (Program program)
- void **setProgramId** (Program program)
- void **set** (Selector selector)
- void **set** (Transform transform)

OptiX API object getters

Reitrieve OptiX API object value from a variable

- Buffer **getBuffer** () const
- GeometryGroup **getGeometryGroup** () const
- GeometryInstance **getGeometryInstance** () const
- Group **getGroup** () const
- Program **getProgram** () const
- Selector **getSelector** () const
- TextureSampler **getTextureSampler** () const
- Transform **getTransform** () const

User data variable accessors

- void setUserData (RTsize size, const void ∗ptr)
- void getUserData (RTsize size, void ∗ptr) const

Friends

- class **Handle**< **VariableObj** >

Additional Inherited Members

3.54 optix::VectorDim< DIM > Struct Template Reference

3.55 optix::VectorDim< 2 > Struct Template Reference

Public Types

- typedef float2 **VectorType**

3.56 optix::VectorDim< 3 > Struct Template Reference

Public Types

- typedef float3 **VectorType**

3.57 optix::VectorDim< 4 > Struct Template Reference

Public Types

- typedef float4 **VectorType**

3.58 optix::VectorTypes< T, Dim > Struct Template Reference

3.59 optix::VectorTypes< float, 1 > Struct Template Reference

Public Types

- typedef float **Type**

Static Public Member Functions

- template<class S >
  static __device__
  __forceinline__ Type **make** (S s)

3.60 optix::VectorTypes< float, 2 > Struct Template Reference

Public Types

- typedef float2 **Type**

Static Public Member Functions

- template<class S >
  static __device__
  __forceinline__ Type **make** (S s)

3.61 optix::VectorTypes< float, 3 > Struct Template Reference

Public Types

- typedef float3 **Type**

Static Public Member Functions

- template<class S >
  static __device__
  __forceinline__ Type **make** (S s)

3.62 optix::VectorTypes< float, 4 > Struct Template Reference

Public Types

- typedef float4 **Type**

Static Public Member Functions

- template<class S >
  static __device__
  __forceinline__ Type **make** (S s)

3.63 optix::VectorTypes< int, 1 > Struct Template Reference

Public Types

- typedef int **Type**

Static Public Member Functions

- template<class S >
  static __device__
  __forceinline__ Type **make** (S s)

3.64 optix::VectorTypes< int, 2 > Struct Template Reference

Public Types

- typedef int2 **Type**

Static Public Member Functions

- template<class S >
  static __device__
  __forceinline__ Type **make** (S s)

3.65 optix::VectorTypes< int, 3 > Struct Template Reference

Public Types

- typedef int3 **Type**

Static Public Member Functions

- template<class S >
  static __device__
  __forceinline__ Type **make** (S s)

3.66 optix::VectorTypes< int, 4 > Struct Template Reference

Public Types

- typedef int4 **Type**

Static Public Member Functions

- template<class S >
  static __device__
  __forceinline__ Type **make** (S s)

3.67 optix::VectorTypes< unsigned int, 1 > Struct Template Reference

Public Types

- typedef unsigned int **Type**

Static Public Member Functions

- static __device__
  __forceinline__ Type **make** (unsigned int s)
- template<class S >
  static __device__
  __forceinline__ Type **make** (S s)

3.68 optix::VectorTypes< unsigned int, 2 > Struct Template Reference

Public Types

- typedef uint2 **Type**

Static Public Member Functions

- template<class S >
  static __device__
  __forceinline__ Type **make** (S s)

3.69 optix::VectorTypes< unsigned int, 3 > Struct Template Reference

Public Types

- typedef uint3 **Type**

Static Public Member Functions

- template<class S >
  static __device__
  __forceinline__ Type **make** (S s)

3.70 optix::VectorTypes< unsigned int, 4 > Struct Template Reference

Public Types

- typedef uint4 **Type**

Static Public Member Functions

- template<class S >
  static __device__
  __forceinline__ Type **make** (S s)

3.71 RTPinternals_3070::WoopTriangle Struct Reference

Public Attributes

- float **t** [4]
- float **u** [4]
- float **v** [4]

4 File Documentation

4.1 optix.h File Reference

4.1.1 Detailed Description

OptiX public API header.

Author

NVIDIA Corporation Includes the host api if compiling host code, includes the cuda api if compiling device code. For the math library routines include optix_math.h

Macros

- #define **OPTIX_VERSION**

4.1.2 Macro Definition Documentation

4.1.2.1 #define OPTIX_VERSION

Value:

```
3070 /* 3.7.0 (major =  OPTIX_VERSION/1000,       *
                            *        minor = (OPTIX_VERSION%1000)/10,   *
                            *        micro =  OPTIX_VERSION%10          */
```

4.2 optix_cuda_interop.h File Reference

4.2.1 Detailed Description

OptiX public API declarations CUDAInterop.

Author

NVIDIA Corporation OptiX public API declarations for CUDA interoperability

Typedefs

- typedef unsigned int **CUdeviceptr**

Functions

- RTresult RTAPI rtBufferCreateForCUDA (RTcontext context, unsigned int bufferdesc, RTbuffer ∗buffer)
- RTresult RTAPI rtBufferGetDevicePointer (RTbuffer buffer, unsigned int optix_device_number, void ∗∗device_pointer)
- RTresult RTAPI rtBufferMarkDirty (RTbuffer buffer)
- RTresult RTAPI rtBufferSetDevicePointer (RTbuffer buffer, unsigned int optix_device_number, CUdeviceptr device_pointer)

4.3 optix_d3d10_interop.h File Reference

4.3.1 Detailed Description

OptiX public API declarations D3D10 interop.

Author

NVIDIA Corporation OptiX public API declarations for D3D10 interoperability

Typedefs

- typedef struct IDXGIAdapter **IDXGIAdapter**
- typedef struct ID3D10Device **ID3D10Device**
- typedef struct ID3D10Resource **ID3D10Resource**

Functions

- RTresult RTAPI rtContextSetD3D10Device (RTcontext context, ID3D10Device ∗device)
- RTresult RTAPI rtDeviceGetD3D10Device (int ∗device, IDXGIAdapter ∗pAdapter)
- RTresult RTAPI rtBufferCreateFromD3D10Resource (RTcontext context, unsigned int bufferdesc, ID3D10Resource ∗resource, RTbuffer ∗buffer)
- RTresult RTAPI rtTextureSamplerCreateFromD3D10Resource (RTcontext context, ID3D10Resource ∗resource, RTtexturesampler ∗textureSampler)
- RTresult RTAPI rtBufferGetD3D10Resource (RTbuffer buffer, ID3D10Resource ∗∗resource)
- RTresult RTAPI rtTextureSamplerGetD3D10Resource (RTtexturesampler textureSampler, ID3D10Resource ∗∗resource)
- RTresult RTAPI rtBufferD3D10Register (RTbuffer buffer)
- RTresult RTAPI rtBufferD3D10Unregister (RTbuffer buffer)
- RTresult RTAPI rtTextureSamplerD3D10Register (RTtexturesampler textureSampler)
- RTresult RTAPI rtTextureSamplerD3D10Unregister (RTtexturesampler textureSampler)

4.4 optix_d3d11_interop.h File Reference

4.4.1 Detailed Description

OptiX public API declarations D3D11 interop.

Author

NVIDIA Corporation OptiX public API declarations for D3D11 interoperability

Typedefs

- typedef struct IDXGIAdapter **IDXGIAdapter**
- typedef struct ID3D11Device **ID3D11Device**
- typedef struct ID3D11Resource **ID3D11Resource**

Functions

- RTresult RTAPI rtContextSetD3D11Device (RTcontext context, ID3D11Device ∗device)
- RTresult RTAPI rtDeviceGetD3D11Device (int ∗device, IDXGIAdapter ∗pAdapter)
- RTresult RTAPI rtBufferCreateFromD3D11Resource (RTcontext context, unsigned int bufferdesc, ID3D11Resource ∗resource, RTbuffer ∗buffer)
- RTresult RTAPI rtTextureSamplerCreateFromD3D11Resource (RTcontext context, ID3D11Resource ∗resource, RTtexturesampler ∗textureSampler)
- RTresult RTAPI rtBufferGetD3D11Resource (RTbuffer buffer, ID3D11Resource ∗∗resource)
- RTresult RTAPI rtTextureSamplerGetD3D11Resource (RTtexturesampler textureSampler, ID3D11Resource ∗∗resource)
- RTresult RTAPI rtBufferD3D11Register (RTbuffer buffer)
- RTresult RTAPI rtBufferD3D11Unregister (RTbuffer buffer)
- RTresult RTAPI rtTextureSamplerD3D11Register (RTtexturesampler textureSampler)
- RTresult RTAPI rtTextureSamplerD3D11Unregister (RTtexturesampler textureSampler)

4.5 optix_d3d9_interop.h File Reference

4.5.1 Detailed Description

OptiX public API declarations D3D9 interop.

Author

NVIDIA Corporation OptiX public API declarations for D3D9 interoperability

Typedefs

- typedef struct IDirect3DDevice9 IDirect3DDevice9
- typedef struct IDirect3DResource9 IDirect3DResource9

Functions

- RTresult RTAPI rtContextSetD3D9Device (RTcontext context, IDirect3DDevice9 ∗device)
- RTresult RTAPI rtDeviceGetD3D9Device (int ∗device, const char ∗pszAdapterName)
- RTresult RTAPI rtBufferCreateFromD3D9Resource (RTcontext context, unsigned int bufferdesc, IDirect3DResource9 ∗resource, RTbuffer ∗buffer)
- RTresult RTAPI rtTextureSamplerCreateFromD3D9Resource (RTcontext context, IDirect3DResource9 ∗resource, RTtexturesampler ∗textureSampler)

- RTresult RTAPI rtBufferGetD3D9Resource (RTbuffer buffer, IDirect3DResource9 ∗∗resource)
- RTresult RTAPI rtTextureSamplerGetD3D9Resource (RTtexturesampler textureSampler, IDirect3DResource9 ∗∗pResource)
- RTresult RTAPI rtBufferD3D9Register (RTbuffer buffer)
- RTresult RTAPI rtBufferD3D9Unregister (RTbuffer buffer)
- RTresult RTAPI rtTextureSamplerD3D9Register (RTtexturesampler textureSampler)
- RTresult RTAPI rtTextureSamplerD3D9Unregister (RTtexturesampler textureSampler)

4.5.2 Typedef Documentation

4.5.2.1 typedef struct IDirect3DDevice9 IDirect3DDevice9

IDirect3DDevice9 structure

4.5.2.2 typedef struct IDirect3DResource9 IDirect3DResource9

IDirect3DResource9 structure

4.6 optix_datatypes.h File Reference

4.6.1 Detailed Description

OptiX public API.

Author

NVIDIA Corporation OptiX public API Reference - Datatypes

Classes

- struct Ray

Macros

- #define RT_DEFAULT_MAX 1.e27f

Functions

- static __inline__ RT_HOSTDEVICE Ray **make_Ray** (float3 origin, float3 direction, unsigned int ray_type, float tmin, float tmax)

4.6.2 Macro Definition Documentation

4.6.2.1 #define RT_DEFAULT_MAX 1.e27f

Max t for a ray

4.7 optix_declarations.h File Reference

4.7.1 Detailed Description

OptiX public API declarations.

Author

NVIDIA Corporation OptiX public API declarations

Enumerations

- enum RTformat {
  RT_FORMAT_UNKNOWN = 0x100,
  RT_FORMAT_FLOAT,
  RT_FORMAT_FLOAT2,
  RT_FORMAT_FLOAT3,
  RT_FORMAT_FLOAT4,
  RT_FORMAT_BYTE,
  RT_FORMAT_BYTE2,
  RT_FORMAT_BYTE3,
  RT_FORMAT_BYTE4,
  RT_FORMAT_UNSIGNED_BYTE,
  RT_FORMAT_UNSIGNED_BYTE2,
  RT_FORMAT_UNSIGNED_BYTE3,
  RT_FORMAT_UNSIGNED_BYTE4,
  RT_FORMAT_SHORT,
  RT_FORMAT_SHORT2,
  RT_FORMAT_SHORT3,
  RT_FORMAT_SHORT4,
  RT_FORMAT_UNSIGNED_SHORT,
  RT_FORMAT_UNSIGNED_SHORT2,
  RT_FORMAT_UNSIGNED_SHORT3,
  RT_FORMAT_UNSIGNED_SHORT4,
  RT_FORMAT_INT,
  RT_FORMAT_INT2,
  RT_FORMAT_INT3,
  RT_FORMAT_INT4,
  RT_FORMAT_UNSIGNED_INT,
  RT_FORMAT_UNSIGNED_INT2,
  RT_FORMAT_UNSIGNED_INT3,
  RT_FORMAT_UNSIGNED_INT4,
  RT_FORMAT_USER,
  RT_FORMAT_BUFFER_ID,
  RT_FORMAT_PROGRAM_ID }
- enum RTobjecttype {

RT_OBJECTTYPE_UNKNOWN = 0x200,
RT_OBJECTTYPE_GROUP,
RT_OBJECTTYPE_GEOMETRY_GROUP,
RT_OBJECTTYPE_TRANSFORM,
RT_OBJECTTYPE_SELECTOR,
RT_OBJECTTYPE_GEOMETRY_INSTANCE,
RT_OBJECTTYPE_BUFFER,
RT_OBJECTTYPE_TEXTURE_SAMPLER,
RT_OBJECTTYPE_OBJECT,
RT_OBJECTTYPE_MATRIX_FLOAT2x2,
RT_OBJECTTYPE_MATRIX_FLOAT2x3,
RT_OBJECTTYPE_MATRIX_FLOAT2x4,
RT_OBJECTTYPE_MATRIX_FLOAT3x2,
RT_OBJECTTYPE_MATRIX_FLOAT3x3,
RT_OBJECTTYPE_MATRIX_FLOAT3x4,
RT_OBJECTTYPE_MATRIX_FLOAT4x2,
RT_OBJECTTYPE_MATRIX_FLOAT4x3,
RT_OBJECTTYPE_MATRIX_FLOAT4x4,
RT_OBJECTTYPE_FLOAT,
RT_OBJECTTYPE_FLOAT2,
RT_OBJECTTYPE_FLOAT3,
RT_OBJECTTYPE_FLOAT4,
RT_OBJECTTYPE_INT,
RT_OBJECTTYPE_INT2,
RT_OBJECTTYPE_INT3,
RT_OBJECTTYPE_INT4,
RT_OBJECTTYPE_UNSIGNED_INT,
RT_OBJECTTYPE_UNSIGNED_INT2,
RT_OBJECTTYPE_UNSIGNED_INT3,
RT_OBJECTTYPE_UNSIGNED_INT4,
RT_OBJECTTYPE_USER,
RT_OBJECTTYPE_PROGRAM }

- enum RTwrapmode {
  RT_WRAP_REPEAT,
  RT_WRAP_CLAMP_TO_EDGE,
  RT_WRAP_MIRROR,
  RT_WRAP_CLAMP_TO_BORDER }
- enum RTfiltermode {
  RT_FILTER_NEAREST,
  RT_FILTER_LINEAR,
  RT_FILTER_NONE }
- enum RTtexturereadmode {
  RT_TEXTURE_READ_ELEMENT_TYPE,
  RT_TEXTURE_READ_NORMALIZED_FLOAT }
- enum RTgltarget {
  RT_TARGET_GL_TEXTURE_2D,
  RT_TARGET_GL_TEXTURE_RECTANGLE,
  RT_TARGET_GL_TEXTURE_3D,
  RT_TARGET_GL_RENDER_BUFFER }
- enum RTtextureindexmode {
  RT_TEXTURE_INDEX_NORMALIZED_COORDINATES,
  RT_TEXTURE_INDEX_ARRAY_INDEX }
- enum RTbuffertype {
  RT_BUFFER_INPUT = 0x1,
  RT_BUFFER_OUTPUT = 0x2,
  RT_BUFFER_INPUT_OUTPUT = RT_BUFFER_INPUT | RT_BUFFER_OUTPUT }
- enum RTbufferflag {
  RT_BUFFER_GPU_LOCAL = 0x4,

RT_BUFFER_COPY_ON_DIRTY = 0x8 }
- enum RTexception {
  RT_EXCEPTION_PROGRAM_ID_INVALID = 0x3EE,
  RT_EXCEPTION_TEXTURE_ID_INVALID = 0x3EF,
  RT_EXCEPTION_BUFFER_ID_INVALID = 0x3FA,
  RT_EXCEPTION_INDEX_OUT_OF_BOUNDS = 0x3FB,
  RT_EXCEPTION_STACK_OVERFLOW = 0x3FC,
  RT_EXCEPTION_BUFFER_INDEX_OUT_OF_BOUNDS = 0x3FD,
  RT_EXCEPTION_INVALID_RAY = 0x3FE,
  RT_EXCEPTION_INTERNAL_ERROR = 0x3FF,
  RT_EXCEPTION_USER = 0x400,
  RT_EXCEPTION_ALL = 0x7FFFFFFF }
- enum RTresult {
  RT_SUCCESS = 0,
  RT_TIMEOUT_CALLBACK = 0x100,
  RT_ERROR_INVALID_CONTEXT = 0x500,
  RT_ERROR_INVALID_VALUE = 0x501,
  RT_ERROR_MEMORY_ALLOCATION_FAILED = 0x502,
  RT_ERROR_TYPE_MISMATCH = 0x503,
  RT_ERROR_VARIABLE_NOT_FOUND = 0x504,
  RT_ERROR_VARIABLE_REDECLARED = 0x505,
  RT_ERROR_ILLEGAL_SYMBOL = 0x506,
  RT_ERROR_INVALID_SOURCE = 0x507,
  RT_ERROR_VERSION_MISMATCH = 0x508,
  RT_ERROR_OBJECT_CREATION_FAILED = 0x600,
  RT_ERROR_NO_DEVICE = 0x601,
  RT_ERROR_INVALID_DEVICE = 0x602,
  RT_ERROR_INVALID_IMAGE = 0x603,
  RT_ERROR_FILE_NOT_FOUND = 0x604,
  RT_ERROR_ALREADY_MAPPED = 0x605,
  RT_ERROR_INVALID_DRIVER_VERSION = 0x606,
  RT_ERROR_CONTEXT_CREATION_FAILED = 0x607,
  RT_ERROR_RESOURCE_NOT_REGISTERED = 0x608,
  RT_ERROR_RESOURCE_ALREADY_REGISTERED = 0x609,
  RT_ERROR_LAUNCH_FAILED = 0x900,
  RT_ERROR_UNKNOWN = ∼0 }
- enum RTdeviceattribute {
  RT_DEVICE_ATTRIBUTE_MAX_THREADS_PER_BLOCK,
  RT_DEVICE_ATTRIBUTE_CLOCK_RATE,
  RT_DEVICE_ATTRIBUTE_MULTIPROCESSOR_COUNT,
  RT_DEVICE_ATTRIBUTE_EXECUTION_TIMEOUT_ENABLED,
  RT_DEVICE_ATTRIBUTE_MAX_HARDWARE_TEXTURE_COUNT,
  RT_DEVICE_ATTRIBUTE_NAME,
  RT_DEVICE_ATTRIBUTE_COMPUTE_CAPABILITY,
  RT_DEVICE_ATTRIBUTE_TOTAL_MEMORY,
  RT_DEVICE_ATTRIBUTE_TCC_DRIVER,
  RT_DEVICE_ATTRIBUTE_CUDA_DEVICE_ORDINAL }
- enum RTcontextattribute {
  RT_CONTEXT_ATTRIBUTE_MAX_TEXTURE_COUNT,
  RT_CONTEXT_ATTRIBUTE_CPU_NUM_THREADS,
  RT_CONTEXT_ATTRIBUTE_USED_HOST_MEMORY,
  RT_CONTEXT_ATTRIBUTE_GPU_PAGING_ACTIVE,
  RT_CONTEXT_ATTRIBUTE_GPU_PAGING_FORCED_OFF,
  RT_CONTEXT_ATTRIBUTE_AVAILABLE_DEVICE_MEMORY = 0x10000000 }
- enum RTbufferidnull { RT_BUFFER_ID_NULL = 0 }
- enum RTprogramidnull { RT_PROGRAM_ID_NULL = 0 }
- enum RTtextureidnull { RT_TEXTURE_ID_NULL = 0 }

4.7.2 Enumeration Type Documentation

4.7.2.1 enum RTbufferflag

Buffer flags

Enumerator

RT_BUFFER_GPU_LOCAL An RT_BUFFER_INPUT_OUTPUT has separate copies on each device that are not synchronized

RT_BUFFER_COPY_ON_DIRTY A CUDA Interop buffer will only be synchronized across devices when dirtied by rtBufferMap or rtBufferMarkDirty

4.7.2.2 enum RTbufferidnull

Sentinel values

Enumerator

RT_BUFFER_ID_NULL sentinel for describing a non-existent buffer id

4.7.2.3 enum RTbuffertype

Buffer type

Enumerator

RT_BUFFER_INPUT Input buffer for the GPU

RT_BUFFER_OUTPUT Output buffer for the GPU

RT_BUFFER_INPUT_OUTPUT Ouput/Input buffer for the GPU

4.7.2.4 enum RTcontextattribute

Context attributes

Enumerator

RT_CONTEXT_ATTRIBUTE_MAX_TEXTURE_COUNT sizeof(int)

RT_CONTEXT_ATTRIBUTE_CPU_NUM_THREADS sizeof(int)

RT_CONTEXT_ATTRIBUTE_USED_HOST_MEMORY sizeof(RTsize)

RT_CONTEXT_ATTRIBUTE_GPU_PAGING_ACTIVE sizeof(int)

RT_CONTEXT_ATTRIBUTE_GPU_PAGING_FORCED_OFF sizeof(int)

RT_CONTEXT_ATTRIBUTE_AVAILABLE_DEVICE_MEMORY sizeof(RTsize)

4.7.2.5 enum RTdeviceattribute

Device attributes

Enumerator

RT_DEVICE_ATTRIBUTE_MAX_THREADS_PER_BLOCK Max Threads per Block

RT_DEVICE_ATTRIBUTE_CLOCK_RATE Clock rate

RT_DEVICE_ATTRIBUTE_MULTIPROCESSOR_COUNT Multiprocessor count

RT_DEVICE_ATTRIBUTE_EXECUTION_TIMEOUT_ENABLED Execution timeout enabled

RT_DEVICE_ATTRIBUTE_MAX_HARDWARE_TEXTURE_COUNT Hardware Texture count

RT_DEVICE_ATTRIBUTE_NAME Attribute Name

RT_DEVICE_ATTRIBUTE_COMPUTE_CAPABILITY Compute Capabilities

RT_DEVICE_ATTRIBUTE_TOTAL_MEMORY Total Memory

RT_DEVICE_ATTRIBUTE_TCC_DRIVER sizeof(int)

RT_DEVICE_ATTRIBUTE_CUDA_DEVICE_ORDINAL sizeof(int)

4.7.2.6 enum RTexception

Exceptions

Enumerator

RT_EXCEPTION_PROGRAM_ID_INVALID	Program ID not valid
RT_EXCEPTION_TEXTURE_ID_INVALID	Texture ID not valid
RT_EXCEPTION_BUFFER_ID_INVALID	Buffer ID not valid
RT_EXCEPTION_INDEX_OUT_OF_BOUNDS	Index out of bounds
RT_EXCEPTION_STACK_OVERFLOW	Stack overflow
RT_EXCEPTION_BUFFER_INDEX_OUT_OF_BOUNDS	Buffer index out of bounds
RT_EXCEPTION_INVALID_RAY	Invalid ray
RT_EXCEPTION_INTERNAL_ERROR	Internal error
RT_EXCEPTION_USER	User exception
RT_EXCEPTION_ALL	All exceptions

4.7.2.7 enum RTfiltermode

Filter mode

Enumerator

RT_FILTER_NEAREST	Nearest
RT_FILTER_LINEAR	Linear
RT_FILTER_NONE	No filter

4.7.2.8 enum RTformat

OptiX formats

Enumerator

RT_FORMAT_UNKNOWN	Format unknown
RT_FORMAT_FLOAT	Float
RT_FORMAT_FLOAT2	sizeof(float)∗2
RT_FORMAT_FLOAT3	sizeof(float)∗3
RT_FORMAT_FLOAT4	sizeof(float)∗2
RT_FORMAT_BYTE	BYTE
RT_FORMAT_BYTE2	sizeof(CHAR)∗2
RT_FORMAT_BYTE3	sizeof(CHAR)∗3
RT_FORMAT_BYTE4	sizeof(CHAR)∗4
RT_FORMAT_UNSIGNED_BYTE	UCHAR
RT_FORMAT_UNSIGNED_BYTE2	sizeof(UCHAR)∗2
RT_FORMAT_UNSIGNED_BYTE3	sizeof(UCHAR)∗3
RT_FORMAT_UNSIGNED_BYTE4	sizeof(UCHAR)∗4
RT_FORMAT_SHORT	SHORT
RT_FORMAT_SHORT2	sizeof(SHORT)∗2
RT_FORMAT_SHORT3	sizeof(SHORT)∗3
RT_FORMAT_SHORT4	sizeof(SHORT)∗4
RT_FORMAT_UNSIGNED_SHORT	USHORT

RT_FORMAT_UNSIGNED_SHORT2 sizeof(USHORT)∗2

RT_FORMAT_UNSIGNED_SHORT3 sizeof(USHORT)∗3

RT_FORMAT_UNSIGNED_SHORT4 sizeof(USHORT)∗4

RT_FORMAT_INT INT

RT_FORMAT_INT2 sizeof(INT)∗2

RT_FORMAT_INT3 sizeof(INT)∗3

RT_FORMAT_INT4 sizeof(INT)∗4

RT_FORMAT_UNSIGNED_INT sizeof(UINT)

RT_FORMAT_UNSIGNED_INT2 sizeof(UINT)∗2

RT_FORMAT_UNSIGNED_INT3 sizeof(UINT)∗3

RT_FORMAT_UNSIGNED_INT4 sizeof(UINT)∗4

RT_FORMAT_USER User Format

RT_FORMAT_BUFFER_ID Buffer Id

RT_FORMAT_PROGRAM_ID Program Id

4.7.2.9 enum RTgltarget

GL Target

Enumerator

RT_TARGET_GL_TEXTURE_2D GL texture 2D

RT_TARGET_GL_TEXTURE_RECTANGLE GL texture rectangle

RT_TARGET_GL_TEXTURE_3D GL texture 3D

RT_TARGET_GL_RENDER_BUFFER GL render buffer

4.7.2.10 enum RTobjecttype

OptiX Object Types

Enumerator

RT_OBJECTTYPE_UNKNOWN Object Type Unknown

RT_OBJECTTYPE_GROUP Group Type

RT_OBJECTTYPE_GEOMETRY_GROUP Geometry Group Type

RT_OBJECTTYPE_TRANSFORM Transform Type

RT_OBJECTTYPE_SELECTOR Selector Type

RT_OBJECTTYPE_GEOMETRY_INSTANCE Geometry Instance Type

RT_OBJECTTYPE_BUFFER Buffer Type

RT_OBJECTTYPE_TEXTURE_SAMPLER Texture Sampler Type

RT_OBJECTTYPE_OBJECT Object Type

RT_OBJECTTYPE_MATRIX_FLOAT2x2 Matrix Float 2x2

RT_OBJECTTYPE_MATRIX_FLOAT2x3 Matrix Float 2x3

RT_OBJECTTYPE_MATRIX_FLOAT2x4 Matrix Float 2x4

RT_OBJECTTYPE_MATRIX_FLOAT3x2 Matrix Float 3x2

RT_OBJECTTYPE_MATRIX_FLOAT3x3 Matrix Float 3x3

RT_OBJECTTYPE_MATRIX_FLOAT3x4 Matrix Float 3x4

RT_OBJECTTYPE_MATRIX_FLOAT4x2 Matrix Float 4x2

RT_OBJECTTYPE_MATRIX_FLOAT4x3 Matrix Float 4x3

RT_OBJECTTYPE_MATRIX_FLOAT4x4 Matrix Float 4x4
RT_OBJECTTYPE_FLOAT Float Type
RT_OBJECTTYPE_FLOAT2 Float2 Type
RT_OBJECTTYPE_FLOAT3 Float3 Type
RT_OBJECTTYPE_FLOAT4 Float4 Type
RT_OBJECTTYPE_INT Integer Type
RT_OBJECTTYPE_INT2 Integer2 Type
RT_OBJECTTYPE_INT3 Integer3 Type
RT_OBJECTTYPE_INT4 Integer4 Type
RT_OBJECTTYPE_UNSIGNED_INT Unsigned Integer Type
RT_OBJECTTYPE_UNSIGNED_INT2 Unsigned Integer2 Type
RT_OBJECTTYPE_UNSIGNED_INT3 Unsigned Integer3 Type
RT_OBJECTTYPE_UNSIGNED_INT4 Unsigned Integer4 Type
RT_OBJECTTYPE_USER User Object Type
RT_OBJECTTYPE_PROGRAM Object Type Program - Added in OptiX 3.0

4.7.2.11 enum RTprogramidnull

Enumerator

RT_PROGRAM_ID_NULL sentinel for describing a non-existent program id

4.7.2.12 enum RTresult

Result

Enumerator

RT_SUCCESS Success
RT_TIMEOUT_CALLBACK Timeout callback
RT_ERROR_INVALID_CONTEXT Invalid Context
RT_ERROR_INVALID_VALUE Invalid Value
RT_ERROR_MEMORY_ALLOCATION_FAILED Timeout callback
RT_ERROR_TYPE_MISMATCH Type Mismatch
RT_ERROR_VARIABLE_NOT_FOUND Variable not found
RT_ERROR_VARIABLE_REDECLARED Variable redeclared
RT_ERROR_ILLEGAL_SYMBOL Illegal symbol
RT_ERROR_INVALID_SOURCE Invalid source
RT_ERROR_VERSION_MISMATCH Version mismatch
RT_ERROR_OBJECT_CREATION_FAILED Object creation failed
RT_ERROR_NO_DEVICE No device
RT_ERROR_INVALID_DEVICE Invalid device
RT_ERROR_INVALID_IMAGE Invalid image
RT_ERROR_FILE_NOT_FOUND File not found
RT_ERROR_ALREADY_MAPPED Already mapped
RT_ERROR_INVALID_DRIVER_VERSION Invalid driver version
RT_ERROR_CONTEXT_CREATION_FAILED Context creation failed
RT_ERROR_RESOURCE_NOT_REGISTERED Resource not registered
RT_ERROR_RESOURCE_ALREADY_REGISTERED Resource already registered
RT_ERROR_LAUNCH_FAILED Launch failed
RT_ERROR_UNKNOWN Error unknown

4.7.2.13 enum RTtextureidnull

Enumerator

RT_TEXTURE_ID_NULL sentinel for describing a non-existent texture id

4.7.2.14 enum RTtextureindexmode

Texture index mode

Enumerator

RT_TEXTURE_INDEX_NORMALIZED_COORDINATES Texture Index normalized coordinates

RT_TEXTURE_INDEX_ARRAY_INDEX Texture Index Array

4.7.2.15 enum RTtexturereadmode

Texture read mode

Enumerator

RT_TEXTURE_READ_ELEMENT_TYPE Read element type

RT_TEXTURE_READ_NORMALIZED_FLOAT Read normalized float

4.7.2.16 enum RTwrapmode

Wrap mode

Enumerator

RT_WRAP_REPEAT Wrap repeat

RT_WRAP_CLAMP_TO_EDGE Clamp to edge

RT_WRAP_MIRROR Mirror

RT_WRAP_CLAMP_TO_BORDER Clamp to border

4.8 optix_defines.h File Reference

4.8.1 Detailed Description

OptiX public API.

Author

NVIDIA Corporation OptiX public API Reference - Definitions

Classes

- struct rti_internal_typeinfo::rti_typeinfo
- struct rti_internal_typeinfo::rti_typeenum< T >

Macros

- #define **OPTIX_ASM_PTR** "r"
- #define **OPTIX_ASM_SIZE_T** "r"
- #define **OPTIX_ASM_PTR_SIZE_STR** "32"
- #define **OPTIX_BITNESS_SUFFIX** ""

Typedefs

- typedef size_t **optix::optix_size_t**

Enumerations

- enum rtSemanticTypes {
  _OPTIX_SEMANTIC_TYPE_LaunchIndex = 0x100,
  _OPTIX_SEMANTIC_TYPE_CurrentRay = 0x200,
  _OPTIX_SEMANTIC_TYPE_IntersectionDistance = 0x300 }
- enum RTtransformkind {
  RT_WORLD_TO_OBJECT = 0xf00,
  RT_OBJECT_TO_WORLD }
- enum RTtransformflags { RT_INTERNAL_INVERSE_TRANSPOSE = 0x1000 }
- enum **rtiTypeKind** { **_OPTIX_VARIABLE** = 0x796152 }
- enum **rtiTypeEnum** {
  _OPTIX_TYPE_ENUM_UNKNOWN = 0x1337,
  _OPTIX_TYPE_ENUM_PROGRAM_ID,
  _OPTIX_TYPE_ENUM_PROGRAM_AS_ID }

4.8.2 Enumeration Type Documentation

4.8.2.1 enum rtSemanticTypes

Enumerator

_OPTIX_SEMANTIC_TYPE_LaunchIndex	Type uint3
_OPTIX_SEMANTIC_TYPE_CurrentRay	Type Ray
_OPTIX_SEMANTIC_TYPE_IntersectionDistance	Type float

4.8.2.2 enum RTtransformflags

Transform flags

Enumerator

RT_INTERNAL_INVERSE_TRANSPOSE	Inverse transpose flag

4.8.2.3 enum RTtransformkind

Transform type

Enumerator

RT_WORLD_TO_OBJECT	World to Object transformation
RT_OBJECT_TO_WORLD	Object to World transformation

4.9 optix_device.h File Reference

4.9.1 Detailed Description

OptiX public API.

Author

NVIDIA Corporation OptiX public API Reference - Host/Device side

Classes

- struct optix::VectorTypes< T, Dim >
- struct optix::VectorTypes< int, 1 >
- struct optix::VectorTypes< int, 2 >
- struct optix::VectorTypes< int, 3 >
- struct optix::VectorTypes< int, 4 >
- struct optix::VectorTypes< unsigned int, 1 >
- struct optix::VectorTypes< unsigned int, 2 >
- struct optix::VectorTypes< unsigned int, 3 >
- struct optix::VectorTypes< unsigned int, 4 >
- struct optix::VectorTypes< float, 1 >
- struct optix::VectorTypes< float, 2 >
- struct optix::VectorTypes< float, 3 >
- struct optix::VectorTypes< float, 4 >
- struct rtObject
- struct rtCallableProgramSizeofWrapper< T >
- struct rtCallableProgramSizeofWrapper< void >
- struct optix::bufferId< T, Dim >
- struct optix::buffer< T, Dim >
- struct optix::buffer< T, Dim >::type< T2 >
- struct optix::bufferId< T, Dim >
- class rti_internal_callableprogram::CPArgVoid
- struct rti_internal_callableprogram::is_CPArgVoid< T1 >
- struct rti_internal_callableprogram::is_CPArgVoid< CPArgVoid >
- struct rti_internal_callableprogram::check_is_CPArgVoid< Condition, Dummy >
- struct rti_internal_callableprogram::check_is_CPArgVoid< false, IntentionalError >
- class rti_internal_callableprogram::callableProgramIdBase< ReturnT, Arg0T, Arg1T, Arg2T, Arg3T, Arg4T, Arg5T, Arg6T, Arg7T, Arg8T, Arg9T >
- singleton optix::callableProgramId< T >
- singleton optix::boundCallableProgramId< T >
- struct rti_internal_typeinfo::rti_typeenum< optix::callableProgramId< T > >
- struct rti_internal_typeinfo::rti_typeenum< optix::boundCallableProgramId< T > >

Macros

- #define rtDeclareVariable(type, name, semantic, annotation)
- #define rtDeclareAnnotation(variable, annotation)
- #define rtCallableProgram(return_type, function_name, parameter_list)
- #define rtBuffer __device__ optix::buffer
- #define rtBufferId optix::bufferId
- #define rtTextureSampler texture
- #define RT_PROGRAM __global__
- #define **RT_CALLABLE_PROGRAM** __device__ __noinline__
- #define **RT_INTERNAL_CALLABLE_PROGRAM_DEFS**(...)
- #define **RT_INTERNAL_BOUND_CALLABLE_PROGRAM_DEFS**(...)
- #define rtCallableProgramId optix::callableProgramId
- #define rtCallableProgramX optix::boundCallableProgramId

Typedefs

- typedef unsigned int **optix::rtPickledLocalPointer**
- typedef int **optix::rtTextureId**

Functions

- static __device__
  rtPickledLocalPointer **optix::rtPickleLocalPointer** (void ∗p)
- static __device__ void ∗ **optix::rtUnpickleLocalPointer** (rtPickledLocalPointer p)
- template<class T >
  static __device__ void rtTrace (rtObject topNode, optix::Ray ray, T &prd)
- static __device__ bool rtPotentialIntersection (float tmin)
- static __device__ bool rtReportIntersection (unsigned int material)
- static __device__ void rtIgnoreIntersection ()
- static __device__ void rtTerminateRay ()
- static __device__ void rtIntersectChild (unsigned int index)
- static __device__ float3 rtTransformPoint (RTtransformkind kind, const float3 &p)
- static __device__ float3 rtTransformVector (RTtransformkind kind, const float3 &v)
- static __device__ float3 rtTransformNormal (RTtransformkind kind, const float3 &n)
- static __device__ void rtGetTransform (RTtransformkind kind, float matrix[16])
- static __device__ void rtThrow (unsigned int code)
- static __device__ unsigned int rtGetExceptionCode ()
- static __device__ void rtPrintExceptionDetails ()

- template<typename T >
  __device__ T optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ float4 optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ int4 optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ uint4 optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ unsigned char optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ char optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ unsigned short optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ short optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ int optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ unsigned int optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ uchar1 optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ char1 optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ ushort1 optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ short1 optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ uint1 optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ int1 optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ float optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ uchar2 optix::rtTex1D (rtTextureId id, float x)

- template<>
  __device__ char2 optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ ushort2 optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ short2 optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ uint2 optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ int2 optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ float2 optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ uchar4 optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ char4 optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ ushort4 optix::rtTex1D (rtTextureId id, float x)
- template<>
  __device__ short4 optix::rtTex1D (rtTextureId id, float x)
- __device__ void optix::rtTex1D (unsigned char ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (char ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (unsigned short ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (short ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (unsigned int ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (int ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (uchar1 ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (char1 ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (ushort1 ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (short1 ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (uint1 ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (int1 ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (float ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (uchar2 ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (char2 ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (ushort2 ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (short2 ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (uint2 ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (int2 ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (float2 ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (uchar4 ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (char4 ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (ushort4 ∗retVal, rtTextureId id, float x)
- __device__ void optix::rtTex1D (short4 ∗retVal, rtTextureId id, float x)
- template<typename T >
  __device__ T optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ float4 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ int4 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ uint4 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ unsigned char optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ char optix::rtTex2D (rtTextureId id, float x, float y)

- template<>
  __device__ unsigned short optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ short optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ int optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ unsigned int optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ uchar1 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ char1 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ ushort1 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ short1 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ uint1 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ int1 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ float optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ uchar2 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ char2 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ ushort2 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ short2 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ uint2 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ int2 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ float2 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ uchar4 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ char4 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ ushort4 optix::rtTex2D (rtTextureId id, float x, float y)
- template<>
  __device__ short4 optix::rtTex2D (rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (unsigned char ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (char ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (unsigned short ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (short ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (unsigned int ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (int ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (uchar1 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (char1 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (ushort1 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (short1 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (uint1 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (int1 ∗retVal, rtTextureId id, float x, float y)

- __device__ void optix::rtTex2D (float ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (uchar2 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (char2 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (ushort2 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (short2 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (uint2 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (int2 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (float2 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (uchar4 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (char4 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (ushort4 ∗retVal, rtTextureId id, float x, float y)
- __device__ void optix::rtTex2D (short4 ∗retVal, rtTextureId id, float x, float y)
- template<typename T >
  __device__ T optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ float4 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ int4 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ uint4 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ unsigned char optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ char optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ unsigned short optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ short optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ int optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ unsigned int optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ uchar1 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ char1 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ ushort1 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ short1 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ uint1 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ int1 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ float optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ uchar2 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ char2 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ ushort2 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ short2 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ uint2 optix::rtTex3D (rtTextureId id, float x, float y, float z)

- template<>
  __device__ int2 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ float2 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ uchar4 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ char4 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ ushort4 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- template<>
  __device__ short4 optix::rtTex3D (rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (unsigned char ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (char ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (unsigned short ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (short ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (unsigned int ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (int ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (uchar1 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (char1 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (ushort1 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (short1 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (uint1 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (int1 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (float ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (uchar2 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (char2 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (ushort2 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (short2 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (uint2 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (int2 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (float2 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (uchar4 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (char4 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (ushort4 ∗retVal, rtTextureId id, float x, float y, float z)
- __device__ void optix::rtTex3D (short4 ∗retVal, rtTextureId id, float x, float y, float z)

- static __device__ void rtPrintf (const char ∗fmt)
- template<typename T1 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1)
- template<typename T1 , typename T2 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2)
- template<typename T1 , typename T2 , typename T3 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3)
- template<typename T1 , typename T2 , typename T3 , typename T4 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3, T4 arg4)
- template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3, T4 arg4, T5 arg5)
- template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3, T4 arg4, T5 arg5, T6 arg6)
- template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 , typename T7 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3, T4 arg4, T5 arg5, T6 arg6, T7 arg7)
- template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 , typename T7 , typename T8 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3, T4 arg4, T5 arg5, T6 arg6, T7 arg7, T8 arg8)

- template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 , typename T7 , typename T8 , typename T9 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3, T4 arg4, T5 arg5, T6 arg6, T7 arg7, T8 arg8, T9 arg9)
- template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 , typename T7 , typename T8 , typename T9 , typename T10 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3, T4 arg4, T5 arg5, T6 arg6, T7 arg7, T8 arg8, T9 arg9, T10 arg10)
- template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 , typename T7 , typename T8 , typename T9 , typename T10 , typename T11 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3, T4 arg4, T5 arg5, T6 arg6, T7 arg7, T8 arg8, T9 arg9, T10 arg10, T11 arg11)
- template<typename T1 , typename T2 , typename T3 , typename T4 , typename T5 , typename T6 , typename T7 , typename T8 , typename T9 , typename T10 , typename T11 , typename T12 >
  static __device__ void rtPrintf (const char ∗fmt, T1 arg1, T2 arg2, T3 arg3, T4 arg4, T5 arg5, T6 arg6, T7 arg7, T8 arg8, T9 arg9, T10 arg10, T11 arg11, T12 arg12)

4.9.2 Macro Definition Documentation

4.9.2.1 #define RT_INTERNAL_BOUND_CALLABLE_PROGRAM_DEFS(...)

Value:

```
public rti_internal_callableprogram::callableProgramIdBase<__VA_ARGS__>
       \
  {                                                                      \
  }
```

4.9.2.2 #define RT_INTERNAL_CALLABLE_PROGRAM_DEFS(...)

Value:

```
public rti_internal_callableprogram::callableProgramIdBase<__VA_ARGS__>
       \
  {                                                                      \
  public:                                                                \
    /* Default constructor */                                            \
    __device__ __forceinline__ callableProgramId() {}                    \
    /* Constructor that initializes the id with null.*/                  \
    __device__ __forceinline__ callableProgramId(RTprogramidnull nullid) \
      : rti_internal_callableprogram::callableProgramIdBase<__VA_ARGS__>
      (nullid) {} \
    /* Constructor that initializes the id.*/                            \
    __device__ __forceinline__ explicit callableProgramId(int id)        \
      : rti_internal_callableprogram::callableProgramIdBase<__VA_ARGS__>
      (id) {} \
    /* assigment that initializes the id with null. */                   \
    __device__ __forceinline__ callableProgramId& operator= (RTprogramidnull nullid) \
      { this->m_id = nullid; return *this; } \
    /* Return the id */                                                  \
    __device__ __forceinline__ int getId() const { return this->m_id; } \
    /* Return whether the id is valid */                                 \
    __device__ __forceinline__ operator bool() const \
    { return this->m_id != RT_PROGRAM_ID_NULL; } \
  }
```

4.10 optix_gl_interop.h File Reference

4.10.1 Detailed Description

OptiX public API declarations GLInterop.

Author

NVIDIA Corporation OptiX public API declarations for GL interoperability

Typedefs

- typedef void ∗ **HGPUNV**

Functions

- RTresult RTAPI rtBufferCreateFromGLBO (RTcontext context, unsigned int bufferdesc, unsigned int glId, RTbuffer ∗buffer)
- RTresult RTAPI rtTextureSamplerCreateFromGLImage (RTcontext context, unsigned int glId, RTgltarget target, RTtexturesampler ∗textureSampler)
- RTresult RTAPI rtBufferGetGLBOId (RTbuffer buffer, unsigned int ∗glId)
- RTresult RTAPI rtTextureSamplerGetGLImageId (RTtexturesampler textureSampler, unsigned int ∗glId)
- RTresult RTAPI rtBufferGLRegister (RTbuffer buffer)
- RTresult RTAPI rtBufferGLUnregister (RTbuffer buffer)
- RTresult RTAPI rtTextureSamplerGLRegister (RTtexturesampler textureSampler)
- RTresult RTAPI rtTextureSamplerGLUnregister (RTtexturesampler textureSampler)
- RTresult RTAPI rtDeviceGetWGLDevice (int ∗device, HGPUNV gpu)

4.11 optix_host.h File Reference

4.11.1 Detailed Description

OptiX public API.

Author

NVIDIA Corporation OptiX public API Reference - Host side

Macros

- #define **RTAPI** __declspec(dllimport)

Typedefs

- typedef unsigned int **RTsize**
- typedef struct RTacceleration_api ∗ RTacceleration
- typedef struct RTbuffer_api ∗ RTbuffer
- typedef struct RTcontext_api ∗ RTcontext
- typedef struct RTgeometry_api ∗ RTgeometry
- typedef struct
  RTgeometryinstance_api ∗ RTgeometryinstance
- typedef struct
  RTgeometrygroup_api ∗ RTgeometrygroup
- typedef struct RTgroup_api ∗ RTgroup
- typedef struct RTmaterial_api ∗ RTmaterial
- typedef struct RTprogram_api ∗ RTprogram
- typedef struct RTselector_api ∗ RTselector
- typedef struct
  RTtexturesampler_api ∗ RTtexturesampler
- typedef struct RTtransform_api ∗ RTtransform
- typedef struct RTvariable_api ∗ RTvariable
- typedef void ∗ RTobject
- typedef int(∗ RTtimeoutcallback)(void)

Functions

- RTresult RTAPI rtGetVersion (unsigned int ∗version)
- RTresult RTAPI rtDeviceGetDeviceCount (unsigned int ∗count)
- RTresult RTAPI rtDeviceGetAttribute (int ordinal, RTdeviceattribute attrib, RTsize size, void ∗p)
- RTresult RTAPI rtVariableSetObject (RTvariable v, RTobject object)
- RTresult RTAPI rtVariableSetUserData (RTvariable v, RTsize size, const void ∗ptr)
- RTresult RTAPI rtVariableGetObject (RTvariable v, RTobject ∗object)
- RTresult RTAPI rtVariableGetUserData (RTvariable v, RTsize size, void ∗ptr)
- RTresult RTAPI rtVariableGetName (RTvariable v, const char ∗∗name_return)
- RTresult RTAPI rtVariableGetAnnotation (RTvariable v, const char ∗∗annotation_return)
- RTresult RTAPI rtVariableGetType (RTvariable v, RTobjecttype ∗type_return)
- RTresult RTAPI rtVariableGetContext (RTvariable v, RTcontext ∗context)
- RTresult RTAPI rtVariableGetSize (RTvariable v, RTsize ∗size)
- RTresult RTAPI rtContextCreate (RTcontext ∗context)
- RTresult RTAPI rtContextDestroy (RTcontext context)
- RTresult RTAPI rtContextValidate (RTcontext context)
- void RTAPI rtContextGetErrorString (RTcontext context, RTresult code, const char ∗∗return_string)
- RTresult RTAPI rtContextSetAttribute (RTcontext context, RTcontextattribute attrib, RTsize size, void ∗p)
- RTresult RTAPI rtContextGetAttribute (RTcontext context, RTcontextattribute attrib, RTsize size, void ∗p)
- RTresult RTAPI rtContextSetDevices (RTcontext context, unsigned int count, const int ∗devices)
- RTresult RTAPI rtContextGetDevices (RTcontext context, int ∗devices)
- RTresult RTAPI rtContextGetDeviceCount (RTcontext context, unsigned int ∗count)
- RTresult RTAPI rtContextSetStackSize (RTcontext context, RTsize stack_size_bytes)
- RTresult RTAPI rtContextGetStackSize (RTcontext context, RTsize ∗stack_size_bytes)
- RTresult RTAPI rtContextSetTimeoutCallback (RTcontext context, RTtimeoutcallback callback, double min_polling_seconds)
- RTresult RTAPI rtContextSetEntryPointCount (RTcontext context, unsigned int num_entry_points)
- RTresult RTAPI rtContextGetEntryPointCount (RTcontext context, unsigned int ∗num_entry_points)
- RTresult RTAPI rtContextSetRayGenerationProgram (RTcontext context, unsigned int entry_point_index, RTprogram program)
- RTresult RTAPI rtContextGetRayGenerationProgram (RTcontext context, unsigned int entry_point_index, RTprogram ∗program)
- RTresult RTAPI rtContextSetExceptionProgram (RTcontext context, unsigned int entry_point_index, RTprogram program)
- RTresult RTAPI rtContextGetExceptionProgram (RTcontext context, unsigned int entry_point_index, RTprogram ∗program)
- RTresult RTAPI rtContextSetExceptionEnabled (RTcontext context, RTexception exception, int enabled)
- RTresult RTAPI rtContextGetExceptionEnabled (RTcontext context, RTexception exception, int ∗enabled)
- RTresult RTAPI rtContextSetRayTypeCount (RTcontext context, unsigned int num_ray_types)
- RTresult RTAPI rtContextGetRayTypeCount (RTcontext context, unsigned int ∗num_ray_types)
- RTresult RTAPI rtContextSetMissProgram (RTcontext context, unsigned int ray_type_index, RTprogram program)
- RTresult RTAPI rtContextGetMissProgram (RTcontext context, unsigned int ray_type_index, RTprogram ∗program)
- RTresult RTAPI rtContextGetTextureSamplerFromId (RTcontext context, int sampler_id, RTtexturesampler ∗sampler)
- RTresult RTAPI rtContextCompile (RTcontext context)
- RTresult RTAPI rtContextLaunch1D (RTcontext context, unsigned int entry_point_index, RTsize image_width)
- RTresult RTAPI rtContextLaunch2D (RTcontext context, unsigned int entry_point_index, RTsize image_width, RTsize image_height)
- RTresult RTAPI rtContextLaunch3D (RTcontext context, unsigned int entry_point_index, RTsize image_width, RTsize image_height, RTsize image_depth)
- RTresult RTAPI rtContextGetRunningState (RTcontext context, int ∗running)
- RTresult RTAPI rtContextSetPrintEnabled (RTcontext context, int enabled)

- RTresult RTAPI rtContextGetPrintEnabled (RTcontext context, int ∗enabled)
- RTresult RTAPI rtContextSetPrintBufferSize (RTcontext context, RTsize buffer_size_bytes)
- RTresult RTAPI rtContextGetPrintBufferSize (RTcontext context, RTsize ∗buffer_size_bytes)
- RTresult RTAPI rtContextSetPrintLaunchIndex (RTcontext context, int x, int y, int z)
- RTresult RTAPI rtContextGetPrintLaunchIndex (RTcontext context, int ∗x, int ∗y, int ∗z)
- RTresult RTAPI rtContextDeclareVariable (RTcontext context, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtContextQueryVariable (RTcontext context, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtContextRemoveVariable (RTcontext context, RTvariable v)
- RTresult RTAPI rtContextGetVariableCount (RTcontext context, unsigned int ∗count)
- RTresult RTAPI rtContextGetVariable (RTcontext context, unsigned int index, RTvariable ∗v)
- RTresult RTAPI rtProgramCreateFromPTXString (RTcontext context, const char ∗ptx, const char ∗program_name, RTprogram ∗program)
- RTresult RTAPI rtProgramCreateFromPTXFile (RTcontext context, const char ∗filename, const char ∗program_name, RTprogram ∗program)
- RTresult RTAPI rtProgramDestroy (RTprogram program)
- RTresult RTAPI rtProgramValidate (RTprogram program)
- RTresult RTAPI rtProgramGetContext (RTprogram program, RTcontext ∗context)
- RTresult RTAPI rtProgramDeclareVariable (RTprogram program, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtProgramQueryVariable (RTprogram program, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtProgramRemoveVariable (RTprogram program, RTvariable v)
- RTresult RTAPI rtProgramGetVariableCount (RTprogram program, unsigned int ∗count)
- RTresult RTAPI rtProgramGetVariable (RTprogram program, unsigned int index, RTvariable ∗v)
- RTresult RTAPI rtProgramGetId (RTprogram program, int ∗program_id)
- RTresult RTAPI rtContextGetProgramFromId (RTcontext context, int program_id, RTprogram ∗program)
- RTresult RTAPI rtGroupCreate (RTcontext context, RTgroup ∗group)
- RTresult RTAPI rtGroupDestroy (RTgroup group)
- RTresult RTAPI rtGroupValidate (RTgroup group)
- RTresult RTAPI rtGroupGetContext (RTgroup group, RTcontext ∗context)
- RTresult RTAPI rtGroupSetAcceleration (RTgroup group, RTacceleration acceleration)
- RTresult RTAPI rtGroupGetAcceleration (RTgroup group, RTacceleration ∗acceleration)
- RTresult RTAPI rtGroupSetChildCount (RTgroup group, unsigned int count)
- RTresult RTAPI rtGroupGetChildCount (RTgroup group, unsigned int ∗count)
- RTresult RTAPI rtGroupSetChild (RTgroup group, unsigned int index, RTobject child)
- RTresult RTAPI rtGroupGetChild (RTgroup group, unsigned int index, RTobject ∗child)
- RTresult RTAPI rtGroupGetChildType (RTgroup group, unsigned int index, RTobjecttype ∗type)
- RTresult RTAPI rtSelectorCreate (RTcontext context, RTselector ∗selector)
- RTresult RTAPI rtSelectorDestroy (RTselector selector)
- RTresult RTAPI rtSelectorValidate (RTselector selector)
- RTresult RTAPI rtSelectorGetContext (RTselector selector, RTcontext ∗context)
- RTresult RTAPI rtSelectorSetVisitProgram (RTselector selector, RTprogram program)
- RTresult RTAPI rtSelectorGetVisitProgram (RTselector selector, RTprogram ∗program)
- RTresult RTAPI rtSelectorSetChildCount (RTselector selector, unsigned int count)
- RTresult RTAPI rtSelectorGetChildCount (RTselector selector, unsigned int ∗count)
- RTresult RTAPI rtSelectorSetChild (RTselector selector, unsigned int index, RTobject child)
- RTresult RTAPI rtSelectorGetChild (RTselector selector, unsigned int index, RTobject ∗child)
- RTresult RTAPI rtSelectorGetChildType (RTselector selector, unsigned int index, RTobjecttype ∗type)
- RTresult RTAPI rtSelectorDeclareVariable (RTselector selector, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtSelectorQueryVariable (RTselector selector, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtSelectorRemoveVariable (RTselector selector, RTvariable v)
- RTresult RTAPI rtSelectorGetVariableCount (RTselector selector, unsigned int ∗count)
- RTresult RTAPI rtSelectorGetVariable (RTselector selector, unsigned int index, RTvariable ∗v)
- RTresult RTAPI rtTransformCreate (RTcontext context, RTtransform ∗transform)
- RTresult RTAPI rtTransformDestroy (RTtransform transform)
- RTresult RTAPI rtTransformValidate (RTtransform transform)
- RTresult RTAPI rtTransformGetContext (RTtransform transform, RTcontext ∗context)

- RTresult RTAPI rtTransformSetMatrix (RTtransform transform, int transpose, const float ∗matrix, const float ∗inverse_matrix)
- RTresult RTAPI rtTransformGetMatrix (RTtransform transform, int transpose, float ∗matrix, float ∗inverse_matrix)
- RTresult RTAPI rtTransformSetChild (RTtransform transform, RTobject child)
- RTresult RTAPI rtTransformGetChild (RTtransform transform, RTobject ∗child)
- RTresult RTAPI rtTransformGetChildType (RTtransform transform, RTobjecttype ∗type)
- RTresult RTAPI rtGeometryGroupCreate (RTcontext context, RTgeometrygroup ∗geometrygroup)
- RTresult RTAPI rtGeometryGroupDestroy (RTgeometrygroup geometrygroup)
- RTresult RTAPI rtGeometryGroupValidate (RTgeometrygroup geometrygroup)
- RTresult RTAPI rtGeometryGroupGetContext (RTgeometrygroup geometrygroup, RTcontext ∗context)
- RTresult RTAPI rtGeometryGroupSetAcceleration (RTgeometrygroup geometrygroup, RTacceleration acceleration)
- RTresult RTAPI rtGeometryGroupGetAcceleration (RTgeometrygroup geometrygroup, RTacceleration ∗acceleration)
- RTresult RTAPI rtGeometryGroupSetChildCount (RTgeometrygroup geometrygroup, unsigned int count)
- RTresult RTAPI rtGeometryGroupGetChildCount (RTgeometrygroup geometrygroup, unsigned int ∗count)
- RTresult RTAPI rtGeometryGroupSetChild (RTgeometrygroup geometrygroup, unsigned int index, RTgeometryinstance geometryinstance)
- RTresult RTAPI rtGeometryGroupGetChild (RTgeometrygroup geometrygroup, unsigned int index, RTgeometryinstance ∗geometryinstance)
- RTresult RTAPI rtAccelerationCreate (RTcontext context, RTacceleration ∗acceleration)
- RTresult RTAPI rtAccelerationDestroy (RTacceleration acceleration)
- RTresult RTAPI rtAccelerationValidate (RTacceleration acceleration)
- RTresult RTAPI rtAccelerationGetContext (RTacceleration acceleration, RTcontext ∗context)
- RTresult RTAPI rtAccelerationSetBuilder (RTacceleration acceleration, const char ∗builder)
- RTresult RTAPI rtAccelerationGetBuilder (RTacceleration acceleration, const char ∗∗return_string)
- RTresult RTAPI rtAccelerationSetTraverser (RTacceleration acceleration, const char ∗traverser)
- RTresult RTAPI rtAccelerationGetTraverser (RTacceleration acceleration, const char ∗∗return_string)
- RTresult RTAPI rtAccelerationSetProperty (RTacceleration acceleration, const char ∗name, const char ∗value)
- RTresult RTAPI rtAccelerationGetProperty (RTacceleration acceleration, const char ∗name, const char ∗∗return_string)
- RTresult RTAPI rtAccelerationGetDataSize (RTacceleration acceleration, RTsize ∗size)
- RTresult RTAPI rtAccelerationGetData (RTacceleration acceleration, void ∗data)
- RTresult RTAPI rtAccelerationSetData (RTacceleration acceleration, const void ∗data, RTsize size)
- RTresult RTAPI rtAccelerationMarkDirty (RTacceleration acceleration)
- RTresult RTAPI rtAccelerationIsDirty (RTacceleration acceleration, int ∗dirty)
- RTresult RTAPI rtGeometryInstanceCreate (RTcontext context, RTgeometryinstance ∗geometryinstance)
- RTresult RTAPI rtGeometryInstanceDestroy (RTgeometryinstance geometryinstance)
- RTresult RTAPI rtGeometryInstanceValidate (RTgeometryinstance geometryinstance)
- RTresult RTAPI rtGeometryInstanceGetContext (RTgeometryinstance geometryinstance, RTcontext ∗context)
- RTresult RTAPI rtGeometryInstanceSetGeometry (RTgeometryinstance geometryinstance, RTgeometry geometry)
- RTresult RTAPI rtGeometryInstanceGetGeometry (RTgeometryinstance geometryinstance, RTgeometry ∗geometry)
- RTresult RTAPI rtGeometryInstanceSetMaterialCount (RTgeometryinstance geometryinstance, unsigned int count)
- RTresult RTAPI rtGeometryInstanceGetMaterialCount (RTgeometryinstance geometryinstance, unsigned int ∗count)
- RTresult RTAPI rtGeometryInstanceSetMaterial (RTgeometryinstance geometryinstance, unsigned int idx, RTmaterial material)
- RTresult RTAPI rtGeometryInstanceGetMaterial (RTgeometryinstance geometryinstance, unsigned int idx, RTmaterial ∗material)

- RTresult RTAPI rtGeometryInstanceDeclareVariable (RTgeometryinstance geometryinstance, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtGeometryInstanceQueryVariable (RTgeometryinstance geometryinstance, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtGeometryInstanceRemoveVariable (RTgeometryinstance geometryinstance, RTvariable v)
- RTresult RTAPI rtGeometryInstanceGetVariableCount (RTgeometryinstance geometryinstance, unsigned int ∗count)
- RTresult RTAPI rtGeometryInstanceGetVariable (RTgeometryinstance geometryinstance, unsigned int index, RTvariable ∗v)
- RTresult RTAPI rtGeometryCreate (RTcontext context, RTgeometry ∗geometry)
- RTresult RTAPI rtGeometryDestroy (RTgeometry geometry)
- RTresult RTAPI rtGeometryValidate (RTgeometry geometry)
- RTresult RTAPI rtGeometryGetContext (RTgeometry geometry, RTcontext ∗context)
- RTresult RTAPI rtGeometrySetPrimitiveCount (RTgeometry geometry, unsigned int num_primitives)
- RTresult RTAPI rtGeometryGetPrimitiveCount (RTgeometry geometry, unsigned int ∗num_primitives)
- RTresult RTAPI rtGeometrySetPrimitiveIndexOffset (RTgeometry geometry, unsigned int index_offset)
- RTresult RTAPI rtGeometryGetPrimitiveIndexOffset (RTgeometry geometry, unsigned int ∗index_offset)
- RTresult RTAPI rtGeometrySetBoundingBoxProgram (RTgeometry geometry, RTprogram program)
- RTresult RTAPI rtGeometryGetBoundingBoxProgram (RTgeometry geometry, RTprogram ∗program)
- RTresult RTAPI rtGeometrySetIntersectionProgram (RTgeometry geometry, RTprogram program)
- RTresult RTAPI rtGeometryGetIntersectionProgram (RTgeometry geometry, RTprogram ∗program)
- RTresult RTAPI rtGeometryMarkDirty (RTgeometry geometry)
- RTresult RTAPI rtGeometryIsDirty (RTgeometry geometry, int ∗dirty)
- RTresult RTAPI rtGeometryDeclareVariable (RTgeometry geometry, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtGeometryQueryVariable (RTgeometry geometry, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtGeometryRemoveVariable (RTgeometry geometry, RTvariable v)
- RTresult RTAPI rtGeometryGetVariableCount (RTgeometry geometry, unsigned int ∗count)
- RTresult RTAPI rtGeometryGetVariable (RTgeometry geometry, unsigned int index, RTvariable ∗v)
- RTresult RTAPI rtMaterialCreate (RTcontext context, RTmaterial ∗material)
- RTresult RTAPI rtMaterialDestroy (RTmaterial material)
- RTresult RTAPI rtMaterialValidate (RTmaterial material)
- RTresult RTAPI rtMaterialGetContext (RTmaterial material, RTcontext ∗context)
- RTresult RTAPI rtMaterialSetClosestHitProgram (RTmaterial material, unsigned int ray_type_index, RTprogram program)
- RTresult RTAPI rtMaterialGetClosestHitProgram (RTmaterial material, unsigned int ray_type_index, RTprogram ∗program)
- RTresult RTAPI rtMaterialSetAnyHitProgram (RTmaterial material, unsigned int ray_type_index, RTprogram program)
- RTresult RTAPI rtMaterialGetAnyHitProgram (RTmaterial material, unsigned int ray_type_index, RTprogram ∗program)
- RTresult RTAPI rtMaterialDeclareVariable (RTmaterial material, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtMaterialQueryVariable (RTmaterial material, const char ∗name, RTvariable ∗v)
- RTresult RTAPI rtMaterialRemoveVariable (RTmaterial material, RTvariable v)
- RTresult RTAPI rtMaterialGetVariableCount (RTmaterial material, unsigned int ∗count)
- RTresult RTAPI rtMaterialGetVariable (RTmaterial material, unsigned int index, RTvariable ∗v)
- RTresult RTAPI rtTextureSamplerCreate (RTcontext context, RTtexturesampler ∗texturesampler)
- RTresult RTAPI rtTextureSamplerDestroy (RTtexturesampler texturesampler)
- RTresult RTAPI rtTextureSamplerValidate (RTtexturesampler texturesampler)
- RTresult RTAPI rtTextureSamplerGetContext (RTtexturesampler texturesampler, RTcontext ∗context)
- RTresult RTAPI rtTextureSamplerSetMipLevelCount (RTtexturesampler texturesampler, unsigned int num_mip_levels)
- RTresult RTAPI rtTextureSamplerGetMipLevelCount (RTtexturesampler texturesampler, unsigned int ∗num_mip_levels)
- RTresult RTAPI rtTextureSamplerSetArraySize (RTtexturesampler texturesampler, unsigned int num_textures_in_array)
- RTresult RTAPI rtTextureSamplerGetArraySize (RTtexturesampler texturesampler, unsigned int ∗num_textures_in_array)

- RTresult RTAPI rtTextureSamplerSetWrapMode (RTtexturesampler texturesampler, unsigned int dimension, RTwrapmode wrapmode)
- RTresult RTAPI rtTextureSamplerGetWrapMode (RTtexturesampler texturesampler, unsigned int dimension, RTwrapmode ∗wrapmode)
- RTresult RTAPI rtTextureSamplerSetFilteringModes (RTtexturesampler texturesampler, RTfiltermode minification, RTfiltermode magnification, RTfiltermode mipmapping)
- RTresult RTAPI rtTextureSamplerGetFilteringModes (RTtexturesampler texturesampler, RTfiltermode ∗minification, RTfiltermode ∗magnification, RTfiltermode ∗mipmapping)
- RTresult RTAPI rtTextureSamplerSetMaxAnisotropy (RTtexturesampler texturesampler, float value)
- RTresult RTAPI rtTextureSamplerGetMaxAnisotropy (RTtexturesampler texturesampler, float ∗value)
- RTresult RTAPI rtTextureSamplerSetReadMode (RTtexturesampler texturesampler, RTtexturereadmode readmode)
- RTresult RTAPI rtTextureSamplerGetReadMode (RTtexturesampler texturesampler, RTtexturereadmode ∗readmode)
- RTresult RTAPI rtTextureSamplerSetIndexingMode (RTtexturesampler texturesampler, RTtextureindexmode indexmode)
- RTresult RTAPI rtTextureSamplerGetIndexingMode (RTtexturesampler texturesampler, RTtextureindexmode ∗indexmode)
- RTresult RTAPI rtTextureSamplerSetBuffer (RTtexturesampler texturesampler, unsigned int texture_array_idx, unsigned int mip_level, RTbuffer buffer)
- RTresult RTAPI rtTextureSamplerGetBuffer (RTtexturesampler texturesampler, unsigned int texture_array_idx, unsigned int mip_level, RTbuffer ∗buffer)
- RTresult RTAPI rtTextureSamplerGetId (RTtexturesampler texturesampler, int ∗texture_id)
- RTresult RTAPI rtBufferCreate (RTcontext context, unsigned int bufferdesc, RTbuffer ∗buffer)
- RTresult RTAPI rtBufferDestroy (RTbuffer buffer)
- RTresult RTAPI rtBufferValidate (RTbuffer buffer)
- RTresult RTAPI rtBufferGetContext (RTbuffer buffer, RTcontext ∗context)
- RTresult RTAPI rtBufferSetFormat (RTbuffer buffer, RTformat format)
- RTresult RTAPI rtBufferGetFormat (RTbuffer buffer, RTformat ∗format)
- RTresult RTAPI rtBufferSetElementSize (RTbuffer buffer, RTsize size_of_element)
- RTresult RTAPI rtBufferGetElementSize (RTbuffer buffer, RTsize ∗size_of_element)
- RTresult RTAPI rtBufferSetSize1D (RTbuffer buffer, RTsize width)
- RTresult RTAPI rtBufferGetSize1D (RTbuffer buffer, RTsize ∗width)
- RTresult RTAPI rtBufferSetSize2D (RTbuffer buffer, RTsize width, RTsize height)
- RTresult RTAPI rtBufferGetSize2D (RTbuffer buffer, RTsize ∗width, RTsize ∗height)
- RTresult RTAPI rtBufferSetSize3D (RTbuffer buffer, RTsize width, RTsize height, RTsize depth)
- RTresult RTAPI rtBufferGetSize3D (RTbuffer buffer, RTsize ∗width, RTsize ∗height, RTsize ∗depth)
- RTresult RTAPI rtBufferSetSizev (RTbuffer buffer, unsigned int dimensionality, const RTsize ∗dims)
- RTresult RTAPI rtBufferGetSizev (RTbuffer buffer, unsigned int dimensionality, RTsize ∗dims)
- RTresult RTAPI rtBufferGetDimensionality (RTbuffer buffer, unsigned int ∗dimensionality)
- RTresult RTAPI rtBufferMap (RTbuffer buffer, void ∗∗user_pointer)
- RTresult RTAPI rtBufferUnmap (RTbuffer buffer)
- RTresult RTAPI rtBufferGetId (RTbuffer buffer, int ∗buffer_id)
- RTresult RTAPI rtContextGetBufferFromId (RTcontext context, int buffer_id, RTbuffer ∗buffer)

- RTresult RTAPI rtVariableSet1f (RTvariable v, float f1)
- RTresult RTAPI rtVariableSet2f (RTvariable v, float f1, float f2)
- RTresult RTAPI rtVariableSet3f (RTvariable v, float f1, float f2, float f3)
- RTresult RTAPI rtVariableSet4f (RTvariable v, float f1, float f2, float f3, float f4)
- RTresult RTAPI rtVariableSet1fv (RTvariable v, const float ∗f)
- RTresult RTAPI rtVariableSet2fv (RTvariable v, const float ∗f)
- RTresult RTAPI rtVariableSet3fv (RTvariable v, const float ∗f)
- RTresult RTAPI rtVariableSet4fv (RTvariable v, const float ∗f)
- RTresult RTAPI rtVariableSet1i (RTvariable v, int i1)
- RTresult RTAPI rtVariableSet2i (RTvariable v, int i1, int i2)

- RTresult RTAPI rtVariableSet3i (RTvariable v, int i1, int i2, int i3)
- RTresult RTAPI rtVariableSet4i (RTvariable v, int i1, int i2, int i3, int i4)
- RTresult RTAPI rtVariableSet1iv (RTvariable v, const int ∗i)
- RTresult RTAPI rtVariableSet2iv (RTvariable v, const int ∗i)
- RTresult RTAPI rtVariableSet3iv (RTvariable v, const int ∗i)
- RTresult RTAPI rtVariableSet4iv (RTvariable v, const int ∗i)
- RTresult RTAPI rtVariableSet1ui (RTvariable v, unsigned int u1)
- RTresult RTAPI rtVariableSet2ui (RTvariable v, unsigned int u1, unsigned int u2)
- RTresult RTAPI rtVariableSet3ui (RTvariable v, unsigned int u1, unsigned int u2, unsigned int u3)
- RTresult RTAPI rtVariableSet4ui (RTvariable v, unsigned int u1, unsigned int u2, unsigned int u3, unsigned int u4)
- RTresult RTAPI rtVariableSet1uiv (RTvariable v, const unsigned int ∗u)
- RTresult RTAPI rtVariableSet2uiv (RTvariable v, const unsigned int ∗u)
- RTresult RTAPI rtVariableSet3uiv (RTvariable v, const unsigned int ∗u)
- RTresult RTAPI rtVariableSet4uiv (RTvariable v, const unsigned int ∗u)
- RTresult RTAPI rtVariableSetMatrix2x2fv (RTvariable v, int transpose, const float ∗m)
- RTresult RTAPI rtVariableSetMatrix2x3fv (RTvariable v, int transpose, const float ∗m)
- RTresult RTAPI rtVariableSetMatrix2x4fv (RTvariable v, int transpose, const float ∗m)
- RTresult RTAPI rtVariableSetMatrix3x2fv (RTvariable v, int transpose, const float ∗m)
- RTresult RTAPI rtVariableSetMatrix3x3fv (RTvariable v, int transpose, const float ∗m)
- RTresult RTAPI rtVariableSetMatrix3x4fv (RTvariable v, int transpose, const float ∗m)
- RTresult RTAPI rtVariableSetMatrix4x2fv (RTvariable v, int transpose, const float ∗m)
- RTresult RTAPI rtVariableSetMatrix4x3fv (RTvariable v, int transpose, const float ∗m)
- RTresult RTAPI rtVariableSetMatrix4x4fv (RTvariable v, int transpose, const float ∗m)

- RTresult RTAPI rtVariableGet1f (RTvariable v, float ∗f1)
- RTresult RTAPI rtVariableGet2f (RTvariable v, float ∗f1, float ∗f2)
- RTresult RTAPI rtVariableGet3f (RTvariable v, float ∗f1, float ∗f2, float ∗f3)
- RTresult RTAPI rtVariableGet4f (RTvariable v, float ∗f1, float ∗f2, float ∗f3, float ∗f4)
- RTresult RTAPI rtVariableGet1fv (RTvariable v, float ∗f)
- RTresult RTAPI rtVariableGet2fv (RTvariable v, float ∗f)
- RTresult RTAPI rtVariableGet3fv (RTvariable v, float ∗f)
- RTresult RTAPI rtVariableGet4fv (RTvariable v, float ∗f)
- RTresult RTAPI rtVariableGet1i (RTvariable v, int ∗i1)
- RTresult RTAPI rtVariableGet2i (RTvariable v, int ∗i1, int ∗i2)
- RTresult RTAPI rtVariableGet3i (RTvariable v, int ∗i1, int ∗i2, int ∗i3)
- RTresult RTAPI rtVariableGet4i (RTvariable v, int ∗i1, int ∗i2, int ∗i3, int ∗i4)
- RTresult RTAPI rtVariableGet1iv (RTvariable v, int ∗i)
- RTresult RTAPI rtVariableGet2iv (RTvariable v, int ∗i)
- RTresult RTAPI rtVariableGet3iv (RTvariable v, int ∗i)
- RTresult RTAPI rtVariableGet4iv (RTvariable v, int ∗i)
- RTresult RTAPI rtVariableGet1ui (RTvariable v, unsigned int ∗u1)
- RTresult RTAPI rtVariableGet2ui (RTvariable v, unsigned int ∗u1, unsigned int ∗u2)
- RTresult RTAPI rtVariableGet3ui (RTvariable v, unsigned int ∗u1, unsigned int ∗u2, unsigned int ∗u3)
- RTresult RTAPI rtVariableGet4ui (RTvariable v, unsigned int ∗u1, unsigned int ∗u2, unsigned int ∗u3, unsigned int ∗u4)
- RTresult RTAPI rtVariableGet1uiv (RTvariable v, unsigned int ∗u)
- RTresult RTAPI rtVariableGet2uiv (RTvariable v, unsigned int ∗u)
- RTresult RTAPI rtVariableGet3uiv (RTvariable v, unsigned int ∗u)
- RTresult RTAPI rtVariableGet4uiv (RTvariable v, unsigned int ∗u)
- RTresult RTAPI rtVariableGetMatrix2x2fv (RTvariable v, int transpose, float ∗m)
- RTresult RTAPI rtVariableGetMatrix2x3fv (RTvariable v, int transpose, float ∗m)
- RTresult RTAPI rtVariableGetMatrix2x4fv (RTvariable v, int transpose, float ∗m)
- RTresult RTAPI rtVariableGetMatrix3x2fv (RTvariable v, int transpose, float ∗m)
- RTresult RTAPI rtVariableGetMatrix3x3fv (RTvariable v, int transpose, float ∗m)

- RTresult RTAPI rtVariableGetMatrix3x4fv (RTvariable v, int transpose, float ∗m)
- RTresult RTAPI rtVariableGetMatrix4x2fv (RTvariable v, int transpose, float ∗m)
- RTresult RTAPI rtVariableGetMatrix4x3fv (RTvariable v, int transpose, float ∗m)
- RTresult RTAPI rtVariableGetMatrix4x4fv (RTvariable v, int transpose, float ∗m)

4.11.2 Typedef Documentation

4.11.2.1 typedef struct RTacceleration_api∗ **RTacceleration**

Opaque type to handle Acceleration Structures - Note that the ∗_api type should never be used directly. Only the typedef target name will be guaranteed to remain unchanged

4.11.2.2 typedef struct RTbuffer_api∗ **RTbuffer**

Opaque type to handle Buffers - Note that the ∗_api type should never be used directly. Only the typedef target name will be guaranteed to remain unchanged

4.11.2.3 typedef struct RTcontext_api∗ **RTcontext**

Opaque type to handle Contexts - Note that the ∗_api type should never be used directly. Only the typedef target name will be guaranteed to remain unchanged

4.11.2.4 typedef struct RTgeometry_api∗ **RTgeometry**

Opaque type to handle Geometry - Note that the ∗_api type should never be used directly. Only the typedef target name will be guaranteed to remain unchanged

4.11.2.5 typedef struct RTgeometrygroup_api∗ **RTgeometrygroup**

Opaque type to handle Geometry Group - Note that the ∗_api type should never be used directly. Only the typedef target name will be guaranteed to remain unchanged

4.11.2.6 typedef struct RTgeometryinstance_api∗ **RTgeometryinstance**

Opaque type to handle Geometry Instance - Note that the ∗_api type should never be used directly. Only the typedef target name will be guaranteed to remain unchanged

4.11.2.7 typedef struct RTgroup_api∗ **RTgroup**

Opaque type to handle Group - Note that the ∗_api type should never be used directly. Only the typedef target name will be guaranteed to remain unchanged

4.11.2.8 typedef struct RTmaterial_api∗ **RTmaterial**

Opaque type to handle Material - Note that the ∗_api type should never be used directly. Only the typedef target name will be guaranteed to remain unchanged

4.11.2.9 typedef void∗ **RTobject**

Opaque type to handle Object - Note that the ∗_api type should never be used directly. Only the typedef target name will be guaranteed to remain unchanged

4.11.2.10 typedef struct RTprogram_api∗ **RTprogram**

Opaque type to handle Program - Note that the ∗_api type should never be used directly. Only the typedef target name will be guaranteed to remain unchanged

4.11.2.11 typedef struct RTselector_api∗ **RTselector**

Opaque type to handle Selector - Note that the ∗_api type should never be used directly. Only the typedef target name will be guaranteed to remain unchanged

4.11.2.12 typedef struct RTtexturesampler_api∗ **RTtexturesampler**

Opaque type to handle Texture Sampler - Note that the ∗_api type should never be used directly. Only the typedef target name will be guaranteed to remain unchanged

4.11.2.13 typedef int(∗ RTtimeoutcallback)(void)

Callback signature for use with rtContextSetTimeoutCallback. Return 1 to ask for abort, 0 to continue.

4.11.2.14 typedef struct RTtransform_api∗ **RTtransform**

Opaque type to handle Transform - Note that the ∗_api type should never be used directly. Only the typedef target name will be guaranteed to remain unchanged

4.11.2.15 typedef struct RTvariable_api∗ **RTvariable**

Opaque type to handle Variable - Note that the ∗_api type should never be used directly. Only the typedef target name will be guaranteed to remain unchanged

4.12 optix_prime.h File Reference

4.12.1 Detailed Description

OptiX Prime public API.

Author

NVIDIA Corporation OptiX Prime public API

Macros

- #define **OPTIX_PRIME_VERSION**
- #define **RTPAPI** __declspec(dllimport)

Typedefs

- typedef unsigned int **RTPsize**
- typedef struct RTPcontext_api ∗ RTPcontext
- typedef struct RTPmodel_api ∗ RTPmodel
- typedef struct RTPquery_api ∗ RTPquery
- typedef struct RTPbufferdesc_api ∗ RTPbufferdesc
- typedef struct CUstream_st ∗ **cudaStream_t**

Functions

- RTPresult RTPAPI rtpContextCreate (RTPcontexttype type, RTPcontext ∗context)
- RTPresult RTPAPI rtpContextSetCudaDeviceNumbers (RTPcontext context, unsigned deviceCount, const unsigned ∗deviceNumbers)
- RTPresult RTPAPI rtpContextSetCpuThreads (RTPcontext context, unsigned numThreads)
- RTPresult RTPAPI rtpContextDestroy (RTPcontext context)
- RTPresult RTPAPI rtpContextGetLastErrorString (RTPcontext context, const char ∗∗return_string)

- RTPresult RTPAPI rtpBufferDescCreate (RTPcontext context, RTPbufferformat format, RTPbuffertype type, void ∗buffer, RTPbufferdesc ∗desc)
- RTPresult RTPAPI rtpBufferDescGetContext (RTPbufferdesc desc, RTPcontext ∗context)
- RTPresult RTPAPI rtpBufferDescSetRange (RTPbufferdesc desc, RTPsize begin, RTPsize end)
- RTPresult RTPAPI rtpBufferDescSetStride (RTPbufferdesc desc, unsigned strideBytes)
- RTPresult RTPAPI rtpBufferDescSetCudaDeviceNumber (RTPbufferdesc desc, unsigned deviceNumber)
- RTPresult RTPAPI rtpBufferDescDestroy (RTPbufferdesc desc)
- RTPresult RTPAPI rtpModelCreate (RTPcontext context, RTPmodel ∗model)
- RTPresult RTPAPI rtpModelGetContext (RTPmodel model, RTPcontext ∗context)
- RTPresult RTPAPI rtpModelSetTriangles (RTPmodel model, RTPbufferdesc indices, RTPbufferdesc vertices)
- RTPresult RTPAPI rtpModelSetInstances (RTPmodel model, RTPbufferdesc instances, RTPbufferdesc transforms)
- RTPresult RTPAPI rtpModelUpdate (RTPmodel model, unsigned hints)
- RTPresult RTPAPI rtpModelFinish (RTPmodel model)
- RTPresult RTPAPI rtpModelGetFinished (RTPmodel model, int ∗isFinished)
- RTPresult RTPAPI rtpModelCopy (RTPmodel model, RTPmodel srcModel)
- RTPresult RTPAPI rtpModelSetBuilderParameter (RTPmodel model_api, RTPbuilderparam param, RTPsize size, void ∗ptr)
- RTPresult RTPAPI rtpModelDestroy (RTPmodel model)
- RTPresult RTPAPI rtpQueryCreate (RTPmodel model, RTPquerytype queryType, RTPquery ∗query)
- RTPresult RTPAPI rtpQueryGetContext (RTPquery query, RTPcontext ∗context)
- RTPresult RTPAPI rtpQuerySetRays (RTPquery query, RTPbufferdesc rays)
- RTPresult RTPAPI rtpQuerySetHits (RTPquery query, RTPbufferdesc hits)
- RTPresult RTPAPI rtpQueryExecute (RTPquery query, unsigned hints)
- RTPresult RTPAPI rtpQueryFinish (RTPquery query)
- RTPresult RTPAPI rtpQueryGetFinished (RTPquery query, int ∗isFinished)
- RTPresult RTPAPI rtpQuerySetCudaStream (RTPquery query, cudaStream_t stream)
- RTPresult RTPAPI rtpQueryDestroy (RTPquery query)
- RTPresult RTPAPI rtpHostBufferLock (void ∗buffer, RTPsize size)
- RTPresult RTPAPI rtpHostBufferUnlock (void ∗buffer)
- RTPresult RTPAPI rtpGetErrorString (RTPresult errorCode, const char ∗∗errorString)
- RTPresult RTPAPI rtpGetVersion (unsigned int ∗version)
- RTPresult RTPAPI rtpGetVersionString (const char ∗∗versionString)

4.12.2 Macro Definition Documentation

4.12.2.1 #define OPTIX_PRIME_VERSION

Value:

```
3070 /* 3.7.0 (major =  OPTIX_PRIME_VERSION/1000,     *
                                *        minor = (OPTIX_PRIME_VERSION%1000)/10, *
                                *        micro =  OPTIX_PRIME_VERSION%10        */
```

4.12.3 Typedef Documentation

4.12.3.1 typedef struct RTPbufferdesc_api∗ RTPbufferdesc

Opaque type. Note that the ∗_api type should never be used directly. Only the typedef target name will be guaranteed to remain unchanged.

4.12.3.2 typedef struct RTPcontext_api∗ RTPcontext

Opaque type. Note that the ∗_api type should never be used directly. Only the typedef target name will be guaranteed to remain unchanged.

4.12.3.3 typedef struct RTPmodel_api∗ **RTPmodel**

Opaque type. Note that the ∗_api type should never be used directly. Only the typedef target name will be guaranteed to remain unchanged.

4.12.3.4 typedef struct RTPquery_api∗ **RTPquery**

Opaque type. Note that the ∗_api type should never be used directly. Only the typedef target name will be guaranteed to remain unchanged.

4.13 optix_prime_declarations.h File Reference

4.13.1 Detailed Description

OptiX Prime public API declarations.

Author

NVIDIA Corporation OptiX Prime public API declarations

Enumerations

- enum RTPresult {
RTP_SUCCESS = 0,
RTP_ERROR_INVALID_VALUE = 1,
RTP_ERROR_OUT_OF_MEMORY = 2,
RTP_ERROR_INVALID_HANDLE = 3,
RTP_ERROR_NOT_SUPPORTED = 4,
RTP_ERROR_OBJECT_CREATION_FAILED = 5,
RTP_ERROR_MEMORY_ALLOCATION_FAILED = 6,
RTP_ERROR_INVALID_CONTEXT = 7,
RTP_ERROR_VALIDATION_ERROR = 8,
RTP_ERROR_INVALID_OPERATION = 9,
RTP_ERROR_UNKNOWN = 999 }
- enum RTPcontexttype {
RTP_CONTEXT_TYPE_CPU = 0x100,
RTP_CONTEXT_TYPE_CUDA = 0x101 }
- enum RTPbuffertype {
RTP_BUFFER_TYPE_HOST = 0x200,
RTP_BUFFER_TYPE_CUDA_LINEAR = 0x201 }
- enum RTPbufferformat {
RTP_BUFFER_FORMAT_INDICES_INT3 = 0x400,
RTP_BUFFER_FORMAT_INDICES_INT3_MASK_INT = 0x401,
RTP_BUFFER_FORMAT_VERTEX_FLOAT3 = 0x420,
RTP_BUFFER_FORMAT_VERTEX_FLOAT4 = 0x421,
RTP_BUFFER_FORMAT_RAY_ORIGIN_DIRECTION = 0x440,
RTP_BUFFER_FORMAT_RAY_ORIGIN_TMIN_DIRECTION_TMAX = 0x441,
RTP_BUFFER_FORMAT_RAY_ORIGIN_MASK_DIRECTION_TMAX = 0x442,
RTP_BUFFER_FORMAT_HIT_BITMASK = 0x460,
RTP_BUFFER_FORMAT_HIT_T = 0x461,
RTP_BUFFER_FORMAT_HIT_T_TRIID = 0x462,
RTP_BUFFER_FORMAT_HIT_T_TRIID_U_V = 0x463,
RTP_BUFFER_FORMAT_HIT_T_TRIID_INSTID = 0x464,
RTP_BUFFER_FORMAT_HIT_T_TRIID_INSTID_U_V = 0x465,
RTP_BUFFER_FORMAT_INSTANCE_MODEL = 0x480,
RTP_BUFFER_FORMAT_TRANSFORM_FLOAT4x4 = 0x490,
RTP_BUFFER_FORMAT_TRANSFORM_FLOAT4x3 = 0x491 }

- enum RTPquerytype {
  RTP_QUERY_TYPE_ANY = 0x1000,
  RTP_QUERY_TYPE_CLOSEST = 0x1001 }
- enum RTPmodelhint {
  RTP_MODEL_HINT_NONE = 0x0000,
  RTP_MODEL_HINT_ASYNC = 0x2001,
  RTP_MODEL_HINT_MASK_UPDATE = 0x2002,
  RTP_MODEL_HINT_USER_TRIANGLES_AFTER_COPY_SET = 0x2004 }
- enum RTPqueryhint {
  RTP_QUERY_HINT_NONE = 0x0000,
  RTP_QUERY_HINT_ASYNC = 0x4001 }
- enum RTPbuilderparam {
  RTP_BUILDER_PARAM_CHUNK_SIZE = 0x800,
  RTP_BUILDER_PARAM_USE_CALLER_TRIANGLES = 0x801 }

4.13.2 Enumeration Type Documentation

4.13.2.1 enum RTPbufferformat

Buffer formats

Enumerator

RTP_BUFFER_FORMAT_INDICES_INT3 Index buffer with 3 integer vertex indices per triangle

RTP_BUFFER_FORMAT_INDICES_INT3_MASK_INT Index buffer with 3 integer vertex indices per triangle, and an integer visibility mask

RTP_BUFFER_FORMAT_VERTEX_FLOAT3 Vertex buffer with 3 floats per vertex position

RTP_BUFFER_FORMAT_VERTEX_FLOAT4 Vertex buffer with 4 floats per vertex position

RTP_BUFFER_FORMAT_RAY_ORIGIN_DIRECTION float3:origin float3:direction

RTP_BUFFER_FORMAT_RAY_ORIGIN_TMIN_DIRECTION_TMAX float3:origin, float:tmin, float3:direction, float:tmax

RTP_BUFFER_FORMAT_RAY_ORIGIN_MASK_DIRECTION_TMAX float3:origin, int:mask, float3:direction, float:tmax. If used, buffer format RTP_BUFFER_FORMAT_INDICES_INT3_MASK_INT is required!

RTP_BUFFER_FORMAT_HIT_BITMASK one bit per ray 0=miss, 1=hit

RTP_BUFFER_FORMAT_HIT_T float:ray distance ($t < 0$ for miss)

RTP_BUFFER_FORMAT_HIT_T_TRIID float:ray distance ($t < 0$ for miss), int:triangle id

RTP_BUFFER_FORMAT_HIT_T_TRIID_U_V float:ray distance ($t < 0$ for miss), int:triangle id, float2:barycentric coordinates u,v (w=1-u-v)

RTP_BUFFER_FORMAT_HIT_T_TRIID_INSTID float:ray distance ($t < 0$ for miss), int:triangle id, int:instance position in list

RTP_BUFFER_FORMAT_HIT_T_TRIID_INSTID_U_V float:ray distance ($t < 0$ for miss), int:triangle id, int:instance position in list, float2:barycentric coordinates u,v (w=1-u-v)

RTP_BUFFER_FORMAT_INSTANCE_MODEL RTPmodel:objects of type RTPmodel

RTP_BUFFER_FORMAT_TRANSFORM_FLOAT4x4 float:row major 4x4 affine matrix (it is assumed that the last row has the entries 0.0f, 0.0f, 0.0f, 1.0f, and will be ignored)

RTP_BUFFER_FORMAT_TRANSFORM_FLOAT4x3 float:row major 4x3 affine matrix

4.13.2.2 enum RTPbuffertype

Buffer types

Enumerator

RTP_BUFFER_TYPE_HOST Buffer in host memory

RTP_BUFFER_TYPE_CUDA_LINEAR Linear buffer in device memory on a cuda device

4.13.2.3 enum RTPbuilderparam

Enumerator

RTP_BUILDER_PARAM_CHUNK_SIZE Number of bytes used for a chunk of the acceleration structure build

RTP_BUILDER_PARAM_USE_CALLER_TRIANGLES A hint to specify which data should be used for the intersection test

4.13.2.4 enum RTPcontexttype

Context types

Enumerator

RTP_CONTEXT_TYPE_CPU CPU context

RTP_CONTEXT_TYPE_CUDA CUDA context

4.13.2.5 enum RTPmodelhint

Model hints

Enumerator

RTP_MODEL_HINT_NONE No hints. Use default settings.

RTP_MODEL_HINT_ASYNC Asynchronous model updating

RTP_MODEL_HINT_MASK_UPDATE Upload buffer with mask data again

RTP_MODEL_HINT_USER_TRIANGLES_AFTER_COPY_SET Clear dirty flag of triangles.

4.13.2.6 enum RTPqueryhint

Query hints

Enumerator

RTP_QUERY_HINT_NONE No hints. Use default settings.

RTP_QUERY_HINT_ASYNC Asynchronous query execution

4.13.2.7 enum RTPquerytype

Query types

Enumerator

RTP_QUERY_TYPE_ANY Return any hit along a ray

RTP_QUERY_TYPE_CLOSEST Return only the closest hit along a ray

4.13.2.8 enum RTPresult

Return value for OptiX Prime APIs

Enumerator

RTP_SUCCESS Success

RTP_ERROR_INVALID_VALUE An invalid value was provided

RTP_ERROR_OUT_OF_MEMORY Out of memory

RTP_ERROR_INVALID_HANDLE An invalid handle was supplied

RTP_ERROR_NOT_SUPPORTED An unsupported function was requested

RTP_ERROR_OBJECT_CREATION_FAILED Object creation failed

RTP_ERROR_MEMORY_ALLOCATION_FAILED Memory allocation failed

RTP_ERROR_INVALID_CONTEXT An invalid context was provided

RTP_ERROR_VALIDATION_ERROR A validation error occurred

RTP_ERROR_INVALID_OPERATION An invalid operation was performed

RTP_ERROR_UNKNOWN Unknown error

4.14 optix_prime_professional.h File Reference

4.14.1 Detailed Description

OptiX Prime Professional build.

Author

NVIDIA Corporation OptiX Low Level professional API declarations

4.15 optix_primepp.h File Reference

4.15.1 Detailed Description

A C++ wrapper around the OptiX Prime API.

Classes

- class optix::prime::ContextObj
- class optix::prime::BufferDescObj
- class optix::prime::ModelObj
- class optix::prime::QueryObj
- class optix::prime::Exception

Macros

- #define **CHK**(code) checkError(code, getContext()->getRTPcontext())

Typedefs

- typedef Handle< BufferDescObj > optix::prime::BufferDesc
- typedef Handle< ContextObj > optix::prime::Context
- typedef Handle< ModelObj > optix::prime::Model
- typedef Handle< QueryObj > optix::prime::Query

Functions

- void **optix::prime::checkError** (RTPresult code, RTPcontext context)

4.16 optix_world.h File Reference

4.16.1 Detailed Description

OptiX public API C and C++ API.

Author

NVIDIA Corporation This header is designed to be included by both host and device code providing access to the C-API along with the C++ API found in optixpp_namespaces.h. In addition various helper classes and file will also be included when compiling C++ compatible code.

Note that the CUDA vector types will be defined in the optix:: namespace.

4.17 optixpp_namespace.h File Reference

4.17.1 Detailed Description

A C++ wrapper around the OptiX API.

Classes

- class optix::Handle< T >
- class optix::Exception
- class optix::APIObj
- class optix::DestroyableObj
- class optix::ScopedObj
- class optix::VariableObj
- class optix::ContextObj
- class optix::ProgramObj
- class optix::GroupObj
- class optix::GeometryGroupObj
- class optix::TransformObj
- class optix::SelectorObj
- class optix::AccelerationObj
- class optix::GeometryInstanceObj
- class optix::GeometryObj
- class optix::MaterialObj
- class optix::TextureSamplerObj
- class optix::BufferObj
- struct optix::bufferId< T, Dim >
- singleton optix::callableProgramId< T >

Macros

- #define **WIN32_LEAN_AND_MEAN**
- #define **rtBufferId** optix::bufferId
- #define RT_INTERNAL_CALLABLE_PROGRAM_DEFS()
- #define **rtCallableProgramId** optix::callableProgramId

Typedefs

- typedef Handle< AccelerationObj > optix::Acceleration
- typedef Handle< BufferObj > optix::Buffer
- typedef Handle< ContextObj > optix::Context
- typedef Handle< GeometryObj > optix::Geometry
- typedef Handle< GeometryGroupObj > optix::GeometryGroup
- typedef Handle
  < GeometryInstanceObj > optix::GeometryInstance
- typedef Handle< GroupObj > optix::Group
- typedef Handle< MaterialObj > optix::Material
- typedef Handle< ProgramObj > optix::Program
- typedef Handle< SelectorObj > optix::Selector
- typedef Handle< TextureSamplerObj > optix::TextureSampler
- typedef Handle< TransformObj > optix::Transform
- typedef Handle< VariableObj > optix::Variable

Functions

- template<typename ReturnT >
  class callableProgramId< ReturnT()> **optix::RT_INTERNAL_CALLABLE_PROGRAM_DEFS** ()
- template<typename ReturnT , typename Arg0T >
  class callableProgramId
  < ReturnT(Arg0T)> **optix::RT_INTERNAL_CALLABLE_PROGRAM_DEFS** ()
- template<typename ReturnT , typename Arg0T , typename Arg1T >
  class callableProgramId
  < ReturnT(Arg0T, Arg1T)> **optix::RT_INTERNAL_CALLABLE_PROGRAM_DEFS** ()
- template<typename ReturnT , typename Arg0T , typename Arg1T , typename Arg2T >
  class callableProgramId
  < ReturnT(Arg0T, Arg1T, Arg2T)> **optix::RT_INTERNAL_CALLABLE_PROGRAM_DEFS** ()
- template<typename ReturnT , typename Arg0T , typename Arg1T , typename Arg2T , typename Arg3T >
  class callableProgramId
  < ReturnT(Arg0T, Arg1T, Arg2T,
  Arg3T)> **optix::RT_INTERNAL_CALLABLE_PROGRAM_DEFS** ()
- template<typename ReturnT , typename Arg0T , typename Arg1T , typename Arg2T , typename Arg3T , typename Arg4T >
  class callableProgramId
  < ReturnT(Arg0T, Arg1T, Arg2T,
  Arg3T, Arg4T)> **optix::RT_INTERNAL_CALLABLE_PROGRAM_DEFS** ()
- template<typename ReturnT , typename Arg0T , typename Arg1T , typename Arg2T , typename Arg3T , typename Arg4T , typename Arg5T >
  class callableProgramId
  < ReturnT(Arg0T, Arg1T, Arg2T,
  Arg3T, Arg4T, Arg5T)> **optix::RT_INTERNAL_CALLABLE_PROGRAM_DEFS** ()
- template<typename ReturnT , typename Arg0T , typename Arg1T , typename Arg2T , typename Arg3T , typename Arg4T , typename Arg5T , typename Arg6T >
  class callableProgramId
  < ReturnT(Arg0T, Arg1T, Arg2T,
  Arg3T, Arg4T, Arg5T, Arg6T)> **optix::RT_INTERNAL_CALLABLE_PROGRAM_DEFS** ()
- template<typename ReturnT , typename Arg0T , typename Arg1T , typename Arg2T , typename Arg3T , typename Arg4T , typename Arg5T , typename Arg6T , typename Arg7T >
  class callableProgramId
  < ReturnT(Arg0T, Arg1T, Arg2T,
  Arg3T, Arg4T, Arg5T, Arg6T,
  Arg7T)> **optix::RT_INTERNAL_CALLABLE_PROGRAM_DEFS** ()

- template<typename ReturnT , typename Arg0T , typename Arg1T , typename Arg2T , typename Arg3T , typename Arg4T , typename Arg5T , typename Arg6T , typename Arg7T , typename Arg8T >
  class callableProgramId
  < ReturnT(Arg0T, Arg1T, Arg2T,
  Arg3T, Arg4T, Arg5T, Arg6T,
  Arg7T, Arg8T)> **optix::RT_INTERNAL_CALLABLE_PROGRAM_DEFS** ()
- template<typename ReturnT , typename Arg0T , typename Arg1T , typename Arg2T , typename Arg3T , typename Arg4T , typename Arg5T , typename Arg6T , typename Arg7T , typename Arg8T , typename Arg9T >
  class callableProgramId
  < ReturnT(Arg0T, Arg1T, Arg2T,
  Arg3T, Arg4T, Arg5T, Arg6T,
  Arg7T, Arg8T, Arg9T)> **optix::RT_INTERNAL_CALLABLE_PROGRAM_DEFS** ()

4.17.2 Macro Definition Documentation

4.17.2.1 #define RT_INTERNAL_CALLABLE_PROGRAM_DEFS( )

Value:

```
{                                             \
  public:                                       \
    callableProgramId() {}                      \
    callableProgramId(int id) : m_id(id) {}     \
    int getId() const { return m_id; }          \
  private:                                      \
    int m_id;                                   \
  }
```

callableProgramId is a host version of the device side callableProgramId.

Use callableProgramId to define types that can be included from both the host and device code. This class provides a container that can be used to transport the program id back and forth between host and device code. The callableProgramId class is useful, because it can take a program id obtained from rtProgramGetId and provide accessors for calling the program corresponding to the program id.

"bindless_type.h" used by both host and device code:

```
#include <optix_world.h>
struct ProgramInfo {
  int val;
  rtProgramId<int(int)> program;
};
```

Host code:

```
#include "bindless_type.h"
ProgramInfo input_program_info;
input_program_info.val = 0;
input_program_info.program = rtCallableProgramId<int(int)>(inputProgram0->getId());
context["input_program_info"]->setUserData(sizeof(ProgramInfo), &input_program_info);
```

Device code:

```
#include "bindless_type.h"
rtBuffer<int,1> result;
rtDeclareVariable(ProgramInfo, input_program_info, ,);

RT_PROGRAM void bindless()
{
  int value = input_program_info.program(input_program_info.val);
  result[0] = value;
}
```

4.18 optixu.h File Reference

4.18.1 Detailed Description

Simple API for performing raytracing queries using OptiX or the CPU.

Macros

- #define **RTU_INLINE** static inline
- #define **RTU_CHECK_ERROR**(func)
- #define **RTU_GROUP_ADD_CHILD**(_parent, _child, _index)
- #define **RTU_SELECTOR_ADD_CHILD**(_parent, _child, _index)

Functions

- RTresult RTAPI rtuNameForType (RTobjecttype type, char ∗buffer, RTsize bufferSize)
- RTresult RTAPI rtuGetSizeForRTformat (RTformat format, size_t ∗size)
- RTresult RTAPI rtuCUDACompileString (const char ∗source, const char ∗∗preprocessorArguments, unsigned int numPreprocessorArguments, RTsize ∗resultSize, RTsize ∗errorSize)
- RTresult RTAPI rtuCUDACompileFile (const char ∗filename, const char ∗∗preprocessorArguments, unsigned int numPreprocessorArguments, RTsize ∗resultSize, RTsize ∗errorSize)
- RTresult RTAPI rtuCUDAGetCompileResult (char ∗result, char ∗error)
- RTresult RTAPI rtuCreateClusteredMesh (RTcontext context, unsigned int usePTX32InHost64, RTgeometry ∗mesh, unsigned int num_verts, const float ∗verts, unsigned int num_tris, const unsigned ∗indices, const unsigned ∗mat_indices)
- RTresult RTAPI rtuCreateClusteredMeshExt (RTcontext context, unsigned int usePTX32InHost64, RTgeometry ∗mesh, unsigned int num_verts, const float ∗verts, unsigned int num_tris, const unsigned ∗indices, const unsigned ∗mat_indices, RTbuffer norms, const unsigned ∗norm_indices, RTbuffer tex_coords, const unsigned ∗tex_indices)

- RTU_INLINE RTresult rtuGroupAddChild (RTgroup group, RTobject child, unsigned int ∗index)
- RTU_INLINE RTresult rtuSelectorAddChild (RTselector selector, RTobject child, unsigned int ∗index)
- RTU_INLINE RTresult rtuGeometryGroupAddChild (RTgeometrygroup geometrygroup, RTgeometryinstance child, unsigned int ∗index)

- RTU_INLINE RTresult rtuTransformSetChild (RTtransform transform, RTobject child)

- RTU_INLINE RTresult rtuTransformGetChild (RTtransform transform, RTobject ∗type)
- RTU_INLINE RTresult rtuTransformGetChildType (RTtransform transform, RTobjecttype ∗type)

- RTU_INLINE RTresult rtuGroupRemoveChild (RTgroup group, RTobject child)
- RTU_INLINE RTresult rtuSelectorRemoveChild (RTselector selector, RTobject child)
- RTU_INLINE RTresult rtuGeometryGroupRemoveChild (RTgeometrygroup geometrygroup, RTgeometryinstance child)

- RTU_INLINE RTresult rtuGroupRemoveChildByIndex (RTgroup group, unsigned int index)
- RTU_INLINE RTresult rtuSelectorRemoveChildByIndex (RTselector selector, unsigned int index)
- RTU_INLINE RTresult rtuGeometryGroupRemoveChildByIndex (RTgeometrygroup geometrygroup, unsigned int index)

- RTU_INLINE RTresult rtuGroupGetChildIndex (RTgroup group, RTobject child, unsigned int ∗index)
- RTU_INLINE RTresult rtuSelectorGetChildIndex (RTselector selector, RTobject child, unsigned int ∗index)
- RTU_INLINE RTresult rtuGeometryGroupGetChildIndex (RTgeometrygroup geometrygroup, RTgeometryinstance child, unsigned int ∗index)

4.18.2 Macro Definition Documentation

4.18.2.1 #define RTU_CHECK_ERROR(*func*)

Value:

```
do {                                        \
    RTresult code = func;                     \
    if( code != RT_SUCCESS )                  \
      return code;                            \
  } while(0)
```

4.18.2.2 #define RTU_GROUP_ADD_CHILD(*_parent*, *_child*, *_index*)

Value:

```
unsigned int _count;                                              \
  RTU_CHECK_ERROR( rtGroupGetChildCount( (_parent), &_count ) );        \
  RTU_CHECK_ERROR( rtGroupSetChildCount( (_parent), _count+1 ) );       \
  RTU_CHECK_ERROR( rtGroupSetChild( (_parent), _count, (_child) ) );    \
  if( _index ) *(_index) = _count;                                      \
  return RT_SUCCESS
```

4.18.2.3 #define RTU_SELECTOR_ADD_CHILD(*_parent*, *_child*, *_index*)

Value:

```
unsigned int _count;                                              \
  RTU_CHECK_ERROR( rtSelectorGetChildCount( (_parent), &_count ) );     \
  RTU_CHECK_ERROR( rtSelectorSetChildCount( (_parent), _count+1 ) );    \
  RTU_CHECK_ERROR( rtSelectorSetChild( (_parent), _count, (_child) ) ); \
  if( _index ) *(_index) = _count;                                      \
  return RT_SUCCESS
```

4.19 optixu_aabb_namespace.h File Reference

4.19.1 Detailed Description

OptiX public API.

Author

NVIDIA Corporation OptiX public API Reference - Public AABB namespace

Classes

- class optix::Aabb

Macros

- #define **RT_AABB_ASSERT** assert
- #define **OPTIXU_INLINE_DEFINED** 1
- #define **OPTIXU_INLINE** __forceinline__

4.20 optixu_math_namespace.h File Reference

4.20.1 Detailed Description

OptiX public API.

Author

NVIDIA Corporation This file implements common mathematical operations on vector types (float3, float4 etc.) since these are not provided as standard by CUDA.

The syntax is modelled on the Cg standard library.

This file has also been modified from the original cutil_math.h file. cutil_math.h is a subset of this file, and you should use this file in place of any cutil_math.h file you wish to use.

Classes

- struct optix::Onb

Macros

- #define **OPTIXU_INLINE_DEFINED** 1
- #define **OPTIXU_INLINE** __forceinline__
- #define **OPTIXU_MATH_DEFINE_IN_NAMESPACE**

Typedefs

- typedef unsigned int **optix::uint**
- typedef unsigned short **optix::ushort**

Functions

- OPTIXU_INLINE float **optix::fminf** (const float a, const float b)
- OPTIXU_INLINE float **optix::fmaxf** (const float a, const float b)
- OPTIXU_INLINE float **optix::copysignf** (const float dst, const float src)
- OPTIXU_INLINE int **optix::max** (int a, int b)
- OPTIXU_INLINE int **optix::min** (int a, int b)
- OPTIXU_INLINE int **optix::float_as_int** (const float f)
- OPTIXU_INLINE float **optix::int_as_float** (int i)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::lerp** (const float a, const float b, const float t)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::bilerp** (const float x00, const float x10, const float x01, const float x11, const float u, const float v)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::clamp** (const float f, const float a, const float b)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::getByIndex** (const float1 &v, int i)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::setByIndex** (float1 &v, int i, float x)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::operator-** (const float2 &a)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::lerp** (const float2 &a, const float2 &b, const float t)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::bilerp** (const float2 &x00, const float2 &x10, const float2 &x01, const float2 &x11, const float u, const float v)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::dot** (const float2 &a, const float2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::length** (const float2 &v)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::normalize** (const float2 &v)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::floor** (const float2 &v)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::reflect** (const float2 &i, const float2 &n)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::faceforward** (const float2 &n, const float2 &i, const float2 &nref)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::expf** (const float2 &v)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::getByIndex** (const float2 &v, int i)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::setByIndex** (float2 &v, int i, float x)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::operator-** (const float3 &a)

- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::lerp** (const float3 &a, const float3 &b, const float t)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::bilerp** (const float3 &x00, const float3 &x10, const float3 &x01, const float3 &x11, const float u, const float v)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::dot** (const float3 &a, const float3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::cross** (const float3 &a, const float3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::length** (const float3 &v)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::normalize** (const float3 &v)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::floor** (const float3 &v)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::reflect** (const float3 &i, const float3 &n)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::faceforward** (const float3 &n, const float3 &i, const float3 &nref)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::expf** (const float3 &v)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::getByIndex** (const float3 &v, int i)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::setByIndex** (float3 &v, int i, float x)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::operator-** (const float4 &a)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::lerp** (const float4 &a, const float4 &b, const float t)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::bilerp** (const float4 &x00, const float4 &x10, const float4 &x01, const float4 &x11, const float u, const float v)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::dot** (const float4 &a, const float4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::length** (const float4 &r)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::normalize** (const float4 &v)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::floor** (const float4 &v)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::reflect** (const float4 &i, const float4 &n)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::faceforward** (const float4 &n, const float4 &i, const float4 &nref)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::expf** (const float4 &v)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::getByIndex** (const float4 &v, int i)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::setByIndex** (float4 &v, int i, float x)
- OPTIXU_INLINE RT_HOSTDEVICE int **optix::clamp** (const int f, const int a, const int b)
- OPTIXU_INLINE RT_HOSTDEVICE int **optix::getByIndex** (const int1 &v, int i)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::setByIndex** (int1 &v, int i, int x)
- OPTIXU_INLINE RT_HOSTDEVICE int2 **optix::operator-** (const int2 &a)
- OPTIXU_INLINE RT_HOSTDEVICE int2 **optix::min** (const int2 &a, const int2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE int2 **optix::max** (const int2 &a, const int2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE int **optix::getByIndex** (const int2 &v, int i)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::setByIndex** (int2 &v, int i, int x)
- OPTIXU_INLINE RT_HOSTDEVICE int3 **optix::operator-** (const int3 &a)
- OPTIXU_INLINE RT_HOSTDEVICE int3 **optix::min** (const int3 &a, const int3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE int3 **optix::max** (const int3 &a, const int3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE int **optix::getByIndex** (const int3 &v, int i)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::setByIndex** (int3 &v, int i, int x)
- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::operator-** (const int4 &a)
- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::min** (const int4 &a, const int4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::max** (const int4 &a, const int4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE int **optix::getByIndex** (const int4 &v, int i)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::setByIndex** (int4 &v, int i, int x)
- OPTIXU_INLINE RT_HOSTDEVICE
  unsigned int **optix::clamp** (const unsigned int f, const unsigned int a, const unsigned int b)
- OPTIXU_INLINE RT_HOSTDEVICE
  unsigned int **optix::getByIndex** (const uint1 &v, unsigned int i)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::setByIndex** (uint1 &v, int i, unsigned int x)
- OPTIXU_INLINE RT_HOSTDEVICE uint2 **optix::min** (const uint2 &a, const uint2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE uint2 **optix::max** (const uint2 &a, const uint2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE
  unsigned int **optix::getByIndex** (const uint2 &v, unsigned int i)

- OPTIXU_INLINE RT_HOSTDEVICE void **optix::setByIndex** (uint2 &v, int i, unsigned int x)
- OPTIXU_INLINE RT_HOSTDEVICE uint3 **optix::min** (const uint3 &a, const uint3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE uint3 **optix::max** (const uint3 &a, const uint3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE
  unsigned int **optix::getByIndex** (const uint3 &v, unsigned int i)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::setByIndex** (uint3 &v, int i, unsigned int x)
- OPTIXU_INLINE RT_HOSTDEVICE
  unsigned int **optix::getByIndex** (const uint4 &v, unsigned int i)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::setByIndex** (uint4 &v, int i, unsigned int x)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::smoothstep** (const float edge0, const float edge1, const float x)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::temperature** (const float t)
- OPTIXU_INLINE RT_HOSTDEVICE bool **optix::intersect_triangle_branchless** (const Ray &ray, const float3 &p0, const float3 &p1, const float3 &p2, float3 &n, float &t, float &beta, float &gamma)
- OPTIXU_INLINE RT_HOSTDEVICE bool **optix::intersect_triangle_earlyexit** (const Ray &ray, const float3 &p0, const float3 &p1, const float3 &p2, float3 &n, float &t, float &beta, float &gamma)
- OPTIXU_INLINE RT_HOSTDEVICE bool **optix::intersect_triangle** (const Ray &ray, const float3 &p0, const float3 &p1, const float3 &p2, float3 &n, float &t, float &beta, float &gamma)
- OPTIXU_INLINE RT_HOSTDEVICE bool **optix::refract** (float3 &r, const float3 &i, const float3 &n, const float ior)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::fresnel_schlick** (const float cos_theta, const float exponent=5.0f, const float minimum=0.0f, const float maximum=1.0f)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::fresnel_schlick** (const float cos_theta, const float exponent, const float3 &minimum, const float3 &maximum)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::luminance** (const float3 &rgb)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::luminanceCIE** (const float3 &rgb)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::cosine_sample_hemisphere** (const float u1, const float u2, float3 &p)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::square_to_disk** (const float2 &sample)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::cart_to_pol** (const float3 &v)

- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::make_float2** (const float s)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::make_float2** (const int2 &a)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::make_float2** (const uint2 &a)

- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::fminf** (const float2 &a, const float2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::fminf** (const float2 &a)

- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::fmaxf** (const float2 &a, const float2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::fmaxf** (const float2 &a)

- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::operator+** (const float2 &a, const float2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::operator+** (const float2 &a, const float b)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::operator+** (const float a, const float2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator+=** (float2 &a, const float2 &b)

- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::operator-** (const float2 &a, const float2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::operator-** (const float2 &a, const float b)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::operator-** (const float a, const float2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator-=** (float2 &a, const float2 &b)

- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::operator∗** (const float2 &a, const float2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::operator∗** (const float2 &a, const float s)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::operator∗** (const float s, const float2 &a)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator∗=** (float2 &a, const float2 &s)

- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator∗=** (float2 &a, const float s)

- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::operator/** (const float2 &a, const float2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::operator/** (const float2 &a, const float s)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::operator/** (const float s, const float2 &a)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator/=** (float2 &a, const float s)

- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::clamp** (const float2 &v, const float a, const float b)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::clamp** (const float2 &v, const float2 &a, const float2 &b)

- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::make_float3** (const float s)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::make_float3** (const float2 &a)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::make_float3** (const int3 &a)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::make_float3** (const uint3 &a)

- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::fminf** (const float3 &a, const float3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::fminf** (const float3 &a)

- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::fmaxf** (const float3 &a, const float3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::fmaxf** (const float3 &a)

- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::operator+** (const float3 &a, const float3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::operator+** (const float3 &a, const float b)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::operator+** (const float a, const float3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator+=** (float3 &a, const float3 &b)

- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::operator-** (const float3 &a, const float3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::operator-** (const float3 &a, const float b)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::operator-** (const float a, const float3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator-=** (float3 &a, const float3 &b)

- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::operator∗** (const float3 &a, const float3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::operator∗** (const float3 &a, const float s)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::operator∗** (const float s, const float3 &a)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator∗=** (float3 &a, const float3 &s)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator∗=** (float3 &a, const float s)

- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::operator/** (const float3 &a, const float3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::operator/** (const float3 &a, const float s)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::operator/** (const float s, const float3 &a)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator/=** (float3 &a, const float s)

- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::clamp** (const float3 &v, const float a, const float b)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::clamp** (const float3 &v, const float3 &a, const float3 &b)

- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::make_float4** (const float s)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::make_float4** (const float3 &a)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::make_float4** (const int4 &a)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::make_float4** (const uint4 &a)

- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::fminf** (const float4 &a, const float4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::fminf** (const float4 &a)

- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::fmaxf** (const float4 &a, const float4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float **optix::fmaxf** (const float4 &a)

- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::operator+** (const float4 &a, const float4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::operator+** (const float4 &a, const float b)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::operator+** (const float a, const float4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator+=** (float4 &a, const float4 &b)

- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::operator-** (const float4 &a, const float4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::operator-** (const float4 &a, const float b)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::operator-** (const float a, const float4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator-=** (float4 &a, const float4 &b)

- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::operator∗** (const float4 &a, const float4 &s)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::operator∗** (const float4 &a, const float s)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::operator∗** (const float s, const float4 &a)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator∗=** (float4 &a, const float4 &s)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator∗=** (float4 &a, const float s)

- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::operator/** (const float4 &a, const float4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::operator/** (const float4 &a, const float s)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::operator/** (const float s, const float4 &a)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator/=** (float4 &a, const float s)

- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::clamp** (const float4 &v, const float a, const float b)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::clamp** (const float4 &v, const float4 &a, const float4 &b)

- OPTIXU_INLINE RT_HOSTDEVICE int2 **optix::make_int2** (const int s)
- OPTIXU_INLINE RT_HOSTDEVICE int2 **optix::make_int2** (const float2 &a)

- OPTIXU_INLINE RT_HOSTDEVICE int2 **optix::operator+** (const int2 &a, const int2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator+=** (int2 &a, const int2 &b)

- OPTIXU_INLINE RT_HOSTDEVICE int2 **optix::operator-** (const int2 &a, const int2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE int2 **optix::operator-** (const int2 &a, const int b)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator-=** (int2 &a, const int2 &b)

- OPTIXU_INLINE RT_HOSTDEVICE int2 **optix::operator∗** (const int2 &a, const int2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE int2 **optix::operator∗** (const int2 &a, const int s)
- OPTIXU_INLINE RT_HOSTDEVICE int2 **optix::operator∗** (const int s, const int2 &a)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator∗=** (int2 &a, const int s)

- OPTIXU_INLINE RT_HOSTDEVICE int2 **optix::clamp** (const int2 &v, const int a, const int b)
- OPTIXU_INLINE RT_HOSTDEVICE int2 **optix::clamp** (const int2 &v, const int2 &a, const int2 &b)

- OPTIXU_INLINE RT_HOSTDEVICE bool **optix::operator==** (const int2 &a, const int2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE bool **optix::operator!=** (const int2 &a, const int2 &b)

- OPTIXU_INLINE RT_HOSTDEVICE int3 **optix::make_int3** (const int s)
- OPTIXU_INLINE RT_HOSTDEVICE int3 **optix::make_int3** (const float3 &a)

- OPTIXU_INLINE RT_HOSTDEVICE int3 **optix::operator+** (const int3 &a, const int3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator+=** (int3 &a, const int3 &b)

- OPTIXU_INLINE RT_HOSTDEVICE int3 **optix::operator-** (const int3 &a, const int3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator-=** (int3 &a, const int3 &b)

- OPTIXU_INLINE RT_HOSTDEVICE int3 **optix::operator∗** (const int3 &a, const int3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE int3 **optix::operator∗** (const int3 &a, const int s)
- OPTIXU_INLINE RT_HOSTDEVICE int3 **optix::operator∗** (const int s, const int3 &a)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator∗=** (int3 &a, const int s)

- OPTIXU_INLINE RT_HOSTDEVICE int3 **optix::operator/** (const int3 &a, const int3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE int3 **optix::operator/** (const int3 &a, const int s)
- OPTIXU_INLINE RT_HOSTDEVICE int3 **optix::operator/** (const int s, const int3 &a)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator/=** (int3 &a, const int s)

- OPTIXU_INLINE RT_HOSTDEVICE int3 **optix::clamp** (const int3 &v, const int a, const int b)
- OPTIXU_INLINE RT_HOSTDEVICE int3 **optix::clamp** (const int3 &v, const int3 &a, const int3 &b)

- OPTIXU_INLINE RT_HOSTDEVICE bool **optix::operator==** (const int3 &a, const int3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE bool **optix::operator!=** (const int3 &a, const int3 &b)

- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::make_int4** (const int s)
- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::make_int4** (const float4 &a)

- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::operator+** (const int4 &a, const int4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator+=** (int4 &a, const int4 &b)

- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::operator-** (const int4 &a, const int4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator-=** (int4 &a, const int4 &b)

- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::operator∗** (const int4 &a, const int4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::operator∗** (const int4 &a, const int s)
- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::operator∗** (const int s, const int4 &a)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator∗=** (int4 &a, const int s)

- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::operator/** (const int4 &a, const int4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::operator/** (const int4 &a, const int s)
- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::operator/** (const int s, const int4 &a)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator/=** (int4 &a, const int s)

- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::clamp** (const int4 &v, const int a, const int b)
- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::clamp** (const int4 &v, const int4 &a, const int4 &b)

- OPTIXU_INLINE RT_HOSTDEVICE bool **optix::operator==** (const int4 &a, const int4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE bool **optix::operator!=** (const int4 &a, const int4 &b)

- OPTIXU_INLINE RT_HOSTDEVICE uint2 **optix::make_uint2** (const unsigned int s)
- OPTIXU_INLINE RT_HOSTDEVICE uint2 **optix::make_uint2** (const float2 &a)

- OPTIXU_INLINE RT_HOSTDEVICE uint2 **optix::operator+** (const uint2 &a, const uint2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator+=** (uint2 &a, const uint2 &b)

- OPTIXU_INLINE RT_HOSTDEVICE uint2 **optix::operator-** (const uint2 &a, const uint2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE uint2 **optix::operator-** (const uint2 &a, const unsigned int b)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator-=** (uint2 &a, const uint2 &b)

- OPTIXU_INLINE RT_HOSTDEVICE uint2 **optix::operator∗** (const uint2 &a, const uint2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE uint2 **optix::operator∗** (const uint2 &a, const unsigned int s)
- OPTIXU_INLINE RT_HOSTDEVICE uint2 **optix::operator∗** (const unsigned int s, const uint2 &a)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator∗=** (uint2 &a, const unsigned int s)

- OPTIXU_INLINE RT_HOSTDEVICE uint2 **optix::clamp** (const uint2 &v, const unsigned int a, const unsigned int b)
- OPTIXU_INLINE RT_HOSTDEVICE uint2 **optix::clamp** (const uint2 &v, const uint2 &a, const uint2 &b)

- OPTIXU_INLINE RT_HOSTDEVICE bool **optix::operator==** (const uint2 &a, const uint2 &b)
- OPTIXU_INLINE RT_HOSTDEVICE bool **optix::operator!=** (const uint2 &a, const uint2 &b)

- OPTIXU_INLINE RT_HOSTDEVICE uint3 **optix::make_uint3** (const unsigned int s)
- OPTIXU_INLINE RT_HOSTDEVICE uint3 **optix::make_uint3** (const float3 &a)

- OPTIXU_INLINE RT_HOSTDEVICE uint3 **optix::operator+** (const uint3 &a, const uint3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator+=** (uint3 &a, const uint3 &b)

- OPTIXU_INLINE RT_HOSTDEVICE uint3 **optix::operator-** (const uint3 &a, const uint3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator-=** (uint3 &a, const uint3 &b)

- OPTIXU_INLINE RT_HOSTDEVICE uint3 **optix::operator∗** (const uint3 &a, const uint3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE uint3 **optix::operator∗** (const uint3 &a, const unsigned int s)
- OPTIXU_INLINE RT_HOSTDEVICE uint3 **optix::operator∗** (const unsigned int s, const uint3 &a)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator∗=** (uint3 &a, const unsigned int s)

- OPTIXU_INLINE RT_HOSTDEVICE uint3 **optix::operator/** (const uint3 &a, const uint3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE uint3 **optix::operator/** (const uint3 &a, const unsigned int s)
- OPTIXU_INLINE RT_HOSTDEVICE uint3 **optix::operator/** (const unsigned int s, const uint3 &a)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator/=** (uint3 &a, const unsigned int s)

- OPTIXU_INLINE RT_HOSTDEVICE uint3 **optix::clamp** (const uint3 &v, const unsigned int a, const unsigned int b)
- OPTIXU_INLINE RT_HOSTDEVICE uint3 **optix::clamp** (const uint3 &v, const uint3 &a, const uint3 &b)

- OPTIXU_INLINE RT_HOSTDEVICE bool **optix::operator==** (const uint3 &a, const uint3 &b)
- OPTIXU_INLINE RT_HOSTDEVICE bool **optix::operator!=** (const uint3 &a, const uint3 &b)

- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::make_uint4** (const unsigned int s)
- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::make_uint4** (const float4 &a)

- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::min** (const uint4 &a, const uint4 &b)

- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::max** (const uint4 &a, const uint4 &b)

- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::operator+** (const uint4 &a, const uint4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator+=** (uint4 &a, const uint4 &b)

- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::operator-** (const uint4 &a, const uint4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator-=** (uint4 &a, const uint4 &b)

- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::operator∗** (const uint4 &a, const uint4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::operator∗** (const uint4 &a, const unsigned int s)

- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::operator*** (const unsigned int s, const uint4 &a)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator*=** (uint4 &a, const unsigned int s)

- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::operator/** (const uint4 &a, const uint4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::operator/** (const uint4 &a, const unsigned int s)
- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::operator/** (const unsigned int s, const uint4 &a)
- OPTIXU_INLINE RT_HOSTDEVICE void **optix::operator/=** (uint4 &a, const unsigned int s)

- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::clamp** (const uint4 &v, const unsigned int a, const unsigned int b)
- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::clamp** (const uint4 &v, const uint4 &a, const uint4 &b)

- OPTIXU_INLINE RT_HOSTDEVICE bool **optix::operator==** (const uint4 &a, const uint4 &b)
- OPTIXU_INLINE RT_HOSTDEVICE bool **optix::operator!=** (const uint4 &a, const uint4 &b)

- OPTIXU_INLINE RT_HOSTDEVICE int2 **optix::make_int2** (const int3 &v0)
- OPTIXU_INLINE RT_HOSTDEVICE int2 **optix::make_int2** (const int4 &v0)
- OPTIXU_INLINE RT_HOSTDEVICE int3 **optix::make_int3** (const int4 &v0)
- OPTIXU_INLINE RT_HOSTDEVICE uint2 **optix::make_uint2** (const uint3 &v0)
- OPTIXU_INLINE RT_HOSTDEVICE uint2 **optix::make_uint2** (const uint4 &v0)
- OPTIXU_INLINE RT_HOSTDEVICE uint3 **optix::make_uint3** (const uint4 &v0)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::make_float2** (const float3 &v0)
- OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::make_float2** (const float4 &v0)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::make_float3** (const float4 &v0)

- OPTIXU_INLINE RT_HOSTDEVICE int3 **optix::make_int3** (const int v0, const int2 &v1)
- OPTIXU_INLINE RT_HOSTDEVICE int3 **optix::make_int3** (const int2 &v0, const int v1)
- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::make_int4** (const int v0, const int v1, const int2 &v2)
- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::make_int4** (const int v0, const int2 &v1, const int v2)
- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::make_int4** (const int2 &v0, const int v1, const int v2)
- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::make_int4** (const int v0, const int3 &v1)
- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::make_int4** (const int3 &v0, const int v1)
- OPTIXU_INLINE RT_HOSTDEVICE int4 **optix::make_int4** (const int2 &v0, const int2 &v1)
- OPTIXU_INLINE RT_HOSTDEVICE uint3 **optix::make_uint3** (const unsigned int v0, const uint2 &v1)
- OPTIXU_INLINE RT_HOSTDEVICE uint3 **optix::make_uint3** (const uint2 &v0, const unsigned int v1)
- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::make_uint4** (const unsigned int v0, const unsigned int v1, const uint2 &v2)
- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::make_uint4** (const unsigned int v0, const uint2 &v1, const unsigned int v2)
- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::make_uint4** (const uint2 &v0, const unsigned int v1, const unsigned int v2)
- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::make_uint4** (const unsigned int v0, const uint3 &v1)
- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::make_uint4** (const uint3 &v0, const unsigned int v1)
- OPTIXU_INLINE RT_HOSTDEVICE uint4 **optix::make_uint4** (const uint2 &v0, const uint2 &v1)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::make_float3** (const float2 &v0, const float v1)
- OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::make_float3** (const float v0, const float2 &v1)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::make_float4** (const float v0, const float v1, const float2 &v2)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::make_float4** (const float v0, const float2 &v1, const float v2)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::make_float4** (const float2 &v0, const float v1, const float v2)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::make_float4** (const float v0, const float3 &v1)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::make_float4** (const float3 &v0, const float v1)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::make_float4** (const float2 &v0, const float2 &v1)

4.21 optixu_math_stream_namespace.h File Reference

4.21.1 Detailed Description

OptiX public API.

Author

NVIDIA Corporation Stream operators for CUDA vector types

Functions

- std::ostream & **optix::operator**<< (std::ostream &os, const optix::Aabb &aabb)

- std::ostream & **optix::operator**<< (std::ostream &os, const optix::float4 &v)
- std::istream & **optix::operator**>> (std::istream &is, optix::float4 &v)
- std::ostream & **optix::operator**<< (std::ostream &os, const optix::float3 &v)
- std::istream & **optix::operator**>> (std::istream &is, optix::float3 &v)
- std::ostream & **optix::operator**<< (std::ostream &os, const optix::float2 &v)
- std::istream & **optix::operator**>> (std::istream &is, optix::float2 &v)

- std::ostream & **optix::operator**<< (std::ostream &os, const optix::int4 &v)
- std::istream & **optix::operator**>> (std::istream &is, optix::int4 &v)
- std::ostream & **optix::operator**<< (std::ostream &os, const optix::int3 &v)
- std::istream & **optix::operator**>> (std::istream &is, optix::int3 &v)
- std::ostream & **optix::operator**<< (std::ostream &os, const optix::int2 &v)
- std::istream & **optix::operator**>> (std::istream &is, optix::int2 &v)

- std::ostream & **optix::operator**<< (std::ostream &os, const optix::uint4 &v)
- std::istream & **optix::operator**>> (std::istream &is, optix::uint4 &v)
- std::ostream & **optix::operator**<< (std::ostream &os, const optix::uint3 &v)
- std::istream & **optix::operator**>> (std::istream &is, optix::uint3 &v)
- std::ostream & **optix::operator**<< (std::ostream &os, const optix::uint2 &v)
- std::istream & **optix::operator**>> (std::istream &is, optix::uint2 &v)

- template<unsigned int M, unsigned int N>
  std::ostream & **optix::operator**<< (std::ostream &os, const optix::Matrix< M, N > &m)
- template<unsigned int M, unsigned int N>
  std::istream & **optix::operator**>> (std::istream &is, optix::Matrix< M, N > &m)

4.22 optixu_matrix_namespace.h File Reference

4.22.1 Detailed Description

OptiX public API.

Author

NVIDIA Corporation OptiX public API Reference - Public Matrix namespace

Classes

- struct optix::VectorDim< DIM >
- struct optix::VectorDim< 2 >
- struct optix::VectorDim< 3 >
- struct optix::VectorDim< 4 >
- class optix::Matrix< M, N >
- class optix::Matrix< M, N >

Macros

- #define **OPTIXU_INLINE_DEFINED** 1
- #define **OPTIXU_INLINE** __forceinline__
- #define **RT_MATRIX_ACCESS**(m, i, j) m[i∗N+j]
- #define **RT_MAT_DECL** template <unsigned int M, unsigned int N>

Typedefs

- typedef Matrix< 2, 2 > **optix::Matrix2x2**
- typedef Matrix< 2, 3 > **optix::Matrix2x3**
- typedef Matrix< 2, 4 > **optix::Matrix2x4**
- typedef Matrix< 3, 2 > **optix::Matrix3x2**
- typedef Matrix< 3, 3 > **optix::Matrix3x3**
- typedef Matrix< 3, 4 > **optix::Matrix3x4**
- typedef Matrix< 4, 2 > **optix::Matrix4x2**
- typedef Matrix< 4, 3 > **optix::Matrix4x3**
- typedef Matrix< 4, 4 > **optix::Matrix4x4**

Functions

- template<unsigned int M>
  OPTIXU_INLINE RT_HOSTDEVICE
  Matrix< M, M > & **optix::operator∗=** (Matrix< M, M > &m1, const Matrix< M, M > &m2)
- RT_MAT_DECL OPTIXU_INLINE
  RT_HOSTDEVICE Matrix< M, N > & **optix::operator-=** (Matrix< M, N > &m1, const Matrix< M, N > &m2)
- RT_MAT_DECL OPTIXU_INLINE
  RT_HOSTDEVICE Matrix< M, N > & **optix::operator+=** (Matrix< M, N > &m1, const Matrix< M, N > &m2)
- RT_MAT_DECL OPTIXU_INLINE
  RT_HOSTDEVICE Matrix< M, N > & **optix::operator∗=** (Matrix< M, N > &m1, float f)
- RT_MAT_DECL OPTIXU_INLINE
  RT_HOSTDEVICE Matrix< M, N > & **optix::operator/=** (Matrix< M, N > &m1, float f)
- RT_MAT_DECL OPTIXU_INLINE
  RT_HOSTDEVICE Matrix< M, N > **optix::operator-** (const Matrix< M, N > &m1, const Matrix< M, N > &m2)
- RT_MAT_DECL OPTIXU_INLINE
  RT_HOSTDEVICE Matrix< M, N > **optix::operator+** (const Matrix< M, N > &m1, const Matrix< M, N > &m2)
- RT_MAT_DECL OPTIXU_INLINE
  RT_HOSTDEVICE Matrix< M, N > **optix::operator/** (const Matrix< M, N > &m, float f)
- RT_MAT_DECL OPTIXU_INLINE
  RT_HOSTDEVICE Matrix< M, N > **optix::operator∗** (const Matrix< M, N > &m, float f)
- RT_MAT_DECL OPTIXU_INLINE
  RT_HOSTDEVICE Matrix< M, N > **optix::operator∗** (float f, const Matrix< M, N > &m)
- RT_MAT_DECL OPTIXU_INLINE
  RT_HOSTDEVICE Matrix< M, N >
  ::floatM **optix::operator∗** (const Matrix< M, N > &m, const typename Matrix< M, N >::floatN &v)
- RT_MAT_DECL OPTIXU_INLINE
  RT_HOSTDEVICE Matrix< M, N >
  ::floatN **optix::operator∗** (const typename Matrix< M, N >::floatM &v, const Matrix< M, N > &m)
- template<unsigned int M, unsigned int N, unsigned int R>
  OPTIXU_INLINE RT_HOSTDEVICE
  Matrix< M, R > **optix::operator∗** (const Matrix< M, N > &m1, const Matrix< N, R > &m2)
- template<unsigned int N>
  OPTIXU_INLINE RT_HOSTDEVICE float2 **optix::operator∗** (const Matrix< 2, N > &m, const typename Matrix< 2, N >::floatN &vec)

- template<unsigned int N>
  OPTIXU_INLINE RT_HOSTDEVICE float3 **optix::operator*** (const Matrix< 3, N > &m, const typename Matrix< 3, N >::floatN &vec)
- template<unsigned int N>
  OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::operator*** (const Matrix< 4, N > &m, const typename Matrix< 4, N >::floatN &vec)
- OPTIXU_INLINE RT_HOSTDEVICE float4 **optix::operator*** (const Matrix< 4, 4 > &m, const float4 &vec)
- template<unsigned int M, unsigned int N, unsigned int R>
  RT_HOSTDEVICE Matrix< M, R > **optix::operator*** (const Matrix< M, N > &m1, const Matrix< N, R > &m2)
- template<unsigned int M>
  RT_HOSTDEVICE Matrix< M, M > & **optix::operator*=** (Matrix< M, M > &m1, const Matrix< M, M > &m2)
- OPTIXU_INLINE RT_HOSTDEVICE
  Matrix< 3, 3 > **optix::make_matrix3x3** (const Matrix< 4, 4 > &matrix)

4.23 optixu_traversal.h File Reference

4.23.1 Detailed Description

Simple API for performing raytracing queries using OptiX or the CPU.

Classes

- struct RTUtraversalresult

Typedefs

- typedef struct RTUtraversal_api * RTUtraversal

Enumerations

- enum RTUquerytype {
  RTU_QUERY_TYPE_ANY_HIT = 0,
  RTU_QUERY_TYPE_CLOSEST_HIT,
  RTU_QUERY_TYPE_COUNT }
- enum RTUrayformat {
  RTU_RAYFORMAT_ORIGIN_DIRECTION_TMIN_TMAX_INTERLEAVED = 0,
  RTU_RAYFORMAT_ORIGIN_DIRECTION_INTERLEAVED,
  RTU_RAYFORMAT_COUNT }
- enum RTUtriformat {
  RTU_TRIFORMAT_MESH = 0,
  RTU_TRIFORMAT_TRIANGLE_SOUP,
  RTU_TRIFORMAT_COUNT }
- enum RTUinitoptions {
  RTU_INITOPTION_NONE = 0,
  RTU_INITOPTION_GPU_ONLY = 1 << 0,
  RTU_INITOPTION_CPU_ONLY = 1 << 1,
  RTU_INITOPTION_CULL_BACKFACE = 1 << 2 }
- enum RTUoutput {
  RTU_OUTPUT_NONE = 0,
  RTU_OUTPUT_NORMAL = 1 << 0,
  RTU_OUTPUT_BARYCENTRIC = 1 << 1,
  RTU_OUTPUT_BACKFACING = 1 << 2 }
- enum RTUoption { RTU_OPTION_INT_NUM_THREADS =0 }

Functions

- RTresult RTAPI rtuTraversalCreate (RTUtraversal ∗traversal, RTUquerytype query_type, RTUrayformat ray_format, RTUtriformat tri_format, unsigned int outputs, unsigned int options, RTcontext context)
- RTresult RTAPI rtuTraversalGetErrorString (RTUtraversal traversal, RTresult code, const char ∗∗return_string)
- RTresult RTAPI rtuTraversalSetOption (RTUtraversal traversal, RTUoption option, void ∗value)
- RTresult RTAPI rtuTraversalSetMesh (RTUtraversal traversal, unsigned int num_verts, const float ∗verts, unsigned int num_tris, const unsigned ∗indices)
- RTresult RTAPI rtuTraversalSetTriangles (RTUtraversal traversal, unsigned int num_tris, const float ∗tris)
- RTresult RTAPI rtuTraversalSetAccelData (RTUtraversal traversal, const void ∗data, RTsize data_size)
- RTresult RTAPI rtuTraversalGetAccelDataSize (RTUtraversal traversal, RTsize ∗data_size)
- RTresult RTAPI rtuTraversalGetAccelData (RTUtraversal traversal, void ∗data)
- RTresult RTAPI rtuTraversalMapRays (RTUtraversal traversal, unsigned int num_rays, float ∗∗rays)
- RTresult RTAPI rtuTraversalUnmapRays (RTUtraversal traversal)
- RTresult RTAPI rtuTraversalPreprocess (RTUtraversal traversal)
- RTresult RTAPI rtuTraversalTraverse (RTUtraversal traversal)
- RTresult RTAPI rtuTraversalMapResults (RTUtraversal traversal, RTUtraversalresult ∗∗results)
- RTresult RTAPI rtuTraversalUnmapResults (RTUtraversal traversal)
- RTresult RTAPI rtuTraversalMapOutput (RTUtraversal traversal, RTUoutput which, void ∗∗output)
- RTresult RTAPI rtuTraversalUnmapOutput (RTUtraversal traversal, RTUoutput which)
- RTresult RTAPI rtuTraversalDestroy (RTUtraversal traversal)

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