MAGE

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Contents

1 Namespace Index **1**

1.1 Namespace List 1

2 Class Index **3**

2.1 Class List 3

3 Namespace Documentation **5**

3.1 mage Namespace Reference 5

3.1.1 Enumeration Type Documentation 6

3.1.1.1 ReadWriteMutexLockType 6

3.1.2 Function Documentation 7

3.1.2.1 AllocAligned() [1/2] 7

3.1.2.2 AllocAligned() [2/2] 7

3.1.2.3 AtomicAdd() [1/2] 7

3.1.2.4 AtomicAdd() [2/2] 7

3.1.2.5 AtomicCompareAndSwap() 8

3.1.2.6 AtomicCompareAndSwapPointer() 8

3.1.2.7 EnqueueTasks() 8

3.1.2.8 Error() 8

3.1.2.9 FindWordEnd() 8

3.1.2.10 FreeAligned() 8

3.1.2.11 Info() 8

3.1.2.12 NumberOfSystemCores() 9

3.1.2.13 ProcessError() 9

3.1.2.14 Round2Int() . . . 9
3.1.2.15 Severe() . . . 9
3.1.2.16 task_entry() . . . 9
3.1.2.17 TasksCleanup() . . . 9
3.1.2.18 TasksInit() . . . 9
3.1.2.19 TerminalWidth() . . . 9
3.1.2.20 WaitForAllTasks() . . . 10
3.1.2.21 Warning() . . . 10
3.1.2.22 WindowProc() . . . 10
3.1.3 Variable Documentation . . . 10
3.1.3.1 g_engine . . . 10
3.1.3.2 general_configuration . . . 10
3.1.3.3 lvertex_input_element_desc . . . 10
3.1.3.4 nb_unfinished_tasks . . . 10
3.1.3.5 task_queue . . . 11
3.1.3.6 task_queue_mutex . . . 11
3.1.3.7 tasks_running_condition . . . 11
3.1.3.8 threads . . . 11
3.1.3.9 tlvertex_input_element_desc . . . 11
3.1.3.10 vertex_input_element_desc . . . 11
3.1.3.11 worker_semaphore . . . 11

4 Class Documentation 13

4.1 mage::AABB Struct Reference . . . 13

4.1.1 Constructor & Destructor Documentation . . . 13

4.1.1.1 AABB() . . . 13

4.1.2 Member Function Documentation . . . 13

4.1.2.1 Inside() [1/2] . . . 13

4.1.2.2 Inside() [2/2] . . . 14

4.1.3 Member Data Documentation . . . 14

4.1.3.1 p_max . . . 14

4.1.3.2 p_min . . . 14

4.2 mage::ConditionVariable Class Reference . . . 14

4.2.1 Member Enumeration Documentation . . . 14

4.2.1.1 anonymous enum . . . 14

4.2.2 Constructor & Destructor Documentation . . . 15

4.2.2.1 ConditionVariable() . . . 15

4.2.2.2 ~ConditionVariable() . . . 15

4.2.3 Member Function Documentation . . . 15

4.2.3.1 Lock() . . . 15

4.2.3.2 Signal() . . . 15

4.2.3.3 Unlock() . . . 15

4.2.3.4 Wait() . . . 15

4.2.4 Member Data Documentation . . . 15

4.2.4.1 m_condition_mutex . . . 15

4.2.4.2 m_events . . . 16

4.2.4.3 m_nb_waiters . . . 16

4.2.4.4 m_nb_waiters_mutex . . . 16

4.3 mage::Edge Struct Reference . . . 16

4.3.1 Constructor & Destructor Documentation . . . 16

4.3.1.1 Edge() . . . 16

4.3.2 Member Data Documentation . . . 16

4.3.2.1 v0 . . . 16
4.3.2.2 v1 . . . 16
4.4 mage::Engine Class Reference . . . 17
4.4.1 Constructor & Destructor Documentation . . . 17
4.4.1.1 Engine() . . . 17
4.4.1.2 ~Engine() . . . 17
4.4.2 Member Function Documentation . . . 17
4.4.2.1 GetWindow() . . . 17
4.4.2.2 Run() . . . 17
4.4.2.3 SetDeactiveFlag() . . . 17
4.4.3 Member Data Documentation . . . 18
4.4.3.1 m_deactive . . . 18
4.4.3.2 m_loaded . . . 18
4.4.3.3 m_setup . . . 18
4.4.3.4 m_window . . . 18
4.5 mage::EngineSetup Struct Reference . . . 18
4.5.1 Constructor & Destructor Documentation . . . 18
4.5.1.1 EngineSetup() [1/2] . . . 18
4.5.1.2 EngineSetup() [2/2] . . . 18
4.5.2 Member Data Documentation . . . 19
4.5.2.1 m_instance . . . 19
4.5.2.2 m_name . . . 19
4.6 mage::Face Struct Reference . . . 19
4.6.1 Constructor & Destructor Documentation . . . 19
4.6.1.1 Face() . . . 19
4.6.2 Member Data Documentation . . . 19
4.6.2.1 v0 . . . 19
4.6.2.2 v1 . . . 19
4.6.2.3 v2 . . . 20
4.7 mage::GeneralConfiguration Struct Reference . . . 20

4.7.1 Constructor & Destructor Documentation . . . 20
4.7.1.1 GeneralConfiguration() . . . 20
4.7.2 Member Function Documentation . . . 20
4.7.2.1 IsQuiet() . . . 20
4.7.2.2 IsVerbose() . . . 20
4.7.3 Member Data Documentation . . . 20
4.7.3.1 m_quiet . . . 20
4.7.3.2 m_verbose . . . 21
4.8 mage::IndexedEdge Struct Reference . . . 21
4.8.1 Member Data Documentation . . . 21
4.8.1.1 iv0 . . . 21
4.8.1.2 iv1 . . . 21
4.9 mage::IndexedFace Struct Reference . . . 21
4.9.1 Member Data Documentation . . . 21
4.9.1.1 iv0 . . . 21
4.9.1.2 iv1 . . . 21
4.9.1.3 iv2 . . . 22
4.10 mage::LinkedList< T > Class Template Reference . . . 22
4.10.1 Constructor & Destructor Documentation . . . 22
4.10.1.1 LinkedList() . . . 22
4.10.1.2 ~LinkedList() . . . 23
4.10.2 Member Function Documentation . . . 23
4.10.2.1 Add() . . . 23
4.10.2.2 Empty() . . . 23
4.10.2.3 GetAt() . . . 23
4.10.2.4 GetCompleteLinkedListElement() . . . 23
4.10.2.5 GetFirst() . . . 23
4.10.2.6 GetIterator() . . . 23
4.10.2.7 GetLast() . . . 23
4.10.2.8 GetNext() . . . 24

4.10.2.9 GetPrevious() . . . 24
4.10.2.10 GetRandom() . . . 24
4.10.2.11 GetSize() . . . 24
4.10.2.12 InsertAfter() . . . 24
4.10.2.13 InsertBefore() . . . 24
4.10.2.14 Remove() . . . 24
4.10.3 Member Data Documentation . . . 25
4.10.3.1 m_first . . . 25
4.10.3.2 m_last . . . 25
4.10.3.3 m_size . . . 25
4.11 mage::LinkedList< T >::LinkedListElement Struct Reference . . . 25
4.11.1 Constructor & Destructor Documentation . . . 25
4.11.1.1 LinkedListElement() . . . 25
4.11.1.2 ~LinkedListElement() . . . 25
4.11.2 Member Data Documentation . . . 26
4.11.2.1 data . . . 26
4.11.2.2 next . . . 26
4.11.2.3 prev . . . 26
4.12 mage::LinkedList< T >::LinkedListIterator Struct Reference . . . 26
4.12.1 Constructor & Destructor Documentation . . . 26
4.12.1.1 LinkedListIterator() . . . 26
4.12.1.2 ~LinkedListIterator() . . . 26
4.12.2 Member Function Documentation . . . 27
4.12.2.1 HasNext() . . . 27
4.12.2.2 Next() . . . 27
4.12.3 Member Data Documentation . . . 27
4.12.3.1 m_next . . . 27
4.13 mage::LVertex Struct Reference . . . 27
4.13.1 Constructor & Destructor Documentation . . . 27
4.13.1.1 LVertex() [1/2] . . . 27

4.13.1.2 LVertex() [2/2] . . . 28
4.13.2 Member Data Documentation . . . 28
4.13.2.1 diffuse . . . 28
4.13.2.2 p . . . 28
4.13.2.3 tu . . . 28
4.13.2.4 tv . . . 28
4.14 mage::MemoryArena Class Reference . . . 28
4.14.1 Constructor & Destructor Documentation . . . 29
4.14.1.1 MemoryArena() . . . 29
4.14.1.2 ~MemoryArena() . . . 29
4.14.2 Member Function Documentation . . . 29
4.14.2.1 Alloc() [1/2] . . . 29
4.14.2.2 Alloc() [2/2] . . . 29
4.14.2.3 FreeAll() . . . 29
4.14.3 Member Data Documentation . . . 29
4.14.3.1 m_available_blocks . . . 29
4.14.3.2 m_block_size . . . 29
4.14.3.3 m_current_block . . . 29
4.14.3.4 m_current_block_pos . . . 30
4.14.3.5 m_used_blocks . . . 30
4.15 mage::Mutex Class Reference . . . 30
4.15.1 Constructor & Destructor Documentation . . . 30
4.15.1.1 Mutex() [1/2] . . . 30
4.15.1.2 ~Mutex() . . . 30
4.15.1.3 Mutex() [2/2] . . . 31
4.15.2 Member Function Documentation . . . 31
4.15.2.1 Create() . . . 31
4.15.2.2 Destroy() . . . 31
4.15.2.3 operator=() . . . 31
4.15.3 Friends And Related Function Documentation . . . 31

4.15.3.1 MutexLock . . . 31
4.15.4 Member Data Documentation . . . 31
4.15.4.1 m_critical_section . . . 31
4.16 mage::MutexLock Struct Reference . . . 31
4.16.1 Constructor & Destructor Documentation . . . 32
4.16.1.1 MutexLock() [1/2] . . . 32
4.16.1.2 ~MutexLock() . . . 32
4.16.1.3 MutexLock() [2/2] . . . 32
4.16.2 Member Function Documentation . . . 32
4.16.2.1 operator=() . . . 32
4.16.3 Member Data Documentation . . . 32
4.16.3.1 m_mutex . . . 32
4.17 mage::ProgressReporter Class Reference . . . 32
4.17.1 Constructor & Destructor Documentation . . . 33
4.17.1.1 ProgressReporter() . . . 33
4.17.1.2 ~ProgressReporter() . . . 33
4.17.2 Member Function Documentation . . . 33
4.17.2.1 Done() . . . 33
4.17.2.2 Update() . . . 33
4.17.3 Member Data Documentation . . . 34
4.17.3.1 m_buffer . . . 34
4.17.3.2 m_current_space . . . 34
4.17.3.3 m_fout . . . 34
4.17.3.4 m_mutex . . . 34
4.17.3.5 m_nb_plusses . . . 34
4.17.3.6 m_nb_plusses_printed . . . 34
4.17.3.7 m_nb_work . . . 34
4.17.3.8 m_timer . . . 34
4.17.3.9 m_work_done . . . 34
4.18 mage::ReadWriteMutex Class Reference . . . 34

4.18.1 Constructor & Destructor Documentation . . . 35
4.18.1.1 ReadWriteMutex() [1/2] . . . 35
4.18.1.2 ~ReadWriteMutex() . . . 35
4.18.1.3 ReadWriteMutex() [2/2] . . . 35
4.18.2 Member Function Documentation . . . 36
4.18.2.1 AcquireRead() . . . 36
4.18.2.2 AcquireWrite() . . . 36
4.18.2.3 Create() . . . 36
4.18.2.4 Destroy() . . . 36
4.18.2.5 operator=() . . . 36
4.18.2.6 ReleaseRead() . . . 36
4.18.2.7 ReleaseWrite() . . . 36
4.18.3 Friends And Related Function Documentation . . . 36
4.18.3.1 ReadWriteMutexLock . . . 36
4.18.4 Member Data Documentation . . . 36
4.18.4.1 m_active_writer_readers . . . 36
4.18.4.2 m_critical_section . . . 37
4.18.4.3 m_nb_readers_waiting . . . 37
4.18.4.4 m_nb_writers_waiting . . . 37
4.18.4.5 m_ready_to_read_handle . . . 37
4.18.4.6 m_ready_to_write_handle . . . 37
4.19 mage::ReadWriteMutexLock Struct Reference . . . 37
4.19.1 Constructor & Destructor Documentation . . . 38
4.19.1.1 ReadWriteMutexLock() [1/2] . . . 38
4.19.1.2 ~ReadWriteMutexLock() . . . 38
4.19.1.3 ReadWriteMutexLock() [2/2] . . . 38
4.19.2 Member Function Documentation . . . 38
4.19.2.1 DowngradeToRead() . . . 38
4.19.2.2 operator=() . . . 38
4.19.2.3 UpgradeToWrite() . . . 38

4.19.3 Member Data Documentation . . . 38
4.19.3.1 m_mutex . . . 38
4.19.3.2 m_type . . . 38
4.20 mage::Reference< T > Class Template Reference . . . 39
4.20.1 Constructor & Destructor Documentation . . . 39
4.20.1.1 Reference() [1/2] . . . 39
4.20.1.2 Reference() [2/2] . . . 39
4.20.1.3 ~Reference() . . . 39
4.20.2 Member Function Documentation . . . 39
4.20.2.1 GetPtr() . . . 39
4.20.2.2 operator bool() . . . 40
4.20.2.3 operator->() [1/2] . . . 40
4.20.2.4 operator->() [2/2] . . . 40
4.20.2.5 operator=() [1/2] . . . 40
4.20.2.6 operator=() [2/2] . . . 40
4.20.3 Member Data Documentation . . . 40
4.20.3.1 m_ptr . . . 40
4.21 mage::ReferenceCounted Class Reference . . . 40
4.21.1 Constructor & Destructor Documentation . . . 41
4.21.1.1 ReferenceCounted() . . . 41
4.21.2 Member Data Documentation . . . 41
4.21.2.1 m_reference_count . . . 41
4.22 mage::Resource Class Reference . . . 41
4.22.1 Constructor & Destructor Documentation . . . 42
4.22.1.1 Resource() . . . 42
4.22.1.2 ~Resource() . . . 42
4.22.2 Member Function Documentation . . . 42
4.22.2.1 DecrementReferenceCount() . . . 42
4.22.2.2 GetFilename() . . . 42
4.22.2.3 GetName() . . . 42

4.22.2.4 GetPath() . . . 42
4.22.2.5 IncrementReferenceCount() . . . 42
4.22.3 Friends And Related Function Documentation . . . 42
4.22.3.1 ResourceManager . . . 42
4.22.4 Member Data Documentation . . . 43
4.22.4.1 m_name . . . 43
4.22.4.2 m_path . . . 43
4.22.4.3 m_reference_count . . . 43
4.23 mage::ResourceManager< T > Class Template Reference . . . 43
4.23.1 Constructor & Destructor Documentation . . . 43
4.23.1.1 ResourceManager() . . . 43
4.23.1.2 ~ResourceManager() . . . 44
4.23.2 Member Function Documentation . . . 44
4.23.2.1 Add() . . . 44
4.23.2.2 EmptyDestroy() . . . 44
4.23.2.3 GetResource() . . . 44
4.23.2.4 GetResources() . . . 44
4.23.2.5 Remove() . . . 44
4.23.3 Member Data Documentation . . . 44
4.23.3.1 CreateResource . . . 44
4.23.3.2 m_resources . . . 45
4.24 mage::Semaphore Class Reference . . . 45
4.24.1 Constructor & Destructor Documentation . . . 45
4.24.1.1 Semaphore() . . . 45
4.24.1.2 ~Semaphore() . . . 45
4.24.2 Member Function Documentation . . . 45
4.24.2.1 Post() . . . 45
4.24.2.2 TryWait() . . . 45
4.24.2.3 Wait() . . . 46
4.24.3 Member Data Documentation . . . 46

4.24.3.1 m_handle . . . 46
4.25 mage::Task Class Reference . . . 46
4.25.1 Constructor & Destructor Documentation . . . 46
4.25.1.1 ~Task() . . . 46
4.25.2 Member Function Documentation . . . 46
4.25.2.1 Run() . . . 46
4.26 mage::Timer Class Reference . . . 46
4.26.1 Constructor & Destructor Documentation . . . 47
4.26.1.1 Timer() . . . 47
4.26.1.2 ~Timer() . . . 47
4.26.2 Member Function Documentation . . . 47
4.26.2.1 GetTime() . . . 47
4.26.2.2 Reset() . . . 47
4.26.2.3 Start() . . . 47
4.26.2.4 Stop() . . . 47
4.26.2.5 Time() . . . 47
4.26.3 Member Data Documentation . . . 48
4.26.3.1 m_elapsed . . . 48
4.26.3.2 m_one_over_frequency . . . 48
4.26.3.3 m_performance_counter . . . 48
4.26.3.4 m_performance_frequency . . . 48
4.26.3.5 m_running . . . 48
4.26.3.6 m_time0 . . . 48
4.27 mage::TLVertex Struct Reference . . . 48
4.27.1 Constructor & Destructor Documentation . . . 49
4.27.1.1 TLVertex() [1/2] . . . 49
4.27.1.2 TLVertex() [2/2] . . . 49
4.27.2 Member Data Documentation . . . 49
4.27.2.1 diffuse . . . 49
4.27.2.2 p . . . 49
4.27.2.3 tu . . . 49
4.27.2.4 tv . . . 49
4.28 mage::Vertex Struct Reference . . . 49
4.28.1 Constructor & Destructor Documentation . . . 50
4.28.1.1 Vertex() [1/2] . . . 50
4.28.1.2 Vertex() [2/2] . . . 50
4.28.2 Member Data Documentation . . . 50
4.28.2.1 n . . . 50
4.28.2.2 p . . . 50
4.28.2.3 tu . . . 50
4.28.2.4 tv . . . 50

Chapter 1

Namespace Index

1.1 Namespace List

Here is a list of all namespaces with brief descriptions:

mage 5

Chapter 2

Class Index

2.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

mage::AABB . . . 13
mage::ConditionVariable . . . 14
mage::Edge . . . 16
mage::Engine . . . 17
mage::EngineSetup . . . 18
mage::Face . . . 19
mage::GeneralConfiguration . . . 20
mage::IndexedEdge . . . 21
mage::IndexedFace . . . 21
mage::LinkedList< T > . . . 22
mage::LinkedList< T >::LinkedListElement . . . 25
mage::LinkedList< T >::LinkedListIterator . . . 26
mage::LVertex . . . 27
mage::MemoryArena . . . 28
mage::Mutex . . . 30
mage::MutexLock . . . 31
mage::ProgressReporter . . . 32
mage::ReadWriteMutex . . . 34
mage::ReadWriteMutexLock . . . 37
mage::Reference< T > . . . 39
mage::ReferenceCounted . . . 40
mage::Resource . . . 41
mage::ResourceManager< T > . . . 43
mage::Semaphore . . . 45
mage::Task . . . 46
mage::Timer . . . 46
mage::TLVertex . . . 48
mage::Vertex . . . 49

Chapter 3

Namespace Documentation

3.1 mage Namespace Reference

Classes

- struct AABB
- class ConditionVariable
- struct Edge
- class Engine
- struct EngineSetup
- struct Face
- struct GeneralConfiguration
- struct IndexedEdge
- struct IndexedFace
- class LinkedList
- struct LVertex
- class MemoryArena
- class Mutex
- struct MutexLock
- class ProgressReporter
- class ReadWriteMutex
- struct ReadWriteMutexLock
- class Reference
- class ReferenceCounted
- class Resource
- class ResourceManager
- class Semaphore
- class Task
- class Timer
- struct TLVertex
- struct Vertex

Enumerations

- enum ReadWriteMutexLockType { READ, WRITE }

Functions

- LRESULT CALLBACK WindowProc (HWND wnd, UINT msg, WPARAM wparam, LPARAM lparam)
- const char * FindWordEnd (const char *buffer)
- static void ProcessError (const char *format, va_list args, const char *error_type, int disposition)
- void Info (const char *format,...)
- void Warning (const char *format,...)
- void Error (const char *format,...)
- void Severe (const char *format,...)
- int TerminalWidth ()
- int Round2Int (float val)
- void * AllocAligned (size_t size)
- template<typename T >
  T * AllocAligned (uint32_t count)
- void FreeAligned (void *ptr)
- int32_t AtomicAdd (AtomicInt32 *v, int32_t delta)
- int32_t AtomicCompareAndSwap (AtomicInt32 *v, int32_t new_value, int32_t old_value)
- template<typename T >
  T * AtomicCompareAndSwapPointer (T **v, T *new_value, T *old_value)
- float AtomicAdd (volatile float *v, float delta)
- int NumberOfSystemCores ()
- static DWORD WINAPI task_entry (LPVOID)
- void TasksInit ()
- void TasksCleanup ()
- void EnqueueTasks (const vector< Task *> &tasks)
- void WaitForAllTasks ()

Variables

- GeneralConfiguration general_configuration
- Engine * g_engine = NULL
- D3D11_INPUT_ELEMENT_DESC vertex_input_element_desc [ ]
- D3D11_INPUT_ELEMENT_DESC lvertex_input_element_desc [ ]
- D3D11_INPUT_ELEMENT_DESC tlvertex_input_element_desc [ ]
- static HANDLE * threads
- static Mutex * task_queue_mutex = Mutex::Create()
- static std::vector< Task * > task_queue
- static Semaphore * worker_semaphore
- static uint32_t nb_unfinished_tasks
- static ConditionVariable * tasks_running_condition

3.1.1 Enumeration Type Documentation

3.1.1.1 ReadWriteMutexLockType

```
enum mage::ReadWriteMutexLockType
```

Enumerator

READ	
WRITE	

3.1.2 Function Documentation

3.1.2.1 AllocAligned() [1/2]

```
void* mage::AllocAligned (
            size_t size )
```

Allocates memory on an alignment boundary of 64 bytes.

Parameters

in	*size*	The requested size in bytes to allocate in memory.

Returns

NULL if the allocation failed.
A pointer to the memory block that was allocated. The pointer is a multiple of the alignment of 64 bytes.

3.1.2.2 AllocAligned() [2/2]

```
template<typename T >
T* mage::AllocAligned (
            uint32_t count )
```

Allocates memory on an alignment boundary of 64 bytes.

Template Parameters

T	The type of objects to allocate in memory.

Parameters

in	*count*	The number of objects of type T to allocate in memory.

Returns

NULL if the allocation failed.
A pointer to the memory block that was allocated. The pointer is a multiple of the alignment of 64 bytes.

3.1.2.3 AtomicAdd() [1/2]

```
int32_t mage::AtomicAdd (
            AtomicInt32 * v,
            int32_t delta )
```

3.1.2.4 AtomicAdd() [2/2]

```
float mage::AtomicAdd (
            volatile float * v,
            float delta )
```

3.1.2.5 AtomicCompareAndSwap()

```
int32_t mage::AtomicCompareAndSwap (
            AtomicInt32 * v,
            int32_t new_value,
            int32_t old_value )
```

3.1.2.6 AtomicCompareAndSwapPointer()

```
template<typename T >
T* mage::AtomicCompareAndSwapPointer (
            T ** v,
            T * new_value,
            T * old_value )
```

3.1.2.7 EnqueueTasks()

```
void mage::EnqueueTasks (
            const vector< Task *> & tasks )
```

3.1.2.8 Error()

```
void mage::Error (
            const char * format,
             ...  )
```

3.1.2.9 FindWordEnd()

```
const char* mage::FindWordEnd (
            const char * buffer )
```

3.1.2.10 FreeAligned()

```
void mage::FreeAligned (
            void * ptr )
```

Frees a block of memory that was allocated with mage::AllocAligned(size_t) or mage::AllocAligned<T>(uint32_t).

Parameters

in	*ptr*	A pointer to the memory block that was allocated.

3.1.2.11 Info()

```
void mage::Info (
```

```
            const char * format,
             ...  )
```

3.1.2.12 NumberOfSystemCores()

```
int mage::NumberOfSystemCores ( )
```

3.1.2.13 ProcessError()

```
static void mage::ProcessError (
            const char * format,
            va_list args,
            const char * error_type,
            int disposition )  [static]
```

3.1.2.14 Round2Int()

```
int mage::Round2Int (
            float val )
```

3.1.2.15 Severe()

```
void mage::Severe (
            const char * format,
             ...  )
```

3.1.2.16 task_entry()

```
static DWORD WINAPI mage::task_entry (
            LPVOID  )  [static]
```

3.1.2.17 TasksCleanup()

```
void mage::TasksCleanup ( )
```

3.1.2.18 TasksInit()

```
void mage::TasksInit ( )
```

3.1.2.19 TerminalWidth()

```
int mage::TerminalWidth ( )
```

3.1.2.20 WaitForAllTasks()

```
void mage::WaitForAllTasks ( )
```

3.1.2.21 Warning()

```
void mage::Warning (
            const char * format,
             ...  )
```

3.1.2.22 WindowProc()

```
LRESULT CALLBACK mage::WindowProc (
            HWND wnd,
            UINT msg,
            WPARAM wparam,
            LPARAM lparam )
```

3.1.3 Variable Documentation

3.1.3.1 g_engine

```
Engine * mage::g_engine = NULL
```

3.1.3.2 general_configuration

```
GeneralConfiguration mage::general_configuration
```

3.1.3.3 lvertex_input_element_desc

```
D3D11_INPUT_ELEMENT_DESC mage::lvertex_input_element_desc[]
```

Initial value:

```
= {
        { "POSITION", 0, DXGI_FORMAT_R32G32B32_FLOAT, 0, UINT(offsetof(LVertex, p)),
      D3D11_INPUT_PER_VERTEX_DATA, 0 },
        { "DIFFUSE", 0, DXGI_FORMAT_R32G32B32A32_FLOAT, 0, UINT(offsetof(LVertex, diffuse)),
      D3D11_INPUT_PER_VERTEX_DATA, 0 },
        { "UV", 0, DXGI_FORMAT_R32G32_FLOAT, 0, UINT(offsetof(LVertex, tu)), D3D11_INPUT_PER_VERTEX_DATA, 0
       }
    }
```

3.1.3.4 nb_unfinished_tasks

```
uint32_t mage::nb_unfinished_tasks  [static]
```

3.1.3.5 task_queue

```
std::vector<Task *> mage::task_queue  [static]
```

3.1.3.6 task_queue_mutex

```
Mutex* mage::task_queue_mutex = Mutex::Create()  [static]
```

3.1.3.7 tasks_running_condition

```
ConditionVariable* mage::tasks_running_condition  [static]
```

3.1.3.8 threads

```
HANDLE* mage::threads  [static]
```

3.1.3.9 tlvertex_input_element_desc

```
D3D11_INPUT_ELEMENT_DESC mage::tlvertex_input_element_desc[]
```

Initial value:

```
= {
        { "POSITION", 0, DXGI_FORMAT_R32G32B32A32_FLOAT, 0, UINT(offsetof(TLVertex, p)),
      D3D11_INPUT_PER_VERTEX_DATA, 0 },
        { "DIFFUSE", 0, DXGI_FORMAT_R32G32B32A32_FLOAT, 0, UINT(offsetof(TLVertex, diffuse)),
      D3D11_INPUT_PER_VERTEX_DATA, 0 },
        { "UV", 0, DXGI_FORMAT_R32G32_FLOAT, 0, UINT(offsetof(TLVertex, tu)), D3D11_INPUT_PER_VERTEX_DATA,
      0 }
    }
```

3.1.3.10 vertex_input_element_desc

```
D3D11_INPUT_ELEMENT_DESC mage::vertex_input_element_desc[]
```

Initial value:

```
= {
        { "POSITION", 0, DXGI_FORMAT_R32G32B32_FLOAT, 0, UINT(offsetof(Vertex, p)),
      D3D11_INPUT_PER_VERTEX_DATA, 0 },
        { "NORMAL", 0, DXGI_FORMAT_R32G32B32_FLOAT, 0, UINT(offsetof(Vertex, n)),
      D3D11_INPUT_PER_VERTEX_DATA, 0 },
        { "UV", 0, DXGI_FORMAT_R32G32_FLOAT, 0, UINT(offsetof(Vertex, tu)), D3D11_INPUT_PER_VERTEX_DATA, 0
      }
    }
```

3.1.3.11 worker_semaphore

```
Semaphore* mage::worker_semaphore  [static]
```

Chapter 4

Class Documentation

4.1 mage::AABB Struct Reference

`#include <geometry.hpp>`

Public Member Functions

- AABB ()
- bool Inside (AABB &aabb) const
- bool Inside (Face &face) const

Public Attributes

- XMFLOAT3 p_min
- XMFLOAT3 p_max

4.1.1 Constructor & Destructor Documentation

4.1.1.1 AABB()

```
mage::AABB::AABB ( )
```

4.1.2 Member Function Documentation

4.1.2.1 Inside() [1/2]

```
bool mage::AABB::Inside (
            AABB & aabb ) const
```

4.1.2.2 Inside() [2/2]

```
bool mage::AABB::Inside (
            Face & face ) const
```

4.1.3 Member Data Documentation

4.1.3.1 p_max

```
XMFLOAT3 mage::AABB::p_max
```

4.1.3.2 p_min

```
XMFLOAT3 mage::AABB::p_min
```

4.2 mage::ConditionVariable Class Reference

```
#include <lock.hpp>
```

Public Member Functions

- ConditionVariable ()
- ~ConditionVariable ()
- void Lock ()
- void Unlock ()
- void Wait ()
- void Signal ()

Private Types

- enum { SIGNAL = 0, BROADCAST = 1, NUM_EVENTS = 2 }

Private Attributes

- uint32_t m_nb_waiters
- CRITICAL_SECTION m_nb_waiters_mutex
- CRITICAL_SECTION m_condition_mutex
- HANDLE m_events [NUM_EVENTS]

4.2.1 Member Enumeration Documentation

4.2.1.1 anonymous enum

```
anonymous enum  [private]
```

Enumerator

SIGNAL	
BROADCAST	
NUM_EVENTS	

4.2.2 Constructor & Destructor Documentation

4.2.2.1 ConditionVariable()

```
mage::ConditionVariable::ConditionVariable ( )
```

4.2.2.2 ~ConditionVariable()

```
mage::ConditionVariable::~ConditionVariable ( )
```

4.2.3 Member Function Documentation

4.2.3.1 Lock()

```
void mage::ConditionVariable::Lock ( )
```

4.2.3.2 Signal()

```
void mage::ConditionVariable::Signal ( )
```

4.2.3.3 Unlock()

```
void mage::ConditionVariable::Unlock ( )
```

4.2.3.4 Wait()

```
void mage::ConditionVariable::Wait ( )
```

4.2.4 Member Data Documentation

4.2.4.1 m_condition_mutex

```
CRITICAL_SECTION mage::ConditionVariable::m_condition_mutex  [private]
```

4.2.4.2 m_events

```
HANDLE mage::ConditionVariable::m_events[NUM_EVENTS]  [private]
```

4.2.4.3 m_nb_waiters

```
uint32_t mage::ConditionVariable::m_nb_waiters  [private]
```

4.2.4.4 m_nb_waiters_mutex

```
CRITICAL_SECTION mage::ConditionVariable::m_nb_waiters_mutex  [private]
```

4.3 mage::Edge Struct Reference

```
#include <geometry.hpp>
```

Public Member Functions

- Edge (Vertex *v0, Vertex *v1)

Public Attributes

- Vertex * v0
- Vertex * v1

4.3.1 Constructor & Destructor Documentation

4.3.1.1 Edge()

```
mage::Edge::Edge (
            Vertex * v0,
            Vertex * v1 )
```

4.3.2 Member Data Documentation

4.3.2.1 v0

```
Vertex* mage::Edge::v0
```

4.3.2.2 v1

```
Vertex* mage::Edge::v1
```

4.4 mage::Engine Class Reference

`#include <engine.hpp>`

Public Member Functions

- Engine (const EngineSetup *setup=NULL)
- virtual ~Engine ()
- void Run ()
- HWND GetWindow () const
- void SetDeactiveFlag (bool deactive)

Private Attributes

- bool m_loaded
- HWND m_window
- bool m_deactive
- EngineSetup m_setup

4.4.1 Constructor & Destructor Documentation

4.4.1.1 Engine()

```
mage::Engine::Engine (
            const EngineSetup * setup = NULL )
```

4.4.1.2 ~Engine()

```
mage::Engine::~Engine ( )  [virtual]
```

4.4.2 Member Function Documentation

4.4.2.1 GetWindow()

```
HWND mage::Engine::GetWindow ( ) const
```

4.4.2.2 Run()

```
void mage::Engine::Run ( )
```

4.4.2.3 SetDeactiveFlag()

```
void mage::Engine::SetDeactiveFlag (
            bool deactive )
```

4.4.3 Member Data Documentation

4.4.3.1 m_deactive

```
bool mage::Engine::m_deactive  [private]
```

4.4.3.2 m_loaded

```
bool mage::Engine::m_loaded  [private]
```

4.4.3.3 m_setup

```
EngineSetup mage::Engine::m_setup  [private]
```

4.4.3.4 m_window

```
HWND mage::Engine::m_window  [private]
```

4.5 mage::EngineSetup Struct Reference

```
#include <engine.hpp>
```

Public Member Functions

- EngineSetup (const wstring &name=L"Application")
- EngineSetup (const EngineSetup &setup)

Public Attributes

- HINSTANCE m_instance
- wstring m_name

4.5.1 Constructor & Destructor Documentation

4.5.1.1 EngineSetup() [1/2]

```
mage::EngineSetup::EngineSetup (
            const wstring & name = L"Application" )
```

4.5.1.2 EngineSetup() [2/2]

```
mage::EngineSetup::EngineSetup (
            const EngineSetup & setup )
```

4.5.2 Member Data Documentation

4.5.2.1 m_instance

```
HINSTANCE mage::EngineSetup::m_instance
```

4.5.2.2 m_name

```
wstring mage::EngineSetup::m_name
```

4.6 mage::Face Struct Reference

```
#include <geometry.hpp>
```

Public Member Functions

- Face (Vertex *v0, Vertex *v1, Vertex *v2)

Public Attributes

- Vertex * v0
- Vertex * v1
- Vertex * v2

4.6.1 Constructor & Destructor Documentation

4.6.1.1 Face()

```
mage::Face::Face (
            Vertex * v0,
            Vertex * v1,
            Vertex * v2 )
```

4.6.2 Member Data Documentation

4.6.2.1 v0

```
Vertex* mage::Face::v0
```

4.6.2.2 v1

```
Vertex* mage::Face::v1
```

4.6.2.3 v2

```
Vertex* mage::Face::v2
```

4.7 mage::GeneralConfiguration Struct Reference

```
#include <engine.hpp>
```

Public Member Functions

- GeneralConfiguration ()
- bool IsQuiet () const
- bool IsVerbose () const

Public Attributes

- bool m_quiet
- bool m_verbose

4.7.1 Constructor & Destructor Documentation

4.7.1.1 GeneralConfiguration()

```
mage::GeneralConfiguration::GeneralConfiguration ( )
```

4.7.2 Member Function Documentation

4.7.2.1 IsQuiet()

```
bool mage::GeneralConfiguration::IsQuiet ( ) const
```

4.7.2.2 IsVerbose()

```
bool mage::GeneralConfiguration::IsVerbose ( ) const
```

4.7.3 Member Data Documentation

4.7.3.1 m_quiet

```
bool mage::GeneralConfiguration::m_quiet
```

4.7.3.2 m_verbose

```
bool mage::GeneralConfiguration::m_verbose
```

4.8 mage::IndexedEdge Struct Reference

```
#include <geometry.hpp>
```

Public Attributes

- uint16_t iv0
- uint16_t iv1

4.8.1 Member Data Documentation

4.8.1.1 iv0

```
uint16_t mage::IndexedEdge::iv0
```

4.8.1.2 iv1

```
uint16_t mage::IndexedEdge::iv1
```

4.9 mage::IndexedFace Struct Reference

```
#include <geometry.hpp>
```

Public Attributes

- uint16_t iv0
- uint16_t iv1
- uint16_t iv2

4.9.1 Member Data Documentation

4.9.1.1 iv0

```
uint16_t mage::IndexedFace::iv0
```

4.9.1.2 iv1

```
uint16_t mage::IndexedFace::iv1
```

4.9.1.3 iv2

```
uint16_t mage::IndexedFace::iv2
```

4.10 mage::LinkedList< T > Class Template Reference

```
#include <linkedlist.hpp>
```

Classes

- struct LinkedListElement
- struct LinkedListIterator

Public Member Functions

- LinkedList ()
- virtual ~LinkedList ()
- T * Add (T *data)
- T * InsertBefore (T *data, LinkedListElement *next_element)
- T * InsertAfter (T *data, LinkedListElement *prev_element)
- template<typename bool no_data_destruction>
  void Remove (T **data)
- template<typename bool no_data_destruction>
  void Empty ()
- T * GetFirst () const
- T * GetLast () const
- T * GetPrevious (T *data) const
- T * GetNext (T *data) const
- T * GetAt (uint64_t index) const
- T * GetRandom () const
- LinkedListIterator GetIterator () const
- LinkedListElement * GetCompleteLinkedListElement (T *data) const
- uint64_t GetSize () const

Private Attributes

- LinkedListElement * m_first
- LinkedListElement * m_last
- uint64_t m_size

4.10.1 Constructor & Destructor Documentation

4.10.1.1 LinkedList()

```
template<typename T>
mage::LinkedList< T >::LinkedList ( )
```

4.10.1.2 ~LinkedList()

```
template<typename T>
virtual mage::LinkedList< T >::~LinkedList ( )  [virtual]
```

4.10.2 Member Function Documentation

4.10.2.1 Add()

```
template<typename T>
T* mage::LinkedList< T >::Add (
            T * data )
```

4.10.2.2 Empty()

```
template<typename T>
template<typename bool no_data_destruction>
void mage::LinkedList< T >::Empty ( )
```

4.10.2.3 GetAt()

```
template<typename T>
T* mage::LinkedList< T >::GetAt (
            uint64_t index ) const
```

4.10.2.4 GetCompleteLinkedListElement()

```
template<typename T>
LinkedListElement* mage::LinkedList< T >::GetCompleteLinkedListElement (
            T * data ) const
```

4.10.2.5 GetFirst()

```
template<typename T>
T* mage::LinkedList< T >::GetFirst ( ) const
```

4.10.2.6 GetIterator()

```
template<typename T>
LinkedListIterator mage::LinkedList< T >::GetIterator ( ) const
```

4.10.2.7 GetLast()

```
template<typename T>
T* mage::LinkedList< T >::GetLast ( ) const
```

4.10.2.8 GetNext()

```
template<typename T>
T* mage::LinkedList< T >::GetNext (
            T * data ) const
```

4.10.2.9 GetPrevious()

```
template<typename T>
T* mage::LinkedList< T >::GetPrevious (
            T * data ) const
```

4.10.2.10 GetRandom()

```
template<typename T>
T* mage::LinkedList< T >::GetRandom ( ) const
```

4.10.2.11 GetSize()

```
template<typename T>
uint64_t mage::LinkedList< T >::GetSize ( ) const
```

4.10.2.12 InsertAfter()

```
template<typename T>
T* mage::LinkedList< T >::InsertAfter (
            T * data,
            LinkedListElement * prev_element )
```

4.10.2.13 InsertBefore()

```
template<typename T>
T* mage::LinkedList< T >::InsertBefore (
            T * data,
            LinkedListElement * next_element )
```

4.10.2.14 Remove()

```
template<typename T>
template<typename bool no_data_destruction>
void mage::LinkedList< T >::Remove (
            T ** data )
```

4.10.3 Member Data Documentation

4.10.3.1 m_first

```
template<typename T>
LinkedListElement* mage::LinkedList< T >::m_first  [private]
```

4.10.3.2 m_last

```
template<typename T>
LinkedListElement* mage::LinkedList< T >::m_last  [private]
```

4.10.3.3 m_size

```
template<typename T>
uint64_t mage::LinkedList< T >::m_size  [private]
```

4.11 mage::LinkedList< T >::LinkedListElement Struct Reference

```
#include <linkedlist.hpp>
```

Public Member Functions

- LinkedListElement (T *data)
- virtual ~LinkedListElement ()

Public Attributes

- T * data
- LinkedListElement * next
- LinkedListElement * prev

4.11.1 Constructor & Destructor Documentation

4.11.1.1 LinkedListElement()

```
template<typename T>
mage::LinkedList< T >::LinkedListElement::LinkedListElement (
            T * data )
```

4.11.1.2 ~LinkedListElement()

```
template<typename T>
virtual mage::LinkedList< T >::LinkedListElement::~LinkedListElement ( )  [virtual]
```

4.11.2 Member Data Documentation

4.11.2.1 data

```
template<typename T>
T* mage::LinkedList< T >::LinkedListElement::data
```

4.11.2.2 next

```
template<typename T>
LinkedListElement* mage::LinkedList< T >::LinkedListElement::next
```

4.11.2.3 prev

```
template<typename T>
LinkedListElement* mage::LinkedList< T >::LinkedListElement::prev
```

4.12 mage::LinkedList< T >::LinkedListIterator Struct Reference

```
#include <linkedlist.hpp>
```

Public Member Functions

- LinkedListIterator (const LinkedList< T > &list)
- virtual ~LinkedListIterator ()
- bool HasNext () const
- T * Next ()

Private Attributes

- LinkedListElement * m_next

4.12.1 Constructor & Destructor Documentation

4.12.1.1 LinkedListIterator()

```
template<typename T>
mage::LinkedList< T >::LinkedListIterator::LinkedListIterator (
            const LinkedList< T > & list )
```

4.12.1.2 ~LinkedListIterator()

```
template<typename T>
virtual mage::LinkedList< T >::LinkedListIterator::~LinkedListIterator ( )  [virtual]
```

4.12.2 Member Function Documentation

4.12.2.1 HasNext()

```
template<typename T>
bool mage::LinkedList< T >::LinkedListIterator::HasNext ( ) const
```

4.12.2.2 Next()

```
template<typename T>
T* mage::LinkedList< T >::LinkedListIterator::Next ( )
```

4.12.3 Member Data Documentation

4.12.3.1 m_next

```
template<typename T>
LinkedListElement* mage::LinkedList< T >::LinkedListIterator::m_next  [private]
```

4.13 mage::LVertex Struct Reference

```
#include <geometry.hpp>
```

Public Member Functions

- LVertex ()
- LVertex (XMFLOAT3 p, XMFLOAT4 diffuse, float tu, float tv)

Public Attributes

- XMFLOAT3 p
- XMFLOAT4 diffuse
- float tu
- float tv

4.13.1 Constructor & Destructor Documentation

4.13.1.1 LVertex() [1/2]

```
mage::LVertex::LVertex ( )
```

4.13.1.2 LVertex() [2/2]

```
mage::LVertex::LVertex (
            XMFLOAT3 p,
            XMFLOAT4 diffuse,
            float tu,
            float tv )
```

4.13.2 Member Data Documentation

4.13.2.1 diffuse

```
XMFLOAT4 mage::LVertex::diffuse
```

4.13.2.2 p

```
XMFLOAT3 mage::LVertex::p
```

4.13.2.3 tu

```
float mage::LVertex::tu
```

4.13.2.4 tv

```
float mage::LVertex::tv
```

4.14 mage::MemoryArena Class Reference

```
#include <arena.hpp>
```

Public Member Functions

- MemoryArena (uint32_t block_size=32768)
- ~MemoryArena ()
- void FreeAll ()
- void * Alloc (uint32_t size)
- template<typename T >
  T * Alloc (uint32_t count=1)

Private Attributes

- uint32_t m_current_block_pos
- uint32_t m_block_size
- char * m_current_block
- vector< char * > m_used_blocks
- vector< char * > m_available_blocks

4.14.1 Constructor & Destructor Documentation

4.14.1.1 MemoryArena()

```
mage::MemoryArena::MemoryArena (
            uint32_t block_size = 32768 )
```

4.14.1.2 ~MemoryArena()

```
mage::MemoryArena::~MemoryArena ( )
```

4.14.2 Member Function Documentation

4.14.2.1 Alloc() [1/2]

```
void* mage::MemoryArena::Alloc (
            uint32_t size )
```

4.14.2.2 Alloc() [2/2]

```
template<typename T >
T* mage::MemoryArena::Alloc (
            uint32_t count = 1 )
```

4.14.2.3 FreeAll()

```
void mage::MemoryArena::FreeAll ( )
```

4.14.3 Member Data Documentation

4.14.3.1 m_available_blocks

```
vector<char *> mage::MemoryArena::m_available_blocks  [private]
```

4.14.3.2 m_block_size

```
uint32_t mage::MemoryArena::m_block_size  [private]
```

4.14.3.3 m_current_block

```
char* mage::MemoryArena::m_current_block  [private]
```

4.14.3.4 m_current_block_pos

```
uint32_t mage::MemoryArena::m_current_block_pos  [private]
```

4.14.3.5 m_used_blocks

```
vector<char *> mage::MemoryArena::m_used_blocks  [private]
```

4.15 mage::Mutex Class Reference

```
#include <lock.hpp>
```

Static Public Member Functions

- static Mutex * Create ()
- static void Destroy (Mutex *mutex)

Private Member Functions

- Mutex ()
- ~Mutex ()
- Mutex (Mutex &mutex)
- Mutex & operator= (const Mutex &mutex)

Private Attributes

- CRITICAL_SECTION m_critical_section

Friends

- struct MutexLock

4.15.1 Constructor & Destructor Documentation

4.15.1.1 Mutex() [1/2]

```
mage::Mutex::Mutex ( )  [private]
```

4.15.1.2 ~Mutex()

```
mage::Mutex::~Mutex ( )  [private]
```

4.15.1.3 Mutex() [2/2]

```
mage::Mutex::Mutex (
            Mutex & mutex )  [private]
```

4.15.2 Member Function Documentation

4.15.2.1 Create()

```
static Mutex* mage::Mutex::Create ( )  [static]
```

4.15.2.2 Destroy()

```
static void mage::Mutex::Destroy (
            Mutex * mutex )  [static]
```

4.15.2.3 operator=()

```
Mutex& mage::Mutex::operator= (
            const Mutex & mutex )  [private]
```

4.15.3 Friends And Related Function Documentation

4.15.3.1 MutexLock

```
friend struct MutexLock  [friend]
```

4.15.4 Member Data Documentation

4.15.4.1 m_critical_section

```
CRITICAL_SECTION mage::Mutex::m_critical_section  [private]
```

4.16 mage::MutexLock Struct Reference

```
#include <lock.hpp>
```

Public Member Functions

- MutexLock (Mutex &mutex)
- ~MutexLock ()

Private Member Functions

- MutexLock (const MutexLock &mutex_lock)
- MutexLock & operator= (const MutexLock &mutex_lock)

Private Attributes

- Mutex & m_mutex

4.16.1 Constructor & Destructor Documentation

4.16.1.1 MutexLock() [1/2]

```
mage::MutexLock::MutexLock (
            Mutex & mutex )
```

4.16.1.2 ~MutexLock()

```
mage::MutexLock::~MutexLock ( )
```

4.16.1.3 MutexLock() [2/2]

```
mage::MutexLock::MutexLock (
            const MutexLock & mutex_lock )  [private]
```

4.16.2 Member Function Documentation

4.16.2.1 operator=()

```
MutexLock& mage::MutexLock::operator= (
            const MutexLock & mutex_lock )  [private]
```

4.16.3 Member Data Documentation

4.16.3.1 m_mutex

```
Mutex& mage::MutexLock::m_mutex  [private]
```

4.17 mage::ProgressReporter Class Reference

```
#include <progressreporter.hpp>
```

Public Member Functions

- ProgressReporter (int nb_work, const string &title, int bar_length=-1)
- virtual ~ProgressReporter ()
- void Update (int num=1)
- void Done ()

Private Attributes

- const int m_nb_work
- int m_work_done
- int m_nb_plusses_printed
- int m_nb_plusses
- Timer * m_timer
- FILE * m_fout
- char * m_buffer
- char * m_current_space
- Mutex * m_mutex

4.17.1 Constructor & Destructor Documentation

4.17.1.1 ProgressReporter()

```
mage::ProgressReporter::ProgressReporter (
            int nb_work,
            const string & title,
            int bar_length = -1 )
```

4.17.1.2 ~ProgressReporter()

```
mage::ProgressReporter::~ProgressReporter ( )  [virtual]
```

4.17.2 Member Function Documentation

4.17.2.1 Done()

```
void mage::ProgressReporter::Done ( )
```

4.17.2.2 Update()

```
void mage::ProgressReporter::Update (
            int num = 1 )
```

4.17.3 Member Data Documentation

4.17.3.1 m_buffer

```
char* mage::ProgressReporter::m_buffer  [private]
```

4.17.3.2 m_current_space

```
char* mage::ProgressReporter::m_current_space  [private]
```

4.17.3.3 m_fout

```
FILE* mage::ProgressReporter::m_fout  [private]
```

4.17.3.4 m_mutex

```
Mutex* mage::ProgressReporter::m_mutex  [private]
```

4.17.3.5 m_nb_plusses

```
int mage::ProgressReporter::m_nb_plusses  [private]
```

4.17.3.6 m_nb_plusses_printed

```
int mage::ProgressReporter::m_nb_plusses_printed  [private]
```

4.17.3.7 m_nb_work

```
const int mage::ProgressReporter::m_nb_work  [private]
```

4.17.3.8 m_timer

```
Timer* mage::ProgressReporter::m_timer  [private]
```

4.17.3.9 m_work_done

```
int mage::ProgressReporter::m_work_done  [private]
```

4.18 mage::ReadWriteMutex Class Reference

```
#include <lock.hpp>
```

Static Public Member Functions

- static ReadWriteMutex * Create ()
- static void Destroy (ReadWriteMutex *mutex)

Private Member Functions

- ReadWriteMutex ()
- ~ReadWriteMutex ()
- ReadWriteMutex (ReadWriteMutex &mutex)
- ReadWriteMutex & operator= (const ReadWriteMutex &mutex)
- void AcquireRead ()
- void ReleaseRead ()
- void AcquireWrite ()
- void ReleaseWrite ()

Private Attributes

- LONG m_nb_writers_waiting
- LONG m_nb_readers_waiting
- DWORD m_active_writer_readers
- HANDLE m_ready_to_read_handle
- HANDLE m_ready_to_write_handle
- CRITICAL_SECTION m_critical_section

Friends

- struct ReadWriteMutexLock

4.18.1 Constructor & Destructor Documentation

4.18.1.1 ReadWriteMutex() [1/2]

```
mage::ReadWriteMutex::ReadWriteMutex ( )  [private]
```

4.18.1.2 ~ReadWriteMutex()

```
mage::ReadWriteMutex::~ReadWriteMutex ( )  [private]
```

4.18.1.3 ReadWriteMutex() [2/2]

```
mage::ReadWriteMutex::ReadWriteMutex (
            ReadWriteMutex & mutex )  [private]
```

4.18.2 Member Function Documentation

4.18.2.1 AcquireRead()

```
void mage::ReadWriteMutex::AcquireRead ( )  [private]
```

4.18.2.2 AcquireWrite()

```
void mage::ReadWriteMutex::AcquireWrite ( )  [private]
```

4.18.2.3 Create()

```
static ReadWriteMutex* mage::ReadWriteMutex::Create ( )  [static]
```

4.18.2.4 Destroy()

```
static void mage::ReadWriteMutex::Destroy (
            ReadWriteMutex * mutex )  [static]
```

4.18.2.5 operator=()

```
ReadWriteMutex& mage::ReadWriteMutex::operator= (
            const ReadWriteMutex & mutex )  [private]
```

4.18.2.6 ReleaseRead()

```
void mage::ReadWriteMutex::ReleaseRead ( )  [private]
```

4.18.2.7 ReleaseWrite()

```
void mage::ReadWriteMutex::ReleaseWrite ( )  [private]
```

4.18.3 Friends And Related Function Documentation

4.18.3.1 ReadWriteMutexLock

```
friend struct ReadWriteMutexLock  [friend]
```

4.18.4 Member Data Documentation

4.18.4.1 m_active_writer_readers

```
DWORD mage::ReadWriteMutex::m_active_writer_readers  [private]
```

4.18.4.2 m_critical_section

```
CRITICAL_SECTION mage::ReadWriteMutex::m_critical_section  [private]
```

4.18.4.3 m_nb_readers_waiting

```
LONG mage::ReadWriteMutex::m_nb_readers_waiting  [private]
```

4.18.4.4 m_nb_writers_waiting

```
LONG mage::ReadWriteMutex::m_nb_writers_waiting  [private]
```

4.18.4.5 m_ready_to_read_handle

```
HANDLE mage::ReadWriteMutex::m_ready_to_read_handle  [private]
```

4.18.4.6 m_ready_to_write_handle

```
HANDLE mage::ReadWriteMutex::m_ready_to_write_handle  [private]
```

4.19 mage::ReadWriteMutexLock Struct Reference

```
#include <lock.hpp>
```

Public Member Functions

- ReadWriteMutexLock (ReadWriteMutex &mutex, ReadWriteMutexLockType mutex_type)
- ~ReadWriteMutexLock ()
- void UpgradeToWrite ()
- void DowngradeToRead ()

Private Member Functions

- ReadWriteMutexLock (const ReadWriteMutexLock &mutex)
- ReadWriteMutexLock & operator= (const ReadWriteMutexLock &mutex)

Private Attributes

- ReadWriteMutexLockType m_type
- ReadWriteMutex & m_mutex

4.19.1 Constructor & Destructor Documentation

4.19.1.1 ReadWriteMutexLock() [1/2]

```
mage::ReadWriteMutexLock::ReadWriteMutexLock (
            ReadWriteMutex & mutex,
            ReadWriteMutexLockType mutex_type )
```

4.19.1.2 ~ReadWriteMutexLock()

```
mage::ReadWriteMutexLock::~ReadWriteMutexLock ( )
```

4.19.1.3 ReadWriteMutexLock() [2/2]

```
mage::ReadWriteMutexLock::ReadWriteMutexLock (
            const ReadWriteMutexLock & mutex )  [private]
```

4.19.2 Member Function Documentation

4.19.2.1 DowngradeToRead()

```
void mage::ReadWriteMutexLock::DowngradeToRead ( )
```

4.19.2.2 operator=()

```
ReadWriteMutexLock& mage::ReadWriteMutexLock::operator= (
            const ReadWriteMutexLock & mutex )  [private]
```

4.19.2.3 UpgradeToWrite()

```
void mage::ReadWriteMutexLock::UpgradeToWrite ( )
```

4.19.3 Member Data Documentation

4.19.3.1 m_mutex

```
ReadWriteMutex& mage::ReadWriteMutexLock::m_mutex  [private]
```

4.19.3.2 m_type

```
ReadWriteMutexLockType mage::ReadWriteMutexLock::m_type  [private]
```

4.20 mage::Reference< T > Class Template Reference

`#include <reference.hpp>`

Public Member Functions

- Reference (T *ptr=NULL)
- Reference (const Reference< T > &reference)
- virtual ~Reference ()
- Reference & operator= (T *ptr)
- Reference & operator= (const Reference< T > &reference)
- T * operator-> ()
- const T * operator-> () const
- const T * GetPtr () const
- operator bool () const

Private Attributes

- T * m_ptr

4.20.1 Constructor & Destructor Documentation

4.20.1.1 Reference() [1/2]

```
template<typename T>
mage::Reference< T >::Reference (
            T * ptr = NULL )
```

4.20.1.2 Reference() [2/2]

```
template<typename T>
mage::Reference< T >::Reference (
            const Reference< T > & reference )
```

4.20.1.3 ~Reference()

```
template<typename T>
virtual mage::Reference< T >::~Reference ( )  [virtual]
```

4.20.2 Member Function Documentation

4.20.2.1 GetPtr()

```
template<typename T>
const T* mage::Reference< T >::GetPtr ( ) const
```

4.20.2.2 operator bool()

```
template<typename T>
mage::Reference< T >::operator bool ( ) const
```

4.20.2.3 operator->() [1/2]

```
template<typename T>
T* mage::Reference< T >::operator-> ( )
```

4.20.2.4 operator->() [2/2]

```
template<typename T>
const T* mage::Reference< T >::operator-> ( ) const
```

4.20.2.5 operator=() [1/2]

```
template<typename T>
Reference& mage::Reference< T >::operator= (
            T * ptr )
```

4.20.2.6 operator=() [2/2]

```
template<typename T>
Reference& mage::Reference< T >::operator= (
            const Reference< T > & reference )
```

4.20.3 Member Data Documentation

4.20.3.1 m_ptr

```
template<typename T>
T* mage::Reference< T >::m_ptr  [private]
```

4.21 mage::ReferenceCounted Class Reference

```
#include <reference.hpp>
```

Public Member Functions

- ReferenceCounted ()

Public Attributes

- AtomicInt32 m_reference_count

4.21.1 Constructor & Destructor Documentation

4.21.1.1 ReferenceCounted()

```
mage::ReferenceCounted::ReferenceCounted ( )
```

4.21.2 Member Data Documentation

4.21.2.1 m_reference_count

```
AtomicInt32 mage::ReferenceCounted::m_reference_count
```

4.22 mage::Resource Class Reference

```
#include <resource.hpp>
```

Public Member Functions

- Resource (const string &name, const string &path="./")
- virtual ~Resource ()
- const string & GetName () const
- const string & GetPath () const
- const string & GetFilename () const

Private Member Functions

- uint32_t IncrementReferenceCount ()
- uint32_t DecrementReferenceCount ()

Private Attributes

- const string m_name
- const string m_path
- AtomicInt32 m_reference_count

Friends

- template<typename T >
  class ResourceManager

4.22.1 Constructor & Destructor Documentation

4.22.1.1 Resource()

```
mage::Resource::Resource (
            const string & name,
            const string & path = "./" )
```

4.22.1.2 ~Resource()

```
virtual mage::Resource::~Resource ( )  [virtual]
```

4.22.2 Member Function Documentation

4.22.2.1 DecrementReferenceCount()

```
uint32_t mage::Resource::DecrementReferenceCount ( )  [private]
```

4.22.2.2 GetFilename()

```
const string& mage::Resource::GetFilename ( ) const
```

4.22.2.3 GetName()

```
const string& mage::Resource::GetName ( ) const
```

4.22.2.4 GetPath()

```
const string& mage::Resource::GetPath ( ) const
```

4.22.2.5 IncrementReferenceCount()

```
uint32_t mage::Resource::IncrementReferenceCount ( )  [private]
```

4.22.3 Friends And Related Function Documentation

4.22.3.1 ResourceManager

```
template<typename T >
friend class ResourceManager  [friend]
```

4.22.4 Member Data Documentation

4.22.4.1 m_name

```
const string mage::Resource::m_name  [private]
```

4.22.4.2 m_path

```
const string mage::Resource::m_path  [private]
```

4.22.4.3 m_reference_count

```
AtomicInt32 mage::Resource::m_reference_count  [private]
```

4.23 mage::ResourceManager< T > Class Template Reference

```
#include <resource.hpp>
```

Public Member Functions

- ResourceManager (void(*CreateResourceFunction)(T **resource, const string &name, const string &path)=NULL)
- virtual ~ResourceManager ()
- T * Add (const string &name, const string &path="./")
- void Remove (T **resource)
- void EmptyDestroy ()
- T * GetResource (const string &name, const string &path="./") const
- const LinkedList< T > * GetResources () const

Private Attributes

- LinkedList< T > * m_resources
- void(* CreateResource)(T **resource, const string &name, const string &path)

4.23.1 Constructor & Destructor Documentation

4.23.1.1 ResourceManager()

```
template<typename T >
mage::ResourceManager< T >::ResourceManager (
            void(*)(T **resource, const string &name, const string &path) CreateResource↩
Function = NULL )
```

4.23.1.2 ~ResourceManager()

```
template<typename T >
virtual mage::ResourceManager< T >::~ResourceManager ( )  [virtual]
```

4.23.2 Member Function Documentation

4.23.2.1 Add()

```
template<typename T >
T * mage::ResourceManager< T >::Add (
            const string & name,
            const string & path = "./" )
```

4.23.2.2 EmptyDestroy()

```
template<typename T >
void mage::ResourceManager< T >::EmptyDestroy ( )
```

4.23.2.3 GetResource()

```
template<typename T >
T * mage::ResourceManager< T >::GetResource (
            const string & name,
            const string & path = "./" ) const
```

4.23.2.4 GetResources()

```
template<typename T >
const LinkedList< T >* mage::ResourceManager< T >::GetResources ( ) const
```

4.23.2.5 Remove()

```
template<typename T >
void mage::ResourceManager< T >::Remove (
            T ** resource )
```

4.23.3 Member Data Documentation

4.23.3.1 CreateResource

```
template<typename T >
void(* mage::ResourceManager< T >::CreateResource) (T **resource, const string &name, const
string &path)  [private]
```

4.23.3.2 m_resources

```
template<typename T >
LinkedList< T >* mage::ResourceManager< T >::m_resources  [private]
```

4.24 mage::Semaphore Class Reference

```
#include <lock.hpp>
```

Public Member Functions

- Semaphore ()
- ~Semaphore ()
- void Post (uint32_t count=1)
- void Wait ()
- bool TryWait ()

Private Attributes

- HANDLE m_handle

4.24.1 Constructor & Destructor Documentation

4.24.1.1 Semaphore()

```
mage::Semaphore::Semaphore ( )
```

4.24.1.2 ~Semaphore()

```
mage::Semaphore::~Semaphore ( )
```

4.24.2 Member Function Documentation

4.24.2.1 Post()

```
void mage::Semaphore::Post (
            uint32_t count = 1 )
```

4.24.2.2 TryWait()

```
bool mage::Semaphore::TryWait ( )
```

4.24.2.3 Wait()

```
void mage::Semaphore::Wait ( )
```

4.24.3 Member Data Documentation

4.24.3.1 m_handle

```
HANDLE mage::Semaphore::m_handle  [private]
```

4.25 mage::Task Class Reference

```
#include <task.hpp>
```

Public Member Functions

- virtual ~Task ()
- virtual void Run ()=0

4.25.1 Constructor & Destructor Documentation

4.25.1.1 ~Task()

```
virtual mage::Task::~Task ( )  [virtual]
```

4.25.2 Member Function Documentation

4.25.2.1 Run()

```
virtual void mage::Task::Run ( )  [pure virtual]
```

4.26 mage::Timer Class Reference

```
#include <timer.hpp>
```

Public Member Functions

- Timer ()
- virtual ~Timer ()
- void Start ()
- void Stop ()
- void Reset ()
- double Time ()

Private Member Functions

- double GetTime ()

Private Attributes

- double m_time0
- double m_elapsed
- bool m_running
- LARGE_INTEGER m_performance_counter
- LARGE_INTEGER m_performance_frequency
- double m_one_over_frequency

4.26.1 Constructor & Destructor Documentation

4.26.1.1 Timer()

```
mage::Timer::Timer ( )
```

4.26.1.2 ~Timer()

```
virtual mage::Timer::~Timer ( )  [virtual]
```

4.26.2 Member Function Documentation

4.26.2.1 GetTime()

```
double mage::Timer::GetTime ( )  [private]
```

4.26.2.2 Reset()

```
void mage::Timer::Reset ( )
```

4.26.2.3 Start()

```
void mage::Timer::Start ( )
```

4.26.2.4 Stop()

```
void mage::Timer::Stop ( )
```

4.26.2.5 Time()

```
double mage::Timer::Time ( )
```

4.26.3 Member Data Documentation

4.26.3.1 m_elapsed

```
double mage::Timer::m_elapsed  [private]
```

4.26.3.2 m_one_over_frequency

```
double mage::Timer::m_one_over_frequency  [private]
```

4.26.3.3 m_performance_counter

```
LARGE_INTEGER mage::Timer::m_performance_counter  [private]
```

4.26.3.4 m_performance_frequency

```
LARGE_INTEGER mage::Timer::m_performance_frequency  [private]
```

4.26.3.5 m_running

```
bool mage::Timer::m_running  [private]
```

4.26.3.6 m_time0

```
double mage::Timer::m_time0  [private]
```

4.27 mage::TLVertex Struct Reference

```
#include <geometry.hpp>
```

Public Member Functions

- TLVertex ()
- TLVertex (XMFLOAT4 p, XMFLOAT4 diffuse, float tu, float tv)

Public Attributes

- XMFLOAT4 p
- XMFLOAT4 diffuse
- float tu
- float tv

4.27.1 Constructor & Destructor Documentation

4.27.1.1 TLVertex() [1/2]

```
mage::TLVertex::TLVertex ( )
```

4.27.1.2 TLVertex() [2/2]

```
mage::TLVertex::TLVertex (
            XMFLOAT4 p,
            XMFLOAT4 diffuse,
            float tu,
            float tv )
```

4.27.2 Member Data Documentation

4.27.2.1 diffuse

```
XMFLOAT4 mage::TLVertex::diffuse
```

4.27.2.2 p

```
XMFLOAT4 mage::TLVertex::p
```

4.27.2.3 tu

```
float mage::TLVertex::tu
```

4.27.2.4 tv

```
float mage::TLVertex::tv
```

4.28 mage::Vertex Struct Reference

```
#include <geometry.hpp>
```

Public Member Functions

- Vertex ()
- Vertex (XMFLOAT3 p, XMFLOAT3 n, float tu, float tv)

Public Attributes

- XMFLOAT3 p
- XMFLOAT3 n
- float tu
- float tv

4.28.1 Constructor & Destructor Documentation

4.28.1.1 Vertex() [1/2]

```
mage::Vertex::Vertex ( )
```

4.28.1.2 Vertex() [2/2]

```
mage::Vertex::Vertex (
            XMFLOAT3 p,
            XMFLOAT3 n,
            float tu,
            float tv )
```

4.28.2 Member Data Documentation

4.28.2.1 n

```
XMFLOAT3 mage::Vertex::n
```

4.28.2.2 p

```
XMFLOAT3 mage::Vertex::p
```

4.28.2.3 tu

```
float mage::Vertex::tu
```

4.28.2.4 tv

```
float mage::Vertex::tv
```