Raytracer

Generated by Doxygen 1.8.15

Chapter 1

Hierarchical Index

1.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

Chapter 2

Class Index

2.1 Class List

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

Chapter 3

File Index

3.1 File List

Here is a list of all files with brief descriptions:

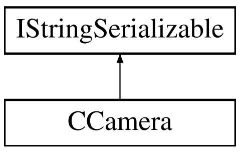
Chapter 4

Class Documentation

4.1 CCamera Class Reference

```
#include <camera.hpp>
```

Inheritance diagram for CCamera:



Public Member Functions

- CCamera (r32 FieldOfView=(Pi32/4.0f), Vec3 Position=Vec3(0.0f, 0.0f, 0.0f), Vec3 Forward=Vec3(0.0f, 0.0f, -1.0f), Vec3 Up=Vec3(0.0f, 1.0f, 0.0f))
- void SetPosition (Vec3 Position)
- void SetForward (Vec3 Forward)
- void SetUp (Vec3 Up)
- Vec3 GetPosition () const
- Vec3 GetForward () const
- Vec3 GetUp () const
- CRay RayFromUV (r32 U, r32 V, r32 AspectRatio=1.0f) const
- virtual std::string & ReadFromString (std::string &String) override
- virtual void WriteToString (std::string &String) const override

4.1.1 Detailed Description

Camera class

Definition at line 8 of file camera.hpp.

4.1.2 Constructor & Destructor Documentation

4.1.2.1 CCamera()

```
CCamera::CCamera (
             r32 FieldOfView = (Pi32 / 4.0f),
             Vec3 Position = Vec3(0.0f, 0.0f, 0.0f),
             Vec3 Forward = Vec3(0.0f, 0.0f, -1.0f),
             Vec3 Up = Vec3(0.0f, 1.0f, 0.0f) )
```

Constructor

Parameters

FieldOfView	the camera's field of view on its vertical axis. Must be in radians.
Position	the camera's position in the world.
Forward	the direction where the camera's facing.
Up	the up axis of the world.

Definition at line 3 of file camera.cpp.

4.1.3 Member Function Documentation

4.1.3.1 GetForward()

```
Vec3 CCamera::GetForward ( ) const
```

Definition at line 33 of file camera.cpp.

4.1.3.2 GetPosition()

```
Vec3 CCamera::GetPosition ( ) const
```

Definition at line 29 of file camera.cpp.

4.1.3.3 GetUp()

```
Vec3 CCamera::GetUp ( ) const
```

Definition at line 37 of file camera.cpp.

4.1.3.4 RayFromUV()

```
CRay CCamera::RayFromUV (
             r32 U,
             r32 V,
             r32 AspectRatio = 1.0f ) const
```

Creates a ray from the camera to a given pixel.

Parameters

U	normalized horizontal pixel coordinate (0 means left, 1 means the right edge).
V	normalized vertical pixel coordinate (0 means bottom, 1 means upper edge).
AspectRatio	the image's width divided by its height.

Definition at line 42 of file camera.cpp.

4.1.3.5 ReadFromString()

```
std::string & CCamera::ReadFromString (
             std::string & String )  [override], [virtual]
```

Serializes the camera from a string (json format).

Implements IStringSerializable.

Definition at line 58 of file camera.cpp.

4.1.3.6 SetForward()

```
void CCamera::SetForward (
             Vec3 Forward )
```

Definition at line 19 of file camera.cpp.

4.1.3.7 SetPosition()

```
void CCamera::SetPosition (
             Vec3 Position )
```

Definition at line 14 of file camera.cpp.

4.1.3.8 SetUp()

```
void CCamera::SetUp (
            Vec3 Up )
```

Definition at line 24 of file camera.cpp.

4.1.3.9 WriteToString()

```
void CCamera::WriteToString (
            std::string & String ) const  [override], [virtual]
```

Serlializes the camera to a string (json format).

Implements IStringSerializable.

Definition at line 95 of file camera.cpp.

The documentation for this class was generated from the following files:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/camera.hpp
- E:/dev/VS 14/Projects/raytracer/raytracer/src/camera.cpp

4.2 CHeteroStore< T > Class Template Reference

```
#include <heterostore.hpp>
```

Public Member Functions

- CHeteroStore ()
- ∼CHeteroStore ()
- size_t Size () const
- void Resize (size_t NewSize)
- void PushBack (T ∗Elem)
- void PushBack (CSharedPointer< T > Elem)
- CSharedPointer< T > & operator[ ] (size_t Index)
- const CSharedPointer< T > & operator[ ] (size_t Index) const

4.2.1 Detailed Description

template<class T>
class CHeteroStore< T >

Heterogoneous collection to store objects of the same interface but different subtypes. Non-copyable.

Definition at line 10 of file heterostore.hpp.

4.2.2 Constructor & Destructor Documentation

4.2.2.1 CHeteroStore()

```
template<class T>
CHeteroStore< T >::CHeteroStore ( )  [inline]
```

Constructor. Creates the an empty container.

Definition at line 16 of file heterostore.hpp.

4.2.2.2 ∼CHeteroStore()

```
template<class T>
CHeteroStore< T >::∼CHeteroStore ( )  [inline]
```

Definition at line 24 of file heterostore.hpp.

4.2.3 Member Function Documentation

4.2.3.1 operator[]() [1/2]

```
template<class T>
CSharedPointer<T>& CHeteroStore< T >::operator[] (
              size_t Index )  [inline]
```

Index operator to access elements. Throws, if Index is out of range.

Definition at line 77 of file heterostore.hpp.

4.2.3.2 operator[]() [2/2]

```
template<class T>
const CSharedPointer<T>& CHeteroStore< T >::operator[] (
              size_t Index ) const  [inline]
```

Index operator to access elements. Throws, if Index is out of range.

Definition at line 87 of file heterostore.hpp.

4.2.3.3 PushBack() [1/2]

```
template<class T>
void CHeteroStore< T >::PushBack (
             T * Elem )  [inline]
```

Adds an element at the and of the container. Resizes the containter if needed.

Definition at line 54 of file heterostore.hpp.

4.2.3.4 PushBack() [2/2]

```
template<class T>
void CHeteroStore< T >::PushBack (
             CSharedPointer< T > Elem )  [inline]
```

Adds an element at the and of the container. Resizes the containter if needed.

Definition at line 66 of file heterostore.hpp.

4.2.3.5 Resize()

```
template<class T>
void CHeteroStore< T >::Resize (
             size_t NewSize )  [inline]
```

Resizes the container, copying the objects.

Definition at line 35 of file heterostore.hpp.

4.2.3.6 Size()

```
template<class T>
size_t CHeteroStore< T >::Size ( ) const  [inline]
```

Definition at line 29 of file heterostore.hpp.

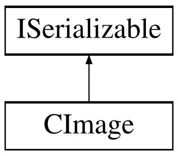
The documentation for this class was generated from the following file:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/heterostore.hpp

4.3 CImage Class Reference

```
#include <image.hpp>
```

Inheritance diagram for CImage:



Public Member Functions

- CImage (s32 Width=1, s32 Height=1)
- CImage (const CImage &Other)
- virtual ∼CImage ()
- CImage & operator= (const CImage &Other)
- UColor & operator() (s32 X, s32 Y)
- UColor operator() (s32 X, s32 Y) const
- s32 Width () const
- s32 Height () const
- UColor ∗ Pixels ()
- const UColor ∗ Pixels () const
- void Resize (s32 Width, s32 Height)
- Vec3 Sample (r32 U, r32 V) const
- void Blit (const CImage &Image, s32 OffsetX, s32 OffsetY)
- virtual std::istream & Read (std::istream &Stream)
- virtual std::ostream & Write (std::ostream &Stream) const

4.3.1 Detailed Description

Image class that stores pixel data and allows for sampling.

Definition at line 40 of file image.hpp.

4.3.2 Constructor & Destructor Documentation

4.3.2.1 CImage() [1/2]

```
CImage::CImage (
            s32 Width = 1,
            s32 Height = 1 )
```

Constructor

Parameters

Width	width of the image. Must be greater than 0.
Height	height of the image. Must be greate than 0.

Definition at line 5 of file image.cpp.

4.3.2.2 CImage() [2/2]

```
CImage::CImage (
            const CImage & Other )
```

Definition at line 17 of file image.cpp.

4.3.2.3 ∼CImage()

```
CImage::∼CImage ( ) [virtual]
```

Definition at line 27 of file image.cpp.

4.3.3 Member Function Documentation

4.3.3.1 Blit()

```
void CImage::Blit (
            const CImage & Image,
            s32 OffsetX,
            s32 OffsetY )
```

Copies an image to another at a given location.

Parameters

Image	the image to copy to this image.
OffsetX	the X coordinate at which to start the copy.
OffsetY	the Y coordinate at which to start the copy.

Definition at line 113 of file image.cpp.

4.3.3.2 Height()

```
s32 CImage::Height ( ) const
```

Definition at line 74 of file image.cpp.

4.3.3.3 operator()() [1/2]

```
UColor & CImage::operator() (
             s32 X,
             s32 Y )
```

Returns the pixel at (X, Y). Throws out_of_range exception if X or Y are invalid.

Definition at line 48 of file image.cpp.

4.3.3.4 operator()() [2/2]

```
UColor CImage::operator() (
             s32 X,
             s32 Y ) const
```

Returns the pixel at (X, Y). Throws out_of_range exception if X or Y are invalid.

Definition at line 59 of file image.cpp.

4.3.3.5 operator=()

```
CImage & CImage::operator= (
             const CImage & Other )
```

Definition at line 32 of file image.cpp.

4.3.3.6 Pixels() [1/2]

```
UColor * CImage::Pixels ( )
```

Returns the raw pointer to the pixel data.

Definition at line 79 of file image.cpp.

4.3.3.7 Pixels() [2/2]

```
const UColor * CImage::Pixels ( ) const
```

Returns the raw pointer to the pixel data.

Definition at line 84 of file image.cpp.

4.3.3.8 Read()

```
std::istream & CImage::Read (
             std::istream & Stream )  [virtual]
```

Reads the image in .bmp format from a stream.

Parameters

Stream	the stream from which to read. Must be binary.

Implements ISerializable.

Definition at line 133 of file image.cpp.

4.3.3.9 Resize()

```
void CImage::Resize (
             s32 Width,
             s32 Height )
```

Resizes the image to a new resolution

Parameters

Width	the new width of the image. Must be greater than 0.
Height	the new height of the iamge. Must be reater than 0.

Definition at line 89 of file image.cpp.

4.3.3.10 Sample()

```
Vec3 CImage::Sample (
             r32 U,
             r32 V ) const
```

Returns a normalized color from the normalized image coordinates.

Parameters

U	normalized horizontal coordinate ranging from [0..1).
V	normalized vertical coordinate ranging from [0..1).

Definition at line 103 of file image.cpp.

4.3.3.11 Width()

```
s32 CImage::Width ( ) const
```

Definition at line 70 of file image.cpp.

4.3.3.12 Write()

```
std::ostream & CImage::Write (
             std::ostream & Stream ) const  [virtual]
```

Writes the image in .bmp format to a stream.

Parameters

Stream	the stream to write. Must be binary.

Implements ISerializable.

Definition at line 176 of file image.cpp.

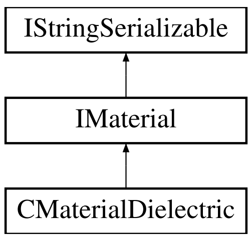
The documentation for this class was generated from the following files:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/image.hpp
- E:/dev/VS 14/Projects/raytracer/raytracer/src/image.cpp

4.4 CMaterialDielectric Class Reference

```
#include <material.hpp>
```

Inheritance diagram for CMaterialDielectric:



Public Member Functions

- CMaterialDielectric (Vec3 Color, r32 RefractiveIndex, CSharedPointer< CImage > Texture=nullptr)
- virtual CRay Scatter (const CRay &Ray, Vec3 Position, Vec3 Normal) const
- virtual std::string & ReadFromString (std::string &String)
- virtual void WriteToString (std::string &String) const

Additional Inherited Members

4.4.1 Detailed Description

Dielectric material which rays pass through.

Definition at line 72 of file material.hpp.

4.4.2 Constructor & Destructor Documentation

4.4.2.1 CMaterialDielectric()

```
CMaterialDielectric::CMaterialDielectric (
             Vec3 Color,
             r32 RefractiveIndex,
             CSharedPointer< CImage > Texture = nullptr )
```

See IMaterial

Parameters

Color	the color of the material.
RefractiveIndex	the physical refractive index of the material.
Texture	the texture of the material.

Definition at line 143 of file material.cpp.

4.4.3 Member Function Documentation

4.4.3.1 ReadFromString()

```
std::string & CMaterialDielectric::ReadFromString (
             std::string & String )  [virtual]
```

Reads the object from a string, possibly removing contents from the string.

Implements IStringSerializable.

Definition at line 175 of file material.cpp.

4.4.3.2 Scatter()

```
CRay CMaterialDielectric::Scatter (
             const CRay & Ray,
             Vec3 Position,
             Vec3 Normal ) const  [virtual]
```

Returns the refraction/reflection of the ray depending on the angle.

Implements IMaterial.

Definition at line 151 of file material.cpp.

4.4.3.3 WriteToString()

```
void CMaterialDielectric::WriteToString (
             std::string & String ) const  [virtual]
```

Writes the object to a string.

Implements IStringSerializable.

Definition at line 213 of file material.cpp.

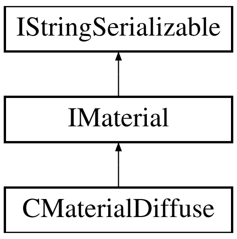
The documentation for this class was generated from the following files:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/material.hpp
- E:/dev/VS 14/Projects/raytracer/raytracer/src/material.cpp

4.5 CMaterialDiffuse Class Reference

```
#include <material.hpp>
```

Inheritance diagram for CMaterialDiffuse:



Public Member Functions

- CMaterialDiffuse (Vec3 Color, CSharedPointer< CImage > Texture=nullptr)
- virtual CRay Scatter (const CRay &Ray, Vec3 Position, Vec3 Normal) const
- virtual std::string & ReadFromString (std::string &String)
- virtual void WriteToString (std::string &String) const

Additional Inherited Members

4.5.1 Detailed Description

Diffuse (matte) material

Definition at line 38 of file material.hpp.

4.5.2 Constructor & Destructor Documentation

4.5.2.1 CMaterialDiffuse()

```
CMaterialDiffuse::CMaterialDiffuse (
            Vec3 Color,
            CSharedPointer< CImage > Texture = nullptr )
```

See IMaterial

Definition at line 19 of file material.cpp.

4.5.3 Member Function Documentation

4.5.3.1 ReadFromString()

```
std::string & CMaterialDiffuse::ReadFromString (
            std::string & String )  [virtual]
```

Reads the object from a string, possibly removing contents from the string.

Implements IStringSerializable.

Definition at line 30 of file material.cpp.

4.5.3.2 Scatter()

```
CRay CMaterialDiffuse::Scatter (
            const CRay & Ray,
            Vec3 Position,
            Vec3 Normal ) const  [virtual]
```

Scatters the ray in a random direction.

Implements IMaterial.

Definition at line 25 of file material.cpp.

4.5.3.3 WriteToString()

```
void CMaterialDiffuse::WriteToString (
            std::string & String ) const  [virtual]
```

Writes the object to a string.

Implements IStringSerializable.

Definition at line 60 of file material.cpp.

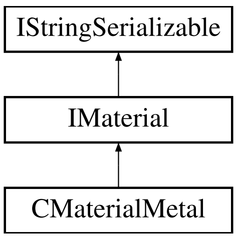
The documentation for this class was generated from the following files:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/material.hpp
- E:/dev/VS 14/Projects/raytracer/raytracer/src/material.cpp

4.6 CMaterialMetal Class Reference

```
#include <material.hpp>
```

Inheritance diagram for CMaterialMetal:



Public Member Functions

- CMaterialMetal (Vec3 Color, r32 Fuzziness=0.0f, CSharedPointer< CImage > Texture=nullptr)
- virtual CRay Scatter (const CRay &Ray, Vec3 Position, Vec3 Normal) const
- virtual std::string & ReadFromString (std::string &String)
- virtual void WriteToString (std::string &String) const

Protected Attributes

- r32 m_Fuzziness

4.6.1 Detailed Description

Metallic material which reflects rays in a mirror-life fashion.

Definition at line 52 of file material.hpp.

4.6.2 Constructor & Destructor Documentation

4.6.2.1 CMaterialMetal()

```
CMaterialMetal::CMaterialMetal (
             Vec3 Color,
             r32 Fuzziness = 0.0f,
             CSharedPointer< CImage > Texture = nullptr )
```

See IMaterial

Parameters

Color	the color of the material.
Fuzziness	randomizes the direction of the reflection. 0 means perfectly clear metal.
Texture	the texture of the material.

Definition at line 75 of file material.cpp.

4.6.3 Member Function Documentation

4.6.3.1 ReadFromString()

```
std::string & CMaterialMetal::ReadFromString (
             std::string & String )  [virtual]
```

Reads the object from a string, possibly removing contents from the string.

Implements IStringSerializable.

Definition at line 89 of file material.cpp.

4.6.3.2 Scatter()

```
CRay CMaterialMetal::Scatter (
             const CRay & Ray,
             Vec3 Position,
             Vec3 Normal ) const  [virtual]
```

Mathematically reflects ray, randomizing it by the metal's fuzziness.

Implements IMaterial.

Definition at line 82 of file material.cpp.

4.6.3.3 WriteToString()

```
void CMaterialMetal::WriteToString (
             std::string & String ) const  [virtual]
```

Writes the object to a string.

Implements IStringSerializable.

Definition at line 127 of file material.cpp.

4.6.4 Member Data Documentation

4.6.4.1 m_Fuzziness

```
r32 CMaterialMetal::m_Fuzziness  [protected]
```

Parameter which controls how fuzzy the metal is. 0 means perfectly clear.

Definition at line 68 of file material.hpp.

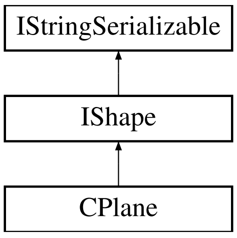
The documentation for this class was generated from the following files:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/material.hpp
- E:/dev/VS 14/Projects/raytracer/raytracer/src/material.cpp

4.7 CPlane Class Reference

```
#include <plane.hpp>
```

Inheritance diagram for CPlane:



Public Member Functions

- CPlane (Vec3 Normal, r32 Offset, Vec3 TextureUp=Vec3(0.0f, 0.0f, -1.0f), CSharedPointer< IMaterial > Material=nullptr)
- virtual ∼CPlane ()
- virtual void GetUV (Vec3 Point, r32 &U, r32 &V) const
- virtual bool Intersect (const CRay &Ray, r32 tMin, r32 tMax, SHitInfo &HitInfo) const
- virtual std::string & ReadFromString (std::string &String)
- virtual void WriteToString (std::string &String) const

Additional Inherited Members

4.7.1 Detailed Description

Shape that represents a plane in the world.

Equation for the plane is $Nx*x + Ny*y + Nz*z = offset$

Definition at line 10 of file plane.hpp.

4.7.2 Constructor & Destructor Documentation

4.7.2.1 CPlane()

```
CPlane::CPlane (
            Vec3 Normal,
            r32 Offset,
            Vec3 TextureUp = Vec3(0.0f, 0.0f, -1.0f),
            CSharedPointer< IMaterial > Material = nullptr )
```

Constructor

Parameters

Normal	the surface normal of the plane.
Offset	the value how far along the plane is on the normal relative to the world origin.
TextureUp	world vector which defines which axis corresponds to the texture's vertical axis.
Material	the material of the plane.

Definition at line 3 of file plane.cpp.

4.7.2.2 ∼CPlane()

```
CPlane::∼CPlane ( )  [virtual]
```

Definition at line 15 of file plane.cpp.

4.7.3 Member Function Documentation

4.7.3.1 GetUV()

```
void CPlane::GetUV (
             Vec3 Point,
             r32 & U,
             r32 & V ) const  [virtual]
```

Returns the UV coordinates of the object at a given point.

Implements IShape.

Definition at line 20 of file plane.cpp.

4.7.3.2 Intersect()

```
bool CPlane::Intersect (
             const CRay & Ray,
             r32 tMin,
             r32 tMax,
             SHitInfo & HitInfo ) const  [virtual]
```

Checks whether a ray intersects with the shape.

Parameters

Ray	the ray to check the intersection with.
tMin	the minimum t parameter of the ray to consider for intersection.
tMax	the maximum t paramter of the ray to consided for intersection.
HitInfo	reference to the object which will store the collision information.

Implements IShape.

Definition at line 26 of file plane.cpp.

4.7.3.3 ReadFromString()

```
std::string & CPlane::ReadFromString (
             std::string & String )  [virtual]
```

Reads the object from a string, possibly removing contents from the string.

Implements IStringSerializable.

Definition at line 47 of file plane.cpp.

4.7.3.4 WriteToString()

```
void CPlane::WriteToString (
             std::string & String ) const  [virtual]
```

Writes the object to a string.

Implements IStringSerializable.

Definition at line 105 of file plane.cpp.

The documentation for this class was generated from the following files:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/plane.hpp
- E:/dev/VS 14/Projects/raytracer/raytracer/src/plane.cpp

4.8 CRay Class Reference

```
#include <ray.hpp>
```

Public Member Functions

- CRay (Vec3 Origin, Vec3 Direction)
- Vec3 & Origin ()
- Vec3 Origin () const
- Vec3 & Direction ()
- Vec3 Direction () const
- Vec3 PointAt (r32 tVal) const

4.8.1 Detailed Description

Class that represents a physical ray, that has a starting point and a direction.

Definition at line 6 of file ray.hpp.

4.8.2 Constructor & Destructor Documentation

4.8.2.1 CRay()

```
CRay::CRay (
            Vec3 Origin,
            Vec3 Direction )
```

Constructor

Parameters

Origin	starting location of the ray in the world.
Direction	direction vector of the ray.

Definition at line 3 of file ray.cpp.

4.8.3 Member Function Documentation

4.8.3.1 Direction() [1/2]

```
Vec3 & CRay::Direction ( )
```

Definition at line 19 of file ray.cpp.

4.8.3.2 Direction() [2/2]

```
Vec3 CRay::Direction ( ) const
```

Definition at line 23 of file ray.cpp.

4.8.3.3 Origin() [1/2]

```
Vec3 & CRay::Origin ( )
```

Definition at line 10 of file ray.cpp.

4.8.3.4 Origin() [2/2]

```
Vec3 CRay::Origin ( ) const
```

Definition at line 14 of file ray.cpp.

4.8.3.5 PointAt()

```
Vec3 CRay::PointAt (
             r32 tVal ) const
```

Returns a position along the ray given a parameter.

The position returned is P(t) = A+V∗t.

Parameters

tVal	the parameter.

Definition at line 28 of file ray.cpp.

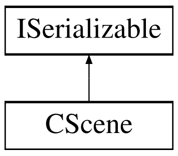
The documentation for this class was generated from the following files:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/ray.hpp
- E:/dev/VS 14/Projects/raytracer/raytracer/src/ray.cpp

4.9 CScene Class Reference

```
#include <scene.hpp>
```

Inheritance diagram for CScene:



Public Member Functions

- CScene ()
- ∼CScene ()
- void SetCamera (CCamera Camera)
- void AddShape (IShape ∗Shape)
- void RenderRegion (SRegion &Region, SRenderParams &Params, SSharedRenderData &Shared) const
- void Render (CImage &Image, SRenderParams &Params) const
- virtual std::istream & Read (std::istream &Stream)
- virtual std::ostream & Write (std::ostream &Stream) const

4.9.1 Detailed Description

Scene class that contains the objects, camera and renders the image.

Definition at line 41 of file scene.hpp.

4.9.2 Constructor & Destructor Documentation

4.9.2.1 CScene()

```
CScene::CScene ( )
```

Definition at line 9 of file scene.cpp.

4.9.2.2 ∼CScene()

```
CScene::∼CScene ( )
```

Definition at line 12 of file scene.cpp.

4.9.3 Member Function Documentation

4.9.3.1 AddShape()

```
void CScene::AddShape (
            IShape * Shape )
```

Adds a shape to the scene.

Definition at line 22 of file scene.cpp.

4.9.3.2 Read()

```
std::istream & CScene::Read (
            std::istream & Stream )  [virtual]
```

Reads the scene from a stream in json format.

Implements ISerializable.

Definition at line 209 of file scene.cpp.

4.9.3.3 Render()

```
void CScene::Render (
            CImage & Image,
            SRenderParams & Params ) const
```

Renders the scene to an image.

Parameters

Image	the image to render to.
Params	the render parameters.

Definition at line 128 of file scene.cpp.

4.9.3.4 RenderRegion()

```
void CScene::RenderRegion (
            SRegion & Region,
            SRenderParams & Params,
            SSharedRenderData & Shared ) const
```

Renders a subregion of the final image.

Parameters

Region	the region to render.
Params	the render parameters.
Shared	the data shared between threads.

Definition at line 77 of file scene.cpp.

4.9.3.5 SetCamera()

```
void CScene::SetCamera (
             CCamera Camera )
```

Definition at line 17 of file scene.cpp.

4.9.3.6 Write()

```
std::ostream & CScene::Write (
             std::ostream & Stream ) const  [virtual]
```

Writes the scene to a stream in json format.

Implements ISerializable.

Definition at line 252 of file scene.cpp.

The documentation for this class was generated from the following files:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/scene.hpp
- E:/dev/VS 14/Projects/raytracer/raytracer/src/scene.cpp

4.10 CSharedPointer< T > Class Template Reference

```
#include <sharedpointer.hpp>
```

Public Member Functions

- CSharedPointer ()
- CSharedPointer (T ∗Pointer)
- CSharedPointer (const CSharedPointer &Other)
- ∼CSharedPointer ()
- CSharedPointer & operator= (const CSharedPointer &Other)
- operator T ∗ ()
- operator const T ∗ () const
- T & operator ∗ ()
- const T & operator ∗ () const
- T ∗ operator-> ()
- const T ∗ operator-> () const
- T ∗ Pointer ()
- const T ∗ Pointer () const
- bool IsNull () const

4.10.1 Detailed Description

template<class T>
class CSharedPointer< T >

Shared pointer class which uses reference counting to keep track of its objects.

Definition at line 7 of file sharedpointer.hpp.

4.10.2 Constructor & Destructor Documentation

4.10.2.1 CSharedPointer() [1/3]

```
template<class T>
CSharedPointer< T >::CSharedPointer ( )  [inline]
```

Definition at line 10 of file sharedpointer.hpp.

4.10.2.2 CSharedPointer() [2/3]

```
template<class T>
CSharedPointer< T >::CSharedPointer (
             T * Pointer )  [inline]
```

Definition at line 16 of file sharedpointer.hpp.

4.10.2.3 CSharedPointer() [3/3]

```
template<class T>
CSharedPointer< T >::CSharedPointer (
             const CSharedPointer< T > & Other )  [inline]
```

Definition at line 26 of file sharedpointer.hpp.

4.10.2.4 ∼CSharedPointer()

```
template<class T>
CSharedPointer< T >::~CSharedPointer ( )  [inline]
```

Definition at line 36 of file sharedpointer.hpp.

4.10.3 Member Function Documentation

4.10.3.1 IsNull()

```
template<class T>
bool CSharedPointer< T >::IsNull ( ) const  [inline]
```

Definition at line 112 of file sharedpointer.hpp.

4.10.3.2 operator *() [1/2]

```
template<class T>
T& CSharedPointer< T >::operator * ( )  [inline]
```

Definition at line 82 of file sharedpointer.hpp.

4.10.3.3 operator *() [2/2]

```
template<class T>
const T& CSharedPointer< T >::operator * ( ) const  [inline]
```

Definition at line 87 of file sharedpointer.hpp.

4.10.3.4 operator const T *()

```
template<class T>
CSharedPointer< T >::operator const T * ( ) const  [inline]
```

Definition at line 77 of file sharedpointer.hpp.

4.10.3.5 operator T *()

```
template<class T>
CSharedPointer< T >::operator T * ( )  [inline]
```

Definition at line 72 of file sharedpointer.hpp.

4.10.3.6 operator->() [1/2]

```
template<class T>
T* CSharedPointer< T >::operator-> ( )  [inline]
```

Definition at line 92 of file sharedpointer.hpp.

4.10.3.7 operator->() [2/2]

```
template<class T>
const T* CSharedPointer< T >::operator-> ( ) const  [inline]
```

Definition at line 97 of file sharedpointer.hpp.

4.10.3.8 operator=()

```
template<class T>
CSharedPointer& CSharedPointer< T >::operator= (
              const CSharedPointer< T > & Other )  [inline]
```

Definition at line 49 of file sharedpointer.hpp.

4.10.3.9 Pointer() [1/2]

```
template<class T>
T* CSharedPointer< T >::Pointer ( )  [inline]
```

Definition at line 102 of file sharedpointer.hpp.

4.10.3.10 Pointer() [2/2]

```
template<class T>
const T* CSharedPointer< T >::Pointer ( ) const  [inline]
```

Definition at line 107 of file sharedpointer.hpp.

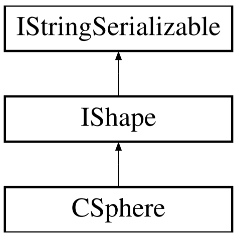
The documentation for this class was generated from the following file:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/sharedpointer.hpp

4.11 CSphere Class Reference

```
#include <sphere.hpp>
```

Inheritance diagram for CSphere:



Public Member Functions

- CSphere (Vec3 Center, r32 Radius, CSharedPointer< IMaterial > Material=nullptr)
- virtual ∼CSphere ()
- virtual void GetUV (Vec3 Point, r32 &U, r32 &V) const
- virtual bool Intersect (const CRay &Ray, r32 tMin, r32 tMax, SHitInfo &HitInfo) const
- virtual std::string & ReadFromString (std::string &String)
- virtual void WriteToString (std::string &String) const

Additional Inherited Members

4.11.1 Detailed Description

Shape class that represents a sphere in the world.

Definition at line 5 of file sphere.hpp.

4.11.2 Constructor & Destructor Documentation

4.11.2.1 CSphere()

```
CSphere::CSphere (
            Vec3 Center,
            r32 Radius,
            CSharedPointer< IMaterial > Material = nullptr )
```

Constructor

Parameters

Center	the location of the sphere.
Radius	the radius of the sphere.
Material	the material of the sphere.

Definition at line 3 of file sphere.cpp.

4.11.2.2 ∼CSphere()

```
CSphere::∼CSphere ( )  [virtual]
```

Definition at line 10 of file sphere.cpp.

4.11.3 Member Function Documentation

4.11.3.1 GetUV()

```
void CSphere::GetUV (
             Vec3 Point,
             r32 & U,
             r32 & V ) const  [virtual]
```

Returns the UV coordinates of the object at a given point.

Implements IShape.

Definition at line 15 of file sphere.cpp.

4.11.3.2 Intersect()

```
bool CSphere::Intersect (
             const CRay & Ray,
             r32 tMin,
             r32 tMax,
             SHitInfo & HitInfo ) const  [virtual]
```

Checks whether a ray intersects with the shape.

Parameters

Ray	the ray to check the intersection with.
tMin	the minimum t parameter of the ray to consider for intersection.
tMax	the maximum t paramter of the ray to consided for intersection.
HitInfo	reference to the object which will store the collision information.

Implements IShape.

Definition at line 22 of file sphere.cpp.

4.11.3.3 ReadFromString()

```
std::string & CSphere::ReadFromString (
             std::string & String )  [virtual]
```

Reads the object from a string, possibly removing contents from the string.

Implements IStringSerializable.

Definition at line 50 of file sphere.cpp.

4.11.3.4 WriteToString()

```
void CSphere::WriteToString (
             std::string & String ) const  [virtual]
```

Writes the object to a string.

Implements IStringSerializable.

Definition at line 98 of file sphere.cpp.

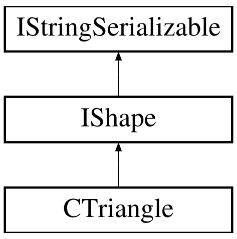
The documentation for this class was generated from the following files:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/sphere.hpp
- E:/dev/VS 14/Projects/raytracer/raytracer/src/sphere.cpp

4.12 CTriangle Class Reference

```
#include <triangle.hpp>
```

Inheritance diagram for CTriangle:



Public Member Functions

- CTriangle (CSharedPointer< IMaterial > Material, Vec3 P0, Vec3 P1, Vec3 P2, bool bCustomNormals=false, Vec3 N0=Vec3(), Vec3 N1=Vec3(), Vec3 N2=Vec3())
- virtual ∼CTriangle ()
- virtual void GetUV (Vec3 Point, r32 &U, r32 &V) const
- virtual bool Intersect (const CRay &Ray, r32 tMin, r32 tMax, SHitInfo &HitInfo) const
- virtual std::string & ReadFromString (std::string &String)
- virtual void WriteToString (std::string &String) const

Additional Inherited Members

4.12.1 Detailed Description

Definition at line 5 of file triangle.hpp.

4.12.2 Constructor & Destructor Documentation

4.12.2.1 CTriangle()

```
CTriangle::CTriangle (
            CSharedPointer< IMaterial > Material,
            Vec3 P0,
            Vec3 P1,
            Vec3 P2,
            bool bCustomNormals = false,
            Vec3 N0 = Vec3(),
            Vec3 N1 = Vec3(),
            Vec3 N2 = Vec3() )
```

Definition at line 4 of file triangle.cpp.

4.12.2.2 ∼CTriangle()

```
CTriangle::∼CTriangle ( )  [virtual]
```

Definition at line 30 of file triangle.cpp.

4.12.3 Member Function Documentation

4.12.3.1 GetUV()

```
void CTriangle::GetUV (
             Vec3 Point,
             r32 & U,
             r32 & V ) const  [virtual]
```

Returns the UV coordinates of the object at a given point.

Implements IShape.

Definition at line 35 of file triangle.cpp.

4.12.3.2 Intersect()

```
bool CTriangle::Intersect (
             const CRay & Ray,
             r32 tMin,
             r32 tMax,
             SHitInfo & HitInfo ) const  [virtual]
```

Checks whether a ray intersects with the shape.

Parameters

Ray	the ray to check the intersection with.
tMin	the minimum t parameter of the ray to consider for intersection.
tMax	the maximum t paramter of the ray to consided for intersection.
HitInfo	reference to the object which will store the collision information.

Implements IShape.

Definition at line 41 of file triangle.cpp.

4.12.3.3 ReadFromString()

```
std::string & CTriangle::ReadFromString (
             std::string & String )  [virtual]
```

Reads the object from a string, possibly removing contents from the string.

Implements IStringSerializable.

Definition at line 83 of file triangle.cpp.

4.12.3.4 WriteToString()

```
void CTriangle::WriteToString (
            std::string & String ) const  [virtual]
```

Writes the object to a string.

Implements IStringSerializable.

Definition at line 88 of file triangle.cpp.

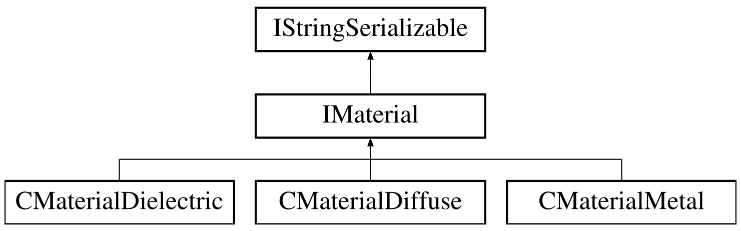
The documentation for this class was generated from the following files:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/triangle.hpp
- E:/dev/VS 14/Projects/raytracer/raytracer/src/triangle.cpp

4.13 IMaterial Class Reference

```
#include <material.hpp>
```

Inheritance diagram for IMaterial:



Public Member Functions

- IMaterial (Vec3 Color, CSharedPointer< CImage > Texture=nullptr)
- Vec3 GetColor () const
- const CSharedPointer< CImage > & GetTexture () const
- virtual CRay Scatter (const CRay &Ray, Vec3 Position, Vec3 Normal) const =0

Protected Attributes

- Vec3 m_Color
- CSharedPointer< CImage > m_Texture

4.13.1 Detailed Description

Generic material interface. Stores an object's color, texture and the reflection function.

Definition at line 11 of file material.hpp.

4.13.2 Constructor & Destructor Documentation

4.13.2.1 IMaterial()

```
IMaterial::IMaterial (
            Vec3 Color,
            CSharedPointer< CImage > Texture = nullptr )
```

Constructor

Parameters

Color	the material's diffuse color.
Texture	pointer to a CImage which contains additional color information.

Definition at line 3 of file material.cpp.

4.13.3 Member Function Documentation

4.13.3.1 GetColor()

```
Vec3 IMaterial::GetColor ( ) const
```

Returns the material's color.

Definition at line 9 of file material.cpp.

4.13.3.2 GetTexture()

```
const CSharedPointer< CImage > & IMaterial::GetTexture ( ) const
```

Returns a pointer to material's texture.

Definition at line 14 of file material.cpp.

4.13.3.3 Scatter()

```
virtual CRay IMaterial::Scatter (
            const CRay & Ray,
            Vec3 Position,
            Vec3 Normal ) const  [pure virtual]
```

Reflects the vector given the surface coordinate and its normal.

Parameters

Ray	the ray to reflect.
Position	the coordinate where the collision occured.
Normal	the surface normal of the shape where the collision occured.

Implemented in CMaterialDielectric, CMaterialMetal, and CMaterialDiffuse.

4.13.4 Member Data Documentation

4.13.4.1 m_Color

`Vec3 IMaterial::m_Color [protected]`

Definition at line 33 of file material.hpp.

4.13.4.2 m_Texture

`CSharedPointer<CImage> IMaterial::m_Texture [protected]`

Definition at line 34 of file material.hpp.

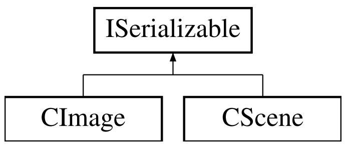
The documentation for this class was generated from the following files:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/material.hpp
- E:/dev/VS 14/Projects/raytracer/raytracer/src/material.cpp

4.14 ISerializable Class Reference

`#include <serializable.hpp>`

Inheritance diagram for ISerializable:



Public Member Functions

- virtual ∼ISerializable ()
- virtual std::istream & Read (std::istream &Stream)=0
- virtual std::ostream & Write (std::ostream &Stream) const =0

4.14.1 Detailed Description

Serializable interface that supports reading from and writing to streams.

Definition at line 6 of file serializable.hpp.

4.14.2 Constructor & Destructor Documentation

4.14.2.1 ∼ISerializable()

```
ISerializable::∼ISerializable ( )  [virtual]
```

Definition at line 3 of file serializable.cpp.

4.14.3 Member Function Documentation

4.14.3.1 Read()

```
virtual std::istream& ISerializable::Read (
             std::istream & Stream )  [pure virtual]
```

Reads the object from a stream.

Implemented in CImage, and CScene.

4.14.3.2 Write()

```
virtual std::ostream& ISerializable::Write (
             std::ostream & Stream ) const  [pure virtual]
```

Writes the object to a stream.

Implemented in CImage, and CScene.

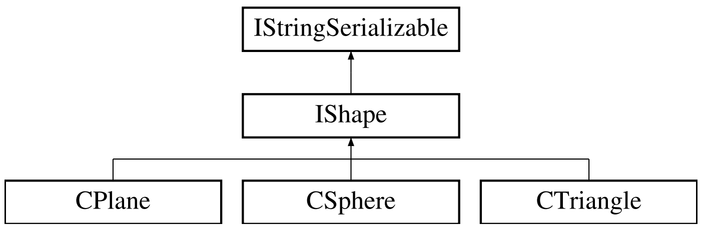
The documentation for this class was generated from the following files:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/serializable.hpp
- E:/dev/VS 14/Projects/raytracer/raytracer/src/serializable.cpp

4.15 IShape Class Reference

```
#include <shape.hpp>
```

Inheritance diagram for IShape:



Public Member Functions

- IShape (CSharedPointer< IMaterial > Material)
- virtual ∼IShape ()=0
- const CSharedPointer< IMaterial > & GetMaterial () const
- virtual void GetUV (Vec3 Point, r32 &U, r32 &V) const =0
- virtual bool Intersect (const CRay &Ray, r32 tMin, r32 tMax, SHitInfo &HitInfo) const =0

Protected Attributes

- CSharedPointer< IMaterial > m_Material

4.15.1 Detailed Description

Generic shape interface.

Definition at line 20 of file shape.hpp.

4.15.2 Constructor & Destructor Documentation

4.15.2.1 IShape()

```
IShape::IShape (
            CSharedPointer< IMaterial > Material )
```

Constructor

Parameters

Material	pointer to the shape's material.

Definition at line 3 of file shape.cpp.

4.15.2.2 ∼IShape()

```
IShape::∼IShape ( )  [pure virtual]
```

Definition at line 9 of file shape.cpp.

4.15.3 Member Function Documentation

4.15.3.1 GetMaterial()

```
const CSharedPointer< IMaterial > & IShape::GetMaterial ( ) const
```

Returns the shape's material pointer.

Definition at line 14 of file shape.cpp.

4.15.3.2 GetUV()

```
virtual void IShape::GetUV (
             Vec3 Point,
             r32 & U,
             r32 & V ) const  [pure virtual]
```

Returns the UV coordinates of the object at a given point.

Implemented in CPlane, CSphere, and CTriangle.

4.15.3.3 Intersect()

```
virtual bool IShape::Intersect (
             const CRay & Ray,
             r32 tMin,
             r32 tMax,
             SHitInfo & HitInfo ) const  [pure virtual]
```

Checks whether a ray intersects with the shape.

Parameters

Ray	the ray to check the intersection with.
tMin	the minimum t parameter of the ray to consider for intersection.
tMax	the maximum t paramter of the ray to consided for intersection.
HitInfo	reference to the object which will store the collision information.

Implemented in CPlane, CSphere, and CTriangle.

4.15.4 Member Data Documentation

4.15.4.1 m_Material

```
CSharedPointer<IMaterial> IShape::m_Material  [protected]
```

Pointer to the shape's material

Definition at line 45 of file shape.hpp.

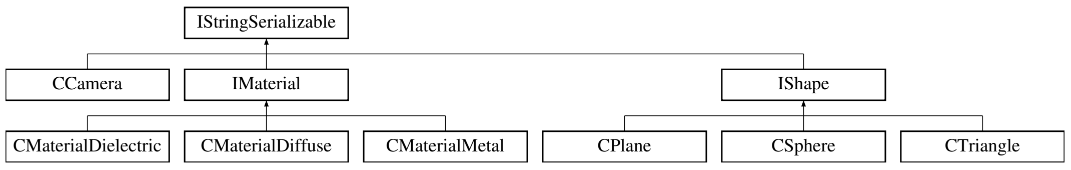
The documentation for this class was generated from the following files:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/shape.hpp
- E:/dev/VS 14/Projects/raytracer/raytracer/src/shape.cpp

4.16 IStringSerializable Class Reference

```
#include <serializable.hpp>
```

Inheritance diagram for IStringSerializable:



Public Member Functions

- virtual ∼IStringSerializable ()
- virtual std::string & ReadFromString (std::string &String)=0
- virtual void WriteToString (std::string &String) const =0

4.16.1 Detailed Description

Serializable interface that supports reading from and writing to strings

Definition at line 23 of file serializable.hpp.

4.16.2 Constructor & Destructor Documentation

4.16.2.1 ∼IStringSerializable()

```
IStringSerializable::∼IStringSerializable ( )  [virtual]
```

Definition at line 17 of file serializable.cpp.

4.16.3 Member Function Documentation

4.16.3.1 ReadFromString()

```
virtual std::string& IStringSerializable::ReadFromString (
            std::string & String )  [pure virtual]
```

Reads the object from a string, possibly removing contents from the string.

Implemented in CMaterialDielectric, CMaterialMetal, CMaterialDiffuse, CCamera, CPlane, CSphere, and CTriangle.

4.16.3.2 WriteToString()

```
virtual void IStringSerializable::WriteToString (
            std::string & String ) const  [pure virtual]
```

Writes the object to a string.

Implemented in CMaterialDielectric, CMaterialMetal, CMaterialDiffuse, CCamera, CPlane, CSphere, and CTriangle.

The documentation for this class was generated from the following files:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/serializable.hpp
- E:/dev/VS 14/Projects/raytracer/raytracer/src/serializable.cpp

4.17 SArguments Struct Reference

Public Attributes

- std::string OutputName
- std::string ScenePath
- s32 RenderWidth
- s32 RenderHeight
- u32 SampleCount
- u32 MaxDepth
- u32 MaxThreadCount

4.17.1 Detailed Description

Contains all the possible arguments the program can start with

Definition at line 26 of file raytracer.cpp.

4.17.2 Member Data Documentation

4.17.2.1 MaxDepth

`u32 SArguments::MaxDepth`

Maximum number of times a ray can bounce.

Definition at line 33 of file raytracer.cpp.

4.17.2.2 MaxThreadCount

`u32 SArguments::MaxThreadCount`

Maximum number of threads the app is allowed to create.

Definition at line 34 of file raytracer.cpp.

4.17.2.3 OutputName

`std::string SArguments::OutputName`

The path of the output image file.

Definition at line 28 of file raytracer.cpp.

4.17.2.4 RenderHeight

`s32 SArguments::RenderHeight`

Height of the output image.

Definition at line 31 of file raytracer.cpp.

4.17.2.5 RenderWidth

`s32 SArguments::RenderWidth`

Width of the output image.

Definition at line 30 of file raytracer.cpp.

4.17.2.6 SampleCount

```
u32 SArguments::SampleCount
```

Number of rays to shoot per pixel.

Definition at line 32 of file raytracer.cpp.

4.17.2.7 ScenePath

```
std::string SArguments::ScenePath
```

Path to the scene to load (json format).

Definition at line 29 of file raytracer.cpp.

The documentation for this struct was generated from the following file:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/raytracer.cpp

4.18 SBitmapFileHeader Struct Reference

```
#include <image.hpp>
```

Public Attributes

- u16 Type
- u32 Size
- u16 Reserved1
- u16 Reserved2
- u32 Offset

4.18.1 Detailed Description

Struct which holds the .bmp file information. See `https://docs.microsoft.com/en-us/windows/desktop/api/wi`

Definition at line 11 of file image.hpp.

4.18.2 Member Data Documentation

4.18.2.1 Offset

`u32 SBitmapFileHeader::Offset`

Definition at line 17 of file image.hpp.

4.18.2.2 Reserved1

`u16 SBitmapFileHeader::Reserved1`

Definition at line 15 of file image.hpp.

4.18.2.3 Reserved2

`u16 SBitmapFileHeader::Reserved2`

Definition at line 16 of file image.hpp.

4.18.2.4 Size

`u32 SBitmapFileHeader::Size`

Definition at line 14 of file image.hpp.

4.18.2.5 Type

`u16 SBitmapFileHeader::Type`

Definition at line 13 of file image.hpp.

The documentation for this struct was generated from the following file:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/image.hpp

4.19 SBitmapInfoHeader Struct Reference

```
#include <image.hpp>
```

Public Attributes

- u32 Size
- s32 Width
- s32 Height
- u16 Planes
- u16 BitCount
- u32 Compression
- u32 ImageSize
- s32 PixelsPerMeterX
- s32 PixelsPerMeterY
- u32 ClrUsed
- u32 ClrImportant

4.19.1 Detailed Description

Struct which holds the .bmp image information. See `https://docs.microsoft.com/en-us/windows/desktop/api/`

Definition at line 23 of file image.hpp.

4.19.2 Member Data Documentation

4.19.2.1 BitCount

```
u16 SBitmapInfoHeader::BitCount
```

Definition at line 29 of file image.hpp.

4.19.2.2 ClrImportant

```
u32 SBitmapInfoHeader::ClrImportant
```

Definition at line 35 of file image.hpp.

4.19.2.3 ClrUsed

```
u32 SBitmapInfoHeader::ClrUsed
```

Definition at line 34 of file image.hpp.

4.19.2.4 Compression

```
u32 SBitmapInfoHeader::Compression
```

Definition at line 30 of file image.hpp.

4.19.2.5 Height

```
s32 SBitmapInfoHeader::Height
```

Definition at line 27 of file image.hpp.

4.19.2.6 ImageSize

```
u32 SBitmapInfoHeader::ImageSize
```

Definition at line 31 of file image.hpp.

4.19.2.7 PixelsPerMeterX

```
s32 SBitmapInfoHeader::PixelsPerMeterX
```

Definition at line 32 of file image.hpp.

4.19.2.8 PixelsPerMeterY

```
s32 SBitmapInfoHeader::PixelsPerMeterY
```

Definition at line 33 of file image.hpp.

4.19.2.9 Planes

```
u16 SBitmapInfoHeader::Planes
```

Definition at line 28 of file image.hpp.

4.19.2.10 Size

```
u32 SBitmapInfoHeader::Size
```

Definition at line 25 of file image.hpp.

4.19.2.11 Width

```
s32 SBitmapInfoHeader::Width
```

Definition at line 26 of file image.hpp.

The documentation for this struct was generated from the following file:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/image.hpp

4.20 SHitInfo Struct Reference

```
#include <shape.hpp>
```

Public Attributes

- r32 tVal
- Vec3 Point
- Vec3 Normal
- const IShape $*$ Shape

4.20.1 Detailed Description

Stores the hit information of a ray-shape collision.

Definition at line 11 of file shape.hpp.

4.20.2 Member Data Documentation

4.20.2.1 Normal

```
Vec3 SHitInfo::Normal
```

The surface normal of the object where the collision occured.

Definition at line 15 of file shape.hpp.

4.20.2.2 Point

```
Vec3 SHitInfo::Point
```

The world coordinate where the collision occured.

Definition at line 14 of file shape.hpp.

4.20.2.3 Shape

```
const IShape* SHitInfo::Shape
```

Pointer to the object which the ray collided with.

Definition at line 16 of file shape.hpp.

4.20.2.4 tVal

```
r32 SHitInfo::tVal
```

The t parameter of the ray where the collision occured.

Definition at line 13 of file shape.hpp.

The documentation for this struct was generated from the following file:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/shape.hpp

4.21 SRegion Struct Reference

```
#include <scene.hpp>
```

Public Attributes

- CImage Image
- s32 OffsetX
- s32 OffsetY

4.21.1 Detailed Description

A region of the final render.

Definition at line 13 of file scene.hpp.

4.21.2 Member Data Documentation

4.21.2.1 Image

`CImage SRegion::Image`

The image of the region.

Definition at line 15 of file scene.hpp.

4.21.2.2 OffsetX

`s32 SRegion::OffsetX`

Horizontal coordinate in the final image.

Definition at line 16 of file scene.hpp.

4.21.2.3 OffsetY

`s32 SRegion::OffsetY`

Vertical coordinate in the final image.

Definition at line 17 of file scene.hpp.

The documentation for this struct was generated from the following file:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/scene.hpp

4.22 SRenderParams Struct Reference

```
#include <scene.hpp>
```

Public Attributes

- u32 SampleCount
- u32 MaxDepth
- u32 MaxThreadCount
- r32 AspectRatio
- s32 FullRenderWidth
- s32 FullRenderHeight

4.22.1 Detailed Description

The parameters of the render.

Definition at line 21 of file scene.hpp.

4.22.2 Member Data Documentation

4.22.2.1 AspectRatio

`r32 SRenderParams::AspectRatio`

The aspect ratio of the output image. Internal use.

Definition at line 28 of file scene.hpp.

4.22.2.2 FullRenderHeight

`s32 SRenderParams::FullRenderHeight`

The height of the final image. Internal use.

Definition at line 30 of file scene.hpp.

4.22.2.3 FullRenderWidth

`s32 SRenderParams::FullRenderWidth`

The width of the final image. Internal use.

Definition at line 29 of file scene.hpp.

4.22.2.4 MaxDepth

`u32 SRenderParams::MaxDepth`

The maximum number of times a ray can bounce.

Definition at line 24 of file scene.hpp.

4.22.2.5 MaxThreadCount

```
u32 SRenderParams::MaxThreadCount
```

The maximum number of threads the app can create.

Definition at line 25 of file scene.hpp.

4.22.2.6 SampleCount

```
u32 SRenderParams::SampleCount
```

The number of pixels to shoot per pixel.

Definition at line 23 of file scene.hpp.

The documentation for this struct was generated from the following file:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/scene.hpp

4.23 SSharedRenderData Struct Reference

```
#include <scene.hpp>
```

Public Attributes

- std::atomic< u32 > PixelsProcessed
- std::mutex PrintMutex

4.23.1 Detailed Description

Multithread data of the render.

Definition at line 34 of file scene.hpp.

4.23.2 Member Data Documentation

4.23.2.1 PixelsProcessed

```
std::atomic<u32> SSharedRenderData::PixelsProcessed
```

The number of pixels processed by the threads.

Definition at line 36 of file scene.hpp.

4.23.2.2 PrintMutex

```
std::mutex SSharedRenderData::PrintMutex
```

Lock for the output stream.

Definition at line 37 of file scene.hpp.

The documentation for this struct was generated from the following file:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/scene.hpp

4.24 UColor Union Reference

```
#include <color.hpp>
```

Public Attributes

- u32 Color
- struct {
    u8 Alpha
    u8 Blue
    u8 Green
    u8 Red
  } Components

4.24.1 Detailed Description

Stores color information in 0xRRGGBBAA format.

Definition at line 6 of file color.hpp.

4.24.2 Member Data Documentation

4.24.2.1 Alpha

```
u8 UColor::Alpha
```

Alpha channel of the color.

Definition at line 12 of file color.hpp.

4.24.2.2 Blue

```
u8 UColor::Blue
```

BLue channel of the color.

Definition at line 13 of file color.hpp.

4.24.2.3 Color

```
u32 UColor::Color
```

32 bit unsigned integer holding the color information

Definition at line 8 of file color.hpp.

4.24.2.4 Components

```
struct { ... } UColor::Components
```

Struct to access the components separately.

4.24.2.5 Green

```
u8 UColor::Green
```

Green channel of the color.

Definition at line 14 of file color.hpp.

4.24.2.6 Red

```
u8 UColor::Red
```

Red channel of the color.

Definition at line 15 of file color.hpp.

The documentation for this union was generated from the following file:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/color.hpp

4.25 Vec3 Struct Reference

```
#include <common.hpp>
```

Public Member Functions

- Vec3 ()
- Vec3 (r32 X, r32 Y, r32 Z)
- Vec3 operator- () const
- bool operator== (const Vec3 &Other) const
- Vec3 & operator+= (const Vec3 &Other)
- Vec3 & operator-= (const Vec3 &Other)
- Vec3 & operator ∗= (const Vec3 &Other)
- Vec3 operator+ (const Vec3 &Other) const
- Vec3 operator- (const Vec3 &Other) const
- Vec3 operator ∗ (const Vec3 &Other) const
- Vec3 & operator ∗= (r32 S)
- Vec3 & operator/= (r32 S)
- Vec3 operator ∗ (r32 S) const
- Vec3 operator/ (r32 S) const
- r32 LengthSq () const
- r32 Length () const

Public Attributes

- r32 X
- r32 Y
- r32 Z

4.25.1 Detailed Description

Mathematical 3D vector.

Definition at line 55 of file common.hpp.

4.25.2 Constructor & Destructor Documentation

4.25.2.1 Vec3() [1/2]

```
Vec3::Vec3 ( )
```

Empty constructor. Initializes to 0.

Definition at line 70 of file common.cpp.

4.25.2.2 Vec3() [2/2]

```
Vec3::Vec3 (
             r32 X,
             r32 Y,
             r32 Z )
```

Sets the coordinates to the appropriate parameters.

Definition at line 77 of file common.cpp.

4.25.3 Member Function Documentation

4.25.3.1 Length()

```
r32 Vec3::Length ( ) const
```

Returns the Pythagorean length.

Definition at line 186 of file common.cpp.

4.25.3.2 LengthSq()

```
r32 Vec3::LengthSq ( ) const
```

Returns the square of the Pythagorean length.

Definition at line 181 of file common.cpp.

4.25.3.3 operator *() [1/2]

```
Vec3 Vec3::operator * (
             const Vec3 & Other ) const
```

Multiplies a vector with another (component-wise).

Definition at line 121 of file common.cpp.

4.25.3.4 operator *() [2/2]

```
Vec3 Vec3::operator * (
             r32 S ) const
```

Multiplies a vector with a scalar.

Definition at line 163 of file common.cpp.

4.25.3.5 operator *=() [1/2]

```
Vec3 & Vec3::operator *= (
             const Vec3 & Other )
```

Multiplies a vector with another (component-wise).

Definition at line 113 of file common.cpp.

4.25.3.6 operator *=() [2/2]

```
Vec3 & Vec3::operator *= (
             r32 S )
```

Multiplies a vector with a scalar.

Definition at line 142 of file common.cpp.

4.25.3.7 operator+()

```
Vec3 Vec3::operator+ (
             const Vec3 & Other ) const
```

Adds a vector to another (component-wise).

Definition at line 128 of file common.cpp.

4.25.3.8 operator+=()

```
Vec3 & Vec3::operator+= (
             const Vec3 & Other )
```

Adds a vector to another (component-wise).

Definition at line 97 of file common.cpp.

4.25.3.9 operator-() [1/2]

```
Vec3 Vec3::operator- ( ) const
```

Returns the negated version of the vector.

Definition at line 84 of file common.cpp.

4.25.3.10 operator-() [2/2]

```
Vec3 Vec3::operator- (
             const Vec3 & Other ) const
```

Subtracts a vector from another (component-wise).

Definition at line 135 of file common.cpp.

4.25.3.11 operator-=()

```
Vec3 & Vec3::operator-= (
             const Vec3 & Other )
```

Subtracts a vector from another (component-wise).

Definition at line 105 of file common.cpp.

4.25.3.12 operator/()

```
Vec3 Vec3::operator/ (
             r32 S ) const
```

Divides a vector by a scalar.

Definition at line 169 of file common.cpp.

4.25.3.13 operator/=()

```
Vec3 & Vec3::operator/= (
             r32 S )
```

Divides a vector by a scalar.

Definition at line 150 of file common.cpp.

4.25.3.14 operator==()

```
bool Vec3::operator== (
             const Vec3 & Other ) const
```

Checks if all coordinates are equal.

Definition at line 89 of file common.cpp.

4.25.4 Member Data Documentation

4.25.4.1 X

```
r32 Vec3::X
```

X coordinate of the vector.

Definition at line 57 of file common.hpp.

4.25.4.2 Y

```
r32 Vec3::Y
```

Y coordinate of the vector.

Definition at line 58 of file common.hpp.

4.25.4.3 Z

```
r32 Vec3::Z
```

Z coordinate of the vector.

Definition at line 59 of file common.hpp.

The documentation for this struct was generated from the following files:

- E:/dev/VS 14/Projects/raytracer/raytracer/src/common.hpp
- E:/dev/VS 14/Projects/raytracer/raytracer/src/common.cpp

Chapter 5

File Documentation

5.1 E:/dev/VS 14/Projects/raytracer/raytracer/src/camera.cpp File Reference

```
#include "camera.hpp"
```

5.2 E:/dev/VS 14/Projects/raytracer/raytracer/src/camera.hpp File Reference

```
#include "common.hpp"
#include "ray.hpp"
#include "serializable.hpp"
```

Classes

- class CCamera

5.3 E:/dev/VS 14/Projects/raytracer/raytracer/src/color.cpp File Reference

```
#include "color.hpp"
```

Functions

- u32 RGBToU32 (u32 R, u32 G, u32 B)
- u32 RGBAToU32 (u32 R, u32 G, u32 B, u32 A)
- u32 Vec3ToU32 (const Vec3 &V)
- Vec3 U32ToVec3 (u32 Color)

5.3.1 Function Documentation

5.3.1.1 RGBAToU32()

```
u32 RGBAToU32 (
             u32 R,
             u32 G,
             u32 B,
             u32 A )
```

Combines RGBA color values to a single u32

Definition at line 12 of file color.cpp.

5.3.1.2 RGBToU32()

```
u32 RGBToU32 (
             u32 R,
             u32 G,
             u32 B )
```

Combines RGB color values to a single u32.

Definition at line 3 of file color.cpp.

5.3.1.3 U32ToVec3()

```
Vec3 U32ToVec3 (
             u32 Color )
```

Converts a color stored in a u32 to a normalized color vector.

Definition at line 26 of file color.cpp.

5.3.1.4 Vec3ToU32()

```
u32 Vec3ToU32 (
             const Vec3 & V )
```

Converts a normalized color (values rangin from 0-1) to a single u32.

Definition at line 21 of file color.cpp.

5.4 E:/dev/VS 14/Projects/raytracer/raytracer/src/color.hpp File Reference

```
#include "common.hpp"
```

Classes

- union UColor

Functions

- u32 RGBToU32 (u32 R, u32 G, u32 B)
- u32 RGBAToU32 (u32 R, u32 G, u32 B, u32 A)
- u32 Vec3ToU32 (const Vec3 &V)
- Vec3 U32ToVec3 (u32 Color)

5.4.1 Function Documentation

5.4.1.1 RGBAToU32()

```
u32 RGBAToU32 (
             u32 R,
             u32 G,
             u32 B,
             u32 A )
```

Combines RGBA color values to a single u32

Definition at line 12 of file color.cpp.

5.4.1.2 RGBToU32()

```
u32 RGBToU32 (
             u32 R,
             u32 G,
             u32 B )
```

Combines RGB color values to a single u32.

Definition at line 3 of file color.cpp.

5.4.1.3 U32ToVec3()

```
Vec3 U32ToVec3 (
             u32 Color )
```

Converts a color stored in a u32 to a normalized color vector.

Definition at line 26 of file color.cpp.

5.4.1.4 Vec3ToU32()

```
u32 Vec3ToU32 (
             const Vec3 & V )
```

Converts a normalized color (values rangin from 0-1) to a single u32.

Definition at line 21 of file color.cpp.

5.5 E:/dev/VS 14/Projects/raytracer/raytracer/src/common.cpp File Reference

```
#include "common.hpp"
```

Functions

- r32 DegreeToRadian (r32 Degree)
- r32 RadianToDegree (r32 Radian)
- r32 RandomNormalized ()
- r32 RandomNormalizedNeg ()
- std::string ExtractQuote (std::string &String)
- std::string ExtractBraceContents (std::string &String)
- Vec3 ExtractVec3 (std::string String)
- void WriteVec3 (std::string &String, Vec3 V)
- Vec3 operator $*$ (r32 S, const Vec3 &V)
- Vec3 Normalize (const Vec3 &V)
- r32 Dot (const Vec3 &A, const Vec3 &B)
- Vec3 Cross (const Vec3 &A, const Vec3 &B)
- Vec3 Project (const Vec3 &A, const Vec3 &B)
- Vec3 Reject (const Vec3 &A, const Vec3 &B)
- Vec3 Reflect (Vec3 Incident, Vec3 Normal)
- Vec3 Refract (Vec3 Incident, Vec3 Normal, r32 RefractiveRatio)
- Vec3 Lerp (const Vec3 &A, const Vec3 &B, r32 t)
- Vec3 RandomInUnitSphere ()

5.5.1 Function Documentation

5.5.1.1 Cross()

```
Vec3 Cross (
             const Vec3 & A,
             const Vec3 & B )
```

Returns two vectors' cross product.

Definition at line 207 of file common.cpp.

5.5.1.2 DegreeToRadian()

```
r32 DegreeToRadian (
             r32 Degree )
```

Converts degrees to radians.

Definition at line 3 of file common.cpp.

5.5.1.3 Dot()

```
r32 Dot (
             const Vec3 & A,
             const Vec3 & B )
```

Returns two vectors' dot product.

Definition at line 202 of file common.cpp.

5.5.1.4 ExtractBraceContents()

```
std::string ExtractBraceContents (
             std::string & String )
```

Extracts content from a string between curly {} braces. The braces and the characters between are removed from the string.

Definition at line 33 of file common.cpp.

5.5.1.5 ExtractQuote()

```
std::string ExtractQuote (
             std::string & String )
```

Extracts a quote from a string. Extracts characters between "" characters, removing them from the string. Quotes are also removed.

Definition at line 25 of file common.cpp.

5.5.1.6 ExtractVec3()

```
Vec3 ExtractVec3 (
             std::string String )
```

Returns a Vec3 from a string. String must be {x, y, z} format.

Definition at line 51 of file common.cpp.

5.5.1.7 Lerp()

```
Vec3 Lerp (
             const Vec3 & A,
             const Vec3 & B,
             r32 t )
```

Linearly interpolates between to vectors given a t value.

Definition at line 242 of file common.cpp.

5.5.1.8 Normalize()

```
Vec3 Normalize (
             const Vec3 & V )
```

Returns the vector divided by its length.

Definition at line 191 of file common.cpp.

5.5.1.9 operator *()

```
Vec3 operator * (
             r32 S,
             const Vec3 & V )
```

Multiplies a vector with a scalar.

Definition at line 176 of file common.cpp.

5.5.1.10 Project()

```
Vec3 Project (
             const Vec3 & A,
             const Vec3 & B )
```

Returns vector A's projection to B.

Definition at line 214 of file common.cpp.

5.5.1.11 RadianToDegree()

```
r32 RadianToDegree (
             r32 Radian )
```

Converts radians to degrees.

Definition at line 8 of file common.cpp.

5.5.1.12 RandomInUnitSphere()

```
Vec3 RandomInUnitSphere ( )
```

Returns a unit vector pointing in a random direction

Definition at line 247 of file common.cpp.

5.5.1.13 RandomNormalized()

```
r32 RandomNormalized ( )
```

Returns a random number between [0..1).

Definition at line 13 of file common.cpp.

5.5.1.14 RandomNormalizedNeg()

```
r32 RandomNormalizedNeg ( )
```

Returns a random number between (-1..1).

Definition at line 20 of file common.cpp.

5.5.1.15 Reflect()

```
Vec3 Reflect (
             Vec3 Incident,
             Vec3 Normal )
```

Returns a vector's reflection given the surface normal.

Definition at line 224 of file common.cpp.

5.5.1.16 Refract()

```
Vec3 Refract (
             Vec3 Incident,
             Vec3 Normal,
             r32 RefractiveRatio )
```

Returns a vector's refraction given a surface normal and the refractive index ratio between the medium. Returns a null vector if no refraction is possible.

Definition at line 229 of file common.cpp.

5.5.1.17 Reject()

```
Vec3 Reject (
             const Vec3 & A,
             const Vec3 & B )
```

Returns vector A's rejection from B.

Definition at line 219 of file common.cpp.

5.5.1.18 WriteVec3()

```
void WriteVec3 (
             std::string & String,
             Vec3 V )
```

Writes a Vec3 to a string in {x, y, z} format.

Definition at line 63 of file common.cpp.

5.6 E:/dev/VS 14/Projects/raytracer/raytracer/src/common.hpp File Reference

```
#include <cinttypes>
#include <cfloat>
#include <cmath>
#include <random>
#include <algorithm>
#include <string>
#include <stdexcept>
#include <iostream>
#include <iomanip>
#include <fstream>
#include <cstring>
#include <atomic>
#include <mutex>
#include <sstream>
```

Classes

- struct Vec3

Typedefs

- typedef uint8_t u8
- typedef int8_t s8
- typedef uint16_t u16
- typedef int16_t s16
- typedef uint32_t u32
- typedef int32_t s32
- typedef uint64_t u64
- typedef int64_t s64
- typedef float r32
- typedef double r64

Functions

- r32 DegreeToRadian (r32 Degree)
- r32 RadianToDegree (r32 Radian)
- r32 RandomNormalized ()
- r32 RandomNormalizedNeg ()
- template<class T >
  T Clamp (T Val, T Min, T Max)
- Vec3 operator * (r32 S, const Vec3 &V)
- Vec3 Normalize (const Vec3 &V)
- r32 Dot (const Vec3 &A, const Vec3 &B)
- Vec3 Cross (const Vec3 &A, const Vec3 &B)
- Vec3 Project (const Vec3 &A, const Vec3 &B)
- Vec3 Reject (const Vec3 &A, const Vec3 &B)
- Vec3 Reflect (Vec3 Incident, Vec3 Normal)
- Vec3 Refract (Vec3 Incident, Vec3 Normal, r32 RefractiveRatio)
- Vec3 Lerp (const Vec3 &A, const Vec3 &B, r32 t)
- Vec3 RandomInUnitSphere ()
- std::string ExtractQuote (std::string &String)
- std::string ExtractBraceContents (std::string &String)
- Vec3 ExtractVec3 (std::string String)
- void WriteVec3 (std::string &String, Vec3 V)

Variables

- const r32 Pi32 = 3.1415927f

5.6.1 Typedef Documentation

5.6.1.1 r32

```
typedef float r32
```

32 bit floating point value.

Definition at line 27 of file common.hpp.

5.6.1.2 r64

```
typedef double r64
```

64 bit floating point value.

Definition at line 28 of file common.hpp.

5.6.1.3 s16

```
typedef int16_t s16
```

Signed 16 bit integer.

Definition at line 21 of file common.hpp.

5.6.1.4 s32

```
typedef int32_t s32
```

Signed 32 bit integer.

Definition at line 23 of file common.hpp.

5.6.1.5 s64

```
typedef int64_t s64
```

Signed 64 bit integer.

Definition at line 25 of file common.hpp.

5.6.1.6 s8

```
typedef int8_t s8
```

Signed 8 bit integer.

Definition at line 19 of file common.hpp.

5.6.1.7 u16

```
typedef uint16_t u16
```

Unsigned 16 bit integer.

Definition at line 20 of file common.hpp.

5.6.1.8 u32

```
typedef uint32_t u32
```

Unsigned 32 bit integer.

Definition at line 22 of file common.hpp.

5.6.1.9 u64

```
typedef uint64_t u64
```

Unsigned 64 bit integer.

Definition at line 24 of file common.hpp.

5.6.1.10 u8

```
typedef uint8_t u8
```

Unsigned 8 bit integer.

Definition at line 18 of file common.hpp.

5.6.2 Function Documentation

5.6.2.1 Clamp()

```
template<class T >
T Clamp (
             T Val,
             T Min,
             T Max )
```

Clamps a value between a range .

Parameters

Val	value to clamp.
Min	lower bound of the clamp.
Max	upper bound of the clamp.

Definition at line 48 of file common.hpp.

5.6.2.2 Cross()

```
Vec3 Cross (
             const Vec3 & A,
             const Vec3 & B )
```

Returns two vectors' cross product.

Definition at line 207 of file common.cpp.

5.6.2.3 DegreeToRadian()

```
r32 DegreeToRadian (
             r32 Degree )
```

Converts degrees to radians.

Definition at line 3 of file common.cpp.

5.6.2.4 Dot()

```
r32 Dot (
             const Vec3 & A,
             const Vec3 & B )
```

Returns two vectors' dot product.

Definition at line 202 of file common.cpp.

5.6.2.5 ExtractBraceContents()

```
std::string ExtractBraceContents (
             std::string & String )
```

Extracts content from a string between curly {} braces. The braces and the characters between are removed from the string.

Definition at line 33 of file common.cpp.

5.6.2.6 ExtractQuote()

```
std::string ExtractQuote (
              std::string & String )
```

Extracts a quote from a string. Extracts characters between "" characters, removing them from the string. Quotes are also removed.

Definition at line 25 of file common.cpp.

5.6.2.7 ExtractVec3()

```
Vec3 ExtractVec3 (
              std::string String )
```

Returns a Vec3 from a string. String must be {x, y, z} format.

Definition at line 51 of file common.cpp.

5.6.2.8 Lerp()

```
Vec3 Lerp (
              const Vec3 & A,
              const Vec3 & B,
              r32 t )
```

Linearly interpolates between to vectors given a t value.

Definition at line 242 of file common.cpp.

5.6.2.9 Normalize()

```
Vec3 Normalize (
              const Vec3 & V )
```

Returns the vector divided by its length.

Definition at line 191 of file common.cpp.

5.6.2.10 operator *()

```
Vec3 operator * (
             r32 S,
             const Vec3 & V )
```

Multiplies a vector with a scalar.

Definition at line 176 of file common.cpp.

5.6.2.11 Project()

```
Vec3 Project (
             const Vec3 & A,
             const Vec3 & B )
```

Returns vector A's projection to B.

Definition at line 214 of file common.cpp.

5.6.2.12 RadianToDegree()

```
r32 RadianToDegree (
             r32 Radian )
```

Converts radians to degrees.

Definition at line 8 of file common.cpp.

5.6.2.13 RandomInUnitSphere()

```
Vec3 RandomInUnitSphere ( )
```

Returns a unit vector pointing in a random direction

Definition at line 247 of file common.cpp.

5.6.2.14 RandomNormalized()

```
r32 RandomNormalized ( )
```

Returns a random number between [0..1).

Definition at line 13 of file common.cpp.

5.6.2.15 RandomNormalizedNeg()

```
r32 RandomNormalizedNeg ( )
```

Returns a random number between (-1..1).

Definition at line 20 of file common.cpp.

5.6.2.16 Reflect()

```
Vec3 Reflect (
             Vec3 Incident,
             Vec3 Normal )
```

Returns a vector's reflection given the surface normal.

Definition at line 224 of file common.cpp.

5.6.2.17 Refract()

```
Vec3 Refract (
             Vec3 Incident,
             Vec3 Normal,
             r32 RefractiveRatio )
```

Returns a vector's refraction given a surface normal and the refractive index ratio between the medium. Returns a null vector if no refraction is possible.

Definition at line 229 of file common.cpp.

5.6.2.18 Reject()

```
Vec3 Reject (
             const Vec3 & A,
             const Vec3 & B )
```

Returns vector A's rejection from B.

Definition at line 219 of file common.cpp.

5.6.2.19 WriteVec3()

```
void WriteVec3 (
            std::string & String,
            Vec3 V )
```

Writes a Vec3 to a string in {x, y, z} format.

Definition at line 63 of file common.cpp.

5.6.3 Variable Documentation

5.6.3.1 Pi32

```
const r32 Pi32 = 3.1415927f
```

32 bit constant for pi.

Definition at line 30 of file common.hpp.

5.7 E:/dev/VS 14/Projects/raytracer/raytracer/src/heterostore.hpp File Reference

```
#include <algorithm>
#include "sharedpointer.hpp"
```

Classes

- class CHeteroStore< T >

5.8 E:/dev/VS 14/Projects/raytracer/raytracer/src/image.cpp File Reference

```
#include "image.hpp"
#include <stdexcept>
```

5.9 E:/dev/VS 14/Projects/raytracer/raytracer/src/image.hpp File Reference

```
#include "common.hpp"
#include "color.hpp"
#include "serializable.hpp"
```

Classes

- struct SBitmapFileHeader
- struct SBitmapInfoHeader
- class CImage

5.10 E:/dev/VS 14/Projects/raytracer/raytracer/src/material.cpp File Reference

```
#include "material.hpp"
```

5.11 E:/dev/VS 14/Projects/raytracer/raytracer/src/material.hpp File Reference

```
#include "common.hpp"
#include "sharedpointer.hpp"
#include "ray.hpp"
#include "image.hpp"
```

Classes

- class IMaterial
- class CMaterialDiffuse
- class CMaterialMetal
- class CMaterialDielectric

5.12 E:/dev/VS 14/Projects/raytracer/raytracer/src/plane.cpp File Reference

```
#include "plane.hpp"
```

5.13 E:/dev/VS 14/Projects/raytracer/raytracer/src/plane.hpp File Reference

```
#include "shape.hpp"
```

Classes

- class CPlane

5.14 E:/dev/VS 14/Projects/raytracer/raytracer/src/ray.cpp File Reference

```
#include "ray.hpp"
```

5.15 E:/dev/VS 14/Projects/raytracer/raytracer/src/ray.hpp File Reference

```
#include "common.hpp"
```

Classes

- class CRay

5.16 E:/dev/VS 14/Projects/raytracer/raytracer/src/raytracer.cpp File Reference

```
#include "common.hpp"
#include "image.hpp"
#include "shape.hpp"
#include "ray.hpp"
#include "camera.hpp"
#include "scene.hpp"
#include "sphere.hpp"
#include "plane.hpp"
```

Classes

- struct SArguments

Functions

- void PrintHelp ()
- bool ParseArguments (int argc, char **argv, SArguments &Arguments)
- int main (int argc, char **argv)

5.16.1 Function Documentation

5.16.1.1 main()

```
int main (
            int argc,
            char ** argv )
```

Definition at line 132 of file raytracer.cpp.

5.16.1.2 ParseArguments()

```
bool ParseArguments (
            int argc,
            char ** argv,
            SArguments & Arguments )
```

Parses the command line arguments.

Definition at line 39 of file raytracer.cpp.

5.16.1.3 PrintHelp()

```
void PrintHelp ( )
```

Displays the command line usage for the app.

Definition at line 13 of file raytracer.cpp.

5.17 E:/dev/VS 14/Projects/raytracer/raytracer/src/scene.cpp File Reference

```
#include "scene.hpp"
#include "common.hpp"
#include <iostream>
#include <iomanip>
#include <thread>
#include <chrono>
```

5.18 E:/dev/VS 14/Projects/raytracer/raytracer/src/scene.hpp File Reference

```
#include "heterostore.hpp"
#include "ray.hpp"
#include "image.hpp"
#include "camera.hpp"
#include "shape.hpp"
#include "plane.hpp"
#include "sphere.hpp"
```

Classes

- struct SRegion
- struct SRenderParams
- struct SSharedRenderData
- class CScene

5.19 E:/dev/VS 14/Projects/raytracer/raytracer/src/serializable.cpp File Reference

```
#include "serializable.hpp"
```

Functions

- std::istream & operator>> (std::istream &Stream, ISerializable ∗Var)
- std::ostream & operator<< (std::ostream &Stream, const ISerializable ∗Var)

5.19.1 Function Documentation

5.19.1.1 operator<<()

```
std::ostream& operator<< (
            std::ostream & Stream,
            const ISerializable * Var )
```

Stream operator overload to write the object to a stream.

Definition at line 12 of file serializable.cpp.

5.19.1.2 operator>>()

```
std::istream& operator>> (
            std::istream & Stream,
            ISerializable * Var )
```

Stream operator overload to read the object from a stream.

Definition at line 8 of file serializable.cpp.

5.20 E:/dev/VS 14/Projects/raytracer/raytracer/src/serializable.hpp File Reference

```
#include "common.hpp"
```

Classes

- class ISerializable
- class IStringSerializable

Functions

- std::istream & operator>> (std::istream &Stream, ISerializable ∗Var)
- std::ostream & operator<< (std::ostream &Stream, const ISerializable ∗Var)

5.20.1 Function Documentation

5.20.1.1 operator<<()

```
std::ostream& operator<< (
            std::ostream & Stream,
            const ISerializable * Var )
```

Stream operator overload to write the object to a stream.

Definition at line 12 of file serializable.cpp.

5.20.1.2 operator>>()

```
std::istream& operator>> (
            std::istream & Stream,
            ISerializable * Var )
```

Stream operator overload to read the object from a stream.

Definition at line 8 of file serializable.cpp.

5.21 E:/dev/VS 14/Projects/raytracer/raytracer/src/shape.cpp File Reference

```
#include "shape.hpp"
```

5.22 E:/dev/VS 14/Projects/raytracer/raytracer/src/shape.hpp File Reference

```
#include "common.hpp"
#include "sharedpointer.hpp"
#include "ray.hpp"
#include "material.hpp"
```

Classes

- struct SHitInfo
- class IShape

5.23 E:/dev/VS 14/Projects/raytracer/raytracer/src/sharedpointer.hpp File Reference

```
#include <stdexcept>
```

Classes

- class CSharedPointer< T >

5.24 E:/dev/VS 14/Projects/raytracer/raytracer/src/sphere.cpp File Reference

```
#include "sphere.hpp"
```

5.25 E:/dev/VS 14/Projects/raytracer/raytracer/src/sphere.hpp File Reference

```
#include "shape.hpp"
```

Classes

- class CSphere

5.26 E:/dev/VS 14/Projects/raytracer/raytracer/src/triangle.cpp File Reference

```
#include "triangle.hpp"
```

5.27 E:/dev/VS 14/Projects/raytracer/raytracer/src/triangle.hpp File Reference

```
#include "shape.hpp"
```

Classes

- class CTriangle

Index