raytracer

0.1.0

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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 documented files with brief descriptions:

Chapter 4

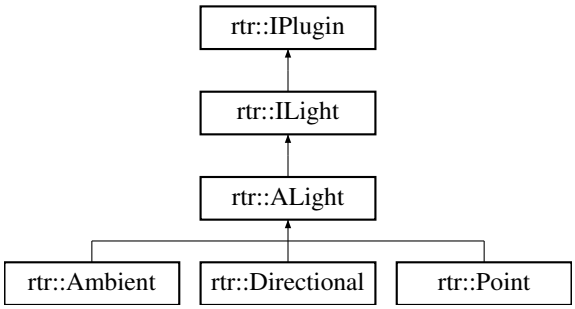
Class Documentation

4.1 rtr::ALight Class Reference

An abstract class for lights.

`#include <ALight.hpp>`

Inheritance diagram for rtr::ALight:



Public Member Functions

- void setType (const LightType &type) override

  Sets the type of the light (directional, ambient or point).
- void setIntensity (const float &intensity) override

  Sets the intensity of the light, based on the configuration file.
- const LightType & getType () const override

  Gets the type of the light based on the configuration file.
- Vector & getPosition () override

  Gets the position of the light based on the configuration file.
- Vector & getDirection () override

  Gets the direction of the light based on the configuration file.
- Color & getColor () override

  Gets the color of the light based on the configuration file.
- float & getIntensity () override

  Gets the intensity of the light based on the configuration file.

4.1.1 Detailed Description

An abstract class for lights.

4.1.2 Member Function Documentation

4.1.2.1 setType()

```
void rtr::ALight::setType (
            const LightType & type )  [inline], [override], [virtual]
```

Sets the type of the light (directional, ambient or point).

Parameters

type	The type of the light (defined in the enum class LighType).

Implements rtr::ILight.

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

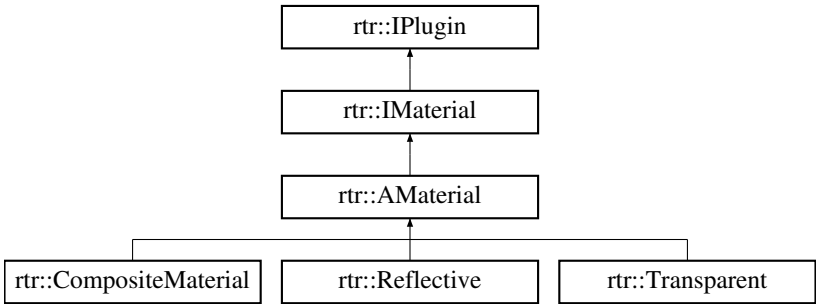
- App/include/RayTracer/Abstraction/ALight.hpp

4.2 rtr::AMaterial Class Reference

An abstract class for materials, based on the interface IMaterials.

`#include <AMaterial.hpp>`

Inheritance diagram for rtr::AMaterial:



Public Member Functions

- void setType (const MaterialType &type) override

  Sets the type of the material.
- void setReflectivity (const float &reflectivity) override

  Sets the color of the material.
- void setTransparency (const float &transparency) override

  Sets the transparency of the material.
- const MaterialType & getType () const override

  Gets the type of the material based on the configuration file.
- Color & getColor () override

  Gets the color of the material based on the configuration file.
- const float & getReflectivity () const override

  Gets the reflectiveness of the material based on the configuration file.
- const float & getTransparency () const override

  Gets the transparency of the material based on the configuration file.

4.2.1 Detailed Description

An abstract class for materials, based on the interface IMaterials.

4.2.2 Member Function Documentation

4.2.2.1 setReflectivity()

```
void rtr::AMaterial::setReflectivity (
            const float & reflectivity )  [inline], [override], [virtual]
```

Sets the color of the material.

Parameters

reflectivity	The reflectiveness of the material, based on the configuration file.

Implements rtr::IMaterial.

4.2.2.2 setTransparency()

```
void rtr::AMaterial::setTransparency (
            const float & transparency )  [inline], [override], [virtual]
```

Sets the transparency of the material.

Parameters

transparency	The transparency of the material, based on the configuration file.

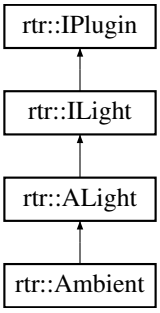
Implements rtr::IMaterial.

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

- App/include/RayTracer/Abstraction/AMaterial.hpp

4.3 rtr::Ambient Class Reference

Inheritance diagram for rtr::Ambient:



Public Member Functions

- Color LightColor (const Vector &normal, const Color &col) override

  Creates light effects based on the light type.
- std::string getPluginName () const override

  Gets the name of the plugin.
- Vector & getDirection () override

  Gets the direction of the light based on the configuration file.

4.3.1 Member Function Documentation

4.3.1.1 getPluginName()

```
std::string rtr::Ambient::getPluginName ( ) const  [inline], [override], [virtual]
```

Gets the name of the plugin.

Returns

A string of the plugin's name, defined as const expressions.

Implements rtr::IPlugin.

4.3.1.2 LightColor()

```
Color rtr::Ambient::LightColor (
            const Vector & normal,
            const Color & col )  [override], [virtual]
```

Creates light effects based on the light type.

Parameters

normal	The normal of the shape.
col	The current color of the shape.

Returns

The new color of the shape with the light effects.

Implements rtr::ILight.

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

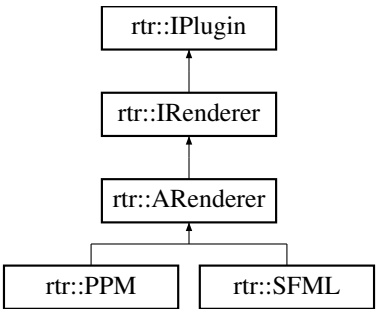
- App/plugins/Light/Ambient/include/RayTracer/Ambient.hpp

4.4 rtr::ARenderer Class Reference

An abstract class for renderers, based on the interface IRenderer.

`#include <ARenderer.hpp>`

Inheritance diagram for rtr::ARenderer:



Public Member Functions

- void setType (const RendererType &rendererType) override

  Sets the type of the renderer.
- void setName (const std::string &name) override

  Sets the name of the renderer.
- void setPixels (const std::vector< std::vector< rtr::Color >> &pixels) override

  Sets the pixels of the renderer.
- const RendererType & getType () const override

  Gets the type of the renderer based on the configuration file.
- Resolution & getResolution () override

  Gets the resolution of the renderer based on the configuration file.
- Color & getBackgroundColor () override

  Gets the background color of the renderer based on the configuration file.
- const std::string & getName () const override

  Gets the name of the renderer based on the configuration file.
- std::vector< std::vector< rtr::Color > > & getPixels () override

  Gets the pixels of the renderer based on the configuration file.

4.4.1 Detailed Description

An abstract class for renderers, based on the interface IRenderer.

4.4.2 Member Function Documentation

4.4.2.1 getBackgroundColor()

```
Color& rtr::ARenderer::getBackgroundColor ( )  [inline], [override], [virtual]
```

Gets the background color of the renderer based on the configuration file.

Returns

The background color of the renderer.

Implements rtr::IRenderer.

4.4.2.2 getName()

```
const std::string& rtr::ARenderer::getName ( ) const  [inline], [override], [virtual]
```

Gets the name of the renderer based on the configuration file.

Returns

A string of the renderer's name.

Implements rtr::IRenderer.

4.4.2.3 getPixels()

```
std::vector<std::vector<rtr::Color> >& rtr::ARenderer::getPixels ( )  [inline], [override],
[virtual]
```

Gets the pixels of the renderer based on the configuration file.

Returns

Each pixels of the image.

Implements rtr::IRenderer.

4.4.2.4 getResolution()

```
Resolution& rtr::ARenderer::getResolution ( )  [inline], [override], [virtual]
```

Gets the resolution of the renderer based on the configuration file.

Returns

The resolution of the renderer using the Resolution class.

Implements rtr::IRenderer.

4.4.2.5 getType()

```
const RendererType& rtr::ARenderer::getType ( ) const  [inline], [override], [virtual]
```

Gets the type of the renderer based on the configuration file.

Returns

The type of the renderer, using the enum class RendererType.

Implements rtr::IRenderer.

4.4.2.6 setName()

```
void rtr::ARenderer::setName (
            const std::string & name )  [inline], [override], [virtual]
```

Sets the name of the renderer.

Parameters

name	The name of the renderer, based on the configuration file.

Implements rtr::IRenderer.

4.4.2.7 setPixels()

```
void rtr::ARenderer::setPixels (
            const std::vector< std::vector< rtr::Color >> & pixels )  [inline], [override],
[virtual]
```

Sets the pixels of the renderer.

Parameters

pixels	The pixels of the renderer.

Implements rtr::IRenderer.

4.4.2.8 setType()

```
void rtr::ARenderer::setType (
            const RendererType & rendererType )  [inline], [override], [virtual]
```

Sets the type of the renderer.

Parameters

rendererType	The type of the renderer (defined in the RendererType enum class).

Implements rtr::IRenderer.

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

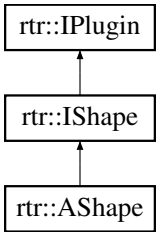
- App/include/RayTracer/Abstraction/ARenderer.hpp

4.5 rtr::AShape Class Reference

An abstract class for shapes, based on the interface IShape.

```
#include <AShape.hpp>
```

Inheritance diagram for rtr::AShape:



Public Member Functions

- void setType (const ShapeType &type) override
  Sets the type of the shape (sphere, plane, cone...).
- void setRadius (const double &radius) override
  Sets the radius of the shape.
- void setHeight (const double &height) override
  Sets the height of the shape.
- void setMaterial (std::unique_ptr< AMaterial > material) override
  Sets the material of the shape.
- const ShapeType & getType () const override
  Gets the type of the shape.
- AMaterial & getMaterial () override
  Gets the material of the shape.
- Vector & getPosition () override
  Gets the position of the shape.
- Vector & getNormal () override
  Gets the normal of the shape.
- Vector & getRotation () override
  Gets the rotation of the shape, used to create the shape.
- const double & getRadius () const override
  Gets the radius of the shape.
- const double & getHeight () const override
  Gets the height of the shape.
- Vector getDistance (const Vector &point) override
  Gets the distance between the shape and a point.

4.5.1 Detailed Description

An abstract class for shapes, based on the interface IShape.

4.5.2 Member Function Documentation

4.5.2.1 getDistance()

```
Vector rtr::AShape::getDistance (
            const Vector & point )  [inline], [override], [virtual]
```

Gets the distance between the shape and a point.

Parameters

point	The point to check the distance with.

Returns

The distance between the shape and the point.

Implements rtr::IShape.

4.5.2.2 getHeight()

```
const double& rtr::AShape::getHeight ( ) const  [inline], [override], [virtual]
```

Gets the height of the shape.

Returns

The height of the shape as a double.

Implements rtr::IShape.

4.5.2.3 getMaterial()

```
AMaterial& rtr::AShape::getMaterial ( )  [inline], [override], [virtual]
```

Gets the material of the shape.

Returns

The material of the shape, using the AMaterial class.

Implements rtr::IShape.

4.5.2.4 getNormal()

```
Vector& rtr::AShape::getNormal ( )  [inline], [override], [virtual]
```

Gets the normal of the shape.

Returns

The normal of the shape, using the Vector class.

Implements rtr::IShape.

4.5.2.5 getPosition()

```
Vector& rtr::AShape::getPosition ( )  [inline], [override], [virtual]
```

Gets the position of the shape.

Returns

The position of the shape, using the Vector class.

Implements rtr::IShape.

4.5.2.6 getRadius()

```
const double& rtr::AShape::getRadius ( ) const  [inline], [override], [virtual]
```

Gets the radius of the shape.

Returns

The radius of the shape as a double, used to check the size of the shape.

Implements rtr::IShape.

4.5.2.7 getRotation()

```
Vector& rtr::AShape::getRotation ( )  [inline], [override], [virtual]
```

Gets the rotation of the shape, used to create the shape.

Returns

The rotation of the shape, using the Vector class.

Implements rtr::IShape.

4.5.2.8 getType()

```
const ShapeType& rtr::AShape::getType ( ) const  [inline], [override], [virtual]
```

Gets the type of the shape.

Returns

The type of the shape, using the ShapeType enum class.

Implements rtr::IShape.

4.5.2.9 setHeight()

```
void rtr::AShape::setHeight (
            const double & height )  [inline], [override], [virtual]
```

Sets the height of the shape.

Parameters

height	The height of the shape.

Implements rtr::IShape.

4.5.2.10 setMaterial()

```
void rtr::AShape::setMaterial (
            std::unique_ptr< AMaterial > material )  [inline], [override], [virtual]
```

Sets the material of the shape.

Parameters

material	The material of the shape (transparency, reflectivity...).

Implements rtr::IShape.

4.5.2.11 setRadius()

```
void rtr::AShape::setRadius (
            const double & radius )  [inline], [override], [virtual]
```

Sets the radius of the shape.

Parameters

radius	The radius of the shape.

Implements rtr::IShape.

4.5.2.12 setType()

```
void rtr::AShape::setType (
            const ShapeType & type )  [inline], [override], [virtual]
```

Sets the type of the shape (sphere, plane, cone...).

Parameters

type	The type of the shape.

Implements rtr::IShape.

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

- App/include/RayTracer/Abstraction/AShape.hpp

4.6 rtr::Camera Class Reference

A class to handle the camera.

`#include <Camera.hpp>`

Public Member Functions

- **Camera** (uint16_t fov, const Vector &origin, const Vector &direction)
- void setFov (const uint16_t fov)

  Sets the camera's field of view.
- uint16_t getFov () const

  Gets the camera's field of view.
- const Vector & getOrigin () const

  Gets the camera's origin.
- const Vector & getDirection () const

  Gets the camera's direction.
- const Vector & getUp () const

  Gets the camera's up vector.
- std::pair< Vector, Vector > ray (const double u, const double v) const

  The camera's ray, used to check if the ray intersects with an object.

4.6.1 Detailed Description

A class to handle the camera.

4.6.2 Member Function Documentation

4.6.2.1 getFov()

```
uint16_t rtr::Camera::getFov ( ) const  [inline]
```

Gets the camera's field of view.

Returns

The field of view, as a uint16, or a unsigned short.

4.6.2.2 ray()

```
std::pair<Vector, Vector> rtr::Camera::ray (
            const double u,
            const double v ) const  [inline]
```

The camera's ray, used to check if the ray intersects with an object.

Parameters

u	defines the horizontal position of the ray.
v	defines the vertical position of the ray.

Returns

A pair of vectors that defines the origin of the ray and its normal.

4.6.2.3 setFov()

```
void rtr::Camera::setFov (
            const uint16_t fov )  [inline]
```

Sets the camera's field of view.

Parameters

fov	The field of view, as a uint16, or a unsigned short.

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

- App/include/RayTracer/Scene/Camera.hpp

4.7 rtr::Color Class Reference

Class representing RGB colors.

```
#include <Color.hpp>
```

Public Member Functions

- **Color** (const uint8_t r, const uint8_t g, const uint8_t b)
- **Color** (const color_t &color)
- void setColor (const uint8_t r, const uint8_t g, const uint8_t b)

  Sets the color components.
- void setColor (const color_t &color)

  Sets the color components.
- void **setR** (const uint8_t r)
- void **setG** (const uint8_t g)
- void **setB** (const uint8_t b)
- color_t **getValue** () const
- uint8_t **getR** () const
- uint8_t **getG** () const
- uint8_t **getB** () const

- Color operator+ (const Color &other) const

  Adds two colors.
- Color operator∗ (const double &scalar) const

  Multiplies a color by a scalar.
- Color operator∗ (const Color &other) const

  Multiplies two colors.
- Color operator+= (const Color &other)

  Adds a color to the current color.
- Color operator∗= (const double &scalar)

  Multiplies the current color by a scalar.

Static Public Member Functions

- static constexpr color_t **getRed** ()
- static constexpr color_t **getGreen** ()
- static constexpr color_t **getBlue** ()
- static constexpr color_t **getWhite** ()
- static constexpr color_t **getBlack** ()
- static constexpr color_t **getYellow** ()
- static constexpr color_t **getMagenta** ()
- static constexpr color_t **getCyan** ()
- static constexpr color_t **getGray** ()
- static constexpr color_t **getOrange** ()
- static constexpr color_t **getBrown** ()
- static constexpr color_t **getLightBlue** ()
- static constexpr color_t **getLightGreen** ()
- static constexpr color_t **getLightPink** ()
- static constexpr color_t **getLightYellow** ()
- static constexpr color_t **getLightGray** ()
- static constexpr color_t **getDarkGray** ()
- static constexpr color_t **getDarkRed** ()
- static constexpr color_t **getDarkGreen** ()
- static constexpr color_t **getDarkBlue** ()
- static constexpr color_t **getDarkYellow** ()

4.7.1 Detailed Description

Class representing RGB colors.

4.7.2 Member Function Documentation

4.7.2.1 operator∗() [1/2]

```
Color rtr::Color::operator* (
            const Color & other ) const  [inline]
```

Multiplies two colors.

Parameters

other	The other color to multiply.

Returns

The product of the two colors.

4.7.2.2 operator∗() [2/2]

```
Color rtr::Color::operator* (
            const double & scalar ) const  [inline]
```

Multiplies a color by a scalar.

Parameters

scalar	The scalar to multiply by.

Returns

The product of the color and the scalar.

4.7.2.3 operator∗=()

```
Color rtr::Color::operator*= (
            const double & scalar )  [inline]
```

Multiplies the current color by a scalar.

Parameters

scalar	The scalar to multiply by.

Returns

A reference to the current color.

4.7.2.4 operator+()

```
Color rtr::Color::operator+ (
            const Color & other ) const  [inline]
```

Adds two colors.

Parameters

other	The other color to add.

Returns

The sum of the two colors.

4.7.2.5 operator+=()

```
Color rtr::Color::operator+= (
            const Color & other )  [inline]
```

Adds a color to the current color.

Parameters

other	The other color to add.

Returns

A reference to the current color.

4.7.2.6 setColor() [1/2]

```
void rtr::Color::setColor (
            const color_t & color )  [inline]
```

Sets the color components.

Parameters

color	An RGB color.

4.7.2.7 setColor() [2/2]

```
void rtr::Color::setColor (
            const uint8_t r,
            const uint8_t g,
            const uint8_t b )  [inline]
```

Sets the color components.

Parameters

r	Red color component.
g	Green color component.
b	Blue color component.

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

- App/include/RayTracer/Utils/Color.hpp

4.8 color_s Struct Reference

A struct representing an RGB color.

`#include <Color.hpp>`

4.8.1 Detailed Description

A struct representing an RGB color.

Type alias for an RGB color component.

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

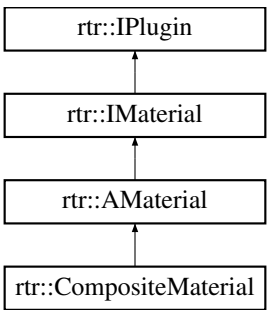
- App/include/RayTracer/Utils/Color.hpp

4.9 rtr::CompositeMaterial Class Reference

A class to create a composite material.

`#include <Material.hpp>`

Inheritance diagram for rtr::CompositeMaterial:



Public Member Functions

- std::string getPluginName () const override

  Gets the name of the plugin.
- void addMaterial (std::unique_ptr< AMaterial > material)

  Adds a material to the composite material.
- void applyMaterial (Color *color) override

  Applies the material to the shape (transparency and reflectiveness).

4.9.1 Detailed Description

A class to create a composite material.

4.9.2 Member Function Documentation

4.9.2.1 addMaterial()

```
void rtr::CompositeMaterial::addMaterial (
            std::unique_ptr< AMaterial > material )  [inline]
```

Adds a material to the composite material.

Parameters

material	The material to add.

4.9.2.2 getPluginName()

```
std::string rtr::CompositeMaterial::getPluginName ( ) const  [inline], [override], [virtual]
```

Gets the name of the plugin.

Returns

A string of the plugin's name, defined as const expressions.

Implements rtr::IPlugin.

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

- App/include/RayTracer/Composite/Material.hpp

4.10 rtr::Core Class Reference

A class representing the core functionality of the ray tracer.

`#include <Core.hpp>`

Classes

- class CoreException

  An exception class for core errors.

Static Public Member Functions

- static void runRayTracer (Scene &scene)

  Runs the ray tracer with a given Scene object.

4.10.1 Detailed Description

A class representing the core functionality of the ray tracer.

4.10.2 Member Function Documentation

4.10.2.1 runRayTracer()

```
static void rtr::Core::runRayTracer (
            Scene & scene )  [static]
```

Runs the ray tracer with a given Scene object.

Parameters

scene	The Scene object used for ray tracing.

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

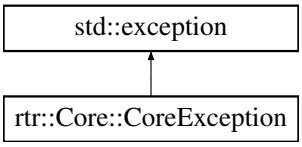
- App/include/RayTracer/Core.hpp

4.11 rtr::Core::CoreException Class Reference

An exception class for core errors.

`#include <Core.hpp>`

Inheritance diagram for rtr::Core::CoreException:



Public Member Functions

- **CoreException** (std::string msg)
- **CoreException** (const CoreException &)=delete
- CoreException & **operator=** (const CoreException &)=delete
- **CoreException** (const CoreException &&)=delete
- CoreException & **operator=** (const CoreException &&)=delete
- const char * what () const noexcept override

  Returns the error message.

4.11.1 Detailed Description

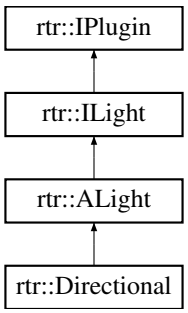
An exception class for core errors.

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

- App/include/RayTracer/Core.hpp

4.12 rtr::Directional Class Reference

Inheritance diagram for rtr::Directional:



Public Member Functions

- Color LightColor (const Vector &normal, const Color &col) override

  Creates light effects based on the light type.
- std::string getPluginName () const override

  Gets the name of the plugin.

4.12.1 Member Function Documentation

4.12.1.1 getPluginName()

```
std::string rtr::Directional::getPluginName ( ) const  [inline], [override], [virtual]
```

Gets the name of the plugin.

Returns

A string of the plugin's name, defined as const expressions.

Implements rtr::IPlugin.

4.12.1.2 LightColor()

```
Color rtr::Directional::LightColor (
            const Vector & normal,
            const Color & col )  [override], [virtual]
```

Creates light effects based on the light type.

Parameters

normal	The normal of the shape.
col	The current color of the shape.

Returns

The new color of the shape with the light effects.

Implements rtr::ILight.

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

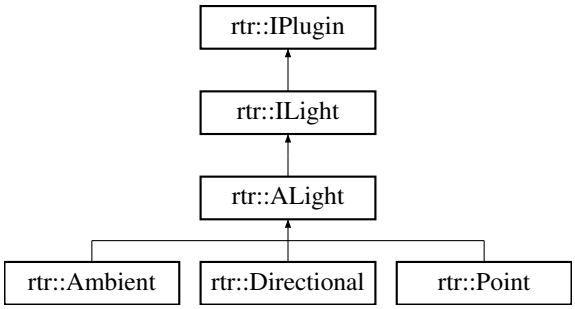
- App/plugins/Light/Directional/include/RayTracer/Directional.hpp

4.13 rtr::ILight Class Reference

An interface for lights.

```
#include <ILight.hpp>
```

Inheritance diagram for rtr::ILight:



Public Member Functions

- virtual void setType (const LightType &type)=0

  Sets the type of the light (directional, ambient or point).
- virtual void setIntensity (const float &intensity)=0

  Sets the intensity of the light, based on the configuration file.
- virtual Color LightColor (const Vector &normal, const Color &col)=0

  Creates light effects based on the light type.
- virtual const LightType & getType () const =0

  Gets the type of the light based on the configuration file.
- virtual Vector & getPosition ()=0

  Gets the position of the light based on the configuration file.
- virtual Vector & getDirection ()=0

  Gets the direction of the light based on the configuration file.
- virtual Color & getColor ()=0

  Gets the color of the light based on the configuration file.
- virtual float & getIntensity ()=0

  Gets the intensity of the light based on the configuration file.

4.13.1 Detailed Description

An interface for lights.

4.13.2 Member Function Documentation

4.13.2.1 LightColor()

```
virtual Color rtr::ILight::LightColor (
            const Vector & normal,
            const Color & col )  [pure virtual]
```

Creates light effects based on the light type.

Parameters

normal	The normal of the shape.
col	The current color of the shape.

Returns

The new color of the shape with the light effects.

Implemented in rtr::Point, rtr::Directional, and rtr::Ambient.

4.13.2.2 setType()

```
virtual void rtr::ILight::setType (
            const LightType & type )  [pure virtual]
```

Sets the type of the light (directional, ambient or point).

Parameters

type	The type of the light (defined in the enum class LighType).

Implemented in rtr::ALight.

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

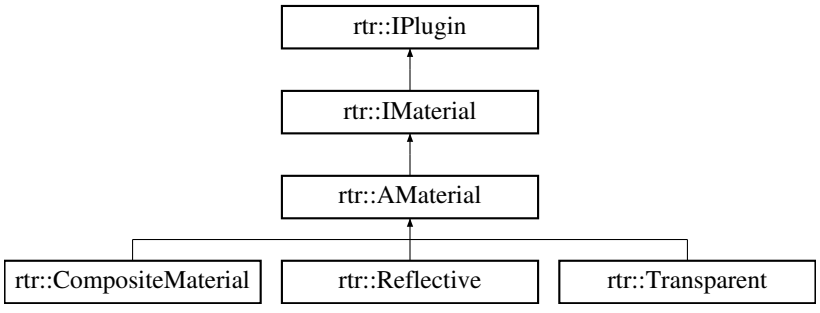
- App/include/RayTracer/Abstraction/ILight.hpp

4.14 rtr::IMaterial Class Reference

An interface for materials.

```
#include <IMaterial.hpp>
```

Inheritance diagram for rtr::IMaterial:



Public Member Functions

- virtual void applyMaterial (Color *color)=0

  Applies the material to the shape (transparency and reflectiveness).
- virtual void setType (const MaterialType &type)=0

  Sets the type of the material.
- virtual void setReflectivity (const float &reflectivity)=0

  Sets the color of the material.
- virtual void setTransparency (const float &transparency)=0

  Sets the transparency of the material.
- virtual const MaterialType & getType () const =0

  Gets the type of the material based on the configuration file.
- virtual Color & getColor ()=0

  Gets the color of the material based on the configuration file.
- virtual const float & getReflectivity () const =0

  Gets the reflectiveness of the material based on the configuration file.
- virtual const float & getTransparency () const =0

  Gets the transparency of the material based on the configuration file.

4.14.1 Detailed Description

An interface for materials.

4.14.2 Member Function Documentation

4.14.2.1 setReflectivity()

```
virtual void rtr::IMaterial::setReflectivity (
            const float & reflectivity )  [pure virtual]
```

Sets the color of the material.

Parameters

reflectivity	The reflectiveness of the material, based on the configuration file.

Implemented in rtr::AMaterial.

4.14.2.2 setTransparency()

```
virtual void rtr::IMaterial::setTransparency (
            const float & transparency )  [pure virtual]
```

Sets the transparency of the material.

Parameters

transparency	The transparency of the material, based on the configuration file.

Implemented in rtr::AMaterial.

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

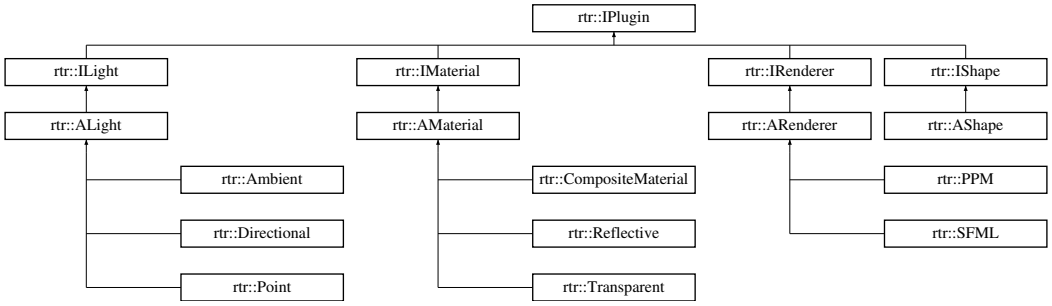
- App/include/RayTracer/Abstraction/IMaterial.hpp

4.15 rtr::IPlugin Class Reference

An interface for plugins.

`#include <IPlugin.hpp>`

Inheritance diagram for rtr::IPlugin:



Public Member Functions

- virtual std::string getPluginName () const =0

  Gets the name of the plugin.

4.15.1 Detailed Description

An interface for plugins.

4.15.2 Member Function Documentation

4.15.2.1 getPluginName()

```
virtual std::string rtr::IPlugin::getPluginName ( ) const  [pure virtual]
```

Gets the name of the plugin.

Returns

A string of the plugin's name, defined as const expressions.

Implemented in rtr::SFML, rtr::PPM, rtr::Transparent, rtr::Reflective, rtr::Point, rtr::Directional, rtr::Ambient, and rtr::CompositeMaterial.

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

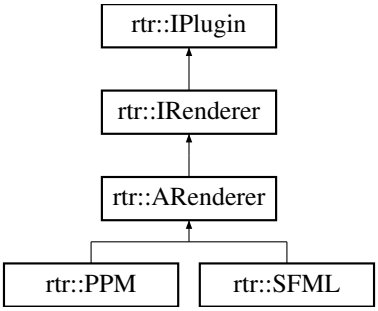
- App/include/RayTracer/Abstraction/IPlugin.hpp

4.16 rtr::IRenderer Class Reference

An interface for renderers.

`#include <IRenderer.hpp>`

Inheritance diagram for rtr::IRenderer:



Public Member Functions

- virtual void render (const std::vector< std::unique_ptr< AShape >> &shapes, const std::vector< std::unique_ptr< ALight >> &lights, const Camera &camera)=0

  Renders the scene based on the shapes, lights and camera.
- virtual void setType (const RendererType &rendererType)=0

  Sets the type of the renderer.
- virtual void setName (const std::string &name)=0

  Sets the name of the renderer.
- virtual void setPixels (const std::vector< std::vector< rtr::Color >> &pixels)=0

  Sets the pixels of the renderer.
- virtual const RendererType & getType () const =0

  Gets the type of the renderer based on the configuration file.
- virtual const std::string & getName () const =0

  Gets the name of the renderer based on the configuration file.
- virtual Resolution & getResolution ()=0

  Gets the resolution of the renderer based on the configuration file.
- virtual Color & getBackgroundColor ()=0

  Gets the background color of the renderer based on the configuration file.
- virtual std::vector< std::vector< rtr::Color > > & getPixels ()=0

  Gets the pixels of the renderer based on the configuration file.

4.16.1 Detailed Description

An interface for renderers.

4.16.2 Member Function Documentation

4.16.2.1 getBackgroundColor()

```
virtual Color& rtr::IRenderer::getBackgroundColor ( )  [pure virtual]
```

Gets the background color of the renderer based on the configuration file.

Returns

The background color of the renderer.

Implemented in rtr::ARenderer.

4.16.2.2 getName()

```
virtual const std::string& rtr::IRenderer::getName ( ) const  [pure virtual]
```

Gets the name of the renderer based on the configuration file.

Returns

A string of the renderer's name.

Implemented in rtr::ARenderer.

4.16.2.3 getPixels()

```
virtual std::vector<std::vector<rtr::Color> >& rtr::IRenderer::getPixels ( )  [pure virtual]
```

Gets the pixels of the renderer based on the configuration file.

Returns

Each pixels of the image.

Implemented in rtr::ARenderer.

4.16.2.4 getResolution()

```
virtual Resolution& rtr::IRenderer::getResolution ( )  [pure virtual]
```

Gets the resolution of the renderer based on the configuration file.

Returns

The resolution of the renderer using the Resolution class.

Implemented in rtr::ARenderer.

4.16.2.5 getType()

```
virtual const RendererType& rtr::IRenderer::getType ( ) const  [pure virtual]
```

Gets the type of the renderer based on the configuration file.

Returns

The type of the renderer, using the enum class RendererType.

Implemented in rtr::ARenderer.

4.16.2.6 render()

```
virtual void rtr::IRenderer::render (
            const std::vector< std::unique_ptr< AShape >> & shapes,
            const std::vector< std::unique_ptr< ALight >> & lights,
            const Camera & camera )  [pure virtual]
```

Renders the scene based on the shapes, lights and camera.

Parameters

shapes	The shapes of the scene.
lights	The lights of the scene.
camera	The camera of the scene.

Implemented in rtr::SFML, and rtr::PPM.

4.16.2.7 setName()

```
virtual void rtr::IRenderer::setName (
```

```
            const std::string & name )  [pure virtual]
```

Sets the name of the renderer.

Parameters

name	The name of the renderer, based on the configuration file.

Implemented in rtr::ARenderer.

4.16.2.8 setPixels()

```
virtual void rtr::IRenderer::setPixels (
            const std::vector< std::vector< rtr::Color >> & pixels )  [pure virtual]
```

Sets the pixels of the renderer.

Parameters

pixels	The pixels of the renderer.

Implemented in rtr::ARenderer.

4.16.2.9 setType()

```
virtual void rtr::IRenderer::setType (
            const RendererType & rendererType )  [pure virtual]
```

Sets the type of the renderer.

Parameters

rendererType	The type of the renderer (defined in the RendererType enum class).

Implemented in rtr::ARenderer.

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

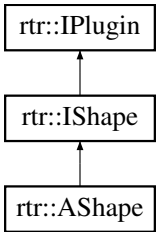
- App/include/RayTracer/Abstraction/IRenderer.hpp

4.17 rtr::IShape Class Reference

An interface used to get the shape's parameters based on the configuration file.

`#include <IShape.hpp>`

Inheritance diagram for rtr::IShape:



Public Member Functions

- virtual void setType (const ShapeType &type)=0
  Sets the type of the shape (sphere, plane, cone...).
- virtual void setMaterial (std::unique_ptr< AMaterial > material)=0
  Sets the material of the shape.
- virtual void setRadius (const double &radius)=0
  Sets the radius of the shape.
- virtual void setHeight (const double &height)=0
  Sets the height of the shape.
- virtual const ShapeType & getType () const =0
  Gets the type of the shape.
- virtual AMaterial & getMaterial ()=0
  Gets the material of the shape.
- virtual Vector & getPosition ()=0
  Gets the position of the shape.
- virtual Vector & getNormal ()=0
  Gets the normal of the shape.
- virtual Vector & getRotation ()=0
  Gets the rotation of the shape, used to create the shape.
- virtual const double & getRadius () const =0
  Gets the radius of the shape.
- virtual const double & getHeight () const =0
  Gets the height of the shape.
- virtual bool hits (std::pair< Vector, Vector > ray, RayHit &hit)=0
  Checks if the ray hits the shape, used to render the output file.
- virtual Vector getDistance (const Vector &point)=0
  Gets the distance between the shape and a point.

4.17.1 Detailed Description

An interface used to get the shape's parameters based on the configuration file.

4.17.2 Member Function Documentation

4.17.2.1 getDistance()

```
virtual Vector rtr::IShape::getDistance (
            const Vector & point )  [pure virtual]
```

Gets the distance between the shape and a point.

Parameters

point	The point to check the distance with.

Returns

The distance between the shape and the point.

Implemented in rtr::AShape.

4.17.2.2 getHeight()

```
virtual const double& rtr::IShape::getHeight ( ) const  [pure virtual]
```

Gets the height of the shape.

Returns

The height of the shape as a double.

Implemented in rtr::AShape.

4.17.2.3 getMaterial()

```
virtual AMaterial& rtr::IShape::getMaterial ( )  [pure virtual]
```

Gets the material of the shape.

Returns

The material of the shape, using the AMaterial class.

Implemented in rtr::AShape.

4.17.2.4 getNormal()

```
virtual Vector& rtr::IShape::getNormal ( )  [pure virtual]
```

Gets the normal of the shape.

Returns

The normal of the shape, using the Vector class.

Implemented in rtr::AShape.

4.17.2.5 getPosition()

```
virtual Vector& rtr::IShape::getPosition ( )  [pure virtual]
```

Gets the position of the shape.

Returns

The position of the shape, using the Vector class.

Implemented in rtr::AShape.

4.17.2.6 getRadius()

```
virtual const double& rtr::IShape::getRadius ( ) const  [pure virtual]
```

Gets the radius of the shape.

Returns

The radius of the shape as a double, used to check the size of the shape.

Implemented in rtr::AShape.

4.17.2.7 getRotation()

```
virtual Vector& rtr::IShape::getRotation ( )  [pure virtual]
```

Gets the rotation of the shape, used to create the shape.

Returns

The rotation of the shape, using the Vector class.

Implemented in rtr::AShape.

4.17.2.8 getType()

```
virtual const ShapeType& rtr::IShape::getType ( ) const  [pure virtual]
```

Gets the type of the shape.

Returns

The type of the shape, using the ShapeType enum class.

Implemented in rtr::AShape.

4.17.2.9 hits()

```
virtual bool rtr::IShape::hits (
            std::pair< Vector, Vector > ray,
            RayHit & hit )  [pure virtual]
```

Checks if the ray hits the shape, used to render the output file.

Parameters

ray	A pair of vectors, to get the rays of the "camera".
hit	The hit of the ray, used to check if the ray hits the shape.

Returns

A boolean, true if the ray hits the shape, false otherwise.

4.17.2.10 setHeight()

```
virtual void rtr::IShape::setHeight (
            const double & height )  [pure virtual]
```

Sets the height of the shape.

Parameters

height	The height of the shape.

Implemented in rtr::AShape.

4.17.2.11 setMaterial()

```
virtual void rtr::IShape::setMaterial (
            std::unique_ptr< AMaterial > material )  [pure virtual]
```

Sets the material of the shape.

Parameters

material	The material of the shape (transparency, reflectivity...).

Implemented in rtr::AShape.

4.17.2.12 setRadius()

```
virtual void rtr::IShape::setRadius (
            const double & radius )  [pure virtual]
```

Sets the radius of the shape.

Parameters

radius	The radius of the shape.

Implemented in rtr::AShape.

4.17.2.13 setType()

```
virtual void rtr::IShape::setType (
            const ShapeType & type )  [pure virtual]
```

Sets the type of the shape (sphere, plane, cone...).

Parameters

type	The type of the shape.

Implemented in rtr::AShape.

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

- App/include/RayTracer/Abstraction/IShape.hpp

4.18 rtr::LightFactory Class Reference

A factory class for the lights.

`#include <Light.hpp>`

Static Public Member Functions

- static std::unique_ptr< ALight > createLight (const Color &color, const float &intensity)

  Creates a light based on the color and intensity (specific to the ambient light).
- static std::unique_ptr< ALight > createLight (const LightType &type, const Color &color, const float &intensity, const Vector &vector)

  Creates a light based on the type, color, intensity and a vector (used for directional and point lights).

4.18.1 Detailed Description

A factory class for the lights.

4.18.2 Member Function Documentation

4.18.2.1 createLight() [1/2]

```
static std::unique_ptr<ALight> rtr::LightFactory::createLight (
            const Color & color,
            const float & intensity )  [static]
```

Creates a light based on the color and intensity (specific to the ambient light).

Parameters

color	The color of the light.
intensity	The intensity of the light.

Returns

A unique pointer to the light.

4.18.2.2 createLight() [2/2]

```
static std::unique_ptr<ALight> rtr::LightFactory::createLight (
            const LightType & type,
```

```
            const Color & color,
            const float & intensity,
            const Vector & vector )  [static]
```

Creates a light based on the type, color, intensity and a vector (used for directional and point lights).

Parameters

type	The type of the light (defined in the LightType enum class).
color	The color of the light.
intensity	The intensity of the light.
vector	A vector to get the position of the light.

Returns

A unique pointer to the light.

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

- App/include/RayTracer/Factory/Light.hpp

4.19 rtr::MaterialFactory Class Reference

A factory class for the materials of the shapes.

`#include <Material.hpp>`

Static Public Member Functions

- static std::unique_ptr< AMaterial > createMaterial (const MaterialType &type, const float &floatValue)
  Creates a material based on the type and the color.

4.19.1 Detailed Description

A factory class for the materials of the shapes.

4.19.2 Member Function Documentation

4.19.2.1 createMaterial()

```
static std::unique_ptr<AMaterial> rtr::MaterialFactory::createMaterial (
            const MaterialType & type,
            const float & floatValue )  [static]
```

Creates a material based on the type and the color.

Parameters

type	The type of the material (defined in the MaterialType enum class).
floatValue	The value of the transparency and reflectiveness to set.

Returns

A unique pointer to the material.

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

- App/include/RayTracer/Factory/Material.hpp

4.20 rtr::Parser Class Reference

Class dedicated to the parsing of configuration files and command-line arguments.

`#include <Parser.hpp>`

Classes

- class ParserException

  Exception class for errors in the parsers.

Static Public Member Functions

- static int parseArgs (const std::string &filePath)

  Parses command-line arguments.
- static std::unique_ptr< rtr::Scene > parseFile (const std::string &filePath)

  Parses a configuration file and returns a Scene object.
- static void parseRenderer (const libconfig::Setting &renderer, Scene &scene)

  Parses the renderer settings from a configuration file.
- static void parseCamera (const libconfig::Setting &camera, Scene &scene)

  Parses the camera settings from a configuration file.
- static ShapeType parseShapeType (const std::string &type)

  Parses the shape type from a string.
- static void parseShapes (const libconfig::Setting &shapesSetting, Scene &scene)

  Parses the shapes settings from a configuration file.
- static std::unique_ptr< AMaterial > parseMaterial (const libconfig::Setting &materialSetting)

  Parses the material settings from a configuration file.
- static LightType parseLightType (const std::string &type)

  Parses the light settings from a configuration file.
- static void parseLights (const libconfig::Setting &lightsSetting, Scene &scene)

  Parses the light settings from a configuration file.
- template<typename T , typename ConversionFunc >
  static T getVector (const libconfig::Setting &setting, ConversionFunc convert)

  Templated function to get a vector from a configuration file setting.
- template<typename T >
  static T convertInt (const libconfig::Setting &setting)

  Templated function to convert an integer value from a configuration file setting.

4.20.1 Detailed Description

Class dedicated to the parsing of configuration files and command-line arguments.

4.20.2 Member Function Documentation

4.20.2.1 convertInt()

```
template<typename T >
static T rtr::Parser::convertInt (
            const libconfig::Setting & setting )  [static]
```

Templated function to convert an integer value from a configuration file setting.

Template Parameters

T	The type of the value.

Parameters

setting	The setting in the configuration file.

Returns

The parsed value.

4.20.2.2 getVector()

```
template<typename T , typename ConversionFunc >
static T rtr::Parser::getVector (
            const libconfig::Setting & setting,
            ConversionFunc convert )  [static]
```

Templated function to get a vector from a configuration file setting.

Template Parameters

T	The type of the vector.
ConversionFunc	The function to convert the vector elements.

Parameters

setting	The setting in the configuration file.

Parameters

convert	The conversion function.

Returns

The parsed vector.

4.20.2.3 parseArgs()

```
static int rtr::Parser::parseArgs (
            const std::string & filePath )  [static]
```

Parses command-line arguments.

Parameters

filePath	The path to the configuration file.

Returns

0 on success, 1 on failure.

4.20.2.4 parseCamera()

```
static void rtr::Parser::parseCamera (
            const libconfig::Setting & camera,
            Scene & scene )  [static]
```

Parses the camera settings from a configuration file.

Parameters

camera	The camera settings in the configuration file.
scene	The Scene object to update with the parsed settings.

4.20.2.5 parseFile()

```
static std::unique_ptr<rtr::Scene> rtr::Parser::parseFile (
            const std::string & filePath )  [static]
```

Parses a configuration file and returns a Scene object.

Parameters

filePath	The path to the configuration file.

Returns

A unique_ptr to a Scene object.

4.20.2.6 parseLights()

```
static void rtr::Parser::parseLights (
            const libconfig::Setting & lightsSetting,
            Scene & scene )  [static]
```

Parses the light settings from a configuration file.

Parameters

lightsSetting	The lights settings in the configuration files.
scene	The Scene object to update with the parsed settings.

4.20.2.7 parseLightType()

```
static LightType rtr::Parser::parseLightType (
            const std::string & type )  [static]
```

Parses the light settings from a configuration file.

Parameters

type	The light type as a string.

Returns

The parsed light type.

4.20.2.8 parseMaterial()

```
static std::unique_ptr<AMaterial> rtr::Parser::parseMaterial (
            const libconfig::Setting & materialSetting )  [static]
```

Parses the material settings from a configuration file.

Parameters

materialSetting	The material settings in the configuration file.

Returns

A unique_ptr to a Material object.

4.20.2.9 parseRenderer()

```
static void rtr::Parser::parseRenderer (
            const libconfig::Setting & renderer,
            Scene & scene )  [static]
```

Parses the renderer settings from a configuration file.

Parameters

renderer	The renderer settings in the configuration file.
scene	The Scene object to update with the parsed settings.

4.20.2.10 parseShapes()

```
static void rtr::Parser::parseShapes (
            const libconfig::Setting & shapesSetting,
            Scene & scene )  [static]
```

Parses the shapes settings from a configuration file.

Parameters

shapesSetting	The shapes settings in the configuration file.
scene	The Scene object to update with the parsed settings.

4.20.2.11 parseShapeType()

```
static ShapeType rtr::Parser::parseShapeType (
            const std::string & type )  [static]
```

Parses the shape type from a string.

Parameters

type	The shape type as a string.

Returns

The parsed shape type.

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

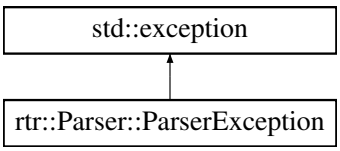
- App/include/RayTracer/Parser.hpp

4.21 rtr::Parser::ParserException Class Reference

Exception class for errors in the parsers.

`#include <Parser.hpp>`

Inheritance diagram for rtr::Parser::ParserException:



Public Member Functions

- **ParserException** (std::string msg)
- **ParserException** (const ParserException &)=delete
- ParserException & **operator=** (const ParserException &)=delete
- **ParserException** (const ParserException &&)=delete
- ParserException & **operator=** (const ParserException &&)=delete
- const char * what () const noexcept override

  Returns the error message.

4.21.1 Detailed Description

Exception class for errors in the parsers.

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

- App/include/RayTracer/Parser.hpp

4.22 rtr::PluginLoader Class Reference

A class to load the plugins.

`#include <Plugin.hpp>`

Public Types

- using **PluginCreator** = std::unique_ptr< IPlugin >(*)()

Public Member Functions

- template<typename T >
  std::unique_ptr< T > getPlugin (const std::string &pluginName)
  Gets the plugin based on the name.
- void **closePlugins** ()

Static Public Member Functions

- static PluginLoader & getInstance ()
  Gets the instance of the plugin loader.

4.22.1 Detailed Description

A class to load the plugins.

4.22.2 Member Function Documentation

4.22.2.1 getInstance()

```
static PluginLoader& rtr::PluginLoader::getInstance ( )  [inline], [static]
```

Gets the instance of the plugin loader.

Returns

A reference to the plugin loader.

4.22.2.2 getPlugin()

```
template<typename T >
std::unique_ptr<T> rtr::PluginLoader::getPlugin (
            const std::string & pluginName )
```

Gets the plugin based on the name.

Parameters

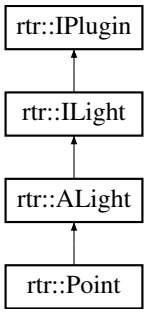
pluginName	The name of the plugin.

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

- App/include/RayTracer/Loader/Plugin.hpp

4.23 rtr::Point Class Reference

Inheritance diagram for rtr::Point:



Public Member Functions

- std::string getPluginName () const override
  Gets the name of the plugin.
- Color LightColor (const Vector &normal, const Color &col) override
  Creates light effects based on the light type.
- Vector & getDirection () override
  Gets the direction of the light based on the configuration file.

4.23.1 Member Function Documentation

4.23.1.1 getPluginName()

```
std::string rtr::Point::getPluginName ( ) const  [inline], [override], [virtual]
```

Gets the name of the plugin.

Returns

A string of the plugin's name, defined as const expressions.

Implements rtr::IPlugin.

4.23.1.2 LightColor()

```
Color rtr::Point::LightColor (
            const Vector & normal,
            const Color & col )  [override], [virtual]
```

Creates light effects based on the light type.

Parameters

normal	The normal of the shape.
col	The current color of the shape.

Returns

The new color of the shape with the light effects.

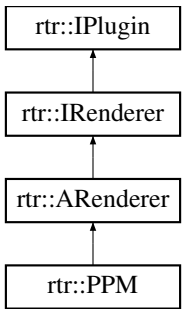
Implements rtr::ILight.

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

- App/plugins/Light/Point/include/RayTracer/Point.hpp

4.24 rtr::PPM Class Reference

Inheritance diagram for rtr::PPM:



Public Member Functions

- std::string getPluginName () const override

  Gets the name of the plugin.
- void render (const std::vector< std::unique_ptr< AShape >> &shapes, const std::vector< std::unique_ptr< ALight >> &lights, const Camera &camera) override

  Renders the scene based on the shapes, lights and camera.
- void **writePixels** (const Color color, const std::size_t width, const std::size_t height)
- void **writeToFile** (const std::string &width, const std::string &height)
- bool **isShadowed** (const Vector &lightDir, const Vector &point, const std::vector< std::unique_ptr< AShape >> &shapes)

Static Public Member Functions

- static std::string **getHeader** (const std::string &width, const std::string &height)

4.24.1 Member Function Documentation

4.24.1.1 getPluginName()

```
std::string rtr::PPM::getPluginName ( ) const  [inline], [override], [virtual]
```

Gets the name of the plugin.

Returns

A string of the plugin's name, defined as const expressions.

Implements rtr::IPlugin.

4.24.1.2 render()

```
void rtr::PPM::render (
            const std::vector< std::unique_ptr< AShape >> & shapes,
            const std::vector< std::unique_ptr< ALight >> & lights,
            const Camera & camera )  [override], [virtual]
```

Renders the scene based on the shapes, lights and camera.

Parameters

shapes	The shapes of the scene.
lights	The lights of the scene.
camera	The camera of the scene.

Implements rtr::IRenderer.

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

- App/plugins/Renderer/PPM/include/RayTracer/PPM.hpp

4.25 ray_hit_s Struct Reference

A struct representing a ray hit in 3D space.

```
#include <RayHit.hpp>
```

4.25.1 Detailed Description

A struct representing a ray hit in 3D space.

Type alias for a ray hit.

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

- App/include/RayTracer/Utils/RayHit.hpp

4.26 rtr::RayHit Class Reference

A class representing a ray hit in 3D space.

`#include <RayHit.hpp>`

Public Member Functions

- const ray_hit_t & **getRayHit** () const noexcept
- void setRayHit (const ray_hit_t &ray_hit) noexcept

  Sets the ray hit data.
- void setRayHit (const Vector &point, const Vector &normal, const double &distance) noexcept

  Sets the ray hit data.
- void setPoint (const Vector &point) noexcept

  Sets the point of intersection.
- void setNormal (const Vector &normal) noexcept

  Sets the normal vector at the point of intersection.
- void setDistance (const double &distance) noexcept

  Sets the distance from the ray origin to the point of intersection.

4.26.1 Detailed Description

A class representing a ray hit in 3D space.

4.26.2 Member Function Documentation

4.26.2.1 setDistance()

```
void rtr::RayHit::setDistance (
            const double & distance )  [inline], [noexcept]
```

Sets the distance from the ray origin to the point of intersection.

Parameters

distance	The distance to set.

4.26.2.2 setNormal()

```
void rtr::RayHit::setNormal (
            const Vector & normal )  [inline], [noexcept]
```

Sets the normal vector at the point of intersection.

Parameters

normal	The normal vector to set.

4.26.2.3 setPoint()

```
void rtr::RayHit::setPoint (
            const Vector & point )  [inline], [noexcept]
```

Sets the point of intersection.

Parameters

point	The point of intersection to set.

4.26.2.4 setRayHit() [1/2]

```
void rtr::RayHit::setRayHit (
            const ray_hit_t & ray_hit )  [inline], [noexcept]
```

Sets the ray hit data.

Parameters

ray_hit	The ray hit data to set

4.26.2.5 setRayHit() [2/2]

```
void rtr::RayHit::setRayHit (
            const Vector & point,
            const Vector & normal,
            const double & distance )  [inline], [noexcept]
```

Sets the ray hit data.

Parameters

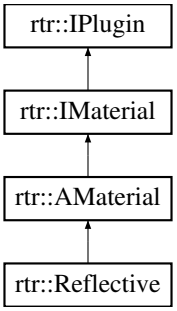
point	The point of intersection.
normal	The normal vector at the point of intersection.
distance	The distance from the ray origin to the point of intersection.

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

- App/include/RayTracer/Utils/RayHit.hpp

4.27 rtr::Reflective Class Reference

Inheritance diagram for rtr::Reflective:



Public Member Functions

- void applyMaterial (Color *color) override

  Applies the material to the shape (transparency and reflectiveness).
- std::string getPluginName () const override

  Gets the name of the plugin.

4.27.1 Member Function Documentation

4.27.1.1 getPluginName()

```
std::string rtr::Reflective::getPluginName ( ) const  [inline], [override], [virtual]
```

Gets the name of the plugin.

Returns

A string of the plugin's name, defined as const expressions.

Implements rtr::IPlugin.

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

- App/plugins/Material/Reflective/include/RayTracer/Reflective.hpp

4.28 rtr::RendererFactory Class Reference

A factory class to create the renderers.

```
#include <Renderer.hpp>
```

Static Public Member Functions

- static std::unique_ptr< ARenderer > createRenderer (const RendererType &type, const std::string &name, const Resolution &resolution, const Color &backgroundColor)

  Creates a renderer based on the type, name, resolution and background color.

4.28.1 Detailed Description

A factory class to create the renderers.

4.28.2 Member Function Documentation

4.28.2.1 createRenderer()

```
static std::unique_ptr<ARenderer> rtr::RendererFactory::createRenderer (
            const RendererType & type,
            const std::string & name,
            const Resolution & resolution,
            const Color & backgroundColor )  [static]
```

Creates a renderer based on the type, name, resolution and background color.

Parameters

type	The type of the renderer (defined in the RendererType enum class).
name	A string of the renderer's name.
resolution	The resolution of the renderer.
backgroundColor	The background color of the renderer.

Returns

A unique pointer to the renderer.

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

- App/include/RayTracer/Factory/Renderer.hpp

4.29 rtr::Resolution Class Reference

Class representing the resolution of an image.

`#include <Resolution.hpp>`

Public Member Functions

- **Resolution** (const uint16_t &width, const uint16_t &height)
- **Resolution** (const resolution_t &resolution)
- void setWidth (const uint16_t &width)

  Sets the width of the resolution.
- void setHeight (const uint16_t &height)

  Sets the height of the resolution.
- void setResolution (const uint16_t &width, const uint16_t &height)

  Sets the resolution to the given width and height.
- void setResolution (const resolution_t &resolution)

  Sets the resolution to the given resolution struct.
- uint16_t getWidth () const

  Gets the width of the resolution.
- uint16_t getHeight () const

  Gets the height of the resolution.
- resolution_t getValue () const

  Gets the resolution as a struct.

4.29.1 Detailed Description

Class representing the resolution of an image.

4.29.2 Member Function Documentation

4.29.2.1 getHeight()

```
uint16_t rtr::Resolution::getHeight ( ) const  [inline]
```

Gets the height of the resolution.

Returns

The height of the resolution.

4.29.2.2 getValue()

```
resolution_t rtr::Resolution::getValue ( ) const  [inline]
```

Gets the resolution as a struct.

Returns

The resolution struct.

4.29.2.3 getWidth()

```
uint16_t rtr::Resolution::getWidth ( ) const  [inline]
```

Gets the width of the resolution.

Returns

The width of the resolution.

4.29.2.4 setHeight()

```
void rtr::Resolution::setHeight (
            const uint16_t & height )  [inline]
```

Sets the height of the resolution.

Parameters

height	The height to set.

4.29.2.5 setResolution() [1/2]

```
void rtr::Resolution::setResolution (
            const resolution_t & resolution )  [inline]
```

Sets the resolution to the given resolution struct.

Parameters

resolution	The resolution struct to set.

4.29.2.6 setResolution() [2/2]

```
void rtr::Resolution::setResolution (
            const uint16_t & width,
            const uint16_t & height )  [inline]
```

Sets the resolution to the given width and height.

Parameters

width	The width of the resolution.
height	The height of the resolution.

4.29.2.7 setWidth()

```
void rtr::Resolution::setWidth (
            const uint16_t & width )  [inline]
```

Sets the width of the resolution.

Parameters

width	The width to set.

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

- App/include/RayTracer/Utils/Resolution.hpp

4.30 resolution_s Struct Reference

A struct representing the resolution of an image.

`#include <Resolution.hpp>`

4.30.1 Detailed Description

A struct representing the resolution of an image.

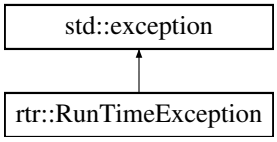
Type alias for the resolution of an image.

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

- App/include/RayTracer/Utils/Resolution.hpp

4.31 rtr::RunTimeException Class Reference

Inheritance diagram for rtr::RunTimeException:



Public Member Functions

- **RunTimeException** (std::string msg)
- **RunTimeException** (const RunTimeException &)=delete
- RunTimeException & **operator=** (const RunTimeException &)=delete
- **RunTimeException** (const RunTimeException &&)=delete
- RunTimeException & **operator=** (const RunTimeException &&)=delete
- const char * **what** () const noexcept override

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

- App/include/RayTracer/Exception/RunTime.hpp

4.32 rtr::Scene Class Reference

A class to represent the scene.

`#include <Scene.hpp>`

Public Member Functions

- void setCamera (const Camera &camera)

  Sets the camera of the scene.
- void setRenderer (std::unique_ptr< ARenderer > renderer)

  Sets the renderer of the scene.
- void addShape (std::unique_ptr< AShape > shape)

  Adds a shape to the scene.
- void addLight (std::unique_ptr< ALight > light)

  Adds a light to the scene.
- Camera & getCamera ()

  Gets the camera of the scene.
- const std::unique_ptr< ARenderer > & getRenderer () const

  Gets the renderer of the scene.
- const std::vector< std::unique_ptr< AShape > > & getShapes () const

  Gets the shapes of the scene.
- const std::vector< std::unique_ptr< ALight > > & getLights () const

  Gets the lights of the scene.

4.32.1 Detailed Description

A class to represent the scene.

4.32.2 Member Function Documentation

4.32.2.1 addLight()

```
void rtr::Scene::addLight (
            std::unique_ptr< ALight > light )  [inline]
```

Adds a light to the scene.

Parameters

light	The light to add, which can be a point light, a directional light and an ambient light.

4.32.2.2 addShape()

```
void rtr::Scene::addShape (
            std::unique_ptr< AShape > shape )  [inline]
```

Adds a shape to the scene.

Parameters

shape	The shape to add, which can be a sphere, a plane and a cone.

4.32.2.3 getLights()

```
const std::vector<std::unique_ptr<ALight> >& rtr::Scene::getLights ( ) const  [inline]
```

Gets the lights of the scene.

Returns

A vector of unique pointers to the lights.

4.32.2.4 getRenderer()

```
const std::unique_ptr<ARenderer>& rtr::Scene::getRenderer ( ) const  [inline]
```

Gets the renderer of the scene.

Returns

A unique pointer to the renderer.

4.32.2.5 getShapes()

```
const std::vector<std::unique_ptr<AShape> >& rtr::Scene::getShapes ( ) const  [inline]
```

Gets the shapes of the scene.

Returns

A vector of unique pointers to the shapes.

4.32.2.6 setCamera()

```
void rtr::Scene::setCamera (
            const Camera & camera )  [inline]
```

Sets the camera of the scene.

Parameters

camera	The camera to set.

4.32.2.7 setRenderer()

```
void rtr::Scene::setRenderer (
            std::unique_ptr< ARenderer > renderer )  [inline]
```

Sets the renderer of the scene.

Parameters

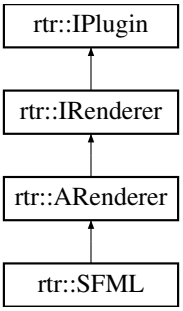
renderer	The renderer to set.

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

- App/include/RayTracer/Scene/Scene.hpp

4.33 rtr::SFML Class Reference

Inheritance diagram for rtr::SFML:



Public Member Functions

- std::string getPluginName () const override

  Gets the name of the plugin.
- void render (const std::vector< std::unique_ptr< AShape >> &shapes, const std::vector< std::unique_ptr< ALight >> &lights, const Camera &camera) override

  Renders the scene based on the shapes, lights and camera.

4.33.1 Member Function Documentation

4.33.1.1 getPluginName()

```
std::string rtr::SFML::getPluginName ( ) const  [inline], [override], [virtual]
```

Gets the name of the plugin.

Returns

A string of the plugin's name, defined as const expressions.

Implements rtr::IPlugin.

4.33.1.2 render()

```
void rtr::SFML::render (
            const std::vector< std::unique_ptr< AShape >> & shapes,
            const std::vector< std::unique_ptr< ALight >> & lights,
            const Camera & camera )  [override], [virtual]
```

Renders the scene based on the shapes, lights and camera.

Parameters

shapes	The shapes of the scene.
lights	The lights of the scene.
camera	The camera of the scene.

Implements rtr::IRenderer.

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

- App/plugins/Renderer/SFML/include/RayTracer/SFML.hpp

4.34 rtr::ShapeFactory Class Reference

A factory class for the shapes.

`#include <Shape.hpp>`

Static Public Member Functions

- static std::unique_ptr< AShape > createShape (const Vector &position, const Vector &normal)

  Creates a shape based on the position and normal (for the plane).
- static std::unique_ptr< AShape > createShape (const Vector &position, const double &radius)

  Creates a shape based on the position and radius (for the sphere).
- static std::unique_ptr< AShape > createShape (const ShapeType &type, const Vector &position, const Vector &rotation, const double &radius, const double &height)

  Creates a shape based on the type position, rotation, radius and height.

4.34.1 Detailed Description

A factory class for the shapes.

4.34.2 Member Function Documentation

4.34.2.1 createShape() [1/3]

```
static std::unique_ptr<AShape> rtr::ShapeFactory::createShape (
            const ShapeType & type,
            const Vector & position,
            const Vector & rotation,
            const double & radius,
            const double & height )  [static]
```

Creates a shape based on the type position, rotation, radius and height.

Parameters

type	The type of the shape (defined in the ShapeType enum class).
position	Used to get the position of the shape.
rotation	Used to get the rotation of the shape.
radius	Used to get the radius of the shape.
height	Used to get the height of the shape.

Returns

A unique pointer to the shape.

4.34.2.2 createShape() [2/3]

```
static std::unique_ptr<AShape> rtr::ShapeFactory::createShape (
            const Vector & position,
            const double & radius )  [static]
```

Creates a shape based on the position and radius (for the sphere).

Parameters

position	Used to get the position of the shape.
radius	Used to get the radius of the shape.

Returns

A unique pointer to the shape.

4.34.2.3 createShape() [3/3]

```
static std::unique_ptr<AShape> rtr::ShapeFactory::createShape (
            const Vector & position,
            const Vector & normal )  [static]
```

Creates a shape based on the position and normal (for the plane).

Parameters

position	Used to get the position of the shape.
normal	Used to get the normal of the shape.

Returns

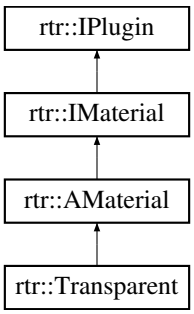
A unique pointer to the shape.

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

- App/include/RayTracer/Factory/Shape.hpp

4.35 rtr::Transparent Class Reference

Inheritance diagram for rtr::Transparent:



Public Member Functions

- void applyMaterial (Color *color) override

  Applies the material to the shape (transparency and reflectiveness).
- std::string getPluginName () const override

  Gets the name of the plugin.

4.35.1 Member Function Documentation

4.35.1.1 getPluginName()

```
std::string rtr::Transparent::getPluginName ( ) const  [inline], [override], [virtual]
```

Gets the name of the plugin.

Returns

A string of the plugin's name, defined as const expressions.

Implements rtr::IPlugin.

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

- App/plugins/Material/Transparent/include/RayTracer/Transparent.hpp

4.36 rtr::Vector Class Reference

Public Member Functions

- **Vector** (const double x, const double y, const double z)
- **Vector** (const vector_t position)
- void setX (const double x)

  Sets the x-component of the vector.
- void setY (const double y)

  Sets the y-component of the vector.
- void setZ (const double z)

  Sets the z-component of the vector.
- void setVector (const double x, const double y, const double z)

  Sets the vector to the given x, y, and z values.
- void setVector (const vector_t &position)

  Sets the vector to the given vector struct.
- double getX () const

  Gets the x-component of the vector.
- double getY () const

  Gets the y-component of the vector.
- double getZ () const

  Gets the z-component of the vector.
- vector_t getValue () const

  Gets the vector as a struct.
- Vector operator+ (const Vector &other) const

  Adds two vectors.
- Vector operator+ (const double scalar) const

  Adds a scalar to the vector.

- Vector operator- (const Vector &other) const

  Subtracts two vectors.
- Vector operator∗ (const Vector &other) const

  Multiplies two vectors.
- Vector operator∗ (const double scalar) const

  Multiplies the vector by a scalar.
- Vector operator/ (const double scalar) const

  Divides the vector by a scalar.
- double length () const

  Gets the length of the vector.
- double dot (const Vector &other) const

  Calculates the dot product of the vector and another vector.
- Vector cross (const Vector &other) const

  Calculates the cross product of the vector and another vector.
- Vector normalize () const

  Normalizes the vector.

4.36.1 Member Function Documentation

4.36.1.1 cross()

```
Vector rtr::Vector::cross (
            const Vector & other ) const  [inline]
```

Calculates the cross product of the vector and another vector.

Parameters

other	The other vector to calculate the cross product with.

Returns

The cross product of the two vectors.

4.36.1.2 dot()

```
double rtr::Vector::dot (
            const Vector & other ) const  [inline]
```

Calculates the dot product of the vector and another vector.

Parameters

other	The other vector to calculate the dot product with.

Returns

The dot product of the two vectors.

4.36.1.3 getValue()

```
vector_t rtr::Vector::getValue ( ) const  [inline]
```

Gets the vector as a struct.

Returns

The vector struct.

4.36.1.4 getX()

```
double rtr::Vector::getX ( ) const  [inline]
```

Gets the x-component of the vector.

Returns

The x-component of the vector.

4.36.1.5 getY()

```
double rtr::Vector::getY ( ) const  [inline]
```

Gets the y-component of the vector.

Returns

The y-component of the vector.

4.36.1.6 getZ()

```
double rtr::Vector::getZ ( ) const  [inline]
```

Gets the z-component of the vector.

Returns

The z-component of the vector.

4.36.1.7 length()

```
double rtr::Vector::length ( ) const  [inline]
```

Gets the length of the vector.

Returns

The length of the vector.

4.36.1.8 normalize()

```
Vector rtr::Vector::normalize ( ) const  [inline]
```

Normalizes the vector.

Returns

The normalized vector.

4.36.1.9 operator*() [1/2]

```
Vector rtr::Vector::operator* (
            const double scalar ) const  [inline]
```

Multiplies the vector by a scalar.

Parameters

scalar	The scalar to multiply by.

Returns

The product of the vector and the scalar.

4.36.1.10 operator*() [2/2]

```
Vector rtr::Vector::operator* (
            const Vector & other ) const  [inline]
```

Multiplies two vectors.

Parameters

other	The other vector to multiply.

Returns

The product of the two vectors.

4.36.1.11 operator+() [1/2]

```
Vector rtr::Vector::operator+ (
            const double scalar ) const  [inline]
```

Adds a scalar to the vector.

Parameters

scalar	The scalar to add.

Returns

The sum of the vector and the scalar.

4.36.1.12 operator+() [2/2]

```
Vector rtr::Vector::operator+ (
            const Vector & other ) const  [inline]
```

Adds two vectors.

Parameters

other	The other vector to add.

Returns

The sum of the two vectors.

4.36.1.13 operator-()

```
Vector rtr::Vector::operator- (
            const Vector & other ) const  [inline]
```

Subtracts two vectors.

Parameters

other	The other vector to subtract.

Returns

The difference of the two vectors.

4.36.1.14 operator/()

```
Vector rtr::Vector::operator/ (
            const double scalar ) const  [inline]
```

Divides the vector by a scalar.

Parameters

scalar	The scalar to divide by.

Returns

The quotient of the vector and the scalar.

4.36.1.15 setVector() [1/2]

```
void rtr::Vector::setVector (
            const double x,
            const double y,
            const double z )  [inline]
```

Sets the vector to the given x, y, and z values.

Parameters

x	The x-component of the vector.
y	The y-component of the vector.
z	The z-component of the vector.

4.36.1.16 setVector() [2/2]

```
void rtr::Vector::setVector (
            const vector_t & position )  [inline]
```

Sets the vector to the given vector struct.

Parameters

position	The vector struct to set.

4.36.1.17 setX()

```
void rtr::Vector::setX (
            const double x )  [inline]
```

Sets the x-component of the vector.

Parameters

x	The x-component to set.

4.36.1.18 setY()

```
void rtr::Vector::setY (
            const double y )  [inline]
```

Sets the y-component of the vector.

Parameters

y	The y-component to set.

4.36.1.19 setZ()

```
void rtr::Vector::setZ (
            const double z )  [inline]
```

Sets the z-component of the vector.

Parameters

z	The z-component to set.

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

- App/include/RayTracer/Utils/Vector.hpp

4.37 vector_s Struct Reference

A struct representing a 3D vector.

`#include <Vector.hpp>`

4.37.1 Detailed Description

A struct representing a 3D vector.

Type alias for a 3D vector.

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

- App/include/RayTracer/Utils/Vector.hpp

Chapter 5

File Documentation

5.1 App/include/RayTracer/Abstraction/ALight.hpp File Reference

```
#include "RayTracer/Abstraction/ILight.hpp"
```

Classes

- class rtr::ALight

  An abstract class for lights.

5.2 App/include/RayTracer/Abstraction/AMaterial.hpp File Reference

```
#include "RayTracer/Abstraction/IMaterial.hpp"
```

Classes

- class rtr::AMaterial

  An abstract class for materials, based on the interface IMaterials.

5.3 App/include/RayTracer/Abstraction/ARenderer.hpp File Reference

```
#include "RayTracer/Abstraction/IRenderer.hpp"
```

Classes

- class rtr::ARenderer

  An abstract class for renderers, based on the interface IRenderer.

5.4 App/include/RayTracer/Abstraction/AShape.hpp File Reference

```
#include "RayTracer/Abstraction/IShape.hpp"
```

Classes

- class rtr::AShape

  An abstract class for shapes, based on the interface IShape.

5.5 App/include/RayTracer/Abstraction/ILight.hpp File Reference

```
#include <vector>
#include "RayTracer/Abstraction/IPlugin.hpp"
#include "RayTracer/Abstraction/AShape.hpp"
#include "RayTracer/Constants.hpp"
#include "RayTracer/Utils/Vector.hpp"
#include "RayTracer/Utils/Color.hpp"
```

Classes

- class rtr::ILight

  An interface for lights.

5.6 App/include/RayTracer/Abstraction/IMaterial.hpp File Reference

```
#include "RayTracer/Abstraction/IPlugin.hpp"
#include "RayTracer/Utils/Color.hpp"
#include "RayTracer/Constants.hpp"
```

Classes

- class rtr::IMaterial

  An interface for materials.

5.7 App/include/RayTracer/Abstraction/IPlugin.hpp File Reference

```
#include <string>
```

Classes

- class rtr::IPlugin

  An interface for plugins.

5.8 App/include/RayTracer/Abstraction/IRenderer.hpp File Reference

```
#include <vector>
#include "RayTracer/Abstraction/AShape.hpp"
#include "RayTracer/Abstraction/ALight.hpp"
#include "RayTracer/Scene/Camera.hpp"
#include "RayTracer/Utils/Resolution.hpp"
#include "RayTracer/Constants.hpp"
```

Classes

- class rtr::IRenderer

  An interface for renderers.

5.9 App/include/RayTracer/Abstraction/IShape.hpp File Reference

```
#include <memory>
#include "RayTracer/Abstraction/AMaterial.hpp"
#include "RayTracer/Constants.hpp"
#include "RayTracer/Utils/Vector.hpp"
#include "RayTracer/Utils/RayHit.hpp"
```

Classes

- class rtr::IShape

  An interface used to get the shape's parameters based on the configuration file.

5.10 App/include/RayTracer/Composite/Material.hpp File Reference

```
#include <vector>
#include <memory>
#include "RayTracer/Abstraction/AMaterial.hpp"
```

Classes

- class rtr::CompositeMaterial

  A class to create a composite material.

5.11 App/include/RayTracer/Factory/Material.hpp File Reference

```
#include "RayTracer/Abstraction/AMaterial.hpp"
#include "RayTracer/Loader/Plugin.hpp"
```

Classes

- class rtr::MaterialFactory

  A factory class for the materials of the shapes.

5.12 App/include/RayTracer/Constants.hpp File Reference

Enumerations

- enum class **RendererType** { **PPM** , **SFML** , **NONE** }
- enum class **ShapeType** {
  SPHERE , **PLANE** , **CYLINDER** , **CONE** ,
  NONE }
- enum class **LightType** { **AMBIENT** , **DIRECTIONAL** , **POINT** , **NONE** }
- enum class **MaterialType** { **TRANSPARENT** , **REFLECTIVE** , **NONE** }

5.13 App/include/RayTracer/Core.hpp File Reference

```
#include "RayTracer/Abstraction/ARenderer.hpp"
#include "RayTracer/Scene/Scene.hpp"
```

Classes

- class rtr::Core

  A class representing the core functionality of the ray tracer.
- class rtr::Core::CoreException

  An exception class for core errors.

5.14 App/include/RayTracer/Factory/Light.hpp File Reference

```
#include "RayTracer/Abstraction/ALight.hpp"
#include "RayTracer/Loader/Plugin.hpp"
```

Classes

- class rtr::LightFactory

  A factory class for the lights.

5.15 App/include/RayTracer/Factory/Renderer.hpp File Reference

```
#include "RayTracer/Abstraction/ARenderer.hpp"
#include "RayTracer/Loader/Plugin.hpp"
```

Classes

- class rtr::RendererFactory

  A factory class to create the renderers.

5.16 App/include/RayTracer/Factory/Shape.hpp File Reference

```
#include "RayTracer/Abstraction/AShape.hpp"
#include "RayTracer/Loader/Plugin.hpp"
```

Classes

- class rtr::ShapeFactory

  A factory class for the shapes.

5.17 App/include/RayTracer/Loader/Plugin.hpp File Reference

```
#include <dlfcn.h>
#include <unordered_map>
#include <filesystem>
#include "RayTracer/Abstraction/IRenderer.hpp"
#include "RayTracer/Exception/RunTime.hpp"
```

Classes

- class rtr::PluginLoader

  A class to load the plugins.

5.18 App/include/RayTracer/Parser.hpp File Reference

```
#include <iostream>
#include <libconfig.h++>
#include "RayTracer/Scene/Scene.hpp"
```

Classes

- class rtr::Parser

  Class dedicated to the parsing of configuration files and command-line arguments.
- class rtr::Parser::ParserException

  Exception class for errors in the parsers.

5.19 App/include/RayTracer/Scene/Camera.hpp File Reference

```
#include "RayTracer/Utils/Vector.hpp"
```

Classes

- class rtr::Camera

  A class to handle the camera.

5.20 App/include/RayTracer/Scene/Scene.hpp File Reference

```
#include <vector>
#include "RayTracer/Scene/Camera.hpp"
#include "RayTracer/Abstraction/ALight.hpp"
#include "RayTracer/Abstraction/AShape.hpp"
#include "RayTracer/Factory/Renderer.hpp"
```

Classes

- class rtr::Scene

  A class to represent the scene.

5.21 App/include/RayTracer/Utils/Color.hpp File Reference

```
#include <cstdint>
```

Classes

- class rtr::Color

  Class representing RGB colors.

Typedefs

- using **rtr::color_t** = struct color_s { uint8_t r{0}

Variables

- uint8_t rtr::g {0}

  Green color component.
- uint8_t rtr::b {0}

  Blue color component.

5.22 App/include/RayTracer/Utils/RayHit.hpp File Reference

```
#include "RayTracer/Utils/Vector.hpp"
```

Classes

- class rtr::RayHit

  A class representing a ray hit in 3D space.

Typedefs

- using **rtr::ray_hit_t** = struct ray_hit_s { Vector point

Variables

- Vector rtr::normal

  The normal vector at the point of intersection.
- double rtr::distance

  The distance from the ray origin to the point of intersection.

5.23 App/include/RayTracer/Utils/Resolution.hpp File Reference

```
#include <cstdint>
```

Classes

- class rtr::Resolution

  Class representing the resolution of an image.

Typedefs

- using **rtr::resolution_t** = struct resolution_s { uint16_t width

Variables

- uint16_t rtr::height

  The height of the image.

5.24 App/include/RayTracer/Utils/Vector.hpp File Reference

```
#include <cstdint>
#include <cmath>
```

Classes

- class rtr::Vector

Typedefs

- using **rtr::vector_t** = struct vector_s { double x

Variables

- double rtr::y

  The y-component of the vector.
- double rtr::z

  The z-component of the vector.

Index