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# **Chapter 1**

# **Hierarchical Index**

## 1.1 Class Hierarchy

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

rtr::Camera
rtr::Color
rtr::Core
std::exception
rtr::Core::CoreException
rtr::Parser::ParserException
rtr::RunTimeException
rtr::IPlugin
rtr::ILight
rtr::ALight
rtr::Ambient
rtr::Directional
rtr::Point
rtr::IMaterial
rtr::AMaterial
rtr::CompositeMaterial
rtr::Reflective
rtr::Transparent
rtr::IRenderer
rtr::ARenderer
rtr::PPM
rtr::SFML
rtr::IShape
rtr::AShape
rtr::LightFactory
rtr::MaterialFactory
rtr::Parser
rtr::PluginLoader
rtr::RayHit
rtr::RendererFactory
rtr::Resolution
rtr::Scene
rtr::ShapeFactory
rtr::Vector

2 Hierarchical Index

# Chapter 2

# **Class Index**

## 2.1 Class List

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

rtr::ALight
rtr::AMaterial
rtr::Ambient
rtr::ARenderer
rtr::AShape
rtr::Camera
rtr::Color
rtr::CompositeMaterial
rtr::Core
rtr::Core::CoreException
rtr::Directional
rtr::lLight
rtr::IMaterial
rtr::IPlugin
rtr::IRenderer
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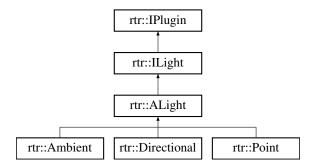
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## **Chapter 3**

## **Class Documentation**

## 3.1 rtr::ALight Class Reference

Inheritance diagram for rtr::ALight:



### **Public Member Functions**

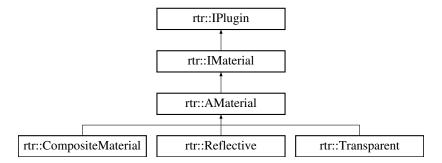
- void **setType** (const LightType &type) override
- · void setIntensity (const float &intensity) override
- const LightType & getType () const override
- Vector & getPosition () override
- Vector & getDirection () override
- Color & getColor () override
- float & getIntensity () override

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

App/include/RayTracer/Abstraction/ALight.hpp

## 3.2 rtr::AMaterial Class Reference

Inheritance diagram for rtr::AMaterial:



#### **Public Member Functions**

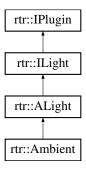
- void **setType** (const MaterialType &type) override
- · void setReflectivity (const float &reflectivity) override
- void **setTransparency** (const float &transparency) override
- const MaterialType & getType () const override
- · Color & getColor () override
- const float & getReflectivity () const override
- const float & getTransparency () const override

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

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

## 3.3 rtr::Ambient Class Reference

Inheritance diagram for rtr::Ambient:



#### **Public Member Functions**

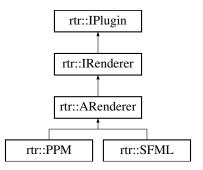
- Color LightColor (const Vector &normal, const Color &col) override
- std::string getPluginName () const override
- Vector & getDirection () override

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

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

## 3.4 rtr::ARenderer Class Reference

Inheritance diagram for rtr::ARenderer:



### **Public Member Functions**

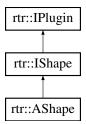
- void **setType** (const RendererType &rendererType) override
- void setName (const std::string &name) override
- const RendererType & getType () const override
- Resolution & getResolution () override
- Color & getBackgroundColor () override
- const std::string & getName () const override
- std::vector< std::vector< rtr::Color > > & getPixels () override
- void setPixels (const std::vector< std::vector< rtr::Color >> &pixels) override

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

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

## 3.5 rtr::AShape Class Reference

Inheritance diagram for rtr::AShape:



#### **Public Member Functions**

- void **setType** (const ShapeType &type) override
- · void setRadius (const double &radius) override
- · void setHeight (const double &height) override
- void setMaterial (std::unique\_ptr< AMaterial > material) override
- const ShapeType & getType () const override
- · AMaterial & getMaterial () override
- Vector & getPosition () override
- Vector & getNormal () override
- · Vector & getRotation () override
- const double & getRadius () const override
- · const double & getHeight () const override
- Vector getDistance (const Vector &point) override

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

App/include/RayTracer/Abstraction/AShape.hpp

## 3.6 rtr::Camera Class Reference

#### **Public Member Functions**

- Camera (uint16 t fov, const Vector & origin, const Vector & direction)
- void **setFov** (const uint16 t fov)
- uint16 t getFov () const
- const Vector & getOrigin () const
- const Vector & getDirection () const
- const Vector & getUp () const
- std::pair< Vector, Vector > ray (const double u, const double v) const

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

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

## 3.7 rtr::Color Class Reference

### **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)
- void setColor (const color\_t &color)
- 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
- · Color operator\* (const double &scalar) const
- Color operator\* (const Color &other) const
- Color operator+= (const Color &other)
- Color operator\*= (const double &scalar)

#### Static Public Member Functions

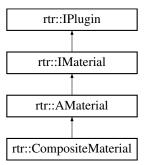
- static constexpr color\_t getRed ()
- · static constexpr color t getGreen ()
- static constexpr color\_t getBlue ()
- static constexpr color t getWhite ()
- static constexpr color\_t getBlack ()
- static constexpr color t getYellow ()
- static constexpr color\_t getMagenta ()
- static constexpr color 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 ()

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

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

## 3.8 rtr::CompositeMaterial Class Reference

Inheritance diagram for rtr::CompositeMaterial:



### **Public Member Functions**

- std::string getPluginName () const override
- void addMaterial (std::unique\_ptr< AMaterial > material)
- void applyMaterial (Color \*color) override

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

App/include/RayTracer/Composite/Material.hpp

## 3.9 rtr::Core Class Reference

#### **Classes**

class CoreException

#### **Static Public Member Functions**

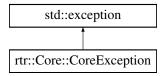
• static void runRayTracer (Scene &scene)

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

• App/include/RayTracer/Core.hpp

## 3.10 rtr::Core::CoreException Class Reference

Inheritance diagram for rtr::Core::CoreException:



### **Public Member Functions**

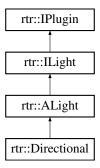
- CoreException (std::string msg)
- CoreException (const CoreException &)=delete
- CoreException & operator= (const CoreException &)=delete
- CoreException (const CoreException &&)=delete
- CoreException & operator= (const CoreException &&)=delete
- const char \* what () const noexcept override

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

• App/include/RayTracer/Core.hpp

## 3.11 rtr::Directional Class Reference

Inheritance diagram for rtr::Directional:



#### **Public Member Functions**

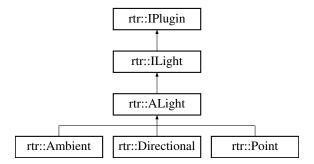
- Color LightColor (const Vector &normal, const Color &col) override
- std::string getPluginName () const override

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

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

## 3.12 rtr::ILight Class Reference

Inheritance diagram for rtr::ILight:



## **Public Member Functions**

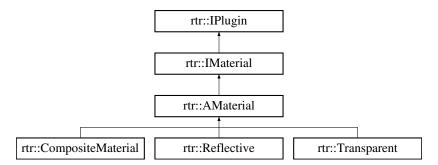
- virtual void **setType** (const LightType &type)=0
- virtual void setIntensity (const float &intensity)=0
- virtual Color LightColor (const Vector &normal, const Color &col)=0
- virtual const LightType & getType () const =0
- virtual Vector & getPosition ()=0
- virtual Vector & getDirection ()=0
- virtual Color & getColor ()=0
- virtual float & getIntensity ()=0

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

App/include/RayTracer/Abstraction/ILight.hpp

## 3.13 rtr::IMaterial Class Reference

Inheritance diagram for rtr::IMaterial:



### **Public Member Functions**

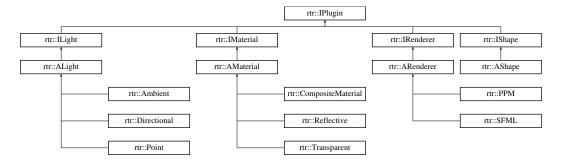
- virtual void applyMaterial (Color \*color)=0
- virtual void **setType** (const MaterialType &type)=0
- virtual void setReflectivity (const float &reflectivity)=0
- virtual void **setTransparency** (const float &transparency)=0
- virtual const MaterialType & getType () const =0
- virtual Color & getColor ()=0
- virtual const float & getReflectivity () const =0
- virtual const float & getTransparency () const =0

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

App/include/RayTracer/Abstraction/IMaterial.hpp

## 3.14 rtr::IPlugin Class Reference

Inheritance diagram for rtr::IPlugin:



## **Public Member Functions**

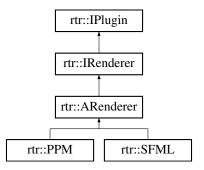
• virtual std::string getPluginName () const =0

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

App/include/RayTracer/Abstraction/IPlugin.hpp

## 3.15 rtr::IRenderer Class Reference

Inheritance diagram for rtr::IRenderer:



#### **Public Member Functions**

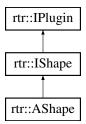
- virtual void render (const std::vector< std::unique\_ptr< AShape >> &shapes, const std::vector< std
   ::unique\_ptr< ALight >> &lights, const Camera &camera)=0
- virtual void **setType** (const RendererType &rendererType)=0
- virtual void setName (const std::string &name)=0
- virtual void setPixels (const std::vector< std::vector< rtr::Color >> &pixels)=0
- virtual const RendererType & getType () const =0
- virtual const std::string & getName () const =0
- virtual Resolution & getResolution ()=0
- virtual Color & getBackgroundColor ()=0
- virtual std::vector< std::vector< rtr::Color > > & getPixels ()=0

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

App/include/RayTracer/Abstraction/IRenderer.hpp

## 3.16 rtr::IShape Class Reference

Inheritance diagram for rtr::IShape:



## **Public Member Functions**

- virtual void **setType** (const ShapeType &type)=0
- virtual void setMaterial (std::unique ptr< AMaterial > material)=0
- virtual void **setRadius** (const double &radius)=0
- virtual void **setHeight** (const double &height)=0
- virtual const ShapeType & **getType** () const =0
- virtual AMaterial & getMaterial ()=0
- virtual Vector & getPosition ()=0
- virtual Vector & getNormal ()=0
- virtual Vector & getRotation ()=0
- virtual const double & getRadius () const =0
- virtual const double & getHeight () const =0
- virtual bool hits (std::pair< Vector, Vector > ray, RayHit &hit)=0
- virtual Vector getDistance (const Vector &point)=0

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

App/include/RayTracer/Abstraction/IShape.hpp

## 3.17 rtr::LightFactory Class Reference

#### **Static Public Member Functions**

- static std::unique\_ptr< ALight > createLight (const Color &color, const float &intensity)
- static std::unique\_ptr< ALight > createLight (const LightType &type, const Color &color, const float &intensity, const Vector &vector)

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

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

## 3.18 rtr::MaterialFactory Class Reference

#### Static Public Member Functions

• static std::unique ptr< AMaterial > createMaterial (const MaterialType &type, const float &floatValue)

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

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

## 3.19 rtr::Parser Class Reference

#### Classes

class ParserException

#### **Static Public Member Functions**

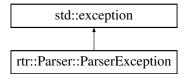
- static int parseArgs (const std::string &filePath)
- static std::unique\_ptr< rtr::Scene > parseFile (const std::string &filePath)
- static void parseRenderer (const libconfig::Setting &renderer, Scene &scene)
- static void parseCamera (const libconfig::Setting &camera, Scene &scene)
- static ShapeType parseShapeType (const std::string &type)
- static void **parseShapes** (const libconfig::Setting &shapesSetting, Scene &scene)
- static std::unique\_ptr< AMaterial > parseMaterial (const libconfig::Setting &materialSetting)
- static LightType parseLightType (const std::string &type)
- static void parseLights (const libconfig::Setting &lightsSetting, Scene &scene)
- template<typename T , typename ConversionFunc > static T getVector (const libconfig::Setting &setting, ConversionFunc convert)
- template<typename T >
   static T convertInt (const libconfig::Setting &setting)

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

App/include/RayTracer/Parser.hpp

## 3.20 rtr::Parser::ParserException Class Reference

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

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

• App/include/RayTracer/Parser.hpp

## 3.21 rtr::PluginLoader Class Reference

## **Public Types**

• using **PluginCreator** = std::unique\_ptr< IPlugin >(\*)()

#### **Public Member Functions**

template<typename T >
 std::unique\_ptr< T > getPlugin (const std::string &pluginName)

## **Static Public Member Functions**

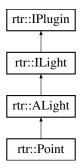
• static PluginLoader & getInstance ()

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

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

## 3.22 rtr::Point Class Reference

Inheritance diagram for rtr::Point:



#### **Public Member Functions**

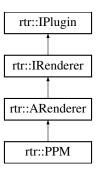
- std::string getPluginName () const override
- Color LightColor (const Vector &normal, const Color &col) override
- Vector & getDirection () override

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

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

## 3.23 rtr::PPM Class Reference

Inheritance diagram for rtr::PPM:



#### **Public Member Functions**

- std::string getPluginName () const override
- void render (const std::vector< std::unique\_ptr< AShape >> &shapes, const std::vector< std::unique\_ptr<</li>
   ALight >> &lights, const Camera &camera) override
- 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</li>
   >> &shapes)

#### Static Public Member Functions

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

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

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

## 3.24 rtr::RayHit Class Reference

#### **Public Member Functions**

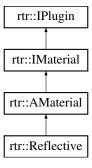
- const ray\_hit\_t & getRayHit () const noexcept
- void setRayHit (const ray\_hit\_t &ray\_hit) noexcept
- void setRayHit (const Vector &point, const Vector &normal, const double &distance) noexcept
- void setPoint (const Vector &point) noexcept
- · void setNormal (const Vector &normal) noexcept
- · void setDistance (const double &distance) noexcept

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

App/include/RayTracer/Utils/RayHit.hpp

## 3.25 rtr::Reflective Class Reference

Inheritance diagram for rtr::Reflective:



#### **Public Member Functions**

- void applyMaterial (Color \*color) override
- std::string getPluginName () const override

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

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

## 3.26 rtr::RendererFactory Class Reference

#### Static Public Member Functions

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

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

App/include/RayTracer/Factory/Renderer.hpp

## 3.27 rtr::Resolution Class Reference

#### **Public Member Functions**

- Resolution (const uint16\_t &width, const uint16\_t &height)
- Resolution (const resolution t &resolution)
- void setWidth (const uint16 t &width)
- void setHeight (const uint16\_t &height)
- void setResolution (const uint16\_t &width, const uint16\_t &height)
- void setResolution (const resolution\_t &resolution)
- uint16\_t getWidth () const
- uint16\_t getHeight () const
- · resolution t getValue () const

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

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

## 3.28 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

## 3.29 rtr::Scene Class Reference

## **Public Member Functions**

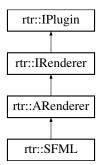
- void setCamera (const Camera &camera)
- void setRenderer (std::unique\_ptr< ARenderer > renderer)
- void addShape (std::unique\_ptr< AShape > shape)
- void addLight (std::unique\_ptr< ALight > light)
- Camera & getCamera ()
- const std::unique ptr< ARenderer > & getRenderer () const
- const std::vector< std::unique\_ptr< AShape > > & getShapes () const
- const std::vector< std::unique\_ptr< ALight > > & getLights () const

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

• App/include/RayTracer/Scene/Scene.hpp

## 3.30 rtr::SFML Class Reference

Inheritance diagram for rtr::SFML:



## **Public Member Functions**

- std::string getPluginName () const override
- void render (const std::vector< std::unique\_ptr< AShape >> &shapes, const std::vector< std::unique\_ptr<</li>
   ALight >> &lights, const Camera &camera) override

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

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

## 3.31 rtr::ShapeFactory Class Reference

## **Static Public Member Functions**

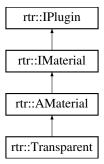
- static std::unique\_ptr< AShape > createShape (const Vector &position, const Vector &normal)
- static std::unique\_ptr< AShape > createShape (const Vector &position, const double &radius)
- static std::unique\_ptr< AShape > createShape (const ShapeType &type, const Vector &position, const Vector &rotation, const double &radius, const double &height)

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

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

## 3.32 rtr::Transparent Class Reference

Inheritance diagram for rtr::Transparent:



### **Public Member Functions**

- void applyMaterial (Color \*color) override
- std::string getPluginName () const override

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

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

## 3.33 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)
- void setY (const double y)
- void **setZ** (const double z)
- void **setVector** (const double x, const double y, const double z)
- void setVector (const vector\_t &position)
- double **getX** () const
- · double getY () const
- double getZ () const
- vector\_t getValue () const
- · Vector operator+ (const Vector &other) const
- Vector operator+ (const double scalar) const
- Vector operator- (const Vector & other) const
- Vector operator\* (const Vector &other) const
- Vector operator\* (const double scalar) const
- Vector operator/ (const double scalar) const
- double length () const
- double dot (const Vector & other) const
- Vector cross (const Vector & other) const
- Vector normalize () const

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

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

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