# RayTracer

Generated by Doxygen 1.13.2

# Chapter 1

# Namespace Index

## 1.1 Namespace List

Here is a list of all namespaces with brief descriptions:

# Chapter 2

# Hierarchical Index

## 2.1 Class Hierarchy

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

# Chapter 3

# Class Index

## 3.1 Class List

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

# Chapter 4

# File Index

## 4.1 File List

Here is a list of all files with brief descriptions:

# Chapter 5

# Namespace Documentation

## 5.1 Math Namespace Reference

### Classes

- class Color
- class Matrix4x4
- class Point3D
- class Rectangle3D
- class Vector3D

## 5.2 RayTracer Namespace Reference

### Classes

- class Camera
- class Cone
- class Cube
- class Cylinder
- struct HitRecord
- class ICamera
- class Plane
- class Ray
- class Sphere

### Functions

- IPlugin * createCameraPlugin ()
- IPlugin * createConePrimitive ()
- IPlugin * createCylinderPrimitive ()

### 5.2.1 Function Documentation

#### 5.2.1.1 createCameraPlugin()

```
IPlugin * RayTracer::createCameraPlugin ()
```

#### 5.2.1.2 createConePrimitive()

```
IPlugin * RayTracer::createConePrimitive ()
```

#### 5.2.1.3 createCylinderPrimitive()

```
IPlugin * RayTracer::createCylinderPrimitive ()
```

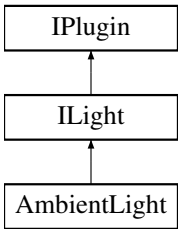
# Chapter 6

# Class Documentation

## 6.1 AmbientLight Class Reference

`#include <AmbientLight.hpp>`

Inheritance diagram for AmbientLight:




### Public Member Functions

- AmbientLight (float intensity=1.0f)
- ~AmbientLight ()=default
- PluginType getType () const override
- LightType getLightType () const override
- void setIntensity (float intensity) override
- float getIntensity () const override
- void applyLight (float &r, float &g, float &b) const override
- void setDirection (float, float, float) override
- Math::Vector3D getDirection () const override

### Public Member Functions inherited from ILight

- ILight ()=default
- virtual ~ILight ()=default

### Public Member Functions inherited from IPlugin

- IPlugin ()=default
- virtual ~IPlugin ()=default

### 6.1.1 Constructor & Destructor Documentation

#### 6.1.1.1 AmbientLight()

```
AmbientLight::AmbientLight (
            float intensity = 1.0f)
```

#### 6.1.1.2 ~AmbientLight()

```
AmbientLight::~AmbientLight ()  [default]
```

### 6.1.2 Member Function Documentation

#### 6.1.2.1 applyLight()

```
void AmbientLight::applyLight (
            float & r,
            float & g,
            float & b) const  [override], [virtual]
```

Implements ILight.

#### 6.1.2.2 getDirection()

```
Math::Vector3D AmbientLight::getDirection () const  [inline], [override], [virtual]
```

Implements ILight.

#### 6.1.2.3 getIntensity()

```
float AmbientLight::getIntensity () const  [override], [virtual]
```

Implements ILight.

#### 6.1.2.4 getLightType()

```
LightType AmbientLight::getLightType () const  [inline], [override], [virtual]
```

Implements ILight.

#### 6.1.2.5 getType()

```
PluginType AmbientLight::getType () const  [inline], [override], [virtual]
```

Implements IPlugin.

#### 6.1.2.6 setDirection()

```
void AmbientLight::setDirection (
            float ,
            float ,
            float )  [inline], [override], [virtual]
```

Implements ILight.

#### 6.1.2.7 setIntensity()

```
void AmbientLight::setIntensity (
            float intensity)  [override], [virtual]
```

Implements ILight.

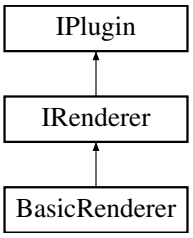
The documentation for this class was generated from the following files:

- src/plugins/lights/AmbientLight.hpp
- src/plugins/lights/AmbientLight.cpp

## 6.2 BasicRenderer Class Reference

```
#include <BasicRenderer.hpp>
```

Inheritance diagram for BasicRenderer:




### Public Member Functions

- BasicRenderer ()
- ~BasicRenderer ()=default
- PluginType getType () const override
- void setRendererType (RendererType type) override
- RendererType getRendererType () const override
- void renderScene () override
- void setCamera (RayTracer::ICamera *camera) override
- void setLights (std::vector< ILight * > &lights) override
- void setPrimitives (std::vector< IPrimitive * > &primitives) override

### Public Member Functions inherited from IRenderer

- IRenderer ()=default
- virtual ~IRenderer ()=default

### Public Member Functions inherited from IPlugin

- IPlugin ()=default
- virtual ~IPlugin ()=default

## 6.2.1 Constructor & Destructor Documentation

### 6.2.1.1 BasicRenderer()

```
BasicRenderer::BasicRenderer ()
```

### 6.2.1.2 ~BasicRenderer()

```
BasicRenderer::~BasicRenderer ()  [default]
```

## 6.2.2 Member Function Documentation

### 6.2.2.1 getRendererType()

```
RendererType BasicRenderer::getRendererType () const  [inline], [override], [virtual]
```

Implements IRenderer.

### 6.2.2.2 getType()

```
PluginType BasicRenderer::getType () const  [inline], [override], [virtual]
```

Implements IPlugin.

### 6.2.2.3 renderScene()

```
void BasicRenderer::renderScene ()  [override], [virtual]
```

Implements IRenderer.

### 6.2.2.4 setCamera()

```
void BasicRenderer::setCamera (
            RayTracer::ICamera * camera)  [override], [virtual]
```

Implements IRenderer.

#### 6.2.2.5 setLights()

```
void BasicRenderer::setLights (
            std::vector< ILight * > & lights)  [override], [virtual]
```

Implements IRenderer.

#### 6.2.2.6 setPrimitives()

```
void BasicRenderer::setPrimitives (
            std::vector< IPrimitive * > & primitives)  [override], [virtual]
```

Implements IRenderer.

#### 6.2.2.7 setRendererType()

```
void BasicRenderer::setRendererType (
            RendererType type)  [inline], [override], [virtual]
```

Implements IRenderer.

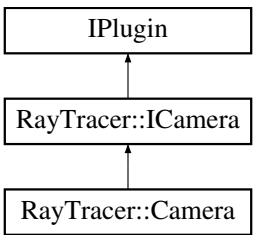
The documentation for this class was generated from the following files:

- src/plugins/render/BasicRenderer.hpp
- src/plugins/render/BasicRenderer.cpp

## 6.3 RayTracer::Camera Class Reference

```
#include <Camera.hpp>
```

Inheritance diagram for RayTracer::Camera:



**Public Member Functions**

- Camera ()
- Camera (const Math::Point3D &origin, const Math::Rectangle3D &screen, float fov)
- ~Camera ()=default
- PluginType getType () const override
- void rotate (float angle, const Math::Vector3D &axis) override
- void translate (const Math::Vector3D &translation) override
- void setPosition (Math::Point3D position) override
- Math::Point3D getPosition () const override
- void setResolution (int width, int height) override
- void getResolution (int &width, int &height) const override
- void setFieldOfView (float fov) override
- float getFieldOfView () const override
- int getWidth () const override
- int getHeight () const override
- void updateScreen () override
- Ray rayAt (double u, double v) const override
- void setLookAt (const Math::Point3D &lookAt) override
- Math::Point3D getLookAt () const override

## Public Member Functions inherited from RayTracer::ICamera

- virtual ~ICamera ()=default

## Public Member Functions inherited from IPlugin

- IPlugin ()=default
- virtual ~IPlugin ()=default

### 6.3.1 Constructor & Destructor Documentation

#### 6.3.1.1 Camera() [1/2]

```
RayTracer::Camera::Camera ()
```

#### 6.3.1.2 Camera() [2/2]

```
RayTracer::Camera::Camera (
            const Math::Point3D & origin,
            const Math::Rectangle3D & screen,
            float fov)
```

#### 6.3.1.3 ~Camera()

```
RayTracer::Camera::~Camera ()  [default]
```

## 6.3.2 Member Function Documentation

### 6.3.2.1 getFieldOfView()

```
float RayTracer::Camera::getFieldOfView () const  [override], [virtual]
```

Implements RayTracer::ICamera.

### 6.3.2.2 getHeight()

```
int RayTracer::Camera::getHeight () const  [inline], [override], [virtual]
```

Implements RayTracer::ICamera.

### 6.3.2.3 getLookAt()

```
Math::Point3D RayTracer::Camera::getLookAt () const  [inline], [override], [virtual]
```

Implements RayTracer::ICamera.

### 6.3.2.4 getPosition()

```
Math::Point3D RayTracer::Camera::getPosition () const  [override], [virtual]
```

Implements RayTracer::ICamera.

### 6.3.2.5 getResolution()

```
void RayTracer::Camera::getResolution (
            int & width,
            int & height) const  [override], [virtual]
```

Implements RayTracer::ICamera.

### 6.3.2.6 getType()

```
PluginType RayTracer::Camera::getType () const  [inline], [override], [virtual]
```

Implements IPlugin.

### 6.3.2.7 getWidth()

```
int RayTracer::Camera::getWidth () const  [inline], [override], [virtual]
```

Implements RayTracer::ICamera.

#### 6.3.2.8 rayAt()

```
Ray RayTracer::Camera::rayAt (
            double u,
            double v) const  [override], [virtual]
```

Implements RayTracer::ICamera.

#### 6.3.2.9 rotate()

```
void RayTracer::Camera::rotate (
            float angle,
            const Math::Vector3D & axis)  [override], [virtual]
```

Implements RayTracer::ICamera.

#### 6.3.2.10 setFieldOfView()

```
void RayTracer::Camera::setFieldOfView (
            float fov)  [override], [virtual]
```

Implements RayTracer::ICamera.

#### 6.3.2.11 setLookAt()

```
void RayTracer::Camera::setLookAt (
            const Math::Point3D & lookAt)  [override], [virtual]
```

Implements RayTracer::ICamera.

#### 6.3.2.12 setPosition()

```
void RayTracer::Camera::setPosition (
            Math::Point3D position)  [inline], [override], [virtual]
```

Implements RayTracer::ICamera.

#### 6.3.2.13 setResolution()

```
void RayTracer::Camera::setResolution (
            int width,
            int height)  [override], [virtual]
```

Implements RayTracer::ICamera.

#### 6.3.2.14 translate()

```
void RayTracer::Camera::translate (
            const Math::Vector3D & translation)  [override], [virtual]
```

Implements RayTracer::ICamera.

#### 6.3.2.15 updateScreen()

```
void RayTracer::Camera::updateScreen ()  [override], [virtual]
```

Implements RayTracer::ICamera.

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

- src/plugins/camera/Camera.hpp
- src/plugins/camera/Camera.cpp

## 6.4 Math::Color Class Reference

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

### Public Member Functions

- Color (float r, float g, float b)
- ~Color ()=default
- float getR () const
- float getG () const
- float getB () const
- Color operator+ (const Color &other) const
- Color operator+= (const Color &other)

### 6.4.1 Constructor & Destructor Documentation

#### 6.4.1.1 Color()

```
Math::Color::Color (
            float r,
            float g,
            float b)  [inline]
```

#### 6.4.1.2 ~Color()

```
Math::Color::~Color ()  [default]
```

### 6.4.2 Member Function Documentation

#### 6.4.2.1 getB()

```
float Math::Color::getB () const  [inline]
```

#### 6.4.2.2 getG()

```
float Math::Color::getG () const  [inline]
```

#### 6.4.2.3 getR()

```
float Math::Color::getR () const  [inline]
```

#### 6.4.2.4 operator+()

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

#### 6.4.2.5 operator+=()

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

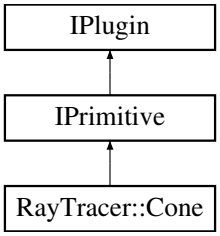
The documentation for this class was generated from the following file:

- src/plugins/math/Color.hpp

## 6.5 RayTracer::Cone Class Reference

```
#include <Cone.hpp>
```

Inheritance diagram for RayTracer::Cone:



**Public Member Functions**

- Cone ()
- ~Cone ()=default
- bool hits (const Ray &ray) const override
- bool intersect (const Ray &ray, HitRecord &rec) const override
- void translate (const Math::Vector3D &translation) override
- void rotate (float angle, const Math::Vector3D &axis) override
- const Math::Point3D & getCenter () const override
- float getRadius () const override
- const Math::Color & getColor () const override
- PluginType getType () const override
- PrimitiveType getPrimitiveType () const override
- Math::Point3D getPosition () const override
- void setPosition (const Math::Point3D &position) override
- void setRadius (float newRadius) override
- void setNormal (const Math::Vector3D &newNormal) override
- Math::Vector3D getNormal () const override
- void setColor (Math::Color newColor) override
- float getHeight () const override
- void setHeight (float newHeight) override

## Public Member Functions inherited from IPrimitive

- IPrimitive ()=default
- virtual ~IPrimitive ()=default
- PluginType getType () const override

## Public Member Functions inherited from IPlugin

- IPlugin ()=default
- virtual ~IPlugin ()=default

### 6.5.1 Constructor & Destructor Documentation

#### 6.5.1.1 Cone()

```
RayTracer::Cone::Cone ()
```

#### 6.5.1.2 ~Cone()

```
RayTracer::Cone::~Cone ()  [default]
```

### 6.5.2 Member Function Documentation

#### 6.5.2.1 getCenter()

```
const Math::Point3D & RayTracer::Cone::getCenter () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.5.2.2 getColor()

```
const Math::Color & RayTracer::Cone::getColor () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.5.2.3 getHeight()

```
float RayTracer::Cone::getHeight () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.5.2.4 getNormal()

```
Math::Vector3D RayTracer::Cone::getNormal () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.5.2.5 getPosition()

```
Math::Point3D RayTracer::Cone::getPosition () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.5.2.6 getPrimitiveType()

```
PrimitiveType RayTracer::Cone::getPrimitiveType () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.5.2.7 getRadius()

```
float RayTracer::Cone::getRadius () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.5.2.8 getType()

```
PluginType RayTracer::Cone::getType () const  [inline], [override], [virtual]
```

Implements IPlugin.

#### 6.5.2.9 hits()

```
bool RayTracer::Cone::hits (
            const Ray & ray) const  [override], [virtual]
```

Implements IPrimitive.

#### 6.5.2.10 intersect()

```
bool RayTracer::Cone::intersect (
            const Ray & ray,
            HitRecord & rec) const  [override], [virtual]
```

Implements IPrimitive.

#### 6.5.2.11 rotate()

```
void RayTracer::Cone::rotate (
            float angle,
            const Math::Vector3D & axis)  [override], [virtual]
```

Implements IPrimitive.

#### 6.5.2.12 setColor()

```
void RayTracer::Cone::setColor (
            Math::Color newColor)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.5.2.13 setHeight()

```
void RayTracer::Cone::setHeight (
            float newHeight)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.5.2.14 setNormal()

```
void RayTracer::Cone::setNormal (
            const Math::Vector3D & newNormal)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.5.2.15 setPosition()

```
void RayTracer::Cone::setPosition (
            const Math::Point3D & position)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.5.2.16 setRadius()

```
void RayTracer::Cone::setRadius (
            float newRadius)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.5.2.17 translate()

```
void RayTracer::Cone::translate (
            const Math::Vector3D & translation)  [override], [virtual]
```

Implements IPrimitive.

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

- src/plugins/primitives/Cone.hpp
- src/plugins/primitives/Cone.cpp

## 6.6 Core Class Reference

```
#include <Core.hpp>
```

### Public Member Functions

- Core ()=default
- bool isFileValid (const std::string &filename)
- std::vector< IPlugin * > getPlugins () const
- void addPlugin (IPlugin *plugin)
- void convertVectorPluginToVectorLight (std::vector< IPlugin * > &plugins, std::vector< ILight * > &lights)
- void convertVectorPluginToVectorPrimitive (std::vector< IPlugin * > &plugins, std::vector< IPrimitive * > &primitives)

### 6.6.1 Constructor & Destructor Documentation

#### 6.6.1.1 Core()

```
Core::Core ()  [default]
```

### 6.6.2 Member Function Documentation

#### 6.6.2.1 addPlugin()

```
void Core::addPlugin (
            IPlugin * plugin)  [inline]
```

#### 6.6.2.2 convertVectorPluginToVectorLight()

```
void Core::convertVectorPluginToVectorLight (
            std::vector< IPlugin * > & plugins,
            std::vector< ILight * > & lights)
```

#### 6.6.2.3 convertVectorPluginToVectorPrimitive()

```
void Core::convertVectorPluginToVectorPrimitive (
            std::vector< IPlugin * > & plugins,
            std::vector< IPrimitive * > & primitives)
```

#### 6.6.2.4 getPlugins()

```
std::vector< IPlugin * > Core::getPlugins () const  [inline]
```

#### 6.6.2.5 isFileValid()

```
bool Core::isFileValid (
            const std::string & filename)
```

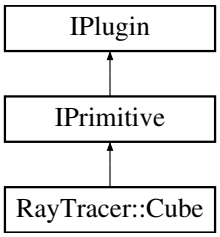
The documentation for this class was generated from the following files:

- src/core/Core.hpp
- src/core/Core.cpp

## 6.7 RayTracer::Cube Class Reference

`#include <Cube.hpp>`

Inheritance diagram for RayTracer::Cube:




### Public Member Functions

- Cube ()
- ~Cube ()=default
- bool hits (const Ray &ray) const override
- bool intersect (const Ray &ray, HitRecord &rec) const override
- void translate (const Math::Vector3D &translation) override
- void rotate (float angle, const Math::Vector3D &axis) override
- const Math::Point3D & getCenter () const override
- float getRadius () const override
- const Math::Color & getColor () const override
- PluginType getType () const override
- PrimitiveType getPrimitiveType () const override
- Math::Point3D getPosition () const override
- void setPosition (const Math::Point3D &position) override
- void setRadius (float newSize) override
- void setNormal (const Math::Vector3D &newNormal) override
- Math::Vector3D getNormal () const override
- void setColor (Math::Color newColor) override
- void setSize (float newSize)
- float getSize () const
- void setHeight (float newHeight) override
- float getHeight () const override

### Public Member Functions inherited from IPrimitive

- IPrimitive ()=default
- virtual ~IPrimitive ()=default
- PluginType getType () const override

### Public Member Functions inherited from IPlugin

- IPlugin ()=default
- virtual ~IPlugin ()=default

## 6.7.1 Constructor & Destructor Documentation

### 6.7.1.1 Cube()

```
RayTracer::Cube::Cube ()
```

### 6.7.1.2 ~Cube()

```
RayTracer::Cube::~Cube ()  [default]
```

## 6.7.2 Member Function Documentation

### 6.7.2.1 getCenter()

```
const Math::Point3D & RayTracer::Cube::getCenter () const  [inline], [override], [virtual]
```

Implements IPrimitive.

### 6.7.2.2 getColor()

```
const Math::Color & RayTracer::Cube::getColor () const  [inline], [override], [virtual]
```

Implements IPrimitive.

### 6.7.2.3 getHeight()

```
float RayTracer::Cube::getHeight () const  [inline], [override], [virtual]
```

Implements IPrimitive.

### 6.7.2.4 getNormal()

```
Math::Vector3D RayTracer::Cube::getNormal () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.7.2.5 getPosition()

```
Math::Point3D RayTracer::Cube::getPosition () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.7.2.6 getPrimitiveType()

```
PrimitiveType RayTracer::Cube::getPrimitiveType () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.7.2.7 getRadius()

```
float RayTracer::Cube::getRadius () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.7.2.8 getSize()

```
float RayTracer::Cube::getSize () const  [inline]
```

#### 6.7.2.9 getType()

```
PluginType RayTracer::Cube::getType () const  [inline], [override], [virtual]
```

Implements IPlugin.

#### 6.7.2.10 hits()

```
bool RayTracer::Cube::hits (
            const Ray & ray) const  [override], [virtual]
```

Implements IPrimitive.

#### 6.7.2.11 intersect()

```
bool RayTracer::Cube::intersect (
            const Ray & ray,
            RayTracer::HitRecord & rec) const  [override], [virtual]
```

Implements IPrimitive.

#### 6.7.2.12 rotate()

```
void RayTracer::Cube::rotate (
            float angle,
            const Math::Vector3D & axis)  [override], [virtual]
```

Implements IPrimitive.

#### 6.7.2.13 setColor()

```
void RayTracer::Cube::setColor (
            Math::Color newColor)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.7.2.14 setHeight()

```
void RayTracer::Cube::setHeight (
            float newHeight)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.7.2.15 setNormal()

```
void RayTracer::Cube::setNormal (
            const Math::Vector3D & newNormal)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.7.2.16 setPosition()

```
void RayTracer::Cube::setPosition (
            const Math::Point3D & position)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.7.2.17 setRadius()

```
void RayTracer::Cube::setRadius (
            float newSize)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.7.2.18 setSize()

```
void RayTracer::Cube::setSize (
            float newSize)  [inline]
```

#### 6.7.2.19 translate()

```
void RayTracer::Cube::translate (
            const Math::Vector3D & translation)  [override], [virtual]
```

Implements IPrimitive.

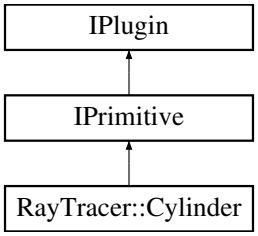
The documentation for this class was generated from the following files:

- src/plugins/primitives/Cube.hpp
- src/plugins/primitives/Cube.cpp

## 6.8 RayTracer::Cylinder Class Reference

```
#include <Cylinder.hpp>
```

Inheritance diagram for RayTracer::Cylinder:




### Public Member Functions

- Cylinder ()
- ~Cylinder ()=default
- bool hits (const Ray &ray) const override
- bool intersect (const Ray &ray, HitRecord &rec) const override
- void translate (const Math::Vector3D &translation) override
- void rotate (float angle, const Math::Vector3D &axis) override
- const Math::Point3D & getCenter () const override
- float getRadius () const override
- const Math::Color & getColor () const override
- PrimitiveType getPrimitiveType () const override
- Math::Point3D getPosition () const override
- void setPosition (const Math::Point3D &position) override
- void setRadius (float newRadius) override
- void setNormal (const Math::Vector3D &newNormal) override
- Math::Vector3D getNormal () const override
- void setColor (Math::Color newColor) override
- float getHeight () const override
- void setHeight (float newHeight) override

### Public Member Functions inherited from IPrimitive

- IPrimitive ()=default
- virtual ~IPrimitive ()=default
- PluginType getType () const override

### Public Member Functions inherited from IPlugin

- IPlugin ()=default
- virtual ~IPlugin ()=default

## 6.8.1 Constructor & Destructor Documentation

### 6.8.1.1 Cylinder()

```
RayTracer::Cylinder::Cylinder ()
```

### 6.8.1.2 ~Cylinder()

```
RayTracer::Cylinder::~Cylinder ()  [default]
```

## 6.8.2 Member Function Documentation

### 6.8.2.1 getCenter()

```
const Math::Point3D & RayTracer::Cylinder::getCenter () const  [inline], [override], [virtual]
```

Implements IPrimitive.

### 6.8.2.2 getColor()

```
const Math::Color & RayTracer::Cylinder::getColor () const  [inline], [override], [virtual]
```

Implements IPrimitive.

### 6.8.2.3 getHeight()

```
float RayTracer::Cylinder::getHeight () const  [inline], [override], [virtual]
```

Implements IPrimitive.

### 6.8.2.4 getNormal()

```
Math::Vector3D RayTracer::Cylinder::getNormal () const  [inline], [override], [virtual]
```

Implements IPrimitive.

### 6.8.2.5 getPosition()

```
Math::Point3D RayTracer::Cylinder::getPosition () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.8.2.6 getPrimitiveType()

```
PrimitiveType RayTracer::Cylinder::getPrimitiveType () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.8.2.7 getRadius()

```
float RayTracer::Cylinder::getRadius () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.8.2.8 hits()

```
bool RayTracer::Cylinder::hits (
            const Ray & ray) const  [override], [virtual]
```

Implements IPrimitive.

#### 6.8.2.9 intersect()

```
bool RayTracer::Cylinder::intersect (
            const Ray & ray,
            HitRecord & rec) const  [override], [virtual]
```

Implements IPrimitive.

#### 6.8.2.10 rotate()

```
void RayTracer::Cylinder::rotate (
            float angle,
            const Math::Vector3D & axis)  [override], [virtual]
```

Implements IPrimitive.

#### 6.8.2.11 setColor()

```
void RayTracer::Cylinder::setColor (
            Math::Color newColor)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.8.2.12 setHeight()

```
void RayTracer::Cylinder::setHeight (
            float newHeight)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.8.2.13 setNormal()

```
void RayTracer::Cylinder::setNormal (
            const Math::Vector3D & newNormal)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.8.2.14 setPosition()

```
void RayTracer::Cylinder::setPosition (
            const Math::Point3D & position)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.8.2.15 setRadius()

```
void RayTracer::Cylinder::setRadius (
            float newRadius)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.8.2.16 translate()

```
void RayTracer::Cylinder::translate (
            const Math::Vector3D & translation)  [override], [virtual]
```

Implements IPrimitive.

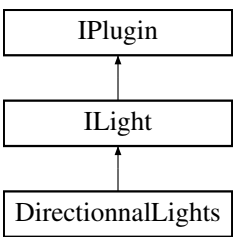
The documentation for this class was generated from the following files:

- src/plugins/primitives/Cylinder.hpp
- src/plugins/primitives/Cylinder.cpp

## 6.9 DirectionnalLights Class Reference

```
#include <DirectionnalLights.hpp>
```

Inheritance diagram for DirectionnalLights:



**Public Member Functions**

- DirectionnalLights (float intensity=1.0f, Math::Vector3D direction=Math::Vector3D(0, 0, -1))
- ~DirectionnalLights ()=default
- PluginType getType () const override
- LightType getLightType () const override
- void setIntensity (float intensity) override
- float getIntensity () const override
- void setDirection (float x, float y, float z) override
- Math::Vector3D getDirection () const override
- void applyLight (float &r, float &g, float &b) const override

## Public Member Functions inherited from ILight

- ILight ()=default
- virtual ~ILight ()=default

## Public Member Functions inherited from IPlugin

- IPlugin ()=default
- virtual ~IPlugin ()=default

### 6.9.1 Constructor & Destructor Documentation

#### 6.9.1.1 DirectionnalLights()

```
DirectionnalLights::DirectionnalLights (
            float intensity = 1.0f,
            Math::Vector3D direction = Math::Vector3D(0, 0, -1))
```

#### 6.9.1.2 ~DirectionnalLights()

```
DirectionnalLights::~DirectionnalLights ()  [default]
```

### 6.9.2 Member Function Documentation

#### 6.9.2.1 applyLight()

```
void DirectionnalLights::applyLight (
            float & r,
            float & g,
            float & b) const  [override], [virtual]
```

Implements ILight.

#### 6.9.2.2 getDirection()

```
Math::Vector3D DirectionnalLights::getDirection () const  [override], [virtual]
```

Implements ILight.

#### 6.9.2.3 getIntensity()

```
float DirectionnalLights::getIntensity () const  [override], [virtual]
```

Implements ILight.

#### 6.9.2.4 getLightType()

```
LightType DirectionnalLights::getLightType () const  [inline], [override], [virtual]
```

Implements ILight.

#### 6.9.2.5 getType()

```
PluginType DirectionnalLights::getType () const  [inline], [override], [virtual]
```

Implements IPlugin.

#### 6.9.2.6 setDirection()

```
void DirectionnalLights::setDirection (
            float x,
            float y,
            float z)  [override], [virtual]
```

Implements ILight.

#### 6.9.2.7 setIntensity()

```
void DirectionnalLights::setIntensity (
            float intensity)  [override], [virtual]
```

Implements ILight.

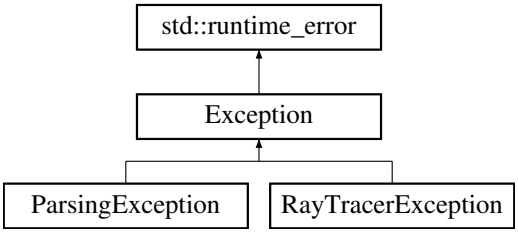
The documentation for this class was generated from the following files:

- src/plugins/lights/DirectionnalLights.hpp
- src/plugins/lights/DirectionnalLights.cpp

## 6.10 Exception Class Reference

`#include <Exceptions.hpp>`

Inheritance diagram for Exception:




### Public Member Functions

- Exception (const std::string &message)

### 6.10.1 Constructor & Destructor Documentation

#### 6.10.1.1 Exception()

```
Exception::Exception (
            const std::string & message)  [inline], [explicit]
```

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

- src/exceptions/Exceptions.hpp

## 6.11 RayTracer::HitRecord Struct Reference

`#include <HitRecord.hpp>`

### Public Attributes

- Math::Point3D point = Math::Point3D(0,0,0)
- Math::Vector3D normal = Math::Vector3D(0,0,0)
- float t = 0
- Math::Color color = Math::Color(0,0,0)

### 6.11.1 Member Data Documentation

#### 6.11.1.1 color

```
Math::Color RayTracer::HitRecord::color = Math::Color(0,0,0)
```

#### 6.11.1.2 normal

```
Math::Vector3D RayTracer::HitRecord::normal = Math::Vector3D(0,0,0)
```

#### 6.11.1.3 point

```
Math::Point3D RayTracer::HitRecord::point = Math::Point3D(0,0,0)
```

#### 6.11.1.4 t

```
float RayTracer::HitRecord::t = 0
```

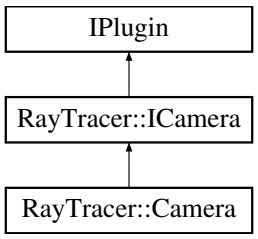
The documentation for this struct was generated from the following file:

- src/plugins/primitives/HitRecord.hpp

## 6.12 RayTracer::ICamera Class Reference

```
#include <ICamera.hpp>
```

Inheritance diagram for RayTracer::ICamera:




### Public Member Functions

- virtual ~ICamera ()=default
- virtual void rotate (float angle, const Math::Vector3D &axis)=0
- virtual void translate (const Math::Vector3D &translation)=0
- virtual void setPosition (Math::Point3D position)=0
- virtual Math::Point3D getPosition () const =0
- virtual void setResolution (int width, int height)=0
- virtual void getResolution (int &width, int &height) const =0
- virtual void setFieldOfView (float fov)=0
- virtual float getFieldOfView () const =0
- virtual int getWidth () const =0
- virtual int getHeight () const =0
- virtual void updateScreen ()=0
- virtual Ray rayAt (double u, double v) const =0
- virtual void setLookAt (const Math::Point3D &lookAt)=0
- virtual Math::Point3D getLookAt () const =0

### Public Member Functions inherited from IPlugin

- IPlugin ()=default
- virtual ~IPlugin ()=default
- virtual PluginType getType () const =0

## 6.12.1 Constructor & Destructor Documentation

### 6.12.1.1 ~ICamera()

```
virtual RayTracer::ICamera::~ICamera ()  [virtual], [default]
```

## 6.12.2 Member Function Documentation

### 6.12.2.1 getFieldOfView()

```
virtual float RayTracer::ICamera::getFieldOfView () const  [pure virtual]
```

Implemented in RayTracer::Camera.

### 6.12.2.2 getHeight()

```
virtual int RayTracer::ICamera::getHeight () const  [pure virtual]
```

Implemented in RayTracer::Camera.

### 6.12.2.3 getLookAt()

```
virtual Math::Point3D RayTracer::ICamera::getLookAt () const  [pure virtual]
```

Implemented in RayTracer::Camera.

### 6.12.2.4 getPosition()

```
virtual Math::Point3D RayTracer::ICamera::getPosition () const  [pure virtual]
```

Implemented in RayTracer::Camera.

### 6.12.2.5 getResolution()

```
virtual void RayTracer::ICamera::getResolution (
            int & width,
            int & height) const  [pure virtual]
```

Implemented in RayTracer::Camera.

#### 6.12.2.6 getWidth()

```
virtual int RayTracer::ICamera::getWidth () const  [pure virtual]
```

Implemented in RayTracer::Camera.

#### 6.12.2.7 rayAt()

```
virtual Ray RayTracer::ICamera::rayAt (
            double u,
            double v) const  [pure virtual]
```

Implemented in RayTracer::Camera.

#### 6.12.2.8 rotate()

```
virtual void RayTracer::ICamera::rotate (
            float angle,
            const Math::Vector3D & axis)  [pure virtual]
```

Implemented in RayTracer::Camera.

#### 6.12.2.9 setFieldOfView()

```
virtual void RayTracer::ICamera::setFieldOfView (
            float fov)  [pure virtual]
```

Implemented in RayTracer::Camera.

#### 6.12.2.10 setLookAt()

```
virtual void RayTracer::ICamera::setLookAt (
            const Math::Point3D & lookAt)  [pure virtual]
```

Implemented in RayTracer::Camera.

#### 6.12.2.11 setPosition()

```
virtual void RayTracer::ICamera::setPosition (
            Math::Point3D position)  [pure virtual]
```

Implemented in RayTracer::Camera.

#### 6.12.2.12 setResolution()

```
virtual void RayTracer::ICamera::setResolution (
            int width,
            int height)  [pure virtual]
```

Implemented in RayTracer::Camera.

#### 6.12.2.13 translate()

```
virtual void RayTracer::ICamera::translate (
            const Math::Vector3D & translation)  [pure virtual]
```

Implemented in RayTracer::Camera.

#### 6.12.2.14 updateScreen()

```
virtual void RayTracer::ICamera::updateScreen ()  [pure virtual]
```

Implemented in RayTracer::Camera.

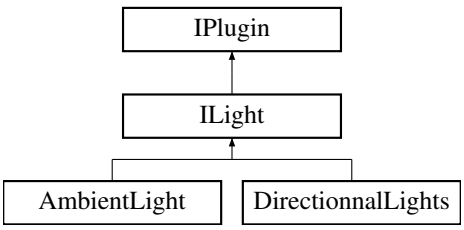
The documentation for this class was generated from the following file:

- src/plugins/camera/ICamera.hpp

## 6.13 ILight Class Reference

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

Inheritance diagram for ILight:




### Public Member Functions

- ILight ()=default
- virtual ~ILight ()=default
- virtual LightType getLightType () const =0
- virtual void setIntensity (float intensity)=0
- virtual float getIntensity () const =0
- virtual void applyLight (float &r, float &g, float &b) const =0
- virtual void setDirection (float x, float y, float z)=0
- virtual Math::Vector3D getDirection () const =0

### Public Member Functions inherited from IPlugin

- IPlugin ()=default
- virtual ~IPlugin ()=default
- virtual PluginType getType () const =0

### 6.13.1 Constructor & Destructor Documentation

#### 6.13.1.1 ILight()

```
ILight::ILight () [default]
```

#### 6.13.1.2 ~ILight()

```
virtual ILight::~ILight () [virtual], [default]
```

### 6.13.2 Member Function Documentation

#### 6.13.2.1 applyLight()

```
virtual void ILight::applyLight (
            float & r,
            float & g,
            float & b) const [pure virtual]
```

Implemented in AmbientLight, and DirectionnalLights.

#### 6.13.2.2 getDirection()

```
virtual Math::Vector3D ILight::getDirection () const [pure virtual]
```

Implemented in AmbientLight, and DirectionnalLights.

#### 6.13.2.3 getIntensity()

```
virtual float ILight::getIntensity () const [pure virtual]
```

Implemented in AmbientLight, and DirectionnalLights.

#### 6.13.2.4 getLightType()

```
virtual LightType ILight::getLightType () const [pure virtual]
```

Implemented in AmbientLight, and DirectionnalLights.

#### 6.13.2.5 setDirection()

```
virtual void ILight::setDirection (
            float x,
            float y,
            float z) [pure virtual]
```

Implemented in AmbientLight, and DirectionnalLights.

#### 6.13.2.6 setIntensity()

```
virtual void ILight::setIntensity (
            float intensity)  [pure virtual]
```

Implemented in AmbientLight, and DirectionnalLights.

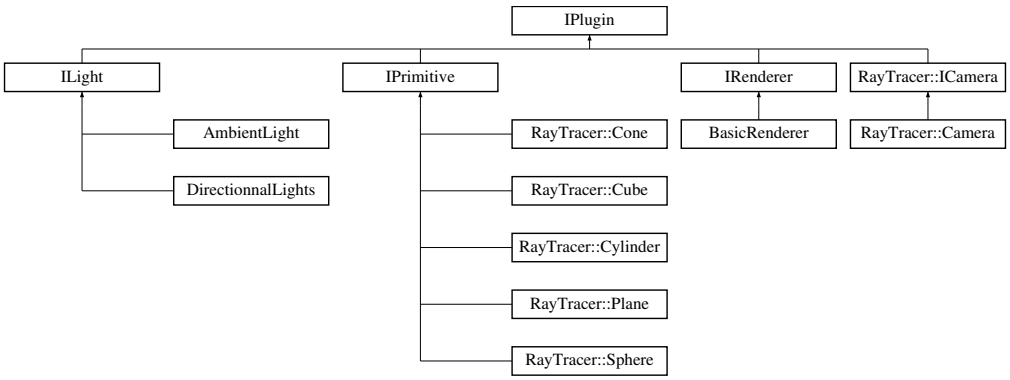
The documentation for this class was generated from the following file:

- src/plugins/lights/ILight.hpp

## 6.14 IPlugin Class Reference

```
#include <IPlugin.hpp>
```

Inheritance diagram for IPlugin:




### Public Member Functions

- IPlugin ()=default
- virtual ~IPlugin ()=default
- virtual PluginType getType () const =0

### 6.14.1 Constructor & Destructor Documentation

#### 6.14.1.1 IPlugin()

```
IPlugin::IPlugin ()  [default]
```

#### 6.14.1.2 ~IPlugin()

```
virtual IPlugin::~IPlugin ()  [virtual], [default]
```

### 6.14.2 Member Function Documentation

#### 6.14.2.1 getType()

```
virtual PluginType IPlugin::getType () const  [pure virtual]
```

Implemented in AmbientLight, BasicRenderer, DirectionnalLights, IPrimitive, RayTracer::Camera, RayTracer::Cone, RayTracer::Cube, RayTracer::Plane, and RayTracer::Sphere.

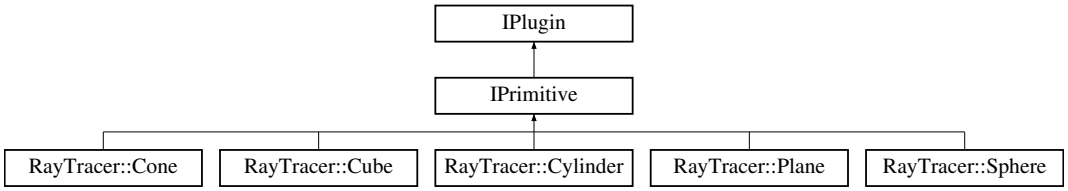
The documentation for this class was generated from the following file:

- src/plugins/IPlugin.hpp

## 6.15 IPrimitive Class Reference

```
#include <IPrimitive.hpp>
```

Inheritance diagram for IPrimitive:




#### Public Member Functions

- IPrimitive ()=default
- virtual ~IPrimitive ()=default
- virtual bool hits (const RayTracer::Ray &ray) const =0
- virtual void translate (const Math::Vector3D &translation)=0
- virtual void rotate (float angle, const Math::Vector3D &axis)=0
- virtual bool intersect (const RayTracer::Ray &ray, RayTracer::HitRecord &rec) const =0
- virtual const Math::Point3D & getCenter () const =0
- virtual float getRadius () const =0
- virtual const Math::Color & getColor () const =0
- virtual Math::Point3D getPosition () const =0
- virtual PrimitiveType getPrimitiveType () const =0
- virtual Math::Vector3D getNormal () const =0
- virtual float getHeight () const =0
- virtual void setPosition (const Math::Point3D &position)=0
- virtual void setRadius (float radius)=0
- virtual void setColor (Math::Color color)=0
- virtual void setNormal (const Math::Vector3D &normal)=0
- virtual void setHeight (float height)=0
- PluginType getType () const override

### Public Member Functions inherited from IPlugin

- IPlugin ()=default
- virtual ~IPlugin ()=default

## 6.15.1 Constructor & Destructor Documentation

### 6.15.1.1 IPrimitive()

```
IPrimitive::IPrimitive ()  [default]
```

### 6.15.1.2 ~IPrimitive()

```
virtual IPrimitive::~IPrimitive ()  [virtual], [default]
```

## 6.15.2 Member Function Documentation

### 6.15.2.1 getCenter()

```
virtual const Math::Point3D & IPrimitive::getCenter () const  [pure virtual]
```

Implemented in RayTracer::Cone, RayTracer::Cube, RayTracer::Cylinder, RayTracer::Plane, and RayTracer::Sphere.

### 6.15.2.2 getColor()

```
virtual const Math::Color & IPrimitive::getColor () const  [pure virtual]
```

Implemented in RayTracer::Cone, RayTracer::Cube, RayTracer::Cylinder, RayTracer::Plane, and RayTracer::Sphere.

### 6.15.2.3 getHeight()

```
virtual float IPrimitive::getHeight () const  [pure virtual]
```

Implemented in RayTracer::Cone, RayTracer::Cube, RayTracer::Cylinder, RayTracer::Plane, and RayTracer::Sphere.

### 6.15.2.4 getNormal()

```
virtual Math::Vector3D IPrimitive::getNormal () const  [pure virtual]
```

Implemented in RayTracer::Cone, RayTracer::Cube, RayTracer::Cylinder, RayTracer::Plane, and RayTracer::Sphere.

### 6.15.2.5 getPosition()

```
virtual Math::Point3D IPrimitive::getPosition () const  [pure virtual]
```

Implemented in RayTracer::Cone, RayTracer::Cube, RayTracer::Cylinder, RayTracer::Plane, and RayTracer::Sphere.

#### 6.15.2.6 getPrimitiveType()

```
virtual PrimitiveType IPrimitive::getPrimitiveType () const  [pure virtual]
```

Implemented in RayTracer::Cone, RayTracer::Cube, RayTracer::Cylinder, RayTracer::Plane, and RayTracer::Sphere.

#### 6.15.2.7 getRadius()

```
virtual float IPrimitive::getRadius () const  [pure virtual]
```

Implemented in RayTracer::Cone, RayTracer::Cube, RayTracer::Cylinder, RayTracer::Plane, and RayTracer::Sphere.

#### 6.15.2.8 getType()

```
PluginType IPrimitive::getType () const  [inline], [override], [virtual]
```

Implements IPlugin.

Reimplemented in RayTracer::Plane, and RayTracer::Sphere.

#### 6.15.2.9 hits()

```
virtual bool IPrimitive::hits (
            const RayTracer::Ray & ray) const  [pure virtual]
```

Implemented in RayTracer::Cone, RayTracer::Cube, RayTracer::Cylinder, RayTracer::Plane, and RayTracer::Sphere.

#### 6.15.2.10 intersect()

```
virtual bool IPrimitive::intersect (
            const RayTracer::Ray & ray,
            RayTracer::HitRecord & rec) const  [pure virtual]
```

Implemented in RayTracer::Cone, RayTracer::Cube, RayTracer::Cylinder, RayTracer::Plane, and RayTracer::Sphere.

#### 6.15.2.11 rotate()

```
virtual void IPrimitive::rotate (
            float angle,
            const Math::Vector3D & axis)  [pure virtual]
```

Implemented in RayTracer::Cone, RayTracer::Cube, RayTracer::Cylinder, RayTracer::Plane, and RayTracer::Sphere.

#### 6.15.2.12 setColor()

```
virtual void IPrimitive::setColor (
            Math::Color color)  [pure virtual]
```

Implemented in RayTracer::Cone, RayTracer::Cube, RayTracer::Cylinder, RayTracer::Plane, and RayTracer::Sphere.

#### 6.15.2.13 setHeight()

```
virtual void IPrimitive::setHeight (
            float height)  [pure virtual]
```

Implemented in RayTracer::Cone, RayTracer::Cube, RayTracer::Cylinder, RayTracer::Plane, and RayTracer::Sphere.

#### 6.15.2.14 setNormal()

```
virtual void IPrimitive::setNormal (
            const Math::Vector3D & normal)  [pure virtual]
```

Implemented in RayTracer::Cone, RayTracer::Cube, RayTracer::Cylinder, RayTracer::Plane, and RayTracer::Sphere.

#### 6.15.2.15 setPosition()

```
virtual void IPrimitive::setPosition (
            const Math::Point3D & position)  [pure virtual]
```

Implemented in RayTracer::Cone, RayTracer::Cube, RayTracer::Cylinder, RayTracer::Plane, and RayTracer::Sphere.

#### 6.15.2.16 setRadius()

```
virtual void IPrimitive::setRadius (
            float radius)  [pure virtual]
```

Implemented in RayTracer::Cone, RayTracer::Cube, RayTracer::Cylinder, RayTracer::Plane, and RayTracer::Sphere.

#### 6.15.2.17 translate()

```
virtual void IPrimitive::translate (
            const Math::Vector3D & translation)  [pure virtual]
```

Implemented in RayTracer::Cone, RayTracer::Cube, RayTracer::Cylinder, RayTracer::Plane, and RayTracer::Sphere.

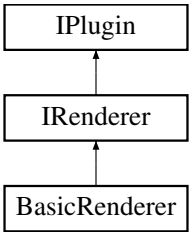
The documentation for this class was generated from the following file:

- src/plugins/primitives/IPrimitive.hpp

## 6.16 IRenderer Class Reference

`#include <IRenderer.hpp>`

Inheritance diagram for IRenderer:



**Public Member Functions**

- IRenderer ()=default
- virtual ~IRenderer ()=default
- virtual void setRendererType (RendererType type)=0
- virtual RendererType getRendererType () const =0
- virtual void renderScene ()=0
- virtual void setCamera (RayTracer::ICamera *camera)=0
- virtual void setLights (std::vector< ILight * > &lights)=0
- virtual void setPrimitives (std::vector< IPrimitive * > &primitives)=0

## Public Member Functions inherited from IPlugin

- IPlugin ()=default
- virtual ~IPlugin ()=default
- virtual PluginType getType () const =0

### 6.16.1 Constructor & Destructor Documentation

#### 6.16.1.1 IRenderer()

```
IRenderer::IRenderer ()  [default]
```

#### 6.16.1.2 ~IRenderer()

```
virtual IRenderer::~IRenderer ()  [virtual], [default]
```

### 6.16.2 Member Function Documentation

#### 6.16.2.1 getRendererType()

```
virtual RendererType IRenderer::getRendererType () const  [pure virtual]
```

Implemented in BasicRenderer.

#### 6.16.2.2 renderScene()

```
virtual void IRenderer::renderScene ()  [pure virtual]
```

Implemented in BasicRenderer.

#### 6.16.2.3 setCamera()

```
virtual void IRenderer::setCamera (
            RayTracer::ICamera * camera)  [pure virtual]
```

Implemented in BasicRenderer.

#### 6.16.2.4 setLights()

```
virtual void IRenderer::setLights (
            std::vector< ILight * > & lights)  [pure virtual]
```

Implemented in BasicRenderer.

#### 6.16.2.5 setPrimitives()

```
virtual void IRenderer::setPrimitives (
            std::vector< IPrimitive * > & primitives)  [pure virtual]
```

Implemented in BasicRenderer.

#### 6.16.2.6 setRendererType()

```
virtual void IRenderer::setRendererType (
            RendererType type)  [pure virtual]
```

Implemented in BasicRenderer.

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

- src/plugins/render/IRenderer.hpp

## 6.17 Math::Matrix4x4 Class Reference

```
#include <Matrix.hpp>
```

### Public Member Functions

- Matrix4x4 ()
- ~Matrix4x4 ()=default
- void identity ()
- void rotationMatrix (float angle, const Vector3D &axis)
- Point3D applyToPoint (const Point3D &point) const
- Vector3D applyToVector (const Vector3D &vector) const

### 6.17.1 Constructor & Destructor Documentation

#### 6.17.1.1 Matrix4x4()

```
Math::Matrix4x4::Matrix4x4 ()
```

#### 6.17.1.2 ~Matrix4x4()

```
Math::Matrix4x4::~Matrix4x4 ()  [default]
```

### 6.17.2 Member Function Documentation

#### 6.17.2.1 applyToPoint()

```
Math::Point3D Math::Matrix4x4::applyToPoint (
            const Point3D & point) const
```

#### 6.17.2.2 applyToVector()

```
Math::Vector3D Math::Matrix4x4::applyToVector (
            const Vector3D & vector) const
```

#### 6.17.2.3 identity()

```
void Math::Matrix4x4::identity ()
```

#### 6.17.2.4 rotationMatrix()

```
void Math::Matrix4x4::rotationMatrix (
            float angle,
            const Vector3D & axis)
```

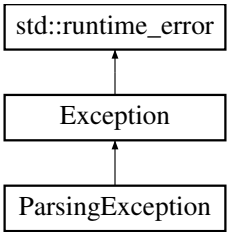
The documentation for this class was generated from the following files:

- src/plugins/math/Matrix.hpp
- src/plugins/math/Matrix.cpp

## 6.18 ParsingException Class Reference

```
#include <Exceptions.hpp>
```

Inheritance diagram for ParsingException:



#### Public Member Functions

- ParsingException (const std::string &message)

### Public Member Functions inherited from Exception

- Exception (const std::string &message)

### 6.18.1 Constructor & Destructor Documentation

#### 6.18.1.1 ParsingException()

```
ParsingException::ParsingException (
            const std::string & message)  [inline], [explicit]
```

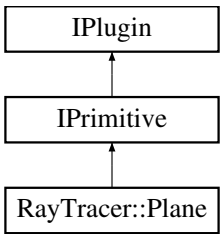
The documentation for this class was generated from the following file:

- src/exceptions/Exceptions.hpp

## 6.19 RayTracer::Plane Class Reference

```
#include <Plane.hpp>
```

Inheritance diagram for RayTracer::Plane:




#### Public Member Functions

- Plane ()
- ~Plane ()=default
- bool hits (const RayTracer::Ray &ray) const override
- void translate (const Math::Vector3D &translation) override
- void rotate (float angle, const Math::Vector3D &axis) override
- virtual bool intersect (const RayTracer::Ray &ray, RayTracer::HitRecord &rec) const override
- const Math::Point3D & getCenter () const override
- float getRadius () const override
- const Math::Color & getColor () const override
- PluginType getType () const override
- void setPosition (const Math::Point3D &newPoint) override
- Math::Point3D getPosition () const override
- void setRadius (float newRadius) override
- void setNormal (const Math::Vector3D &newNormal) override
- Math::Vector3D getNormal () const override
- void setColor (Math::Color newColor) override
- PrimitiveType getPrimitiveType () const override
- void setHeight (float newHeight) override
- float getHeight () const override

### Public Member Functions inherited from IPrimitive

- IPrimitive ()=default
- virtual ~IPrimitive ()=default

### Public Member Functions inherited from IPlugin

- IPlugin ()=default
- virtual ~IPlugin ()=default

## 6.19.1 Constructor & Destructor Documentation

#### 6.19.1.1 Plane()

```
RayTracer::Plane::Plane ()
```

#### 6.19.1.2 ~Plane()

```
RayTracer::Plane::~Plane ()  [default]
```

## 6.19.2 Member Function Documentation

#### 6.19.2.1 getCenter()

```
const Math::Point3D & RayTracer::Plane::getCenter () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.19.2.2 getColor()

```
const Math::Color & RayTracer::Plane::getColor () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.19.2.3 getHeight()

```
float RayTracer::Plane::getHeight () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.19.2.4 getNormal()

```
Math::Vector3D RayTracer::Plane::getNormal () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.19.2.5 getPosition()

```
Math::Point3D RayTracer::Plane::getPosition () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.19.2.6 getPrimitiveType()

```
PrimitiveType RayTracer::Plane::getPrimitiveType () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.19.2.7 getRadius()

```
float RayTracer::Plane::getRadius () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.19.2.8 getType()

```
PluginType RayTracer::Plane::getType () const  [inline], [override], [virtual]
```

Reimplemented from IPrimitive.

#### 6.19.2.9 hits()

```
bool RayTracer::Plane::hits (
            const RayTracer::Ray & ray) const  [override], [virtual]
```

Implements IPrimitive.

#### 6.19.2.10 intersect()

```
bool RayTracer::Plane::intersect (
            const RayTracer::Ray & ray,
            RayTracer::HitRecord & rec) const  [override], [virtual]
```

Implements IPrimitive.

#### 6.19.2.11 rotate()

```
void RayTracer::Plane::rotate (
            float angle,
            const Math::Vector3D & axis)  [override], [virtual]
```

Implements IPrimitive.

#### 6.19.2.12 setColor()

```
void RayTracer::Plane::setColor (
            Math::Color newColor)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.19.2.13 setHeight()

```
void RayTracer::Plane::setHeight (
            float newHeight)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.19.2.14 setNormal()

```
void RayTracer::Plane::setNormal (
            const Math::Vector3D & newNormal)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.19.2.15 setPosition()

```
void RayTracer::Plane::setPosition (
            const Math::Point3D & newPoint)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.19.2.16 setRadius()

```
void RayTracer::Plane::setRadius (
            float newRadius)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.19.2.17 translate()

```
void RayTracer::Plane::translate (
            const Math::Vector3D & translation)  [override], [virtual]
```

Implements IPrimitive.

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

- src/plugins/primitives/Plane.hpp
- src/plugins/primitives/Plane.cpp

# 6.20 PluginLoader Class Reference

`#include <PluginLoader.hpp>`

### Public Member Functions

- PluginLoader ()=default
- ~PluginLoader ()=default
- void storeHandle (void *handle, const std::string &path)
- IPlugin * loadCameraPlugin (const std::string &path)
- std::vector< IPlugin * > loadlightsPlugin (const std::string &path)
- IPlugin * loadRenderPlugin (const std::string &path)
- void * loadSharedLibrary (const std::string &path, void *&handle)
- void * loadSymbol (void *handle, const std::string &symbolName)
- IPlugin * createPrimitive (const std::string &libPath, const std::string &symbolName)
- void unloadCamera (IPlugin *camera)
- void unloadRender (IPlugin *plugin)
- void unloadLights (std::vector< IPlugin * > lights)
- void unloadPrimitives (std::vector< IPlugin * > primitive)

### Static Public Member Functions

- static void *& chooseHandleByPath (const std::string &path)
- static void *& getInstance (const std::string &path)

### Public Attributes

- IPlugin * camera
- IPlugin * render
- std::vector< IPlugin * > lights
- std::vector< IPlugin * > primitive

### Static Public Attributes

- static void * planeHandle = nullptr
- static void * sphereHandle = nullptr
- static void * cylinderHandle = nullptr
- static void * coneHandle = nullptr
- static void * cubeHandle = nullptr

## 6.20.1 Constructor & Destructor Documentation

### 6.20.1.1 PluginLoader()

`PluginLoader::PluginLoader () [default]`

#### 6.20.1.2 ~PluginLoader()

```
PluginLoader::~PluginLoader ()  [default]
```

### 6.20.2 Member Function Documentation

#### 6.20.2.1 chooseHandleByPath()

```
static void *& PluginLoader::chooseHandleByPath (
            const std::string & path)  [static]
```

#### 6.20.2.2 createPrimitive()

```
IPlugin * PluginLoader::createPrimitive (
            const std::string & libPath,
            const std::string & symbolName)
```

#### 6.20.2.3 getInstance()

```
void *& PluginLoader::getInstance (
            const std::string & path)  [static]
```

#### 6.20.2.4 loadCameraPlugin()

```
IPlugin * PluginLoader::loadCameraPlugin (
            const std::string & path)
```

#### 6.20.2.5 loadlightsPlugin()

```
std::vector< IPlugin * > PluginLoader::loadlightsPlugin (
            const std::string & path)
```

#### 6.20.2.6 loadRenderPlugin()

```
IPlugin * PluginLoader::loadRenderPlugin (
            const std::string & path)
```

#### 6.20.2.7 loadSharedLibrary()

```
void * PluginLoader::loadSharedLibrary (
            const std::string & path,
            void *& handle)
```

#### 6.20.2.8 loadSymbol()

```
void * PluginLoader::loadSymbol (
            void * handle,
            const std::string & symbolName)
```

#### 6.20.2.9 storeHandle()

```
void PluginLoader::storeHandle (
            void * handle,
            const std::string & path)
```

#### 6.20.2.10 unloadCamera()

```
void PluginLoader::unloadCamera (
            IPlugin * camera)
```

#### 6.20.2.11 unloadLights()

```
void PluginLoader::unloadLights (
            std::vector< IPlugin * > lights)
```

#### 6.20.2.12 unloadPrimitives()

```
void PluginLoader::unloadPrimitives (
            std::vector< IPlugin * > primitive)
```

#### 6.20.2.13 unloadRender()

```
void PluginLoader::unloadRender (
            IPlugin * plugin)
```

### 6.20.3 Member Data Documentation

#### 6.20.3.1 camera

```
IPlugin* PluginLoader::camera
```

#### 6.20.3.2 coneHandle

```
void * PluginLoader::coneHandle = nullptr  [static]
```

#### 6.20.3.3 cubeHandle

```
void * PluginLoader::cubeHandle = nullptr  [static]
```

#### 6.20.3.4 cylinderHandle

```
void * PluginLoader::cylinderHandle = nullptr  [static]
```

#### 6.20.3.5 lights

```
std::vector<IPlugin *> PluginLoader::lights
```

#### 6.20.3.6 planeHandle

```
void * PluginLoader::planeHandle = nullptr  [static]
```

#### 6.20.3.7 primitive

```
std::vector<IPlugin *> PluginLoader::primitive
```

#### 6.20.3.8 render

```
IPlugin* PluginLoader::render
```

#### 6.20.3.9 sphereHandle

```
void * PluginLoader::sphereHandle = nullptr  [static]
```

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

- src/loaders/PluginLoader.hpp
- src/loaders/PluginLoader.cpp

## 6.21 Math::Point3D Class Reference

```
#include <Point.hpp>
```

### Public Member Functions

- Point3D (float x, float y, float z)
- ~Point3D ()=default
- float getX () const
- float getY () const
- float getZ () const
- Point3D operator+ (const Point3D &other) const
- Point3D operator+= (const Point3D &other)

### 6.21.1 Constructor & Destructor Documentation

#### 6.21.1.1 Point3D()

```
Math::Point3D::Point3D (
            float x,
            float y,
            float z)  [inline]
```

#### 6.21.1.2 ~Point3D()

```
Math::Point3D::~Point3D ()  [default]
```

### 6.21.2 Member Function Documentation

#### 6.21.2.1 getX()

```
float Math::Point3D::getX () const  [inline]
```

#### 6.21.2.2 getY()

```
float Math::Point3D::getY () const  [inline]
```

#### 6.21.2.3 getZ()

```
float Math::Point3D::getZ () const  [inline]
```

#### 6.21.2.4 operator+()

```
Point3D Math::Point3D::operator+ (
            const Point3D & other) const  [inline]
```

#### 6.21.2.5 operator+=()

```
Point3D Math::Point3D::operator+= (
            const Point3D & other)  [inline]
```

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

- src/plugins/math/Point.hpp

## 6.22 RayTracer::Ray Class Reference

```
#include <Ray.hpp>
```

**Public Member Functions**

- Ray (const Math::Point3D &origin, const Math::Vector3D &direction)
- const Math::Point3D & getOrigin () const
- const Math::Vector3D & getDirection () const

### 6.22.1 Constructor & Destructor Documentation

#### 6.22.1.1 Ray()

```
RayTracer::Ray::Ray (
            const Math::Point3D & origin,
            const Math::Vector3D & direction)
```

### 6.22.2 Member Function Documentation

#### 6.22.2.1 getDirection()

```
const Math::Vector3D & RayTracer::Ray::getDirection () const  [inline]
```

#### 6.22.2.2 getOrigin()

```
const Math::Point3D & RayTracer::Ray::getOrigin () const  [inline]
```

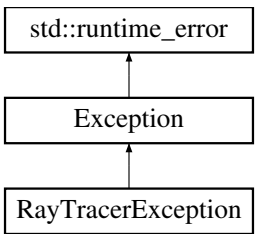
The documentation for this class was generated from the following files:

- src/plugins/primitives/Ray.hpp
- src/plugins/primitives/Ray.cpp

## 6.23 RayTracerException Class Reference

```
#include <Exceptions.hpp>
```

Inheritance diagram for RayTracerException:




**Public Member Functions**

- RayTracerException (const std::string &message)

### Public Member Functions inherited from Exception

- Exception (const std::string &message)

## 6.23.1 Constructor & Destructor Documentation

### 6.23.1.1 RayTracerException()

```
RayTracerException::RayTracerException (
            const std::string & message)  [inline], [explicit]
```

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

- src/exceptions/Exceptions.hpp

# 6.24 Math::Rectangle3D Class Reference

```
#include <Rectangle.hpp>
```

### Public Member Functions

- Rectangle3D (const Math::Point3D &origin, const Math::Vector3D &bottom_side, const Math::Vector3D &left_side)
- Math::Point3D pointAt (double u, double v) const

### Public Attributes

- Math::Point3D origin
- Math::Vector3D bottom_side
- Math::Vector3D left_side

## 6.24.1 Constructor & Destructor Documentation

### 6.24.1.1 Rectangle3D()

```
Math::Rectangle3D::Rectangle3D (
            const Math::Point3D & origin,
            const Math::Vector3D & bottom_side,
            const Math::Vector3D & left_side)
```

## 6.24.2 Member Function Documentation

### 6.24.2.1 pointAt()

```
Math::Point3D Math::Rectangle3D::pointAt (
            double u,
            double v) const
```

### 6.24.3 Member Data Documentation

#### 6.24.3.1 bottom_side

```
Math::Vector3D Math::Rectangle3D::bottom_side
```

#### 6.24.3.2 left_side

```
Math::Vector3D Math::Rectangle3D::left_side
```

#### 6.24.3.3 origin

```
Math::Point3D Math::Rectangle3D::origin
```

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

- src/plugins/math/Rectangle.hpp
- src/plugins/math/Rectangle.cpp

## 6.25 SceneLoader Class Reference

```
#include <SceneLoader.hpp>
```

#### Public Member Functions

- SceneLoader ()=default
- ~SceneLoader ()=default
- bool checkCfgError (const std::string &filename)
- void loadCamera (IPlugin *camera)
- void loadLights (std::vector< IPlugin * > lights)
- void loadRender (IPlugin *plugin)
- std::vector< IPlugin * > loadPrimitives (PluginLoader &pluginLoader)
- void fillSphere (IPlugin *sphere, Setting &sphereSetting)
- void fillPlane (IPlugin *plane, Setting &planeSetting)
- void fillCylinder (IPlugin *cylinder, Setting &cylinderSetting)
- void fillCone (IPlugin *cone, Setting &coneSetting)
- void fillCube (IPlugin *cube, Setting &cubeSetting)
- template<typename T>
  T * castPlugin (IPlugin *plugin)

### 6.25.1 Constructor & Destructor Documentation

#### 6.25.1.1 SceneLoader()

```
SceneLoader::SceneLoader ()  [default]
```

#### 6.25.1.2 ~SceneLoader()

```
SceneLoader::~SceneLoader ()  [default]
```

### 6.25.2 Member Function Documentation

#### 6.25.2.1 castPlugin()

```
template<typename T>
T * SceneLoader::castPlugin (
            IPlugin * plugin)  [inline]
```

#### 6.25.2.2 checkCfgError()

```
bool SceneLoader::checkCfgError (
            const std::string & filename)
```

#### 6.25.2.3 fillCone()

```
void SceneLoader::fillCone (
            IPlugin * cone,
            Setting & coneSetting)
```

#### 6.25.2.4 fillCube()

```
void SceneLoader::fillCube (
            IPlugin * cube,
            Setting & cubeSetting)
```

#### 6.25.2.5 fillCylinder()

```
void SceneLoader::fillCylinder (
            IPlugin * cylinder,
            Setting & cylinderSetting)
```

#### 6.25.2.6 fillPlane()

```
void SceneLoader::fillPlane (
            IPlugin * plane,
            Setting & planeSetting)
```

#### 6.25.2.7 fillSphere()

```
void SceneLoader::fillSphere (
            IPlugin * sphere,
            Setting & sphereSetting)
```

#### 6.25.2.8 loadCamera()

```
void SceneLoader::loadCamera (
            IPlugin * camera)
```

#### 6.25.2.9 loadLights()

```
void SceneLoader::loadLights (
            std::vector< IPlugin * > lights)
```

#### 6.25.2.10 loadPrimitives()

```
std::vector< IPlugin * > SceneLoader::loadPrimitives (
            PluginLoader & pluginLoader)
```

#### 6.25.2.11 loadRender()

```
void SceneLoader::loadRender (
            IPlugin * plugin)
```

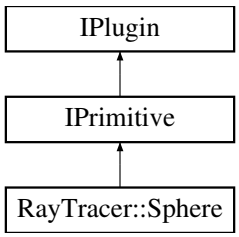
The documentation for this class was generated from the following files:

- src/loaders/SceneLoader.hpp
- src/loaders/SceneLoader.cpp

## 6.26 RayTracer::Sphere Class Reference

```
#include <Sphere.hpp>
```

Inheritance diagram for RayTracer::Sphere:



**Public Member Functions**

- Sphere ()
- ~Sphere ()=default
- PluginType getType () const override
- PrimitiveType getPrimitiveType () const override
- bool hits (const Ray &ray) const override
- bool intersect (const Ray &ray, RayTracer::HitRecord &rec) const override
- void translate (const Math::Vector3D &translation) override
- void rotate (float angle, const Math::Vector3D &axis) override
- const Math::Point3D & getCenter () const override
- float getRadius () const override
- const Math::Color & getColor () const override
- void setPosition (const Math::Point3D &newCenter) override
- Math::Point3D getPosition () const override
- void setRadius (float newRadius) override
- void setNormal (const Math::Vector3D &newNormal) override
- Math::Vector3D getNormal () const override
- void setColor (Math::Color newColor) override
- float getHeight () const override
- void setHeight (float newHeight) override

## Public Member Functions inherited from IPrimitive

- IPrimitive ()=default
- virtual ~IPrimitive ()=default

## Public Member Functions inherited from IPlugin

- IPlugin ()=default
- virtual ~IPlugin ()=default

### 6.26.1 Constructor & Destructor Documentation

#### 6.26.1.1 Sphere()

```
RayTracer::Sphere::Sphere ()
```

#### 6.26.1.2 ~Sphere()

```
RayTracer::Sphere::~Sphere ()  [default]
```

### 6.26.2 Member Function Documentation

#### 6.26.2.1 getCenter()

```
const Math::Point3D & RayTracer::Sphere::getCenter () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.26.2.2 getColor()

```
const Math::Color & RayTracer::Sphere::getColor () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.26.2.3 getHeight()

```
float RayTracer::Sphere::getHeight () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.26.2.4 getNormal()

```
Math::Vector3D RayTracer::Sphere::getNormal () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.26.2.5 getPosition()

```
Math::Point3D RayTracer::Sphere::getPosition () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.26.2.6 getPrimitiveType()

```
PrimitiveType RayTracer::Sphere::getPrimitiveType () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.26.2.7 getRadius()

```
float RayTracer::Sphere::getRadius () const  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.26.2.8 getType()

```
PluginType RayTracer::Sphere::getType () const  [inline], [override], [virtual]
```

Reimplemented from IPrimitive.

#### 6.26.2.9 hits()

```
bool RayTracer::Sphere::hits (
            const Ray & ray) const  [override], [virtual]
```

Implements IPrimitive.

#### 6.26.2.10 intersect()

```
bool RayTracer::Sphere::intersect (
            const Ray & ray,
            RayTracer::HitRecord & rec) const  [override], [virtual]
```

Implements IPrimitive.

#### 6.26.2.11 rotate()

```
void RayTracer::Sphere::rotate (
            float angle,
            const Math::Vector3D & axis)  [override], [virtual]
```

Implements IPrimitive.

#### 6.26.2.12 setColor()

```
void RayTracer::Sphere::setColor (
            Math::Color newColor)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.26.2.13 setHeight()

```
void RayTracer::Sphere::setHeight (
            float newHeight)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.26.2.14 setNormal()

```
void RayTracer::Sphere::setNormal (
            const Math::Vector3D & newNormal)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.26.2.15 setPosition()

```
void RayTracer::Sphere::setPosition (
            const Math::Point3D & newCenter)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.26.2.16 setRadius()

```
void RayTracer::Sphere::setRadius (
            float newRadius)  [inline], [override], [virtual]
```

Implements IPrimitive.

#### 6.26.2.17 translate()

```
void RayTracer::Sphere::translate (
            const Math::Vector3D & translation)  [override], [virtual]
```

Implements IPrimitive.

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

- src/plugins/primitives/Sphere.hpp
- src/plugins/primitives/Sphere.cpp

## 6.27 Math::Vector3D Class Reference

```
#include <Vector.hpp>
```

### Public Member Functions

- Vector3D (float x, float y, float z)
- ~Vector3D ()=default
- float getX () const
- float getY () const
- float getZ () const
- Vector3D operator+ (const Vector3D &other) const
- Vector3D operator- (const Vector3D &other) const
- double dot (const Vector3D &other) const

### 6.27.1 Constructor & Destructor Documentation

#### 6.27.1.1 Vector3D()

```
Math::Vector3D::Vector3D (
            float x,
            float y,
            float z)  [inline]
```

#### 6.27.1.2 ~Vector3D()

```
Math::Vector3D::~Vector3D ()  [default]
```

### 6.27.2 Member Function Documentation

#### 6.27.2.1 dot()

```
double Math::Vector3D::dot (
            const Vector3D & other) const
```

#### 6.27.2.2 getX()

```
float Math::Vector3D::getX () const  [inline]
```

#### 6.27.2.3 getY()

```
float Math::Vector3D::getY () const  [inline]
```

#### 6.27.2.4 getZ()

```
float Math::Vector3D::getZ () const  [inline]
```

#### 6.27.2.5 operator+()

```
Vector3D Math::Vector3D::operator+ (
            const Vector3D & other) const  [inline]
```

#### 6.27.2.6 operator-()

```
Vector3D Math::Vector3D::operator- (
            const Vector3D & other) const  [inline]
```

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

- src/plugins/math/Vector.hpp
- src/plugins/math/Vector.cpp

# Chapter 7

# File Documentation

## 7.1 src/core/Core.cpp File Reference

```
#include "Core.hpp"
```

### Functions

- void core_run (char *filename)

### 7.1.1 Function Documentation

#### 7.1.1.1 core_run()

```
void core_run (
            char * filename)
```

## 7.2 src/core/Core.hpp File Reference

```
#include "PluginLoader.hpp"
#include "SceneLoader.hpp"
#include "IPrimitive.hpp"
#include "Exceptions.hpp"
#include "IRenderer.hpp"
#include "ICamera.hpp"
#include "IPlugin.hpp"
#include "ILight.hpp"
#include <SFML/Graphics.hpp>
#include <SFML/Window.hpp>
#include <iostream>
#include <fstream>
#include <cstring>
#include <dlfcn.h>
#include <string>
#include <vector>
```

### Classes

- class Core

## 7.3 Core.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** Core
00006 */
00007
00008 #pragma once
00009
00010 #include "PluginLoader.hpp"
00011 #include "SceneLoader.hpp"
00012 #include "IPrimitive.hpp"
00013 #include "Exceptions.hpp"
00014 #include "IRenderer.hpp"
00015 #include "ICamera.hpp"
00016 #include "IPlugin.hpp"
00017 #include "ILight.hpp"
00018
00019 #include <SFML/Graphics.hpp>
00020 #include <SFML/Window.hpp>
00021 #include <iostream>
00022 #include <fstream>
00023 #include <cstring>
00024 #include <dlfcn.h>
00025 #include <string>
00026 #include <vector>
00027
00028 class Core {
00029     public:
00030         Core() = default;
00031
00032         bool isFileValid(const std::string &filename);
00033
00034         std::vector<IPlugin*> getPlugins() const {
00035             return plugins;
00036         }
00037
00038         void addPlugin(IPlugin *plugin) {
00039             plugins.push_back(plugin);
00040         }
00041
00042         void convertVectorPluginToVectorLight(std::vector<IPlugin*> &plugins, std::vector<ILight*>
      &lights);
00043         void convertVectorPluginToVectorPrimitive(std::vector<IPlugin*> &plugins,
      std::vector<IPrimitive*> &primitives);
00044
00045     private:
00046         std::vector<IPlugin*> plugins;
00047 };
```

## 7.4 src/exceptions/Exceptions.hpp File Reference

```
#include <stdexcept>
#include <string>
```

### Classes

- class Exception
- class ParsingException
- class RayTracerException

## 7.5 Exceptions.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** B-OOP-400-MPL-4-1-raytracer-vincent.bichat
00004 ** File description:
00005 ** exceptions
00006 */
00007
00008 #pragma once
00009
00010 #include <stdexcept>
00011 #include <string>
00012
00013 // Base exception class
00014 class Exception : public std::runtime_error {
00015 public:
00016     explicit Exception(const std::string& message)
00017         : std::runtime_error(message) {}
00018 };
00019
00020 // Parsing error
00021 class ParsingException : public Exception {
00022 public:
00023     explicit ParsingException(const std::string& message)
00024         : Exception("Parsing Error: " + message) {}
00025 };
00026
00027 // RayTracer error
00028 class RayTracerException : public Exception {
00029 public:
00030     explicit RayTracerException(const std::string& message)
00031         : Exception("RayTracer Error: " + message) {}
00032 };
```

## 7.6 src/loaders/PluginLoader.cpp File Reference

```
#include "PluginLoader.hpp"
```

## 7.7 src/loaders/PluginLoader.hpp File Reference

```
#include "IPlugin.hpp"
#include <unordered_map>
#include <iostream>
#include <dlfcn.h>
#include <vector>
#include <string>
```

### Classes

- class PluginLoader

## 7.8 PluginLoader.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** PluginLoader
00006 */
00007
00008 #pragma once
00009
00010 #include "IPlugin.hpp"
00011
00012 #include <unordered_map>
00013 #include <iostream>
00014 #include <dlfcn.h>
00015 #include <vector>
00016 #include <string>
00017
00018 class PluginLoader {
00019     public:
00020         PluginLoader() = default;
00021         ~PluginLoader() = default;
00022
00023         // Load the plugin from the given path
00024         void storeHandle(void *handle, const std::string &path);
00025         IPlugin *loadCameraPlugin(const std::string &path);
00026         std::vector<IPlugin *>loadlightsPlugin(const std::string &path);
00027         IPlugin *loadRenderPlugin(const std::string &path);
00028
00029         void *loadSharedLibrary(const std::string &path, void *&handle);
00030         void *loadSymbol(void *handle, const std::string &symbolName);
00031         IPlugin *createPrimitive(const std::string &libPath, const std::string &symbolName);
00032         static void *&chooseHandleByPath(const std::string &path);
00033
00034         // Unload the plugin
00035         void unloadCamera(IPlugin *camera);
00036         void unloadRender(IPlugin *plugin);
00037         void unloadLights(std::vector<IPlugin *> lights);
00038         void unloadPrimitives(std::vector<IPlugin *> primitive);
00039
00040         // Store the loaded plugins
00041         IPlugin *camera;
00042         IPlugin *render;
00043         std::vector<IPlugin *> lights;
00044         std::vector<IPlugin *> primitive;
00045         static void *planeHandle;
00046         static void *sphereHandle;
00047         static void *cylinderHandle;
00048         static void *coneHandle;
00049         static void *cubeHandle;
00050
00051         // Store the loaded plugin handles
00052         static void *&getInstance(const std::string &path);
00053
00054     private:
00055         static std::unordered_map<std::string, void **> _factory;
00056         // Handle for the loaded plugin
00057         // This is a pointer to the shared library
00058         void *cameraHandle = nullptr;
00059         void *lightHandle = nullptr;
00060         void *renderHandle = nullptr;
00061 };
```

## 7.9 src/loaders/SceneLoader.cpp File Reference

```
#include "SceneLoader.hpp"
```

## 7.10 src/loaders/SceneLoader.hpp File Reference

```
#include "PluginLoader.hpp"
#include "SceneLoader.hpp"
```

```
#include "Exceptions.hpp"
#include "IRenderer.hpp"
#include "ICamera.hpp"
#include "IPlugin.hpp"
#include "ILight.hpp"
#include <libconfig.h++>
#include <iostream>
#include <vector>
```

### Classes

- class SceneLoader

## 7.11 SceneLoader.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** SceneLoader
00006 */
00007
00008 #pragma once
00009
00010 #include "PluginLoader.hpp"
00011 #include "SceneLoader.hpp"
00012 #include "Exceptions.hpp"
00013 #include "IRenderer.hpp"
00014 #include "ICamera.hpp"
00015 #include "IPlugin.hpp"
00016 #include "ILight.hpp"
00017
00018 #include <libconfig.h++>
00019
00020 #include <iostream>
00021 #include <vector>
00022
00023 using namespace libconfig;
00024
00025 class SceneLoader {
00026     public:
00027         SceneLoader() = default;
00028         ~SceneLoader() = default;
00029
00030         bool checkCfgError(const std::string &filename);
00031         void loadCamera(IPlugin *camera);
00032         void loadLights(std::vector<IPlugin *> lights);
00033         void loadRender(IPlugin *plugin);
00034         std::vector<IPlugin *> loadPrimitives(PluginLoader &pluginLoader);
00035
00036         void fillSphere(IPlugin *sphere, Setting &sphereSetting);
00037         void fillPlane(IPlugin *plane, Setting &planeSetting);
00038         void fillCylinder(IPlugin *cylinder, Setting &cylinderSetting);
00039         void fillCone(IPlugin *cone, Setting &coneSetting);
00040         void fillCube(IPlugin *cube, Setting &cubeSetting);
00041
00042         template <typename T>
00043         T *castPlugin(IPlugin *plugin) {
00044             return dynamic_cast<T *>(plugin);
00045         }
00046
00047     private:
00048         Config cfg;
00049 };
```

## 7.12 src/main.cpp File Reference

```
#include "Exceptions.hpp"
#include <iostream>
```

### Functions

- void core_run (char *filename)
- void display_usage ()
- int main (int argc, char **argv)

### 7.12.1 Function Documentation

#### 7.12.1.1 core_run()

```
void core_run (
            char * filename)
```

#### 7.12.1.2 display_usage()

```
void display_usage ()
```

#### 7.12.1.3 main()

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

## 7.13 src/plugins/camera/Camera.cpp File Reference

```
#include "Camera.hpp"
```

### Namespaces

- namespace RayTracer

### Functions

- IPlugin * RayTracer::createCameraPlugin ()

## 7.14 src/plugins/camera/Camera.hpp File Reference

```
#include "Rectangle.hpp"
#include "ICamera.hpp"
#include "Point.hpp"
#include "Ray.hpp"
#include <cmath>
```

### Classes

- class RayTracer::Camera

### Namespaces

- namespace RayTracer

## 7.15 Camera.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** Camera
00006 */
00007
00008 #pragma once
00009
00010 #include "Rectangle.hpp"
00011 #include "ICamera.hpp"
00012 #include "Point.hpp"
00013 #include "Ray.hpp"
00014
00015 #include <cmath>
00016
00017 namespace RayTracer {
00018     class Camera : public ICamera {
00019         public:
00020             Camera();
00021             Camera(const Math::Point3D& origin, const Math::Rectangle3D& screen, float fov);
00022             ~Camera() = default;
00023
00024             // Get the type of the plugin
00025             PluginType getType() const override {
00026                 return PluginType::CAMERA;
00027             }
00028
00029             // Rotate the camera around the axis
00030             void rotate(float angle, const Math::Vector3D &axis) override;
00031             // Translate the camera
00032             void translate(const Math::Vector3D &translation) override;
00033
00034             // Setters and Getters for camera position
00035             void setPosition(Math::Point3D position) override { origin = position; }
00036             Math::Point3D getPosition() const override;
00037
00038             // Setters and Getters for camera resolution
00039             void setResolution(int width, int height) override;
00040             void getResolution(int &width, int &height) const override;
00041
00042             // Setters and Getters for camera field of view
00043             void setFieldOfView(float fov) override;
00044             float getFieldOfView() const override;
00045
00046             int getWidth() const override { return width; }
00047             int getHeight() const override { return height; }
00048
```

```
00049             // Update the screen rectangle based on the field of view
00050             void updateScreen() override;
00051
00052             Ray rayAt(double u, double v) const override;
00053
00054             void setLookAt(const Math::Point3D &lookAt) override;
00055             Math::Point3D getLookAt() const override { return lookAt_; }
00056
00057         private:
00058             Math::Point3D origin;
00059             Math::Point3D lookAt_;
00060             Math::Rectangle3D screen;
00061             float fieldOfView;
00062             int width;
00063             int height;
00064     };
00065 }
```

## 7.16 src/plugins/camera/ICamera.hpp File Reference

```
#include "IPlugin.hpp"
#include "Point.hpp"
#include "Ray.hpp"
```

### Classes

- class RayTracer::ICamera

### Namespaces

- namespace RayTracer

## 7.17 ICamera.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** ICamera
00006 */
00007
00008 #pragma once
00009
00010 #include "IPlugin.hpp"
00011 #include "Point.hpp"
00012 #include "Ray.hpp"
00013
00014 namespace RayTracer {
00015     class ICamera : public IPlugin {
00016     public:
00017         virtual ~ICamera() = default;
00018
00019         //rotate the camera around the axis
00020         virtual void rotate(float angle, const Math::Vector3D &axis) = 0;
00021         virtual void translate(const Math::Vector3D &translation) = 0;
00022
00023         virtual void setPosition(Math::Point3D position) = 0;
00024         virtual Math::Point3D getPosition() const = 0;
00025
00026         virtual void setResolution(int width, int height) = 0;
00027         virtual void getResolution(int &width, int &height) const = 0;
00028
00029         virtual void setFieldOfView(float fov) = 0;
00030         virtual float getFieldOfView() const = 0;
```

```
00031
00032         virtual int getWidth() const = 0;
00033         virtual int getHeight() const = 0;
00034
00035         virtual void updateScreen() = 0;
00036
00037         virtual Ray rayAt(double u, double v) const = 0;
00038
00039         virtual void setLookAt(const Math::Point3D &lookAt) = 0;
00040         virtual Math::Point3D getLookAt() const = 0;
00041     };
00042 }
```

# 7.18 src/plugins/IPlugin.hpp File Reference

### Classes

- class IPlugin

### Enumerations

- enum class PluginType { CAMERA , LIGHT , PRIMITIVE , RENDERER }

## 7.18.1 Enumeration Type Documentation

### 7.18.1.1 PluginType

```
enum class PluginType  [strong]
```

**Enumerator**

| | |
|---|---|
| CAMERA | |
| LIGHT | |
| PRIMITIVE | |
| RENDERER | |

# 7.19 IPlugin.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** IPlugin
00006 */
00007
00008 #pragma once
00009
00010 enum class PluginType {
00011     CAMERA,
00012     LIGHT,
00013     PRIMITIVE,
00014     RENDERER,
00015 };
00016
00017 class IPlugin {
00018     public:
00019         IPlugin() = default;
00020         virtual ~IPlugin() = default;
00021
00022         virtual PluginType getType() const = 0;
00023 };
```

## 7.20 src/plugins/lights/AmbientLight.cpp File Reference

```
#include "AmbientLight.hpp"
```

### Functions

- IPlugin * createAmbientLight ()

### 7.20.1 Function Documentation

#### 7.20.1.1 createAmbientLight()

```
IPlugin * createAmbientLight ()
```

## 7.21 src/plugins/lights/AmbientLight.hpp File Reference

```
#include "ILight.hpp"
```

### Classes

- class AmbientLight

## 7.22 AmbientLight.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** AmbientLight
00006 */
00007
00008 #pragma once
00009
00010 #include "ILight.hpp"
00011
00012 class AmbientLight : public ILight {
00013     public:
00014         AmbientLight(float intensity = 1.0f);
00015         ~AmbientLight() = default;
00016
00017         // Get the type of the plugin
00018         PluginType getType() const override {
00019             return PluginType::LIGHT;
00020         }
00021
00022         // Get the light type
00023         LightType getLightType() const override {
00024             return LightType::AMBIENT;
00025         }
00026
00027         // Setters and Getters for light intensity
00028         void setIntensity(float intensity) override;
00029         float getIntensity() const override;
00030
00031         // function to Apply the light to a color
00032         void applyLight(float &r, float &g, float &b) const override;
00033
00034         void setDirection(float, float, float) override {} // No direction for ambient light
00035         Math::Vector3D getDirection() const override {return Math::Vector3D(0, 0, 0);} // No direction
    for ambient light
00036     private:
00037         float intensity;
00038 };
```

## 7.23 src/plugins/lights/DirectionnalLights.cpp File Reference

```
#include "DirectionnalLights.hpp"
#include "Rectangle.hpp"
#include "Vector.hpp"
#include "Point.hpp"
```

### Functions

- IPlugin * createDirectionnalLights ()

### 7.23.1 Function Documentation

#### 7.23.1.1 createDirectionnalLights()

```
IPlugin * createDirectionnalLights ()
```

## 7.24 src/plugins/lights/DirectionnalLights.hpp File Reference

```
#include "ILight.hpp"
```

### Classes

- class DirectionnalLights

## 7.25 DirectionnalLights.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** DirectionnalLights
00006 */
00007
00008 #pragma once
00009
00010 #include "ILight.hpp"
00011
00012 class DirectionnalLights : public ILight {
00013     public:
00014         DirectionnalLights(float intensity = 1.0f, Math::Vector3D direction = Math::Vector3D(0, 0,
      -1));
00015         ~DirectionnalLights() = default;
00016
00017         // Get the type of the plugin
00018         PluginType getType() const override {
00019             return PluginType::LIGHT;
00020         }
00021
00022         // Get the light type
00023         LightType getLightType() const override {
00024             return LightType::DIRECTIONAL;
00025         }
```

```
00026
00027         // Setters and Getters for light intensity
00028         void setIntensity(float intensity) override;
00029         float getIntensity() const override;
00030
00031         // Setters and Getters for light direction
00032         void setDirection(float x, float y, float z) override;
00033         Math::Vector3D getDirection() const override;
00034
00035         // function to Apply the light to a color
00036         void applyLight(float &r, float &g, float &b) const override;
00037     private:
00038         float intensity;
00039         Math::Point3D position;
00040         Math::Vector3D direction;
00041 };
```

## 7.26 src/plugins/lights/ILight.hpp File Reference

```
#include "IPlugin.hpp"
#include "Vector.hpp"
#include "Point.hpp"
```

### Classes

- class ILight

### Enumerations

- enum class LightType { AMBIENT , DIRECTIONAL }

### 7.26.1 Enumeration Type Documentation

#### 7.26.1.1 LightType

```
enum class LightType  [strong]
```

**Enumerator**

| | |
|---|---|
| AMBIENT | |
| DIRECTIONAL | |

## 7.27 ILight.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** ILight
00006 */
00007
00008 #pragma once
00009
00010 #include "IPlugin.hpp"
00011 #include "Vector.hpp"
00012 #include "Point.hpp"
00013
00014 enum class LightType {
00015     AMBIENT,
00016     DIRECTIONAL
00017 };
00018
00019 class ILight : public IPlugin {
00020     public:
00021     ILight() = default;
00022     virtual ~ILight() = default;
00023
00024     virtual LightType getLightType() const = 0;
00025
00026     virtual void setIntensity(float intensity) = 0;
00027     virtual float getIntensity() const = 0;
00028     virtual void applyLight(float &r, float &g, float &b) const = 0;
00029
00030     virtual void setDirection(float x, float y, float z) = 0;
00031     virtual Math::Vector3D getDirection() const = 0;
00032 };
```

## 7.28 src/plugins/math/Color.cpp File Reference

```
#include "Color.hpp"
```

## 7.29 src/plugins/math/Color.hpp File Reference

### Classes

- class Math::Color

### Namespaces

- namespace Math

## 7.30 Color.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** Point
00006 */
00007
```

```
00008 #pragma once
00009
00010 namespace Math {
00011     class Color {
00012         public:
00013             Color(float r, float g, float b) : r(r), g(g), b(b) {}
00014             ~Color() = default;
00015
00016             float getR() const { return r; }
00017             float getG() const { return g; }
00018             float getB() const { return b; }
00019
00020             Color operator+(const Color &other) const { return Color(r + other.r, g + other.g, b +
      other.b); }
00021             Color operator+=(const Color &other) { r += other.r; g += other.g; b += other.b; return
      *this; }
00022         private:
00023             float r;
00024             float g;
00025             float b;
00026     };
00027 }
```

## 7.31 src/plugins/math/Matrix.cpp File Reference

```
#include "Matrix.hpp"
```

## 7.32 src/plugins/math/Matrix.hpp File Reference

```
#include "Vector.hpp"
#include "Point.hpp"
#include <cmath>
```

### Classes

- class Math::Matrix4x4

### Namespaces

- namespace Math

## 7.33 Matrix.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** Matrix
00006 */
00007
00008 #pragma once
00009
00010 #include "Vector.hpp"
00011 #include "Point.hpp"
00012
00013 #include <cmath>
```

```
00014
00015 namespace Math {
00016     class Matrix4x4 {
00017     public:
00018         Matrix4x4();
00019         ~Matrix4x4() = default;
00020
00021         // Create identity matrix
00022         void identity();
00023
00024         // Create rotation matrix around an axis
00025         void rotationMatrix(float angle, const Vector3D &axis);
00026
00027         // Apply matrix to a point
00028         Point3D applyToPoint(const Point3D &point) const;
00029
00030         // Apply matrix to a vector
00031         Vector3D applyToVector(const Vector3D &vector) const;
00032
00033     private:
00034         float data[4][4];
00035     };
00036 }
```

## 7.34 src/plugins/math/Point.cpp File Reference

```
#include "Point.hpp"
```

## 7.35 src/plugins/math/Point.hpp File Reference

### Classes

- class Math::Point3D

### Namespaces

- namespace Math

## 7.36 Point.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** Point
00006 */
00007
00008 #pragma once
00009
00010 namespace Math {
00011     class Point3D {
00012         public:
00013             Point3D(float x, float y, float z) : x(x), y(y), z(z) {}
00014             ~Point3D() = default;
00015
00016             float getX() const { return x; }
00017             float getY() const { return y; }
00018             float getZ() const { return z; }
00019
00020             Point3D operator+(const Point3D &other) const { return Point3D(x + other.x, y + other.y, z
      + other.z); }
00021             Point3D operator+=(const Point3D &other) { x += other.x; y += other.y; z += other.z;
     return *this; }
00022
00023         private:
00024             float x;
00025             float y;
00026             float z;
00027     };
00028 }
```

## 7.37 src/plugins/math/Rectangle.cpp File Reference

```
#include "Rectangle.hpp"
```

### Namespaces

- namespace Math

## 7.38 src/plugins/math/Rectangle.hpp File Reference

```
#include "Vector.hpp"
#include "Point.hpp"
```

### Classes

- class Math::Rectangle3D

### Namespaces

- namespace Math

## 7.39 Rectangle.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** Rectangle
00006 */
00007
00008 #pragma once
00009
00010 #include "Vector.hpp"
00011 #include "Point.hpp"
00012
00013 namespace Math {
00014     class Rectangle3D {
00015     public:
00016         Rectangle3D(const Math::Point3D& origin, const Math::Vector3D& bottom_side, const
      Math::Vector3D& left_side);
00017
00018         Math::Point3D origin; // Bottom-left corner of the rectangle
00019         Math::Vector3D bottom_side;
00020         Math::Vector3D left_side;
00021
00022         Math::Point3D pointAt(double u, double v) const;
00023     };
00024 }
```

## 7.40 src/plugins/math/Vector.cpp File Reference

```
#include "Vector.hpp"
```

### Namespaces

- namespace Math

## 7.41 src/plugins/math/Vector.hpp File Reference

### Classes

- class Math::Vector3D

### Namespaces

- namespace Math

## 7.42 Vector.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** Vector
00006 */
00007
00008 #pragma once
00009
00010 namespace Math {
00011     class Vector3D {
00012         public:
00013             Vector3D(float x, float y, float z) : x(x), y(y), z(z) {}
00014             ~Vector3D() = default;
00015
00016             float getX() const { return x; }
00017             float getY() const { return y; }
00018             float getZ() const { return z; }
00019
00020             Vector3D operator+(const Vector3D &other) const { return Vector3D(x + other.x, y +
      other.y, z + other.z); }
00021             Vector3D operator-(const Vector3D &other) const { return Vector3D(x - other.x, y -
      other.y, z - other.z); }
00022
00023             double dot(const Vector3D& other) const;
00024         private:
00025             float x;
00026             float y;
00027             float z;
00028     };
00029 }
```

## 7.43 src/plugins/primitives/Cone.cpp File Reference

```
#include "Cone.hpp"
```

### Namespaces

- namespace RayTracer

### Functions

- IPlugin * RayTracer::createConePrimitive ()

## 7.44 src/plugins/primitives/Cone.hpp File Reference

```
#include "IPrimitive.hpp"
#include "Vector.hpp"
#include "Point.hpp"
#include "Color.hpp"
#include "Ray.hpp"
#include <iostream>
#include <cmath>
```

### Classes

- class RayTracer::Cone

### Namespaces

- namespace RayTracer

## 7.45 Cone.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** Cone
00006 */
00007
00008 #pragma once
00009
00010 #include "IPrimitive.hpp"
00011 #include "Vector.hpp"
00012 #include "Point.hpp"
00013 #include "Color.hpp"
00014 #include "Ray.hpp"
00015
00016 #include <iostream>
00017 #include <cmath>
00018
00019 namespace RayTracer {
00020     class Cone : public IPrimitive {
00021     public:
00022         // Constructeur : base est le sommet du cône, axis est la direction de l'axe,
00023         // radius est le rayon de la base, height est la hauteur
00024         Cone();
00025         ~Cone() = default;
00026
00027         // Interface IPrimitive
00028         bool hits(const Ray &ray) const override;
00029         bool intersect(const Ray &ray, HitRecord &rec) const override;
00030         void translate(const Math::Vector3D &translation) override;
00031         void rotate(float angle, const Math::Vector3D &axis) override;
00032
00033         // Getters
00034         const Math::Point3D &getCenter() const override { return vertex; }
00035         float getRadius() const override { return radius; }
00036         const Math::Color &getColor() const override { return color; }
00037
```

```
00038         // Get the type of the plugin
00039         PluginType getType() const override {
00040             return PluginType::PRIMITIVE;
00041         }
00042 
00043         // Get the primitive type
00044         PrimitiveType getPrimitiveType() const override{
00045             return PrimitiveType::CONE;
00046         }
00047 
00048         Math::Point3D getPosition() const override { return vertex; }
00049         void setPosition(const Math::Point3D &position) override { vertex = position; }
00050         void setRadius(float newRadius) override { radius = newRadius; }
00051         void setNormal(const Math::Vector3D &newNormal) override { axis = newNormal; }
00052         Math::Vector3D getNormal() const override { return axis; }
00053         void setColor(Math::Color newColor) override { color = newColor; }
00054 
00055         float getHeight() const override { return height; }
00056         void setHeight(float newHeight) override { height = newHeight; }
00057 
00058     private:
00059         Math::Point3D vertex;    // Sommet du cône
00060         Math::Vector3D axis;     // Direction de l'axe
00061         float radius;            // Rayon de la base
00062         float height;            // Hauteur du cône
00063         Math::Color color;       // Couleur du cône
00064     };
00065 }
```

# 7.46 src/plugins/primitives/Cube.cpp File Reference

```
#include "Cube.hpp"
```

### Functions

- IPlugin * createCubePrimitive ()

## 7.46.1 Function Documentation

### 7.46.1.1 createCubePrimitive()

```
IPlugin * createCubePrimitive ()
```

# 7.47 src/plugins/primitives/Cube.hpp File Reference

```
#include "IPrimitive.hpp"
#include "Vector.hpp"
#include "Point.hpp"
#include "Ray.hpp"
#include <algorithm>
#include <cmath>
```

### Classes

- class RayTracer::Cube

### Namespaces

- namespace RayTracer

## 7.48 Cube.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** Cube
00006 */
00007
00008 #pragma once
00009
00010 #include "IPrimitive.hpp"
00011 #include "Vector.hpp"
00012 #include "Point.hpp"
00013 #include "Ray.hpp"
00014
00015 #include <algorithm>
00016 #include <cmath>
00017
00018 namespace RayTracer {
00019     class Cube : public IPrimitive {
00020     public:
00021         Cube();
00022         ~Cube() = default;
00023
00024         bool hits(const Ray &ray) const override;
00025         bool intersect(const Ray &ray, HitRecord &rec) const override;
00026         void translate(const Math::Vector3D &translation) override;
00027         void rotate(float angle, const Math::Vector3D &axis) override;
00028
00029         // Getters
00030         const Math::Point3D &getCenter() const override {
00031             return center;
00032         }
00033         float getRadius() const override {
00034             return size / 2.0f; // Demi-taille du cube
00035         }
00036         const Math::Color &getColor() const override {
00037             return color;
00038         }
00039
00040         // Get the type of the plugin
00041         PluginType getType() const override {
00042             return PluginType::PRIMITIVE;
00043         }
00044
00045         // Get the primitive type
00046         PrimitiveType getPrimitiveType() const override {
00047             return PrimitiveType::CUBE;
00048         }
00049
00050         Math::Point3D getPosition() const override {
00051             return center;
00052         }
00053         void setPosition(const Math::Point3D &position) override {
00054             center = position;
00055         }
00056         void setRadius(float newSize) override {
00057             size = newSize * 2.0f; // Le rayon est la moitié de la taille
00058         }
00059         void setNormal(const Math::Vector3D &newNormal) override {
00060             // Pas applicable directement pour un cube
00061             (void)newNormal;
00062         }
00063         Math::Vector3D getNormal() const override {
00064             // Un cube n'a pas une seule normale
00065             return Math::Vector3D(0, 0, 0);
00066         }
00067         void setColor(Math::Color newColor) override {
00068             color = newColor;
00069         }
00070
00071         // Spécifique au cube
00072         void setSize(float newSize) {
00073             size = newSize;
```

```
00074         }
00075         float getSize() const {
00076             return size;
00077         }
00078
00079         // Set height
00080         void setHeight(float newHeight) override {
00081             // Pas applicable directement pour un cube
00082             (void)newHeight;
00083         }
00084         float getHeight() const override {
00085             // Pas applicable directement pour un cube
00086             return size;
00087         }
00088
00089     private:
00090         Math::Point3D center; // Centre du cube
00091         float size;           // Taille du cube (longueur d'une arête)
00092         Math::Color color;    // Couleur du cube
00093
00094         // Directions des axes du cube (pour supporter la rotation)
00095         Math::Vector3D xAxis;
00096         Math::Vector3D yAxis;
00097         Math::Vector3D zAxis;
00098     };
00099 }
```

## 7.49 src/plugins/primitives/Cylinder.cpp File Reference

```
#include "Cylinder.hpp"
```

### Namespaces

- namespace RayTracer

### Functions

- IPlugin * RayTracer::createCylinderPrimitive ()

## 7.50 src/plugins/primitives/Cylinder.hpp File Reference

```
#include "IPrimitive.hpp"
#include "Vector.hpp"
#include "Color.hpp"
#include "Point.hpp"
#include "Ray.hpp"
#include <iostream>
#include <cmath>
```

### Classes

- class RayTracer::Cylinder

### Namespaces

- namespace RayTracer

## 7.51 Cylinder.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer [WSL: Ubuntu-24.04]
00004 ** File description:
00005 ** Cylinder
00006 */
00007
00008 #pragma once
00009
00010 #include "IPrimitive.hpp"
00011 #include "Vector.hpp"
00012 #include "Color.hpp"
00013 #include "Point.hpp"
00014 #include "Ray.hpp"
00015
00016 #include <iostream>
00017 #include <cmath>
00018
00019 namespace RayTracer {
00020     class Cylinder : public IPrimitive {
00021     public:
00022         Cylinder();
00023         ~Cylinder() = default;
00024
00025         bool hits(const Ray &ray) const override;
00026         bool intersect(const Ray &ray, HitRecord &rec) const override;
00027         void translate(const Math::Vector3D &translation) override;
00028         void rotate(float angle, const Math::Vector3D &axis) override;
00029
00030         const Math::Point3D &getCenter() const override { return base; }
00031         float getRadius() const override { return radius; }
00032         const Math::Color &getColor() const override { return color; }
00033
00034         PrimitiveType getPrimitiveType() const override { return PrimitiveType::CYLINDER; }
00035         Math::Point3D getPosition() const override { return base; }
00036         void setPosition(const Math::Point3D &position) override { base = position; }
00037         void setRadius(float newRadius) override { radius = newRadius; }
00038         void setNormal(const Math::Vector3D &newNormal) override { axis = newNormal; }
00039         Math::Vector3D getNormal() const override { return axis; }
00040         void setColor(Math::Color newColor) override { color = newColor; }
00041
00042         float getHeight() const override { return height; }
00043         void setHeight(float newHeight) override { height = newHeight; }
00044
00045     private:
00046         Math::Point3D base;
00047         Math::Vector3D axis;
00048         float radius;
00049         float height;
00050         Math::Color color;
00051     };
00052 }
```

## 7.52 src/plugins/primitives/HitRecord.hpp File Reference

```
#include "Vector.hpp"
#include "Point.hpp"
#include "Color.hpp"
```

### Classes

- struct RayTracer::HitRecord

### Namespaces

- namespace RayTracer

## 7.53 HitRecord.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer [WSL: Ubuntu-24.04]
00004 ** File description:
00005 ** HitRecord
00006 */
00007
00008 #pragma once
00009
00010 #include "Vector.hpp"
00011 #include "Point.hpp"
00012 #include "Color.hpp"
00013
00014 namespace RayTracer {
00015     struct HitRecord {
00016         Math::Point3D point = Math::Point3D(0,0,0);
00017         Math::Vector3D normal = Math::Vector3D(0,0,0);
00018         float t = 0;
00019         Math::Color color = Math::Color(0,0,0);
00020     };
00021 }
```

## 7.54 src/plugins/primitives/IPrimitive.hpp File Reference

```
#include "HitRecord.hpp"
#include "IPlugin.hpp"
#include "Vector.hpp"
#include "Color.hpp"
#include "Point.hpp"
#include "Ray.hpp"
#include <vector>
```

### Classes

- class IPrimitive

### Enumerations

- enum class PrimitiveType {
  SPHERE , PLANE , CUBE , CYLINDER ,
  CONE , DONUT }

### 7.54.1 Enumeration Type Documentation

#### 7.54.1.1 PrimitiveType

```
enum class PrimitiveType  [strong]
```

**Enumerator**

| | |
|---|---|
| SPHERE | |
| PLANE | |
| CUBE | |
| CYLINDER | |
| CONE | |
| DONUT | |

## 7.55 IPrimitive.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** IPrimitive
00006 */
00007
00008 #pragma once
00009
00010 #include "HitRecord.hpp"
00011 #include "IPlugin.hpp"
00012 #include "Vector.hpp"
00013 #include "Color.hpp"
00014 #include "Point.hpp"
00015 #include "Ray.hpp"
00016
00017 #include <vector>
00018
00019 enum class PrimitiveType {
00020     SPHERE,
00021     PLANE,
00022     CUBE,
00023     CYLINDER,
00024     CONE,
00025     DONUT,
00026 };
00027
00028 class IPrimitive : public IPlugin {
00029     public:
00030         IPrimitive() = default;
00031         virtual ~IPrimitive() = default;
00032
00033         bool virtual hits(const RayTracer::Ray &ray) const = 0;
00034         void virtual translate(const Math::Vector3D &translation) = 0;
00035         void virtual rotate(float angle, const Math::Vector3D &axis) = 0;
00036         virtual bool intersect(const RayTracer::Ray &ray, RayTracer::HitRecord &rec) const = 0;
00037
00038         // Getters
00039         virtual const Math::Point3D &getCenter() const = 0;
00040         virtual float getRadius() const = 0;
00041         virtual const Math::Color &getColor() const = 0;
00042         virtual Math::Point3D getPosition() const = 0;
00043         virtual PrimitiveType getPrimitiveType() const = 0;
00044         virtual Math::Vector3D getNormal() const = 0;
00045         virtual float getHeight() const = 0;
00046
00047
00048
00049         // Setters
00050         virtual void setPosition(const Math::Point3D &position) = 0;
00051         virtual void setRadius(float radius) = 0;
00052         virtual void setColor(Math::Color color) = 0;
00053         virtual void setNormal(const Math::Vector3D &normal) = 0;
00054         virtual void setHeight(float height) = 0;
00055
00056         // Get the type of the plugin
00057         PluginType getType() const override {
00058             return PluginType::PRIMITIVE;
00059         }
00060 };
```

## 7.56 src/plugins/primitives/Plane.cpp File Reference

```
#include "Plane.hpp"
```

### Functions

- IPlugin * createPlanePrimitive ()

### 7.56.1 Function Documentation

#### 7.56.1.1 createPlanePrimitive()

```
IPlugin * createPlanePrimitive ()
```

## 7.57 src/plugins/primitives/Plane.hpp File Reference

```
#include "IPrimitive.hpp"
#include "Vector.hpp"
#include "Point.hpp"
#include "Ray.hpp"
#include <cmath>
```

**Classes**

- class RayTracer::Plane

**Namespaces**

- namespace RayTracer

## 7.58 Plane.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** Plane
00006 */
00007
00008 #pragma once
00009
00010 #include "IPrimitive.hpp"
00011 #include "Vector.hpp"
00012 #include "Point.hpp"
00013 #include "Ray.hpp"
00014
00015 #include <cmath>
00016
00017 namespace RayTracer {
00018     class Plane : public IPrimitive {
00019     public:
00020         Plane();
00021         ~Plane() = default;
00022
00023             bool hits(const RayTracer::Ray &ray) const override;
00024             void translate(const Math::Vector3D &translation) override;
00025             void rotate(float angle, const Math::Vector3D &axis) override;
00026
00027             virtual bool intersect(const RayTracer::Ray &ray, RayTracer::HitRecord &rec) const
    override;
00028
00029             // Getters
00030             const Math::Point3D &getCenter() const override {
00031                 return point;
00032             }
00033             float getRadius() const override {
00034                 return 0; // Planes do not have a radius
```

```
00035             }
00036             const Math::Color &getColor() const override {
00037                 return color;
00038             }
00039
00040             // Get the type of the plugin
00041             PluginType getType() const override {
00042                 return PluginType::PRIMITIVE;
00043             }
00044
00045             void setPosition(const Math::Point3D &newPoint) override {
00046             point = newPoint;
00047             }
00048             Math::Point3D getPosition() const override {
00049                     return point;
00050             }
00051             void setRadius(float newRadius) override {
00052                 // Not applicable for Plane
00053                 (void)newRadius;
00054             }
00055             void setNormal(const Math::Vector3D &newNormal) override {
00056                 normal = newNormal;
00057             }
00058
00059             Math::Vector3D getNormal() const override {
00060                 return normal;
00061             }
00062
00063             void setColor(Math::Color newColor) override {
00064                 color = newColor;
00065             }
00066
00067             // Get the primitive type
00068             PrimitiveType getPrimitiveType() const override{
00069                 return PrimitiveType::PLANE;
00070             }
00071
00072             // Set the height (not applicable for Plane)
00073             void setHeight(float newHeight) override {
00074                 // Not applicable for Plane
00075                 (void)newHeight;
00076             }
00077             float getHeight() const override {
00078                 return 0; // Planes do not have a height
00079             }
00080
00081         private:
00082             Math::Point3D point;
00083             Math::Vector3D normal;
00084             Math::Color color; // Color of the plane
00085     };
00086 }
00087
```

## 7.59 src/plugins/primitives/Ray.cpp File Reference

```
#include "Ray.hpp"
```

## 7.60 src/plugins/primitives/Ray.hpp File Reference

```
#include "Vector.hpp"
#include "Point.hpp"
```

### Classes

- class RayTracer::Ray

### Namespaces

- namespace RayTracer

## 7.61 Ray.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** Ray
00006 */
00007
00008 #pragma once
00009
00010 #include "Vector.hpp"
00011 #include "Point.hpp"
00012
00013 namespace RayTracer {
00014     class Ray {
00015         public:
00016         Ray(const Math::Point3D &origin, const Math::Vector3D &direction);
00017
00018         //Getters
00019
00020         const Math::Point3D &getOrigin() const {
00021             return origin;
00022         }
00023         const Math::Vector3D &getDirection() const {
00024             return direction;
00025         }
00026
00027         private:
00028         Math::Point3D origin;
00029         Math::Vector3D direction;
00030     };
00031 }
```

## 7.62 src/plugins/primitives/Sphere.cpp File Reference

```
#include "Sphere.hpp"
```

### Functions

- IPlugin * createSpherePrimitive ()

### 7.62.1 Function Documentation

#### 7.62.1.1 createSpherePrimitive()

```
IPlugin * createSpherePrimitive ()
```

## 7.63 src/plugins/primitives/Sphere.hpp File Reference

```
#include "IPrimitive.hpp"
#include "Matrix.hpp"
#include "Point.hpp"
#include "Ray.hpp"
#include <cmath>
```

### Classes

- class RayTracer::Sphere

### Namespaces

- namespace RayTracer

## 7.64 Sphere.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** Sphere
00006 */
00007
00008 #pragma once
00009
00010 #include "IPrimitive.hpp"
00011 #include "Matrix.hpp"
00012 #include "Point.hpp"
00013 #include "Ray.hpp"
00014
00015 #include <cmath>
00016
00017 namespace RayTracer {
00018     class Sphere : public IPrimitive {
00019         public:
00020             Sphere();
00021             ~Sphere() = default;
00022
00023             // Get the type of the plugin
00024             PluginType getType() const override {
00025                 return PluginType::PRIMITIVE;
00026             }
00027
00028             // Get the primitive type
00029             PrimitiveType getPrimitiveType() const override {
00030                 return PrimitiveType::SPHERE;
00031             }
00032             // hits function
00033             bool hits(const Ray &ray) const override;
00034             bool intersect(const Ray &ray, RayTracer::HitRecord &rec) const override;
00035             void translate(const Math::Vector3D &translation) override;
00036             void rotate(float angle, const Math::Vector3D &axis) override;
00037
00038             // Getters
00039             const Math::Point3D &getCenter() const override {
00040                 return center;
00041             }
00042             float getRadius() const override {
00043                 return radius;
00044             }
00045
00046             // Get color
00047             const Math::Color &getColor() const override {
00048                 return color;
```

```
00049             }
00050
00051             void setPosition(const Math::Point3D &newCenter) override {
00052                 center = newCenter;
00053             }
00054             Math::Point3D getPosition() const override {
00055                 return center;
00056             }
00057             void setRadius(float newRadius) override {
00058                 radius = newRadius;
00059             }
00060             void setNormal(const Math::Vector3D &newNormal) override  {
00061                 (void)newNormal; // Not applicable for Sphere
00062             }
00063             Math::Vector3D getNormal() const override {
00064                 return Math::Vector3D(0, 0, 0); // Not applicable for Sphere
00065             }
00066             void setColor(Math::Color newColor) override {
00067                 color = newColor;
00068             }
00069
00070             float getHeight() const override {
00071                 return 0; // Not applicable for Sphere
00072             }
00073             void setHeight(float newHeight) override {
00074                 (void)newHeight; // Not applicable for Sphere
00075             }
00076
00077         private:
00078         Math::Point3D center;
00079         float radius;
00080         Math::Color color; // Color of the sphere
00081     };
00082 }
```

# 7.65 src/plugins/render/BasicRenderer.cpp File Reference

```
#include "BasicRenderer.hpp"
```

### Functions

- IPlugin * createRenderPlugin ()

## 7.65.1 Function Documentation

### 7.65.1.1 createRenderPlugin()

```
IPlugin * createRenderPlugin ()
```

# 7.66 src/plugins/render/BasicRenderer.hpp File Reference

```
#include "IRenderer.hpp"
#include "ICamera.hpp"
#include "Sphere.hpp"
#include "Ray.hpp"
#include <iostream>
#include <fstream>
#include <cmath>
```

### Classes

- class BasicRenderer

## 7.67 BasicRenderer.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** BasicRenderer
00006 */
00007
00008 #include "IRenderer.hpp"
00009 #include "ICamera.hpp"
00010 #include "Sphere.hpp"
00011 #include "Ray.hpp"
00012
00013 #include <iostream>
00014 #include <fstream>
00015 #include <cmath>
00016
00017 #pragma once
00018
00019 class BasicRenderer : public IRenderer {
00020     public:
00021         BasicRenderer();
00022         ~BasicRenderer() = default;
00023
00024         // Get the type of the plugin
00025         PluginType getType() const override {
00026             return PluginType::RENDERER;
00027         }
00028
00029         // Set the renderer type
00030         void setRendererType(RendererType type) override {
00031             this->type = type;
00032         }
00033
00034         // Get the renderer type
00035         RendererType getRendererType() const override {
00036             return this->type;
00037         }
00038
00039         // Function to render the scene
00040         void renderScene() override;
00041
00042         // Function to set the camera
00043         void setCamera(RayTracer::ICamera *camera) override;
00044
00045         // Function to set the lights
00046         void setLights(std::vector<ILight *> &lights) override;
00047
00048         // Function to set the primitives
00049         void setPrimitives(std::vector<IPrimitive *> &primitives) override;
00050
00051     private:
00052         RendererType type;
00053         RayTracer::ICamera *camera;
00054         std::vector<ILight *> lights;
00055         std::vector<IPrimitive *> primitives;
00056 };
```

## 7.68 src/plugins/render/IRenderer.hpp File Reference

```
#include "IPrimitive.hpp"
#include "IPlugin.hpp"
#include "ICamera.hpp"
#include "ILight.hpp"
#include <vector>
```

### Classes

- class IRenderer

### Enumerations

- enum class RendererType { BASIC , SFML , FILE }

## 7.68.1 Enumeration Type Documentation

### 7.68.1.1 RendererType

```
enum class RendererType  [strong]
```

**Enumerator**

| | |
|---|---|
| BASIC | |
| SFML | |
| FILE | |

# 7.69 IRenderer.hpp

Go to the documentation of this file.

```
00001 /*
00002 ** EPITECH PROJECT, 2025
00003 ** RayTracer
00004 ** File description:
00005 ** IRenderer
00006 */
00007
00008 #pragma once
00009
00010 #include "IPrimitive.hpp"
00011 #include "IPlugin.hpp"
00012 #include "ICamera.hpp"
00013 #include "ILight.hpp"
00014
00015 #include <vector>
00016
00017 enum class RendererType {
00018     BASIC,
00019     SFML,
00020     FILE,
00021 };
00022
00023 class IRenderer : public IPlugin {
00024     public:
00025         IRenderer() = default;
00026         virtual ~IRenderer() = default;
00027
00028         // Set RendererType
00029         virtual void setRendererType(RendererType type) = 0;
00030
00031         // Get the type of the renderer
00032         virtual RendererType getRendererType() const = 0;
00033
00034         // Function to render the scene
00035         virtual void renderScene() = 0;
00036
00037         // Function to set the camera
00038         virtual void setCamera(RayTracer::ICamera *camera) = 0;
00039
00040         // Function to set the lights
00041         virtual void setLights(std::vector<ILight *> &lights) = 0;
00042
00043         // Function to set the primitives
00044         virtual void setPrimitives(std::vector<IPrimitive *> &primitives) = 0;
00045 };
```

# Index