

# Raytracer Project

0.1

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# Chapter 1

## README

This projects goal is to make a simple raytracer with only cubes as 3D models.

### Example image

### Build

Build the project : make -> Builds the main program (-O3). make run -> Builds and runs the main program (-O3).

make debug -> Builds the main program in debug mode (-g -O0)

make clean -> Cleans the trash files created by make and the main program.

make doc -> Make the html and latex documentation html is in "html/index.html" latex is in "latex/refman.pdf"

### Usage

The usage is juste ./main for now.

### AUTHORS

Sébastien GOUBEAU ([sebastiengou@outlook.fr](mailto:sebastiengou@outlook.fr))





## Chapter 2

# Namespace Index

### 2.1 Namespace List

Here is a list of all namespaces with brief descriptions:

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| <a href="#">gameui</a>    | ..... | <a href="#">11</a> |
| <a href="#">raytracer</a> | ..... | <a href="#">12</a> |



## Chapter 3

# Hierarchical Index

### 3.1 Class Hierarchy

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

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## Chapter 4

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## Chapter 6

# Namespace Documentation

### 6.1 gameobj Namespace Reference

#### Classes

- class [AmbientLight](#)
- class [Cube](#)
- class [DirectionalLight](#)
- class [FlatShapable](#)
- class [Lighttable](#)
- class [Plan](#)
- class [PointLight](#)
- class [Shapable](#)
- class [Square](#)

### 6.2 gameui Namespace Reference

#### Classes

- class [UIScreen](#)  
*Class to interact with the user visual output.*

#### Enumerations

- enum [WINDOWPARAM](#) { [NO\\_FULLSCREEN](#) = 0, [FULLSCREEN](#) = 1, [FULLSCREEN\\_DESKTOP](#) = 2, [BORDERLESS](#) = 4 }
- Possible parameters for a window.*

#### 6.2.1 Enumeration Type Documentation

##### 6.2.1.1 WINDOWPARAM

enum [gameui::WINDOWPARAM](#)

Possible parameters for a window.

## Enumerator

|                    |   |
|--------------------|---|
| NO_FULLSCREEN      | Size the window to a fixed resolution                                 |
| FULLSCREEN         | Size the window fullscreen but don't change resolution                |
| FULLSCREEN_DESKTOP | Size the window fullscreen and change resolution to screen resolution |
| BORDERLESS         | Make a borderless window  |

## 6.3 raytracer Namespace Reference

### Classes

- class [Camera](#)
- class [Color](#)
- class [Landmark](#)
- class [Ray](#)
- class [Screen](#)
- class [Vect2](#)
- class [Vect3](#)

### Functions

- [Color operator\\*](#) (const float num, const [Color](#) &color)
- void [rotateX](#) ([Vect3](#) &vect, const float angle)
- void [rotateY](#) ([Vect3](#) &vect, const float angle)
- void [rotateZ](#) ([Vect3](#) &vect, const float angle)
- [Vect3 applyAngle](#) ([Vect3](#) &vect, const [Vect3](#) &angles)
- [Vect3 vectorFromAngles](#) (const [Vect3](#) &angles)
- [Vect3 getAngles](#) (const [Vect3](#) &v1, const [Vect3](#) &v2)
- [Vect3 vectorFromPoints](#) (const [Vect3](#) &v1, const [Vect3](#) &v2)
- std::vector< [Ray](#) > [genRays](#) (const [Camera](#) &cam, const [Screen](#) &screen)
- int [closerToOrigin](#) ([Vect3](#) origin, [Vect3](#) point1, [Vect3](#) point2)
- std::vector< [Color](#) > [renderFrame](#) (const std::vector< [gameobj::Shapable](#) \*> &objects, const std::vector< [Ray](#) > &rays, const std::vector< [gameobj::Lightable](#) \*> &lightList)
- [Vect3 operator\\*](#) (const float num, const [Vect3](#) &vect)  
*Overload of the product multiplication between a float and a vector.*
- [Vect2 operator\\*](#) (const float num, const [Vect2](#) &vect)

### Variables

- const float [pi](#) = std::acos(-1)

#### 6.3.1 Function Documentation

#### 6.3.1.1 applyAngle()

```
raytracer::Vect3 raytracer::applyAngle (
    raytracer::Vect3 & vect,
    const Vect3 & angles )
```

#### 6.3.1.2 closerToOrigin()

```
int raytracer::closerToOrigin (
    raytracer::Vect3 origin,
    raytracer::Vect3 point1,
    raytracer::Vect3 point2 )
```

#### 6.3.1.3 genRays()

```
std::vector< raytracer::Ray > raytracer::genRays (
    const Camera & cam,
    const Screen & screen )
```

#### 6.3.1.4 getAngles()

```
raytracer::Vect3 raytracer::getAngles (
    const Vect3 & v1,
    const Vect3 & v2 )
```

#### 6.3.1.5 operator\*() [1/3]

```
raytracer::Color raytracer::operator* (
    const float num,
    const Color & color )
```

#### 6.3.1.6 operator\*() [2/3]

```
raytracer::Vect3 raytracer::operator* (
    const float num,
    const Vect3 & vect )
```

Overload of the product multiplication between a float and a vector.

**Parameters**

|             |  |
|-------------|--|
| <i>num</i>  | the float to multiply with the vector. |
| <i>vect</i> | the vector to multiply with the float. |

**Returns**

A new vector.

**6.3.1.7 operator\*()** [3/3]

```
raytracer::Vect2 raytracer::operator* (
    const float num,
    const Vect2 & vect )
```

**6.3.1.8 renderFrame()**

```
std::vector< raytracer::Color > raytracer::renderFrame (
    const std::vector< gameobj::Shapable *> & objects,
    const std::vector< Ray > & rays,
    const std::vector< gameobj::Lightable *> & lightList )
```

**6.3.1.9 rotateX()**

```
void raytracer::rotateX (
    raytracer::Vect3 & vect,
    const float angle )
```

**6.3.1.10 rotateY()**

```
void raytracer::rotateY (
    raytracer::Vect3 & vect,
    const float angle )
```

#### 6.3.1.11 rotateZ()

```
void raytracer::rotateZ (
    raytracer::Vect3 & vect,
    const float angle )
```

#### 6.3.1.12 vectorFromAngles()

```
raytracer::Vect3 raytracer::vectorFromAngles (
    const Vect3 & angles )
```

#### 6.3.1.13 vectorFromPoints()

```
raytracer::Vect3 raytracer::vectorFromPoints (
    const Vect3 & v1,
    const Vect3 & v2 )
```

### 6.3.2 Variable Documentation

#### 6.3.2.1 pi

```
const float raytracer::pi = std::acos(-1)
```



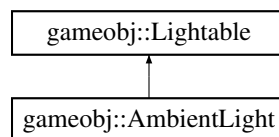
## Chapter 7

# Class Documentation

### 7.1 gameobj::AmbientLight Class Reference

```
#include <ambientlight.hh>
```

Inheritance diagram for gameobj::AmbientLight:



#### Public Member Functions

- [AmbientLight](#) (const [raytracer::Color](#) &color, const float brightness)
- [raytracer::Color getColor](#) () const
- float [getBrightness](#) () const
- void [setColor](#) (const [raytracer::Color](#) &color)
- void [setBrightness](#) (const float brightness)
- virtual [raytracer::Color interact](#) (const std::vector< [Shapable](#) \*> &obj, const [raytracer::Vect3](#) &point, const [FlatShapable](#) &) const override

#### Private Attributes

- [raytracer::Color color\\_](#)
- float [brightness\\_](#)

#### 7.1.1 Constructor & Destructor Documentation

#### 7.1.1.1 AmbientLight()

```
gameobj::AmbientLight::AmbientLight (
    const raytracer::Color & color,
    const float brightness )
```

### 7.1.2 Member Function Documentation

#### 7.1.2.1 getBrightness()

```
float gameobj::AmbientLight::getBrightness ( ) const
```

#### 7.1.2.2 getColor()

```
raytracer::Color gameobj::AmbientLight::getColor ( ) const
```

#### 7.1.2.3 interact()

```
raytracer::Color gameobj::AmbientLight::interact (
    const std::vector< Shapable *> & obj,
    const raytracer::Vect3 & point,
    const FlatShapable & obj ) const [override], [virtual]
```

Implements [gameobj::Lightable](#).

#### 7.1.2.4 setBrightness()

```
void gameobj::AmbientLight::setBrightness (
    const float brightness )
```

#### 7.1.2.5 setColor()

```
void gameobj::AmbientLight::setColor (
    const raytracer::Color & color )
```



### 7.1.3 Member Data Documentation

#### 7.1.3.1 brightness\_

```
float gameobj::AmbientLight::brightness_ [private]
```

#### 7.1.3.2 color\_

```
raytracer::Color gameobj::AmbientLight::color_ [private]
```

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

- includes/gameobj/[ambientlight.hh](#)
- src/gameobj/[ambientlight.cc](#)

## 7.2 raytracer::Camera Class Reference

```
#include <camera.hh>
```

### Public Member Functions

- [Camera](#) ()
- [Camera](#) ([Vect3](#) pos, [Vect3](#) angleVect, float viewAngle)
- [Vect3](#) [getPos](#) () const
- [Vect3](#) [getAng](#) () const
- float [getViewAngle](#) () const

### Private Attributes

- [Vect3](#) [pos\\_](#)
- [Vect3](#) [angleVect\\_](#)
- float [viewAngle\\_](#)

### 7.2.1 Constructor & Destructor Documentation

#### 7.2.1.1 [Camera\(\)](#) [1/2]

```
raytracer::Camera::Camera ( )
```

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

```
raytracer::Camera::Camera (
    raytracer::Vect3 pos,
    raytracer::Vect3 angleVect,
    float viewAngle = raytracer::pi / 2 )
```

## 7.2.2 Member Function Documentation

### 7.2.2.1 getAng()

```
raytracer::Vect3 raytracer::Camera::getAng ( ) const
```

### 7.2.2.2 getPos()

```
raytracer::Vect3 raytracer::Camera::getPos ( ) const
```

### 7.2.2.3 getViewAngle()

```
float raytracer::Camera::getViewAngle ( ) const
```

## 7.2.3 Member Data Documentation

### 7.2.3.1 angleVect\_

```
Vect3 raytracer::Camera::angleVect_ [private]
```

### 7.2.3.2 pos\_

```
Vect3 raytracer::Camera::pos_ [private]
```

## 7.2.3.3 viewAngle\_

```
float raytracer::Camera::viewAngle_ [private]
```

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

- includes/raytracer/camera.hh
- src/raytracer/camera.cc

## 7.3 raytracer::Color Class Reference

```
#include <color.hh>
```

### Public Member Functions

- [Color](#) ()
- [Color](#) (const float r, const float g, const float b)
- float [getR](#) () const
- float [getG](#) () const
- float [getB](#) () const
- void [setR](#) (const float v)
- void [setG](#) (const float v)
- void [setB](#) (const float v)
- void [normalize](#) ()
- [Color operator+](#) (const [Color](#) &other) const
- [Color operator+=](#) (const [Color](#) &other)
- [Color operator-](#) (const [Color](#) &other) const
- [Color operator\\*](#) (const float other) const
- [Color operator\\*](#) (const [Color](#) &other) const

### Private Attributes

- float [r\\_](#)
- float [g\\_](#)
- float [b\\_](#)

### Friends

- [Color operator\\*](#) (const float num, const [Color](#) &color)

### 7.3.1 Constructor & Destructor Documentation

#### 7.3.1.1 Color() [1/2]

```
raytracer::Color::Color ( )
```

#### 7.3.1.2 Color() [2/2]

```
raytracer::Color::Color (
    const float r,
    const float g,
    const float b )
```

### 7.3.2 Member Function Documentation

#### 7.3.2.1 getB()

```
float raytracer::Color::getB ( ) const
```

#### 7.3.2.2 getG()

```
float raytracer::Color::getG ( ) const
```

#### 7.3.2.3 getR()

```
float raytracer::Color::getR ( ) const
```

#### 7.3.2.4 normalize()

```
void raytracer::Color::normalize ( )
```

#### 7.3.2.5 operator\*() [1/2]

```
raytracer::Color raytracer::Color::operator* (
    const float other ) const
```

#### 7.3.2.6 operator\*() [2/2]

```
raytracer::Color raytracer::Color::operator* (
    const Color & other ) const
```

#### 7.3.2.7 operator+()

```
raytracer::Color raytracer::Color::operator+ (
    const Color & other ) const
```

#### 7.3.2.8 operator+=()

```
raytracer::Color raytracer::Color::operator+= (
    const Color & other )
```

#### 7.3.2.9 operator-()

```
raytracer::Color raytracer::Color::operator- (
    const Color & other ) const
```

#### 7.3.2.10 setB()

```
void raytracer::Color::setB (
    const float v )
```

#### 7.3.2.11 setG()

```
void raytracer::Color::setG (
    const float v )
```

#### 7.3.2.12 setR()

```
void raytracer::Color::setR (
    const float v )
```

### 7.3.3 Friends And Related Function Documentation

#### 7.3.3.1 operator\*

```
Color operator* (
    const float num,
    const Color & color ) [friend]
```

### 7.3.4 Member Data Documentation

#### 7.3.4.1 b\_

```
float raytracer::Color::b_ [private]
```

#### 7.3.4.2 g\_

```
float raytracer::Color::g_ [private]
```

#### 7.3.4.3 r\_

```
float raytracer::Color::r_ [private]
```

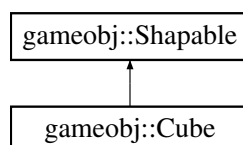
The documentation for this class was generated from the following files:

- [includes/raytracer/color.hh](#)
- [src/raytracer/color.cc](#)

## 7.4 gameobj::Cube Class Reference

```
#include <cube.hh>
```

Inheritance diagram for gameobj::Cube:



## Public Member Functions

- [Cube](#) (const [raytracer::Vect3](#) &center, const float side, const [raytracer::Vect3](#) &angles, const [raytracer::Color](#) &color)
- [raytracer::Vect3 getCenter](#) () const
- float [getSide](#) () const
- [raytracer::Vect3 getAngles](#) () const
- [raytracer::Landmark getLandmark](#) () const
- [raytracer::Color getColor](#) () const
- virtual std::optional< std::tuple< [raytracer::Vect3](#), [raytracer::Vect2](#), [FlatShapable](#) \* > > [intersecte](#) (const [raytracer::Ray](#) &ray) override

## Private Attributes

- [raytracer::Vect3 center\\_](#)
- float [side\\_](#)
- [raytracer::Vect3 angles\\_](#)
- [raytracer::Landmark landmark\\_](#)
- std::vector< [Square](#) > [squares\\_](#)

### 7.4.1 Constructor & Destructor Documentation

#### 7.4.1.1 Cube()

```
gameobj::Cube::Cube (
    const raytracer::Vect3 & center,
    const float side,
    const raytracer::Vect3 & angles,
    const raytracer::Color & color )
```

### 7.4.2 Member Function Documentation

#### 7.4.2.1 getAngles()

```
raytracer::Vect3 gameobj::Cube::getAngles ( ) const
```

#### 7.4.2.2 getCenter()

```
raytracer::Vect3 gameobj::Cube::getCenter ( ) const
```

#### 7.4.2.3 getColor()

```
raytracer::Color gameobj::Cube::getColor ( ) const [virtual]
```

Implements [gameobj::Shapable](#).

#### 7.4.2.4 getLandmark()

```
raytracer::Landmark gameobj::Cube::getLandmark ( ) const
```

#### 7.4.2.5 getSide()

```
float gameobj::Cube::getSide ( ) const
```

#### 7.4.2.6 intersecte()

```
std::optional< std::tuple< raytracer::Vect3, raytracer::Vect2, gameobj::FlatShapable * > >  
gameobj::Cube::intersecte (   
    const raytracer::Ray & ray ) [override], [virtual]
```

Implements [gameobj::Shapable](#).

### 7.4.3 Member Data Documentation

#### 7.4.3.1 angles\_

```
raytracer::Vect3 gameobj::Cube::angles_ [private]
```

#### 7.4.3.2 center\_

```
raytracer::Vect3 gameobj::Cube::center_ [private]
```



## 7.4.3.3 landmark\_

```
raytracer::Landmark gameobj::Cube::landmark_ [private]
```

## 7.4.3.4 side\_

```
float gameobj::Cube::side_ [private]
```

## 7.4.3.5 squares\_

```
std::vector<Square> gameobj::Cube::squares_ [private]
```

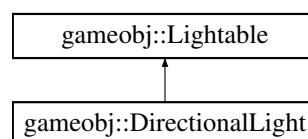
The documentation for this class was generated from the following files:

- includes/gameobj/cube.hh
- src/gameobj/cube.cc

## 7.5 gameobj::DirectionalLight Class Reference

```
#include <dirlight.hh>
```

Inheritance diagram for gameobj::DirectionalLight:



## Public Member Functions

- **DirectionalLight** (const raytracer::Vect3 &dir, const raytracer::Color &color, const float brightness)
- raytracer::Vect3 **getDir** () const
- raytracer::Color **getColor** () const
- float **getBrightness** () const
- void **setDir** (const raytracer::Vect3 &dir)
- void **setColor** (const raytracer::Color &color)
- void **setBrightness** (const float brightness)
- virtual raytracer::Color **interact** (const std::vector< Shapable \*> &obj, const raytracer::Vect3 &point, const FlatShapable &) const override

## Private Attributes

- [raytracer::Vect3](#) `dir_`
- [raytracer::Color](#) `color_`
- float `brightness_`

## 7.5.1 Constructor & Destructor Documentation

### 7.5.1.1 DirectionalLight()

```
gameobj::DirectionalLight::DirectionalLight (
    const raytracer::Vect3 & dir,
    const raytracer::Color & color,
    const float brightness )
```

## 7.5.2 Member Function Documentation

### 7.5.2.1 getBrightness()

```
float gameobj::DirectionalLight::getBrightness ( ) const
```

### 7.5.2.2 getColor()

```
raytracer::Color gameobj::DirectionalLight::getColor ( ) const
```

### 7.5.2.3 getDir()

```
raytracer::Vect3 gameobj::DirectionalLight::getDir ( ) const
```

### 7.5.2.4 interact()

```
raytracer::Color gameobj::DirectionalLight::interact (
    const std::vector< Shapable *> & obj,
    const raytracer::Vect3 & point,
    const FlatShapable & ) const [override], [virtual]
```

Implements [gameobj::Lightable](#).

#### 7.5.2.5 setBrightness()

```
void gameobj::DirectionalLight::setBrightness (
    const float brightness )
```

#### 7.5.2.6 setColor()

```
void gameobj::DirectionalLight::setColor (
    const raytracer::Color & color )
```

#### 7.5.2.7 setDir()

```
void gameobj::DirectionalLight::setDir (
    const raytracer::Vect3 & dir )
```

### 7.5.3 Member Data Documentation

#### 7.5.3.1 brightness\_

```
float gameobj::DirectionalLight::brightness_ [private]
```

#### 7.5.3.2 color\_

```
raytracer::Color gameobj::DirectionalLight::color_ [private]
```

#### 7.5.3.3 dir\_

```
raytracer::Vect3 gameobj::DirectionalLight::dir_ [private]
```

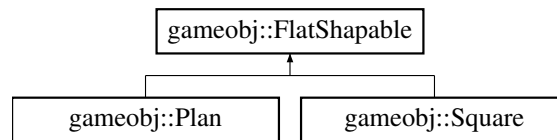
The documentation for this class was generated from the following files:

- includes/gameobj/[dirlight.hh](#)
- src/gameobj/[dirlight.cc](#)

## 7.6 gameobj::FlatShapable Class Reference

```
#include <flatshapable.hh>
```

Inheritance diagram for gameobj::FlatShapable:



### Public Member Functions

- virtual [raytracer::Color](#) [getColor](#) ( ) const =0
- virtual std::optional< std::tuple< [raytracer::Vect3](#), [raytracer::Vect2](#), [FlatShapable](#) \* > > [intersecte](#) (const [raytracer::Ray](#) &ray)=0

#### 7.6.1 Member Function Documentation

##### 7.6.1.1 getColor()

```
virtual raytracer::Color gameobj::FlatShapable::getColor ( ) const [pure virtual]
```

Implemented in [gameobj::Square](#), and [gameobj::Plan](#).

##### 7.6.1.2 intersecte()

```
virtual std::optional<std::tuple<raytracer::Vect3, raytracer::Vect2, FlatShapable*> > gameobj::FlatShapable::intersecte (
    const raytracer::Ray & ray ) [pure virtual]
```

Implemented in [gameobj::Square](#), and [gameobj::Plan](#).

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

- includes/gameobj/[flatshapable.hh](#)

## 7.7 raytracer::Landmark Class Reference

```
#include <landmark.hh>
```

## Public Member Functions

- [Landmark](#) ()
- [Landmark](#) (const [Vect3](#) &o, const [Vect3](#) &x, const [Vect3](#) &y, const [Vect3](#) &z)
- [Vect3](#) getO () const
- [Vect3](#) getX () const
- [Vect3](#) getY () const
- [Vect3](#) getZ () const
- [Vect3](#) transposePoint (const [Vect3](#) &point) const
- [Vect3](#) transposeVect (const [Vect3](#) &vect) const

## Private Attributes

- [Vect3](#) o\_
- [Vect3](#) x\_
- [Vect3](#) y\_
- [Vect3](#) z\_

## 7.7.1 Constructor & Destructor Documentation

### 7.7.1.1 [Landmark\(\)](#) [1/2]

```
raytracer::Landmark::Landmark ( )
```

### 7.7.1.2 [Landmark\(\)](#) [2/2]

```
raytracer::Landmark::Landmark (
    const Vect3 & o,
    const Vect3 & x,
    const Vect3 & y,
    const Vect3 & z )
```

## 7.7.2 Member Function Documentation

### 7.7.2.1 [getO\(\)](#)

```
raytracer::Vect3 raytracer::Landmark::getO ( ) const
```

#### 7.7.2.2 getX()

```
raytracer::Vect3 raytracer::Landmark::getX ( ) const
```

#### 7.7.2.3 getY()

```
raytracer::Vect3 raytracer::Landmark::getY ( ) const
```

#### 7.7.2.4 getZ()

```
raytracer::Vect3 raytracer::Landmark::getZ ( ) const
```

#### 7.7.2.5 transposePoint()

```
raytracer::Vect3 raytracer::Landmark::transposePoint (
    const Vect3 & point ) const
```

#### 7.7.2.6 transposeVect()

```
raytracer::Vect3 raytracer::Landmark::transposeVect (
    const Vect3 & vect ) const
```

### 7.7.3 Member Data Documentation

#### 7.7.3.1 o\_

```
Vect3 raytracer::Landmark::o_ [private]
```

#### 7.7.3.2 x\_

```
Vect3 raytracer::Landmark::x_ [private]
```

7.7.3.3 `y_`

```
Vect3 raytracer::Landmark::y_ [private]
```

7.7.3.4 `z_`

```
Vect3 raytracer::Landmark::z_ [private]
```

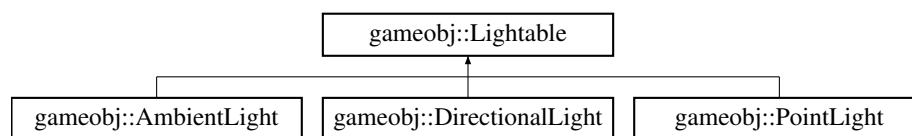
The documentation for this class was generated from the following files:

- includes/raytracer/[landmark.hh](#)
- src/raytracer/[landmark.cc](#)

## 7.8 gameobj::Lightable Class Reference

```
#include <lightable.hh>
```

Inheritance diagram for gameobj::Lightable:



### Public Member Functions

- [raytracer::Color](#) `getColor` () const
- float `getBrightness` () const
- void `setColor` (const [raytracer::Color](#) &color)
- void `setBrightness` (const float brightness)
- virtual [raytracer::Color](#) `interact` (const std::vector< [Shapable](#) \*> &obj, const [raytracer::Vect3](#) &point, const [FlatShapable](#) &) const =0

### 7.8.1 Member Function Documentation

#### 7.8.1.1 `getBrightness()`

```
float gameobj::Lightable::getBrightness ( ) const
```

### 7.8.1.2 getColor()

```
raytracer::Color gameobj::Lightable::getColor ( ) const
```

### 7.8.1.3 interact()

```
virtual raytracer::Color gameobj::Lightable::interact (
    const std::vector< Shapable *> & obj,
    const raytracer::Vect3 & point,
    const FlatShapable & ) const [pure virtual]
```

Implemented in [gameobj::DirectionalLight](#), [gameobj::PointLight](#), and [gameobj::AmbientLight](#).

### 7.8.1.4 setBrightness()

```
void gameobj::Lightable::setBrightness (
    const float brightness )
```

### 7.8.1.5 setColor()

```
void gameobj::Lightable::setColor (
    const raytracer::Color & color )
```

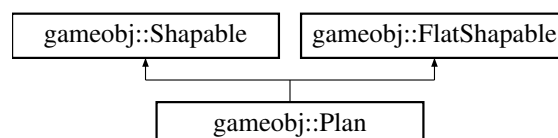
The documentation for this class was generated from the following file:

- [includes/gameobj/lightable.hh](#)

## 7.9 gameobj::Plan Class Reference

```
#include <plan.hh>
```

Inheritance diagram for gameobj::Plan:





## Public Member Functions

- [Plan](#) ()
- [Plan](#) (const [Plan](#) &p)
- [Plan](#) (const [raytracer::Vect3](#) &norm, const [raytracer::Vect3](#) &point, const [raytracer::Color](#) &color)
- [raytracer::Vect3](#) [getNorm](#) () const
- float [getD](#) () const
- [raytracer::Color](#) [getColor](#) () const override
- void [setColor](#) (const [raytracer::Color](#) &color)
- std::optional< std::tuple< [raytracer::Vect3](#), [raytracer::Vect2](#), [FlatShapable](#) \* > > [intersecte](#) (const [raytracer::Ray](#) &ray) override

## Private Attributes

- float [d\\_](#)
- [raytracer::Vect3](#) [norm\\_](#)
- [raytracer::Color](#) [color\\_](#)

## 7.9.1 Constructor & Destructor Documentation

### 7.9.1.1 Plan() [1/3]

```
gameobj::Plan::Plan ( )
```

### 7.9.1.2 Plan() [2/3]

```
gameobj::Plan::Plan (
    const Plan & p )
```

### 7.9.1.3 Plan() [3/3]

```
gameobj::Plan::Plan (
    const raytracer::Vect3 & norm,
    const raytracer::Vect3 & point,
    const raytracer::Color & color )
```

## 7.9.2 Member Function Documentation

#### 7.9.2.1 getColor()

```
raytracer::Color gameobj::Plan::getColor ( ) const [override], [virtual]
```

Implements [gameobj::FlatShapable](#).

#### 7.9.2.2 getD()

```
float gameobj::Plan::getD ( ) const
```

#### 7.9.2.3 getNorm()

```
raytracer::Vect3 gameobj::Plan::getNorm ( ) const
```

#### 7.9.2.4 intersecte()

```
std::optional< std::tuple< raytracer::Vect3, raytracer::Vect2, gameobj::FlatShapable * > >  
gameobj::Plan::intersecte (   
    const raytracer::Ray & ray ) [override], [virtual]
```

Implements [gameobj::FlatShapable](#).

#### 7.9.2.5 setColor()

```
void gameobj::Plan::setColor (   
    const raytracer::Color & color )
```

### 7.9.3 Member Data Documentation

#### 7.9.3.1 color\_

```
raytracer::Color gameobj::Plan::color_ [private]
```

## 7.9.3.2 d\_

```
float gameobj::Plan::d_ [private]
```

## 7.9.3.3 norm\_

```
raytracer::Vect3 gameobj::Plan::norm_ [private]
```

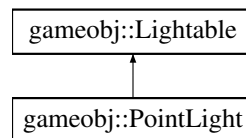
The documentation for this class was generated from the following files:

- includes/gameobj/[plan.hh](#)
- src/gameobj/[plan.cc](#)

## 7.10 gameobj::PointLight Class Reference

```
#include <pointlight.hh>
```

Inheritance diagram for gameobj::PointLight:



## Public Member Functions

- [PointLight](#) (const [raytracer::Vect3](#) &pos, const [raytracer::Color](#) &color, const float brightness)
- [raytracer::Vect3](#) [getPos](#) () const
- [raytracer::Color](#) [getColor](#) () const
- float [getBrightness](#) () const
- void [setPos](#) (const [raytracer::Vect3](#) &pos)
- void [setColor](#) (const [raytracer::Color](#) &color)
- void [setBrightness](#) (const float brightness)
- virtual [raytracer::Color](#) [interact](#) (const std::vector< [Shapable](#) \*> &obj, const [raytracer::Vect3](#) &point, const [FlatShapable](#) &) const override

## Private Attributes

- [raytracer::Vect3](#) [pos\\_](#)
- [raytracer::Color](#) [color\\_](#)
- float [brightness\\_](#)

## 7.10.1 Constructor &amp; Destructor Documentation

### 7.10.1.1 PointLight()

```
gameobj::PointLight::PointLight (
    const raytracer::Vect3 & pos,
    const raytracer::Color & color,
    const float brightness )
```

## 7.10.2 Member Function Documentation

### 7.10.2.1 getBrightness()

```
float gameobj::PointLight::getBrightness ( ) const
```

### 7.10.2.2 getColor()

```
raytracer::Color gameobj::PointLight::getColor ( ) const
```

### 7.10.2.3 getPos()

```
raytracer::Vect3 gameobj::PointLight::getPos ( ) const
```

### 7.10.2.4 interact()

```
raytracer::Color gameobj::PointLight::interact (
    const std::vector< Shapable *> & obj,
    const raytracer::Vect3 & point,
    const FlatShapable & obj ) const [override], [virtual]
```

Implements [gameobj::Lightable](#).

### 7.10.2.5 setBrightness()

```
void gameobj::PointLight::setBrightness (
    const float brightness )
```

#### 7.10.2.6 setColor()

```
void gameobj::PointLight::setColor (
    const raytracer::Color & color )
```

#### 7.10.2.7 setPos()

```
void gameobj::PointLight::setPos (
    const raytracer::Vect3 & pos )
```

### 7.10.3 Member Data Documentation

#### 7.10.3.1 brightness\_

```
float gameobj::PointLight::brightness_ [private]
```

#### 7.10.3.2 color\_

```
raytracer::Color gameobj::PointLight::color_ [private]
```

#### 7.10.3.3 pos\_

```
raytracer::Vect3 gameobj::PointLight::pos_ [private]
```

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

- includes/gameobj/[pointlight.hh](#)
- src/gameobj/[pointlight.cc](#)

## 7.11 raytracer::Ray Class Reference

```
#include <ray.hh>
```

## Public Member Functions

- [Ray](#) (const [Vect3](#) &origin, const [Vect3](#) &vect)
- [Vect3](#) [getOrigin](#) () const
- [Vect3](#) [getVect](#) () const
- bool [colidesBefore](#) (const std::vector< [gameobj::Shapable](#) \*> &objects, const float dist) const
- bool [colides](#) (const std::vector< [gameobj::Shapable](#) \*> &objects) const

## Private Attributes

- [Vect3](#) [origin\\_](#)
- [Vect3](#) [vect\\_](#)

## 7.11.1 Constructor & Destructor Documentation

### 7.11.1.1 Ray()

```
raytracer::Ray::Ray (  
    const Vect3 & origin,  
    const Vect3 & vect )
```

## 7.11.2 Member Function Documentation

### 7.11.2.1 colides()

```
bool raytracer::Ray::colides (  
    const std::vector< gameobj::Shapable *> & objects ) const
```

### 7.11.2.2 colidesBefore()

```
bool raytracer::Ray::colidesBefore (  
    const std::vector< gameobj::Shapable *> & objects,  
    const float dist ) const
```

### 7.11.2.3 getOrigin()

```
raytracer::Vect3 raytracer::Ray::getOrigin ( ) const
```

## 7.11.2.4 getVect()

```
raytracer::Vect3 raytracer::Ray::getVect ( ) const
```

## 7.11.3 Member Data Documentation

## 7.11.3.1 origin\_

```
Vect3 raytracer::Ray::origin_ [private]
```

## 7.11.3.2 vect\_

```
Vect3 raytracer::Ray::vect_ [private]
```

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

- includes/raytracer/[ray.hh](#)
- src/raytracer/[ray.cc](#)

## 7.12 raytracer::Screen Class Reference

```
#include <screen.hh>
```

## Public Member Functions

- [Screen](#) (const [Camera](#) &camera, float width, float height)
- float [getWidth](#) () const
- float [getHeight](#) () const
- float [getPixelSize](#) () const
- [Vect3](#) [getCenter](#) () const
- [Vect3](#) [getI](#) () const
- [Vect3](#) [getJ](#) () const

## Private Attributes

- float [width\\_](#)
- float [height\\_](#)
- float [pixelSize\\_](#)
- [Vect3](#) [center\\_](#)
- [Vect3](#) [i\\_](#)
- [Vect3](#) [j\\_](#)

## 7.12.1 Constructor & Destructor Documentation

### 7.12.1.1 Screen()

```
raytracer::Screen::Screen (
    const Camera & camera,
    float width,
    float height )
```

## 7.12.2 Member Function Documentation

### 7.12.2.1 getCenter()

```
raytracer::Vect3 raytracer::Screen::getCenter ( ) const
```

### 7.12.2.2 getHeight()

```
float raytracer::Screen::getHeight ( ) const
```

### 7.12.2.3 getI()

```
raytracer::Vect3 raytracer::Screen::getI ( ) const
```

### 7.12.2.4 getJ()

```
raytracer::Vect3 raytracer::Screen::getJ ( ) const
```

### 7.12.2.5 getPixelSize()

```
float raytracer::Screen::getPixelSize ( ) const
```



### 7.12.2.6 getWidth()

```
float raytracer::Screen::getWidth ( ) const
```

## 7.12.3 Member Data Documentation

### 7.12.3.1 center\_

```
Vect3 raytracer::Screen::center_ [private]
```

### 7.12.3.2 height\_

```
float raytracer::Screen::height_ [private]
```

### 7.12.3.3 i\_

```
Vect3 raytracer::Screen::i_ [private]
```

### 7.12.3.4 j\_

```
Vect3 raytracer::Screen::j_ [private]
```

### 7.12.3.5 pixelSize\_

```
float raytracer::Screen::pixelSize_ [private]
```

### 7.12.3.6 width\_

```
float raytracer::Screen::width_ [private]
```

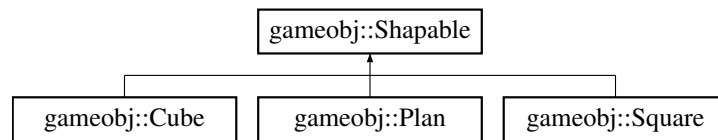
The documentation for this class was generated from the following files:

- [includes/raytracer/screen.hh](#)
- [src/raytracer/screen.cc](#)

## 7.13 gameobj::Shapable Class Reference

```
#include <shapable.hh>
```

Inheritance diagram for gameobj::Shapable:



### Public Member Functions

- virtual [raytracer::Color](#) [getColor](#) () const =0
- virtual std::optional< std::tuple< [raytracer::Vect3](#), [raytracer::Vect2](#), [FlatShapable](#) \* > > [intersecte](#) (const [raytracer::Ray](#) &ray)=0

### 7.13.1 Member Function Documentation

#### 7.13.1.1 getColor()

```
virtual raytracer::Color gameobj::Shapable::getColor ( ) const [pure virtual]
```

Implemented in [gameobj::Cube](#), [gameobj::Square](#), and [gameobj::Plan](#).

#### 7.13.1.2 intersecte()

```
virtual std::optional<std::tuple<raytracer::Vect3, raytracer::Vect2, FlatShapable*> > gameobj::Shapable::intersecte (
    const raytracer::Ray & ray ) [pure virtual]
```

Implemented in [gameobj::Cube](#), [gameobj::Square](#), and [gameobj::Plan](#).

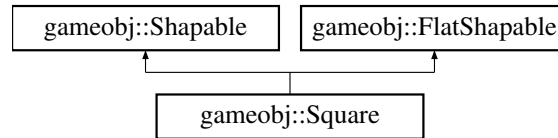
The documentation for this class was generated from the following file:

- includes/gameobj/[shapable.hh](#)

## 7.14 gameobj::Square Class Reference

```
#include <square.hh>
```

Inheritance diagram for gameobj::Square:



### Public Member Functions

- [Square](#) (const [Square](#) &s)
- [Square](#) (const [raytracer::Vect3](#) &A, const [raytracer::Vect3](#) &B, const [raytracer::Vect3](#) &D, const [raytracer::Vect3](#) &norm, const [raytracer::Color](#) &color)
- [raytracer::Vect3](#) [getPos](#) () const
- [raytracer::Vect3](#) [getAB](#) () const
- [raytracer::Vect3](#) [getAD](#) () const
- [gameobj::Plan](#) [getPlan](#) () const
- [raytracer::Color](#) [getColor](#) () const override
- virtual std::optional< std::tuple< [raytracer::Vect3](#), [raytracer::Vect2](#), [FlatShapable](#) \* > > [intersecte](#) (const [raytracer::Ray](#) &ray) override

### Private Attributes

- [Plan](#) p\_
- [raytracer::Vect3](#) pA\_
- [raytracer::Vect3](#) vAB\_
- [raytracer::Vect3](#) vAD\_

### 7.14.1 Constructor & Destructor Documentation

#### 7.14.1.1 [Square\(\)](#) [1/2]

```
gameobj::Square::Square (
    const Square & s )
```

#### 7.14.1.2 [Square\(\)](#) [2/2]

```
gameobj::Square::Square (
    const raytracer::Vect3 & A,
    const raytracer::Vect3 & B,
    const raytracer::Vect3 & D,
    const raytracer::Vect3 & norm,
    const raytracer::Color & color )
```

## 7.14.2 Member Function Documentation

### 7.14.2.1 getAB()

```
raytracer::Vect3 gameobj::Square::getAB ( ) const
```

### 7.14.2.2 getAD()

```
raytracer::Vect3 gameobj::Square::getAD ( ) const
```

### 7.14.2.3 getColor()

```
raytracer::Color gameobj::Square::getColor ( ) const [override], [virtual]
```

Implements [gameobj::FlatShapable](#).

### 7.14.2.4 getPlan()

```
gameobj::Plan gameobj::Square::getPlan ( ) const
```

### 7.14.2.5 getPos()

```
raytracer::Vect3 gameobj::Square::getPos ( ) const
```

### 7.14.2.6 intersecte()

```
std::optional< std::tuple< raytracer::Vect3, raytracer::Vect2, gameobj::FlatShapable * > >  
gameobj::Square::intersecte (  
    const raytracer::Ray & ray ) [override], [virtual]
```

Implements [gameobj::FlatShapable](#).

### 7.14.3 Member Data Documentation

#### 7.14.3.1 p\_

`Plan gameobj::Square::p_ [private]`

#### 7.14.3.2 pA\_

`raytracer::Vect3 gameobj::Square::pA_ [private]`

#### 7.14.3.3 vAB\_

`raytracer::Vect3 gameobj::Square::vAB_ [private]`

#### 7.14.3.4 vAD\_

`raytracer::Vect3 gameobj::Square::vAD_ [private]`

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

- includes/gameobj/[square.hh](#)
- src/gameobj/[square.cc](#)

## 7.15 gameui::UIScreen Class Reference

Class to interact with the user visual output.

```
#include <gameui.hh>
```

### Public Member Functions

- [UIScreen](#) (std::string pageTitle, unsigned [width](#), unsigned [height](#), uint32\_t windowParam)  
*Constructor of the object.*
- [~UIScreen](#) ()
- void [updateScreen](#) ()
- void [loadFrame](#) (std::vector< [raytracer::Color](#) > \*pixels)

## Private Attributes

- unsigned [width](#)
- unsigned [height](#)
- SDL\_Window \* [window](#)
- SDL\_Surface \* [screenSurface](#)
- SDL\_Renderer \* [renderer](#)

### 7.15.1 Detailed Description

Class to interact with the user visual output.

### 7.15.2 Constructor & Destructor Documentation

#### 7.15.2.1 UIScreen()

```
gameui::UIScreen::UIScreen (
    std::string pageTitle,
    unsigned width,
    unsigned height,
    uint32_t windowParam )
```

Constructor of the object.

#### Parameters

|                    |                         |
|--------------------|-------------------------|
| <i>pageTitle</i>   | Title of the page       |
| <i>width</i>       | width of the window     |
| <i>height</i>      | height of the window    |
| <i>windowParam</i> | Parameter of the window |

The `windowParam` parameter has to be filled using the `WINDOWPARAM` enum.

#### 7.15.2.2 ~UIScreen()

```
gameui::UIScreen::~~UIScreen ( )
```

### 7.15.3 Member Function Documentation

### 7.15.3.1 loadFrame()

```
void gameui::UIScreen::loadFrame (
    std::vector< raytracer::Color > * pixels )
```

### 7.15.3.2 updateScreen()

```
void gameui::UIScreen::updateScreen ( )
```

## 7.15.4 Member Data Documentation

### 7.15.4.1 height

```
unsigned gameui::UIScreen::height [private]
```

### 7.15.4.2 renderer

```
SDL_Renderer* gameui::UIScreen::renderer [private]
```

### 7.15.4.3 screenSurface

```
SDL_Surface* gameui::UIScreen::screenSurface [private]
```

### 7.15.4.4 width

```
unsigned gameui::UIScreen::width [private]
```

### 7.15.4.5 window

```
SDL_Window* gameui::UIScreen::window [private]
```

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

- [includes/ui/gameui.hh](#)
- [src/ui/gameui.cc](#)

## 7.16 raytracer::Vect2 Class Reference

```
#include <vect.hh>
```

### Public Member Functions

- [Vect2](#) ()
- [Vect2](#) (float x, float y)
- [Vect2](#) (const [Vect2](#) &v)
- float [getX](#) () const
- float [getY](#) () const
- void [setX](#) (const float v)
- void [setY](#) (const float v)
- bool [isNullVect](#) () const
- float [getNorm](#) () const
- float [dot](#) (const [Vect2](#) &other) const
- void [normalize](#) ()
- [Vect2 operator-](#) () const
- [Vect2 operator+](#) (const [Vect2](#) &other) const
- [Vect2 operator-](#) (const [Vect2](#) &other) const
- [Vect2 operator\\*](#) (const float other) const

### Private Attributes

- float [x\\_](#)
- float [y\\_](#)

### Friends

- [Vect2 operator\\*](#) (const float num, const [Vect2](#) &vect)

## 7.16.1 Constructor & Destructor Documentation

### 7.16.1.1 Vect2() [1/3]

```
raytracer::Vect2::Vect2 ( )
```

### 7.16.1.2 Vect2() [2/3]

```
raytracer::Vect2::Vect2 (
    float x,
    float y )
```



### 7.16.1.3 Vect2() [3/3]

```
raytracer::Vect2::Vect2 (
    const Vect2 & v )
```

## 7.16.2 Member Function Documentation

### 7.16.2.1 dot()

```
float raytracer::Vect2::dot (
    const Vect2 & other ) const
```

### 7.16.2.2 getNorm()

```
float raytracer::Vect2::getNorm ( ) const
```

### 7.16.2.3 getX()

```
float raytracer::Vect2::getX ( ) const
```

### 7.16.2.4 getY()

```
float raytracer::Vect2::getY ( ) const
```

### 7.16.2.5 isNullVect()

```
bool raytracer::Vect2::isNullVect ( ) const
```

### 7.16.2.6 normalize()

```
void raytracer::Vect2::normalize ( )
```

#### 7.16.2.7 operator\*()

```
raytracer::Vect2 raytracer::Vect2::operator* (
    const float other ) const
```

#### 7.16.2.8 operator+()

```
raytracer::Vect2 raytracer::Vect2::operator+ (
    const Vect2 & other ) const
```

#### 7.16.2.9 operator-() [1/2]

```
raytracer::Vect2 raytracer::Vect2::operator- ( ) const
```

#### 7.16.2.10 operator-() [2/2]

```
raytracer::Vect2 raytracer::Vect2::operator- (
    const Vect2 & other ) const
```

#### 7.16.2.11 setX()

```
void raytracer::Vect2::setX (
    const float v )
```

#### 7.16.2.12 setY()

```
void raytracer::Vect2::setY (
    const float v )
```

### 7.16.3 Friends And Related Function Documentation

### 7.16.3.1 operator\*

```
Vect2 operator* (
    const float num,
    const Vect2 & vect ) [friend]
```

## 7.16.4 Member Data Documentation

### 7.16.4.1 x\_

```
float raytracer::Vect2::x_ [private]
```

### 7.16.4.2 y\_

```
float raytracer::Vect2::y_ [private]
```

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

- includes/raytracer/[vect.hh](#)
- src/raytracer/[vect.cc](#)

## 7.17 raytracer::Vect3 Class Reference

```
#include <vect.hh>
```

### Public Member Functions

- [Vect3](#) ()  
*Default constructor.*
- [Vect3](#) (float x, float y, float z)  
*Intuitive constructor.*
- [Vect3](#) (const [Vect3](#) &v)  
*Copy constructor.*
- float [getX](#) () const  
*Getter of x value.*
- float [getY](#) () const  
*Getter of y value.*
- float [getZ](#) () const  
*Getter of z value.*
- void [setX](#) (const float v)  
*Setter of x value.*
- void [setY](#) (const float v)

- *Setter of y value.*  
void [setZ](#) (const float v)
- *Setter of z value.*  
bool [isNullVect](#) () const
- *Check if the vector is null.*  
float [getNorm](#) () const
- *Get the norm of the vector.*  
float [dot](#) (const [Vect3](#) &other) const
- *Get the dot product of this vect with an other.*  
void [normalize](#) ()
- *Normalize the vector.*  
[Vect3 operator-](#) () const
- *Overload of the opposite operator.*  
[Vect3 operator+](#) (const [Vect3](#) &other) const
- *Overload of the addition operator between two vectors.*  
[Vect3 operator-](#) (const [Vect3](#) &other) const
- *Overload of the subtraction operator between two vectors.*  
[Vect3 operator\\*](#) (const float other) const
- *Overload of the product multiplication between a vector and a float.*

### Private Attributes

- float [x\\_](#)
- float [y\\_](#)
- float [z\\_](#)

### Friends

- [Vect3 operator\\*](#) (const float num, const [Vect3](#) &vect)  
*Overload of the product multiplication between a float and a vector.*

## 7.17.1 Constructor & Destructor Documentation

### 7.17.1.1 [Vect3\(\)](#) [1/3]

```
raytracer::Vect3::Vect3 ( )
```

Default constructor.

### 7.17.1.2 [Vect3\(\)](#) [2/3]

```
raytracer::Vect3::Vect3 (
    float x,
    float y,
    float z )
```

Intuitive constructor.

**Parameters**

|          |                            |
|----------|----------------------------|
| <i>x</i> | value of the x coordinate. |
| <i>y</i> | value of the y coordinate. |
| <i>z</i> | value of the z coordinate. |

**7.17.1.3 Vect3()** [3/3]

```
raytracer::Vect3::Vect3 (
    const Vect3 & v )
```

Copy constructor.

**Parameters**

|          |               |
|----------|---------------|
| <i>v</i> | vect to copy. |
|----------|---------------|

**7.17.2 Member Function Documentation****7.17.2.1 dot()**

```
float raytracer::Vect3::dot (
    const Vect3 & other ) const
```

Get the dot product of this vect with an other.

**Returns**

The dot product of the two vectors.

**7.17.2.2 getNorm()**

```
float raytracer::Vect3::getNorm ( ) const
```

Get the norm of the vector.

**Returns**

The norm of the vector.

#### 7.17.2.3 getX()

```
float raytracer::Vect3::getX ( ) const
```

Getter of x value.

##### Returns

Value of x value.

#### 7.17.2.4 getY()

```
float raytracer::Vect3::getY ( ) const
```

Getter of y value.

##### Returns

Value of y value.

#### 7.17.2.5 getZ()

```
float raytracer::Vect3::getZ ( ) const
```

Getter of z value.

##### Returns

Value of z value.

#### 7.17.2.6 isNullVect()

```
bool raytracer::Vect3::isNullVect ( ) const
```

Check if the vector is null.

##### Returns

True if the vector is null, False otherwise.

#### 7.17.2.7 normalize()

```
void raytracer::Vect3::normalize ( )
```

Normalize the vector.

#### 7.17.2.8 operator\*()

```
raytracer::Vect3 raytracer::Vect3::operator* (
    const float other ) const
```

Overload of the product multiplication between a vector and a float.

## Parameters

|              |   |
|--------------|---|
| <i>other</i> | the float to multiply with this vector. |
|--------------|---|

## Returns

A new vector.

## 7.17.2.9 operator+()

```
raytracer::Vect3 raytracer::Vect3::operator+ (
    const Vect3 & other ) const
```

Overload of the addition operator between two vectors.

## Parameters

|              |                                |
|--------------|--------------------------------|
| <i>other</i> | the vector to add to this one. |
|--------------|--------------------------------|

## Returns

A new vector.

## 7.17.2.10 operator-() [1/2]

```
raytracer::Vect3 raytracer::Vect3::operator- ( ) const
```

Overload of the opposite operator.

## Returns

The opposite vector of this one.

## 7.17.2.11 operator-() [2/2]

```
raytracer::Vect3 raytracer::Vect3::operator- (
    const Vect3 & other ) const
```

Overload of the subtraction operator between two vectors.

**Parameters**

|              |                                     |
|--------------|-------------------------------------|
| <i>other</i> | the vector to subtract to this one. |
|--------------|-------------------------------------|

**Returns**

A new vector.

**7.17.2.12 setX()**

```
void raytracer::Vect3::setX (
    const float v )
```

Setter of x value.

**Parameters**

|          |                      |
|----------|----------------------|
| <i>v</i> | value to set x with. |
|----------|----------------------|

**7.17.2.13 setY()**

```
void raytracer::Vect3::setY (
    const float v )
```

Setter of y value.

**Parameters**

|          |                      |
|----------|----------------------|
| <i>v</i> | value to set y with. |
|----------|----------------------|

**7.17.2.14 setZ()**

```
void raytracer::Vect3::setZ (
    const float v )
```

Setter of z value.

**Parameters**

|          |                     |
|----------|---------------------|
| <i>v</i> | value to set z with |
|----------|---------------------|



### 7.17.3 Friends And Related Function Documentation

#### 7.17.3.1 operator\*

```
Vect3 operator* (
    const float num,
    const Vect3 & vect ) [friend]
```

Overload of the product multiplication between a float and a vector.

##### Parameters

|             |  |
|-------------|--|
| <i>num</i>  | the float to multiply with the vector. |
| <i>vect</i> | the vector to multiply with the float. |

##### Returns

A new vector.

### 7.17.4 Member Data Documentation

#### 7.17.4.1 x\_

```
float raytracer::Vect3::x_ [private]
```

the x coordinate

#### 7.17.4.2 y\_

```
float raytracer::Vect3::y_ [private]
```

the y coordinate

#### 7.17.4.3 z\_

```
float raytracer::Vect3::z_ [private]
```

the z coordinate

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

- includes/raytracer/[vect.hh](#)
- src/raytracer/[vect.cc](#)



## Chapter 8

# File Documentation

### 8.1 includes/fwd.hh File Reference

#### Namespaces

- [raytracer](#)
- [gameobj](#)

### 8.2 includes/gameobj/ambientlight.hh File Reference

```
#include "fwd.hh"
#include <vector>
#include "color.hh"
#include "lightable.hh"
#include "shapable.hh"
#include "flatshapable.hh"
```

#### Classes

- class [gameobj::AmbientLight](#)

#### Namespaces

- [gameobj](#)

### 8.3 includes/gameobj/cube.hh File Reference

```
#include "fwd.hh"
#include <vector>
#include <tuple>
#include "ray.hh"
#include "vect.hh"
#include "square.hh"
#include "shapable.hh"
#include "landmark.hh"
#include "color.hh"
#include "flatshapable.hh"
```

## Classes

- class [gameobj::Cube](#)

## Namespaces

- [gameobj](#)

## 8.4 includes/gameobj/dirlight.hh File Reference

```
#include "fwd.hh"
#include <vector>
#include "vect.hh"
#include "color.hh"
#include "shapable.hh"
#include "lightable.hh"
#include "flatshapable.hh"
```

## Classes

- class [gameobj::DirectionalLight](#)

## Namespaces

- [gameobj](#)

## 8.5 includes/gameobj/flatshapable.hh File Reference

```
#include "fwd.hh"
#include <optional>
#include <tuple>
#include "vect.hh"
#include "ray.hh"
#include "color.hh"
```

## Classes

- class [gameobj::FlatShapable](#)

## Namespaces

- [gameobj](#)

## 8.6 includes/gameobj/lightable.hh File Reference

```
#include "fwd.hh"
#include "shapable.hh"
#include "flatshapable.hh"
```

### Classes

- class [gameobj::Lightable](#)

### Namespaces

- [gameobj](#)

## 8.7 includes/gameobj/plan.hh File Reference

```
#include "fwd.hh"
#include <optional>
#include <tuple>
#include "ray.hh"
#include "vect.hh"
#include "shapable.hh"
#include "color.hh"
#include "flatshapable.hh"
```

### Classes

- class [gameobj::Plan](#)

### Namespaces

- [gameobj](#)

## 8.8 includes/gameobj/pointlight.hh File Reference

```
#include "fwd.hh"
#include <vector>
#include "vect.hh"
#include "color.hh"
#include "shapable.hh"
#include "lightable.hh"
#include "flatshapable.hh"
```

## Classes

- class [gameobj::PointLight](#)

## Namespaces

- [gameobj](#)

## 8.9 includes/gameobj/shapable.hh File Reference

```
#include "fwd.hh"
#include <optional>
#include <tuple>
#include "vect.hh"
#include "ray.hh"
#include "color.hh"
#include "shapable.hh"
#include "flatshapable.hh"
```

## Classes

- class [gameobj::Shapable](#)

## Namespaces

- [gameobj](#)

## 8.10 includes/gameobj/square.hh File Reference

```
#include "fwd.hh"
#include <optional>
#include <tuple>
#include "ray.hh"
#include "vect.hh"
#include "plan.hh"
#include "shapable.hh"
#include "color.hh"
#include "flatshapable.hh"
```

## Classes

- class [gameobj::Square](#)

## Namespaces

- [gameobj](#)

## 8.11 includes/raytracer/camera.hh File Reference

```
#include "fwd.hh"
#include "vect.hh"
```

## Classes

- class [raytracer::Camera](#)

## Namespaces

- [raytracer](#)

## 8.12 includes/raytracer/color.hh File Reference

```
#include "fwd.hh"
```

## Classes

- class [raytracer::Color](#)

## Namespaces

- [raytracer](#)

## Functions

- Color [raytracer::operator\\*](#) (const float num, const Color &color)

## 8.13 includes/raytracer/landmark.hh File Reference

```
#include "fwd.hh"
#include "vect.hh"
```

## Classes

- class [raytracer::Landmark](#)

## Namespaces

- [raytracer](#)

## 8.14 includes/raytracer/ray.hh File Reference

```
#include "fwd.hh"  
#include <vector>  
#include "vect.hh"  
#include "shapable.hh"
```

## Classes

- class [raytracer::Ray](#)

## Namespaces

- [raytracer](#)

## 8.15 includes/raytracer/screen.hh File Reference

```
#include "fwd.hh"  
#include "vect.hh"  
#include "camera.hh"
```

## Classes

- class [raytracer::Screen](#)

## Namespaces

- [raytracer](#)



## 8.16 includes/raytracer/utils.hh File Reference

```
#include "fwd.hh"
#include <cmath>
#include <vector>
#include "vect.hh"
#include "ray.hh"
#include "screen.hh"
#include "camera.hh"
#include "shapable.hh"
#include "square.hh"
#include "pointlight.hh"
#include "color.hh"
#include "lightable.hh"
```

### Namespaces

- [raytracer](#)

### Functions

- void [raytracer::rotateX](#) (Vect3 &vect, const float angle)
- void [raytracer::rotateY](#) (Vect3 &vect, const float angle)
- void [raytracer::rotateZ](#) (Vect3 &vect, const float angle)
- Vect3 [raytracer::applyAngle](#) (Vect3 &vect, const Vect3 &angles)
- Vect3 [raytracer::vectorFromAngles](#) (const Vect3 &angles)
- Vect3 [raytracer::getAngles](#) (const Vect3 &v1, const Vect3 &v2)
- Vect3 [raytracer::vectorFromPoints](#) (const Vect3 &v1, const Vect3 &v2)
- std::vector< Ray > [raytracer::genRays](#) (const Camera &cam, const Screen &screen)
- int [raytracer::closerToOrigin](#) (Vect3 origin, Vect3 point1, Vect3 point2)
- std::vector< Color > [raytracer::renderFrame](#) (const std::vector< [gameobj::Shapable](#) \*> &objects, const std::vector< Ray > &rays, const std::vector< [gameobj::Lightable](#) \*> &lightList)

### Variables

- const float [raytracer::pi](#) = std::acos(-1)

## 8.17 includes/raytracer/vect.hh File Reference

Vect2 and Vect3 class managing vector operation.

```
#include "fwd.hh"
```

### Classes

- class [raytracer::Vect3](#)
- class [raytracer::Vect2](#)

## Namespaces

- [raytracer](#)

## Functions

- Vect3 [raytracer::operator\\*](#) (const float num, const Vect3 &vect)  
*Overload of the product multiplication between a float and a vector.*
- Vect2 [raytracer::operator\\*](#) (const float num, const Vect2 &vect)

### 8.17.1 Detailed Description

Vect2 and Vect3 class managing vector operation.

## 8.18 includes/ui/gameui.hh File Reference

Vect2 and Vect3 class managing vector operation.

```
#include "fwd.hh"
#include "color.hh"
#include <SDL2/SDL.h>
#include <vector>
#include <string>
```

## Classes

- class [gameui::UIScreen](#)  
*Class to interact with the user visual output.*

## Namespaces

- [gameui](#)

## Enumerations

- enum [gameui::WINDOWPARAM](#) { [gameui::NO\\_FULLSCREEN](#) = 0, [gameui::FULLSCREEN](#) = 1, [gameui::FULLSCREEN\\_DESKTOP](#) = 2, [gameui::BORDERLESS](#) = 4 }
- Possible parameters for a window.*

### 8.18.1 Detailed Description

Vect2 and Vect3 class managing vector operation.

## 8.19 README.md File Reference

## 8.20 src/gameobj/ambientlight.cc File Reference

```
#include "ambientlight.hh"
```

## 8.21 src/gameobj/cube.cc File Reference

```
#include "cube.hh"  
#include "utils.hh"
```

## 8.22 src/gameobj/dirlight.cc File Reference

```
#include "dirlight.hh"  
#include "ray.hh"
```

## 8.23 src/gameobj/plan.cc File Reference

```
#include "plan.hh"
```

### Functions

- float `computeD` (const `raytracer::Vect3` &p, const `raytracer::Vect3` &n)

### 8.23.1 Function Documentation

#### 8.23.1.1 `computeD()`

```
float computeD (  
    const raytracer::Vect3 & p,  
    const raytracer::Vect3 & n )
```

## 8.24 src/gameobj/pointlight.cc File Reference

```
#include "pointlight.hh"  
#include "utils.hh"  
#include "ray.hh"
```

## 8.25 src/gameobj/square.cc File Reference

```
#include "square.hh"  
#include "utils.hh"
```

## 8.26 src/main.cc File Reference

```
#include <iostream>  
#include <vector>  
#include <cmath>  
#include <string>  
#include <fstream>  
#include <SDL2/SDL.h>  
#include "ray.hh"  
#include "camera.hh"  
#include "vect.hh"  
#include "screen.hh"  
#include "square.hh"  
#include "utils.hh"  
#include "cube.hh"  
#include "color.hh"  
#include "pointlight.hh"  
#include "shapable.hh"  
#include "lightable.hh"  
#include "ambientlight.hh"  
#include "dirlight.hh"  
#include "gameui.hh"
```

### Functions

- void [writeRender](#) (std::string filename, std::vector< [raytracer::Color](#) > &pixels, unsigned width, unsigned height)
- int [main](#) (int argc, char \*argv[])

### 8.26.1 Function Documentation

#### 8.26.1.1 main()

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

#### 8.26.1.2 writeRender()

```
void writeRender (
    std::string filename,
    std::vector< raytracer::Color > & pixels,
    unsigned width,
    unsigned height )
```

### 8.27 src/raytracer/camera.cc File Reference

```
#include "camera.hh"
#include "utils.hh"
```

### 8.28 src/raytracer/color.cc File Reference

```
#include "color.hh"
```

### 8.29 src/raytracer/landmark.cc File Reference

```
#include "landmark.hh"
```

### 8.30 src/raytracer/ray.cc File Reference

```
#include "ray.hh"
#include <tuple>
#include <optional>
#include "color.hh"
#include "utils.hh"
```

### 8.31 `src/raytracer/screen.cc` File Reference

```
#include "screen.hh"  
#include <cmath>  
#include "utils.hh"
```

### 8.32 `src/raytracer/utils.cc` File Reference

```
#include "utils.hh"  
#include <optional>  
#include <tuple>  
#include "flatshapable.hh"
```

### 8.33 `src/raytracer/vect.cc` File Reference

```
#include "vect.hh"  
#include <cmath>
```

### 8.34 `src/ui/gameui.cc` File Reference

```
#include "gameui.hh"
```

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