OpenGL-FinalProject

Generated by Doxygen 1.13.2

Chapter 1

Hierarchical Index

1.1 Class Hierarchy

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

Ragot::Camera . . . . ??
Ragot::Color_Buffer< COLOR > . . . . ??
Ragot::Component . . . . ??
  Ragot::Model_Component . . . . ??
  Ragot::Transform_Component . . . . ??
std::enable_shared_from_this
  Ragot::Entity . . . . ??
Ragot::Frame_Buffer . . . . ??
Ragot::Kernel . . . . ??
Ragot::Light . . . . ??
  Ragot::AreaLight . . . . ??
  Ragot::DirectionalLight . . . . ??
  Ragot::PointLight . . . . ??
Ragot::Material . . . . ??
Ragot::Mesh . . . . ??
Ragot::Window::OpenGL_Context_Settings . . . . ??
Ragot::Rgba8888 . . . . ??
Ragot::Scene . . . . ??
Ragot::Shader . . . . ??
  Ragot::Fragment_Shader . . . . ??
  Ragot::Vertex_Shader . . . . ??
Ragot::Shader_Program . . . . ??
Ragot::Skybox . . . . ??
Ragot::System . . . . ??
Ragot::Task . . . . ??
  Ragot::Critical_Task . . . . ??
  Ragot::Light_Task . . . . ??
  Ragot::Once_Task . . . . ??
Ragot::Terrain . . . . ??
Ragot::Texture2D< COLOR_FORMAT > . . . . ??
Ragot::Texture2D< Rgba8888 > . . . . ??
  Ragot::Texture_Cube . . . . ??
Ragot::Window . . . . ??

Chapter 2

Class Index

2.1 Class List

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

Ragot::AreaLight
: Class for area light . . . . . ??

Ragot::Camera
: Class for managing a camera in OpenGL . . . . . ??

Ragot::Color_Buffer< COLOR >
: Template class for managing a color buffer . . . . . ??

Ragot::Component
: Base class for components . . . . . ??

Ragot::Critical_Task
: Class to execute critical tasks such as rendering, which the Kernel can pause other tasks to execute. These tasks run in the main thread . . . . . ??

Ragot::DirectionalLight
: Class for directional light . . . . . ??

Ragot::Entity
: Class for managing entities in a scene . . . . . ??

Ragot::Fragment_Shader
: Class for managing an OpenGL fragment shader . . . . . ??

Ragot::Frame_Buffer
: Class for managing a frame buffer in OpenGL . . . . . ??

Ragot::Kernel
: Class for managing the kernel that executes tasks . . . . . ??

Ragot::Light
: Base class for different types of lights . . . . . ??

Ragot::Light_Task
: Class to execute cyclic tasks such as Update or Input . . . . . ??

Ragot::Material
: Class for managing a material . . . . . ??

Ragot::Mesh
: Class for managing a 3D mesh . . . . . ??

Ragot::Model_Component
: Component for managing models . . . . . ??

Ragot::Once_Task
: Class for tasks that are executed only once . . . . . ??

Ragot::Window::OpenGL_Context_Settings
: Struct for OpenGL context settings . . . . . ??

Ragot::PointLight
Class for point light . . . . . ??
Ragot::Rgba8888
Union for managing RGBA color values . . . . . ??
Ragot::Scene
Class for managing a scene in OpenGL . . . . . ??
Ragot::Shader
Class for managing an OpenGL shader . . . . . ??
Ragot::Shader_Program
Class for managing an OpenGL shader program . . . . . ??
Ragot::Skybox
Class for rendering a skybox in the scene . . . . . ??
Ragot::System
Class for managing the system in OpenGL . . . . . ??
Ragot::Task
Base class for managing tasks . . . . . ??
Ragot::Terrain
Class for rendering a terrain in the scene . . . . . ??
Ragot::Texture2D< COLOR_FORMAT >
Template class for managing a 2D texture . . . . . ??
Ragot::Texture_Cube
Class for managing a cube texture . . . . . ??
Ragot::Transform_Component
Component for managing transformations . . . . . ??
Ragot::Vertex_Shader
Class for managing an OpenGL vertex shader . . . . . ??
Ragot::Window
Class for managing an SDL window with OpenGL context . . . . . ??

Chapter 3

File Index

3.1 File List

Here is a list of all documented files with brief descriptions:

Ambient.hpp . . . . . ??
Camera.hpp . . . . . ??
Color.hpp . . . . . ??
Color_Buffer.hpp . . . . . ??
Component.hpp . . . . . ??
Entity.hpp . . . . . ??
Mesh.hpp . . . . . ??
MyKernel.hpp . . . . . ??
MySystem.hpp . . . . . ??
Postprocess.hpp . . . . . ??
Shader_Program.hpp . . . . . ??
Task.hpp . . . . . ??
Window.hpp . . . . . ??

Chapter 4

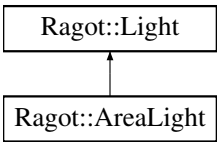
Class Documentation

4.1 Ragot::AreaLight Class Reference

Class for area light.

`#include <Ambient.hpp>`

Inheritance diagram for Ragot::AreaLight:



Public Member Functions

- AreaLight (const glm::vec3 &color, const glm::vec3 &position, const glm::vec3 &size)

  Constructor for the AreaLight class.

Public Member Functions inherited from Ragot::Light

- Light (const glm::vec3 &color)

  Constructor for the Light class.
- virtual ~**Light** ()=default

  Virtual destructor for the Light class.

Public Attributes

- glm::vec3 **position**

  Position of the light.
- glm::vec3 **size**

  Size of the area light.

Public Attributes inherited from Ragot::Light

- glm::vec3 **color**

  Color of the light.

4.1.1 Detailed Description

Class for area light.

4.1.2 Constructor & Destructor Documentation

4.1.2.1 AreaLight()

```
Ragot::AreaLight::AreaLight (
            const glm::vec3 & color,
            const glm::vec3 & position,
            const glm::vec3 & size)  [inline]
```

Constructor for the AreaLight class.

Parameters

color	Color of the light.
position	Position of the light.
size	Size of the area light.

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

- Ambient.hpp

4.2 Ragot::Camera Class Reference

Class for managing a camera in OpenGL.

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

Public Member Functions

- Camera (float ratio=1.f)

  Constructor with default ratio.
- Camera (float near_z, float far_z, float ratio=1.f)

  Constructor with near and far clipping planes.
- Camera (float fov_degrees, float near_z, float far_z, float ratio)

  Constructor with field of view, near and far clipping planes, and aspect ratio.
- float get_fov () const

  Gets the field of view.
- float get_near_z () const

  Gets the near clipping plane.
- float get_far_z () const

  Gets the far clipping plane.
- float get_ratio () const

  Gets the aspect ratio.
- const Point & get_location () const

  Gets the location of the camera.
- const Point & get_target () const

  Gets the target point the camera is looking at.
- void set_fov (float new_fov)

  Sets the field of view and recalculates the projection matrix.
- void set_near_z (float new_near_z)

  Sets the near clipping plane and recalculates the projection matrix.
- void set_far_z (float new_far_z)

  Sets the far clipping plane and recalculates the projection matrix.
- void set_ratio (float new_ratio)

  Sets the aspect ratio and recalculates the projection matrix.
- void set_location (float x, float y, float z)

  Sets the location of the camera.
- void set_target (float x, float y, float z)

  Sets the target point the camera is looking at.
- void reset (float new_fov, float new_near_z, float new_far_z, float new_ratio)

  Resets the camera with new parameters and recalculates the projection matrix.
- void move (const glm::vec3 &translation)

  Moves the camera by a given translation vector.
- void rotate (const glm::mat4 &rotation)

  Rotates the camera by a given rotation matrix.
- const glm::mat4 & get_projection_matrix () const

  Gets the projection matrix of the camera.
- glm::mat4 get_transform_matrix_inverse () const

  Gets the inverse of the transformation matrix for the camera.

4.2.1 Detailed Description

Class for managing a camera in OpenGL.

4.2.2 Constructor & Destructor Documentation

4.2.2.1 Camera() [1/3]

```
Ragot::Camera::Camera (
            float ratio = 1.f)  [inline]
```

Constructor with default ratio.

Parameters

ratio	Aspect ratio (default is 1.0f).

4.2.2.2 Camera() [2/3]

```
Ragot::Camera::Camera (
            float near_z,
            float far_z,
            float ratio = 1.f)  [inline]
```

Constructor with near and far clipping planes.

Parameters

near_z	Near clipping plane.
far_z	Far clipping plane.
ratio	Aspect ratio (default is 1.0f).

4.2.2.3 Camera() [3/3]

```
Ragot::Camera::Camera (
            float fov_degrees,
            float near_z,
            float far_z,
            float ratio)  [inline]
```

Constructor with field of view, near and far clipping planes, and aspect ratio.

Parameters

fov_degrees	Field of view in degrees.
near_z	Near clipping plane.
far_z	Far clipping plane.
ratio	Aspect ratio.

4.2.3 Member Function Documentation

4.2.3.1 get_far_z()

```
float Ragot::Camera::get_far_z () const  [inline]
```

Gets the far clipping plane.

Returns

Far clipping plane.

4.2.3.2 get_fov()

```
float Ragot::Camera::get_fov () const  [inline]
```

Gets the field of view.

Returns

Field of view in degrees.

4.2.3.3 get_location()

```
const Point & Ragot::Camera::get_location () const  [inline]
```

Gets the location of the camera.

Returns

Location of the camera.

4.2.3.4 get_near_z()

```
float Ragot::Camera::get_near_z () const  [inline]
```

Gets the near clipping plane.

Returns

Near clipping plane.

4.2.3.5 get_projection_matrix()

```
const glm::mat4 & Ragot::Camera::get_projection_matrix () const  [inline]
```

Gets the projection matrix of the camera.

Returns

Projection matrix.

4.2.3.6 get_ratio()

```
float Ragot::Camera::get_ratio () const  [inline]
```

Gets the aspect ratio.

Returns

Aspect ratio.

4.2.3.7 get_target()

```
const Point & Ragot::Camera::get_target () const  [inline]
```

Gets the target point the camera is looking at.

Returns

Target point.

4.2.3.8 get_transform_matrix_inverse()

```
glm::mat4 Ragot::Camera::get_transform_matrix_inverse () const  [inline]
```

Gets the inverse of the transformation matrix for the camera.

Returns

Inverse of the transformation matrix.

4.2.3.9 move()

```
void Ragot::Camera::move (
            const glm::vec3 & translation)  [inline]
```

Moves the camera by a given translation vector.

Parameters

translation	Translation vector.

4.2.3.10 reset()

```
void Ragot::Camera::reset (
            float new_fov,
            float new_near_z,
            float new_far_z,
            float new_ratio)  [inline]
```

Resets the camera with new parameters and recalculates the projection matrix.

Parameters

new_fov	New field of view in degrees.
new_near_z	New near clipping plane.
new_far_z	New far clipping plane.
new_ratio	New aspect ratio.

4.2.3.11 rotate()

```
void Ragot::Camera::rotate (
            const glm::mat4 & rotation)  [inline]
```

Rotates the camera by a given rotation matrix.

Parameters

rotation	Rotation matrix.

4.2.3.12 set_far_z()

```
void Ragot::Camera::set_far_z (
            float new_far_z)  [inline]
```

Sets the far clipping plane and recalculates the projection matrix.

Parameters

new_far_z	New far clipping plane.

4.2.3.13 set_fov()

```
void Ragot::Camera::set_fov (
            float new_fov)  [inline]
```

Sets the field of view and recalculates the projection matrix.

Parameters

new_fov	New field of view in degrees.

4.2.3.14 set_location()

```
void Ragot::Camera::set_location (
            float x,
            float y,
            float z)  [inline]
```

Sets the location of the camera.

Parameters

x	X-coordinate of the location.
y	Y-coordinate of the location.
z	Z-coordinate of the location.

4.2.3.15 set_near_z()

```
void Ragot::Camera::set_near_z (
            float new_near_z)  [inline]
```

Sets the near clipping plane and recalculates the projection matrix.

Parameters

new_near_z	New near clipping plane.

4.2.3.16 set_ratio()

```
void Ragot::Camera::set_ratio (
            float new_ratio)  [inline]
```

Sets the aspect ratio and recalculates the projection matrix.

Parameters

new_ratio	New aspect ratio.

4.2.3.17 set_target()

```
void Ragot::Camera::set_target (
            float x,
            float y,
            float z)  [inline]
```

Sets the target point the camera is looking at.

Parameters

x	X-coordinate of the target.
y	Y-coordinate of the target.
z	Z-coordinate of the target.

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

- Camera.hpp

4.3 Ragot::Color_Buffer< COLOR > Class Template Reference

Template class for managing a color buffer.

```
#include <Color_Buffer.hpp>
```

Public Types

- using **Color** = COLOR

  Type alias for the color format.

Public Member Functions

- Color_Buffer (unsigned width, unsigned height)

  Constructor for the Color_Buffer class.
- unsigned get_width () const

  Gets the width of the buffer.
- unsigned get_height () const

  Gets the height of the buffer.
- Color * colors ()

  Gets a pointer to the color data.
- const Color * colors () const

  Gets a constant pointer to the color data.
- Color & get (unsigned offset)

  Gets the color at a specific offset.
- const Color & get (unsigned offset) const

  Gets the color at a specific offset (constant version).
- void set (unsigned offset, const Color &color)

  Sets the color at a specific offset.

4.3.1 Detailed Description

template<typename COLOR>
class Ragot::Color_Buffer< COLOR >

Template class for managing a color buffer.

Template Parameters

COLOR	The color format for the buffer.

4.3.2 Constructor & Destructor Documentation

4.3.2.1 Color_Buffer()

```
template<typename COLOR>
Ragot::Color_Buffer< COLOR >::Color_Buffer (
            unsigned width,
            unsigned height)  [inline]
```

Constructor for the Color_Buffer class.

Parameters

width	Width of the buffer.
height	Height of the buffer.

4.3.3 Member Function Documentation

4.3.3.1 colors() [1/2]

```
template<typename COLOR>
Color * Ragot::Color_Buffer< COLOR >::colors ()  [inline]
```

Gets a pointer to the color data.

Returns

Pointer to the color data.

4.3.3.2 colors() [2/2]

```
template<typename COLOR>
const Color * Ragot::Color_Buffer< COLOR >::colors () const  [inline]
```

Gets a constant pointer to the color data.

Returns

Constant pointer to the color data.

4.3.3.3 get() [1/2]

```
template<typename COLOR>
Color & Ragot::Color_Buffer< COLOR >::get (
            unsigned offset)  [inline]
```

Gets the color at a specific offset.

Parameters

offset	The offset in the buffer.

Returns

Reference to the color at the specified offset.

4.3.3.4 get() [2/2]

```
template<typename COLOR>
const Color & Ragot::Color_Buffer< COLOR >::get (
            unsigned offset) const  [inline]
```

Gets the color at a specific offset (constant version).

Parameters

offset	The offset in the buffer.

Returns

Constant reference to the color at the specified offset.

4.3.3.5 get_height()

```
template<typename COLOR>
unsigned Ragot::Color_Buffer< COLOR >::get_height () const  [inline]
```

Gets the height of the buffer.

Returns

Height of the buffer.

4.3.3.6 get_width()

```
template<typename COLOR>
unsigned Ragot::Color_Buffer< COLOR >::get_width () const  [inline]
```

Gets the width of the buffer.

Returns

Width of the buffer.

4.3.3.7 set()

```
template<typename COLOR>
void Ragot::Color_Buffer< COLOR >::set (
            unsigned offset,
            const Color & color)  [inline]
```

Sets the color at a specific offset.

Parameters

offset	The offset in the buffer.
color	The color to set.

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

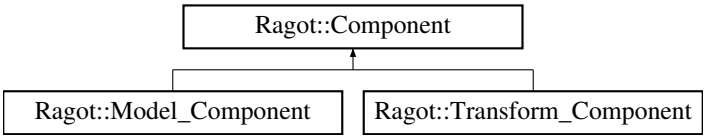
- Color_Buffer.hpp

4.4 Ragot::Component Class Reference

Base class for components.

`#include <Component.hpp>`

Inheritance diagram for Ragot::Component:



Public Member Functions

- virtual ~**Component** ()=default

  Virtual destructor for the Component class.
- std::shared_ptr< Entity > get_entity () const

  Gets the entity associated with this component.
- void set_entity (std::shared_ptr< Entity > ent)

  Sets the entity associated with this component.
- bool get_has_task () const

  Checks if the component has a task.

Protected Attributes

- bool **has_task** = false

  Indicates whether the component has a task.

4.4.1 Detailed Description

Base class for components.

4.4.2 Member Function Documentation

4.4.2.1 get_entity()

```
std::shared_ptr< Entity > Ragot::Component::get_entity () const  [inline]
```

Gets the entity associated with this component.

Returns

Shared pointer to the associated entity.

4.4.2.2 get_has_task()

```
bool Ragot::Component::get_has_task () const  [inline]
```

Checks if the component has a task.

Returns

True if the component has a task, false otherwise.

4.4.2.3 set_entity()

```
void Ragot::Component::set_entity (
            std::shared_ptr< Entity > ent)  [inline]
```

Sets the entity associated with this component.

Parameters

ent	Shared pointer to the entity to associate.

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

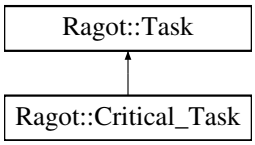
- Component.hpp

4.5 Ragot::Critical_Task Class Reference

Class to execute critical tasks such as rendering, which the Kernel can pause other tasks to execute. These tasks run in the main thread.

```
#include <Task.hpp>
```

Inheritance diagram for Ragot::Critical_Task:



Public Member Functions

- Critical_Task (function< void()> task_func)

  Constructor that calls the base class constructor.
- void execute () override

  Specific execution function for critical tasks.

Public Member Functions inherited from Ragot::Task

- Task (function< void()> task_func)

  Constructor that accepts the function to run for this task.
- virtual ~**Task** ()=default

  Default destructor.
- void **stop_execution** ()

  Stops execution of all tasks, even if executed by one thread.
- void **stop** ()

  Stops execution temporarily for critical sections of code.
- void **resume** ()

  Resumes execution after a stop.

Additional Inherited Members

Protected Member Functions inherited from Ragot::Task

- bool shouldStop ()

  Checks if the task should stop execution.
- bool shouldFinish ()

  Checks if the task should finish execution.
- void **wait_for_resume** ()

  Waits for resume signal to continue execution.

Protected Attributes inherited from Ragot::Task

- function< void()> **task_func**

  Function to run for this task.

4.5.1 Detailed Description

Class to execute critical tasks such as rendering, which the Kernel can pause other tasks to execute. These tasks run in the main thread.

4.5.2 Constructor & Destructor Documentation

4.5.2.1 Critical_Task()

```
Ragot::Critical_Task::Critical_Task (
            function< void()> task_func)  [inline]
```

Constructor that calls the base class constructor.

Parameters

task_func	Function to run for this task.

4.5.3 Member Function Documentation

4.5.3.1 execute()

```
void Ragot::Critical_Task::execute ()  [override], [virtual]
```

Specific execution function for critical tasks.

Implements Ragot::Task.

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

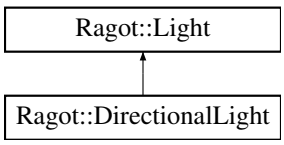
- Task.hpp
- Task.cpp

4.6 Ragot::DirectionalLight Class Reference

Class for directional light.

```
#include <Ambient.hpp>
```

Inheritance diagram for Ragot::DirectionalLight:



Public Member Functions

- DirectionalLight (const glm::vec3 &color, const glm::vec3 direction)
  Constructor for the DirectionalLight class.

Public Member Functions inherited from Ragot::Light

- Light (const glm::vec3 &color)
  Constructor for the Light class.
- virtual ~**Light** ()=default
  Virtual destructor for the Light class.

Public Attributes

- glm::vec3 **direction**
  Direction of the light.

Public Attributes inherited from Ragot::Light

- glm::vec3 **color**

  Color of the light.

4.6.1 Detailed Description

Class for directional light.

4.6.2 Constructor & Destructor Documentation

4.6.2.1 DirectionalLight()

```
Ragot::DirectionalLight::DirectionalLight (
            const glm::vec3 & color,
            const glm::vec3 direction)  [inline]
```

Constructor for the DirectionalLight class.

Parameters

color	Color of the light.
direction	Direction of the light.

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

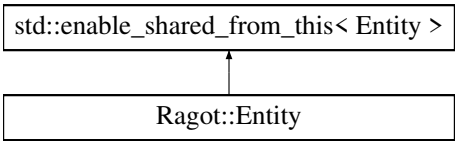
- Ambient.hpp

4.7 Ragot::Entity Class Reference

Class for managing entities in a scene.

```
#include <Entity.hpp>
```

Inheritance diagram for Ragot::Entity:



Public Member Functions

- void set_scene (Scene *scene)
  Sets the scene for this entity.
- const Scene * get_scene ()
  Gets the scene this entity belongs to.
- const Scene * get_scene () const
  Gets the scene this entity belongs to (const version).
- void add_component (shared_ptr< Component > component, const string &name)
  Adds a component to the entity.
- void remove_component (const string &name)
  Removes a component from the entity.
- void add_child (shared_ptr< Entity > child)
  Adds a child entity.
- void remove_child (shared_ptr< Entity > child)
  Removes a child entity.
- void set_transform_parent (Transform_Component *parent)
  Sets the parent transform component.
- const map< string, shared_ptr< Component > > & get_components () const
  Gets the components associated with this entity.

Public Attributes

- Transform_Component **transform**
  Transform component of the entity.

4.7.1 Detailed Description

Class for managing entities in a scene.

4.7.2 Member Function Documentation

4.7.2.1 add_child()

```
void Ragot::Entity::add_child (
            shared_ptr< Entity > child)  [inline]
```

Adds a child entity.

Parameters

child	Shared pointer to the child entity.

4.7.2.2 add_component()

```
void Ragot::Entity::add_component (
            shared_ptr< Component > component,
            const string & name)
```

Adds a component to the entity.

Parameters

component	Shared pointer to the component.
name	Name of the component.

4.7.2.3 get_components()

```
const map< string, shared_ptr< Component > > & Ragot::Entity::get_components () const  [inline]
```

Gets the components associated with this entity.

Returns

Map of components.

4.7.2.4 get_scene() [1/2]

```
const Scene * Ragot::Entity::get_scene ()  [inline]
```

Gets the scene this entity belongs to.

Returns

Pointer to the scene.

4.7.2.5 get_scene() [2/2]

```
const Scene * Ragot::Entity::get_scene () const  [inline]
```

Gets the scene this entity belongs to (const version).

Returns

Pointer to the scene.

4.7.2.6 remove_child()

```
void Ragot::Entity::remove_child (
            shared_ptr< Entity > child)  [inline]
```

Removes a child entity.

Parameters

child	Shared pointer to the child entity.

4.7.2.7 remove_component()

```
void Ragot::Entity::remove_component (
            const string & name)
```

Removes a component from the entity.

Parameters

name	Name of the component.

4.7.2.8 set_scene()

```
void Ragot::Entity::set_scene (
            Scene * scene)  [inline]
```

Sets the scene for this entity.

Parameters

scene	Pointer to the scene.

4.7.2.9 set_transform_parent()

```
void Ragot::Entity::set_transform_parent (
            Transform_Component * parent)  [inline]
```

Sets the parent transform component.

Parameters

parent	Pointer to the parent transform component.

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

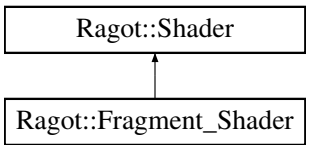
- Entity.hpp
- Entity.cpp

4.8 Ragot::Fragment_Shader Class Reference

Class for managing an OpenGL fragment shader.

```
#include <Shader_Program.hpp>
```

Inheritance diagram for Ragot::Fragment_Shader:



Public Member Functions

- Fragment_Shader (const vector< string > &source_code)

  Constructor for the Fragment_Shader class.

Public Member Functions inherited from Ragot::Shader

- **Shader** ()=delete

  Deleted default constructor.
- ~**Shader** ()

  Destructor for the Shader class.
- GLuint get_id () const

  Gets the shader ID.
- string * get_error ()

  Gets the compilation error message.
- bool is_ok () const

  Checks if the shader is compiled successfully.

Additional Inherited Members

Protected Member Functions inherited from Ragot::Shader

- Shader (const vector< string > &source_code, GLenum type)

  Constructor for the Shader class.
- GLuint compile_shader ()

  Compiles the shader.
- void **show_compilation_error** ()

  Displays compilation errors.

4.8.1 Detailed Description

Class for managing an OpenGL fragment shader.

4.8.2 Constructor & Destructor Documentation

4.8.2.1 Fragment_Shader()

```
Ragot::Fragment_Shader::Fragment_Shader (
            const vector< string > & source_code)  [inline]
```

Constructor for the Fragment_Shader class.

Parameters

source_code	Vector of fragment shader source code.

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

- Shader_Program.hpp

4.9 Ragot::Frame_Buffer Class Reference

Class for managing a frame buffer in OpenGL.

`#include <Postprocess.hpp>`

Public Member Functions

- Frame_Buffer (unsigned width, unsigned height)
  Constructor for the Frame_Buffer class.
- **Frame_Buffer** ()=delete
  Default constructor is deleted.
- ~**Frame_Buffer** ()
  Destructor for the Frame_Buffer class.
- void **bind_frame_buffer** () const
  Binds the frame buffer.
- void **unbind_frame_buffer** () const
  Unbinds the frame buffer.
- void **bind_texture** () const
  Binds the texture.
- void **unbind_texture** () const
  Unbinds the texture.
- void **render** ()
  Renders the frame buffer.

4.9.1 Detailed Description

Class for managing a frame buffer in OpenGL.

4.9.2 Constructor & Destructor Documentation

4.9.2.1 Frame_Buffer()

```
Ragot::Frame_Buffer::Frame_Buffer (
            unsigned width,
            unsigned height)
```

Constructor for the Frame_Buffer class.

Parameters

width	Width of the frame buffer.
height	Height of the frame buffer.

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

- Postprocess.hpp
- Postprocess.cpp

4.10 Ragot::Kernel Class Reference

Class for managing the kernel that executes tasks.

`#include <MyKernel.hpp>`

Public Member Functions

- void add (std::shared_ptr< Task > new_task)
  Adds a new task to the kernel.
- void **run** ()
  Runs the kernel, executing all tasks.
- void **stop** ()
  Stops the kernel and all tasks.
- void **execute_critical** ()
  Executes all critical functions at once.

4.10.1 Detailed Description

Class for managing the kernel that executes tasks.

4.10.2 Member Function Documentation

4.10.2.1 add()

```
void Ragot::Kernel::add (
            std::shared_ptr< Task > new_task)
```

Adds a new task to the kernel.

Parameters

new_task	Shared pointer to the new task to add.

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

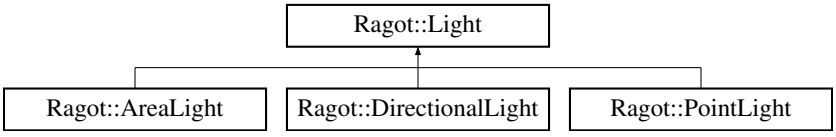
- MyKernel.hpp
- MyKernel.cpp

4.11 Ragot::Light Class Reference

Base class for different types of lights.

`#include <Ambient.hpp>`

Inheritance diagram for Ragot::Light:



Public Member Functions

- Light (const glm::vec3 &color)

  Constructor for the Light class.
- virtual ~**Light** ()=default

  Virtual destructor for the Light class.

Public Attributes

- glm::vec3 **color**

  Color of the light.

4.11.1 Detailed Description

Base class for different types of lights.

4.11.2 Constructor & Destructor Documentation

4.11.2.1 Light()

```
Ragot::Light::Light (
            const glm::vec3 & color)  [inline]
```

Constructor for the Light class.

Parameters

color	Color of the light.

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

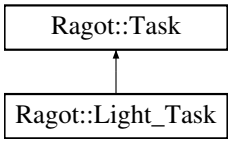
- Ambient.hpp

4.12 Ragot::Light_Task Class Reference

Class to execute cyclic tasks such as Update or Input.

```
#include <Task.hpp>
```

Inheritance diagram for Ragot::Light_Task:



Public Member Functions

- Light_Task (function< void()> task_func)
  Constructor that calls the base class constructor.
- void execute () override
  Specific execution function for light tasks.

Public Member Functions inherited from Ragot::Task

- Task (function< void()> task_func)
  Constructor that accepts the function to run for this task.
- virtual ~**Task** ()=default
  Default destructor.
- void **stop_execution** ()
  Stops execution of all tasks, even if executed by one thread.
- void **stop** ()
  Stops execution temporarily for critical sections of code.
- void **resume** ()
  Resumes execution after a stop.

Additional Inherited Members

Protected Member Functions inherited from Ragot::Task

- bool shouldStop ()
  Checks if the task should stop execution.
- bool shouldFinish ()
  Checks if the task should finish execution.
- void **wait_for_resume** ()
  Waits for resume signal to continue execution.

Protected Attributes inherited from Ragot::Task

- function< void()> **task_func**
  Function to run for this task.

4.12.1 Detailed Description

Class to execute cyclic tasks such as Update or Input.

4.12.2 Constructor & Destructor Documentation

4.12.2.1 Light_Task()

```
Ragot::Light_Task::Light_Task (
            function< void()> task_func)  [inline]
```

Constructor that calls the base class constructor.

Parameters

task_func	Function to run for this task.

4.12.3 Member Function Documentation

4.12.3.1 execute()

```
void Ragot::Light_Task::execute ()  [override], [virtual]
```

Specific execution function for light tasks.

Implements Ragot::Task.

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

- Task.hpp
- Task.cpp

4.13 Ragot::Material Class Reference

Class for managing a material.

```
#include <Mesh.hpp>
```

Public Member Functions

- **Material** ()=delete

  Deleted default constructor.
- Material (const vector< string > &source_code_vertex, const vector< string > &source_code_fragment, const string &texture_base_path)

  Constructor for the Material class.
- ~**Material** ()=default

  Default destructor for the Material class.
- void **use_shader_program** ()

  Uses the shader program.
- GLint get_shader_program_uniform_location (const string &uniform)

  Gets the uniform location in the shader program.
- GLuint get_shader_program_id () const

  Gets the shader program ID.
- const bool bind_texture () const

  Binds the texture.
- const glm::vec3 get_color ()

  Gets the color of the material.
- const float get_shininess ()

  Gets the shininess of the material.

4.13.1 Detailed Description

Class for managing a material.

4.13.2 Constructor & Destructor Documentation

4.13.2.1 Material()

```
Ragot::Material::Material (
            const vector< string > & source_code_vertex,
            const vector< string > & source_code_fragment,
            const string & texture_base_path)
```

Constructor for the Material class.

Parameters

source_code_vertex	Vector of vertex shader source code.
source_code_fragment	Vector of fragment shader source code.
texture_base_path	Path to the base texture file.

4.13.3 Member Function Documentation

4.13.3.1 bind_texture()

```
const bool Ragot::Material::bind_texture () const  [inline]
```

Binds the texture.

Returns

True if the texture is successfully bound, false otherwise.

4.13.3.2 get_color()

```
const glm::vec3 Ragot::Material::get_color ()  [inline]
```

Gets the color of the material.

Returns

Color of the material.

4.13.3.3 get_shader_program_id()

```
GLuint Ragot::Material::get_shader_program_id () const  [inline]
```

Gets the shader program ID.

Returns

Shader program ID.

4.13.3.4 get_shader_program_uniform_location()

```
GLint Ragot::Material::get_shader_program_uniform_location (
            const string & uniform)  [inline]
```

Gets the uniform location in the shader program.

Parameters

uniform	Name of the uniform.

Returns

Uniform location.

4.13.3.5 get_shininess()

```
const float Ragot::Material::get_shininess ()  [inline]
```

Gets the shininess of the material.

Returns

Shininess of the material.

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

- Mesh.hpp
- Mesh.cpp

4.14 Ragot::Mesh Class Reference

Class for managing a 3D mesh.

```
#include <Mesh.hpp>
```

Public Member Functions

- **Mesh** ()=default
  Default constructor for the Mesh class.
- Mesh (const std::string &mesh_file_path)
  Constructor for the Mesh class.
- ~**Mesh** ()
  Destructor for the Mesh class.
- const vector< glm::vec3 > & get_coordinates () const
  Gets the vertex coordinates.
- const vector< glm::vec3 > & get_normals () const
  Gets the vertex normals.
- const vector< glm::vec2 > & get_textures_uv () const
  Gets the texture coordinates.
- const vector< GLuint > & get_indices () const
  Gets the indices.
- const GLuint get_vao_id () const
  Gets the Vertex Array Object ID.
- const GLsizei get_number_of_indices () const
  Gets the number of indices.

Protected Types

- enum {
  COORDINATES_VBO , NORMALS_VBO , TEXTURE_UVS_VBO , INDICES_EBO ,
  VBO_COUNT }

  Enum for VBO indices.

Protected Attributes

- vector< glm::vec3 > **coordinates**

  Vector of vertex coordinates.
- vector< glm::vec3 > **normals**

  Vector of vertex normals.
- vector< glm::vec2 > **texture_coords**

  Vector of texture coordinates.
- vector< GLuint > **indices**

  Vector of indices.

4.14.1 Detailed Description

Class for managing a 3D mesh.

4.14.2 Member Enumeration Documentation

4.14.2.1 anonymous enum

```
anonymous enum  [protected]
```

Enum for VBO indices.

Enumerator

COORDINATES_VBO	VBO index for coordinates.
NORMALS_VBO	VBO index for normals.
TEXTURE_UVS_VBO	VBO index for texture UVs.
INDICES_EBO	VBO index for indices.
VBO_COUNT	Total number of VBOs.

4.14.3 Constructor & Destructor Documentation

4.14.3.1 Mesh()

```
Ragot::Mesh::Mesh (
            const std::string & mesh_file_path)
```

Constructor for the Mesh class.

Parameters

mesh_file_path	Path to the mesh file.

4.14.4 Member Function Documentation

4.14.4.1 get_coordinates()

```
const vector< glm::vec3 > & Ragot::Mesh::get_coordinates () const  [inline]
```

Gets the vertex coordinates.

Returns

Vector of vertex coordinates.

4.14.4.2 get_indices()

```
const vector< GLuint > & Ragot::Mesh::get_indices () const  [inline]
```

Gets the indices.

Returns

Vector of indices.

4.14.4.3 get_normals()

```
const vector< glm::vec3 > & Ragot::Mesh::get_normals () const  [inline]
```

Gets the vertex normals.

Returns

Vector of vertex normals.

4.14.4.4 get_number_of_indices()

```
const GLsizei Ragot::Mesh::get_number_of_indices () const  [inline]
```

Gets the number of indices.

Returns

Number of indices.

4.14.4.5 get_textures_uv()

```
const vector< glm::vec2 > & Ragot::Mesh::get_textures_uv () const  [inline]
```

Gets the texture coordinates.

Returns

Vector of texture coordinates.

4.14.4.6 get_vao_id()

```
const GLuint Ragot::Mesh::get_vao_id () const  [inline]
```

Gets the Vertex Array Object ID.

Returns

VAO ID.

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

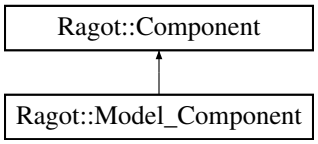
- Mesh.hpp
- Mesh.cpp

4.15 Ragot::Model_Component Class Reference

Component for managing models.

```
#include <Component.hpp>
```

Inheritance diagram for Ragot::Model_Component:



Public Member Functions

- **Model_Component** ()=delete

  Deleted default constructor.
- Model_Component (const string &model_file_path, const string &texture_file_path)

  Constructor for the Model_Component class.
- const GLuint get_shader_program_id () const

  Gets the shader program ID.
- void set_transparency (bool trans)

  Sets the transparency of the model.

Public Member Functions inherited from Ragot::Component

- virtual ~**Component** ()=default

  Virtual destructor for the Component class.
- std::shared_ptr< Entity > get_entity () const

  Gets the entity associated with this component.
- void set_entity (std::shared_ptr< Entity > ent)

  Sets the entity associated with this component.
- bool get_has_task () const

  Checks if the component has a task.

Public Attributes

- Critical_Task **render_task**

  Task for rendering the model.

Additional Inherited Members

Protected Attributes inherited from Ragot::Component

- bool **has_task** = false

  Indicates whether the component has a task.

4.15.1 Detailed Description

Component for managing models.

4.15.2 Constructor & Destructor Documentation

4.15.2.1 Model_Component()

```
Ragot::Model_Component::Model_Component (
            const string & model_file_path,
            const string & texture_file_path)
```

Constructor for the Model_Component class.

Parameters

model_file_path	Path to the model file.
texture_file_path	Path to the texture file.

4.15.3 Member Function Documentation

4.15.3.1 get_shader_program_id()

```
const GLuint Ragot::Model_Component::get_shader_program_id () const  [inline]
```

Gets the shader program ID.

Returns

Shader program ID.

4.15.3.2 set_transparency()

```
void Ragot::Model_Component::set_transparency (
            bool trans)  [inline]
```

Sets the transparency of the model.

Parameters

trans	True to set the model as transparent, false otherwise.

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

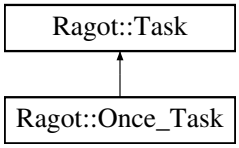
- Component.hpp
- Component.cpp

4.16 Ragot::Once_Task Class Reference

Class for tasks that are executed only once.

```
#include <Task.hpp>
```

Inheritance diagram for Ragot::Once_Task:



Public Member Functions

- Once_Task (function< void()> task_func)

  Constructor that calls the base class constructor.
- void execute () override

  Specific execution function for once-only tasks.

Public Member Functions inherited from Ragot::Task

- Task (function< void()> task_func)

  Constructor that accepts the function to run for this task.
- virtual ~**Task** ()=default

  Default destructor.
- void **stop_execution** ()

  Stops execution of all tasks, even if executed by one thread.
- void **stop** ()

  Stops execution temporarily for critical sections of code.
- void **resume** ()

  Resumes execution after a stop.

Additional Inherited Members

Protected Member Functions inherited from Ragot::Task

- bool shouldStop ()

  Checks if the task should stop execution.
- bool shouldFinish ()

  Checks if the task should finish execution.
- void **wait_for_resume** ()

  Waits for resume signal to continue execution.

Protected Attributes inherited from Ragot::Task

- function< void()> **task_func**

  Function to run for this task.

4.16.1 Detailed Description

Class for tasks that are executed only once.

4.16.2 Constructor & Destructor Documentation

4.16.2.1 Once_Task()

```
Ragot::Once_Task::Once_Task (
            function< void()> task_func)  [inline]
```

Constructor that calls the base class constructor.

Parameters

task_func	Function to run for this task.

4.16.3 Member Function Documentation

4.16.3.1 execute()

```
void Ragot::Once_Task::execute ()  [override], [virtual]
```

Specific execution function for once-only tasks.

Implements Ragot::Task.

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

- Task.hpp
- Task.cpp

4.17 Ragot::Window::OpenGL_Context_Settings Struct Reference

Struct for OpenGL context settings.

```
#include <Window.hpp>
```

Public Attributes

- unsigned **version_major** = 3
  Major version of OpenGL.
- unsigned **version_minor** = 3
  Minor version of OpenGL.
- bool **core_profile** = true
  Core profile flag.
- unsigned **depth_buffer_size** = 24
  Depth buffer size.
- unsigned **stencil_buffer_size** = 0
  Stencil buffer size.
- bool **enable_vsync** = true
  V-Sync enable flag.

4.17.1 Detailed Description

Struct for OpenGL context settings.

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

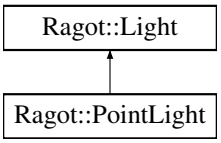
- Window.hpp

4.18 Ragot::PointLight Class Reference

Class for point light.

`#include <Ambient.hpp>`

Inheritance diagram for Ragot::PointLight:



Public Member Functions

- PointLight (const glm::vec3 &color, const glm::vec3 &position)
  Constructor for the PointLight class.

Public Member Functions inherited from Ragot::Light

- Light (const glm::vec3 &color)
  Constructor for the Light class.
- virtual ~**Light** ()=default
  Virtual destructor for the Light class.

Public Attributes

- glm::vec3 **position**
  Position of the light.

Public Attributes inherited from Ragot::Light

- glm::vec3 **color**
  Color of the light.

4.18.1 Detailed Description

Class for point light.

4.18.2 Constructor & Destructor Documentation

4.18.2.1 PointLight()

```
Ragot::PointLight::PointLight (
            const glm::vec3 & color,
            const glm::vec3 & position)  [inline]
```

Constructor for the PointLight class.

Parameters

color	Color of the light.
position	Position of the light.

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

- Ambient.hpp

4.19 Ragot::Rgba8888 Union Reference

Union for managing RGBA color values.

`#include <Color.hpp>`

Public Types

- enum { **RED** , **GREEN** , **BLUE** , **ALPHA** }
  Enum for the RGBA component indices.

Public Attributes

- uint32_t **value**
  32-bit RGBA color value.
- uint8_t **components** [4]
  Array of RGBA components.

4.19.1 Detailed Description

Union for managing RGBA color values.

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

- Color.hpp

4.20 Ragot::Scene Class Reference

Class for managing a scene in OpenGL.

`#include <MySystem.hpp>`

Public Member Functions

- void resize (int width, int height)

  Resizes the scene.
- void on_drag (int pointer_x, int pointer_y)

  Handles pointer drag events.
- void on_click (int pointer_x, int pointer_y, bool down)

  Handles pointer click events.
- void on_translation (glm::vec3 translation)

  Handles translation events.
- void on_shift_pressed (bool down)

  Handles shift key press events.
- void **update** ()

  Updates the scene.
- void **render** ()

  Renders the scene.
- void **postproccess** ()

  Post-processes the scene.
- **Scene** ()

  Constructor for the Scene class.
- void add_entities (shared_ptr< Entity > entity, const string &name)

  Adds an entity to the scene.
- void remove_entities (const string &name)

  Removes an entity from the scene.
- shared_ptr< Entity > get_entity (const string &name) const

  Gets an entity from the scene.
- shared_ptr< Camera > get_camera () const

  Gets the camera of the scene.

4.20.1 Detailed Description

Class for managing a scene in OpenGL.

4.20.2 Member Function Documentation

4.20.2.1 add_entities()

```
void Ragot::Scene::add_entities (
            shared_ptr< Entity > entity,
            const string & name)
```

Adds an entity to the scene.

Parameters

entity	Shared pointer to the entity.
name	Name of the entity.

4.20.2.2 get_camera()

```
shared_ptr< Camera > Ragot::Scene::get_camera () const  [inline]
```

Gets the camera of the scene.

Returns

Shared pointer to the camera.

4.20.2.3 get_entity()

```
shared_ptr< Entity > Ragot::Scene::get_entity (
            const string & name) const
```

Gets an entity from the scene.

Parameters

name	Name of the entity.

Returns

Shared pointer to the entity.

4.20.2.4 on_click()

```
void Ragot::Scene::on_click (
            int pointer_x,
            int pointer_y,
            bool down)
```

Handles pointer click events.

Parameters

pointer_x	X-coordinate of the pointer.
pointer_y	Y-coordinate of the pointer.
down	Indicates if the pointer is pressed down.

4.20.2.5 on_drag()

```
void Ragot::Scene::on_drag (
            int pointer_x,
            int pointer_y)
```

Handles pointer drag events.

Parameters

pointer_x	X-coordinate of the pointer.
pointer_y	Y-coordinate of the pointer.

4.20.2.6 on_shift_pressed()

```
void Ragot::Scene::on_shift_pressed (
            bool down)
```

Handles shift key press events.

Parameters

down	Indicates if the shift key is pressed down.

4.20.2.7 on_translation()

```
void Ragot::Scene::on_translation (
            glm::vec3 translation)
```

Handles translation events.

Parameters

translation	Translation vector.

4.20.2.8 remove_entities()

```
void Ragot::Scene::remove_entities (
            const string & name)
```

Removes an entity from the scene.

Parameters

name	Name of the entity.

4.20.2.9 resize()

```
void Ragot::Scene::resize (
            int width,
            int height)
```

Resizes the scene.

Parameters

width	New width of the scene.
height	New height of the scene.

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

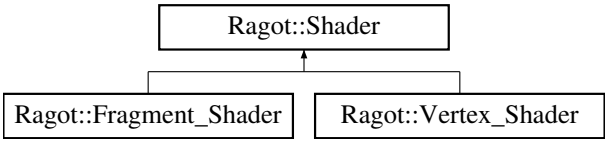
- MySystem.hpp
- MySystem.cpp

4.21 Ragot::Shader Class Reference

Class for managing an OpenGL shader.

`#include <Shader_Program.hpp>`

Inheritance diagram for Ragot::Shader:



Public Member Functions

- **Shader** ()=delete

  Deleted default constructor.
- ~**Shader** ()

  Destructor for the Shader class.
- GLuint get_id () const

  Gets the shader ID.
- string * get_error ()

  Gets the compilation error message.
- bool is_ok () const

  Checks if the shader is compiled successfully.

Protected Member Functions

- Shader (const vector< string > &source_code, GLenum type)

  Constructor for the Shader class.
- GLuint compile_shader ()

  Compiles the shader.
- void **show_compilation_error** ()

  Displays compilation errors.

4.21.1 Detailed Description

Class for managing an OpenGL shader.

4.21.2 Constructor & Destructor Documentation

4.21.2.1 Shader()

```
Ragot::Shader::Shader (
            const vector< string > & source_code,
            GLenum type)  [protected]
```

Constructor for the Shader class.

Parameters

source_code	Vector of shader source code.
type	Shader type (e.g., GL_VERTEX_SHADER, GL_FRAGMENT_SHADER).

4.21.3 Member Function Documentation

4.21.3.1 compile_shader()

```
GLuint Ragot::Shader::compile_shader ()  [protected]
```

Compiles the shader.

Returns

Shader ID.

4.21.3.2 get_error()

```
string * Ragot::Shader::get_error ()  [inline]
```

Gets the compilation error message.

Returns

Pointer to the error message string.

4.21.3.3 get_id()

```
GLuint Ragot::Shader::get_id () const  [inline]
```

Gets the shader ID.

Returns

Shader ID.

4.21.3.4 is_ok()

```
bool Ragot::Shader::is_ok () const  [inline]
```

Checks if the shader is compiled successfully.

Returns

True if compilation succeeded, false otherwise.

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

- Shader_Program.hpp
- Shader_Program.cpp

4.22 Ragot::Shader_Program Class Reference

Class for managing an OpenGL shader program.

```
#include <Shader_Program.hpp>
```

Public Member Functions

- Shader_Program (const vector< string > &source_code_vertex, const vector< string > &source_code_↩ fragment)

  Constructor for the Shader_Program class.
- **Shader_Program** ()=delete

  Deleted default constructor.
- ~**Shader_Program** ()

  Destructor for the Shader_Program class.
- void **use** () const

  Uses the shader program.
- GLuint get_id () const

  Gets the shader program ID.
- GLuint get_uniform_location (string uniform_name) const

  Gets the uniform location in the shader program.

4.22.1 Detailed Description

Class for managing an OpenGL shader program.

4.22.2 Constructor & Destructor Documentation

4.22.2.1 Shader_Program()

```
Ragot::Shader_Program::Shader_Program (
            const vector< string > & source_code_vertex,
            const vector< string > & source_code_fragment)
```

Constructor for the Shader_Program class.

Parameters

source_code_vertex	Vector of vertex shader source code.
source_code_fragment	Vector of fragment shader source code.

4.22.3 Member Function Documentation

4.22.3.1 get_id()

```
GLuint Ragot::Shader_Program::get_id () const  [inline]
```

Gets the shader program ID.

Returns

Shader program ID.

4.22.3.2 get_uniform_location()

```
GLuint Ragot::Shader_Program::get_uniform_location (
            string uniform_name) const  [inline]
```

Gets the uniform location in the shader program.

Parameters

uniform_name	Name of the uniform.

Returns

Uniform location.

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

- Shader_Program.hpp
- Shader_Program.cpp

4.23 Ragot::Skybox Class Reference

Class for rendering a skybox in the scene.

```
#include <Ambient.hpp>
```

Public Member Functions

- Skybox (const string &texture_path)

  Constructor for the Skybox class.
- ~**Skybox** ()

  Destructor for the Skybox class.
- void set_camera (shared_ptr< Camera > cam)

  Sets the camera for the skybox.
- void **render** ()

  Renders the skybox.

4.23.1 Detailed Description

Class for rendering a skybox in the scene.

4.23.2 Constructor & Destructor Documentation

4.23.2.1 Skybox()

```
Ragot::Skybox::Skybox (
            const string & texture_path)
```

Constructor for the Skybox class.

Parameters

texture_path	Path to the texture for the skybox.

4.23.3 Member Function Documentation

4.23.3.1 set_camera()

```
void Ragot::Skybox::set_camera (
            shared_ptr< Camera > cam)  [inline]
```

Sets the camera for the skybox.

Parameters

cam	Shared pointer to the camera.

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

- Ambient.hpp
- Ambient.cpp

4.24 Ragot::System Class Reference

Class for managing the system in OpenGL.

`#include <MySystem.hpp>`

Public Member Functions

- System (const string &Window_Name, const int width, const int height)
  Constructor for the System class.
- **System** ()
  Default constructor for the System class.
- ~**System** ()
  Destructor for the System class.
- void add_entities (shared_ptr< Entity > entity, const string &name)
  Adds an entity to the system.
- void **run** ()
  Runs the system.
- void **stop** ()
  Stops the system.

4.24.1 Detailed Description

Class for managing the system in OpenGL.

4.24.2 Constructor & Destructor Documentation

4.24.2.1 System()

```
Ragot::System::System (
            const string & Window_Name,
            const int width,
            const int height)
```

Constructor for the System class.

Parameters

Window_Name	Name of the window.
width	Width of the window.
height	Height of the window.

4.24.3 Member Function Documentation

4.24.3.1 add_entities()

```
void Ragot::System::add_entities (
            shared_ptr< Entity > entity,
            const string & name)
```

Adds an entity to the system.

Parameters

entity	Shared pointer to the entity.
name	Name of the entity.

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

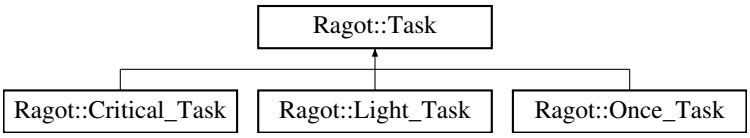
- MySystem.hpp
- MySystem.cpp

4.25 Ragot::Task Class Reference

Base class for managing tasks.

`#include <Task.hpp>`

Inheritance diagram for Ragot::Task:



Public Member Functions

- Task (function< void()> task_func)

  Constructor that accepts the function to run for this task.
- virtual ~**Task** ()=default

  Default destructor.
- virtual void execute ()=0

  Virtual function to execute the task, to be overridden by derived classes.
- void **stop_execution** ()

  Stops execution of all tasks, even if executed by one thread.
- void **stop** ()

  Stops execution temporarily for critical sections of code.
- void **resume** ()

  Resumes execution after a stop.

Protected Member Functions

- bool shouldStop ()

  Checks if the task should stop execution.
- bool shouldFinish ()

  Checks if the task should finish execution.
- void **wait_for_resume** ()

  Waits for resume signal to continue execution.

Protected Attributes

- function< void()> **task_func**
  Function to run for this task.

4.25.1 Detailed Description

Base class for managing tasks.

4.25.2 Constructor & Destructor Documentation

4.25.2.1 Task()

```
Ragot::Task::Task (
            function< void()> task_func)  [inline]
```

Constructor that accepts the function to run for this task.

Parameters

task_func	Function to run for this task.

4.25.3 Member Function Documentation

4.25.3.1 execute()

```
virtual void Ragot::Task::execute ()  [pure virtual]
```

Virtual function to execute the task, to be overridden by derived classes.

Implemented in Ragot::Critical_Task, Ragot::Light_Task, and Ragot::Once_Task.

4.25.3.2 shouldFinish()

```
bool Ragot::Task::shouldFinish ()  [inline], [protected]
```

Checks if the task should finish execution.

Returns

True if the task should finish, false otherwise.

4.25.3.3 shouldStop()

```
bool Ragot::Task::shouldStop ()  [inline], [protected]
```

Checks if the task should stop execution.

Returns

True if the task should stop, false otherwise.

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

- Task.hpp
- Task.cpp

4.26 Ragot::Terrain Class Reference

Class for rendering a terrain in the scene.

```
#include <Ambient.hpp>
```

Public Member Functions

- Terrain (float width, float depth, unsigned x_slices, unsigned z_slices)
  Constructor for the Terrain class.
- ~**Terrain** ()
  Destructor for the Terrain class.
- void set_camera (shared_ptr< Camera > cam)
  Sets the camera for the terrain.
- void **render** ()
  Renders the terrain.

4.26.1 Detailed Description

Class for rendering a terrain in the scene.

4.26.2 Constructor & Destructor Documentation

4.26.2.1 Terrain()

```
Ragot::Terrain::Terrain (
            float width,
            float depth,
            unsigned x_slices,
            unsigned z_slices)
```

Constructor for the Terrain class.

Parameters

width	Width of the terrain.
depth	Depth of the terrain.
x_slices	Number of slices along the x-axis.
z_slices	Number of slices along the z-axis.

4.26.3 Member Function Documentation

4.26.3.1 set_camera()

```
void Ragot::Terrain::set_camera (
            shared_ptr< Camera > cam)  [inline]
```

Sets the camera for the terrain.

Parameters

cam	Shared pointer to the camera.

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

- Ambient.hpp
- Ambient.cpp

4.27 Ragot::Texture2D< COLOR_FORMAT > Class Template Reference

Template class for managing a 2D texture.

```
#include <Mesh.hpp>
```

Public Member Functions

- Texture2D (const string &texture_base_path)
  Constructor for the Texture2D class.
- ~**Texture2D** ()
  Destructor for the Texture2D class.
- bool is_ok () const
  Checks if the texture is loaded.
- virtual bool bind () const
  Binds the texture.

Protected Types

- typedef Color_Buffer< COLOR_FORMAT > **Color_Buffer**
  Type alias for color buffer.

Protected Member Functions

- **Texture2D** ()

  Default constructor for the Texture2D class.
- GLint create_texture_2d (const string &texture_path)

  Creates a 2D texture from a file.
- unique_ptr< Color_Buffer > load_image (const string &texture_path)

  Loads an image from a file.

Protected Attributes

- GLuint **texture_id**

  Texture ID.
- bool **texture_is_loaded**

  Indicates if the texture is loaded.

4.27.1 Detailed Description

template<typename COLOR_FORMAT>
class Ragot::Texture2D< COLOR_FORMAT >

Template class for managing a 2D texture.

Template Parameters

COLOR_FORMAT	Color format of the texture.

4.27.2 Constructor & Destructor Documentation

4.27.2.1 Texture2D()

```
template<typename COLOR_FORMAT>
Ragot::Texture2D< COLOR_FORMAT >::Texture2D (
            const string & texture_base_path)
```

Constructor for the Texture2D class.

Parameters

texture_base_path	Path to the base texture file.

4.27.3 Member Function Documentation

4.27.3.1 bind()

```
template<typename COLOR_FORMAT>
virtual bool Ragot::Texture2D< COLOR_FORMAT >::bind () const  [inline], [virtual]
```

Binds the texture.

Returns

True if the texture is successfully bound, false otherwise.

Reimplemented in Ragot::Texture_Cube.

4.27.3.2 create_texture_2d()

```
template<typename COLOR_FORMAT>
GLint Ragot::Texture2D< COLOR_FORMAT >::create_texture_2d (
            const string & texture_path)  [protected]
```

Creates a 2D texture from a file.

Parameters

texture_path	Path to the texture file.

Returns

The texture ID.

4.27.3.3 is_ok()

```
template<typename COLOR_FORMAT>
bool Ragot::Texture2D< COLOR_FORMAT >::is_ok () const  [inline]
```

Checks if the texture is loaded.

Returns

True if the texture is loaded, false otherwise.

4.27.3.4 load_image()

```
template<typename COLOR_FORMAT>
unique_ptr< Color_Buffer< COLOR_FORMAT > > Ragot::Texture2D< COLOR_FORMAT >::load_image (
            const string & texture_path)  [protected]
```

Loads an image from a file.

Parameters

texture_path	Path to the texture file.

Returns

Unique pointer to the color buffer.

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

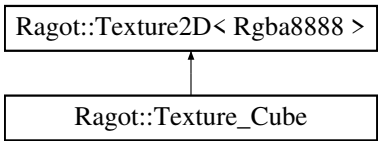
- Mesh.hpp
- Mesh.cpp

4.28 Ragot::Texture_Cube Class Reference

Class for managing a cube texture.

`#include <Mesh.hpp>`

Inheritance diagram for Ragot::Texture_Cube:



Public Member Functions

- Texture_Cube (const string &texture_base_path)
  Constructor for the Texture_Cube class.
- bool bind () const override
  Binds the cube texture.

Public Member Functions inherited from Ragot::Texture2D< Rgba8888 >

- Texture2D (const string &texture_base_path)
  Constructor for the Texture2D class.
- ~**Texture2D** ()
  Destructor for the Texture2D class.
- bool is_ok () const
  Checks if the texture is loaded.

Additional Inherited Members

Protected Types inherited from Ragot::Texture2D< Rgba8888 >

- typedef Color_Buffer< Rgba8888 > **Color_Buffer**
  Type alias for color buffer.

Protected Member Functions inherited from Ragot::Texture2D< Rgba8888 >

- **Texture2D** ()

  Default constructor for the Texture2D class.
- GLint create_texture_2d (const string &texture_path)

  Creates a 2D texture from a file.
- unique_ptr< Color_Buffer > load_image (const string &texture_path)

  Loads an image from a file.

Protected Attributes inherited from Ragot::Texture2D< Rgba8888 >

- GLuint **texture_id**

  Texture ID.
- bool **texture_is_loaded**

  Indicates if the texture is loaded.

4.28.1 Detailed Description

Class for managing a cube texture.

4.28.2 Constructor & Destructor Documentation

4.28.2.1 Texture_Cube()

```
Ragot::Texture_Cube::Texture_Cube (
            const string & texture_base_path)
```

Constructor for the Texture_Cube class.

Parameters

texture_base_path	Path to the base texture file.

4.28.3 Member Function Documentation

4.28.3.1 bind()

```
bool Ragot::Texture_Cube::bind () const  [inline], [override], [virtual]
```

Binds the cube texture.

Returns

True if the texture is successfully bound, false otherwise.

Reimplemented from Ragot::Texture2D< Rgba8888 >.

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

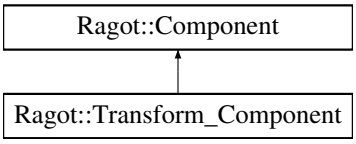
- Mesh.hpp
- Mesh.cpp

4.29 Ragot::Transform_Component Class Reference

Component for managing transformations.

`#include <Component.hpp>`

Inheritance diagram for Ragot::Transform_Component:



Public Member Functions

- **Transform_Component** ()
  Constructor for the Transform_Component class.
- mat4 get_transform_matrix ()
  Gets the transformation matrix.
- void set_position (const vec3 &pos)
  Sets the position.
- vec3 get_position () const
  Gets the position.
- void set_rotation (const vec3 &rot)
  Sets the rotation.
- vec3 get_rotation () const
  Gets the rotation.
- void set_scale (const vec3 &scal)
  Sets the scale.
- vec3 get_scale () const
  Gets the scale.
- void set_parent (Transform_Component *par)
  Sets the parent transformation component.
- Transform_Component * get_parent () const
  Gets the parent transformation component.

Public Member Functions inherited from Ragot::Component

- virtual ~**Component** ()=default
  Virtual destructor for the Component class.
- std::shared_ptr< Entity > get_entity () const
  Gets the entity associated with this component.
- void set_entity (std::shared_ptr< Entity > ent)
  Sets the entity associated with this component.
- bool get_has_task () const
  Checks if the component has a task.

Additional Inherited Members

Protected Attributes inherited from Ragot::Component

- bool **has_task** = false

  Indicates whether the component has a task.

4.29.1 Detailed Description

Component for managing transformations.

4.29.2 Member Function Documentation

4.29.2.1 get_parent()

```
Transform_Component * Ragot::Transform_Component::get_parent () const  [inline]
```

Gets the parent transformation component.

Returns

Pointer to the parent transformation component.

4.29.2.2 get_position()

```
vec3 Ragot::Transform_Component::get_position () const  [inline]
```

Gets the position.

Returns

Current position.

4.29.2.3 get_rotation()

```
vec3 Ragot::Transform_Component::get_rotation () const  [inline]
```

Gets the rotation.

Returns

Current rotation.

4.29.2.4 get_scale()

```
vec3 Ragot::Transform_Component::get_scale () const  [inline]
```

Gets the scale.

Returns

Current scale.

4.29.2.5 get_transform_matrix()

```
mat4 Ragot::Transform_Component::get_transform_matrix ()  [inline]
```

Gets the transformation matrix.

Returns

Transformation matrix.

4.29.2.6 set_parent()

```
void Ragot::Transform_Component::set_parent (
            Transform_Component * par)  [inline]
```

Sets the parent transformation component.

Parameters

par	Pointer to the parent transformation component.

4.29.2.7 set_position()

```
void Ragot::Transform_Component::set_position (
            const vec3 & pos)  [inline]
```

Sets the position.

Parameters

pos	New position.

4.29.2.8 set_rotation()

```
void Ragot::Transform_Component::set_rotation (
            const vec3 & rot)  [inline]
```

Sets the rotation.

Parameters

rot	New rotation.

4.29.2.9 set_scale()

```
void Ragot::Transform_Component::set_scale (
            const vec3 & scal)  [inline]
```

Sets the scale.

Parameters

scal	New scale.

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

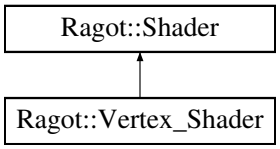
- Component.hpp

4.30 Ragot::Vertex_Shader Class Reference

Class for managing an OpenGL vertex shader.

`#include <Shader_Program.hpp>`

Inheritance diagram for Ragot::Vertex_Shader:



Public Member Functions

- Vertex_Shader (const vector< string > &source_code)

  Constructor for the Vertex_Shader class.

Public Member Functions inherited from Ragot::Shader

- **Shader** ()=delete

  Deleted default constructor.
- ~**Shader** ()

  Destructor for the Shader class.
- GLuint get_id () const

  Gets the shader ID.
- string * get_error ()

  Gets the compilation error message.
- bool is_ok () const

  Checks if the shader is compiled successfully.

Additional Inherited Members

Protected Member Functions inherited from Ragot::Shader

- Shader (const vector< string > &source_code, GLenum type)
  Constructor for the Shader class.
- GLuint compile_shader ()
  Compiles the shader.
- void **show_compilation_error** ()
  Displays compilation errors.

4.30.1 Detailed Description

Class for managing an OpenGL vertex shader.

4.30.2 Constructor & Destructor Documentation

4.30.2.1 Vertex_Shader()

```
Ragot::Vertex_Shader::Vertex_Shader (
            const vector< string > & source_code)  [inline]
```

Constructor for the Vertex_Shader class.

Parameters

source_code	Vector of vertex shader source code.

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

- Shader_Program.hpp

4.31 Ragot::Window Class Reference

Class for managing an SDL window with OpenGL context.

```
#include <Window.hpp>
```

Classes

- struct OpenGL_Context_Settings
  Struct for OpenGL context settings.

Public Types

- enum Position { UNDEFINED = SDL_WINDOWPOS_UNDEFINED , CENTERED = SDL_WINDOWPOS_↩ CENTERED }

  Enum for window position.

Public Member Functions

- Window (const std::string &title, int left_x, int top_y, unsigned width, unsigned height, const OpenGL_Context_Settings &context_details)

  Constructor for the Window class.
- Window (const char *title, int left_x, int top_y, unsigned width, unsigned height, const OpenGL_Context_Settings &context_details)

  Constructor for the Window class.
- ~**Window** ()

  Destructor for the Window class.
- **Window** (const Window &)=delete

  Deleted copy constructor.
- Window & **operator=** (const Window &)=delete

  Deleted copy assignment operator.
- Window (Window &&other) noexcept

  Move constructor for the Window class.
- Window & operator= (Window &&other) noexcept

  Move assignment operator for the Window class.
- void **swap_buffers** ()

  Swaps the OpenGL buffers.
- unsigned get_width ()

  Gets the width of the window.
- unsigned get_height ()

  Gets the height of the window.

4.31.1 Detailed Description

Class for managing an SDL window with OpenGL context.

4.31.2 Member Enumeration Documentation

4.31.2.1 Position

`enum Ragot::Window::Position`

Enum for window position.

Enumerator

UNDEFINED	Undefined position.
CENTERED	Centered position.

4.31.3 Constructor & Destructor Documentation

4.31.3.1 Window() [1/3]

```
Ragot::Window::Window (
            const std::string & title,
            int left_x,
            int top_y,
            unsigned width,
            unsigned height,
            const OpenGL_Context_Settings & context_details)  [inline]
```

Constructor for the Window class.

Parameters

title	Title of the window.
left_x	X coordinate of the window position.
top_y	Y coordinate of the window position.
width	Width of the window.
height	Height of the window.
context_details	OpenGL context settings.

4.31.3.2 Window() [2/3]

```
Ragot::Window::Window (
            const char * title,
            int left_x,
            int top_y,
            unsigned width,
            unsigned height,
            const OpenGL_Context_Settings & context_details)
```

Constructor for the Window class.

Parameters

title	Title of the window.
left_x	X coordinate of the window position.
top_y	Y coordinate of the window position.
width	Width of the window.
height	Height of the window.
context_details	OpenGL context settings.

4.31.3.3 Window() [3/3]

```
Ragot::Window::Window (
            Window && other)  [inline], [noexcept]
```

Move constructor for the Window class.

Parameters

other	Other window to move from.

4.31.4 Member Function Documentation

4.31.4.1 get_height()

```
unsigned Ragot::Window::get_height ()  [inline]
```

Gets the height of the window.

Returns

Height of the window.

4.31.4.2 get_width()

```
unsigned Ragot::Window::get_width ()  [inline]
```

Gets the width of the window.

Returns

Width of the window.

4.31.4.3 operator=()

```
Window & Ragot::Window::operator= (
            Window && other)  [inline], [noexcept]
```

Move assignment operator for the Window class.

Parameters

other	Other window to move from.

Returns

Reference to the moved window.

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

- Window.hpp
- Window.cpp

Chapter 5

File Documentation

5.1 Ambient.hpp

```
00001 /*
00002  *  This file is part of OpenGL-FinalProject
00003  *
00004  *  Developed by Andrés Ragot - github.com/andresragot
00005  *
00006  *  MIT License
00007  *
00008  *  Copyright (c) 2024 Andrés Ragot
00009  *
00010  *  Permission is hereby granted, free of charge, to any person obtaining a copy
00011  *  of this software and associated documentation files (the "Software"), to deal
00012  *  in the Software without restriction, including without limitation the rights
00013  *  to use, copy, modify, merge, publish, distribute, sublicense, and/or sell
00014  *  copies of the Software, and to permit persons to whom the Software is
00015  *  furnished to do so, subject to the following conditions:
00016  *
00017  *  The above copyright notice and this permission notice shall be included in all
00018  *  copies or substantial portions of the Software.
00019  *
00020  *  THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR
00021  *  IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY,
00022  *  FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE
00023  *  AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER
00024  *  LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
00025  *  OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
00026  *  SOFTWARE.
00027  */
00028
00029 #pragma once
00030
00031 #include "Camera.hpp"
00032 #include "Shader_Program.hpp"
00033 #include "Mesh.hpp"
00034 #include "Color.hpp"
00035
00036 #include <glad/glad.h>
00037 #include <string>
00038
00039 namespace Ragot
00040 {
00041     using namespace std;
00042
00047     class Skybox
00048     {
00049     private:
00050         Shader_Program shader_program;
00051         static const GLfloat coordinates[];
00052         static const string vertex_shader_code;
00053         static const string fragment_shader_code;
00054         GLuint vbo_id;
00055         GLuint vao_id;
00056         GLint model_view_matrix_id;
00057         GLint projection_matrix_id;
00058         shared_ptr<Camera> camera = nullptr;
00059         Texture_Cube texture_cube;
00060
00061     public:
```

```
00066         Skybox(const string & texture_path);
00067
00071         ~Skybox();
00072
00077         void set_camera(shared_ptr<Camera> cam) { camera = cam; }
00078
00082         void render();
00083     };
00084
00089     class Terrain
00090     {
00091     private:
00092         enum
00093         {
00094             COORDINATES_VBO,
00095             TEXTURE_UVS_VBO,
00096             INDICES_EBO,
00097             VBO_COUNT
00098         };
00099
00100         Shader_Program shader_program;
00101         static const string vertex_shader_code;
00102         static const string fragment_shader_code;
00103         GLsizei number_of_vertices;
00104         GLsizei number_of_indices;
00105         GLuint vbo_ids[VBO_COUNT];
00106         GLuint vao_id;
00107         GLint model_view_matrix_id;
00108         GLint projection_matrix_id;
00109         GLint view_position_id;
00110         GLint light_position_id;
00111         shared_ptr< Camera > camera = nullptr;
00112         Texture2D< Monochrome8 > texture;
00113
00114     public:
00122         Terrain(float width, float depth, unsigned x_slices, unsigned z_slices);
00123
00127         ~Terrain();
00128
00133         void set_camera(shared_ptr<Camera> cam) { camera = cam; }
00134
00138         void render();
00139     };
00140
00145     class Light
00146     {
00147     public:
00148         glm::vec3 color;
00149
00154         Light(const glm::vec3 & color) : color(color) {}
00155
00159         virtual ~Light() = default;
00160     };
00161
00166     class DirectionalLight : public Light
00167     {
00168     public:
00169         glm::vec3 direction;
00170
00176         DirectionalLight(const glm::vec3 & color, const glm::vec3 direction)
00177             : Light(color), direction(direction) {}
00178     };
00179
00184     class PointLight : public Light
00185     {
00186     public:
00187         glm::vec3 position;
00188
00194         PointLight(const glm::vec3 & color, const glm::vec3 & position)
00195             : Light(color), position(position) {}
00196     };
00197
00202     class AreaLight : public Light
00203     {
00204     public:
00205         glm::vec3 position;
00206         glm::vec3 size;
00207
00214         AreaLight(const glm::vec3 & color, const glm::vec3 & position, const glm::vec3 & size)
00215             : Light(color), position(position), size(size) {}
00216     };
00217 }
```

5.2 Camera.hpp

```
00001 /*
00002  *  This file is part of OpenGL-FinalProject
00003  *
00004  *  Developed by Andrés Ragot - github.com/andresragot
00005  *
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00024  *  LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
00025  *  OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
00026  *  SOFTWARE.
00027  */
00028
00029 #pragma once
00030
00031 #include <glm.hpp>                          // vec3, vec4, ivec4, mat4
00032 #include <gtc/matrix_transform.hpp>         // translate, rotate, scale, perspective
00033 #include <gtc/type_ptr.hpp>                 // value_ptr
00034
00035
00036 namespace Ragot
00037 {
00041     class Camera
00042     {
00043         using Point = glm::vec4;
00044         using Vector = glm::vec4;
00045         using Matrix44 = glm::mat4;
00046
00047     private:
00048         float fov;
00049         float near_z;
00050         float far_z;
00051         float ratio;
00052
00053         Point location;
00054         Point target;
00055
00056         Matrix44 projection_matrix;
00057
00058     public:
00063         Camera(float ratio = 1.f)
00064         {
00065             reset(60.f, 0.1f, 1000.f, ratio);
00066         }
00067
00074         Camera(float near_z, float far_z, float ratio = 1.f)
00075         {
00076             reset(60.f, near_z, far_z, ratio);
00077         }
00078
00086         Camera(float fov_degrees, float near_z, float far_z, float ratio)
00087         {
00088             reset(fov_degrees, near_z, far_z, ratio);
00089         }
00090
00095         float get_fov() const { return fov; }
00096
00101         float get_near_z() const { return near_z; }
00102
00107         float get_far_z() const { return far_z; }
00108
00113         float get_ratio() const { return ratio; }
00114
00119         const Point & get_location() const { return location; }
00120
00125         const Point & get_target() const { return target; }
00126
00131         void set_fov(float new_fov) { fov = new_fov; calculate_projection_matrix(); }
00132
```

```
00137         void set_near_z(float new_near_z) { near_z = new_near_z; calculate_projection_matrix(); }
00138
00143         void set_far_z(float new_far_z) { far_z = new_far_z; calculate_projection_matrix(); }
00144
00149         void set_ratio(float new_ratio) { ratio = new_ratio; calculate_projection_matrix(); }
00150
00157         void set_location(float x, float y, float z) { location[0] = x; location[1] = y; location[2] =
      z; }
00158
00165         void set_target(float x, float y, float z) { target[0] = x; target[1] = y; target[2] = z; }
00166
00174         void reset(float new_fov, float new_near_z, float new_far_z, float new_ratio)
00175         {
00176             set_fov(new_fov);
00177             set_near_z(new_near_z);
00178             set_far_z(new_far_z);
00179             set_ratio(new_ratio);
00180             set_location(0.f, 0.f, 0.f);
00181             set_target(0.f, 0.f, -1.f);
00182             calculate_projection_matrix();
00183         }
00184
00189         void move(const glm::vec3 & translation)
00190         {
00191             location += glm::vec4(translation, 0.f);
00192             // target   += glm::vec4(translation, 1.f);
00193         }
00194
00199         void rotate(const glm::mat4 & rotation)
00200         {
00201             target = location + rotation * (target - location);
00202         }
00203
00208         const glm::mat4 & get_projection_matrix() const
00209         {
00210             return projection_matrix;
00211         }
00212
00217         glm::mat4 get_transform_matrix_inverse() const
00218         {
00219             return glm::lookAt(
00220                 glm::vec3(location[0], location[1], location[2]),
00221                 glm::vec3(target[0], target[1], target[2]),
00222                 glm::vec3(0.0f, 1.0f, 0.0f)
00223             );
00224         }
00225
00226     private:
00230         void calculate_projection_matrix()
00231         {
00232             projection_matrix = glm::perspective(glm::radians(fov), ratio, near_z, far_z);
00233         }
00234     };
00235 }
```

5.3 Color.hpp

```
00001 /*
00002  *  This file is part of OpenGL-FinalProject
00003  *
00004  *  Developed by Andrs Ragot - github.com/andresragot
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00026  *  SOFTWARE.
```

```
00027  */
00028
00029 #pragma once
00030
00031 #include <cstdint>
00032
00033 namespace Ragot
00034 {
00038     using Monochrome8 = uint8_t;
00039
00043     union Rgba8888
00044     {
00048         enum { RED, GREEN, BLUE, ALPHA };
00049
00050         uint32_t value;
00051         uint8_t  components[4];
00052     };
00053 }
```

5.4 Color_Buffer.hpp

```
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00002  *  This file is part of OpenGL-FinalProject
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00025  *  OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
00026  *  SOFTWARE.
00027  */
00028
00029 #pragma once
00030
00031 #include <vector>
00032
00033 namespace Ragot
00034 {
00039     template<typename COLOR>
00040     class Color_Buffer
00041     {
00042     public:
00043         using Color = COLOR;
00044
00045     private:
00046         unsigned width;
00047         unsigned height;
00048
00049         std::vector<Color> buffer;
00050
00051     public:
00057         Color_Buffer(unsigned width, unsigned height)
00058         :
00059             width(width),
00060             height(height),
00061             buffer(width * height)
00062         {
00063         }
00064
00069         unsigned get_width() const
00070         {
00071             return width;
00072         }
00073
00078         unsigned get_height() const
00079         {
```

```
00080             return height;
00081         }
00082
00087         Color* colors()
00088         {
00089             return buffer.data();
00090         }
00091
00096         const Color* colors() const
00097         {
00098             return buffer.data();
00099         }
00100
00106         Color& get(unsigned offset)
00107         {
00108             return buffer[offset];
00109         }
00110
00116         const Color& get(unsigned offset) const
00117         {
00118             return buffer[offset];
00119         }
00120
00126         void set(unsigned offset, const Color& color)
00127         {
00128             buffer[offset] = color;
00129         }
00130     };
00131 }
```

5.5 Component.hpp

```
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00025  *  OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
00026  *  SOFTWARE.
00027  */
00028
00029 #pragma once
00030
00031 #include "MySystem.hpp"
00032 #include "Mesh.hpp"
00033 #include <glm.hpp>
00034 #include <gtc/matrix_transform.hpp>         // translate, rotate, scale, perspective
00035 #include <gtc/type_ptr.hpp>                 // value_ptr, quat
00036 #include "Camera.hpp"
00037 #include "Shader_Program.hpp"
00038
00039 using glm::vec3;
00040 using glm::mat4;
00041
00042 namespace Ragot
00043 {
00047     class Component
00048     {
00049     public:
00053         virtual ~Component() = default;
00054
00059         std::shared_ptr<Entity> get_entity() const { return entity.lock(); }
00060
00065         void set_entity(std::shared_ptr<Entity> ent) { entity = ent; }
```

```
00066
00071         bool get_has_task() const { return has_task; }
00072
00073     private:
00074         std::weak_ptr<Entity> entity;
00075
00076     protected:
00077         bool has_task = false;
00078     };
00079
00083     class Transform_Component : public Component
00084     {
00085     public:
00089         Transform_Component() : position(0.f), rotation(0.f), scale(1.0f), parent(nullptr) {}
00090
00095         mat4 get_transform_matrix()
00096         {
00097             mat4 transform_matrix(1);
00098             transform_matrix  = glm::translate(transform_matrix, position);
00099             transform_matrix  = glm::scale(transform_matrix, scale);
00100
00101             glm::quat quaternion_rotation = glm::quat(glm::radians(rotation));
00102             transform_matrix *= glm::mat4_cast(quaternion_rotation);
00103
00104             if (parent)
00105                 transform_matrix = parent->get_transform_matrix() * transform_matrix;
00106
00107             return transform_matrix;
00108         }
00109
00114         void set_position(const vec3 &pos) { position = pos; }
00115
00120         vec3 get_position() const { return position; }
00121
00126         void set_rotation(const vec3 &rot) { rotation = rot; }
00127
00132         vec3 get_rotation() const { return rotation; }
00133
00138         void set_scale(const vec3 &scal) { scale = scal; }
00139
00144         vec3 get_scale() const { return scale; }
00145
00150         void set_parent(Transform_Component *par) { parent = par; }
00151
00156         Transform_Component* get_parent() const { return parent; }
00157
00158     private:
00159         vec3 position;
00160         vec3 rotation;
00161         vec3 scale;
00162         Transform_Component* parent;
00163     };
00164
00168     class Model_Component : public Component
00169     {
00170     public:
00174         Model_Component() = delete;
00175
00181         Model_Component(const string &model_file_path, const string &texture_file_path);
00182
00183         Critical_Task render_task;
00184
00189         const GLuint get_shader_program_id() const { return material.get_shader_program_id(); }
00190
00195         void set_transparency(bool trans) { is_transparent = trans; }
00196
00197     private:
00198         Mesh mesh;
00199         Material material;
00200         bool is_transparent = false;
00201
00202         static const string vertex_shader_code;
00203         static const string fragment_shader_code;
00204
00205         GLint model_view_matrix_id;
00206         GLint projection_matrix_id;
00207         GLint normal_matrix_id;
00208         GLint view_pos_id;
00209
00210     private:
00214         void configure_material();
00215
00219         void render();
00220     };
00221 }
```

5.6 Entity.hpp

```
00001 /*
00002  *  This file is part of OpenGL-FinalProject
00003  *
00004  *  Developed by Andrés Ragot - github.com/andresragot
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00026  *  SOFTWARE.
00027  */
00028
00029 #pragma once
00030
00031 #include "MySystem.hpp"
00032 #include "Component.hpp"
00033
00034 namespace Ragot
00035 {
00039     class Entity : public std::enable_shared_from_this<Entity>
00040     {
00041         Scene* scene;
00042
00043     public:
00044         Transform_Component transform;
00045
00046     private:
00047         map<string, shared_ptr<Component>> components;
00048         vector<shared_ptr<Entity>> children;
00049
00050     public:
00055         void set_scene(Scene* scene) { this->scene = scene; }
00056
00061         const Scene* get_scene() { return scene; }
00062
00067         const Scene* get_scene() const { return scene; }
00068
00074         void add_component(shared_ptr<Component> component, const string& name);
00075
00080         void remove_component(const string& name);
00081
00086         void add_child(shared_ptr<Entity> child)
00087         {
00088             child->set_transform_parent(&transform);
00089             children.push_back(child);
00090         }
00091
00096         void remove_child(shared_ptr<Entity> child)
00097         {
00098             child->set_transform_parent(nullptr);
00099             children.erase(remove(children.begin(), children.end(), child), children.end());
00100         }
00101
00106         void set_transform_parent(Transform_Component* parent)
00107         {
00108             transform.set_parent(parent);
00109         }
00110
00115         const map<string, shared_ptr<Component>>& get_components() const { return components; }
00116     };
00117 }
```

5.7 Mesh.hpp

```
00001 /*
```

```
00002  *  This file is part of OpenGL-FinalProject
00003  *
00004  *  Developed by Andrés Ragot - github.com/andresragot
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00026  *  SOFTWARE.
00027  */
00028
00029 #pragma once
00030
00031 #include <glad/glad.h>
00032 #include <glm.hpp>
00033 #include <vector>
00034 #include <string>
00035 #include "Camera.hpp"
00036 #include "Shader_Program.hpp"
00037 #include "Color.hpp"
00038 #include "Color_Buffer.hpp"
00039
00040 namespace Ragot
00041 {
00042     using std::vector;
00043
00047     class Mesh
00048     {
00049     protected:
00053         enum
00054         {
00055             COORDINATES_VBO,
00056             NORMALS_VBO,
00057             TEXTURE_UVS_VBO,
00058             INDICES_EBO,
00059             VBO_COUNT
00060         };
00061
00062         vector<glm::vec3> coordinates;
00063         vector<glm::vec3> normals;
00064         vector<glm::vec2> texture_coords;
00065         vector<GLuint> indices;
00066
00067     private:
00068         GLuint vbo_ids[VBO_COUNT];
00069         GLuint vao_id;
00070
00071         GLsizei number_of_indices;
00072
00073         float angle;
00074
00079         void load_mesh(const std::string& mesh_file_path);
00080
00081     private:
00082         Mesh(const Mesh&) = delete;
00083         Mesh& operator=(const Mesh&) = delete;
00084
00085     public:
00089         Mesh() = default;
00090
00095         Mesh(const std::string& mesh_file_path);
00096
00100         ~Mesh()
00101         {
00102             glDeleteVertexArrays(1, &vao_id);
00103             glDeleteBuffers(VBO_COUNT, vbo_ids);
00104         }
00105
00106     public:
00111         const vector<glm::vec3>& get_coordinates() const { return coordinates; }
00112
```

```
00117         const vector<glm::vec3>& get_normals() const { return normals; }
00118
00123         const vector<glm::vec2>& get_textures_uv() const { return texture_coords; }
00124
00129         const vector<GLuint>& get_indices() const { return indices; }
00130
00135         const GLuint get_vao_id() const { return vao_id; }
00136
00141         const GLsizei get_number_of_indices() const { return number_of_indices; }
00142     };
00143
00148     template <typename COLOR_FORMAT>
00149     class Texture2D
00150     {
00151     protected:
00152         typedef Color_Buffer<COLOR_FORMAT> Color_Buffer;
00153
00154         GLuint texture_id;
00155         bool texture_is_loaded;
00156
00157     private:
00158         bool is_uint8 = false;
00159
00160     public:
00165         Texture2D(const string& texture_base_path);
00166
00170         ~Texture2D();
00171
00172     private:
00173         Texture2D(const Texture2D&) = delete;
00174         Texture2D& operator=(const Texture2D&) = delete;
00175
00176     protected:
00180         Texture2D() : texture_id(0), texture_is_loaded(false) {}
00181
00182     public:
00187         bool is_ok() const
00188         {
00189             return texture_is_loaded;
00190         }
00191
00196         virtual bool bind() const
00197         {
00198             return texture_is_loaded ? glBindTexture(GL_TEXTURE_2D, texture_id), true : false;
00199         }
00200
00201     protected:
00207         GLint create_texture_2d(const string& texture_path);
00208
00214         unique_ptr<Color_Buffer> load_image(const string& texture_path);
00215     };
00216
00220     class Texture_Cube : public Texture2D<Rgba8888>
00221     {
00222     public:
00227         Texture_Cube(const string& texture_base_path);
00228
00233         bool bind() const override
00234         {
00235             return texture_is_loaded ? glBindTexture(GL_TEXTURE_CUBE_MAP, texture_id), true : false;
00236         }
00237     };
00238
00242     class Material
00243     {
00244     private:
00245         Shader_Program shader_program;
00246         Texture2D<Rgba8888> texture;
00247         glm::vec3 color;
00248         float shininess;
00249
00250     public:
00251         Material() = delete;
00252
00259         Material(const vector<string>& source_code_vertex, const vector<string>& source_code_fragment,
      const string& texture_base_path);
00260
00264         ~Material() = default;
00265
00269         void use_shader_program() { shader_program.use(); }
00270
00276         GLint get_shader_program_uniform_location(const string& uniform) { return
      shader_program.get_uniform_location(uniform); }
00277
00282         GLuint get_shader_program_id() const { return shader_program.get_id(); }
00283
00288         const bool bind_texture() const { return texture.bind(); }
```

```
00289
00294         const glm::vec3 get_color() { return color; }
00295
00300         const float get_shininess() { return shininess; }
00301     };
00302 }
```

5.8 MyKernel.hpp

```
00001 /*
00002  *  This file is part of OpenGL-FinalProject
00003  *
00004  *  Developed by Andrés Ragot - github.com/andresragot
00005  *
00006  *  MIT License
00007  *
00008  *  Copyright (c) 2024 Andrés Ragot
00009  *
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00011  *  of this software and associated documentation files (the "Software"), to deal
00012  *  in the Software without restriction, including without limitation the rights
00013  *  to use, copy, modify, merge, publish, distribute, sublicense, and/or sell
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00024  *  LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
00025  *  OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
00026  *  SOFTWARE.
00027  */
00028
00029 #pragma once
00030
00031 #include "Task.hpp"
00032 #include <thread>
00033 #include <vector>
00034 #include <memory>
00035 #include <mutex>
00036
00037
00038 namespace Ragot
00039 {
00040     using std::vector;
00041
00045     class Kernel
00046     {
00047         vector<std::shared_ptr<Task>> tasks;
00048         vector<std::shared_ptr<Critical_Task>> render_tasks;
00049
00050         std::mutex tasks_mutex;
00051
00052         std::atomic<bool> exit;
00053         std::atomic<bool> is_running;
00054
00055         std::condition_variable cv;
00056
00057     public:
00062         void add(std::shared_ptr<Task> new_task);
00063
00067         void run();
00068
00072         void stop()
00073         {
00074             tasks.front()->stop_execution();
00075             exit = true;
00076             cv.notify_all();
00077         }
00078
00082         void execute_critical();
00083     };
00084 }
```

5.9 MySystem.hpp

```
00001 /*
00002  *  This file is part of OpenGL-FinalProject
00003  *
00004  *  Developed by Andrés Ragot - github.com/andresragot
00005  *
00006  *  MIT License
00007  *
00008  *  Copyright (c) 2024 Andrés Ragot
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00024  *  LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
00025  *  OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
00026  *  SOFTWARE.
00027  */
00028
00029 #pragma once
00030
00031 #include "Window.hpp"
00032 #include "Task.hpp"
00033 #include "MyKernel.hpp"
00034 #include "Camera.hpp"
00035 #include "Ambient.hpp"
00036 #include "Postprocess.hpp"
00037 #include <string>
00038 #include <memory>
00039 #include <map>
00040 #include <vector>
00041
00042 #include <mutex>
00043 #include <condition_variable>
00044 #include <queue>
00045
00046 namespace Ragot
00047 {
00048     using namespace std;
00049
00050     // Declaración adelantada de Entity
00051     class Entity;
00052
00056     class Scene
00057     {
00058     private:
00059         shared_ptr<Camera> camera = make_shared<Camera>();
00060         map<string, shared_ptr<Entity>> entities;
00061         Frame_Buffer framebuffer;
00062         Skybox skybox;
00063         Terrain terrain;
00064         vector<shared_ptr<Light>> lights;
00065
00066         mutex scene_mutex;
00067
00068         int width;
00069         int height;
00070
00071         float angle_around_x;
00072         float angle_around_y;
00073         float angle_delta_x;
00074         float angle_delta_y;
00075
00076         float camera_speed = 0.025f;
00077
00078         bool pointer_pressed;
00079         int last_pointer_x;
00080         int last_pointer_y;
00081         bool turbo;
00082
00083         float camera_turbo_speed = 2.f;
00084
00085         glm::vec3 camera_translation;
00086
00087     public:
```

```
00093         void resize(int width, int height);
00094
00100         void on_drag(int pointer_x, int pointer_y);
00101
00108         void on_click(int pointer_x, int pointer_y, bool down);
00109
00114         void on_translation(glm::vec3 translation);
00115
00120         void on_shift_pressed(bool down);
00121
00122     public:
00126         void update();
00127
00131         void render();
00132
00136         void postproccess();
00137
00138     public:
00142         Scene();
00143
00144     public:
00150         void add_entities(shared_ptr<Entity> entity, const string& name);
00151
00156         void remove_entities(const string& name);
00157
00163         shared_ptr<Entity> get_entity(const string& name) const;
00164
00169         shared_ptr<Camera> get_camera() const { return camera; }
00170
00171     private:
00176         void set_lights(GLuint shader_program_id);
00177     };
00178
00182     class System
00183     {
00184         Critical_Task buffer_swap;
00185         Critical_Task handle_events;
00186         Critical_Task scene_render;
00187         Light_Task scene_update;
00188         Light_Task process_events;
00189
00190         queue<SDL_Event> eventQueue;
00191         mutex queueMutex;
00192         condition_variable queueCondition;
00193
00194         Window window;
00195         Scene scene;
00196
00197         Kernel kernel;
00198
00199     private:
00203         void input();
00204
00208         void initialize();
00209
00213         void sdl_events();
00214
00215     public:
00222         System(const string& Window_Name, const int width, const int height);
00223
00227         System();
00228
00232         ~System() { SDL_Quit(); }
00233
00234     public:
00240         void add_entities(shared_ptr<Entity> entity, const string& name);
00241
00245         void run()
00246         {
00247             kernel.run();
00248         }
00249
00253         void stop()
00254         {
00255             kernel.stop();
00256         }
00257     };
00258 }
```

5.10 Postprocess.hpp

```
00001 /*
00002  *  This file is part of OpenGL-FinalProject
```

```
00003  *
00004  *  Developed by Andrés Ragot - github.com/andresragot
00005  *
00006  *  MIT License
00007  *
00008  *  Copyright (c) 2024 Andrés Ragot
00009  *
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00024  *  LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
00025  *  OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
00026  *  SOFTWARE.
00027  */
00028
00029 #pragma once
00030 #include "Shader_Program.hpp"
00031
00032 namespace Ragot
00033 {
00037     class Frame_Buffer
00038     {
00039     private:
00043         enum
00044         {
00045             COORDINATES_VBO,
00046             UV_COORDINATES_VBO,
00047             VBO_COUNT
00048         };
00049
00050         static float vertices[];
00051         static float uv_coordenates[];
00052
00053         static const string vertex_code_shader;
00054         static const string fragment_code_shader;
00055
00056         GLuint frame_buffer_id;
00057         GLuint texture_id;
00058         GLuint depthbuffer_id;
00059         GLint current_time_id;
00060
00061         Shader_Program shader_program;
00062
00063         GLuint vbo_id[VBO_COUNT];
00064         GLuint vao_id;
00065
00066     public:
00072         Frame_Buffer(unsigned width, unsigned height);
00073
00077         Frame_Buffer() = delete;
00078
00082         ~Frame_Buffer();
00083
00087         void bind_frame_buffer() const { glBindFramebuffer(GL_FRAMEBUFFER, frame_buffer_id); }
00088
00092         void unbind_frame_buffer() const { glBindFramebuffer(GL_FRAMEBUFFER, 0); }
00093
00097         void bind_texture() const { glBindTexture(GL_TEXTURE_2D, texture_id); }
00098
00102         void unbind_texture() const { glBindTexture(GL_TEXTURE_2D, 0); }
00103
00107         void render();
00108     };
00109 }
```

5.11 Shader_Program.hpp

```
00001 /*
00002  *  This file is part of OpenGL-FinalProject
00003  *
00004  *  Developed by Andrés Ragot - github.com/andresragot
00005  *
```

```
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00025  *  OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
00026  *  SOFTWARE.a
00027  */
00028
00029 #pragma once
00030
00031 #include <glad/glad.h>
00032
00033 #include <string>
00034 #include <vector>
00035
00036 namespace Ragot
00037 {
00038     using namespace std;
00039
00043     class Shader
00044     {
00045     private:
00046         GLuint id;
00047         string error;
00048         bool compilation_succeeded;
00049
00050     protected:
00056         Shader(const vector<string>& source_code, GLenum type);
00057
00062         GLuint compile_shader();
00063
00067         void show_compilation_error();
00068
00069     public:
00070         Shader() = delete;
00071
00075         ~Shader()
00076         {
00077             glDeleteShader(id);
00078         }
00079
00084         GLuint get_id() const
00085         {
00086             return id;
00087         }
00088
00093         string* get_error()
00094         {
00095             return error.empty() ? nullptr : &error;
00096         }
00097
00102         bool is_ok() const
00103         {
00104             return compilation_succeeded;
00105         }
00106     };
00107
00111     class Vertex_Shader : public Shader
00112     {
00113     public:
00118         Vertex_Shader(const vector<string>& source_code) : Shader(source_code, GL_VERTEX_SHADER)
00119         {
00120         }
00121     };
00122
00126     class Fragment_Shader : public Shader
00127     {
00128     public:
00133         Fragment_Shader(const vector<string>& source_code) : Shader(source_code, GL_FRAGMENT_SHADER)
00134         {
00135         }
00136     };
```

```
00137
00141     class Shader_Program
00142     {
00143     private:
00144         GLuint program_id;
00145
00146     public:
00152         Shader_Program(const vector<string>& source_code_vertex, const vector<string>&
      source_code_fragment);
00153
00154         Shader_Program() = delete;
00155
00159         ~Shader_Program()
00160         {
00161             glDeleteProgram(program_id);
00162         }
00163
00167         void use() const
00168         {
00169             glUseProgram(program_id);
00170         }
00171
00176         GLuint get_id() const
00177         {
00178             return program_id;
00179         }
00180
00186         GLuint get_uniform_location(string uniform_name) const
00187         {
00188             return glGetUniformLocation(program_id, uniform_name.c_str());
00189         }
00190
00191     private:
00192         Shader_Program(const Shader_Program&) = delete;
00193         Shader_Program& operator=(const Shader_Program&) = delete;
00194
00200         void initialize(GLuint vertex_shader_id, GLuint fragment_shader_id);
00201
00205         void show_linkage_error();
00206     };
00207 }
```

5.12 Task.hpp

```
00001 /*
00002  *  This file is part of OpenGL-FinalProject
00003  *
00004  *  Developed by Andrés Ragot - github.com/andresragot
00005  *
00006  *  MIT License
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00008  *  Copyright (c) 2024 Andrés Ragot
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00013  *  to use, copy, modify, merge, publish, distribute, sublicense, and/or sell
00014  *  copies of the Software, and to permit persons to whom the Software is
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00024  *  LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
00025  *  OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
00026  *  SOFTWARE.
00027  */
00028
00029 #pragma once
00030
00031
00032 #include <mutex>
00033 #include <condition_variable>
00034 #include <atomic>
00035 #include <functional>
00036
00037 namespace Ragot
00038 {
00039     using std::condition_variable;
```

```
00040     using std::mutex;
00041     using std::atomic;
00042     using std::function;
00043 
00047     class Task
00048     {
00049         static condition_variable cv;
00050         static mutex mtx;
00051         static atomic<bool> is_stop;
00052         static atomic<bool> finish_execution;
00053 
00054     public:
00059         Task(function<void()> task_func) : task_func(task_func) {}
00060 
00064         virtual ~Task() = default;
00065 
00069         virtual void execute() = 0;
00070 
00074         void stop_execution()
00075         {
00076             std::lock_guard<mutex> lock(mtx);
00077             finish_execution = true;
00078             cv.notify_all();
00079         }
00080 
00084         void stop()
00085         {
00086             std::lock_guard<mutex> lock(mtx);
00087             is_stop = true;
00088             cv.notify_all();
00089         }
00090 
00094         void resume()
00095         {
00096             std::lock_guard<mutex> lock(mtx);
00097             is_stop = false;
00098             cv.notify_all();
00099         }
00100 
00101     protected:
00106         bool shouldStop()
00107         {
00108             return is_stop.load();
00109         }
00110 
00115         bool shouldFinish()
00116         {
00117             return finish_execution.load();
00118         }
00119 
00123         void wait_for_resume()
00124         {
00125             std::unique_lock<mutex> lock(mtx);
00126             cv.wait(lock, [this] {return !shouldStop() || shouldFinish(); });
00127         }
00128 
00129     protected:
00130         function<void()> task_func;
00131     };
00132 
00136     class Light_Task : public Task
00137     {
00138     public:
00143         Light_Task(function<void()> task_func) : Task(task_func) {}
00144 
00148         void execute() override;
00149     };
00150 
00154     class Critical_Task : public Task
00155     {
00156     public:
00161         Critical_Task(function<void()> task_func) : Task(task_func) {}
00162 
00166         void execute() override;
00167     };
00168 
00172     class Once_Task : public Task
00173     {
00174     public:
00179         Once_Task(function<void()> task_func) : Task(task_func) {}
00180 
00184         void execute() override;
00185     };
00186 }
00187 
```

5.13 Window.hpp

```
00001 /*
00002  *  This file is part of OpenGL-FinalProject
00003  *
00004  *  Developed by Andrés Ragot - github.com/andresragot
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00025  *  OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
00026  *  SOFTWARE.
00027  */
00028
00029 #pragma once
00030
00031 #include <SDL.h>
00032 #include <string>
00033 #include <utility>
00034
00035 #include <iostream>
00036
00037 namespace Ragot
00038 {
00042     class Window
00043     {
00044     public:
00048         enum Position
00049         {
00050             UNDEFINED = SDL_WINDOWPOS_UNDEFINED,
00051             CENTERED  = SDL_WINDOWPOS_CENTERED,
00052         };
00053
00057         struct OpenGL_Context_Settings
00058         {
00059             unsigned version_major       = 3;
00060             unsigned version_minor       = 3;
00061             bool     core_profile        = true;
00062             unsigned depth_buffer_size   = 24;
00063             unsigned stencil_buffer_size = 0;
00064             bool     enable_vsync        = true;
00065         };
00066
00067     private:
00068         SDL_Window* window_handle;
00069         SDL_GLContext opengl_context;
00070
00071         unsigned width;
00072         unsigned height;
00073
00074     public:
00084         Window(const std::string& title, int left_x, int top_y, unsigned width, unsigned height, const
      OpenGL_Context_Settings& context_details)
00085             : Window(title.c_str(), left_x, top_y, width, height, context_details)
00086         {
00087         }
00088
00098         Window(const char* title, int left_x, int top_y, unsigned width, unsigned height, const
      OpenGL_Context_Settings& context_details);
00099
00103         ~Window();
00104
00105     public:
00106         Window(const Window&) = delete;
00107         Window& operator=(const Window&) = delete;
00108
00113         Window(Window&& other) noexcept
00114         {
00115             this->window_handle  = std::exchange(other.window_handle, nullptr);
00116             this->opengl_context = std::exchange(other.opengl_context, nullptr);
```

```
00117         }
00118
00124         Window& operator=(Window&& other) noexcept
00125         {
00126             this->window_handle  = std::exchange(other.window_handle, nullptr);
00127             this->opengl_context = std::exchange(other.opengl_context, nullptr);
00128
00129             return *this;
00130         }
00131
00135         void swap_buffers()
00136         {
00137             SDL_GL_SwapWindow(window_handle);
00138         }
00139
00144         unsigned get_width() { return width; }
00145
00150         unsigned get_height() { return height; }
00151     };
00152 }
```