pEngine

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1 Hierarchical Index

1.1 Class Hierarchy

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

2 Class Index

2.1 Class List

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

3 File Index

3.1 File List

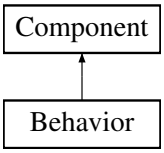
Here is a list of all documented files with brief descriptions:

4 Class Documentation

4.1 Behavior Class Reference

```
#include <behavior.hpp>
```

Inheritance diagram for Behavior:



Public Member Functions

- Behavior ()

  Creates an empty Behavior object.
- Behavior (const Behavior &other)

  Copy constructor.
- Behavior (File_Reader &reader)

  Creates Behavior object using file.
- Behavior * Clone () const

  Clones current Behavior object.
- ~Behavior ()

  Deletes all of the lua states.
- void Update ()

  Update for Behavior object. Calls Behavior manager giving list of its behaviors.
- void Read (File_Reader &reader)

  Reads in the behaviors to be used.
- void Write (File_Writer &writer)

  Gives the names of each lua file to the writer.
- void SetupClassesForLua ()

  Setups up the interface between the engine and the lua files.
- std::vector< std::string > & GetScripts ()

  Returns list of lua filenames.
- void ClassSetup (sol::state *state)

  Sends engine variables and functions to lua.
- bool SwitchScript (unsigned scriptNum, std::string newScriptName)

  Switches one script to another (replace)
- bool AddScript (std::string newScriptName)

  Attaching new script to the object.
- bool CheckIfCopy (std::string newScriptName)

  Checks if the script is already attached to the object.
- void Clear ()

  Clears states and state filenames from object.

Static Public Member Functions

- static CType GetCType ()

  Gets the CType of Behavior (used in Object::GetComponent<>())

Private Attributes

- std::vector< std::string > scripts

  Names of the lua scripts being used.
- std::vector< sol::state * > states

  States of each lua script.

Additional Inherited Members

4.1.1 Detailed Description

Behavior class

Definition at line 30 of file behavior.hpp.

4.1.2 Constructor & Destructor Documentation

4.1.2.1 Behavior() [1/3] Behavior::Behavior ( )

Creates an empty Behavior object.

Definition at line 28 of file behavior.cpp.

```
28 : Component(CType::CBehavior) {}
```

Referenced by Clone().

4.1.2.2 Behavior() [2/3] Behavior::Behavior (const Behavior & *other*)

Copy constructor.

Parameters

other	Behavior object to copy

Definition at line 35 of file behavior.cpp.

```
35                                      : Component(CType::CBehavior) {
36     *this = other;
37 }
```

4.1.2.3 Behavior() [3/3] Behavior::Behavior (File_Reader & *reader*)

Creates Behavior object using file.

Parameters

reader	Data from file

Definition at line 44 of file behavior.cpp.

```
44                                      : Component(CType::CBehavior) {
45     Read(reader);
46 }
```

References Read().

4.1.2.4 ~Behavior() Behavior::~Behavior ( )

Deletes all of the lua states.

Definition at line 61 of file behavior.cpp.

```
61                      {
62     Clear();
63 }
```

References Clear().

4.1.3 Member Function Documentation

4.1.3.1 AddScript() bool Behavior::AddScript (std::string *newScriptName*)

Attaching new script to the object.

Parameters

newScriptName	

Returns

true

false

Definition at line 220 of file behavior.cpp.

```
220                                                 {
221       // Checking if this script is already attached
222     if (CheckIfCopy(newScriptName)) return false;
223       // Setting up new lua state
224     sol::state* state = new sol::state;
225     state->open_libraries(sol::lib::base, sol::lib::math, sol::lib::io, sol::lib::string);
226     states.emplace_back(state);
227       // Adding new script filename to list
228     scripts.emplace_back(newScriptName);
229     ClassSetup(state);
230       // Setting up lua script to run
231     states.back()->script_file(std::string("data/scripts/" + scripts.back()).c_str());
232     (*states.back())["Start"]();
233
234     return true;
235 }
```

References CheckIfCopy(), ClassSetup(), scripts, and states.

Referenced by Editor::Display_Scripts().

4.1.3.2 CheckIfCopy() `bool Behavior::CheckIfCopy (`

`std::string` *newScriptName* `)`

Checks if the script is already attached to the object.

Parameters

newScriptName	Name of script being checked

Returns

true

false

Definition at line 244 of file behavior.cpp.

```
244                                                 {
245       // Checking if script is the same as an existing one
246     for (std::string scriptName : scripts) {
247         if (scriptName.compare(newScriptName) == 0) return true;
248     }
249
250       // Script is not a copy
251     return false;
252 }
```

References scripts.

Referenced by AddScript(), and SwitchScript().

4.1.3.3 ClassSetup() `void Behavior::ClassSetup (`

`sol::state *` *state* `)`

Sends engine variables and functions to lua.

Parameters

state	

Definition at line 147 of file behavior.cpp.

```
147                                     {
148       // Getting objects components
149     Physics* physics = GetParent()->GetComponent<Physics>();
150     Transform* transform = GetParent()->GetComponent<Transform>();
151
152       // Giving lua random functions
153     state->set_function("random_vec3", Random::random_vec3);
154     state->set_function("random_float", Random::random_float);
155
156       // Giving lua glm::vec3 wrapper class
157     sol::usertype<glm::vec3> vec3_type = state->new_usertype<glm::vec3>("vec3",
158         sol::constructors<glm::vec3(float, float, float), glm::vec3(float)>());
159       // Giving lua glm::vec3 wrapper class variables
160     vec3_type.set("x", &glm::vec3::x);
161     vec3_type.set("y", &glm::vec3::y);
162     vec3_type.set("z", &glm::vec3::z);
163       // Giving lua glm::vec3 wrapper class functions
164     state->set_function("normalize", Vector3_Func::normalize);
165     state->set_function("distance", Vector3_Func::distance);
166     state->set_function("get_direction", Vector3_Func::get_direction);
167     state->set_function("zero_vec3", Vector3_Func::zero_vec3);
168     state->set_function("length", Vector3_Func::length);
169
170       // Giving lua physics class
171     state->set("physics", physics);
172     sol::usertype<Physics> physics_type = state->new_usertype<Physics>("Physics",
173         sol::constructors<Physics(), Physics(const Physics)>());
174       // Giving lua physics class variables
175     physics_type.set("acceleration", sol::property(Physics::GetAccelerationRef, &Physics::SetAcceleration));
176     physics_type.set("forces",       sol::property(Physics::GetForcesRef,       &Physics::SetForces));
177     physics_type.set("velocity",     sol::property(Physics::GetVelocityRef,     &Physics::SetVelocity));
178       // Giving lua physics class functions
179     physics_type.set_function("ApplyForce",    &Physics::ApplyForce);
180     physics_type.set_function("UpdateGravity", &Physics::UpdateGravity);
181
182       // Giving lua transform class
183     state->set("transform", transform);
184     sol::usertype<Transform> transform_type = state->new_usertype<Transform>("Transform",
185         sol::constructors<Transform(), Transform(const Transform)>());
186       // Giving lua transform class variables
187     transform_type.set("position",      sol::property(Transform::GetPositionRef,
      &Transform::SetPosition));
188     transform_type.set("rotation",      sol::property(Transform::GetRotationRef,
      &Transform::SetRotation));
189     transform_type.set("scale",         sol::property(Transform::GetScaleRef,
      &Transform::SetScale));
190     transform_type.set("startPosition", sol::property(Transform::GetStartPositionRef,
      &Transform::SetStartPosition));
191 }
```

References Physics::ApplyForce(), Vector3_Func::distance(), Vector3_Func::get_direction(), Physics::GetAcceleration↩Ref(), Object::GetComponent(), Physics::GetForcesRef(), Component::GetParent(), Transform::GetPositionRef(), Transform::GetRotationRef(), Transform::GetScaleRef(), Transform::GetStartPositionRef(), Physics::GetVelocityRef(), Vector3_Func::length(), Vector3_Func::normalize(), Random::random_float(), Random::random_vec3(), Physics::↩SetAcceleration(), Physics::SetForces(), Transform::SetPosition(), Transform::SetRotation(), Transform::SetScale(), Transform::SetStartPosition(), Physics::SetVelocity(), Physics::UpdateGravity(), and Vector3_Func::zero_vec3().

Referenced by AddScript(), and SetupClassesForLua().

4.1.3.4 Clear() `void Behavior::Clear ( )`

Clears states and state filenames from object.

Definition at line 258 of file behavior.cpp.

```
258                         {
259     for (sol::state* state : states) {
260         if (!state) continue;
261         delete state;
262         state = nullptr;
263     }
264 
265     states.clear();
266     scripts.clear();
267 }
```

References scripts, and states.

Referenced by Object::ReRead(), and ~Behavior().

4.1.3.5 Clone() `Behavior * Behavior::Clone ( ) const`

Clones current Behavior object.

Returns

Behavior*

Definition at line 53 of file behavior.cpp.

```
53                                  {
54     return new Behavior(*this);
55 }
```

References Behavior().

4.1.3.6 GetCType() `CType Behavior::GetCType ( ) [static]`

Gets the CType of Behavior (used in Object::GetComponent<>())

Returns

CType

Definition at line 116 of file behavior.cpp.

```
116                             {
117     return CType::CBehavior;
118 }
```

4.1.3.7 GetScripts() `std::vector< std::string > & Behavior::GetScripts ( )`

Returns list of lua filenames.

Returns

std::vector<std::string>&

Definition at line 140 of file behavior.cpp.

```
140 { return scripts; }
```

References scripts.

Referenced by Editor::Display_Scripts().

4.1.3.8 Read() `void Behavior::Read ( File_Reader & reader )`

Reads in the behaviors to be used.

Parameters

reader	Data from file

Definition at line 82 of file behavior.cpp.

```
82                                      {
83     unsigned behavior_num = 0;
84
85       // Reads the name of the lua files
86     while (true) {
87           // Getting the name of the next lua file
88         std::string behavior_name = reader.Read_Behavior_Name("behavior_" + std::to_string(behavior_num));
89         if (behavior_name.compare("") == 0) break;
90           // Adding lua filename to list
91         scripts.emplace_back(behavior_name);
92         ++behavior_num;
93     }
94       // Creating lua state for each of the scripts that were read in
95     for (std::string& script : scripts) {
96         sol::state* state = new sol::state;
97         state->open_libraries(sol::lib::base, sol::lib::math, sol::lib::io, sol::lib::string);
98         states.emplace_back(state);
99     }
100 }
```

References File_Reader::Read_Behavior_Name(), scripts, and states.

Referenced by Behavior(), and Object::ReRead().

4.1.3.9 SetupClassesForLua() `void Behavior::SetupClassesForLua ( )`

Setups up the interface between the engine and the lua files.

Definition at line 124 of file behavior.cpp.

```
124                                 {
125     for (sol::state* state : states) {
126         ClassSetup(state);
127     }
128 
129     for (unsigned i = 0; i < states.size(); ++i) {
130         states[i]->script_file(std::string("data/scripts/" + scripts[i]).c_str());
131         (*states[i])["Start"]();
132     }
133 }
```

References ClassSetup(), scripts, and states.

Referenced by Object_Manager::ReadList(), and Object::ReRead().

4.1.3.10 SwitchScript() `bool Behavior::SwitchScript (`

```
unsigned scriptNum,
std::string newScriptName )
```

Switches one script to another (replace)

Parameters

scriptNum	
newScriptName	

Returns

true

false

Definition at line 201 of file behavior.cpp.

```
201                                                                 {
202       // Checking if this script is already attached
203     if (CheckIfCopy(newScriptName)) return false;
204     sol::state* state = states[scriptNum];
205     scripts[scriptNum] = newScriptName;
206       // Setting up new lua script
207     state->script_file(std::string("data/scripts/" + scripts[scriptNum]).c_str());
208     (*state)["Start"]();
209 
210     return true;
211 }
```

References CheckIfCopy(), scripts, and states.

Referenced by Editor::Display_Scripts().

4.1.3.11 Update() void Behavior::Update ( )

Update for Behavior object. Calls Behavior manager giving list of its behaviors.

Definition at line 70 of file behavior.cpp.

```
70                          {
71     for (sol::state* state : states) {
72         if (!state) continue;
73         (*state)["FixedUpdate"](Engine::GetDt());
74     }
75 }
```

References Engine::GetDt(), and states.

Referenced by Object::Update().

4.1.3.12 Write() void Behavior::Write (File_Writer & *writer*)

Gives the names of each lua file to the writer.

Parameters

writer	

Definition at line 107 of file behavior.cpp.

```
107                                          {
108     writer.Write_Behavior_Name(scripts);
109 }
```

References scripts, and File_Writer::Write_Behavior_Name().

Referenced by Object::Write().

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

- behavior.hpp
- behavior.cpp

4.2 Camera Class Reference

`#include <camera.hpp>`

Public Member Functions

- Camera (int width, int height)

  Creates a new camera with default values.

Static Public Member Functions

- static bool Initialize (File_Reader &settings)

  Initializes the camera.
- static void Update ()

  Moves the camera and checks for some other inputs.
- static void MouseUpdate (GLFWwindow *, double xpos, double ypos)

  Moves the camera using the mouse.
- static void Shutdown ()

  Deletes the camera object if it exists.
- static glm::vec3 & GetPosition ()

  Returns the position of the camera.
- static glm::vec3 & GetFront ()

  Returns the direction of the camera.
- static glm::vec3 & GetUp ()

  Returns the upward direction of the camera.
- static float GetFov ()

  Returns the field of view of the camera.
- static float GetNear ()

  Returns the near view distance of the camera.
- static float GetFar ()

  Returns the far view distance of the camera.
- static float GetYaw ()

  Returns the x rotation of the camera.
- static float GetPitch ()

  Returns the y rotation of the camera.
- static float & GetOriginalMoveSpeed ()

  Returns reference to originalMoveSpeed.
- static float & GetOriginalSprintSpeed ()

  Returns reference to originalSprintSpeed.
- static float & GetOriginalSensitivity ()

  Returns reference to originalSensitivity.

Private Attributes

- glm::vec3 position

  Position of camera.
- glm::vec3 front

  Direction of camera.
- glm::vec3 up

  90 degree upwards direction of camera
- float yaw

  x rotation
- float pitch

  y rotation
- std::pair< float, float > last

  Last position of mouse on screen.

- float fov

  Field of view.
- float speed

  Move speed.
- float nearV

  Near view distance.
- float farV

  Far view distance.
- float sensitivity

  Mouse sensitivity.
- float originalMoveSpeed

  Initial move speed (speed gets change by delta time)
- float originalSprintSpeed

  Initial sprint speed.
- float originalSensitivity

  Original mouse sensitivity.
- bool canMoveMouse

  Whether the user can move the camera using the mouse.

4.2.1 Detailed Description

Camera class ?

Definition at line 26 of file camera.hpp.

4.2.2 Constructor & Destructor Documentation

4.2.2.1 Camera() `Camera::Camera (`

```
int width,
int height )
```

Creates a new camera with default values.

Parameters

width	Width of screen
height	Height of screen

Definition at line 33 of file camera.cpp.

```
33                                  : position(0.f, 0.f, 0.f), front(0.f, 0.f, -1.f),
34     up(0.f, 1.f, 0.f), yaw(-90.f), pitch(0.f), last({ width / 2.f, height / 2.f }),
35     fov(45.f), speed(1), nearV(0.1f), farV(10000.f), sensitivity(1), canMoveMouse(true) {}
```

Referenced by Initialize().

4.2.3 Member Function Documentation

4.2.3.1 GetFar() `float Camera::GetFar ( ) [static]`

Returns the far view distance of the camera.

Returns

float

Definition at line 221 of file camera.cpp.

```
221 { return camera->farV; }
```

References camera, and farV.

Referenced by Graphics::Render().

4.2.3.2 GetFov() `float Camera::GetFov ( ) [static]`

Returns the field of view of the camera.

Returns

float

Definition at line 207 of file camera.cpp.

```
207 { return camera->fov; }
```

References camera, and fov.

Referenced by Graphics::Render().

4.2.3.3 GetFront() `glm::vec3 & Camera::GetFront ( ) [static]`

Returns the direction of the camera.

Returns

vec3&

Definition at line 193 of file camera.cpp.

```
193 { return camera->front; }
```

References camera, and front.

Referenced by Graphics::Render().

4.2.3.4 GetNear() `float Camera::GetNear ( ) [static]`

Returns the near view distance of the camera.

Returns

float

Definition at line 214 of file camera.cpp.

```
214 { return camera->nearV; }
```

References camera, and nearV.

Referenced by Graphics::Render().

4.2.3.5 GetOriginalMoveSpeed() `float & Camera::GetOriginalMoveSpeed ( ) [static]`

Returns reference to originalMoveSpeed.

Returns

float&

Definition at line 242 of file camera.cpp.

```
242 { return camera->originalMoveSpeed; }
```

References camera, and originalMoveSpeed.

Referenced by Editor::Display_Camera_Settings().

4.2.3.6 GetOriginalSensitivity() `float & Camera::GetOriginalSensitivity ( ) [static]`

Returns reference to originalSensitivity.

Returns

float&

Definition at line 256 of file camera.cpp.

```
256 { return camera->originalSensitivity; }
```

References camera, and originalSensitivity.

Referenced by Editor::Display_Camera_Settings().

4.2.3.7 GetOriginalSprintSpeed() `float & Camera::GetOriginalSprintSpeed ( ) [static]`

Returns reference to originalSprintSpeed.

Returns

float&

Definition at line 249 of file camera.cpp.
```
249 { return camera->originalSprintSpeed; }
```

References camera, and originalSprintSpeed.

Referenced by Editor::Display_Camera_Settings().

4.2.3.8 GetPitch() `float Camera::GetPitch ( ) [static]`

Returns the y rotation of the camera.

Returns

float

Definition at line 235 of file camera.cpp.
```
235 { return camera->pitch; }
```

References camera, and pitch.

4.2.3.9 GetPosition() `glm::vec3 & Camera::GetPosition ( ) [static]`

Returns the position of the camera.

Returns

vec3&

Definition at line 186 of file camera.cpp.
```
186 { return camera->position; }
```

References camera, and position.

Referenced by Graphics::Render().

4.2.3.10 GetUp() glm::vec3 & Camera::GetUp ( ) [static]

Returns the upward direction of the camera.

Returns

vec3&

Definition at line 200 of file camera.cpp.

```
200 { return camera->up; }
```

References camera, and up.

Referenced by Graphics::Render().

4.2.3.11 GetYaw() float Camera::GetYaw ( ) [static]

Returns the x rotation of the camera.

Returns

float

Definition at line 228 of file camera.cpp.

```
228 { return camera->yaw; }
```

References camera, and yaw.

4.2.3.12 Initialize() bool Camera::Initialize (File_Reader & *settings*) [static]

Initializes the camera.

Parameters

settings	File that contains settings for the camera

Returns

true

false

Definition at line 44 of file camera.cpp.

```
44                                          {
```

```
45       // Initializing the camera
46     camera = new Camera(settings.Read_Int("windowWidth"), settings.Read_Int("windowHeight"));
47     if (!camera) {
48         Trace::Message("Camera was not initialized.");
49         return false;
50     }
51
52       // Getting data from settings file
53     camera->originalMoveSpeed = settings.Read_Float("moveSpeed");
54     camera->originalSprintSpeed = settings.Read_Float("sprintSpeed");
55     camera->originalSensitivity = settings.Read_Float("sensitivity");
56
57     return true;
58 }
```

References camera, Camera(), Trace::Message(), originalMoveSpeed, originalSensitivity, originalSprintSpeed, File_↩ Reader::Read_Float(), and File_Reader::Read_Int().

Referenced by Engine::Initialize().

4.2.3.13 MouseUpdate() `void Camera::MouseUpdate ( GLFWwindow * , double xpos, double ypos ) [static]`

Moves the camera using the mouse.

Parameters

xpos	x position of the mouse
ypos	y position of the mouse

Returns

void

Definition at line 116 of file camera.cpp.

```
116                                                                 {
117     if (!camera->canMoveMouse) {
118         camera->last = { xpos, ypos };
119         return;
120     }
121       // Setting up variables
122     static bool firstMouse = true;
123     std::pair<double, double> mousePos = { xpos, ypos };
124
125       // Setting the camera sens using delta time
126     camera->sensitivity = camera->originalSensitivity * Engine::GetDeltaTime();
127
128       // Checking if this is the first time the function was called
129     if (firstMouse) {
130         camera->last = { mousePos.first, mousePos.second };
131         firstMouse = false;
132     }
133
134       // Finding how far the mouse is from its last position
135     std::pair<float, float> offset = {
136         mousePos.first - camera->last.first,
137         camera->last.second - mousePos.second
138     };
139       // Setting new last position
```

```
140     camera->last = { mousePos.first, mousePos.second };
141
142       // Updating offsets to use the sensitivity of the camera
143     offset.first *= camera->sensitivity;
144     offset.second *= camera->sensitivity;
145
146       // Applying the offset to the camera's direction
147     camera->yaw += offset.first;
148     camera->pitch += offset.second;
149
150       // Stops the camera from circling completely in the y direction
151     if (camera->pitch > 89.f) camera->pitch = 89.f;
152     if (camera->pitch < -89.f) camera->pitch = -89.f;
153
154       // Finding the direction of the camera
155     glm::vec3 tempFront = {
156         std::cos(glm::radians(camera->yaw)) * std::cos(glm::radians(camera->pitch)),
157         std::sin(glm::radians(camera->pitch)),
158         std::sin(glm::radians(camera->yaw)) * std::cos(glm::radians(camera->pitch))
159     };
160     camera->front = glm::normalize(tempFront);
161
162       // Finding the upward direction of the camera
163     glm::vec3 tempUp = { 0.f, 1.f, 0.f };
164     glm::vec3 right = glm::normalize(glm::cross(tempUp, camera->front));
165     glm::vec3 up = glm::cross(camera->front, right);
166     camera->up = up;
167 }
```

References camera, canMoveMouse, front, Engine::GetDeltaTime(), last, originalSensitivity, pitch, sensitivity, up, and yaw.

Referenced by Graphics::Initialize().

4.2.3.14 Shutdown() `void Camera::Shutdown ( ) [static]`

Deletes the camera object if it exists.

Returns

void

Definition at line 174 of file camera.cpp.

```
174                         {
175     if (camera) {
176         delete camera;
177         camera = nullptr;
178     }
179 }
```

References camera.

Referenced by Engine::Shutdown().

4.2.3.15 Update() `void Camera::Update ( ) [static]`

Moves the camera and checks for some other inputs.

Returns

void

Definition at line 65 of file camera.cpp.

```
65                      {
66       // Checking if the engine should be closed
67     if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_ESCAPE) == GLFW_PRESS && Editor::GetTakeKeyboardInput()) {
68         if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_ESCAPE) == GLFW_RELEASE) {
69             glfwSetWindowShouldClose(Graphics::GetWindow(), true);
70         }
71     }
72
73       // Checking if sprint is being used
74     if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_LEFT_SHIFT) == GLFW_PRESS &&
       Editor::GetTakeKeyboardInput()) {
75         camera->speed = camera->originalSprintSpeed * Engine::GetDeltaTime();
76     }
77     else {
78         camera->speed = camera->originalMoveSpeed * Engine::GetDeltaTime();
79     }
80
81       // Checking for movement using W, A, S, D, SPACE, and CTRL
82     if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_W) == GLFW_PRESS && Editor::GetTakeKeyboardInput()) {
83         camera->position += camera->speed * camera->front;
84     }
85     if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_S) == GLFW_PRESS && Editor::GetTakeKeyboardInput()) {
86         camera->position -= camera->speed * camera->front;
87     }
88     if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_A) == GLFW_PRESS && Editor::GetTakeKeyboardInput()) {
89         camera->position -= glm::normalize(glm::cross(camera->front, camera->up)) * camera->speed;
90     }
91     if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_D) == GLFW_PRESS && Editor::GetTakeKeyboardInput()) {
92         camera->position += glm::normalize(glm::cross(camera->front, camera->up)) * camera->speed;
93     }
94     if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_SPACE) == GLFW_PRESS) {
95         camera->position += camera->speed * camera->up;
96     }
97     if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_LEFT_CONTROL) == GLFW_PRESS) {
98         camera->position -= camera->speed * camera->up;
99     }
100
101      if (glfwGetMouseButton(Graphics::GetWindow(), GLFW_MOUSE_BUTTON_RIGHT) == GLFW_PRESS &&
       Editor::GetTakeKeyboardInput()) {
102          camera->canMoveMouse = true;
103      }
104      if (glfwGetMouseButton(Graphics::GetWindow(), GLFW_MOUSE_BUTTON_RIGHT) == GLFW_RELEASE) {
105          camera->canMoveMouse = false;
106      }
107 }
```

References camera, canMoveMouse, front, Engine::GetDeltaTime(), Editor::GetTakeKeyboardInput(), Graphics::Get↩Window(), originalMoveSpeed, originalSprintSpeed, position, speed, and up.

Referenced by Engine::Update().

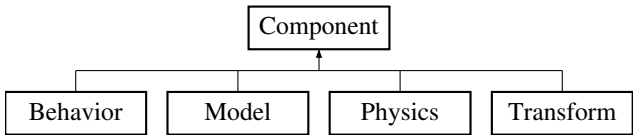
The documentation for this class was generated from the following files:

- camera.hpp
- camera.cpp

4.3 Component Class Reference

`#include <component.hpp>`

Inheritance diagram for Component:



Public Types

- enum CType { **CBehavior**, **CModel**, **CPhysics**, **CTransform** }

Public Member Functions

- Component (CType type_)

  Creates a new component of given type.
- void SetParent (Object *object)

  Sets the parent of the component.
- Object * GetParent () const

  Gets the parent of the component.
- CType GetCType () const

  Gets the type of the component.

Private Attributes

- CType type

  Type of component.
- Object * parent

  Object that this component is attached to.

4.3.1 Detailed Description

Component class

Definition at line 20 of file component.hpp.

4.3.2 Member Enumeration Documentation

4.3.2.1 CType enum Component::CType

Types of components

Definition at line 23 of file component.hpp.

```
23                  {
24              CBehavior,
25              CModel,
26              CPhysics,
27              CTransform,
28          };
```

4.3.3 Constructor & Destructor Documentation

4.3.3.1 Component() Component::Component (CType type_)

Creates a new component of given type.

Parameters

*type_*	Type of component

Definition at line 20 of file component.cpp.

```
20 : type(type_) {}
```

4.3.4 Member Function Documentation

4.3.4.1 GetCType() CType Component::GetCType ( ) const

Gets the type of the component.

Returns

CType Type of the component

Definition at line 41 of file component.cpp.

```
41 { return type; }
```

References type.

Referenced by Object::AddComponent().

4.3.4.2 GetParent() `Object * Component::GetParent ( ) const`

Gets the parent of the component.

Returns

Object* The parent

Definition at line 34 of file component.cpp.

```
34 { return parent; }
```

References parent.

Referenced by Behavior::ClassSetup(), Editor::Display_Model(), Editor::Display_Physics(), Editor::Display_Scripts(), Model::Draw(), Physics::Update(), and Physics::UpdateGravity().

4.3.4.3 SetParent() `void Component::SetParent ( Object * object )`

Sets the parent of the component.

Parameters

object	The object that is the parent

Definition at line 27 of file component.cpp.

```
27 { parent = object; }
```

References parent.

Referenced by Object::AddComponent().

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

- component.hpp
- component.cpp

4.4 Editor Class Reference

```
#include <editor.hpp>
```

Static Public Member Functions

- static bool Initialize ()

  Sets up the config and style of the editor.
- static void Update ()

  Updates the editor content and calls display functions.
- static void Render ()

  Render the editor.
- static void Shutdown ()

  Destroy editor windows and systems.
- static void Reset ()

  Sets selected object to invalid value.
- static bool GetTakeKeyboardInput ()

  Returns whether the program should ignore keyboard input.

Private Member Functions

- void Display_Dockspace ()

  Setup and display the editor's dockspace.
- void Display_Scene ()

  Display the scene window.
- void Display_Components ()

  Display all of the components of the current selected_object.
- void Display_World_Settings ()

  Shows all of the settings of the engine itself.
- void Display_Camera_Settings ()

  Displays the different camera settings, allows user to change them as needed.
- void Display_Scripts (Behavior *behavior)

  Displays the different lua scripts attached to the selected object.
- void Display_Model (Model *model)

  Displays the data of the model being used.
- void Display_Physics (Physics *physics)

  Shows the Physics component.
- void Display_Transform (Transform *transform)

  Display transform data, users can change any of it.
- void Display_Menu_Bar ()

  Displays menu bar that can be used to save the scene.

Private Attributes

- bool isOpen

  Whether the editor window is open or not.
- int selected_object

  Current object selected in the scene window.
- int selected_component

  Current component selected.
- bool takeKeyboardInput

  Whether the program should take keyboard input.
- int object_to_copy

  Object that will be copied if paste is used (doesn't need to be the same as selected_object)

4.4.1 Detailed Description

Editor class

Definition at line 25 of file editor.hpp.

4.4.2 Member Function Documentation

4.4.2.1 Display_Camera_Settings() void Editor::Display_Camera_Settings ( ) [private]

Displays the different camera settings, allows user to change them as needed.

Definition at line 404 of file editor.cpp.

```
404                                     {
405     ImGui::Begin("Camera Settings");
406
407     ImGui::PushItemWidth(137);
408
409       // Default move speed
410     ImGui::Text("Move Speed");
411     ImGui::SameLine(100); ImGui::InputFloat("##2", &Camera::GetOriginalMoveSpeed());
412
413       // Move speed when holding shift
414     ImGui::Text("Sprint Speed");
415     ImGui::SameLine(100); ImGui::InputFloat("##3", &Camera::GetOriginalSprintSpeed());
416
417       // Mouse sensitivity when looking around
418     ImGui::Text("Sensitivity");
419     ImGui::SameLine(100); ImGui::InputFloat("##4", &Camera::GetOriginalSensitivity());
420
421     ImGui::PopItemWidth();
422
423     ImGui::End();
424 }
```

References Camera::GetOriginalMoveSpeed(), Camera::GetOriginalSensitivity(), and Camera::GetOriginalSprint↩ Speed().

Referenced by Update().

4.4.2.2 Display_Components() void Editor::Display_Components ( ) [private]

Display all of the components of the current selected_object.

Definition at line 266 of file editor.cpp.

```
266                                     {
267     ImGui::Begin("Components##1");
268
269     if (selected_object == -1) { ImGui::End(); return; }
270     Object* object = Object_Manager::FindObject(selected_object);
271     std::string objectName = object->GetName();
272
273       // Display name box (allows changing the name of an object)
274     static char nameBuf[128] = "";
275     sprintf(nameBuf, objectName.c_str());
276
277     if (ImGui::InputText("Name", nameBuf, 128, ImGuiInputTextFlags_EnterReturnsTrue)) {
```

```
278         object->SetName(std::string(nameBuf));
279     }
280 
281     if (ImGui::IsItemDeactivatedAfterEdit()) {
282         object->SetName(std::string(nameBuf));
283     }
284 
285       // Template used by the selected object
286     ImGui::Text("Template:");
287     ImGui::SameLine(100);
288     std::string templateName = object->GetTemplateName();
289     if (templateName.empty()) templateName = "No template##1";
290     if (ImGui::Button(templateName.c_str())) {
291         ImGuiFileDialog::Instance()->OpenDialog("ChooseTemplate##1", "Choose File", ".json",
      "./data/json/objects/");
292     }
293 
294     ImGui::SameLine();
295     if (ImGui::Button("New Template")) {
296         object->Write();
297     }
298 
299     if (ImGuiFileDialog::Instance()->Display("ChooseTemplate##1")) {
300         if (ImGuiFileDialog::Instance()->IsOk()) {
301             std::string filePathName = ImGuiFileDialog::Instance()->GetCurrentFileName();
302             object->ReRead(filePathName);
303         }
304 
305         ImGuiFileDialog::Instance()->Close();
306     }
307 
308       // Getting all of the components
309     Behavior* behavior = object->GetComponent<Behavior>();
310     Model* model = object->GetComponent<Model>();
311     Physics* physics = object->GetComponent<Physics>();
312     Transform* transform = object->GetComponent<Transform>();
313 
314       // Display all of the components of the selected_object
315     Display_Transform(transform);
316     Display_Physics(physics);
317     Display_Model(model);
318     Display_Scripts(behavior);
319 
320     ImGui::Separator();
321 
322       // Button to add new components to the selected_object
323     if (ImGui::Button("Add Component##1")) {
324         ImGui::OpenPopup("New Component##1");
325     }
326 
327       // Add new components to object (only ones that the object doesn't already have)
328     if (ImGui::BeginPopup("New Component##1")) {
329         if (!physics) {
330             if (ImGui::Selectable("Physics##1")) {
331                 physics = new Physics;
332                 object->AddComponent(physics);
333             }
334         }
335         if (!model) {
336             if (ImGui::Selectable("Model##1")) {
337                 model = new Model;
338                 object->AddComponent(model);
339             }
340         }
341         if (!behavior) {
342             if (ImGui::Selectable("Scripts##1")) {
343                 behavior = new Behavior;
344                 object->AddComponent(behavior);
345             }
346         }
347         ImGui::EndPopup();
348     }
349 
350     ImGui::End();
351 }
```

References Display_Model(), Display_Physics(), Display_Scripts(), Display_Transform(), Object_Manager::Find↩Object(), and selected_object.

Referenced by Update().

4.4.2.3 Display_Dockspace() void Editor::Display_Dockspace ( ) [private]

Setup and display the editor's dockspace.

Definition at line 170 of file editor.cpp.

```
170                                {
171       // Setting up viewport
172     ImGuiViewport* viewport = ImGui::GetMainViewport();
173     ImGui::SetNextWindowPos(viewport->Pos);
174     ImGui::SetNextWindowSize(viewport->Size);
175     ImGui::SetNextWindowViewport(viewport->ID);
176     ImGui::SetNextWindowBgAlpha(0.0f);
177
178       // Setting up window flags
179     ImGuiWindowFlags window_flags = ImGuiWindowFlags_MenuBar | ImGuiWindowFlags_NoDocking;
180     window_flags |= ImGuiWindowFlags_NoTitleBar | ImGuiWindowFlags_NoCollapse | ImGuiWindowFlags_NoResize |
        ImGuiWindowFlags_NoMove;
181     window_flags |= ImGuiWindowFlags_NoBringToFrontOnFocus | ImGuiWindowFlags_NoNavFocus;
182
183       // Setting up window style
184     ImGui::PushStyleVar(ImGuiStyleVar_WindowRounding, 0.0f);
185     ImGui::PushStyleVar(ImGuiStyleVar_WindowBorderSize, 0.0f);
186     ImGui::PushStyleVar(ImGuiStyleVar_WindowPadding, ImVec2(0.0f, 0.0f));
187
188       // Making the window
189     ImGui::SetNextWindowBgAlpha(0.0f);
190     ImGui::Begin("Editor Window", &editor->isOpen, window_flags);
191     ImGui::PopStyleVar(3);
192
193       // Setting up window settings
194     ImGuiID dockspace_id = ImGui::GetID("Editor");
195     ImGuiDockNodeFlags dockspace_flags = ImGuiDockNodeFlags_PassthruCentralNode |
        ImGuiDockNodeFlags_NoDockingInCentralNode;
196     ImGui::DockSpace(dockspace_id, ImVec2(0.0f, 0.0f), dockspace_flags);
197     editor->Display_Menu_Bar();
198     ImGui::End();
199 }
```

References Display_Menu_Bar(), editor, and isOpen.

Referenced by Update().

4.4.2.4 Display_Menu_Bar() void Editor::Display_Menu_Bar ( ) [private]

Displays menu bar that can be used to save the scene.

Definition at line 677 of file editor.cpp.

```
677                                    {
678     static bool saveAs = false;
679     if (ImGui::BeginMenuBar()) {
680         if (ImGui::BeginMenu("File##1")) {
681             if (ImGui::MenuItem("Save##1")) {
682                 Engine::Write();
683             }
684             if (ImGui::MenuItem("Save As..##1")) {
685                 saveAs = true;
686             }
687
688             ImGui::EndMenu();
689         }
690         if (saveAs) {
691             static char nameBuf[128] = "";
692             sprintf(nameBuf, Engine::GetPresetName().c_str());
693             if (ImGui::InputText("Name", nameBuf, 128, ImGuiInputTextFlags_EnterReturnsTrue)) {
694                 Engine::SetPresetName(std::string(nameBuf));
```

```
695                 Engine::Write();
696                 saveAs = false;
697             }
698 
699             if (ImGui::IsItemDeactivatedAfterEdit()) {
700                 Engine::SetPresetName(std::string(nameBuf));
701                 Engine::Write();
702                 saveAs = false;
703             }
704         }
705 
706         ImGui::EndMenuBar();
707     }
708 }
```

References Engine::GetPresetName(), Engine::SetPresetName(), and Engine::Write().

Referenced by Display_Dockspace().

4.4.2.5 Display_Model() `void Editor::Display_Model ( Model * model ) [private]`

Displays the data of the model being used.

Parameters

model	

Definition at line 511 of file editor.cpp.

```
511                                         {
512     if (!model) return;
513 
514     std::string modelName = model->GetModelName();
515     std::string textureName = model->GetTextureName();
516 
517       // Setting up tree flags
518     ImGuiTreeNodeFlags node_flags = ImGuiTreeNodeFlags_SpanAvailWidth | ImGuiTreeNodeFlags_OpenOnDoubleClick
      | ImGuiTreeNodeFlags_OpenOnArrow;
519     if (selected_component == CType::CModel) node_flags |= ImGuiTreeNodeFlags_Selected;
520 
521     const bool model_open = ImGui::TreeNodeEx((void*)(intptr_t)CType::CModel, node_flags, "Model");
522     if (ImGui::IsItemClicked()) selected_component = CType::CModel;
523 
524       // Right click behavior to delete model component from selected object
525     if (ImGui::IsItemClicked(ImGuiMouseButton_Right)) {
526         selected_component = CType::CModel;
527         ImGui::OpenPopup("DeleteModel##1");
528     }
529 
530     if (ImGui::BeginPopup("DeleteModel##1")) {
531         if (ImGui::Selectable("Delete##3")) {
532             model->GetParent()->RemoveComponent<Model>();
533             selected_component = -1;
534         }
535         ImGui::EndPopup();
536     }
537 
538     if (model_open) {
539           // Model that is being used
540         ImGui::Text("Model"); ImGui::SameLine(100);
541         if (ImGui::Button(modelName.c_str())) {
542             ImGuiFileDialog::Instance()->OpenDialog("ChooseFileDlgKey##1", "Choose File", ".obj",
      "./data/models/");
543         }
544 
545         if (ImGui::ImGuiFileDialog::Instance()->Display("ChooseFileDlgKey##1")) {
```

```
546             if (ImGuiFileDialog::Instance()->IsOk()) {
547                 std::string filePathName = ImGuiFileDialog::Instance()->GetCurrentFileName();
548                 model->SwitchModel(filePathName);
549             }
550 
551             ImGuiFileDialog::Instance()->Close();
552         }
553 
554           // Texture that is being used
555         ImGui::Text("Texture"); ImGui::SameLine(100);
556         if (ImGui::Button(textureName.c_str())) {
557             ImGuiFileDialog::Instance()->OpenDialog("ChooseFileDlgKey##2", "Choose File", ".dds,.DDS",
      "./data/textures/");
558         }
559 
560         if (ImGuiFileDialog::Instance()->Display("ChooseFileDlgKey##2")) {
561             if (ImGuiFileDialog::Instance()->IsOk()) {
562                 std::string filePathName = ImGuiFileDialog::Instance()->GetCurrentFileName();
563                 model->SwitchTexture(filePathName);
564             }
565 
566             ImGuiFileDialog::Instance()->Close();
567         }
568 
569         ImGui::TreePop();
570     }
571 }
```

References Model::GetModelName(), Component::GetParent(), Model::GetTextureName(), Object::Remove↩Component(), selected_component, Model::SwitchModel(), and Model::SwitchTexture().

Referenced by Display_Components().

4.4.2.6 Display_Physics() `void Editor::Display_Physics (`

`Physics * physics ) [private]`

Shows the Physics component.

Parameters

physics	

Definition at line 578 of file editor.cpp.

```
578                                             {
579     if (!physics) return;
580 
581     glm::vec3 velocity = physics->GetVelocity();
582 
583     ImGuiTreeNodeFlags node_flags = ImGuiTreeNodeFlags_SpanAvailWidth | ImGuiTreeNodeFlags_OpenOnDoubleClick
      | ImGuiTreeNodeFlags_OpenOnArrow;
584     if (selected_component == CType::CPhysics) node_flags |= ImGuiTreeNodeFlags_Selected;
585 
586     const bool physics_open = ImGui::TreeNodeEx((void*)(intptr_t)CType::CPhysics, node_flags, "Physics");
587     if (ImGui::IsItemClicked()) selected_component = CType::CPhysics;
588 
589     if (ImGui::IsItemClicked(ImGuiMouseButton_Right)) {
590         selected_component = CType::CPhysics;
591         ImGui::OpenPopup("DeletePhysics##1");
592     }
593 
594     if (ImGui::BeginPopup("DeletePhysics##1")) {
595         if (ImGui::Selectable("Delete##4")) {
596             physics->GetParent()->RemoveComponent<Physics>();
597             selected_component = -1;
598         }
599         ImGui::EndPopup();
```

```
600     }
601
602     if (physics_open) {
603         ImGui::Text("Velocity");
604
605         ImGui::PushItemWidth(50);
606         ImGui::SameLine(100); ImGui::InputFloat("x##1", &velocity.x);
607         ImGui::SameLine(175); ImGui::InputFloat("y##1", &velocity.y);
608         ImGui::SameLine(250); ImGui::InputFloat("z##1", &velocity.z);
609
610         ImGui::InputFloat("Mass##1", &physics->GetMassRef());
611         ImGui::PopItemWidth();
612
613         ImGui::TreePop();
614     }
615 }
```

References Physics::GetMassRef(), Component::GetParent(), Physics::GetVelocity(), Object::RemoveComponent(), and selected_component.

Referenced by Display_Components().

4.4.2.7 Display_Scene() `void Editor::Display_Scene ( )  [private]`

Display the scene window.

Definition at line 205 of file editor.cpp.

```
205                             {
206     ImGui::Begin("Scene");
207
208       // Display all objects
209     for (int i = 0; i < Object_Manager::GetSize(); ++i) {
210         if (ImGui::Selectable(Object_Manager::FindObject(i)->GetName().c_str(), selected_object == i,
        ImGuiSelectableFlags_AllowDoubleClick)) {
211             if (selected_object != i) editor->selected_component = -1;
212             selected_object = i;
213             selected_component = -1;
214         }
215
216           // Checking for right click behavior
217         if (ImGui::IsItemClicked(ImGuiMouseButton_Right)) {
218             if (selected_object != i) editor->selected_component = -1;
219             selected_object = i;
220             selected_component = -1;
221             ImGui::OpenPopup("ObjectSettings##1");
222         }
223     }
224
225     if (ImGui::BeginPopup("ObjectSettings##1")) {
226           // Removes selected object from scene
227         if (ImGui::Selectable("Delete##1")) {
228             Object_Manager::RemoveObject(selected_object);
229             selected_object = -1;
230             selected_component = -1;
231         }
232           // Copies selected object
233         if (ImGui::Selectable("Copy##1")) {
234             editor->object_to_copy = editor->selected_object;
235         }
236           // Pastes copied object into scene
237         if (ImGui::Selectable("Paste##1")) {
238             if (editor->object_to_copy != -1) {
239                 Object* object = new Object(*Object_Manager::FindObject(editor->selected_object));
240                 Object_Manager::AddObject(object);
241             }
242         }
243         ImGui::EndPopup();
244     }
245
246     ImGui::Separator();
247
```

```
248       // Button to add new object to the scene
249     if (ImGui::Button("Add Object")) {
250         Object* newObject = new Object;
251         Transform* transform = new Transform;
252         transform->SetStartPosition(glm::vec3(0.f));
253         newObject->SetName("New_Object");
254         newObject->AddComponent(transform);
255 
256         Object_Manager::AddObject(newObject);
257     }
258 
259     ImGui::End();
260 }
```

References Object::AddComponent(), Object_Manager::AddObject(), editor, Object_Manager::FindObject(), Object_Manager::GetSize(), object_to_copy, Object_Manager::RemoveObject(), selected_component, selected_object, Object::SetName(), and Transform::SetStartPosition().

Referenced by Update().

4.4.2.8 Display_Scripts() void Editor::Display_Scripts (Behavior * *behavior*) [private]

Displays the different lua scripts attached to the selected object.

Parameters

behavior	Contains the script data

Definition at line 431 of file editor.cpp.

```
431                                                 {
432     if (!behavior) return;
433 
434     // Setting up tree flags
435     ImGuiTreeNodeFlags node_flags = ImGuiTreeNodeFlags_SpanAvailWidth | ImGuiTreeNodeFlags_OpenOnDoubleClick
        | ImGuiTreeNodeFlags_OpenOnArrow;
436     if (selected_component == CType::CBehavior) node_flags |= ImGuiTreeNodeFlags_Selected;
437 
438     const bool scripts_open = ImGui::TreeNodeEx((void*)(intptr_t)CType::CBehavior, node_flags, "Scripts");
439     if (ImGui::IsItemClicked()) selected_component = CType::CBehavior;
440 
441       // Right click behavior to delete script component from object
442     if (ImGui::IsItemClicked(ImGuiMouseButton_Right)) {
443         selected_component = CType::CBehavior;
444         ImGui::OpenPopup("DeleteScripts##1");
445     }
446 
447     if (ImGui::BeginPopup("DeleteScripts##1")) {
448         if (ImGui::Selectable("Delete##2")) {
449             behavior->GetParent()->RemoveComponent<Behavior>();
450             selected_component = -1;
451         }
452         ImGui::EndPopup();
453     }
454 
455       // Displays the currently attached scripts
456     if (scripts_open) {
457         std::vector<std::string>& scripts = behavior->GetScripts();
458         unsigned scriptNum = 1;
459         for (std::string& script : scripts) {
460             ImGui::Text(std::string("Script " + std::to_string(scriptNum) + ":").c_str());
461             ImGui::SameLine(100);
462             if (ImGui::Button(script.c_str())) {
463                 ImGuiFileDialog::Instance()->OpenDialog("ChooseFileDlgKey##3", "Choose File", ".lua",
        "./data/scripts/");
```

```
464             }
465
466             if (ImGuiFileDialog::Instance()->Display("ChooseFileDlgKey##3")) {
467                 if (ImGuiFileDialog::Instance()->IsOk()) {
468                     std::string filePathName = ImGuiFileDialog::Instance()->GetCurrentFileName();
469                     if (!behavior->SwitchScript(scriptNum - 1, filePathName))
470                         ImGui::OpenPopup("ExistingScript##1");
471                 }
472
473                 ImGuiFileDialog::Instance()->Close();
474             }
475             ++scriptNum;
476         }
477
478           // Add new script to the object
479         ImGui::Text(""); ImGui::SameLine(100);
480         if (ImGui::Button("New Script##1")) {
481             ImGuiFileDialog::Instance()->OpenDialog("ChooseFileDlgKey##4", "Choose File", ".lua",
      "./data/scripts/");
482         }
483
484         if (ImGuiFileDialog::Instance()->Display("ChooseFileDlgKey##4")) {
485             if (ImGuiFileDialog::Instance()->IsOk()) {
486                 std::string filePathName = ImGuiFileDialog::Instance()->GetCurrentFileName();
487                 if (!behavior->AddScript(filePathName))
488                     ImGui::OpenPopup("ExistingScript##1");
489             }
490
491             ImGuiFileDialog::Instance()->Close();
492         }
493
494           // Popup to say that the selected script to add is already attached to the object
495         if (ImGui::BeginPopup("ExistingScript##1")) {
496             ImGui::Text(std::string("Script already attached to " +
497                 Object_Manager::FindObject(editor->selected_object)->GetName()).c_str(),
498                 ImGui::GetFontSize() * 2);
499             ImGui::EndPopup();
500         }
501
502         ImGui::TreePop();
503     }
504 }
```

References Behavior::AddScript(), editor, Object_Manager::FindObject(), Object::GetName(), Component::GetParent(), Behavior::GetScripts(), Object::RemoveComponent(), selected_component, selected_object, and Behavior::Switch↩ Script().

Referenced by Display_Components().

4.4.2.9 Display_Transform() void Editor::Display_Transform (Transform * *transform*) [private]

Display transform data, users can change any of it.

Parameters

transform	

Definition at line 622 of file editor.cpp.

```
622                                                 {
623     if (!transform) return;
624
625     glm::vec3& position = transform->GetPositionRef();
626     glm::vec3& scale = transform->GetScaleRef();
627     glm::vec3& rotation = transform->GetRotationRef();
```

```
628     glm::vec3& startPos = transform->GetStartPositionRef();
629 
630     ImGuiTreeNodeFlags node_flags = ImGuiTreeNodeFlags_SpanAvailWidth | ImGuiTreeNodeFlags_OpenOnDoubleClick
    | ImGuiTreeNodeFlags_OpenOnArrow;
631     if (selected_component == CType::CTransform) node_flags |= ImGuiTreeNodeFlags_Selected;
632 
633     const bool transform_open = ImGui::TreeNodeEx((void*)(intptr_t)CType::CTransform, node_flags,
    "Transform");
634     if (ImGui::IsItemClicked()) selected_component = CType::CTransform;
635 
636     if (transform_open) {
637         ImGui::Text("Position");
638 
639         ImGui::PushItemWidth(50);
640         ImGui::SameLine(100); ImGui::InputFloat("x##1", &position.x);
641         ImGui::SameLine(175); ImGui::InputFloat("y##1", &position.y);
642         ImGui::SameLine(250); ImGui::InputFloat("z##1", &position.z);
643         ImGui::PopItemWidth();
644 
645         ImGui::Text("Scale");
646 
647         ImGui::PushItemWidth(50);
648         ImGui::SameLine(100); ImGui::InputFloat("x##2", &scale.x);
649         ImGui::SameLine(175); ImGui::InputFloat("y##2", &scale.y);
650         ImGui::SameLine(250); ImGui::InputFloat("z##2", &scale.z);
651         ImGui::PopItemWidth();
652 
653         ImGui::Text("Rotation");
654 
655         ImGui::PushItemWidth(50);
656         ImGui::SameLine(100); ImGui::InputFloat("x##3", &rotation.x);
657         ImGui::SameLine(175); ImGui::InputFloat("y##3", &rotation.y);
658         ImGui::SameLine(250); ImGui::InputFloat("z##3", &rotation.z);
659         ImGui::PopItemWidth();
660 
661         ImGui::Text("Start Pos");
662 
663         ImGui::PushItemWidth(50);
664         ImGui::SameLine(100); ImGui::InputFloat("x##5", &startPos.x);
665         ImGui::SameLine(175); ImGui::InputFloat("y##5", &startPos.y);
666         ImGui::SameLine(250); ImGui::InputFloat("z##5", &startPos.z);
667         ImGui::PopItemWidth();
668 
669         ImGui::TreePop();
670     }
671 }
```

References Transform::GetPositionRef(), Transform::GetRotationRef(), Transform::GetScaleRef(), Transform::Get↩StartPositionRef(), and selected_component.

Referenced by Display_Components().

4.4.2.10 Display_World_Settings() `void Editor::Display_World_Settings ( )  [private]`

Shows all of the settings of the engine itself.

Definition at line 357 of file editor.cpp.

```
357                                 {
358     ImGui::Begin("World Settings");
359     std::string presetName = Engine::GetPresetName();
360 
361       // Allows user to change the preset that is loaded
362     ImGui::Text("Presets"); ImGui::SameLine(120);
363     if (ImGui::Button(presetName.c_str())) {
364         ImGuiFileDialog::Instance()->OpenDialog("ChooseFileDlgKey##3", "Choose File", ".json",
    "./data/json/preset/");
365     }
366 
367     if (ImGuiFileDialog::Instance()->Display("ChooseFileDlgKey##3")) {
368         if (ImGuiFileDialog::Instance()->IsOk()) {
369             std::string filePathName = ImGuiFileDialog::Instance()->GetCurrentFileName();
```

```
370             selected_object = -1;
371             Engine::Restart(filePathName);
372         }
373 
374         ImGuiFileDialog::Instance()->Close();
375     }
376 
377     ImGui::PushItemWidth(141);
378 
379       // Strength of the light being used
380     ImGui::Text("Light Power");
381     ImGui::SameLine(120); ImGui::InputFloat("##1", &Engine::GetLightPower());
382 
383       // Position of the light being used
384     ImGui::Text("Light Position");
385     ImGui::PushItemWidth(50);
386     ImGui::SameLine(120); ImGui::InputFloat("x##4", &Engine::GetLightPos().x);
387     ImGui::SameLine(195); ImGui::InputFloat("y##4", &Engine::GetLightPos().y);
388     ImGui::SameLine(270); ImGui::InputFloat("z##4", &Engine::GetLightPos().z);
389     ImGui::PopItemWidth();
390 
391       // Grav const of the engine
392     ImGui::Text("Grav Const");
393     ImGui::SameLine(120); ImGui::InputDouble("##5", &Engine::GetGravConst());
394 
395     ImGui::PopItemWidth();
396 
397     ImGui::End();
398 }
```

References Engine::GetGravConst(), Engine::GetLightPos(), Engine::GetLightPower(), Engine::GetPresetName(), Engine::Restart(), and selected_object.

Referenced by Update().

4.4.2.11 GetTakeKeyboardInput() `bool Editor::GetTakeKeyboardInput ( ) [static]`

Returns whether the program should ignore keyboard input.

Returns

true

false

Definition at line 716 of file editor.cpp.

```
716 { return editor->takeKeyboardInput; }
```

References editor, and takeKeyboardInput.

Referenced by Camera::Update(), and Graphics::Update().

4.4.2.12 Initialize() bool Editor::Initialize ( ) [static]

Sets up the config and style of the editor.

Returns

true

false

Definition at line 35 of file editor.cpp.

```
35                          {
36       // Initializing the editor
37     editor = new Editor;
38     if (!editor) {
39         Trace::Message("Editor failed to initialize.\n");
40         return false;
41     }
42     editor->selected_object = -1;
43     editor->selected_component = -1;
44     editor->object_to_copy = -1;
45 
46     IMGUI_CHECKVERSION();
47     ImGui::CreateContext();
48 
49       // Setting up ImGui flags
50     ImGui::GetIO().ConfigFlags |= ImGuiConfigFlags_NavEnableKeyboard;
51     ImGui::GetIO().ConfigFlags |= ImGuiConfigFlags_DockingEnable;
52     ImGui::GetIO().ConfigFlags |= ImGuiConfigFlags_ViewportsEnable;
53 
54       // Setting style for ImGui
55     ImGui::StyleColorsDark();
56     if (ImGui::GetIO().ConfigFlags & ImGuiConfigFlags_ViewportsEnable) {
57         ImGui::GetStyle().WindowRounding = 0.f;
58         ImGui::GetStyle().Colors[ImGuiCol_WindowBg].w = 1.f;
59     }
60 
61       // Setting up ImGui
62     ImGui_ImplGlfw_InitForOpenGL(Graphics::GetWindow(), true);
63     ImGui_ImplOpenGL3_Init("#version 330");
64 
65     return true;
66 }
```

References editor, Graphics::GetWindow(), Trace::Message(), object_to_copy, selected_component, and selected_↩ object.

Referenced by Engine::Initialize().

4.4.2.13 Render() void Editor::Render ( ) [static]

Render the editor.

Returns

void

Definition at line 129 of file editor.cpp.

```
129                        {
130     ImGui::Render();
131     ImGui_ImplOpenGL3_RenderDrawData(ImGui::GetDrawData());
132 
133     if (ImGui::GetIO().ConfigFlags & ImGuiConfigFlags_ViewportsEnable) {
134         GLFWwindow* backup_current_context = glfwGetCurrentContext();
135         ImGui::UpdatePlatformWindows();
136         ImGui::RenderPlatformWindowsDefault();
137         glfwMakeContextCurrent(backup_current_context);
138     }
139 }
```

Referenced by Graphics::Render().

4.4.2.14 Reset() void Editor::Reset ( ) [static]

Sets selected object to invalid value.

Returns

void

Definition at line 162 of file editor.cpp.

```
162                     {
163     editor->selected_object = -1;
164 }
```

References editor, and selected_object.

Referenced by Engine::Restart().

4.4.2.15 Shutdown() void Editor::Shutdown ( ) [static]

Destroy editor windows and systems.

Returns

void

Definition at line 146 of file editor.cpp.

```
146                       {
147     if (!editor) return;
148
149     ImGui_ImplOpenGL3_Shutdown();
150     ImGui_ImplGlfw_Shutdown();
151     ImGui::DestroyContext();
152
153     delete editor;
154     editor = nullptr;
155 }
```

References editor.

Referenced by Engine::Shutdown().

4.4.2.16 Update() void Editor::Update ( ) [static]

Updates the editor content and calls display functions.

Returns

void

Definition at line 73 of file editor.cpp.

```
73                  {
74       // ImGui update functions
75     ImGui_ImplOpenGL3_NewFrame();
76     ImGui_ImplGlfw_NewFrame();
77     ImGui::NewFrame();
78 
79     //ImGui::ShowDemoWindow();
80 
81       // Updating whether program should ignore keyboard input
82     if (!ImGui::GetIO().WantCaptureKeyboard) {
83         editor->takeKeyboardInput = true;
84     }
85     else {
86         editor->takeKeyboardInput = false;
87     }
88 
89       // Keyboard shortcuts
90     if (!editor->takeKeyboardInput) {
91           // Save current settings as preset
92         if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_LEFT_CONTROL) == GLFW_PRESS) {
93             if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_S) == GLFW_PRESS) {
94                 if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_S) == GLFW_RELEASE) {
95                     Engine::Write();
96                 }
97             }
98               // Copy current selected object
99             if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_C) == GLFW_PRESS) {
100                 if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_C) == GLFW_RELEASE) {
101                     editor->object_to_copy = editor->selected_object;
102                 }
103             }
104               // Paste current selected object
105             if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_V) == GLFW_PRESS) {
106                 if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_V) == GLFW_RELEASE) {
107                     if (editor->object_to_copy != -1) {
108                         Object* object = new Object(*Object_Manager::FindObject(editor->selected_object));
109                         Object_Manager::AddObject(object);
110                     }
111                 }
112             }
113         }
114     }
115 
116       // Display the different windows
117     editor->Display_Dockspace();
118     editor->Display_Scene();
119     editor->Display_Components();
120     editor->Display_World_Settings();
121     editor->Display_Camera_Settings();
122 }
```

References Object_Manager::AddObject(), Display_Camera_Settings(), Display_Components(), Display_Dockspace(), Display_Scene(), Display_World_Settings(), editor, Object_Manager::FindObject(), Graphics::GetWindow(), object_↩ to_copy, selected_object, takeKeyboardInput, and Engine::Write().

Referenced by Engine::Update().

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

- editor.hpp
- editor.cpp

4.5 Engine Class Reference

`#include <engine.hpp>`

Static Public Member Functions

- static void Initialize ()

  Initializes the engine and the systems in the engine.
- static void Update ()

  Updates object and camera. Object updates have a fixed time step, camera updates have variable time step.
- static void Shutdown ()

  Shutdown systems and then engine.
- static void Restart ()

  Resets the objects in the engine.
- static void Restart (std::string presetName)

  Resets the engine to the given preset.
- static float GetDeltaTime ()

  Returns delta time (variable)
- static float GetDt ()

  Returns delta time (fixed)
- static double & GetGravConst ()

  Returns gravitational constant.
- static std::string GetPresetName ()

  Returns the name of the current preset.
- static float & GetLightPower ()

  Returns reference to power of the light in the scene.
- static glm::vec3 & GetLightPos ()

  Returns reference to the position of the light in the scene.
- static void Write ()

  Writes the engine data to a preset file (creates new one if it doesn't already exist)
- static void SetPresetName (std::string presetName_)

  Sets the name of the preset file.

Private Attributes

- bool isRunning

  state of the main loop
- float deltaTime

  time between frames
- float accumulator

  amount of unused time for physics updates
- float time

  total time
- const float dt = 0.01f

  fixed delta time for physics updates
- std::chrono::steady_clock::time_point currentTime

current read time

- std::chrono::steady_clock::time_point newTime

  newest read time

- std::chrono::steady_clock::duration timeTaken

  time between frames

- double gravConst

  gravitational constant (used in physics)

- std::string presetName

  name of the preset being used

- float lightPower

  Power of the light in the scene.

- glm::vec3 lightPos

  Position of the light in the scene.

4.5.1 Detailed Description

Engine class

Definition at line 24 of file engine.hpp.

4.5.2 Member Function Documentation

4.5.2.1 GetDeltaTime() `float Engine::GetDeltaTime ( ) [static]`

Returns delta time (variable)

Returns

float Variable delta time

Definition at line 171 of file engine.cpp.

```
171 { return engine->deltaTime; }
```

References deltaTime, and engine.

Referenced by Camera::MouseUpdate(), and Camera::Update().

4.5.2.2 GetDt() `float Engine::GetDt ( ) [static]`

Returns delta time (fixed)

Returns

float Fixed delta time

Definition at line 178 of file engine.cpp.
```
178 { return engine->dt; }
```

References dt, and engine.

Referenced by Behavior::Update(), and Physics::Update().

4.5.2.3 GetGravConst() `double & Engine::GetGravConst ( ) [static]`

Returns gravitational constant.

Returns

double Gravitational constant

Definition at line 185 of file engine.cpp.
```
185 { return engine->gravConst; }
```

References engine, and gravConst.

Referenced by Editor::Display_World_Settings(), and Physics::UpdateGravity().

4.5.2.4 GetLightPos() `glm::vec3 & Engine::GetLightPos ( ) [static]`

Returns reference to the position of the light in the scene.

Returns

glm::vec3&

Definition at line 206 of file engine.cpp.
```
206 { return engine->lightPos; }
```

References engine, and lightPos.

Referenced by Editor::Display_World_Settings(), and Model_Data::Draw().

4.5.2.5 GetLightPower() `float & Engine::GetLightPower ( ) [static]`

Returns reference to power of the light in the scene.

Returns

float&

Definition at line 199 of file engine.cpp.

```
199 { return engine->lightPower; }
```

References engine, and lightPower.

Referenced by Editor::Display_World_Settings(), and Model_Data::Draw().

4.5.2.6 GetPresetName() `std::string Engine::GetPresetName ( ) [static]`

Returns the name of the current preset.

Returns

std::string

Definition at line 192 of file engine.cpp.

```
192 { return engine->presetName; }
```

References engine, and presetName.

Referenced by Editor::Display_Menu_Bar(), and Editor::Display_World_Settings().

4.5.2.7 Initialize() `void Engine::Initialize ( ) [static]`

Initializes the engine and the systems in the engine.

Returns

void

Definition at line 41 of file engine.cpp.

```
41                          {
42       // Initializing engine
43     engine = new Engine;
44     if (!engine) {
45         Trace::Message("Engine was not initialized.\n");
46         return;
47     }
48
49       // Reading settings from json
50     File_Reader settings("settings.json");
51     engine->presetName = settings.Read_String("preset");
52
53     File_Reader preset("preset/" + engine->presetName);
54     engine->gravConst = preset.Read_Double("gravConst");
55
56     engine->lightPower = 1000.f;
57     engine->lightPos = preset.Read_Vec3("lightPos");
58     if (engine->lightPos == glm::vec3(0.f)) {
59         engine->lightPos = glm::vec3(4, 4, 0);
60     }
61
62       // Initializing sub systems
63     if (!Model_Data_Manager::Initialize()) return;
64     if (!Texture_Manager::Initialize()) return;
65     if (!Camera::Initialize(settings)) return;
66     if (!Graphics::Initialize(settings)) return;
67     if (!Object_Manager::Initialize(preset)) return;
68     if (!Random::Initialize()) return;
69     if (!Editor::Initialize()) return;
70
71       // Setting up variables used for dt
72     engine->currentTime = std::chrono::steady_clock::now();
73     engine->accumulator = 0.f;
74     engine->time = 0.f;
75     engine->isRunning = true;
76 }
```

References accumulator, currentTime, engine, gravConst, Random::Initialize(), Editor::Initialize(), Model_Data_↩ Manager::Initialize(), Texture_Manager::Initialize(), Object_Manager::Initialize(), Camera::Initialize(), Graphics::↩ Initialize(), isRunning, lightPos, lightPower, Trace::Message(), presetName, File_Reader::Read_Double(), File_↩ Reader::Read_String(), File_Reader::Read_Vec3(), and time.

Referenced by main().

4.5.2.8 Restart() [1/2] void Engine::Restart ( ) [static]

Resets the objects in the engine.

Returns

void

Definition at line 132 of file engine.cpp.

```
132                          {
133       // Removing all current objects
134     Object_Manager::Shutdown();
135     Editor::Reset();
136
137       // Initializing object manager
138     File_Reader settings("settings.json");
```

```
139     engine->presetName = settings.Read_String("preset");
140
141     File_Reader preset("preset/" + engine->presetName);
142     engine->gravConst = preset.Read_Double("gravConst");
143     if (!Object_Manager::Initialize(preset)) return;
144 }
```

References engine, gravConst, Object_Manager::Initialize(), presetName, File_Reader::Read_Double(), File_Reader::Read_String(), Editor::Reset(), and Object_Manager::Shutdown().

Referenced by Editor::Display_World_Settings(), and Graphics::Update().

4.5.2.9 Restart() [2/2] void Engine::Restart (std::string *presetName*) [static]

Resets the engine to the given preset.

Parameters

presetName	Given preset

Returns

void

Definition at line 152 of file engine.cpp.

```
152                                         {
153       // Removing all current objects
154     Object_Manager::Shutdown();
155     Editor::Reset();
156
157       // Initializing object manager
158     File_Reader settings("settings.json");
159     engine->presetName = presetName;
160
161     File_Reader preset("preset/" + engine->presetName);
162     engine->gravConst = preset.Read_Double("gravConst");
163     if (!Object_Manager::Initialize(preset)) return;
164 }
```

References engine, gravConst, Object_Manager::Initialize(), presetName, File_Reader::Read_Double(), Editor::Reset(), and Object_Manager::Shutdown().

4.5.2.10 SetPresetName() void Engine::SetPresetName (std::string *presetName_*) [static]

Sets the name of the preset file.

Parameters

*presetName_*	

Returns

void

Definition at line 230 of file engine.cpp.

```
230                                                 {
231     engine->presetName = presetName_;
232 }
```

References engine, and presetName.

Referenced by Editor::Display_Menu_Bar().

4.5.2.11 Shutdown() `void Engine::Shutdown ( )  [static]`

Shutdown systems and then engine.

Returns

void

Definition at line 110 of file engine.cpp.

```
110                         {
111     if (!engine) return;
112 
113       // Shutdown sub systems
114     Editor::Shutdown();
115     Random::Shutdown();
116     Object_Manager::Shutdown();
117     Graphics::Shutdown();
118     Camera::Shutdown();
119     Texture_Manager::Shutdown();
120     Model_Data_Manager::Shutdown();
121 
122       // Delete engine object
123     delete engine;
124     engine = nullptr;
125 }
```

References engine, Random::Shutdown(), Editor::Shutdown(), Model_Data_Manager::Shutdown(), Texture_Manager↩
::Shutdown(), Object_Manager::Shutdown(), Camera::Shutdown(), and Graphics::Shutdown().

Referenced by main().

4.5.2.12 Update() void Engine::Update ( ) [static]

Updates object and camera. Object updates have a fixed time step, camera updates have variable time step.

Returns

void

Definition at line 84 of file engine.cpp.

```
84                      {
85       // Calculating dt
86     engine->newTime = std::chrono::steady_clock::now();
87     engine->timeTaken = engine->newTime - engine->currentTime;
88     engine->deltaTime = float(engine->timeTaken.count()) *
89         std::chrono::steady_clock::period::num / std::chrono::steady_clock::period::den;
90     engine->currentTime = engine->newTime;
91     engine->accumulator += engine->deltaTime;
92
93     Editor::Update();
94     Camera::Update();
95       // Only called when it is time (fixed time step)
96     while (engine->accumulator >= engine->dt) {
97           // Update objects
98         Object_Manager::Update();
99           // Update dt related variables
100         engine->accumulator -= engine->dt;
101         engine->time += engine->dt;
102     }
103 }
```

References accumulator, currentTime, deltaTime, dt, engine, newTime, time, timeTaken, Editor::Update(), Camera::↩ Update(), and Object_Manager::Update().

Referenced by Graphics::Update().

4.5.2.13 Write() void Engine::Write ( ) [static]

Writes the engine data to a preset file (creates new one if it doesn't already exist)

Returns

void

Definition at line 214 of file engine.cpp.

```
214                      {
215     File_Writer writer;
216
217     writer.Write_Value("gravConst", engine->gravConst);
218     writer.Write_Vec3("lightPos", engine->lightPos);
219     Object_Manager::Write(writer);
220
221     writer.Write_File(std::string ("preset/" + engine->presetName));
222 }
```

References engine, gravConst, lightPos, presetName, Object_Manager::Write(), File_Writer::Write_File(), File_Writer↩ ::Write_Value(), and File_Writer::Write_Vec3().

Referenced by Editor::Display_Menu_Bar(), and Editor::Update().

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

- engine.hpp
- engine.cpp

4.6 File_Reader Class Reference

`#include <file_reader.hpp>`

Public Member Functions

- File_Reader (std::string filename)

  Creates File_Reader object and reads given file.
- void Read_File (std::string filename)

  Reads the json file data into the root variable.
- int Read_Int (std::string valueName)

  Reads int from the json file stored in root.
- std::string Read_String (std::string valueName)

  Reads std::string from the json file stored in root.
- glm::vec3 Read_Vec3 (std::string valueName)

  Reads glm::vec3 from the json file stored in root. glm::vec3 is constructed from an array.
- bool Read_Bool (std::string valueName)

  Reads bool from the json file stored in root.
- float Read_Float (std::string valueName)

  Reads float from the json stored in root.
- double Read_Double (std::string valueName)

  Reads double from the json stored in root.
- std::string Read_Object_Name (std::string valueName)

  Reads the name of an object from an object list (preset folder)
- std::string Read_Object_Template_Name (std::string valueName)

  Reads the name of the template file for object.
- glm::vec3 Read_Object_Position (std::string valueName)

  Reads the position of an object from an object list (preset folder)
- glm::vec3 Read_Object_Scale (std::string valueName)

  Reads the scale of an object.
- std::string Read_Behavior_Name (std::string valueName)

  Reads the name of the behavior.

Private Attributes

- rapidjson::Document root

  Holds the data of the json file.

4.6.1 Detailed Description

File_Reader class

Definition at line 24 of file file_reader.hpp.

4.6.2 Constructor & Destructor Documentation

4.6.2.1 File_Reader() `File_Reader::File_Reader (`

`std::string` *`filename`* `)`

Creates File_Reader object and reads given file.

Parameters

filename	Name of the file to be read

Definition at line 30 of file file_reader.cpp.

```
30                                                  {
31     Read_File(filename);
32 }
```

4.6.3 Member Function Documentation

4.6.3.1 Read_Behavior_Name() std::string File_Reader::Read_Behavior_Name (std::string *valueName*)

Reads the name of the behavior.

Parameters

valueName	Behavior to read

Returns

std::string Name of the behavior

Definition at line 222 of file file_reader.cpp.

```
222                                                                 {
223       // Checking if value exists
224     if (!root["behaviors"].HasMember(valueName.c_str())) {
225         Trace::Message("Error reading std::string: " + valueName + "\n");
226         return std::string("");
227     }
228
229     return root["behaviors"][valueName.c_str()].GetString();
230 }
```

References Trace::Message().

Referenced by Behavior::Read().

4.6.3.2 Read_Bool() bool File_Reader::Read_Bool (std::string *valueName*)

Reads bool from the json file stored in root.

Parameters

valueName	Name of the bool in the json file

Returns

true

false

Definition at line 104 of file file_reader.cpp.

```
104                                                 {
105       // Checking if the value is a bool
106     if (!root.HasMember(valueName.c_str())) {
107         Trace::Message("Error reading bool: " + valueName + "\n");
108         return false;
109     }
110     return root[valueName.c_str()].GetBool();
111 }
```

References Trace::Message().

4.6.3.3 Read_Double() double File_Reader::Read_Double (std::string *valueName*)

Reads double from the json stored in root.

Parameters

valueName	Name of the double in the json file

Returns

double Value that was read

Definition at line 134 of file file_reader.cpp.

```
134                                                   {
135       // Checking if the value is a double (has decimal)
136     if (!root.HasMember(valueName.c_str())) {
137         Trace::Message("Error reading double: " + valueName + "\n");
138         return false;
139     }
140     return root[valueName.c_str()].GetDouble();
141 }
```

References Trace::Message().

Referenced by Engine::Initialize(), and Engine::Restart().

4.6.3.4 Read_File() void File_Reader::Read_File (std::string *filename*)

Reads the json file data into the root variable.

Parameters

filename	Name of the file to be read

Definition at line 39 of file file_reader.cpp.

```
39                                                {
40       // Opening the json file
41     std::string fileToOpen = "data/json/" + filename;
42     FILE* file = fopen(fileToOpen.c_str(), "r");
43
44     char buffer[65536];
45     FileReadStream stream(file, buffer, sizeof(buffer));
46     root.ParseStream<0, UTF8<>, FileReadStream>(stream);
47
48     fclose(file);
49 }
```

4.6.3.5 Read_Float() `float File_Reader::Read_Float (`

`std::string` *valueName*)

Reads float from the json stored in root.

Parameters

valueName	Name of the float in the json file

Returns

float Value that was read

Definition at line 119 of file file_reader.cpp.

```
119                                                    {
120       // Checking if the value is a double (has decimal)
121     if (!root.HasMember(valueName.c_str())) {
122         Trace::Message("Error reading float: " + valueName + "\n");
123         return 0.f;
124     }
125     return root[valueName.c_str()].GetFloat();
126 }
```

References Trace::Message().

Referenced by Camera::Initialize(), and Physics::Read().

4.6.3.6 Read_Int() `int File_Reader::Read_Int (`

`std::string` *valueName*)

Reads int from the json file stored in root.

Parameters

valueName	Name of the int in the json file

Returns

int Value that was read

Definition at line 57 of file file_reader.cpp.

```
57                                          {
58       // Checking if the value is an int
59     if (!root.HasMember(valueName.c_str())) {
60         Trace::Message("Error reading int: " + valueName + "\n");
61         return 0;
62     }
63     return root[valueName.c_str()].GetInt();
64 }
```

References Trace::Message().

Referenced by Camera::Initialize(), and Graphics::Initialize().

4.6.3.7 Read_Object_Name() std::string File_Reader::Read_Object_Name (std::string *valueName*)

Reads the name of an object from an object list (preset folder)

Parameters

valueName	Specifies which object

Returns

std::string Name of the object

Definition at line 149 of file file_reader.cpp.

```
149                                                     {
150       // Checking if the value exists
151     if (!root.HasMember(valueName.c_str())) {
152         Trace::Message("Error reading with " + valueName + "\n");
153         return std::string("");
154     }
155     if (!root[valueName.c_str()].HasMember("objectName")) {
156         Trace::Message("Error reading std::string: " + valueName + "\n");
157         return std::string("");
158     }
159
160     return root[valueName.c_str()]["objectName"].GetString();
161 }
```

References Trace::Message().

Referenced by Object_Manager::ReadList().

4.6.3.8 Read_Object_Position() glm::vec3 File_Reader::Read_Object_Position (std::string *valueName*)

Reads the position of an object from an object list (preset folder)

Parameters

valueName	Specifies which object

Returns

glm::vec3 Position of object

Definition at line 189 of file file_reader.cpp.

```
189                                                             {
190     if (!root[valueName.c_str()].HasMember("position")) {
191         Trace::Message("Error reading vec3: " + valueName + "\n");
192         return glm::vec3(0.f, 0.f, 0.f);
193     }
194
195     Value& array = root[valueName.c_str()]["position"];
196     return glm::vec3(array[0].GetFloat(), array[1].GetFloat(), array[2].GetFloat());
197 }
```

References Trace::Message().

Referenced by Object_Manager::ReadList().

4.6.3.9 Read_Object_Scale() glm::vec3 File_Reader::Read_Object_Scale (std::string *valueName*)

Reads the scale of an object.

Parameters

valueName	

Returns

glm::vec3

Definition at line 205 of file file_reader.cpp.

```
205                                                           {
206       // Checking if value exists
207     if (!root[valueName.c_str()].HasMember("scale")) {
208         Trace::Message("Error reading vec3: " + valueName + "\n");
209         return glm::vec3(0.f, 0.f, 0.f);
210     }
211
212     Value& array = root[valueName.c_str()]["scale"];
213     return glm::vec3(array[0].GetFloat(), array[1].GetFloat(), array[2].GetFloat());
214 }
```

References Trace::Message().

Referenced by Object_Manager::ReadList().

4.6.3.10 Read_Object_Template_Name() std::string File_Reader::Read_Object_Template_Name (std::string *valueName*)

Reads the name of the template file for object.

Parameters

valueName	

Returns

std::string

Definition at line 169 of file file_reader.cpp.

```
169                                                                    {
170       // Checking if the value exists
171     if (!root.HasMember(valueName.c_str())) {
172         Trace::Message("Error reading with " + valueName + "\n");
173         return std::string("");
174     }
175     if (!root[valueName.c_str()].HasMember("templateName")) {
176         Trace::Message("Error reading std::string: " + valueName + "\n");
177         return std::string("");
178     }
179
180     return root[valueName.c_str()]["templateName"].GetString();
181 }
```

References Trace::Message().

Referenced by Object_Manager::ReadList().

4.6.3.11 Read_String() std::string File_Reader::Read_String (std::string *valueName*)

Reads std::string from the json file stored in root.

Parameters

valueName	Name of the std::string in the json file

Returns

std::string Value that was read

Definition at line 72 of file file_reader.cpp.

```
72                                                  {
73       // Checking if the value is a std::string
74     if (!root.HasMember(valueName.c_str())) {
75         Trace::Message("Error reading std::string: " + valueName + "\n");
76         return std::string("");
77     }
78     return root[valueName.c_str()].GetString();
79 }
```

References Trace::Message().

Referenced by Model_Data_Manager::Get(), Texture_Manager::Get(), Engine::Initialize(), Shader::Initialize(), Model_↩ Data::Load(), Object::ReRead(), and Engine::Restart().

4.6.3.12 Read_Vec3() glm::vec3 File_Reader::Read_Vec3 (std::string *valueName*)

Reads glm::vec3 from the json file stored in root. glm::vec3 is constructed from an array.

Parameters

valueName	Name of the glm::vec3 in the json file

Returns

glm::vec3 Value that was read

Definition at line 88 of file file_reader.cpp.

```
88                                                  {
89       // Checking if the value is an array
90     if (!root.HasMember(valueName.c_str())) {
91         Trace::Message("Error reading glm::vec3: " + valueName + "\n");
92         return glm::vec3(0.f, 0.f, 0.f);
93     }
94     return glm::vec3(root[valueName.c_str()][0].GetFloat(), root[valueName.c_str()][1].GetFloat(),
       root[valueName.c_str()][2].GetFloat());
95 }
```

References Trace::Message().

Referenced by Engine::Initialize(), and Physics::Read().

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

- file_reader.hpp
- file_reader.cpp

4.7 File_Writer Class Reference

`#include <file_writer.hpp>`

Public Member Functions

- File_Writer ()

  Creates root object to write data into.
- void Write_File (std::string filename)

  Writes all the data stored in root to the given filename.
- void Write_Vec3 (std::string valueName, glm::vec3 value)

  Write a glm::vec3 into root.
- void Write_String (std::string valueName, std::string value)

  Write a std::string into root.
- template<typename T >
  void Write_Value (std::string valueName, T value)

  Writes most values to root (can't do strings)
- void Write_Behavior_Name (std::vector< std::string > &behaviorNames)

  Writing behaviorNames into nested object and then into root.
- void Write_Object_Data (Object *object)

  Writing data of an object into root.

Private Attributes

- rapidjson::Document root

  Holds the data for the json file.

4.7.1 Detailed Description

File_Writer class

Definition at line 30 of file file_writer.hpp.

4.7.2 Constructor & Destructor Documentation

4.7.2.1 File_Writer() `File_Writer::File_Writer ( )`

Creates root object to write data into.

Definition at line 27 of file file_writer.cpp.

```
27                          {
28     root.SetObject();
29 }
```

4.7.3 Member Function Documentation

4.7.3.1 Write_Behavior_Name() `void File_Writer::Write_Behavior_Name ( std::vector< std::string > & behaviorNames )`

Writing behaviorNames into nested object and then into root.

Parameters

behaviorNames	

Definition at line 88 of file file_writer.cpp.

```
88                                                                                  {
89     Value behaviors(kObjectType);
90
91       // Filling object
92     for (unsigned i = 0; i < behaviorNames.size(); ++i) {
93         std::string behaviorName = std::string("behavior_" + std::to_string(i));
94         Value name(behaviorName.c_str(), SizeType(behaviorName.size()), root.GetAllocator());
95
96         behaviors.AddMember(name, StringRef(behaviorNames[i].c_str()), root.GetAllocator());
97     }
98
99       // Nesting object into root
100     root.AddMember("behaviors", behaviors, root.GetAllocator());
101 }
```

Referenced by Behavior::Write().

4.7.3.2 Write_File() `void File_Writer::Write_File ( std::string filename )`

Writes all the data stored in root to the given filename.

Parameters

filename	

Definition at line 36 of file file_writer.cpp.

```
36                                                  {
37     std::string fileToOpen = "data/json/" + filename;
38     FILE* file = fopen(fileToOpen.c_str(), "w");
39
40     char buffer[65536];
41     FileWriteStream stream(file, buffer, sizeof(buffer));
42
43     PrettyWriter<FileWriteStream> writer(stream);
44     writer.SetMaxDecimalPlaces(3);
45     writer.SetFormatOptions(kFormatSingleLineArray);
46     root.Accept(writer);
47
48     fclose(file);
49 }
```

Referenced by Engine::Write(), and Object::Write().

4.7.3.3 Write_Object_Data() `void File_Writer::Write_Object_Data ( Object * object )`

Writing data of an object into root.

Parameters

object	

Definition at line 108 of file file_writer.cpp.

```
108                                                 {
109     if (!object) return;
110 
111       // Getting transform data from object
112     Transform* transform = object->GetComponent<Transform>();
113     glm::vec3 startPos = { 0.f, 0.f, 0.f };
114     glm::vec3 startScale = { 1.f, 1.f, 1.f };
115     if (transform) startPos = transform->GetStartPosition();
116     if (transform) startScale = transform->GetScale();
117 
118       // Putting position into value rapidjson can use
119     Value pos(kArrayType);
120     pos.PushBack(startPos.x, root.GetAllocator());
121     pos.PushBack(startPos.y, root.GetAllocator());
122     pos.PushBack(startPos.z, root.GetAllocator());
123 
124       // Putting scale into value rapidjson can use
125     Value scale(kArrayType);
126     scale.PushBack(startScale.x, root.GetAllocator());
127     scale.PushBack(startScale.y, root.GetAllocator());
128     scale.PushBack(startScale.z, root.GetAllocator());
129 
130       // Creating and filling object
131     Value objectData(kObjectType);
132 
133     Value objectName(object->GetName().c_str(), SizeType(object->GetName().size()), root.GetAllocator());
134     objectData.AddMember(StringRef("objectName"), objectName, root.GetAllocator());
135     Value templateName(object->GetTemplateName().c_str(), SizeType(object->GetTemplateName().size()),
       root.GetAllocator());
136     objectData.AddMember(StringRef("templateName"), templateName, root.GetAllocator());
137     objectData.AddMember(StringRef("position"), pos, root.GetAllocator());
138     objectData.AddMember(StringRef("scale"), scale, root.GetAllocator());
139 
140       // Nesting object into root
141     std::string objectIdName = "object_" + std::to_string(object->GetId());
142     Value name(objectIdName.c_str(), SizeType(objectIdName.size()), root.GetAllocator());
143     root.AddMember(name, objectData, root.GetAllocator());
144 }
```

References Object::GetId(), Object::GetName(), Transform::GetScale(), Transform::GetStartPosition(), and Object::↩ GetTemplateName().

Referenced by Object_Manager::Write().

4.7.3.4 Write_String()

```
void File_Writer::Write_String (
        std::string valueName,
        std::string value )
```

Write a std::string into root.

Parameters

valueName	
value	

Definition at line 75 of file file_writer.cpp.

```
75                                                                  {
76       // Storing std::string in variable rapidjson can write
77     Value name(valueName.c_str(), SizeType(valueName.size()), root.GetAllocator());
78     Value newValue(value.c_str(), SizeType(value.size()), root.GetAllocator());
79
80     root.AddMember(name, newValue, root.GetAllocator());
81 }
```

Referenced by Model::Write(), and Object::Write().

4.7.3.5 Write_Value() template<typename T >

```
void File_Writer::Write_Value (
              std::string valueName,
              T value )  [inline]
```

Writes most values to root (can't do strings)

Template Parameters

T	

Parameters

valueName	Name of value being written to root
value	Value being written to root

Definition at line 46 of file file_writer.hpp.

```
46                                                  {
47             rapidjson::Value name(valueName.c_str(), rapidjson::SizeType(valueName.size()),
       root.GetAllocator());
48             root.AddMember(name, value, root.GetAllocator());
49         }
```

References root.

Referenced by Engine::Write(), and Physics::Write().

4.7.3.6 Write_Vec3() void File_Writer::Write_Vec3 (

```
              std::string valueName,
              glm::vec3 value )
```

Write a glm::vec3 into root.

Parameters

valueName	Name of glm::vec3
value	glm::vec3 to write

Definition at line 57 of file file_writer.cpp.

```
57                                                                  {
58       // Storing glm::vec3 in array that rapidjson can write
59     Value vector3(kArrayType);
60     vector3.PushBack(value.x, root.GetAllocator());
61     vector3.PushBack(value.y, root.GetAllocator());
62     vector3.PushBack(value.z, root.GetAllocator());
63
64       // Writing vector3 into root
65     Value name(valueName.c_str(), SizeType(valueName.size()), root.GetAllocator());
66     root.AddMember(name, vector3, root.GetAllocator());
67 }
```

Referenced by Engine::Write(), Transform::Write(), and Physics::Write().

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

- file_writer.hpp
- file_writer.cpp

4.8 Graphics Class Reference

`#include <graphics.hpp>`

Public Member Functions

- Graphics (int width, int height)

  Creates Graphics object with given window size.

Static Public Member Functions

- static bool Initialize (File_Reader &settings)

  Initializes the Graphics system using the settings in the given data.
- static bool InitializeGL ()

  Initializes the settings of the graphics system.
- static void Update ()

  Graphics update loop. Calls other update functions for the engine, input, and rendering. This is the main update function for the engine.
- static void Render ()

  Renders all of the objects in the object_manager.
- static void Shutdown ()

  Shutdown the graphics system.
- static bool ErrorCheck (GLenum error)

  Checking for error in given enum.
- static void ErrorCallback (int error, const char *description)

  Error callback for when the graphics system has an issue.
- static std::pair< int, int > GetWindowSize ()

  Returns window size.
- static GLFWwindow * GetWindow ()

  Return the graphics window.

Private Attributes

- std::pair< int, int > windowSize

  Size of the window.
- GLFWwindow * window

  Window for application.
- GLuint vertexArrayId

  Id of the VAO.

4.8.1 Detailed Description

Graphics class

Definition at line 28 of file graphics.hpp.

4.8.2 Constructor & Destructor Documentation

4.8.2.1 Graphics()

```
Graphics::Graphics (
        int width,
        int height )
```

Creates Graphics object with given window size.

Parameters

width	
height	

Definition at line 51 of file graphics.cpp.

```
51                                      {
52     windowSize.first = width;
53     windowSize.second = height;
54 }
```

4.8.3 Member Function Documentation

4.8.3.1 ErrorCallback()

```
void Graphics::ErrorCallback (
        int error,
        const char * description )  [static]
```

Error callback for when the graphics system has an issue.

Parameters

error	Error that occurred
description	Description of error

Returns

void

Definition at line 223 of file graphics.cpp.

```
223                                                                 {
224     Trace::Message("Error: " + std::string(description) + "\n");
225 }
```

References Trace::Message().

4.8.3.2 ErrorCheck() `bool Graphics::ErrorCheck ( GLenum error ) [static]`

Checking for error in given enum.

Parameters

error	Possible error

Returns

true

false

Definition at line 234 of file graphics.cpp.

```
234                                         {
235     error = glGetError();
236     if (error != GL_NO_ERROR) {
237         Trace::Message("Error initializing OpenGl. \n");
238         return false;
239     }
240 
241     return true;
242 }
```

References Trace::Message().

Referenced by InitializeGL().

4.8.3.3 GetWindow() `GLFWwindow * Graphics::GetWindow ( ) [static]`

Return the graphics window.

Returns

GLFWwindow*

Definition at line 258 of file graphics.cpp.

```
258                                 {
259     return graphics->window;
260 }
```

References graphics, and window.

Referenced by Editor::Initialize(), Editor::Update(), Camera::Update(), and Update().

4.8.3.4 GetWindowSize() `std::pair< int, int > Graphics::GetWindowSize ( ) [static]`

Returns window size.

Returns

std::pair<int, int>

Definition at line 249 of file graphics.cpp.

```
249                                       {
250     return graphics->windowSize;
251 }
```

References graphics, and windowSize.

4.8.3.5 Initialize() `bool Graphics::Initialize ( File_Reader & settings ) [static]`

Initializes the Graphics system using the settings in the given data.

Parameters

settings	Settings information

Returns

true

false

Definition at line 63 of file graphics.cpp.

```
63                                                  {
64       // Initializing graphics
65     graphics = new Graphics(settings.Read_Int("windowWidth"), settings.Read_Int("windowHeight"));
66     if (!graphics) {
67         Trace::Message("Graphics was not initialized.");
68         return false;
69     }
70
71       // Setting up error recording with graphics
72     glfwSetErrorCallback(ErrorCallback);
73
74     if (!glfwInit()) {
75         Trace::Message("Could not initialize GLFW.\n");
76         return false;
77     }
78
79       // Setting up the graphics window
80     graphics->window = glfwCreateWindow(graphics->windowSize.first, graphics->windowSize.second,
81         "pEngine", nullptr, nullptr);
82     if (!graphics->window) {
83         Trace::Message("Error creating window.\n");
84         return false;
85     }
86
87       // Setting up callback functions
88     glfwSetCursorPosCallback(graphics->window, Camera::MouseUpdate);
89
90     glfwMakeContextCurrent(graphics->window);
91     //glfwSwapInterval(1);
92     InitializeGL();
93
94     glewExperimental = GL_TRUE;
95     glewInit();
96
97       // Setting up input for keyboard and mouse using glfw library
98     glfwSetInputMode(graphics->window, GLFW_STICKY_KEYS, GL_TRUE);
99     glfwSetInputMode(graphics->window, GLFW_CURSOR, GLFW_CURSOR_HIDDEN);
100
101     glGenVertexArrays(1, &graphics->vertexArrayId);
102     glBindVertexArray(graphics->vertexArrayId);
103
104     if (!Shader::Initialize(settings)) return false;
105
106     return true;
107 }
```

References graphics, Shader::Initialize(), Trace::Message(), Camera::MouseUpdate(), File_Reader::Read_Int(), vertexArrayId, window, and windowSize.

Referenced by Engine::Initialize().

4.8.3.6 InitializeGL() `bool Graphics::InitializeGL ( )  [static]`

Initializes the settings of the graphics system.

Returns

true

false

Definition at line 115 of file graphics.cpp.

```
115                                {
116     GLenum error = GL_NO_ERROR;
117
118     glClearColor(0.f, 0.f, 0.f, 1.f);
119     if (!Graphics::ErrorCheck(error)) return false;
```

```
120
121     glClearDepth(1.f);
122     if (!Graphics::ErrorCheck(error)) return false;
123
124     glEnable(GL_DEPTH_TEST);
125     if (!Graphics::ErrorCheck(error)) return false;
126
127     glDepthFunc(GL_LEQUAL);
128     if (!Graphics::ErrorCheck(error)) return false;
129
130     glShadeModel(GL_SMOOTH);
131     if (!Graphics::ErrorCheck(error)) return false;
132
133     glHint(GL_PERSPECTIVE_CORRECTION_HINT, GL_NICEST);
134     if (!Graphics::ErrorCheck(error)) return false;
135
136     glEnable(GL_CULL_FACE);
137     if (!Graphics::ErrorCheck(error)) return false;
138
139     return true;
140 }
```

References ErrorCheck().

4.8.3.7 Render() `void Graphics::Render ( )  [static]`

Renders all of the objects in the object_manager.

Returns

void

Definition at line 169 of file graphics.cpp.

```
169                     {
170       // Setting up graphics system for rendering
171     glClear(GL_COLOR_BUFFER_BIT | GL_DEPTH_BUFFER_BIT);
172     Shader::Update();
173
174     glm::mat4 projection = perspective(radians(Camera::GetFov()), (float)graphics->windowSize.first /
175         (float)graphics->windowSize.second, Camera::GetNear(), Camera::GetFar());
176
177       // Getting the view matrix of the camera
178     glm::mat4 view = lookAt(
179         Camera::GetPosition(),
180         Camera::GetPosition() + Camera::GetFront(),
181         Camera::GetUp());
182
183       // Rendering all of the objects
184     for (unsigned i = 0; i < Object_Manager::GetSize(); ++i) {
185         Object* object = Object_Manager::FindObject(i);
186
187         Model* model = object->GetComponent<Model>();
188         if (!model) continue;
189
190         model->Draw(projection, view);
191     }
192
193     Editor::Render();
194
195     glfwSwapBuffers(graphics->window);
196 }
```

References Model::Draw(), Object_Manager::FindObject(), Camera::GetFar(), Camera::GetFov(), Camera::GetFront(), Camera::GetNear(), Camera::GetPosition(), Object_Manager::GetSize(), Camera::GetUp(), graphics, Editor::Render(), Shader::Update(), window, and windowSize.

4.8.3.8 Shutdown() void Graphics::Shutdown ( ) [static]

Shutdown the graphics system.

Returns

void

Definition at line 203 of file graphics.cpp.

```
203                         {
204     if (!graphics) return;
205 
206     Shader::Shutdown();
207     glDeleteVertexArrays(1, &graphics->vertexArrayId);
208       // Shutting down opengl
209     glfwDestroyWindow(graphics->window);
210     glfwTerminate();
211       // Deleting graphics object
212     delete graphics;
213     graphics = nullptr;
214 }
```

References graphics, Shader::Shutdown(), vertexArrayId, and window.

Referenced by Engine::Shutdown().

4.8.3.9 Update() void Graphics::Update ( ) [static]

Graphics update loop. Calls other update functions for the engine, input, and rendering. This is the main update function for the engine.

Returns

void

Definition at line 148 of file graphics.cpp.

```
148                         {
149     while(!glfwWindowShouldClose(graphics->window)) {
150           // Run updates
151         Engine::Update();
152         Render();
153         glfwPollEvents();
154 
155           // Check for restart
156         if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_R) == GLFW_PRESS && Editor::GetTakeKeyboardInput()) {
157             if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_R) == GLFW_RELEASE) {
158                 Engine::Restart();
159             }
160         }
161     }
162 }
```

References Editor::GetTakeKeyboardInput(), GetWindow(), graphics, Engine::Restart(), Engine::Update(), and window.

Referenced by main().

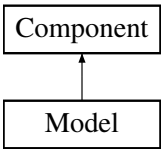
The documentation for this class was generated from the following files:

- graphics.hpp
- graphics.cpp

4.9 Model Class Reference

`#include <model.hpp>`

Inheritance diagram for Model:



Public Member Functions

- Model (GLenum mode_=GL_TRIANGLES)

  Creates a Model object with default values.
- Model (const Model &other)

  Copy constructor.
- Model (File_Reader &reader, GLenum mode_=GL_TRIANGLES)

  Creates a Model object using the data from a file.
- Model * Clone () const

  Clones this Model object.
- void Load (File_Reader &reader)

  Load in the model data from a file (use model manager to not have multiple versions of the same model)
- void Draw (glm::mat4 projection, glm::mat4 view)

  Draw the model.
- void Read (File_Reader &reader)

  Reads name of model file and passes it to the Load function.
- void Write (File_Writer &writer)

  Gives name of model and texture to writer.
- void SwitchModel (std::string modelName)

  Switches the current model to that of the filename provided.
- void SwitchTexture (std::string textureName)

  Switches the current texture to that of the filename provided.
- std::string GetModelName () const

  Returns the filename of the current model.
- std::string GetTextureName () const

  Returns the filename of the current texture.
- Texture * GetTexture () const

  Returns pointer to texture object.

Static Public Member Functions

- static CType GetCType ()

  Gets the CType of Model (used in Object::GetComponent<>())

Private Attributes

- GLenum mode

  Draw mode (Default is GL_TRIANGLES)
- Model_Data * data

  Data about the faces of the model.
- Texture * texture

  Texture object of model.

Additional Inherited Members

4.9.1 Detailed Description

Model class

Definition at line 32 of file model.hpp.

4.9.2 Constructor & Destructor Documentation

4.9.2.1 Model() [1/3]

```
Model::Model (
        GLenum mode_ = GL_TRIANGLES )
```

Creates a Model object with default values.

Parameters

*mode_*	Draw mode for opengl

Definition at line 32 of file model.cpp.

```
32 : Component(CType::CModel), mode(mode_), data(nullptr), texture(nullptr) {}
```

Referenced by Clone().

4.9.2.2 Model() [2/3]

```
Model::Model (
        const Model & other )
```

Copy constructor.

Parameters

other	

Definition at line 39 of file model.cpp.

```
39 : Component(CType::CModel) { *this = other; }
```

4.9.2.3 Model() [3/3] Model::Model (File_Reader & *reader*, GLenum *mode_* = *GL_TRIANGLES*)

Creates a Model object using the data from a file.

Parameters

reader	File with Model data
*mode_*	Draw mode for opengl

Definition at line 47 of file model.cpp.

```
47                                                  : Component(CType::CModel), mode(mode_), data(nullptr),
      texture(nullptr) {
48     Read(reader);
49 }
```

References Read().

4.9.3 Member Function Documentation

4.9.3.1 Clone() Model * Model::Clone ( ) const

Clones this Model object.

Returns

Model* Cloned Model

Definition at line 56 of file model.cpp.

```
56 { return new Model(*this); }
```

References Model().

4.9.3.2 Draw() void Model::Draw (glm::mat4 *projection*, glm::mat4 *view*)

Draw the model.

Parameters

projection	Projection matrix of the scene
view	View matrix of the scene

Definition at line 75 of file model.cpp.

```
75                                                  {
76     Transform* transform = GetParent()->GetComponent<Transform>();
77     if (!data) return;
78
79     data->Draw(this, transform, projection, view);
80 }
```

References data, Model_Data::Draw(), Object::GetComponent(), and Component::GetParent().

Referenced by Graphics::Render().

4.9.3.3 GetCType() `CType Model::GetCType ( ) [static]`

Gets the CType of Model (used in Object::GetComponent<>())

Returns

CType

Definition at line 148 of file model.cpp.

```
148                         {
149     return CType::CModel;
150 }
```

4.9.3.4 GetModelName() `std::string Model::GetModelName ( ) const`

Returns the filename of the current model.

Returns

std::string

Definition at line 121 of file model.cpp.

```
121                                         {
122     if (!data) return "no model";
123     return data->GetModelName();
124 }
```

References data, and Model_Data::GetModelName().

Referenced by Editor::Display_Model().

4.9.3.5 GetTexture() `Texture * Model::GetTexture ( ) const`

Returns pointer to texture object.

Returns

Texture*

Definition at line 141 of file model.cpp.

```
141 { return texture; }
```

References texture.

Referenced by Model_Data::Draw().

4.9.3.6 GetTextureName() `std::string Model::GetTextureName ( ) const`

Returns the filename of the current texture.

Returns

std::string

Definition at line 131 of file model.cpp.

```
131                                     {
132     if (!texture) return "no texture";
133     return texture->GetTextureName();
134 }
```

References Texture::GetTextureName(), and texture.

Referenced by Editor::Display_Model().

4.9.3.7 Load() `void Model::Load ( File_Reader & reader )`

Load in the model data from a file (use model manager to not have multiple versions of the same model)

Parameters

reader	File_reader object that contains Model info

Definition at line 64 of file model.cpp.

```
64                                      {
65     data = Model_Data_Manager::Get(reader);
66     texture = Texture_Manager::Get(reader);
67 }
```

References data, Texture_Manager::Get(), Model_Data_Manager::Get(), and texture.

Referenced by Read().

4.9.3.8 Read() void Model::Read (File_Reader & *reader*)

Reads name of model file and passes it to the Load function.

Parameters

reader	File that contains the name of the model's file

Definition at line 87 of file model.cpp.

```
87 { Load(reader); }
```

References Load().

Referenced by Model(), and Object::ReRead().

4.9.3.9 SwitchModel() void Model::SwitchModel (std::string *modelName*)

Switches the current model to that of the filename provided.

Parameters

modelName	

Definition at line 107 of file model.cpp.

```
107 { data = Model_Data_Manager::Get(modelName); }
```

References data, and Model_Data_Manager::Get().

Referenced by Editor::Display_Model().

4.9.3.10 SwitchTexture() void Model::SwitchTexture (std::string *textureName*)

Switches the current texture to that of the filename provided.

Parameters

textureName	

Definition at line 114 of file model.cpp.

```
114 { texture = Texture_Manager::Get(textureName); }
```

References Texture_Manager::Get(), and texture.

Referenced by Editor::Display_Model().

4.9.3.11 Write() `void Model::Write ( File_Writer & writer )`

Gives name of model and texture to writer.

Parameters

writer	

Definition at line 94 of file model.cpp.

```
94                                      {
95     std::string modelName = data->GetModelName();
96     std::string textureName = texture->GetTextureName();
97
98     writer.Write_String("modelToLoad", modelName.c_str());
99     writer.Write_String("textureToLoad", textureName.c_str());
100 }
```

References data, Model_Data::GetModelName(), Texture::GetTextureName(), texture, and File_Writer::Write_String().

Referenced by Object::Write().

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

- model.hpp
- model.cpp

4.10 Model_Data Class Reference

`#include <model_data.hpp>`

Public Member Functions

- Model_Data ()
  Default constructor.
- Model_Data (const Model_Data &other)
  Copy constructor.
- ~Model_Data ()
  Deletes all buffers of the model.
- bool Load (File_Reader &reader)
  Loads data of a model from given file.
- bool Load (std::string modelName_)
  Loads in model using given filename.
- bool Read (std::string modelName_)
  Reads model data from file.
- void Draw (Model *parent, Transform *transform, glm::mat4 projection, glm::mat4 view)
  Draws the models.
- std::string GetModelName () const
  Returns the filename that the models data was gotten from.

Private Attributes

- std::vector< float > vertices
  Contains vertices of model.
- std::vector< float > normals
  Contains normals of model.
- std::vector< float > uvs
  Contains uv data of model.
- std::string modelName
  Name of the file for the model.
- GLuint vertexbuffer
  Vertex buffer of model.
- GLuint normalbuffer
  Normal buffer of model.
- GLuint uvbuffer
  UV buffer of model.

4.10.1 Detailed Description

Model_Data class

Definition at line 33 of file model_data.hpp.

4.10.2 Constructor & Destructor Documentation

4.10.2.1 Model_Data() [1/2] Model_Data::Model_Data ( )

Default constructor.

Definition at line 33 of file model_data.cpp.
```
33 {}
```

4.10.2.2 Model_Data() [2/2] Model_Data::Model_Data (const Model_Data & other)

Copy constructor.

Parameters

other	

Definition at line 40 of file model_data.cpp.
```
40                                                  {
41     for (float vert : other.vertices) {
42         vertices.emplace_back(vert);
43     }
44     for (float norm : other.normals) {
45         normals.emplace_back(norm);
46     }
47     for (float uv : other.uvs) {
48         uvs.emplace_back(uv);
49     }
50
51     vertexbuffer = other.vertexbuffer;
52     normalbuffer = other.normalbuffer;
53     uvbuffer = other.uvbuffer;
54 }
```

References normalbuffer, normals, uvbuffer, uvs, vertexbuffer, and vertices.

4.10.2.3 ~Model_Data() Model_Data::~Model_Data ( )

Deletes all buffers of the model.

Definition at line 60 of file model_data.cpp.
```
60                          {
61     glDeleteBuffers(1, &vertexbuffer);
62     glDeleteBuffers(1, &uvbuffer);
63     glDeleteBuffers(1, &normalbuffer);
64 }
```

References normalbuffer, uvbuffer, and vertexbuffer.

4.10.3 Member Function Documentation

4.10.3.1 Draw()

```
void Model_Data::Draw (
    Model * parent,
    Transform * transform,
    glm::mat4 projection,
    glm::mat4 view )
```

Draws the models.

Parameters

parent	Model component
transform	Transform component
projection	Projection matrix of the scene
view	View matrix of the scene

Definition at line 219 of file model_data.cpp.

```
219                                                                                 {
220     // Creating the MVP (Model * View * Projection) matrix
221     glm::mat4 model = glm::mat4(1.f);
222     model = glm::translate(model, transform->GetPosition());
223     model = glm::scale(model, transform->GetScale());
224 
225     // Sending data to the shaders
226     glm::mat4 MVP = projection * view * model;
227     glUniformMatrix4fv(Shader::GetMatrixId(), 1, GL_FALSE, &MVP[0][0]);
228     glUniformMatrix4fv(Shader::GetModelMatrixId(), 1, GL_FALSE, &model[0][0]);
229     glUniformMatrix4fv(Shader::GetViewMatrixId(), 1, GL_FALSE, &view[0][0]);
230 
231     // Sending light data to the shaders
232     glm::vec3 lightPos = Engine::GetLightPos();
233     glUniform3f(Shader::GetLightId(), lightPos.x, lightPos.y, lightPos.z);
234     glUniform1f(Shader::GetLightPowerId(), Engine::GetLightPower());
235 
236     // Setup texture for drawing if it exists
237     if (parent->GetTexture())
238         parent->GetTexture()->Display();
239 
240     // Setup the model vertices
241     glEnableVertexAttribArray(0);
242     glBindBuffer(GL_ARRAY_BUFFER, vertexbuffer);
243     glVertexAttribPointer(
244         0,
245         3,
246         GL_FLOAT,
247         GL_FALSE,
248         0,
249         (void*)0
250     );
251 
252     // Setup the model uv
253     glEnableVertexAttribArray(1);
254     glBindBuffer(GL_ARRAY_BUFFER, uvbuffer);
255     glVertexAttribPointer(
256         1,
257         2,
258         GL_FLOAT,
259         GL_FALSE,
260         0,
261         (void*)0
262     );
263 
264     // Setup the model normals
265     glEnableVertexAttribArray(2);
266     glBindBuffer(GL_ARRAY_BUFFER, normalbuffer);
267     glVertexAttribPointer(
268         2,
269         3,
270         GL_FLOAT,
271         GL_FALSE,
272         0,
273         (void*)0
```

```
274     );
275
276       // Draw the object
277     glDrawArrays(GL_TRIANGLES, 0, vertices.size());
278
279       // Disable data sent to shaders
280     glDisableVertexAttribArray(0);
281     glDisableVertexAttribArray(1);
282     glDisableVertexAttribArray(2);
283
284 }
```

References Texture::Display(), Shader::GetLightId(), Engine::GetLightPos(), Engine::GetLightPower(), Shader::GetLightPowerId(), Shader::GetMatrixId(), Shader::GetModelMatrixId(), Transform::GetPosition(), Transform::GetScale(), Model::GetTexture(), Shader::GetViewMatrixId(), normalbuffer, uvbuffer, vertexbuffer, and vertices.

Referenced by Model::Draw().

4.10.3.2 GetModelName() `std::string Model_Data::GetModelName ( ) const`

Returns the filename that the models data was gotten from.

Returns

string Name of the file that contains model data

Definition at line 291 of file model_data.cpp.

```
291 { return modelName; }
```

References modelName.

Referenced by Model_Data_Manager::Get(), Model::GetModelName(), and Model::Write().

4.10.3.3 Load() [1/2] `bool Model_Data::Load ( File_Reader & reader )`

Loads data of a model from given file.

Parameters

reader	File_Reader object containing the model data

Returns

true

false

Definition at line 73 of file model_data.cpp.

```
73                                          {
74     std::string modelName_ = reader.Read_String("modelToLoad");
75
76     return Read(modelName_);
77 }
```

References Read(), and File_Reader::Read_String().

Referenced by Model_Data_Manager::Get().

4.10.3.4 Load() [2/2] bool Model_Data::Load (std::string *modelName_*)

Loads in model using given filename.

Parameters

*model↩ Name_*	Model's filename

Returns

true

false

Definition at line 86 of file model_data.cpp.

```
86 { return Read(modelName_); }
```

References Read().

4.10.3.5 Read() bool Model_Data::Read (std::string *modelName_*)

Reads model data from file.

Parameters

*model↩ Name_*	Model's filename

Returns

true

false

Definition at line 95 of file model_data.cpp.

```
95                                          {
96       // Setting the name of the file (used in model_data_manager)
97     modelName = modelName_;
98
99       // Creating variables for reading
100    std::vector<unsigned> vertex_indices, uv_indices, normal_indices;
101    std::vector<glm::vec3> temp_vertices;
102    std::vector<glm::vec2> temp_uvs;
103    std::vector<glm::vec3> temp_normals;
104
105      // Opening the file
106    std::string fileToOpen = "data/models/" + modelName;
107    FILE* file = fopen(fileToOpen.c_str(), "r");
108    if (!file) {
109        Trace::Message("File '" + modelName + "' was not successfully opened.\n");
110        return false;
111    }
112
113      // Until the whole file is read
114    while (true) {
115        char line_header[256];
116
117          // Getting next line of the file
118        int res = fscanf(file, "%s", line_header);
119        if (res == EOF) break;
120
121          // Checking for which data needs to be read in
122        if (strcmp(line_header,"v") == 0) {
123            glm::vec3 vertex;
124            fscanf(file, "%f %f %f\n", &vertex.x, &vertex.y, &vertex.z);
125            temp_vertices.emplace_back(vertex);
126            continue;
127        }
128
129        if (strcmp(line_header, "vt") == 0) {
130            glm::vec2 uv;
131            fscanf(file, "%f %f\n", &uv.x, &uv.y);
132            temp_uvs.emplace_back(uv);
133            continue;
134        }
135
136        if (strcmp(line_header, "vn") == 0) {
137            glm::vec3 normal;
138            fscanf(file, "%f %f %f\n", &normal.x, &normal.y, &normal.z);
139            temp_normals.emplace_back(normal);
140            continue;
141        }
142
143        if (strcmp(line_header, "f") == 0) {
144              // Connecting face to previous read vertices, uvs, and normals
145            unsigned vertex_index[3], uv_index[3], normal_index[3];
146            int matches = fscanf(file, "%d/%d/%d %d/%d/%d %d/%d/%d\n", &vertex_index[0], &uv_index[0],
    &normal_index[0],
147                &vertex_index[1], &uv_index[1], &normal_index[1], &vertex_index[2], &uv_index[2],
    &normal_index[2]);//,
148
149              // Expects models split into triangles
150            if (matches != 9) {
151                Trace::Message("File is incompatible with this parser. Export using different settings.");
152                return false;
153            }
154
155              // Setting vertices for current face
156            vertices.emplace_back((temp_vertices[vertex_index[0] - 1]).x);
157            vertices.emplace_back((temp_vertices[vertex_index[0] - 1]).y);
158            vertices.emplace_back((temp_vertices[vertex_index[0] - 1]).z);
159
160            vertices.emplace_back((temp_vertices[vertex_index[1] - 1]).x);
161            vertices.emplace_back((temp_vertices[vertex_index[1] - 1]).y);
162            vertices.emplace_back((temp_vertices[vertex_index[1] - 1]).z);
163
164            vertices.emplace_back((temp_vertices[vertex_index[2] - 1]).x);
165            vertices.emplace_back((temp_vertices[vertex_index[2] - 1]).y);
166            vertices.emplace_back((temp_vertices[vertex_index[2] - 1]).z);
167
168              // Setting uvs for current face
169            uvs.emplace_back((temp_uvs[uv_index[0] - 1]).x);
170            uvs.emplace_back((temp_uvs[uv_index[0] - 1]).y);
171
172            uvs.emplace_back((temp_uvs[uv_index[1] - 1]).x);
```

```
173             uvs.emplace_back((temp_uvs[uv_index[1] - 1]).y);
174
175             uvs.emplace_back((temp_uvs[uv_index[2] - 1]).x);
176             uvs.emplace_back((temp_uvs[uv_index[2] - 1]).y);
177
178               // Setting normals for current face
179             normals.emplace_back((temp_normals[normal_index[0] - 1]).x);
180             normals.emplace_back((temp_normals[normal_index[0] - 1]).y);
181             normals.emplace_back((temp_normals[normal_index[0] - 1]).z);
182
183             normals.emplace_back((temp_normals[normal_index[1] - 1]).x);
184             normals.emplace_back((temp_normals[normal_index[1] - 1]).y);
185             normals.emplace_back((temp_normals[normal_index[1] - 1]).z);
186
187             normals.emplace_back((temp_normals[normal_index[2] - 1]).x);
188             normals.emplace_back((temp_normals[normal_index[2] - 1]).y);
189             normals.emplace_back((temp_normals[normal_index[2] - 1]).z);
190         }
191     }
192
193       // Bind vertex data to buffers
194     glGenBuffers(1, &vertexbuffer);
195     glBindBuffer(GL_ARRAY_BUFFER, vertexbuffer);
196     glBufferData(GL_ARRAY_BUFFER, vertices.size() * sizeof(float), &vertices[0], GL_STATIC_DRAW);
197
198       // Bind uv data to buffers
199     glGenBuffers(1, &uvbuffer);
200     glBindBuffer(GL_ARRAY_BUFFER, uvbuffer);
201     glBufferData(GL_ARRAY_BUFFER, uvs.size() * sizeof(float), &uvs[0], GL_STATIC_DRAW);
202
203       // Bind normals data to buffers
204     glGenBuffers(1, &normalbuffer);
205     glBindBuffer(GL_ARRAY_BUFFER, normalbuffer);
206     glBufferData(GL_ARRAY_BUFFER, normals.size() * sizeof(float), &normals[0], GL_STATIC_DRAW);
207
208     return true;
209 }
```

References Trace::Message(), modelName, normalbuffer, normals, uvbuffer, uvs, vertexbuffer, and vertices.

Referenced by Load().

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

- model_data.hpp
- model_data.cpp

4.11 Model_Data_Manager Class Reference

`#include <model_data_manager.hpp>`

Static Public Member Functions

- static bool Initialize ()

  Initializes the model_data_manager.
- static Model_Data * Get (File_Reader &reader)

  Checks if model data has already been read in. If yes then it returns a pointer to that data. If no it reads it in and adds it to the model list.
- static Model_Data * Get (std::string modelName)

  Checks if model data has already been read in. If yes then it returns a pointer to that data. If no it reads it in and adds it to the model list.
- static void Shutdown ()

  Deletes all of the Model_Data objects in the models list then deletes model_data_manager.

Private Attributes

- std::vector< Model_Data * > models

  List of the different Model_Data objects.

4.11.1 Detailed Description

Model_Data_Manager class

Definition at line 25 of file model_data_manager.hpp.

4.11.2 Member Function Documentation

4.11.2.1 Get() [1/2] Model_Data * Model_Data_Manager::Get (File_Reader & *reader*) [static]

Checks if model data has already been read in. If yes then it returns a pointer to that data. If no it reads it in and adds it to the model list.

Parameters

reader	File_Reader object containing model data

Returns

Model_Data* Model data either read or gotten from list

Definition at line 44 of file model_data_manager.cpp.

```
44                                                  {
45     std::string filename = reader.Read_String("modelToLoad");
46       // Checks name of file against other model data objects
47     for (Model_Data* model_data : model_data_manager->models) {
48         if (model_data->GetModelName().compare(filename) == 0) {
49             return model_data;
50         }
51     }
52
53       // Creates new Model_Data object, then adds it to list
54     Model_Data* data = new Model_Data;
55     data->Load(reader);
56     model_data_manager->models.emplace_back(data);
57
58     return data;
59 }
```

References Model_Data::GetModelName(), Model_Data::Load(), model_data_manager, models, and File_Reader::↩ Read_String().

Referenced by Model::Load(), and Model::SwitchModel().

4.11.2.2 Get() [2/2] Model_Data * Model_Data_Manager::Get (std::string *modelName*) [static]

Checks if model data has already been read in. If yes then it returns a pointer to that data. If no it reads it in and adds it to the model list.

Parameters

modelName	Filename of the model to get

Returns

Model_Data* Model data either read or gotten from list

Definition at line 69 of file model_data_manager.cpp.

```
69                                                          {
70       // Checks name of file against other model data objects
71     for (Model_Data* model_data : model_data_manager->models) {
72         if (model_data->GetModelName().compare(modelName) == 0) {
73             return model_data;
74         }
75     }
76
77       // Creates new Model_Data object, then adds it to list
78     Model_Data* data = new Model_Data;
79     data->Load(modelName);
80     model_data_manager->models.emplace_back(data);
81
82     return data;
83 }
```

References Model_Data::GetModelName(), Model_Data::Load(), model_data_manager, and models.

4.11.2.3 Initialize() bool Model_Data_Manager::Initialize ( ) [static]

Initializes the model_data_manager.

Returns

true

false

Definition at line 24 of file model_data_manager.cpp.

```
24                                          {
25       // Initializing model_data_manager
26     model_data_manager = new Model_Data_Manager;
27     if (!model_data_manager) {
28         Trace::Message("Model Data Manager was not initialized.\n");
29         return false;
30     }
31
32     model_data_manager->models.reserve(10);
33     return true;
34 }
```

References Trace::Message(), model_data_manager, and models.

Referenced by Engine::Initialize().

4.11.2.4 Shutdown() void Model_Data_Manager::Shutdown ( ) [static]

Deletes all of the Model_Data objects in the models list then deletes model_data_manager.

Returns

void

Definition at line 91 of file model_data_manager.cpp.

```
91                                      {
92     if (!model_data_manager) return;
93
94       // Deleting all of the Model_Data objects
95     for (Model_Data* model_data : model_data_manager->models) {
96         if (!model_data) continue;
97
98         delete model_data;
99         model_data = nullptr;
100     }
101
102     delete model_data_manager;
103     model_data_manager = nullptr;
104 }
```

References model_data_manager, and models.

Referenced by Engine::Shutdown().

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

- model_data_manager.hpp
- model_data_manager.cpp

4.12 Object Class Reference

`#include <object.hpp>`

Public Member Functions

- Object ()
  Default constructor.
- Object (const Object &other)
  Copy constructor.
- Object (std::string filename)
  Creating object from a file.
- Object * Clone () const
  Clones this object.
- void Update ()
  Updates object (only physics for now)
- void AddComponent (Component *component)
  Adds component to object. Only one of each type of component.
- template<typename T >
  T * GetComponent () const

Get a component of the object (const)

- template<typename T >
  T * GetComponent ()

  Get a component of the object.
- template<typename T >
  void RemoveComponent ()

  Removes component from object.
- void SetId (int id_)

  Sets the id of object.
- int GetId () const

  Returns the id of object.
- void SetName (std::string name_)

  Sets name of object.
- std::string GetName () const

  Returns name of object.
- void SetTemplateName (std::string templateName_)

  Sets the name of the template file.
- std::string GetTemplateName () const

  Returns the name of the template file.
- void Read (std::string objectFilename)

  Reads object from file. This includes the components of an object.
- void ReRead (std::string objectFilename)

  Reading data into object that already exists.
- void Write ()

  Writes the data of the object to a template file.
- std::unordered_map< CType, Component * > GetComponentList ()

  Returns the list of components.
- void Clear ()

  Clears the components from the object.

Private Attributes

- std::unordered_map< CType, Component * > components

  List of components.
- int id

  Location of object in object_manager.
- std::string name

  Name of the object.
- std::string templateName

  Name of the template file used.

4.12.1 Detailed Description

Object class

Definition at line 32 of file object.hpp.

4.12.2 Constructor & Destructor Documentation

4.12.2.1 Object() [1/3] Object::Object ( )

Default constructor.

Definition at line 28 of file object.cpp.

```
28 : id(-1) {}
```

Referenced by Clone().

4.12.2.2 Object() [2/3] Object::Object (const Object & *other*)

Copy constructor.

Parameters

other	Object to be copied

Definition at line 35 of file object.cpp.

```
35                                  {
36     SetName(other.GetName());
37     SetTemplateName(other.GetTemplateName());
38 
39       // Copying Behavior component
40     Behavior* behavior = other.GetComponent<Behavior>();
41     if (behavior) {
42         Behavior* newBehavior = new Behavior(*behavior);
43         AddComponent(newBehavior);
44     }
45 
46       // Copying Model component
47     Model* model = other.GetComponent<Model>();
48     if (model) {
49         Model* newModel = new Model(*model);
50         AddComponent(newModel);
51     }
52 
53       // Copying Physics component
54     Physics* physics = other.GetComponent<Physics>();
55     if (physics) {
56         Physics* newPhysics = new Physics(*physics);
57         AddComponent(newPhysics);
58     }
59 
60       // Copying transform component
61     Transform* transform = other.GetComponent<Transform>();
62     if (transform) {
63         Transform* newTransform = new Transform(*transform);
64         AddComponent(newTransform);
65     }
66 }
```

References AddComponent(), GetComponent(), GetName(), GetTemplateName(), SetName(), and SetTemplate↩ Name().

4.12.2.3 Object() [3/3] Object::Object (std::string *filename*)

Creating object from a file.

Parameters

filename	Name of file used to create object

Definition at line 73 of file object.cpp.

```
73                                  {
74     Read(filename);
75 }
```

References Read().

4.12.3 Member Function Documentation

4.12.3.1 AddComponent() void Object::AddComponent (Component * *component*)

Adds component to object. Only one of each type of component.

Parameters

component	Component to be added

Definition at line 104 of file object.cpp.

```
104                                             {
105     component->SetParent(this);
106     components.emplace(component->GetCType(), component);
107 }
```

References components, Component::GetCType(), and Component::SetParent().

Referenced by Editor::Display_Scene(), Object(), Read(), and ReRead().

4.12.3.2 Clear() void Object::Clear ( )

Clears the components from the object.

Definition at line 265 of file object.cpp.

```
265                  {
266     Behavior* behavior = GetComponent<Behavior>();
267     Model* model = GetComponent<Model>();
268     Physics* physics = GetComponent<Physics>();
269
```

```
270     if (behavior) {
271         delete behavior;
272         behavior = nullptr;
273     }
274     if (model) {
275         delete model;
276         model = nullptr;
277     }
278     if (physics) {
279         delete physics;
280         physics = nullptr;
281     }
282 }
```

4.12.3.3 Clone() `Object * Object::Clone ( ) const`

Clones this object.

Returns

Object*

Definition at line 82 of file object.cpp.

```
82                          {
83     return new Object(*this);
84 }
```

References Object().

4.12.3.4 GetComponent() [1/2] `template<typename T >`

`T* Object::GetComponent ( )  [inline]`

Get a component of the object.

Template Parameters

T	Component class to return

Parameters

type	Type of component

Returns

T* Pointer to the component

Definition at line 70 of file object.hpp.

```
70                          {
```

```
71              // Searching for component using the type (enum as int)
72             auto found = components.find(T::GetCType());
73             if (found == components.end()) {
74                 return nullptr;
75             }
76              // Cast found component into correct type
77             return (T*)found->second;
78         }
```

References components.

4.12.3.5 GetComponent() [2/2] template<typename T >

T* Object::GetComponent ( ) const [inline]

Get a component of the object (const)

Template Parameters

T	Component class to return

Parameters

type	Type of component

Returns

T* Pointer to the component

Definition at line 52 of file object.hpp.

```
52                                 {
53              // Searching for component using the type (enum as int)
54             auto found = components.find(T::GetCType());
55             if (found == components.end()) {
56                 return nullptr;
57             }
58              // Cast found component into correct type
59             return (T*)found->second;
60         }
```

References components.

Referenced by Behavior::ClassSetup(), Model::Draw(), Object(), Physics::Update(), and Physics::UpdateGravity().

4.12.3.6 GetComponentList() std::unordered_map< CType, Component * > Object::GetComponentList ( )

Returns the list of components.

Returns

std::unordered_map<CType, Component*>

Definition at line 257 of file object.cpp.

```
257                                                     {
258     return components;
259 }
```

References components.

4.12.3.7 GetId() `int Object::GetId ( ) const`

Returns the id of object.

Returns

unsigned Position in Object_Manager

Definition at line 121 of file object.cpp.

```
121 { return id; }
```

References id.

Referenced by Object_Manager::CheckName(), Physics::UpdateGravity(), and File_Writer::Write_Object_Data().

4.12.3.8 GetName() `std::string Object::GetName ( ) const`

Returns name of object.

Returns

string Name of object

Definition at line 137 of file object.cpp.

```
137 { return name; }
```

References name.

Referenced by Object_Manager::CheckName(), Editor::Display_Scripts(), Object(), and File_Writer::Write_Object_↩ Data().

4.12.3.9 GetTemplateName() `std::string Object::GetTemplateName ( ) const`

Returns the name of the template file.

Returns

std::string

Definition at line 151 of file object.cpp.

```
151 { return templateName; }
```

References templateName.

Referenced by Object(), and File_Writer::Write_Object_Data().

4.12.3.10 Read() `void Object::Read ( std::string objectFilename )`

Reads object from file. This includes the components of an object.

Parameters

objectFilename	

Definition at line 158 of file object.cpp.

```
158                                         {
159       // Getting data from file
160     File_Reader object_reader("objects/" + objectFilename);
161
162       // Reading Behavior component form file
163     Behavior* object_behavior = new Behavior(object_reader);
164     AddComponent(object_behavior);
165
166       // Reading Model component from file
167     Model* object_model = new Model(object_reader);
168     AddComponent(object_model);
169
170       // Reading Physics component from file
171     Physics* object_physics = new Physics(object_reader);
172     AddComponent(object_physics);
173
174       // Reading Transform component from file
175     Transform* object_transform = new Transform(object_reader);
176     AddComponent(object_transform);
177 }
```

References AddComponent().

Referenced by Object().

4.12.3.11 RemoveComponent() `template<typename T >`

`void Object::RemoveComponent ( ) [inline]`

Removes component from object.

Template Parameters

T	

Definition at line 86 of file object.hpp.

```
86                                  {
87                 // Searching for component using the type (enum as int)
88               auto found = components.find(T::GetCType());
89               if (found == components.end()) return;
90                 // Delete component
91               delete found->second;
92               found->second = nullptr;
93                 // Remove pointer from map
94               components.erase(found->first);
95           }
```

References components.

Referenced by Editor::Display_Model(), Editor::Display_Physics(), and Editor::Display_Scripts().

4.12.3.12 ReRead() `void Object::ReRead ( std::string objectFilename )`

Reading data into object that already exists.

Parameters

objectFilename	Name of template file

Definition at line 184 of file object.cpp.

```
184                                                 {
185       // Getting data from file
186     File_Reader object_reader("objects/" + objectFilename);
187
188     if (name.compare("") == 0)
189         SetName(object_reader.Read_String("name"));
190
191     templateName = objectFilename;
192
193       // Reading Model component from file
194     Model* object_model = GetComponent<Model>();
195     if (!object_model) {
196         object_model = new Model;
197         AddComponent(object_model);
198     }
199     object_model->Read(object_reader);
200
201       // Reading Physics component from file
202     Physics* object_physics = GetComponent<Physics>();
203     if (!object_physics) {
204         object_physics = new Physics;
205         AddComponent(object_physics);
206     }
207     object_physics->Read(object_reader);
208
209       // Reading Transform component from file
210     Transform* object_transform = GetComponent<Transform>();
211     if (!object_transform) {
212         object_transform = new Transform;
213         AddComponent(object_transform);
214     }
215     object_transform->Read(object_reader);
```

```
216
217       // Reading Behavior component form file
218     Behavior* object_behavior = GetComponent<Behavior>();
219     if (object_behavior) object_behavior->Clear();
220     if (!object_behavior) {
221         object_behavior = new Behavior;
222         AddComponent(object_behavior);
223     }
224     object_behavior->Read(object_reader);
225     object_behavior->SetupClassesForLua();
226 }
```

References AddComponent(), Behavior::Clear(), name, Behavior::Read(), Model::Read(), Transform::Read(), Physics↩ ::Read(), File_Reader::Read_String(), SetName(), Behavior::SetupClassesForLua(), and templateName.

4.12.3.13 SetId() `void Object::SetId ( int id_ )`

Sets the id of object.

Parameters

id↩ _↩	Position in Object_Manager

Definition at line 114 of file object.cpp.

```
114 { id = id_; }
```

Referenced by Object_Manager::RemoveObject().

4.12.3.14 SetName() `void Object::SetName ( std::string name_ )`

Sets name of object.

Parameters

name↩ _	Name of object

Definition at line 128 of file object.cpp.

```
128                                     {
129     name = Object_Manager::CheckName(name_, id);
130 }
```

References Object_Manager::CheckName(), and name.

Referenced by Editor::Display_Scene(), Object(), and ReRead().

4.12.3.15 SetTemplateName() void Object::SetTemplateName (std::string *templateName_*)

Sets the name of the template file.

Parameters

*templateName_*	Name of the template file

Definition at line 144 of file object.cpp.

```
144 { templateName = templateName_; }
```

References templateName.

Referenced by Object().

4.12.3.16 Update() void Object::Update ( )

Updates object (only physics for now)

Definition at line 90 of file object.cpp.

```
90                      {
91     Behavior* behavior = GetComponent<Behavior>();
92     if (behavior)
93         behavior->Update();
94     Physics* physics = GetComponent<Physics>();
95     if (physics)
96         physics->Update();
97 }
```

References Behavior::Update(), and Physics::Update().

Referenced by Object_Manager::Update().

4.12.3.17 Write() void Object::Write ( )

Writes the data of the object to a template file.

Definition at line 232 of file object.cpp.

```
232                      {
233     File_Writer object_writer;
234     object_writer.Write_String("name", name);
235     templateName = name + ".json";
236 
237     Model* object_model = GetComponent<Model>();
238     if (object_model) object_model->Write(object_writer);
239 
240     Transform* object_transform = GetComponent<Transform>();
241     if (object_transform) object_transform->Write(object_writer);
242 
243     Physics* object_physics = GetComponent<Physics>();
244     if (object_physics) object_physics->Write(object_writer);
245 
246     Behavior* object_behavior = GetComponent<Behavior>();
```

```
247     if (object_behavior) object_behavior->Write(object_writer);
248
249     object_writer.Write_File(std::string("objects/" + name + ".json"));
250 }
```

References name, templateName, Behavior::Write(), Model::Write(), Transform::Write(), Physics::Write(), File_Writer::Write_File(), and File_Writer::Write_String().

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

- object.hpp
- object.cpp

4.13 Object_Manager Class Reference

`#include <object_manager.hpp>`

Public Member Functions

- void ReadList (File_Reader &preset)

  Reads in objects from a preset list that is given.

Static Public Member Functions

- static bool Initialize (File_Reader &preset)

  Initializes the object_manager object. Reads in objects for the given preset.
- static void AddObject (Object *object)

  Adds object to object_manager.
- static Object * FindObject (int id)

  Finds a object using its id (location in object list) giving instant access.
- static unsigned GetSize ()

  Gets the size of the object_manager object list.
- static void Update ()

  Calls the update function for each object in the object list.
- static void Shutdown ()

  Deletes all objects in the manager and then the object manager.
- static std::string CheckName (std::string objectName, int id)

  Checks if the name of the given object is already being used. If it is being used it applies a number to the back.
- static void RemoveObject (int id)

  Removes an object from the object_manager.
- static void Write (File_Writer &writer)

  Gives all of the object data to writer for output to file.

Private Attributes

- std::vector< Object * > objects

  Current objects being tracked by the engine.

4.13.1 Detailed Description

Object_Manager class

Definition at line 25 of file object_manager.hpp.

4.13.2 Member Function Documentation

4.13.2.1 AddObject() void Object_Manager::AddObject (Object * object) [static]

Adds object to object_manager.

Parameters

object	Object to be added

Returns

void

Definition at line 52 of file object_manager.cpp.

```
52                                          {
53       // Tells object its location in object_manager object list
54     object->SetId(object_manager->objects.size());
55     object_manager->objects.emplace_back(object);
56 }
```

References object_manager, and objects.

Referenced by Editor::Display_Scene(), ReadList(), and Editor::Update().

4.13.2.2 CheckName() std::string Object_Manager::CheckName (std::string objectName, int id) [static]

Checks if the name of the given object is already being used. If it is being used it applies a number to the back.

Parameters

objectName	
id	

Returns

std::string

Definition at line 152 of file object_manager.cpp.

```
152                                                         {
153       // Checking if the name matches any other objects
154     int objWithName = 0;
155     for (Object* objToCheck : object_manager->objects) {
156         if (id != -1 && objToCheck->GetId() == id) continue;
157         if (objToCheck->GetName().find(objectName) != std::string::npos)
158             ++objWithName;
159     }
160
161       // Updating the name
162     if (objWithName > 0)
163         return objectName + "_" + std::to_string(objWithName);
164
165     return objectName;
166 }
```

References Object::GetId(), Object::GetName(), object_manager, and objects.

Referenced by Object::SetName().

4.13.2.3 FindObject() `Object * Object_Manager::FindObject ( int id ) [static]`

Finds a object using its id (location in object list) giving instant access.

Parameters

id	Location of object in object_manager object list

Returns

Object*

Definition at line 64 of file object_manager.cpp.

```
64                                          {
65     if (id >= object_manager->objects.size()) return nullptr;
66     return object_manager->objects[id];
67 }
```

References object_manager, and objects.

Referenced by Editor::Display_Components(), Editor::Display_Scene(), Editor::Display_Scripts(), Graphics::Render(), Shutdown(), Editor::Update(), Update(), and Physics::UpdateGravity().

4.13.2.4 GetSize() unsigned Object_Manager::GetSize ( ) [static]

Gets the size of the object_manager object list.

Returns

unsigned Size of object list

Definition at line 74 of file object_manager.cpp.

```
74 { return object_manager->objects.size(); }
```

References object_manager, and objects.

Referenced by Editor::Display_Scene(), Graphics::Render(), and Physics::UpdateGravity().

4.13.2.5 Initialize() bool Object_Manager::Initialize (File_Reader & *preset*) [static]

Initializes the object_manager object. Reads in objects for the given preset.

Parameters

preset	List of objects for this preset

Returns

true

false

Definition at line 31 of file object_manager.cpp.

```
31                                                  {
32       // Initializing object_manager
33     object_manager = new Object_Manager;
34     if (!object_manager) {
35         Trace::Message("Object Manager was not initialized.");
36         return false; // Failed to initialize
37     }
38
39       // Adding objects from preset into engine
40     object_manager->objects.reserve(10);
41     object_manager->ReadList(preset);
42
43     return true; // Successful initialization
44 }
```

References Trace::Message(), object_manager, objects, and ReadList().

Referenced by Engine::Initialize(), and Engine::Restart().

4.13.2.6 ReadList() void Object_Manager::ReadList (File_Reader & *preset*)

Reads in objects from a preset list that is given.

Parameters

preset	List of objects to be added

Definition at line 112 of file object_manager.cpp.

```
112                                                 {
113       // Track which object we are on
114     unsigned object_num = 0;
115
116       // Reads objects until there is a failed read
117     while (true) {
118           // Getting the name of the objects file
119         std::string object_name = preset.Read_Object_Name("object_" + std::to_string(object_num));
120         std::string template_name = preset.Read_Object_Template_Name("object_" +
      std::to_string(object_num));
121         if (template_name.compare("") == 0) break;
122
123           // Constructing the object
124         Object* object = new Object(template_name);
125         object->SetName(object_name);
126         object->SetTemplateName(template_name);
127           // Reading in the objects position
128         glm::vec3 position = preset.Read_Object_Position("object_" + std::to_string(object_num));
129         glm::vec3 scale = preset.Read_Object_Scale("object_" + std::to_string(object_num));
130         Transform* transform = object->GetComponent<Transform>();
131         transform->SetPosition(position);
132         transform->SetStartPosition(position);
133         transform->SetScale(scale);
134         Behavior* behavior = object->GetComponent<Behavior>();
135         behavior->SetupClassesForLua();
136
137           // Adding the object to the manager
138         AddObject(object);
139
140         ++object_num;
141     }
142 }
```

References AddObject(), File_Reader::Read_Object_Name(), File_Reader::Read_Object_Position(), File_Reader::Read_Object_Scale(), File_Reader::Read_Object_Template_Name(), Transform::SetPosition(), Transform::SetScale(), Transform::SetStartPosition(), and Behavior::SetupClassesForLua().

Referenced by Initialize().

4.13.2.7 RemoveObject() `void Object_Manager::RemoveObject ( int id ) [static]`

Removes an object from the object_manager.

Parameters

id	id of object to remove

Returns

void

Definition at line 174 of file object_manager.cpp.

```
174                                         {
175     if (id >= object_manager->objects.size()) return;
176     Object* objectToDelete = object_manager->objects[id];
177 
178       // Moves all the objects to the right of one being deleted to the left
179     unsigned offset = 0;
180     for (unsigned objectNum = id + 1; objectNum < object_manager->objects.size(); ++objectNum) {
181         Object* objectToSwitch = object_manager->objects[objectNum];
182         object_manager->objects[id + offset] = objectToSwitch;
183         objectToSwitch->SetId(id + offset++);
184     }
185 
186       // Deleting the object
187     delete objectToDelete;
188     objectToDelete = nullptr;
189     object_manager->objects.pop_back();
190 }
```

References object_manager, objects, and Object::SetId().

Referenced by Editor::Display_Scene().

4.13.2.8 Shutdown() `void Object_Manager::Shutdown ( )  [static]`

Deletes all objects in the manager and then the object manager.

Returns

void

Definition at line 92 of file object_manager.cpp.

```
92                                {
93     if (!object_manager) return; // If the object_manager doesn't exist
94 
95       // Deleting each object in the manager
96     for (unsigned i = 0; i < object_manager->objects.size(); ++i) {
97         Object* object = object_manager->FindObject(i);
98         if (object)
99             delete object;
100     }
101 
102       // Deleting the manager
103     delete object_manager;
104     object_manager = nullptr;
105 }
```

References FindObject(), object_manager, and objects.

Referenced by Engine::Restart(), and Engine::Shutdown().

4.13.2.9 Update() `void Object_Manager::Update ( )  [static]`

Calls the update function for each object in the object list.

Returns

void

Definition at line 81 of file object_manager.cpp.

```
81                               {
82     for (unsigned i = 0; i < object_manager->objects.size(); ++i) {
83         object_manager->FindObject(i)->Update();
84     }
85 }
```

References FindObject(), object_manager, objects, and Object::Update().

Referenced by Engine::Update().

4.13.2.10 Write() void Object_Manager::Write (File_Writer & *writer*) [static]

Gives all of the object data to writer for output to file.

Parameters

writer	

Returns

void

Definition at line 198 of file object_manager.cpp.

```
198                                                 {
199     for (Object* object : object_manager->objects) {
200         writer.Write_Object_Data(object);
201     }
202 }
```

References object_manager, objects, and File_Writer::Write_Object_Data().

Referenced by Engine::Write().

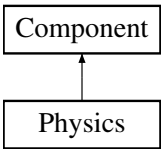
The documentation for this class was generated from the following files:

- object_manager.hpp
- object_manager.cpp

4.14 Physics Class Reference

```
#include <physics.hpp>
```

Inheritance diagram for Physics:



Public Member Functions

- Physics ()

  Creates Physics object with default values.
- Physics (const Physics &other)

  Copy constructor.
- Physics (File_Reader &reader)

  Creates Physics object using file.
- Physics * Clone () const

  Clone Physics object.
- void SetAcceleration (glm::vec3 accel)

  Sets acceleration of object.
- glm::vec3 GetAcceleration () const

  Returns acceleration of object.
- glm::vec3 & GetAccelerationRef ()

  Returns reference to the acceleration of the object.
- void SetForces (glm::vec3 force)

  Sets forces acting on object.
- void AddForce (glm::vec3 force)

  Adds a force to the current forces acting on the object.
- glm::vec3 GetForces () const

  Returns the forces acting on the object.
- glm::vec3 & GetForcesRef ()

  Returns reference to the forces acting on the object.
- void ApplyForce (glm::vec3 direction, float power)

  Applies force in the given direction using the given power.
- void SetVelocity (glm::vec3 vel)

  Sets the velocity of the object.
- glm::vec3 GetVelocity () const

  Returns the current velocity of the object.
- glm::vec3 & GetVelocityRef ()

  Returns reference to velocity of the object.
- void SetMass (float ma)

  Sets the mass of the object.
- float GetMass () const

  Returns the mass of the object.
- float & GetMassRef ()

  Returns reference to mass of the object.
- void Update ()

  Updates the physics of the object.
- void UpdateGravity ()

  Calculates the gravitational pull each object has on each other.
- void Read (File_Reader &reader)

  Reads data for Physics object from file.
- void Write (File_Writer &writer)

  Gives physics data to the writer object.

Static Public Member Functions

- static CType GetCType ()

  Gets the CType of Physics (used in Object::GetComponent<>())

Private Attributes

- glm::vec3 acceleration

  Acceleration of object.
- glm::vec3 forces

  Forces acting on object (reset at end of each update)
- glm::vec3 velocity

  Velocity of object.
- glm::vec3 initialVelocity

  Starting velocity.
- glm::vec3 initialAcceleration

  Starting acceleration.
- float mass

  Mass of object.

Additional Inherited Members

4.14.1 Detailed Description

Physics class

Definition at line 25 of file physics.hpp.

4.14.2 Constructor & Destructor Documentation

4.14.2.1 Physics() [1/3] Physics::Physics ( )

Creates Physics object with default values.

Definition at line 32 of file physics.cpp.

```
32                  : Component(CType::CPhysics),
33      acceleration(glm::vec3(0.f, 0.f, 0.f)), forces(glm::vec3(0.f, 0.f, 0.f)),
34      velocity(glm::vec3(0.f, 0.f, 0.f)), mass(1.f) {}
```

Referenced by Clone().

4.14.2.2 Physics() [2/3] Physics::Physics (const Physics & *other*)

Copy constructor.

Parameters

other	Physics object to be copied

Definition at line 41 of file physics.cpp.

```
41                                      : Component(CType::CPhysics) {
42     *this = other;
43 }
```

4.14.2.3 Physics() [3/3] Physics::Physics (File_Reader & *reader*)

Creates Physics object using file.

Parameters

reader	File to use for making physics object

Definition at line 50 of file physics.cpp.

```
50                                      : Component(CType::CPhysics),
51     acceleration(glm::vec3(0.f, 0.f, 0.f)), forces(glm::vec3(0.f, 0.f, 0.f)),
52     velocity(glm::vec3(0.f, 0.f, 0.f)), mass(1.f) {
53     Read(reader);
54 }
```

References Read().

4.14.3 Member Function Documentation

4.14.3.1 AddForce() void Physics::AddForce (glm::vec3 *force*)

Adds a force to the current forces acting on the object.

Parameters

force	

Definition at line 98 of file physics.cpp.

```
98 { forces += force; }
```

References forces.

Referenced by ApplyForce().

4.14.3.2 ApplyForce() `void Physics::ApplyForce ( glm::vec3 direction, float power )`

Applies force in the given direction using the given power.

Parameters

direction	
power	

Definition at line 120 of file physics.cpp.

```
120                                                     {
121     direction = glm::normalize(direction);
122     direction *= power;
123
124     AddForce(direction);
125 }
```

References AddForce().

Referenced by Behavior::ClassSetup().

4.14.3.3 Clone() `Physics * Physics::Clone ( ) const`

Clone Physics object.

Returns

Physics* Cloned Physics object

Definition at line 61 of file physics.cpp.

```
61                                  {
62     return new Physics(*this);
63 }
```

References Physics().

4.14.3.4 GetAcceleration() `glm::vec3 Physics::GetAcceleration ( ) const`

Returns acceleration of object.

Returns

glm::vec3

Definition at line 77 of file physics.cpp.

```
77 { return acceleration; }
```

References acceleration.

4.14.3.5 GetAccelerationRef() `glm::vec3 & Physics::GetAccelerationRef ( )`

Returns reference to the acceleration of the object.

Returns

glm::vec3&

Definition at line 84 of file physics.cpp.

```
84 { return acceleration; }
```

References acceleration.

Referenced by Behavior::ClassSetup().

4.14.3.6 GetCType() `CType Physics::GetCType ( ) [static]`

Gets the CType of Physics (used in Object::GetComponent<>())

Returns

CType

Definition at line 256 of file physics.cpp.

```
256                         {
257     return CType::CPhysics;
258 }
```

4.14.3.7 GetForces() `glm::vec3 Physics::GetForces ( ) const`

Returns the forces acting on the object.

Returns

glm::vec3

Definition at line 105 of file physics.cpp.

```
105 { return forces; }
```

References forces.

4.14.3.8 GetForcesRef() `glm::vec3 & Physics::GetForcesRef ( )`

Returns reference to the forces acting on the object.

Returns

glm::vec3&

Definition at line 112 of file physics.cpp.

```
112 { return forces; }
```

References forces.

Referenced by Behavior::ClassSetup().

4.14.3.9 GetMass() `float Physics::GetMass ( ) const`

Returns the mass of the object.

Returns

float

Definition at line 160 of file physics.cpp.

```
160 { return mass; }
```

References mass.

4.14.3.10 GetMassRef() `float & Physics::GetMassRef ( )`

Returns reference to mass of the object.

Returns

float&

Definition at line 167 of file physics.cpp.

```
167 { return mass; }
```

References mass.

Referenced by Editor::Display_Physics().

4.14.3.11 GetVelocity() `glm::vec3 Physics::GetVelocity ( ) const`

Returns the current velocity of the object.

Returns

glm::vec3

Definition at line 139 of file physics.cpp.
```
139 { return velocity; }
```

References velocity.

Referenced by Editor::Display_Physics().

4.14.3.12 GetVelocityRef() `glm::vec3 & Physics::GetVelocityRef ( )`

Returns reference to velocity of the object.

Returns

glm::vec3&

Definition at line 146 of file physics.cpp.
```
146 { return velocity; }
```

References velocity.

Referenced by Behavior::ClassSetup().

4.14.3.13 Read() `void Physics::Read ( File_Reader & reader )`

Reads data for Physics object from file.

Parameters

reader	File to be read from

Definition at line 232 of file physics.cpp.
```
232                                     {
233     initialAcceleration = reader.Read_Vec3("acceleration");
234     initialVelocity = reader.Read_Vec3("velocity");
235     SetAcceleration(initialAcceleration);
236     SetVelocity(initialVelocity);
237     SetMass(reader.Read_Float("mass"));
```

```
238 }
```

References initialAcceleration, initialVelocity, File_Reader::Read_Float(), File_Reader::Read_Vec3(), SetAcceleration(), SetMass(), and SetVelocity().

Referenced by Physics(), and Object::ReRead().

4.14.3.14 SetAcceleration() void Physics::SetAcceleration (glm::vec3 *accel*)

Sets acceleration of object.

Parameters

accel	

Definition at line 70 of file physics.cpp.

```
70 { acceleration = accel; }
```

References acceleration.

Referenced by Behavior::ClassSetup(), and Read().

4.14.3.15 SetForces() void Physics::SetForces (glm::vec3 *force*)

Sets forces acting on object.

Parameters

force	

Definition at line 91 of file physics.cpp.

```
91 { forces = force; }
```

References forces.

Referenced by Behavior::ClassSetup().

4.14.3.16 SetMass() void Physics::SetMass (float *ma*)

Sets the mass of the object.

Parameters

ma	

Definition at line 153 of file physics.cpp.

```
153 { mass = ma; }
```

References mass.

Referenced by Read().

4.14.3.17 SetVelocity() `void Physics::SetVelocity ( glm::vec3 vel )`

Sets the velocity of the object.

Parameters

vel	

Definition at line 132 of file physics.cpp.

```
132 { velocity = vel; }
```

References velocity.

Referenced by Behavior::ClassSetup(), and Read().

4.14.3.18 Update() `void Physics::Update ( )`

Updates the physics of the object.

Definition at line 173 of file physics.cpp.

```
173                     {
174       // Finding the acceleration of the object using F=ma
175     acceleration = forces / mass;
176
177       // Updating velocity
178     glm::vec3 oldVel = velocity;
179     velocity += (acceleration * Engine::GetDt());
180
181       // Updating position
182     Transform* transform = GetParent()->GetComponent<Transform>();
183     glm::vec3 position = transform->GetPosition();
184     transform->SetOldPosition(position);
185     position = (velocity * Engine::GetDt()) + position;
186     transform->SetPosition(position);
187
188       // Resetting the forces acting on the object
189     forces = glm::vec3(0.f, 0.f, 0.f);
190 }
```

References acceleration, forces, Object::GetComponent(), Engine::GetDt(), Component::GetParent(), Transform::GetPosition(), mass, Transform::SetOldPosition(), Transform::SetPosition(), and velocity.

Referenced by Object::Update().

4.14.3.19 UpdateGravity() void Physics::UpdateGravity ( )

Calculates the gravitational pull each object has on each other.

Definition at line 196 of file physics.cpp.

```
196                             {
197       // Gets the needed components for the current object
198     Object* object = GetParent();
199     Transform* transform = object->GetComponent<Transform>();
200     Physics* physics = object->GetComponent<Physics>();
201     glm::vec3 position = transform->GetPosition();
202 
203       // For each object
204     for (unsigned i = 0; i < Object_Manager::GetSize(); ++i) {
205         if (i == object->GetId()) continue;
206           // Gets needed components for the object being checked
207         Object* other = Object_Manager::FindObject(i);
208         Physics* otherPhysics = other->GetComponent<Physics>();
209         Transform* otherTransform = other->GetComponent<Transform>();
210         glm::vec3 otherPosition = otherTransform->GetPosition();
211           // Finding the distance between the objects
212         double distance = sqrt(pow(double(otherPosition.x - position.x), 2.0) +
213             pow(double(otherPosition.y - position.y), 2.0) +
214             pow(double(otherPosition.z - position.z), 2.0));
215           // Calculating the force the objects apply on each other
216         double magnitude = Engine::GetGravConst() * ((physics->mass * otherPhysics->mass)) / pow(distance,
      2.0);
217           // Getting the direction (normalized)
218         glm::vec3 direction = otherPosition - position;
219         glm::vec3 normDirection = glm::normalize(direction);
220           // Applying gravitational force to normalized direction
221         glm::vec3 force = normDirection * float(magnitude);
222           // Adding the gravitational force to the forces on object
223         physics->AddForce(force);
224     }
225 }
```

References Object_Manager::FindObject(), Object::GetComponent(), Engine::GetGravConst(), Object::GetId(), Component::GetParent(), Transform::GetPosition(), Object_Manager::GetSize(), and mass.

Referenced by Behavior::ClassSetup().

4.14.3.20 Write() void Physics::Write (File_Writer & *writer*)

Gives physics data to the writer object.

Parameters

writer	

Definition at line 245 of file physics.cpp.

```
245                                       {
246     writer.Write_Vec3("acceleration", initialAcceleration);
247     writer.Write_Vec3("velocity", initialVelocity);
248     writer.Write_Value("mass", mass);
249 }
```

References initialAcceleration, initialVelocity, mass, File_Writer::Write_Value(), and File_Writer::Write_Vec3().

Referenced by Object::Write().

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

- physics.hpp
- physics.cpp

4.15 Random Class Reference

`#include <random.hpp>`

Static Public Member Functions

- static bool Initialize ()

  Initializes the random system.
- static void Shutdown ()

  Delete the random object.
- static glm::vec3 random_vec3 (float low, float high)

  Creates a random vec3.
- static float random_float (float low, float high)

  Creates random float.

Private Attributes

- std::random_device rd

  Random device.

4.15.1 Detailed Description

Random class

Definition at line 23 of file random.hpp.

4.15.2 Member Function Documentation

4.15.2.1 Initialize() `bool Random::Initialize ( ) [static]`

Initializes the random system.

Returns

true

false

Definition at line 24 of file random.cpp.

```
24                          {
25       // Initializing random
26     random = new Random;
27     if (!random) {
28         Trace::Message("Random failed to initialize.");
29         return false;
30     }
31
32     return true;
33 }
```

References Trace::Message(), and random.

Referenced by Engine::Initialize().

4.15.2.2 random_float()

```
float Random::random_float (
        float low,
        float high )  [static]
```

Creates random float.

Parameters

low	Lower boundary in random gen
high	Upper boundary in random gen

Returns

float

Definition at line 70 of file random.cpp.

```
70                                                {
71       // Setup random gen
72     std::mt19937 gen(random->rd());
73     std::uniform_real_distribution<> dist(low, high);
74       // Gen random float
75     return dist(gen);
76 }
```

References random, and rd.

Referenced by Behavior::ClassSetup().

4.15.2.3 random_vec3()

```
glm::vec3 Random::random_vec3 (
        float low,
        float high )  [static]
```

Creates a random vec3.

Parameters

low	Lower boundary in random gen
high	Upper boundary in random gen

Returns

vec3

Definition at line 54 of file random.cpp.

```
54                                                {
55       // Setup random gen
56     std::mt19937 gen(random->rd());
57     std::uniform_real_distribution<> dist(low, high);
58       // Gen random vec3
59     glm::vec3 result_vec3 = { dist(gen), dist(gen), dist(gen) };
60     return result_vec3;
```

```
61 }
```

References random, and rd.

Referenced by Behavior::ClassSetup().

4.15.2.4 Shutdown() `void Random::Shutdown ( ) [static]`

Delete the random object.

Returns

void

Definition at line 40 of file random.cpp.

```
40                          {
41     if (!random) return;
42
43     delete random;
44     random = nullptr;
45 }
```

References random.

Referenced by Engine::Shutdown().

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

- random.hpp
- random.cpp

4.16 Shader Class Reference

`#include <shader.hpp>`

Static Public Member Functions

- static bool Initialize (File_Reader &settings)

  Initializes the shader object.
- static void Update ()

  Tells program to use shader.
- static void Shutdown ()

  Shutdown shader.
- static std::string ReadFile (std::string filename)

  Reads shader file into std::string.
- static void LoadShader (std::string vertexPath, std::string fragmentPath)

  Loads the vertex and fragment shader using given filepaths.
- static GLuint GetProgram ()

  Returns the program id.
- static GLuint GetMatrixId ()

  Returns the mvp buffer id.
- static GLuint GetViewMatrixId ()

  Returns the view matrix buffer id.
- static GLuint GetModelMatrixId ()

  Returns the model matrix buffer id.
- static GLuint GetLightId ()

  Returns the light pos buffer id.
- static GLuint GetLightPowerId ()

  Returns the light power buffer id.

Private Attributes

- GLuint program

  Program id for the engine.
- GLuint matrixId

  MVP matrix id.
- GLuint viewMatrixId

  View matrix id.
- GLuint modelMatrixId

  Model matrix id.
- GLuint lightId

  Light id for world.
- GLuint lightPowerId

  Id for light power buffer.

4.16.1 Detailed Description

Shader class

Definition at line 26 of file shader.hpp.

4.16.2 Member Function Documentation

4.16.2.1 GetLightId() `GLuint Shader::GetLightId ( ) [static]`

Returns the light pos buffer id.

Returns

GLuint

Definition at line 173 of file shader.cpp.

```
173 { return shader->lightId; }
```

References lightId, and shader.

Referenced by Model_Data::Draw().

4.16.2.2 GetLightPowerId() `GLuint Shader::GetLightPowerId ( ) [static]`

Returns the light power buffer id.

Returns

GLuint

Definition at line 180 of file shader.cpp.

```
180 { return shader->lightPowerId; }
```

References lightPowerId, and shader.

Referenced by Model_Data::Draw().

4.16.2.3 GetMatrixId() `GLuint Shader::GetMatrixId ( ) [static]`

Returns the mvp buffer id.

Returns

GLuint

Definition at line 152 of file shader.cpp.

```
152 { return shader->matrixId; }
```

References matrixId, and shader.

Referenced by Model_Data::Draw().

4.16.2.4 GetModelMatrixId() `GLuint Shader::GetModelMatrixId ( ) [static]`

Returns the model matrix buffer id.

Returns

GLuint

Definition at line 166 of file shader.cpp.
```
166 { return shader->modelMatrixId; }
```

References modelMatrixId, and shader.

Referenced by Model_Data::Draw().

4.16.2.5 GetProgram() `GLuint Shader::GetProgram ( ) [static]`

Returns the program id.

Returns

GLuint

Definition at line 145 of file shader.cpp.
```
145 { return shader->program; }
```

References program, and shader.

Referenced by Texture::Load().

4.16.2.6 GetViewMatrixId() `GLuint Shader::GetViewMatrixId ( ) [static]`

Returns the view matrix buffer id.

Returns

GLuint

Definition at line 159 of file shader.cpp.
```
159 { return shader->viewMatrixId; }
```

References shader, and viewMatrixId.

Referenced by Model_Data::Draw().

4.16.2.7 Initialize() `bool Shader::Initialize ( File_Reader & settings ) [static]`

Initializes the shader object.

Parameters

settings	File_Reader object that contains name of shaders to use

Returns

true

false

Definition at line 31 of file shader.cpp.

```
31                                          {
32     shader = new Shader;
33     if (!shader) {
34         Trace::Message("Shader failed to initialize.\n");
35         return false;
36     }
37 
38     //LoadShader("src/shaders/vertex.glsl", "src/shaders/fragment.glsl");
39     LoadShader("src/shaders/" + settings.Read_String("vertexShader") + ".glsl",
40         "src/shaders/" + settings.Read_String("fragShader") + ".glsl");
41     return true;
42 }
```

References LoadShader(), Trace::Message(), File_Reader::Read_String(), and shader.

Referenced by Graphics::Initialize().

4.16.2.8 LoadShader() `void Shader::LoadShader ( std::string vertexPath, std::string fragmentPath ) [static]`

Loads the vertex and fragment shader using given filepaths.

Parameters

vertexPath	// Vertex shader filepath
fragmentPath	// Fragment shader filepath

Returns

void

Definition at line 102 of file shader.cpp.

```
102                                                                     {
103       // Creating shaders
104     GLuint vertShader = glCreateShader(GL_VERTEX_SHADER);
105     GLuint fragShader = glCreateShader(GL_FRAGMENT_SHADER);
106 
107       // Reading shaders
108     std::string vertShaderStr = ReadFile(vertexPath);
109     std::string fragShaderStr = ReadFile(fragmentPath);
110     const char *vertShaderSrc = vertShaderStr.c_str();
111     const char *fragShaderSrc = fragShaderStr.c_str();
```

```
112
113       // Compiling shaders
114     glShaderSource(vertShader, 1, &vertShaderSrc, nullptr);
115     glCompileShader(vertShader);
116
117     glShaderSource(fragShader, 1, &fragShaderSrc, nullptr);
118     glCompileShader(fragShader);
119
120       // Attaching shaders to engine
121     shader->program = glCreateProgram();
122     glAttachShader(shader->program, vertShader);
123     glAttachShader(shader->program, fragShader);
124
125       // Cleanup
126     glDeleteShader(vertShader);
127     glDeleteShader(fragShader);
128
129       // Setting up program
130     glLinkProgram(shader->program);
131     glUseProgram(shader->program);
132
133     shader->matrixId = glGetUniformLocation(shader->program, "MVP");
134     shader->viewMatrixId = glGetUniformLocation(shader->program, "V");
135     shader->modelMatrixId = glGetUniformLocation(shader->program, "M");
136     shader->lightId = glGetUniformLocation(shader->program, "LightPosition_worldspace");
137     shader->lightPowerId = glGetUniformLocation(shader->program, "LightPower");
138 }
```

References lightId, lightPowerId, matrixId, modelMatrixId, program, ReadFile(), shader, and viewMatrixId.

Referenced by Initialize().

4.16.2.9 ReadFile() `std::string Shader::ReadFile ( std::string filepath ) [static]`

Reads shader file into std::string.

Parameters

filepath	Shader file

Returns

std::string

Definition at line 73 of file shader.cpp.

```
73                                              {
74     std::string content;
75
76       // Opening the shader file
77     std::ifstream file(filepath.c_str(), std::ios::in);
78     if (!file.is_open()) {
79         Trace::Message("Failed to read file: " + filepath + "\n");
80         return "";
81     }
82
83       // Saving shader file into std::string
84     std::string line = "";
85     while (!file.eof()) {
86         getline(file, line);
87         content.append(line + "\n");
88     }
89
```

```
90       // Closing file and returning std::string
91     file.close();
92     return content;
93 }
```

References Trace::Message().

Referenced by LoadShader().

4.16.2.10 Shutdown() void Shader::Shutdown ( ) [static]

Shutdown shader.

Returns

void

Definition at line 58 of file shader.cpp.

```
58                          {
59     if (!shader) return;
60 
61     glDeleteProgram(shader->program);
62 
63     delete shader;
64     shader = nullptr;
65 }
```

References program, and shader.

Referenced by Graphics::Shutdown().

4.16.2.11 Update() void Shader::Update ( ) [static]

Tells program to use shader.

Returns

void

Definition at line 49 of file shader.cpp.

```
49                        {
50     glUseProgram(shader->program);
51 }
```

References program, and shader.

Referenced by Graphics::Render().

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

- shader.hpp
- shader.cpp

4.17 Texture Class Reference

`#include <texture.hpp>`

Public Member Functions

- ~Texture ()
  Deletes texture data.
- void Load (std::string textureName_)
  Loads in texture with given filename.
- void Display ()
  Setup texture for drawing.
- std::string GetTextureName () const
  Returns texture name.
- GLuint GetTextureNum () const
  Returns texture data id.

Static Private Member Functions

- static GLuint LoadDDS (std::string filename)
  Loads in the given dds file.

Private Attributes

- std::string textureName
  Name of texture.
- GLuint textureNum
  Loaded texture data id.
- GLuint textureId
  Textures buffer id.
- bool hasBeenSet
  Whether there is a texture or not.

4.17.1 Detailed Description

Texture class

Definition at line 23 of file texture.hpp.

4.17.2 Constructor & Destructor Documentation

4.17.2.1 ~Texture() `Texture::~Texture ( )`

Deletes texture data.

Definition at line 23 of file texture.cpp.

```
23                  {
24     glDeleteTextures(1, &textureNum);
25 }
```

References textureNum.

4.17.3 Member Function Documentation

4.17.3.1 Display() `void Texture::Display ( )`

Setup texture for drawing.

Definition at line 43 of file texture.cpp.

```
43                          {
44     if (!hasBeenSet) return;
45
46     glActiveTexture(GL_TEXTURE0);
47     glBindTexture(GL_TEXTURE_2D, textureNum);
48     glUniform1i(textureId, 0);
49 }
```

References hasBeenSet, textureId, and textureNum.

Referenced by Model_Data::Draw().

4.17.3.2 GetTextureName() `std::string Texture::GetTextureName ( ) const`

Returns texture name.

Returns

std::string

Definition at line 56 of file texture.cpp.

```
56 { return textureName; }
```

References textureName.

Referenced by Texture_Manager::Get(), Model::GetTextureName(), and Model::Write().

4.17.3.3 GetTextureNum() `GLuint Texture::GetTextureNum ( ) const`

Returns texture data id.

Returns

GLuint

Definition at line 63 of file texture.cpp.

```
63 { return textureNum; }
```

References textureNum.

4.17.3.4 Load() `void Texture::Load ( std::string textureName_ )`

Loads in texture with given filename.

Parameters

*textureName_*	Filename of texture

Definition at line 32 of file texture.cpp.

```
32                                          {
33     textureName = textureName_;
34     textureNum = Texture::LoadDDS("data/textures/" + textureName);
35     textureId = glGetUniformLocation(Shader::GetProgram(), "myTextureSampler");
36     hasBeenSet = true;
37 }
```

References Shader::GetProgram(), hasBeenSet, LoadDDS(), textureId, textureName, and textureNum.

Referenced by Texture_Manager::Get().

4.17.3.5 LoadDDS() `GLuint Texture::LoadDDS ( std::string imagepath ) [static], [private]`

Loads in the given dds file.

Parameters

imagepath	DDS filename

Returns

GLuint

Definition at line 74 of file texture.cpp.

```
74                                          {
75     unsigned char header[124];
76
77     FILE *fp;
78
79       // Opening the file
80     fp = fopen(imagepath.c_str(), "rb");
81     if (fp == nullptr)
82         return 0;
83
84       // Making sure it is a dds
85     char filecode[4];
86     fread(filecode, 1, 4, fp);
87     if (strncmp(filecode, "DDS ", 4) != 0) {
88         fclose(fp);
89         return 0;
90     }
91
92       // Getting the surface description
93     fread(&header, 124, 1, fp);
94
95     unsigned int height      = *(unsigned int*)&(header[8 ]);
96     unsigned int width         = *(unsigned int*)&(header[12]);
97     unsigned int linearSize     = *(unsigned int*)&(header[16]);
98     unsigned int mipMapCount = *(unsigned int*)&(header[24]);
99     unsigned int fourCC      = *(unsigned int*)&(header[80]);
100
101     unsigned char * buffer;
102     unsigned int bufsize;
103
104     bufsize = mipMapCount > 1 ? linearSize * 2 : linearSize;
105     buffer = (unsigned char*)malloc(bufsize * sizeof(unsigned char));
106     fread(buffer, 1, bufsize, fp);
107
108       // Close the file
109     fclose(fp);
110
111     unsigned int components  = (fourCC == FOURCC_DXT1) ? 3 : 4;
112     unsigned int format;
113     switch(fourCC) {
114         case FOURCC_DXT1:
115             format = GL_COMPRESSED_RGBA_S3TC_DXT1_EXT;
116             break;
117         case FOURCC_DXT3:
118             format = GL_COMPRESSED_RGBA_S3TC_DXT3_EXT;
119             break;
120         case FOURCC_DXT5:
121             format = GL_COMPRESSED_RGBA_S3TC_DXT5_EXT;
122             break;
123         default:
124             free(buffer);
125             return 0;
126     }
127
128     GLuint textureID;
129     glGenTextures(1, &textureID);
130
131     glBindTexture(GL_TEXTURE_2D, textureID);
132     glPixelStorei(GL_UNPACK_ALIGNMENT,1);
133
134     unsigned int blockSize = (format == GL_COMPRESSED_RGBA_S3TC_DXT1_EXT) ? 8 : 16;
135     unsigned int offset = 0;
136
137     for (unsigned int level = 0; level < mipMapCount && (width || height); ++level) {
138         unsigned int size = ((width+3)/4)*((height+3)/4)*blockSize;
139         glCompressedTexImage2D(GL_TEXTURE_2D, level, format, width, height,
140             0, size, buffer + offset);
141
142         offset += size;
143         width  /= 2;
144         height /= 2;
145
146         if(width < 1) width = 1;
147         if(height < 1) height = 1;
```

```
148
149     }
150
151     free(buffer);
152
153     return textureID;
154 }
```

References FOURCC_DXT1, FOURCC_DXT3, and FOURCC_DXT5.

Referenced by Load().

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

- texture.hpp
- texture.cpp

4.18 Texture_Manager Class Reference

`#include <texture_manager.hpp>`

Static Public Member Functions

- static bool Initialize ()

  Initializes the texture_manager.
- static Texture * Get (File_Reader &reader)

  Looks for texture in list of loaded textures. If found it returns a pointer. If not found it creates texture, adds it to the list of textures and returns a pointer to it.
- static Texture * Get (std::string textureName)

  Looks for texture in list of loaded textures. If found it returns a pointer. If not found it creates texture, adds it to the list of textures and returns a pointer to it.
- static void Shutdown ()

  Deletes all texture object and then the manager.

Private Attributes

- std::vector< Texture * > textures

  List of loaded textures.

4.18.1 Detailed Description

Texture_Manager class

Definition at line 25 of file texture_manager.hpp.

4.18.2 Member Function Documentation

4.18.2.1 Get() [1/2] Texture * Texture_Manager::Get (File_Reader & *reader*) [static]

Looks for texture in list of loaded textures. If found it returns a pointer. If not found it creates texture, adds it to the list of textures and returns a pointer to it.

Parameters

reader	File_Reader object that contains name of texture

Returns

Texture*

Definition at line 45 of file texture_manager.cpp.

```
45                                                  {
46       // Getting texture's filename
47     std::string filename = reader.Read_String("textureToLoad");
48       // Looking for texture in list of loaded textures
49     for (Texture* texture : texture_manager->textures) {
50         if (texture->GetTextureName().compare(filename) == 0) {
51             return texture;
52         }
53     }
54
55       // Creating new texture
56     Texture* texture = new Texture;
57     texture->Load(filename);
58     texture_manager->textures.emplace_back(texture);
59
60     return texture;
61 }
```

References Texture::GetTextureName(), Texture::Load(), File_Reader::Read_String(), texture_manager, and textures.

Referenced by Model::Load(), and Model::SwitchTexture().

4.18.2.2 Get() [2/2] Texture * Texture_Manager::Get (std::string *textureName*) [static]

Looks for texture in list of loaded textures. If found it returns a pointer. If not found it creates texture, adds it to the list of textures and returns a pointer to it.

Parameters

textureName	Name of texture

Returns

Texture*

Definition at line 71 of file texture_manager.cpp.

```
71                                                  {
72       // Looking for texture in list of loaded textures
73     for (Texture* texture : texture_manager->textures) {
74         if (texture->GetTextureName().compare(textureName) == 0) {
75             return texture;
76         }
77     }
78
79       // Creating new texture
```

```
80      Texture* texture = new Texture;
81      texture->Load(textureName);
82      texture_manager->textures.emplace_back(texture);
83
84      return texture;
85  }
```

References Texture::GetTextureName(), Texture::Load(), texture_manager, and textures.

4.18.2.3 Initialize() bool Texture_Manager::Initialize ( ) [static]

Initializes the texture_manager.

Returns

true

false

Definition at line 24 of file texture_manager.cpp.

```
24                                  {
25        // Initializing texture_manager
26      texture_manager = new Texture_Manager;
27      if (!texture_manager) {
28          Trace::Message("Texture Manager was not initialized.\n");
29          return false;
30      }
31
32        // Reserving space in the texture_manager
33      texture_manager->textures.reserve(10);
34      return true;
35  }
```

References Trace::Message(), texture_manager, and textures.

Referenced by Engine::Initialize().

4.18.2.4 Shutdown() void Texture_Manager::Shutdown ( ) [static]

Deletes all texture object and then the manager.

Returns

void

Definition at line 92 of file texture_manager.cpp.

```
92                                  {
93      if (!texture_manager) return;
94
95      for (Texture* texture : texture_manager->textures) {
96          if (!texture) continue;
97
98          delete texture;
99          texture = nullptr;
100     }
101
102     delete texture_manager;
103     texture_manager = nullptr;
104 }
```

References texture_manager, and textures.

Referenced by Engine::Shutdown().

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

- texture_manager.hpp
- texture_manager.cpp

4.19 Trace Class Reference

`#include <trace.hpp>`

Static Public Member Functions

- static void Initialize ()

  Initializes the trace system.
- static void Message (std::string message)

  Prints a message into the output file.
- static void Shutdown ()

  Closes output file and deletes trace object.

Private Attributes

- std::fstream trace_stream

  Output file.

4.19.1 Detailed Description

Trace class

Definition at line 21 of file trace.hpp.

4.19.2 Member Function Documentation

4.19.2.1 Initialize() `void Trace::Initialize ( ) [static]`

Initializes the trace system.

Returns

void

Definition at line 26 of file trace.cpp.

```
26                       {
27     trace = new Trace;
28
29       // Opens output file
30     trace->trace_stream.open("output/trace.log", std::ofstream::out);
31     if (!trace->trace_stream) std::cout « "File wasn't opened successfully.";
32 }
```

References trace, and trace_stream.

Referenced by main().

4.19.2.2 Message() `void Trace::Message ( std::string message ) [static]`

Prints a message into the output file.

Parameters

message	Message to be printed

Returns

void

Definition at line 40 of file trace.cpp.

```
40                                      {
41     if (!trace->trace_stream) return;
42
43     trace->trace_stream « message;
44     std::cout « message;
45 }
```

References trace, and trace_stream.

Referenced by Graphics::ErrorCallback(), Graphics::ErrorCheck(), Random::Initialize(), Engine::Initialize(), Model_Data_Manager::Initialize(), Object_Manager::Initialize(), Editor::Initialize(), Texture_Manager::Initialize(), Shader::Initialize(), Camera::Initialize(), Graphics::Initialize(), Model_Data::Read(), File_Reader::Read_Behavior_Name(), File_Reader::Read_Bool(), File_Reader::Read_Double(), File_Reader::Read_Float(), File_Reader::Read_Int(), File_Reader::Read_Object_Name(), File_Reader::Read_Object_Position(), File_Reader::Read_Object_Scale(), File_Reader::Read_Object_Template_Name(), File_Reader::Read_String(), File_Reader::Read_Vec3(), and Shader::ReadFile().

4.19.2.3 Shutdown() `void Trace::Shutdown ( ) [static]`

Closes output file and deletes trace object.

Returns

void

Definition at line 52 of file trace.cpp.

```
52                          {
53       // Closing output file
54     if (trace->trace_stream) trace->trace_stream.close();
55
56     delete trace;
57     trace = nullptr;
58 }
```

References trace, and trace_stream.

Referenced by main().

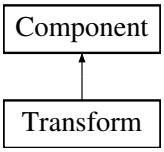
The documentation for this class was generated from the following files:

- trace.hpp
- trace.cpp

4.20 Transform Class Reference

`#include <transform.hpp>`

Inheritance diagram for Transform:



Public Member Functions

- Transform ()
  Creates Transform object with default values.
- Transform (const Transform &other)
  Copy constructor.
- Transform (File_Reader &reader)
  Creates Transform object using file.
- Transform * Clone () const
  Clones current Transform object.
- void SetPosition (glm::vec3 pos)
  Sets position of object.
- glm::vec3 GetPosition () const
  Returns position of object.
- glm::vec3 & GetPositionRef ()
  Returns position reference of object.
- void SetOldPosition (glm::vec3 oldPos)
  Sets old position of object.
- glm::vec3 GetOldPosition () const
  Returns old position of object.
- void SetScale (glm::vec3 sca)
  Sets scale of object.
- glm::vec3 GetScale () const
  Returns scale of object.
- glm::vec3 & GetScaleRef ()
  Returns scale reference of object.
- void SetRotation (glm::vec3 rot)
  Sets rotation of object.
- glm::vec3 GetRotation () const
  Returns rotation of object.
- glm::vec3 & GetRotationRef ()
  Returns rotation reference of object.
- void SetStartPosition (glm::vec3 startPosition_)
  Sets the start position of the object.
- glm::vec3 GetStartPosition () const

Returns the saved start position of the object.

- glm::vec3 & GetStartPositionRef ()

  Returns a reference to the start position of the object.

- void Read (File_Reader &reader)

  Reads data for Transform object from file.

- void Write (File_Writer &writer)

  Gives transform data to writer object.

Static Public Member Functions

- static CType GetCType ()

  Gets the CType of Transform (used in Object::GetComponent<>())

Private Attributes

- glm::vec3 position

  Position of object.

- glm::vec3 oldPosition

  Previous position of object.

- glm::vec3 scale

  Scale of object.

- glm::vec3 rotation

  Rotation of object.

- glm::vec3 startPosition

  Starting position of the object.

Additional Inherited Members

4.20.1 Detailed Description

Transform class

Definition at line 25 of file transform.hpp.

4.20.2 Constructor & Destructor Documentation

4.20.2.1 Transform() [1/3] Transform::Transform ( )

Creates Transform object with default values.

Definition at line 19 of file transform.cpp.

```
19                      : Component(CType::CTransform),
20     position(glm::vec3(0.f, 0.f, 0.f)), scale(glm::vec3(1.f, 1.f, 1.f)), rotation(glm::vec3(0.f, 0.f, 0.f))
       {}
```

Referenced by Clone().

4.20.2.2 Transform() [2/3] Transform::Transform (

```
            const Transform & other )
```

Copy constructor.

Parameters

other	

Definition at line 27 of file transform.cpp.

```
27                                          : Component(CType::CTransform) {
28     *this = other;
29 }
```

4.20.2.3 Transform() [3/3] Transform::Transform (File_Reader & *reader*)

Creates Transform object using file.

Parameters

reader	File to use for making Transform object

Definition at line 36 of file transform.cpp.

```
36                                       : Component(CType::CTransform),
37     position(glm::vec3(0.f, 0.f, 0.f)), scale(glm::vec3(1.f, 1.f, 1.f)), rotation(glm::vec3(0.f, 0.f, 0.f)) {
38     Read(reader);
39 }
```

References Read().

4.20.3 Member Function Documentation

4.20.3.1 Clone() Transform * Transform::Clone ( ) const

Clones current Transform object.

Returns

Transform* Cloned Transform

Definition at line 46 of file transform.cpp.

```
46                                  {
47     return new Transform(*this);
48 }
```

References Transform().

4.20.3.2 GetCType() `CType Transform::GetCType ( ) [static]`

Gets the CType of Transform (used in Object::GetComponent<>())

Returns

CType

Definition at line 171 of file transform.cpp.

```
171                             {
172     return CType::CTransform;
173 }
```

4.20.3.3 GetOldPosition() `glm::vec3 Transform::GetOldPosition ( ) const`

Returns old position of object.

Returns

glm::vec3

Definition at line 83 of file transform.cpp.

```
83 { return oldPosition; }
```

References oldPosition.

4.20.3.4 GetPosition() `glm::vec3 Transform::GetPosition ( ) const`

Returns position of object.

Returns

glm::vec3

Definition at line 62 of file transform.cpp.

```
62 { return position; }
```

References position.

Referenced by Model_Data::Draw(), Physics::Update(), and Physics::UpdateGravity().

4.20.3.5 GetPositionRef() `glm::vec3 & Transform::GetPositionRef ( )`

Returns position reference of object.

Returns

glm::vec3&

Definition at line 69 of file transform.cpp.

```
69 { return position; }
```

References position.

Referenced by Behavior::ClassSetup(), and Editor::Display_Transform().

4.20.3.6 GetRotation() `glm::vec3 Transform::GetRotation ( ) const`

Returns rotation of object.

Returns

float

Definition at line 118 of file transform.cpp.

```
118 { return rotation; }
```

References rotation.

4.20.3.7 GetRotationRef() `glm::vec3 & Transform::GetRotationRef ( )`

Returns rotation reference of object.

Returns

glm::vec3&

Definition at line 125 of file transform.cpp.

```
125 { return rotation; }
```

References rotation.

Referenced by Behavior::ClassSetup(), and Editor::Display_Transform().

4.20.3.8 GetScale() `glm::vec3 Transform::GetScale ( ) const`

Returns scale of object.

Returns

glm::vec3

Definition at line 97 of file transform.cpp.

```
97 { return scale; }
```

References scale.

Referenced by Model_Data::Draw(), and File_Writer::Write_Object_Data().

4.20.3.9 GetScaleRef() `glm::vec3 & Transform::GetScaleRef ( )`

Returns scale reference of object.

Returns

glm::vec3&

Definition at line 104 of file transform.cpp.

```
104 { return scale; }
```

References scale.

Referenced by Behavior::ClassSetup(), and Editor::Display_Transform().

4.20.3.10 GetStartPosition() `glm::vec3 Transform::GetStartPosition ( ) const`

Returns the saved start position of the object.

Returns

glm::vec3

Definition at line 139 of file transform.cpp.

```
139 { return startPosition; }
```

References startPosition.

Referenced by File_Writer::Write_Object_Data().

4.20.3.11 GetStartPositionRef() `glm::vec3 & Transform::GetStartPositionRef ( )`

Returns a reference to the start position of the object.

Returns

glm::vec3&

Definition at line 146 of file transform.cpp.

```
146 { return startPosition; }
```

References startPosition.

Referenced by Behavior::ClassSetup(), and Editor::Display_Transform().

4.20.3.12 Read() `void Transform::Read ( File_Reader & reader )`

Reads data for Transform object from file.

Parameters

reader	File to read from

Definition at line 153 of file transform.cpp.

```
153                                     {
154     //SetRotation(reader.Read_Float("rotation"));
155 }
```

Referenced by Object::ReRead(), and Transform().

4.20.3.13 SetOldPosition() `void Transform::SetOldPosition ( glm::vec3 oldPos )`

Sets old position of object.

Parameters

oldPos	

Definition at line 76 of file transform.cpp.

```
76 { oldPosition = oldPos; }
```

References oldPosition.

Referenced by Physics::Update().

4.20.3.14 SetPosition() void Transform::SetPosition (glm::vec3 *pos*)

Sets position of object.

Parameters

pos	

Definition at line 55 of file transform.cpp.

```
55 { position = pos; }
```

References position.

Referenced by Behavior::ClassSetup(), Object_Manager::ReadList(), and Physics::Update().

4.20.3.15 SetRotation() void Transform::SetRotation (glm::vec3 *rot*)

Sets rotation of object.

Parameters

rot	

Definition at line 111 of file transform.cpp.

```
111 { rotation = rot; }
```

References rotation.

Referenced by Behavior::ClassSetup().

4.20.3.16 SetScale() void Transform::SetScale (glm::vec3 *sca*)

Sets scale of object.

Parameters

sca	

Definition at line 90 of file transform.cpp.

```
90 { scale = sca; }
```

References scale.

Referenced by Behavior::ClassSetup(), and Object_Manager::ReadList().

4.20.3.17 SetStartPosition() void Transform::SetStartPosition (glm::vec3 *startPosition_*)

Sets the start position of the object.

Parameters

*start↩ Position_*	

Definition at line 132 of file transform.cpp.

```
132 { startPosition = startPosition_; }
```

References startPosition.

Referenced by Behavior::ClassSetup(), Editor::Display_Scene(), and Object_Manager::ReadList().

4.20.3.18 Write() void Transform::Write (File_Writer & *writer*)

Gives transform data to writer object.

Parameters

writer	

Definition at line 162 of file transform.cpp.

```
162                                         {
163     writer.Write_Vec3("rotation", rotation);
164 }
```

References rotation, and File_Writer::Write_Vec3().

Referenced by Object::Write().

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

- transform.hpp
- transform.cpp

4.21 Vector3_Func Class Reference

`#include <vector3_func.hpp>`

Static Public Member Functions

- static glm::vec3 normalize (const glm::vec3 vec)

  Wrapper for the glm normalize function.
- static float distance (const glm::vec3 vec1, const glm::vec3 vec2)

  Wrapper for the glm distance function.
- static glm::vec3 get_direction (const glm::vec3 vec1, const glm::vec3 vec2)

  Wrapper for subtracting two glm vectors to make a new vector.
- static glm::vec3 zero_vec3 ()

  Creates a glm::vec3 filled with zeroes.
- static float length (const glm::vec3 vec3)

  Wrapper for the glm length function.

4.21.1 Detailed Description

Vector3_Func class

Definition at line 21 of file vector3_func.hpp.

4.21.2 Member Function Documentation

4.21.2.1 distance() `float Vector3_Func::distance ( const glm::vec3 vec1, const glm::vec3 vec2 ) [static]`

Wrapper for the glm distance function.

Parameters

vec1	First input vec3
vec2	Second input vec3

Returns

float

Definition at line 32 of file vector3_func.cpp.

```
32                                                                  {
33     return glm::distance(vec1, vec2);
34 }
```

Referenced by Behavior::ClassSetup().

4.21.2.2 get_direction() glm::vec3 Vector3_Func::get_direction (const glm::vec3 *vec1*, const glm::vec3 *vec2*) [static]

Wrapper for subtracting two glm vectors to make a new vector.

Parameters

vec1	First input vec3
vec2	Second input vec3

Returns

glm::vec3

Definition at line 43 of file vector3_func.cpp.

```
43                                                                          {
44     return vec1 - vec2;
45 }
```

Referenced by Behavior::ClassSetup().

4.21.2.3 length() float Vector3_Func::length (const glm::vec3 *vec*) [static]

Wrapper for the glm length function.

Parameters

vec	Input vec3

Returns

float

Definition at line 62 of file vector3_func.cpp.

```
62                                                  {
63     return glm::length(vec);
64 }
```

Referenced by Behavior::ClassSetup().

4.21.2.4 normalize() glm::vec3 Vector3_Func::normalize (const glm::vec3 *vec*) [static]

Wrapper for the glm normalize function.

Parameters

vec	Input vec3

Returns

glm::vec3

Definition at line 21 of file vector3_func.cpp.

```
21                                                  {
22     return glm::normalize(vec);
23 }
```

Referenced by Behavior::ClassSetup().

4.21.2.5 zero_vec3() `glm::vec3 Vector3_Func::zero_vec3 ( )  [static]`

Creates a glm::vec3 filled with zeroes.

Returns

glm::vec3

Definition at line 52 of file vector3_func.cpp.

```
52                                          {
53     return glm::vec3(0.f, 0.f, 0.f);
54 }
```

Referenced by Behavior::ClassSetup().

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

- vector3_func.hpp
- vector3_func.cpp

5 File Documentation

5.1 behavior.cpp File Reference

```
#include <glm.hpp>
#include "behavior.hpp"
#include "engine.hpp"
#include "object.hpp"
#include "physics.hpp"
#include "random.hpp"
#include "transform.hpp"
#include "vector3_func.hpp"
```

5.1.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-22

Copyright

5.2 behavior.hpp File Reference

```
#include <vector>
#include <vec3.hpp>
#include <lua.hpp>
#include <sol/sol.hpp>
#include "component.hpp"
#include "file_reader.hpp"
#include "file_writer.hpp"
```

Classes

- class Behavior

5.2.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-22

Copyright

5.3 camera.cpp File Reference

```
#include <glfw3.h>
#include <glm.hpp>
#include "editor.hpp"
#include "engine.hpp"
#include "graphics.hpp"
#include "camera.hpp"
#include "trace.hpp"
```

Variables

- static Camera * camera = nullptr

  Camera object.

5.3.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-05

Copyright

5.4 camera.hpp File Reference

```
#include <utility>
#include <vec3.hpp>
#include "file_reader.hpp"
```

Classes

- class Camera

5.4.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-05

Copyright

Copyright (c) 2021

5.5 component.cpp File Reference

```
#include "component.hpp"
```

5.5.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-05

Copyright

Copyright (c) 2021

5.6 component.hpp File Reference

Classes

- class Component

Typedefs

- typedef Component::CType CType

  Typedef for CType (used in other files)

5.6.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-05

Copyright

Copyright (c) 2021

5.7 editor.cpp File Reference

```
#include <imgui.h>
#include "imgui_impl_glfw.h"
#include "imgui_impl_opengl3.h"
#include "imgui_internal.h"
#include "ImGuiFileDialog.h"
#include <vec3.hpp>
#include "camera.hpp"
#include "editor.hpp"
#include "engine.hpp"
#include "graphics.hpp"
#include "object_manager.hpp"
```

Variables

- static Editor * editor = nullptr

  Editor object.

5.7.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-07-14

Copyright

5.8 editor.hpp File Reference

```
#include "behavior.hpp"
#include "object.hpp"
#include "model.hpp"
#include "physics.hpp"
#include "trace.hpp"
#include "transform.hpp"
```

Classes

- class Editor

5.8.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-07-14

Copyright

5.9 engine.cpp File Reference

```
#include <cmath>
#include <string>
#include "engine.hpp"
#include "graphics.hpp"
#include "object_manager.hpp"
#include "object.hpp"
#include "component.hpp"
#include "model_data_manager.hpp"
#include "physics.hpp"
#include "camera.hpp"
#include "editor.hpp"
#include "file_reader.hpp"
#include "random.hpp"
#include "texture_manager.hpp"
```

Variables

- static Engine * engine = nullptr

  Engine object.

5.9.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-04

Copyright

5.10 engine.hpp File Reference

```
#include <chrono>
#include <string>
#include <vec3.hpp>
```

Classes

- class Engine

5.10.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-04

Copyright

Copyright (c) 2021

5.11 file_reader.cpp File Reference

```
#include <fstream>
#include <iostream>
#include <filereadstream.h>
#include "file_reader.hpp"
#include "trace.hpp"
```

5.11.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-04

Copyright

Copyright (c) 2021

5.12 file_reader.hpp File Reference

```
#include <string>
#include <document.h>
#include <vec3.hpp>
```

Classes

- class File_Reader

5.12.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-04

Copyright

Copyright (c) 2021

5.13 file_writer.cpp File Reference

```
#include <fstream>
#include <iostream>
#include "file_writer.hpp"
#include "trace.hpp"
#include "transform.hpp"
```

5.13.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-07-27

Copyright

Copyright (c) 2021

5.14 file_writer.hpp File Reference

```
#include <string>
#include <vector>
#include <document.h>
#include <filewritestream.h>
#include <prettywriter.h>
#include <vec3.hpp>
#include "object.hpp"
```

Classes

- class File_Writer

5.14.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-07-27

Copyright

Copyright (c) 2021

5.15 graphics.cpp File Reference

```
#include <string>
#include <vector>
#include <cmath>
#include <glew.h>
#include <vec3.hpp>
#include <vec2.hpp>
#include <mat4x4.hpp>
#include <glm.hpp>
#include <gtc/matrix_transform.hpp>
#include <gtx/transform.hpp>
#include "engine.hpp"
#include "graphics.hpp"
#include "object_manager.hpp"
#include "model.hpp"
#include "transform.hpp"
#include "camera.hpp"
#include "editor.hpp"
#include "trace.hpp"
#include "shader.hpp"
```

Variables

- static Graphics * graphics = nullptr
  Graphics object.

5.15.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-05

Copyright

5.16 graphics.hpp File Reference

```
#include <utility>
#include <GL/gl.h>
#include <glfw3.h>
#include "file_reader.hpp"
```

Classes

- class Graphics

5.16.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-05

Copyright

5.17 main.cpp File Reference

```
#include "trace.hpp"
#include "engine.hpp"
#include "graphics.hpp"
```

Functions

- int main (int argc, char ∗argv[ ])

  Main function.

5.17.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-05-06

Copyright

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5.17.2 Function Documentation

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

Main function.

Parameters

argc	
argv	

Returns

int

Definition at line 24 of file main.cpp.

```
24                                  {
25       // Initializing systems
26     Trace::Initialize();
27     Engine::Initialize();
28
29       // Engine update loop
30     Graphics::Update();
31
32       // Shutting down systems
33     Engine::Shutdown();
34     Trace::Shutdown();
35
36     return 0;
37 }
```

References Trace::Initialize(), Engine::Initialize(), Trace::Shutdown(), Engine::Shutdown(), and Graphics::Update().

5.18 model.cpp File Reference

```
#include <cstdio>
#include "object.hpp"
#include "model.hpp"
#include "model_data_manager.hpp"
#include "transform.hpp"
#include "texture.hpp"
#include "texture_manager.hpp"
#include "trace.hpp"
```

5.18.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-06

Copyright

5.19 model.hpp File Reference

```
#include <vector>
#include <array>
#include <string>
#include <GL/gl.h>
#include "component.hpp"
#include "file_reader.hpp"
#include "file_writer.hpp"
#include "model_data.hpp"
#include "texture.hpp"
```

Classes

- class Model

5.19.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-06

Copyright

5.20 model_data.cpp File Reference

```
#include <cstdio>
#include <cstring>
#include <glew.h>
#include <glm.hpp>
#include <gtc/matrix_transform.hpp>
#include <gtx/transform.hpp>
#include "engine.hpp"
#include "model.hpp"
#include "model_data.hpp"
#include "trace.hpp"
#include "shader.hpp"
```

5.20.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-06

Copyright

Copyright (c) 2021

5.21 model_data.hpp File Reference

```
#include <vector>
#include <array>
#include <string>
#include <vec3.hpp>
#include <vec2.hpp>
#include <mat4x4.hpp>
#include <GL/gl.h>
#include "transform.hpp"
```

Classes

- class Model_Data

5.21.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-06

Copyright

Copyright (c) 2021

5.22 model_data_manager.cpp File Reference

```
#include "model_data_manager.hpp"
#include "trace.hpp"
```

Variables

- static Model_Data_Manager * model_data_manager = nullptr

  Model_Data_Manager object.

5.22.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-06

Copyright

5.23 model_data_manager.hpp File Reference

```
#include <vector>
#include <string>
#include "model_data.hpp"
#include "file_reader.hpp"
```

Classes

- class Model_Data_Manager

5.23.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-06

Copyright

5.24 object.cpp File Reference

```
#include "object.hpp"
#include "behavior.hpp"
#include "model.hpp"
#include "object_manager.hpp"
#include "physics.hpp"
#include "transform.hpp"
#include "file_reader.hpp"
```

5.24.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-05

Copyright

5.25 object.hpp File Reference

```
#include <unordered_map>
#include <string>
#include "component.hpp"
#include "trace.hpp"
```

Classes

- class Object

Variables

- static std::unordered_map< CType, std::string > CNames

5.25.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-05

Copyright

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5.25.2 Variable Documentation

5.25.2.1 CNames `std::unordered_map<CType, std::string> CNames [static]`

Initial value:

```
= {
    { CType::CModel, "Model" },
    { CType::CPhysics, "Physics" },
    { CType::CTransform, "Transform" }
}
```

unordered_map tp relate CType enum to string (only used in GetComponent)

Definition at line 25 of file object.hpp.

5.26 object_manager.cpp File Reference

```
#include <string>
#include "behavior.hpp"
#include "object_manager.hpp"
#include "trace.hpp"
#include "transform.hpp"
```

Variables

- static Object_Manager * object_manager = nullptr

  Object_Manager object.

5.26.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-05

Copyright

Copyright (c) 2021

5.27 object_manager.hpp File Reference

```
#include <vector>
#include "object.hpp"
#include "file_reader.hpp"
#include "file_writer.hpp"
```

Classes

- class Object_Manager

5.27.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-05

Copyright

5.28 physics.cpp File Reference

```
#include <cmath>
#include <glm.hpp>
#include "engine.hpp"
#include "object_manager.hpp"
#include "object.hpp"
#include "physics.hpp"
#include "transform.hpp"
```

5.28.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-05

Copyright

5.29 physics.hpp File Reference

```
#include <vec3.hpp>
#include "component.hpp"
#include "file_reader.hpp"
#include "file_writer.hpp"
```

Classes

- class Physics

5.29.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-05

Copyright

5.30 random.cpp File Reference

```
#include "random.hpp"
#include "trace.hpp"
```

Variables

- static Random * random = nullptr

  Random object.

5.30.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-07-13

Copyright

5.31 random.hpp File Reference

```
#include <random>
#include <vec3.hpp>
```

Classes

- class Random

5.31.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-07-13

Copyright

5.32 shader.cpp File Reference

```
#include <fstream>
#include <glew.h>
#include "shader.hpp"
#include "trace.hpp"
```

Variables

- static Shader * shader = nullptr

  Shader object.

5.32.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-19

Copyright

5.33 shader.hpp File Reference

```
#include <string>
#include <GL/gl.h>
#include "file_reader.hpp"
```

Classes

- class Shader

5.33.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-19

Copyright

5.34 texture.cpp File Reference

```
#include <glew.h>
#include "shader.hpp"
#include "texture.hpp"
```

Macros

- #define FOURCC_DXT1 0x31545844
  Equivalent to "DXT1" in ASCII.
- #define FOURCC_DXT3 0x33545844
  Equivalent to "DXT3" in ASCII.
- #define FOURCC_DXT5 0x35545844
  Equivalent to "DXT5" in ASCII.

5.34.1 Detailed Description

Author

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Version

0.1

Date

2021-07-14

Copyright

5.35 texture.hpp File Reference

```
#include <string>
#include <GL/gl.h>
```

Classes

- class Texture

5.35.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-07-14

Copyright

5.36 texture_manager.cpp File Reference

```
#include "texture_manager.hpp"
#include "trace.hpp"
```

Variables

- static Texture_Manager * texture_manager = nullptr

  Texture_Manager object.

5.36.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-07-14

Copyright

5.37 texture_manager.hpp File Reference

```
#include <string>
#include <vector>
#include "file_reader.hpp"
#include "texture.hpp"
```

Classes

- class Texture_Manager

5.37.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-07-14

Copyright

5.38 trace.cpp File Reference

```
#include <iostream>
#include <cstdarg>
#include "trace.hpp"
```

Variables

- static Trace * trace = nullptr

  Trace object.

5.38.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-05

Copyright

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5.39 trace.hpp File Reference

```
#include <string>
#include <fstream>
```

Classes

- class Trace

5.39.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-05

Copyright

5.40 transform.cpp File Reference

```
#include "transform.hpp"
```

5.40.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-05

Copyright

5.41 transform.hpp File Reference

```
#include <vec3.hpp>
#include "component.hpp"
#include "file_reader.hpp"
#include "file_writer.hpp"
```

Classes

- class Transform

5.41.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-05

Copyright

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5.42 vector3_func.cpp File Reference

```
#include "vector3_func.hpp"
```

5.42.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-07-26

Copyright

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5.43 vector3_func.hpp File Reference

```
#include <glm.hpp>
#include <vec3.hpp>
```

Classes

- class Vector3_Func

5.43.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-07-26

Copyright

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