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

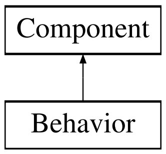
Here is a list of all documented files with brief descriptions:

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 29 of file behavior.cpp.

```
: 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 36 of file behavior.cpp.

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

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 45 of file behavior.cpp.

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

References Read().

4.1.2.4 ∼Behavior()

```
Behavior::∼Behavior ( )
```

Deletes all of the lua states.

Definition at line 62 of file behavior.cpp.

```
                         {
    Clear();
}
```

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 235 of file behavior.cpp.

```
                                                {
      // Checking if this script is already attached
    if (CheckIfCopy(newScriptName)) return false;
      // Setting up new lua state
    sol::state* state = new sol::state;
    state->open_libraries(sol::lib::base, sol::lib::math, sol::lib::io, sol::lib::string);
    states.emplace_back(state);
      // Adding new script filename to list
    scripts.emplace_back(newScriptName);
    ClassSetup(state);
      // Setting up lua script to run
    states.back()->script_file(std::string(std::string(getenv("USERPROFILE")) +
   "/Documents/pEngine/scripts/" + scripts.back()).c_str());
    (*states.back())["Start"]();

    return true;
}
```

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 259 of file behavior.cpp.

```
                                                  {
      // Checking if script is the same as an existing one
    for (std::string scriptName : scripts) {
        if (scriptName.compare(newScriptName) == 0) return true;
    }

      // Script is not a copy
    return false;
}
```

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 148 of file behavior.cpp.

```
148                                         {
149       // Getting objects components
150     //Physics* physics = GetParent()->GetComponent<Physics>();
151     //Transform* transform = GetParent()->GetComponent<Transform>();
152 
153       // Giving lua random functions
154     state->set_function("random_vec3", Random::random_vec3);
155     state->set_function("random_float", Random::random_float);
156 
157       // Giving lua glm::vec3 wrapper class
158     sol::usertype<glm::vec3> vec3_type = state->new_usertype<glm::vec3>("vec3",
159         sol::constructors<glm::vec3(float, float, float), glm::vec3(float)>());
160       // Giving lua glm::vec3 wrapper class variables
161     vec3_type.set("x", &glm::vec3::x);
162     vec3_type.set("y", &glm::vec3::y);
163     vec3_type.set("z", &glm::vec3::z);
164       // Giving lua glm::vec3 wrapper class functions
165     state->set_function("normalize", Vector3_Func::normalize);
166     state->set_function("distance", Vector3_Func::distance);
167     state->set_function("get_direction", Vector3_Func::get_direction);
168     state->set_function("zero_vec3", Vector3_Func::zero_vec3);
169     state->set_function("length", Vector3_Func::length);
170     state->set_function("add_float", Vector3_Func::add_float);
171     state->set_function("add_vec3", Vector3_Func::add_vec3);
172 
173     state->set_function("FindObject", sol::overload(sol::resolve<Object*(int)>(&Object_Manager::FindObject),

174         sol::resolve<Object*(std::string)>(&Object_Manager::FindObject)));
175 
176       // Giving lua physics class
177     sol::usertype<Physics> physics_type = state->new_usertype<Physics>("Physics",
178         sol::constructors<Physics(), Physics(const Physics)>());
179       // Giving lua physics class variables
180     physics_type.set("acceleration", sol::property(Physics::GetAccelerationRef, &Physics::SetAcceleration));
181     physics_type.set("forces",       sol::property(Physics::GetForcesRef,       &Physics::SetForces));
182     physics_type.set("velocity",     sol::property(Physics::GetVelocityRef,     &Physics::SetVelocity));
183       // Giving lua physics class functions
184     physics_type.set_function("ApplyForce",    &Physics::ApplyForce);
185     physics_type.set_function("UpdateGravity", &Physics::UpdateGravity);
186 
187       // Giving lua transform class
188     sol::usertype<Transform> transform_type = state->new_usertype<Transform>("Transform",
189         sol::constructors<Transform(), Transform(const Transform)>());
190       // Giving lua transform class variables
191     transform_type.set("position",      sol::property(Transform::GetPositionRef,
        &Transform::SetPosition));
192     transform_type.set("rotation",      sol::property(Transform::GetRotationRef,
        &Transform::SetRotation));
193     transform_type.set("scale",         sol::property(Transform::GetScaleRef,
        &Transform::SetScale));
194     transform_type.set("startPosition", sol::property(Transform::GetStartPositionRef,
        &Transform::SetStartPosition));
195 
196       // Giving lua object class
197     state->set("object", GetParent());
198     sol::usertype<Object> object_type = state->new_usertype<Object>("Object",
199         sol::constructors<Object(), Object(const Object)>());
200       // Giving lua object class variables
201     object_type.set("name", sol::property(Object::GetNameRef, &Object::SetName));
202     object_type.set("id",   sol::readonly_property(Object::GetId));
203     object_type.set_function("GetPhysics", &Object::GetComponent<Physics>);
204     object_type.set_function("GetTransform", &Object::GetComponent<Transform>);
205 }
```

References Vector3_Func::add_float(), Vector3_Func::add_vec3(), Physics::ApplyForce(), Vector3_Func::distance(), Object_Manager::FindObject(), Vector3_Func::get_direction(), Physics::GetAccelerationRef(), Physics::GetForces↩Ref(), Object::GetId(), Object::GetNameRef(), Component::GetParent(), Transform::GetPositionRef(), Transform::Get↩RotationRef(), Transform::GetScaleRef(), Transform::GetStartPositionRef(), Physics::GetVelocityRef(), Vector3_Func↩::length(), Vector3_Func::normalize(), Random::random_float(), Random::random_vec3(), Physics::SetAcceleration(), Physics::SetForces(), Object::SetName(), 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 273 of file behavior.cpp.

```
                      {
    for (sol::state* state : states) {
        if (!state) continue;
        delete state;
        state = nullptr;
    }

    states.clear();
    scripts.clear();
}
```

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 54 of file behavior.cpp.

```
                             {
    return new Behavior(*this);
}
```

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 117 of file behavior.cpp.

```
                            {
    return CType::CBehavior;
}
```

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

Returns list of lua filenames.

Returns

std::vector<std::string>&

Definition at line 141 of file behavior.cpp.

```
{ 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 83 of file behavior.cpp.

```
                                    {
    unsigned behavior_num = 0;

      // Reads the name of the lua files
    while (true) {
          // Getting the name of the next lua file
        std::string behavior_name = reader.Read_Behavior_Name("behavior_" + std::to_string(behavior_num));
        if (behavior_name.compare("") == 0) break;
          // Adding lua filename to list
        scripts.emplace_back(behavior_name);
        ++behavior_num;
    }
      // Creating lua state for each of the scripts that were read in
    for (unsigned i = 0; i < scripts.size(); ++i) {
        sol::state* state = new sol::state;
        state->open_libraries(sol::lib::base, sol::lib::math, sol::lib::io, sol::lib::string);
        states.emplace_back(state);
     }
}
```

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 125 of file behavior.cpp.

```
                                   {
    for (sol::state* state : states) {
        ClassSetup(state);
    }

    for (unsigned i = 0; i < states.size(); ++i) {
        states[i]->script_file(std::string(std::string(getenv("USERPROFILE")) +
       "/Documents/pEngine/scripts/" + scripts[i]).c_str());
        (*states[i])["Start"]();
    }
}
```

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 215 of file behavior.cpp.

```
                                                                        {
      // Checking if this script is already attached
    if (CheckIfCopy(newScriptName)) return false;
    if (newScriptName.compare(".lua") == 0) return false;
    sol::state* state = states[scriptNum];
    scripts[scriptNum] = newScriptName;
      // Setting up new lua script
    state->script_file(std::string(std::string(getenv("USERPROFILE")) + "/Documents/pEngine/scripts/" +
   scripts[scriptNum]).c_str());
    (*state)["Start"]();

    return true;
}
```

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 71 of file behavior.cpp.

```
                       {
    for (sol::state* state : states) {
        if (!state) continue;
        (*state)["FixedUpdate"](Engine::GetDt());
    }
}
```

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 108 of file behavior.cpp.

```
                                      {
    writer.Write_Behavior_Name(scripts);
}
```

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.

```
                                   : position(0.f, 0.f, 0.f), front(0.f, 0.f, -1.f),
    up(0.f, 1.f, 0.f), yaw(-90.f), pitch(0.f), last({ width / 2.f, height / 2.f }),
    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                                              {
      // Initializing the camera
    camera = new Camera(settings.Read_Int("windowWidth"), settings.Read_Int("windowHeight"));
    if (!camera) {
        Trace::Message("Camera was not initialized.");
        return false;
    }

      // Getting data from settings file
    camera->originalMoveSpeed = settings.Read_Float("moveSpeed");
    camera->originalSprintSpeed = settings.Read_Float("sprintSpeed");
    camera->originalSensitivity = settings.Read_Float("sensitivity");

    return true;
}
```

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.

```
                                                              {
    if (!camera->canMoveMouse) {
        camera->last = { xpos, ypos };
        return;
    }
      // Setting up variables
    static bool firstMouse = true;
    std::pair<double, double> mousePos = { xpos, ypos };

      // Setting the camera sens using delta time
    camera->sensitivity = camera->originalSensitivity * Engine::GetDeltaTime();

      // Checking if this is the first time the function was called
    if (firstMouse) {
        camera->last = { mousePos.first, mousePos.second };
        firstMouse = false;
    }

      // Finding how far the mouse is from its last position
    std::pair<float, float> offset = {
        mousePos.first - camera->last.first,
        camera->last.second - mousePos.second
    };
      // Setting new last position
    camera->last = { mousePos.first, mousePos.second };

      // Updating offsets to use the sensitivity of the camera
    offset.first *= camera->sensitivity;
    offset.second *= camera->sensitivity;

      // Applying the offset to the camera's direction
    camera->yaw += offset.first;
    camera->pitch += offset.second;

      // Stops the camera from circling completely in the y direction
    if (camera->pitch > 89.f) camera->pitch = 89.f;
    if (camera->pitch < -89.f) camera->pitch = -89.f;

      // Finding the direction of the camera
    glm::vec3 tempFront = {
        std::cos(glm::radians(camera->yaw)) * std::cos(glm::radians(camera->pitch)),
        std::sin(glm::radians(camera->pitch)),
        std::sin(glm::radians(camera->yaw)) * std::cos(glm::radians(camera->pitch))
    };
    camera->front = glm::normalize(tempFront);

      // Finding the upward direction of the camera
    glm::vec3 tempUp = { 0.f, 1.f, 0.f };
    glm::vec3 right = glm::normalize(glm::cross(tempUp, camera->front));
    glm::vec3 up = glm::cross(camera->front, right);
    camera->up = up;
}
```

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.

```
                          {
    if (camera) {
        delete camera;
        camera = nullptr;
    }
}
```

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.

```
                      {
      // Checking if the engine should be closed
    if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_ESCAPE) == GLFW_PRESS) {
        if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_ESCAPE) == GLFW_RELEASE) {
            glfwSetWindowShouldClose(Graphics::GetWindow(), true);
        }
    }

      // Checking if sprint is being used
    if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_LEFT_SHIFT) == GLFW_PRESS &&
    Editor::GetTakeKeyboardInput()) {
        camera->speed = camera->originalSprintSpeed * Engine::GetDeltaTime();
    }
    else {
        camera->speed = camera->originalMoveSpeed * Engine::GetDeltaTime();
    }

      // Checking for movement using W, A, S, D, SPACE, and CTRL
    if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_W) == GLFW_PRESS && Editor::GetTakeKeyboardInput()) {
        camera->position += camera->speed * camera->front;
    }
    if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_S) == GLFW_PRESS && Editor::GetTakeKeyboardInput()) {
        camera->position -= camera->speed * camera->front;
    }
    if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_A) == GLFW_PRESS && Editor::GetTakeKeyboardInput()) {
        camera->position -= glm::normalize(glm::cross(camera->front, camera->up)) * camera->speed;
    }
    if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_D) == GLFW_PRESS && Editor::GetTakeKeyboardInput()) {
        camera->position += glm::normalize(glm::cross(camera->front, camera->up)) * camera->speed;
    }
    if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_SPACE) == GLFW_PRESS && Editor::GetTakeKeyboardInput()) {
        camera->position += camera->speed * camera->up;
    }
    if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_LEFT_CONTROL) == GLFW_PRESS &&
    Editor::GetTakeKeyboardInput()) {
        camera->position -= camera->speed * camera->up;
    }

     if (glfwGetMouseButton(Graphics::GetWindow(), GLFW_MOUSE_BUTTON_RIGHT) == GLFW_PRESS &&
    Editor::GetTakeKeyboardInput()) {
         camera->canMoveMouse = true;
     }
     if (glfwGetMouseButton(Graphics::GetWindow(), GLFW_MOUSE_BUTTON_RIGHT) == GLFW_RELEASE) {
         camera->canMoveMouse = false;
     }
}
```

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

Referenced by Engine::Update().

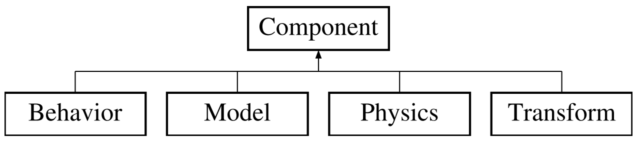
The documentation for this class was generated from the following files:

- 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.

```
              {
        CBehavior,
        CModel,
        CPhysics,
        CTransform,
    };
```

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.

```
: 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.

```
{ 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.

```
{ 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.

```
{ 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 410 of file editor.cpp.

```
410                                     {
411     ImGui::Begin("Camera Settings");
412 
413     ImGui::PushItemWidth(137);
414 
415       // Default move speed
416     ImGui::Text("Move Speed");
417     ImGui::SameLine(100); ImGui::InputFloat("##2", &Camera::GetOriginalMoveSpeed());
418 
419       // Move speed when holding shift
420     ImGui::Text("Sprint Speed");
421     ImGui::SameLine(100); ImGui::InputFloat("##3", &Camera::GetOriginalSprintSpeed());
422 
423       // Mouse sensitivity when looking around
424     ImGui::Text("Sensitivity");
425     ImGui::SameLine(100); ImGui::InputFloat("##4", &Camera::GetOriginalSensitivity());
426 
427     ImGui::PopItemWidth();
428 
429     ImGui::End();
430 }
```

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 271 of file editor.cpp.

```
271                                {
272     ImGui::Begin("Components##1");
273 
274     if (selected_object == -1) { ImGui::End(); return; }
275     Object* object = Object_Manager::FindObject(selected_object);
276     std::string objectName = object->GetName();
277 
278     ImGui::Text("Id: %d", object->GetId());
279 
280       // Display name box (allows changing the name of an object)
281     static char nameBuf[128] = "";
282     sprintf(nameBuf, objectName.c_str());
```

```

    if (ImGui::InputText("Name", nameBuf, 128, ImGuiInputTextFlags_EnterReturnsTrue)) {
        object->SetName(std::string(nameBuf));
    }

    if (ImGui::IsItemDeactivatedAfterEdit()) {
        object->SetName(std::string(nameBuf));
    }

      // Template used by the selected object
    ImGui::Text("Template:");
    ImGui::SameLine(100);
    std::string templateName = object->GetTemplateName();
    if (templateName.empty()) templateName = "No template##1";
    if (ImGui::Button(templateName.c_str())) {
        ImGuiFileDialog::Instance()->OpenDialog("ChooseTemplate##1", "Choose File", ".json",
   std::string(getenv("USERPROFILE")) + "/Documents/pEngine/json/objects/");
    }

    ImGui::SameLine();
    if (ImGui::Button("New Template")) {
        object->Write();
    }

    if (ImGuiFileDialog::Instance()->Display("ChooseTemplate##1")) {
        if (ImGuiFileDialog::Instance()->IsOk()) {
            std::string filePathName = ImGuiFileDialog::Instance()->GetCurrentFileName();
            object->ReRead(filePathName);
        }

        ImGuiFileDialog::Instance()->Close();
    }

      // Getting all of the components
    Behavior* behavior = object->GetComponent<Behavior>();
    Model* model = object->GetComponent<Model>();
    Physics* physics = object->GetComponent<Physics>();
    Transform* transform = object->GetComponent<Transform>();

      // Display all of the components of the selected_object
    Display_Transform(transform);
    Display_Physics(physics);
    Display_Model(model);
    Display_Scripts(behavior);

    ImGui::Separator();

      // Button to add new components to the selected_object
    if (ImGui::Button("Add Component##1")) {
        ImGui::OpenPopup("New Component##1");
    }

      // Add new components to object (only ones that the object doesn't already have)
    if (ImGui::BeginPopup("New Component##1")) {
        if (!physics) {
            if (ImGui::Selectable("Physics##1")) {
                physics = new Physics;
                object->AddComponent(physics);
            }
        }
        if (!model) {
            if (ImGui::Selectable("Model##1")) {
                model = new Model;
                object->AddComponent(model);
            }
        }
        if (!behavior) {
            if (ImGui::Selectable("Scripts##1")) {
                behavior = new Behavior;
                object->AddComponent(behavior);
            }
        }
        ImGui::EndPopup();
    }

    ImGui::End();
}
```

References Display_Model(), Display_Physics(), Display_Scripts(), Display_Transform(), Object_Manager::Find↩ Object(), Object::GetId(), 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 155 of file editor.cpp.

```
                              {
      // Setting up viewport
    ImGuiViewport* viewport = ImGui::GetMainViewport();
    ImGui::SetNextWindowPos(viewport->Pos);
    ImGui::SetNextWindowSize(viewport->Size);
    ImGui::SetNextWindowViewport(viewport->ID);
    ImGui::SetNextWindowBgAlpha(0.0f);

      // Setting up window flags
    ImGuiWindowFlags window_flags = ImGuiWindowFlags_MenuBar | ImGuiWindowFlags_NoDocking;
    window_flags |= ImGuiWindowFlags_NoTitleBar | ImGuiWindowFlags_NoCollapse | ImGuiWindowFlags_NoResize |
   ImGuiWindowFlags_NoMove;
    window_flags |= ImGuiWindowFlags_NoBringToFrontOnFocus | ImGuiWindowFlags_NoNavFocus;

      // Setting up window style
    ImGui::PushStyleVar(ImGuiStyleVar_WindowRounding, 0.0f);
    ImGui::PushStyleVar(ImGuiStyleVar_WindowBorderSize, 0.0f);
    ImGui::PushStyleVar(ImGuiStyleVar_WindowPadding, ImVec2(0.0f, 0.0f));

      // Making the window
    ImGui::SetNextWindowBgAlpha(0.0f);
    ImGui::Begin("Editor Window", &editor->isOpen, window_flags);
    ImGui::PopStyleVar(3);

      // Setting up window settings
    ImGuiID dockspace_id = ImGui::GetID("Editor");
    ImGuiDockNodeFlags dockspace_flags = ImGuiDockNodeFlags_PassthruCentralNode |
   ImGuiDockNodeFlags_NoDockingInCentralNode;
    ImGui::DockSpace(dockspace_id, ImVec2(0.0f, 0.0f), dockspace_flags);
    editor->Display_Menu_Bar();
    ImGui::End();
}
```

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 692 of file editor.cpp.

```
                             {
    static bool saveAs = false;
    if (ImGui::BeginMenuBar()) {
        if (ImGui::BeginMenu("File##1")) {
            if (ImGui::MenuItem("Save##1")) {
                Engine::Write();
            }
            if (ImGui::MenuItem("Save As..##1")) {
                saveAs = true;
            }

            ImGui::EndMenu();
        }
        if (saveAs) {
            static char nameBuf[128] = "";
            sprintf(nameBuf, Engine::GetPresetName().c_str());
            if (ImGui::InputText("Name", nameBuf, 128, ImGuiInputTextFlags_EnterReturnsTrue)) {
                Engine::SetPresetName(std::string(nameBuf));
                Engine::Write();
                saveAs = false;
            }

            if (ImGui::IsItemDeactivatedAfterEdit()) {
                Engine::SetPresetName(std::string(nameBuf));
                Engine::Write();
                saveAs = false;
            }
        }

        ImGui::EndMenuBar();
    }
}
```

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 514 of file editor.cpp.

```
                                       {
    if (!model) return;

    std::string modelName = model->GetModelName();
    std::string textureName = model->GetTextureName();

    if (modelName.compare("") == 0) modelName = "no model";
    if (textureName.compare("") == 0) textureName = "no texture";

      // Setting up tree flags
    ImGuiTreeNodeFlags node_flags = ImGuiTreeNodeFlags_SpanAvailWidth | ImGuiTreeNodeFlags_OpenOnDoubleClick | ImGuiTreeNodeFlags_OpenOnArrow;
    if (selected_component == CType::CModel) node_flags |= ImGuiTreeNodeFlags_Selected;

    const bool model_open = ImGui::TreeNodeEx((void*)(intptr_t)CType::CModel, node_flags, "Model");
    if (ImGui::IsItemClicked()) selected_component = CType::CModel;

      // Right click behavior to delete model component from selected object
    if (ImGui::IsItemClicked(ImGuiMouseButton_Right)) {
        selected_component = CType::CModel;
        ImGui::OpenPopup("DeleteModel##1");
    }

    if (ImGui::BeginPopup("DeleteModel##1")) {
        if (ImGui::Selectable("Delete##3")) {
            model->GetParent()->RemoveComponent<Model>();
            selected_component = -1;
        }
        ImGui::EndPopup();
    }

    if (model_open) {
          // Model that is being used
        ImGui::Text("Model"); ImGui::SameLine(100);
        if (ImGui::Button(modelName.c_str())) {
            ImGuiFileDialog::Instance()->OpenDialog("ChooseFileDlgKey##1", "Choose File", ".obj",
    std::string(getenv("USERPROFILE")) + "/Documents/pEngine/models/");
        }

        if (ImGuiFileDialog::Instance()->Display("ChooseFileDlgKey##1")) {
            if (ImGuiFileDialog::Instance()->IsOk()) {
                std::string filePathName = ImGuiFileDialog::Instance()->GetCurrentFileName();
                model->SwitchModel(filePathName);
            }

            ImGuiFileDialog::Instance()->Close();
        }

          // Texture that is being used
        ImGui::Text("Texture"); ImGui::SameLine(100);
        if (ImGui::Button(textureName.c_str())) {
            ImGuiFileDialog::Instance()->OpenDialog("ChooseFileDlgKey##2", "Choose File", ".dds,.DDS",
    std::string(getenv("USERPROFILE")) + "/Documents/pEngine/textures/");
        }

        if (ImGuiFileDialog::Instance()->Display("ChooseFileDlgKey##2")) {
            if (ImGuiFileDialog::Instance()->IsOk()) {
                std::string filePathName = ImGuiFileDialog::Instance()->GetCurrentFileName();
                model->SwitchTexture(filePathName);
            }

            ImGuiFileDialog::Instance()->Close();
        }

        ImGui::TreePop();
    }
}
```

References Model::GetModelName(), Component::GetParent(), Model::GetTextureName(), Object::RemoveComponent(), 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 584 of file editor.cpp.

```
                                          {
    if (!physics) return;

    glm::vec3& velocity = physics->GetVelocityRef();
    glm::vec3& rotVel = physics->GetRotationalVelocityRef();

    ImGuiTreeNodeFlags node_flags = ImGuiTreeNodeFlags_SpanAvailWidth | ImGuiTreeNodeFlags_OpenOnDoubleClick
   | ImGuiTreeNodeFlags_OpenOnArrow;
    if (selected_component == CType::CPhysics) node_flags |= ImGuiTreeNodeFlags_Selected;

    const bool physics_open = ImGui::TreeNodeEx((void*)(intptr_t)CType::CPhysics, node_flags, "Physics");
    if (ImGui::IsItemClicked()) selected_component = CType::CPhysics;

    if (ImGui::IsItemClicked(ImGuiMouseButton_Right)) {
        selected_component = CType::CPhysics;
        ImGui::OpenPopup("DeletePhysics##1");
    }
    if (ImGui::BeginPopup("DeletePhysics##1")) {
        if (ImGui::Selectable("Delete##4")) {
            physics->GetParent()->RemoveComponent<Physics>();
            selected_component = -1;
        }
        ImGui::EndPopup();
    }

    if (physics_open) {
        ImGui::Text("Velocity");

        ImGui::PushItemWidth(65);
        ImGui::SameLine(100); ImGui::InputFloat("x##1", &velocity.x);
        ImGui::SameLine(185); ImGui::InputFloat("y##1", &velocity.y);
        ImGui::SameLine(270); ImGui::InputFloat("z##1", &velocity.z);

        ImGui::Text("RotVel");

        ImGui::PushItemWidth(65);
        ImGui::SameLine(100); ImGui::InputFloat("x##6", &rotVel.x);
        ImGui::SameLine(185); ImGui::InputFloat("y##6", &rotVel.y);
        ImGui::SameLine(270); ImGui::InputFloat("z##6", &rotVel.z);

        ImGui::Text("Mass");
        ImGui::SameLine(100); ImGui::InputFloat("##6", &physics->GetMassRef());
        ImGui::PopItemWidth();

        ImGui::TreePop();
    }
}
```

References Physics::GetMassRef(), Component::GetParent(), Physics::GetRotationalVelocityRef(), Physics::Get←VelocityRef(), 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 190 of file editor.cpp.

```
                            {
    ImGui::Begin("Scene");

    if (!takeKeyboardInput && ImGui::IsWindowFocused()) {
        if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_LEFT_CONTROL) == GLFW_PRESS) {
              // Copy current selected object
            if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_C) == GLFW_PRESS) {
                if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_C) == GLFW_RELEASE) {
                    editor->object_to_copy = editor->selected_object;
                }
            }
              // Paste current selected object
            if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_V) == GLFW_PRESS) {
                if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_V) == GLFW_RELEASE) {
                    if (editor->object_to_copy != -1) {
                        Object* object = new Object(*Object_Manager::FindObject(editor->selected_object));
                        Object_Manager::AddObject(object);
                    }
                }
            }
        }
    }

      // Display all objects
    for (int i = 0; i < (int)Object_Manager::GetSize(); ++i) {
        if (ImGui::Selectable(Object_Manager::FindObject(i)->GetName().c_str(), selected_object == i,
   ImGuiSelectableFlags_AllowDoubleClick)) {
            if (selected_object != i) editor->selected_component = -1;
            selected_object = i;
            selected_component = -1;
        }

          // Checking for right click behavior
        if (ImGui::IsItemClicked(ImGuiMouseButton_Right)) {
            if (selected_object != i) editor->selected_component = -1;
            selected_object = i;
            selected_component = -1;
            ImGui::OpenPopup("ObjectSettings##1");
        }
    }

    if (ImGui::BeginPopup("ObjectSettings##1")) {
          // Removes selected object from scene
        if (ImGui::Selectable("Delete##1")) {
            Object_Manager::RemoveObject(selected_object);
            selected_object = -1;
            selected_component = -1;
        }
          // Copies selected object
        if (ImGui::Selectable("Copy##1")) {
            editor->object_to_copy = editor->selected_object;
        }
          // Pastes copied object into scene
        if (ImGui::Selectable("Paste##1")) {
            if (editor->object_to_copy != -1) {
                Object* object = new Object(*Object_Manager::FindObject(editor->selected_object));
                Object_Manager::AddObject(object);
            }
        }
        ImGui::EndPopup();
    }

    ImGui::Separator();

      // Button to add new object to the scene
    if (ImGui::Button("Add Object")) {
        Object* newObject = new Object;
        Transform* transform = new Transform;
        transform->SetStartPosition(glm::vec3(0.f));
        newObject->SetName("New_Object");
        newObject->AddComponent(transform);

        Object_Manager::AddObject(newObject);
    }

    ImGui::End();
}
```

References Object::AddComponent(), Object_Manager::AddObject(), editor, Object_Manager::FindObject(), Object_↩ Manager::GetSize(), Graphics::GetWindow(), object_to_copy, Object_Manager::RemoveObject(), selected_component, selected_object, Object::SetName(), Transform::SetStartPosition(), and takeKeyboardInput.

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 437 of file editor.cpp.

```
                                              {
    if (!behavior) return;

    // Setting up tree flags
    ImGuiTreeNodeFlags node_flags = ImGuiTreeNodeFlags_SpanAvailWidth | ImGuiTreeNodeFlags_OpenOnDoubleClick
   | ImGuiTreeNodeFlags_OpenOnArrow;
    if (selected_component == CType::CBehavior) node_flags |= ImGuiTreeNodeFlags_Selected;

    const bool scripts_open = ImGui::TreeNodeEx((void*)(intptr_t)CType::CBehavior, node_flags, "Scripts");
    if (ImGui::IsItemClicked()) selected_component = CType::CBehavior;

      // Right click behavior to delete script component from object
    if (ImGui::IsItemClicked(ImGuiMouseButton_Right)) {
        selected_component = CType::CBehavior;
        ImGui::OpenPopup("DeleteScripts##1");
    }

    if (ImGui::BeginPopup("DeleteScripts##1")) {
        if (ImGui::Selectable("Delete##2")) {
            behavior->GetParent()->RemoveComponent<Behavior>();
            selected_component = -1;
        }
        ImGui::EndPopup();
    }

      // Displays the currently attached scripts
    if (scripts_open) {
        std::vector<std::string>& scripts = behavior->GetScripts();
        unsigned scriptNum = 1;
        for (std::string& script : scripts) {
            ImGui::Text(std::string("Script " + std::to_string(scriptNum) + ":").c_str());
            ImGui::SameLine(100);
            if (ImGui::Button(script.c_str())) {
                ImGuiFileDialog::Instance()->OpenDialog("ChooseFileDlgKey##3", "Choose File", ".lua",
   std::string(getenv("USERPROFILE")) + "/Documents/pEngine/scripts/");
            }

            if (ImGuiFileDialog::Instance()->Display("ChooseFileDlgKey##3")) {
                if (ImGuiFileDialog::Instance()->IsOk()) {
                    std::string filePathName = ImGuiFileDialog::Instance()->GetCurrentFileName();
                    behavior->SwitchScript(scriptNum - 1, filePathName);
                }

                ImGuiFileDialog::Instance()->Close();
            }
            ++scriptNum;
        }

          // Add new script to the object
        ImGui::Indent(71);
        if (ImGui::Button("New Script##1")) {
            ImGuiFileDialog::Instance()->OpenDialog("ChooseFileDlgKey##4", "Choose File", ".lua",
   std::string(getenv("USERPROFILE")) + "/Documents/pEngine/scripts/");
        }

        if (ImGuiFileDialog::Instance()->Display("ChooseFileDlgKey##4")) {
            if (ImGuiFileDialog::Instance()->IsOk()) {
                std::string filePathName = ImGuiFileDialog::Instance()->GetCurrentFileName();
                behavior->AddScript(filePathName);
            }

            ImGuiFileDialog::Instance()->Close();
        }

          // Popup to say that the selected script to add is already attached to the object
        if (ImGui::BeginPopup("ExistingScript##1")) {
            ImGui::Text(std::string("Script already being used or doesn't exist").c_str(),
                ImGui::GetFontSize() * 2);
            ImGui::EndPopup();
        }

        ImGui::TreePop();
    }
}
```

References Behavior::AddScript(), Component::GetParent(), Behavior::GetScripts(), Object::RemoveComponent(), selected_component, and Behavior::SwitchScript().

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 637 of file editor.cpp.

```
                                                 {
    if (!transform) return;

    glm::vec3& position = transform->GetPositionRef();
    glm::vec3& scale = transform->GetScaleRef();
    glm::vec3& rotation = transform->GetRotationRef();
    glm::vec3& startPos = transform->GetStartPositionRef();

    ImGuiTreeNodeFlags node_flags = ImGuiTreeNodeFlags_SpanAvailWidth | ImGuiTreeNodeFlags_OpenOnDoubleClick
   | ImGuiTreeNodeFlags_OpenOnArrow;
    if (selected_component == CType::CTransform) node_flags |= ImGuiTreeNodeFlags_Selected;

    const bool transform_open = ImGui::TreeNodeEx((void*)(intptr_t)CType::CTransform, node_flags,
   "Transform");
    if (ImGui::IsItemClicked()) selected_component = CType::CTransform;

    if (transform_open) {
        ImGui::Text("Position");

        ImGui::PushItemWidth(65);
        ImGui::SameLine(100); ImGui::InputFloat("x##1", &position.x);
        ImGui::SameLine(185); ImGui::InputFloat("y##1", &position.y);
        ImGui::SameLine(270); ImGui::InputFloat("z##1", &position.z);
        ImGui::PopItemWidth();

        ImGui::Text("Scale");

        ImGui::PushItemWidth(65);
        ImGui::SameLine(100); ImGui::InputFloat("x##2", &scale.x);
        ImGui::SameLine(185); ImGui::InputFloat("y##2", &scale.y);
        ImGui::SameLine(270); ImGui::InputFloat("z##2", &scale.z);
        ImGui::PopItemWidth();

        ImGui::Text("Rotation");

        ImGui::PushItemWidth(65);
        ImGui::SameLine(100); ImGui::InputFloat("x##3", &rotation.x);
        ImGui::SameLine(185); ImGui::InputFloat("y##3", &rotation.y);
        ImGui::SameLine(270); ImGui::InputFloat("z##3", &rotation.z);
        ImGui::PopItemWidth();

        ImGui::Text("Start Pos");

        ImGui::PushItemWidth(65);
        ImGui::SameLine(100); ImGui::InputFloat("x##5", &startPos.x);
        ImGui::SameLine(185); ImGui::InputFloat("y##5", &startPos.y);
        ImGui::SameLine(270); ImGui::InputFloat("z##5", &startPos.z);
        ImGui::PopItemWidth();

        ImGui::TreePop();
    }
}
```

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 364 of file editor.cpp.

```
                                 {
    ImGui::Begin("World Settings");
    std::string presetName = Engine::GetPresetName();

      // Allows user to change the preset that is loaded
    ImGui::Text("Presets"); ImGui::SameLine(120);
    if (ImGui::Button(presetName.c_str())) {
        ImGuiFileDialog::Instance()->OpenDialog("ChooseFileDlgKey##3", "Choose File", ".json",
   std::string(getenv("USERPROFILE")) + "/Documents/pEngine/json/preset/");
    }

    if (ImGuiFileDialog::Instance()->Display("ChooseFileDlgKey##3")) {
        if (ImGuiFileDialog::Instance()->IsOk()) {
            std::string filePathName = ImGuiFileDialog::Instance()->GetCurrentFileName();
            if (Engine::Restart(filePathName)) selected_object = -1;
        }

        ImGuiFileDialog::Instance()->Close();
    }

    ImGui::PushItemWidth(141);

      // Strength of the light being used
    ImGui::Text("Light Power");
    ImGui::SameLine(120); ImGui::InputFloat("##1", &Engine::GetLightPower());

      // Position of the light being used
    ImGui::Text("Light Position");
    ImGui::PushItemWidth(65);
    ImGui::SameLine(120); ImGui::InputFloat("x##4", &Engine::GetLightPos().x);
    ImGui::SameLine(205); ImGui::InputFloat("y##4", &Engine::GetLightPos().y);
    ImGui::SameLine(290); ImGui::InputFloat("z##4", &Engine::GetLightPos().z);
    ImGui::PopItemWidth();

      // Grav const of the engine
    ImGui::Text("Grav Const");
    ImGui::SameLine(120); ImGui::InputDouble("##5", &Engine::GetGravConst());

    ImGui::PopItemWidth();

    ImGui::End();
}
```

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 731 of file editor.cpp.

```
{ 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.

```
                         {
    // Initializing the editor
  editor = new Editor;
  if (!editor) {
      Trace::Message("Editor failed to initialize.\n");
      return false;
  }
  editor->selected_object = -1;
  editor->selected_component = -1;
  editor->object_to_copy = -1;

  IMGUI_CHECKVERSION();
  ImGui::CreateContext();

    // Setting up ImGui flags
  ImGui::GetIO().ConfigFlags |= ImGuiConfigFlags_NavEnableKeyboard;
  ImGui::GetIO().ConfigFlags |= ImGuiConfigFlags_DockingEnable;
  ImGui::GetIO().ConfigFlags |= ImGuiConfigFlags_ViewportsEnable;

    // Setting style for ImGui
  ImGui::StyleColorsDark();
  if (ImGui::GetIO().ConfigFlags & ImGuiConfigFlags_ViewportsEnable) {
      ImGui::GetStyle().WindowRounding = 0.f;
      ImGui::GetStyle().Colors[ImGuiCol_WindowBg].w = 1.f;
  }

    // Setting up ImGui
  ImGui_ImplGlfw_InitForOpenGL(Graphics::GetWindow(), true);
  ImGui_ImplOpenGL3_Init("#version 330");

  return true;
}
```

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 114 of file editor.cpp.

```
                     {
  ImGui::Render();
  ImGui_ImplOpenGL3_RenderDrawData(ImGui::GetDrawData());

  if (ImGui::GetIO().ConfigFlags & ImGuiConfigFlags_ViewportsEnable) {
      GLFWwindow* backup_current_context = glfwGetCurrentContext();
      ImGui::UpdatePlatformWindows();
      ImGui::RenderPlatformWindowsDefault();
      glfwMakeContextCurrent(backup_current_context);
  }
}
```

Referenced by Graphics::Render().

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

Sets selected object to invalid value.

Returns

void

Definition at line 147 of file editor.cpp.

```
                      {
    editor->selected_object = -1;
}
```

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 131 of file editor.cpp.

```
                         {
    if (!editor) return;

    ImGui_ImplOpenGL3_Shutdown();
    ImGui_ImplGlfw_Shutdown();
    ImGui::DestroyContext();

    delete editor;
    editor = nullptr;
}
```

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.

```
                    {
    // ImGui update functions
  ImGui_ImplOpenGL3_NewFrame();
  ImGui_ImplGlfw_NewFrame();
  ImGui::NewFrame();

  //ImGui::ShowDemoWindow();

    // Updating whether program should ignore keyboard input
  if (!ImGui::GetIO().WantCaptureKeyboard) {
      editor->takeKeyboardInput = true;
  }
  else {
      editor->takeKeyboardInput = false;
  }

    // Keyboard shortcuts
  if (!editor->takeKeyboardInput) {
        // Save current settings as preset
      if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_LEFT_CONTROL) == GLFW_PRESS) {
          if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_S) == GLFW_PRESS) {
              if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_S) == GLFW_RELEASE) {
                      Engine::Write();
              }
          }
      }
  }

    // Display the different windows
  editor->Display_Dockspace();
  editor->Display_Scene();
  editor->Display_Components();
  editor->Display_World_Settings();
  editor->Display_Camera_Settings();
}
```

References Display_Camera_Settings(), Display_Components(), Display_Dockspace(), Display_Scene(), Display_↩ World_Settings(), editor, Graphics::GetWindow(), 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 bool 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 bool Restart ()

  Resets the objects in the engine.
- static bool 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 189 of file engine.cpp.
```
189 { 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 196 of file engine.cpp.
```
196 { 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 203 of file engine.cpp.

```
203 { 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 224 of file engine.cpp.

```
224 { 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 217 of file engine.cpp.

```
217 { 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 210 of file engine.cpp.

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

References engine, and presetName.

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

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

Initializes the engine and the systems in the engine.

Returns

true

false

Definition at line 42 of file engine.cpp.

```
                          {
      // Initializing engine
    engine = new Engine;
    if (!engine) {
        Trace::Message("Engine was not initialized.\n");
        return false;
    }

      // Reading settings from json
    File_Reader settings;
    if (!settings.Read_File("settings.json")) return false;

    File_Reader preset;
    if (!preset.Read_File("preset/" + settings.Read_String("preset"))) return false;

    engine->presetName = settings.Read_String("preset");
    engine->gravConst = preset.Read_Double("gravConst");

    engine->lightPower = 1000.f;
    engine->lightPos = preset.Read_Vec3("lightPos");
    if (engine->lightPos == glm::vec3(0.f)) {
        engine->lightPos = glm::vec3(4, 4, 0);
    }

      // Initializing sub systems
    if (!Model_Data_Manager::Initialize()) return false;
    if (!Texture_Manager::Initialize()) return false;
    if (!Camera::Initialize(settings)) return false;
    if (!Graphics::Initialize(settings)) return false;
    if (!Object_Manager::Initialize(preset)) return false;
    if (!Random::Initialize()) return false;
    if (!Editor::Initialize()) return false;

      // Setting up variables used for dt
    engine->currentTime = std::chrono::steady_clock::now();
    engine->accumulator = 0.f;
    engine->time = 0.f;
    engine->isRunning = true;

    return true;
}
```

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_File(), File_Reader::Read_String(), File_Reader::Read_Vec3(), and time.

Referenced by main().

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

Resets the objects in the engine.

Returns

true

false

Definition at line 139 of file engine.cpp.

```
                      {
      // Initializing object manager
    File_Reader settings;
    if (!settings.Read_File("settings.json")) return false;

    File_Reader preset;
    if (!preset.Read_File("preset/" + engine->presetName)) return false;

      // Removing all current objects
    Object_Manager::Shutdown();
    Editor::Reset();

    engine->presetName = settings.Read_String("preset");
    engine->gravConst = preset.Read_Double("gravConst");
    if (!Object_Manager::Initialize(preset)) return false;

    return true;
}
```

References engine, gravConst, Object_Manager::Initialize(), presetName, File_Reader::Read_Double(), File_Reader↩ ::Read_File(), 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] `bool Engine::Restart ( std::string presetName ) [static]`

Resets the engine to the given preset.

Parameters

presetName	Given preset

Returns

true

false

Definition at line 165 of file engine.cpp.

```
{
      // Initializing object manager
    File_Reader settings;
    if (!settings.Read_File("settings.json")) return false;

    File_Reader preset;
    if (!preset.Read_File("preset/" + presetName)) return false;

      // Removing all current objects
    Object_Manager::Shutdown();
    Editor::Reset();

    engine->presetName = presetName;
    engine->gravConst = preset.Read_Double("gravConst");
    if (!Object_Manager::Initialize(preset)) return false;

    return true;
}
```

References engine, gravConst, Object_Manager::Initialize(), presetName, File_Reader::Read_Double(), File_Reader↩
::Read_File(), 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

*preset↩ Name_*	

Returns

void

Definition at line 248 of file engine.cpp.

```
{
    engine->presetName = presetName_;
}
```

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 116 of file engine.cpp.

```
                       {
    if (!engine) return;

      // Shutdown sub systems
    Editor::Shutdown();
    Random::Shutdown();
    Object_Manager::Shutdown();
    Graphics::Shutdown();
    Camera::Shutdown();
    Texture_Manager::Shutdown();
    Model_Data_Manager::Shutdown();

      // Delete engine object
    delete engine;
    engine = nullptr;
}
```

References engine, Random::Shutdown(), Editor::Shutdown(), Model_Data_Manager::Shutdown(), Texture_Manager↩ ::Shutdown(), Camera::Shutdown(), Object_Manager::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 90 of file engine.cpp.

```
                     {
      // Calculating dt
    engine->newTime = std::chrono::steady_clock::now();
    engine->timeTaken = engine->newTime - engine->currentTime;
    engine->deltaTime = float(engine->timeTaken.count()) *
        std::chrono::steady_clock::period::num / std::chrono::steady_clock::period::den;
    engine->currentTime = engine->newTime;
    engine->accumulator += engine->deltaTime;

    Editor::Update();
    Camera::Update();
      // Only called when it is time (fixed time step)
    while (engine->accumulator >= engine->dt) {
          // Update objects
        Object_Manager::Update();
          // Update dt related variables
        engine->accumulator -= engine->dt;
        engine->time += engine->dt;
    }
}
```

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 232 of file engine.cpp.

```
                 {
    File_Writer writer;

    writer.Write_Value("gravConst", engine->gravConst);
    writer.Write_Vec3("lightPos", engine->lightPos);
    Object_Manager::Write(writer);

    writer.Write_File(std::string ("preset/" + engine->presetName));
}
```

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

- bool 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 Member Function Documentation

4.6.2.1 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 205 of file file_reader.cpp.

```
                                                            {
      // Checking if value exists
    if (!root["behaviors"].HasMember(valueName.c_str())) {
        return std::string("");
    }

    return root["behaviors"][valueName.c_str()].GetString();
}
```

Referenced by Behavior::Read().

4.6.2.2 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 96 of file file_reader.cpp.

```
                                              {
        // Checking if the value is a bool
      if (!root.HasMember(valueName.c_str())) {
          return false;
       }
       return root[valueName.c_str()].GetBool();
}
```

4.6.2.3 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 124 of file file_reader.cpp.

```
                                                   {
        // Checking if the value is a double (has decimal)
       if (!root.HasMember(valueName.c_str())) {
           return false;
       }
       return root[valueName.c_str()].GetDouble();
}
```

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

4.6.2.4 Read_File() `bool 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

Returns

true

false

Definition at line 32 of file file_reader.cpp.

```
                                            {
    // Opening the json file
    std::string fileToOpen = std::string(getenv("USERPROFILE")) + "/Documents/pEngine/json/" + filename;
    FILE* file = fopen(fileToOpen.c_str(), "r");
    if (!file) return false;

    char buffer[65536];
    FileReadStream stream(file, buffer, sizeof(buffer));
    root.ParseStream<0, UTF8<>, FileReadStream>(stream);

    fclose(file);
    return true;
}
```

Referenced by Engine::Initialize(), Object::Read(), Object::ReRead(), and Engine::Restart().

4.6.2.5 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 110 of file file_reader.cpp.

```
                                            {
    // Checking if the value is a double (has decimal)
    if (!root.HasMember(valueName.c_str())) {
        return 0.f;
    }
    return root[valueName.c_str()].GetFloat();
}
```

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

4.6.2.6 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 52 of file file_reader.cpp.

```
                                                {
    // Checking if the value is an int
    if (!root.HasMember(valueName.c_str())) {
        return 0;
    }
    return root[valueName.c_str()].GetInt();
}
```

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

4.6.2.7 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 138 of file file_reader.cpp.

```
                                                            {
    // Checking if the value exists
    if (!root.HasMember(valueName.c_str())) {
        return std::string("");
    }
    if (!root[valueName.c_str()].HasMember("objectName")) {
        return std::string("");
    }

    return root[valueName.c_str()]["objectName"].GetString();
}
```

Referenced by Object_Manager::ReadList().

4.6.2.8 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 174 of file file_reader.cpp.

```
                                                              {
    if (!root[valueName.c_str()].HasMember("position")) {
        return glm::vec3(0.f, 0.f, 0.f);
    }

    Value& array = root[valueName.c_str()]["position"];
    return glm::vec3(array[0].GetFloat(), array[1].GetFloat(), array[2].GetFloat());
}
```

Referenced by Object_Manager::ReadList().

4.6.2.9 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 189 of file file_reader.cpp.

```
                                                           {
      // Checking if value exists
    if (!root[valueName.c_str()].HasMember("scale")) {
        return glm::vec3(0.f, 0.f, 0.f);
    }

    Value& array = root[valueName.c_str()]["scale"];
    return glm::vec3(array[0].GetFloat(), array[1].GetFloat(), array[2].GetFloat());
}
```

Referenced by Object_Manager::ReadList().

4.6.2.10 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 156 of file file_reader.cpp.

```
                                                                     {
      // Checking if the value exists
    if (!root.HasMember(valueName.c_str())) {
        return std::string("");
    }
    if (!root[valueName.c_str()].HasMember("templateName")) {
        return std::string("");
    }

    return root[valueName.c_str()]["templateName"].GetString();
}
```

Referenced by Object_Manager::ReadList().

4.6.2.11 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 66 of file file_reader.cpp.

```
                                                     {
      // Checking if the value is a std::string
    if (!root.HasMember(valueName.c_str())) {
        return std::string("");
    }
    return root[valueName.c_str()].GetString();
}
```

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

4.6.2.12 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 81 of file file_reader.cpp.

```
                                                            {
        // Checking if the value is an array
      if (!root.HasMember(valueName.c_str())) {
          return glm::vec3(0.f, 0.f, 0.f);
      }
      return glm::vec3(root[valueName.c_str()][0].GetFloat(), root[valueName.c_str()][1].GetFloat(),
      root[valueName.c_str()][2].GetFloat());
}
```

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.

```
                            {
    root.SetObject();
}
```

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.

```
                                                                             {
    Value behaviors(kObjectType);

      // Filling object
    for (unsigned i = 0; i < behaviorNames.size(); ++i) {
        std::string behaviorName = std::string("behavior_" + std::to_string(i));
        Value name(behaviorName.c_str(), SizeType(behaviorName.size()), root.GetAllocator());

        behaviors.AddMember(name, StringRef(behaviorNames[i].c_str()), root.GetAllocator());
    }
```

```
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 = std::string(getenv("USERPROFILE")) + "/Documents/pEngine/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();
```

```

      // Putting position into value rapidjson can use
    Value pos(kArrayType);
    pos.PushBack(startPos.x, root.GetAllocator());
    pos.PushBack(startPos.y, root.GetAllocator());
    pos.PushBack(startPos.z, root.GetAllocator());

      // Putting scale into value rapidjson can use
    Value scale(kArrayType);
    scale.PushBack(startScale.x, root.GetAllocator());
    scale.PushBack(startScale.y, root.GetAllocator());
    scale.PushBack(startScale.z, root.GetAllocator());

      // Creating and filling object
    Value objectData(kObjectType);

    Value objectName(object->GetName().c_str(), SizeType(object->GetName().size()), root.GetAllocator());
    objectData.AddMember(StringRef("objectName"), objectName, root.GetAllocator());
    Value templateName(object->GetTemplateName().c_str(), SizeType(object->GetTemplateName().size()),
   root.GetAllocator());
    objectData.AddMember(StringRef("templateName"), templateName, root.GetAllocator());
    objectData.AddMember(StringRef("position"), pos, root.GetAllocator());
    objectData.AddMember(StringRef("scale"), scale, root.GetAllocator());

      // Nesting object into root
    std::string objectIdName = "object_" + std::to_string(object->GetId());
    Value name(objectIdName.c_str(), SizeType(objectIdName.size()), root.GetAllocator());
    root.AddMember(name, objectData, root.GetAllocator());
}
```

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.

```
                                                                       {
      // Storing std::string in variable rapidjson can write
    Value name(valueName.c_str(), SizeType(valueName.size()), root.GetAllocator());
    Value newValue(value.c_str(), SizeType(value.size()), root.GetAllocator());

    root.AddMember(name, newValue, root.GetAllocator());
}
```

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.

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

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.

```
                                                            {
      // Storing glm::vec3 in array that rapidjson can write
     Value vector3(kArrayType);
     vector3.PushBack(value.x, root.GetAllocator());
     vector3.PushBack(value.y, root.GetAllocator());
     vector3.PushBack(value.z, root.GetAllocator());

      // Writing vector3 into root
     Value name(valueName.c_str(), SizeType(valueName.size()), root.GetAllocator());
     root.AddMember(name, vector3, root.GetAllocator());
 }
```

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.

```
                                    {
      windowSize.first = width;
      windowSize.second = height;
  }
```

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.

```
                                                              {
    Trace::Message("Error: " + std::string(description) + ": " + std::to_string(error) + "\n");
}
```

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.

```
                                       {
    error = glGetError();
    if (error != GL_NO_ERROR) {
        Trace::Message("Error initializing OpenGl. \n");
        return false;
    }

    return true;
}
```

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.

```
                                 {
    return graphics->window;
}
```

References graphics, and window.

Referenced by Editor::Display_Scene(), 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.

```
{
    return graphics->windowSize;
}
```

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.

```
{
    // Initializing graphics
    graphics = new Graphics(settings.Read_Int("windowWidth"), settings.Read_Int("windowHeight"));
    if (!graphics) {
        Trace::Message("Graphics was not initialized.");
        return false;
    }

    // Setting up error recording with graphics
    glfwSetErrorCallback(ErrorCallback);

    if (!glfwInit()) {
        Trace::Message("Could not initialize GLFW.\n");
        return false;
    }

    // Setting up the graphics window
    graphics->window = glfwCreateWindow(graphics->windowSize.first, graphics->windowSize.second,
        "pEngine", nullptr, nullptr);
    if (!graphics->window) {
        Trace::Message("Error creating window.\n");
        return false;
    }

    // Setting up callback functions
    glfwSetCursorPosCallback(graphics->window, Camera::MouseUpdate);

    glfwMakeContextCurrent(graphics->window);
    //glfwSwapInterval(1);
    InitializeGL();

    glewExperimental = GL_TRUE;
    glewInit();

      // Setting up input for keyboard and mouse using glfw library
    glfwSetInputMode(graphics->window, GLFW_STICKY_KEYS, GL_TRUE);
    glfwSetInputMode(graphics->window, GLFW_CURSOR, GLFW_CURSOR_HIDDEN);

     glGenVertexArrays(1, &graphics->vertexArrayId);
     glBindVertexArray(graphics->vertexArrayId);

     if (!Shader::Initialize(settings)) return false;

     return true;
}
```

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.

```
                                {
     GLenum error = GL_NO_ERROR;

     glClearColor(0.f, 0.f, 0.f, 1.f);
     if (!Graphics::ErrorCheck(error)) return false;

     glClearDepth(1.f);
     if (!Graphics::ErrorCheck(error)) return false;

     glEnable(GL_DEPTH_TEST);
     if (!Graphics::ErrorCheck(error)) return false;

     glDepthFunc(GL_LEQUAL);
     if (!Graphics::ErrorCheck(error)) return false;

     glShadeModel(GL_SMOOTH);
     if (!Graphics::ErrorCheck(error)) return false;

     glHint(GL_PERSPECTIVE_CORRECTION_HINT, GL_NICEST);
     if (!Graphics::ErrorCheck(error)) return false;

     glEnable(GL_CULL_FACE);
     if (!Graphics::ErrorCheck(error)) return false;

     return true;
}
```

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.

```
                     {
      // Setting up graphics system for rendering
    glClear(GL_COLOR_BUFFER_BIT | GL_DEPTH_BUFFER_BIT);
    Shader::Update();

    glm::mat4 projection = perspective(radians(Camera::GetFov()), (float)graphics->windowSize.first /
        (float)graphics->windowSize.second, Camera::GetNear(), Camera::GetFar());

      // Getting the view matrix of the camera
    glm::mat4 view = lookAt(
        Camera::GetPosition(),
        Camera::GetPosition() + Camera::GetFront(),
        Camera::GetUp());

      // Rendering all of the objects
    for (unsigned i = 0; i < Object_Manager::GetSize(); ++i) {
        Object* object = Object_Manager::FindObject(i);

        Model* model = object->GetComponent<Model>();
        if (!model) continue;

        model->Draw(projection, view);
    }

    Editor::Render();

    glfwSwapBuffers(graphics->window);
}
```

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.

```
                       {
    if (!graphics) return;

    Shader::Shutdown();
    glDeleteVertexArrays(1, &graphics->vertexArrayId);
      // Shutting down opengl
    glfwDestroyWindow(graphics->window);
    glfwTerminate();
      // Deleting graphics object
    delete graphics;
    graphics = nullptr;
}
```

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.

```
                    {
    while(!glfwWindowShouldClose(graphics->window)) {
        // Run updates
        Engine::Update();
        Render();
        glfwPollEvents();

        // Check for restart
        if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_R) == GLFW_PRESS && Editor::GetTakeKeyboardInput()) {
            if (glfwGetKey(Graphics::GetWindow(), GLFW_KEY_R) == GLFW_RELEASE) {
                Engine::Restart();
            }
        }
    }
}
```

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

Referenced by main().

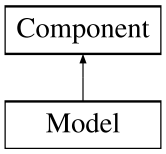
The documentation for this class was generated from the following files:

- 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.

```
: 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.

```
: 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.

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

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.

```
{ 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.

```
                                              {
    Transform* transform = GetParent()->GetComponent<Transform>();
    if (!data) return;

    data->Draw(this, transform, projection, view);
}
```

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 158 of file model.cpp.

```
                        {
    return CType::CModel;
}
```

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

Returns the filename of the current model.

Returns

std::string

Definition at line 131 of file model.cpp.

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

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 151 of file model.cpp.

```
{ 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 141 of file model.cpp.

```
                                         {
    if (!texture) return "no texture";
    return texture->GetTextureName();
}
```

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.

```
                                         {
    data = Model_Data_Manager::Get(reader);
    texture = Texture_Manager::Get(reader);
}
```

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.

```
{ 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.

```
                                        {
       Model_Data* proxy = Model_Data_Manager::Get(modelName);
       if (!proxy) return;

       data = proxy;
}
```

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 119 of file model.cpp.

```
                                          {
    Texture* proxy = Texture_Manager::Get(textureName);
    if (!proxy) return;

    texture = proxy;
}
```

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.

```
                                 {
    std::string modelName = data->GetModelName();
    std::string textureName = texture->GetTextureName();

    writer.Write_String("modelToLoad", modelName.c_str());
    writer.Write_String("textureToLoad", textureName.c_str());
}
```

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.

```
{}
```

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.

```
                                              {
    for (float vert : other.vertices) {
        vertices.emplace_back(vert);
    }
    for (float norm : other.normals) {
        normals.emplace_back(norm);
    }
    for (float uv : other.uvs) {
        uvs.emplace_back(uv);
    }

    vertexbuffer = other.vertexbuffer;
    normalbuffer = other.normalbuffer;
    uvbuffer = other.uvbuffer;
}
```

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.

```
                         {
    glDeleteBuffers(1, &vertexbuffer);
    glDeleteBuffers(1, &uvbuffer);
    glDeleteBuffers(1, &normalbuffer);
}
```

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 )`

```
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 218 of file model_data.cpp.

```
                                                                                                {
    // Creating the MVP (Model * View * Projection) matrix
    glm::mat4 model = glm::mat4(1.f);
    model = glm::translate(model, transform->GetPosition());
    model = glm::rotate(model, (transform->GetRotation().x / 180.f) * glm::pi<float>(), glm::vec3(1, 0, 0));
    model = glm::rotate(model, (transform->GetRotation().y / 180.f) * glm::pi<float>(), glm::vec3(0, 1, 0));
    model = glm::rotate(model, (transform->GetRotation().z / 180.f) * glm::pi<float>(), glm::vec3(0, 0, 1));
    model = glm::scale(model, transform->GetScale());

    // Sending data to the shaders
    glm::mat4 MVP = projection * view * model;
    glUniformMatrix4fv(Shader::GetMatrixId(), 1, GL_FALSE, &MVP[0][0]);
    glUniformMatrix4fv(Shader::GetModelMatrixId(), 1, GL_FALSE, &model[0][0]);
    glUniformMatrix4fv(Shader::GetViewMatrixId(), 1, GL_FALSE, &view[0][0]);

    // Sending light data to the shaders
    glm::vec3 lightPos = Engine::GetLightPos();
    glUniform3f(Shader::GetLightId(), lightPos.x, lightPos.y, lightPos.z);
    glUniform1f(Shader::GetLightPowerId(), Engine::GetLightPower());

    // Setup texture for drawing if it exists
    if (parent->GetTexture())
        parent->GetTexture()->Display();

    // Setup the model vertices
    glEnableVertexAttribArray(0);
    glBindBuffer(GL_ARRAY_BUFFER, vertexbuffer);
    glVertexAttribPointer(
        0,
        3,
        GL_FLOAT,
        GL_FALSE,
        0,
        (void*)0
    );

    // Setup the model uv
    glEnableVertexAttribArray(1);
    glBindBuffer(GL_ARRAY_BUFFER, uvbuffer);
    glVertexAttribPointer(
        1,
        2,
        GL_FLOAT,
        GL_FALSE,
        0,
        (void*)0
    );

    // Setup the model normals
    glEnableVertexAttribArray(2);
    glBindBuffer(GL_ARRAY_BUFFER, normalbuffer);
    glVertexAttribPointer(
        2,
        3,
        GL_FLOAT,
        GL_FALSE,
        0,
        (void*)0
    );

      // Draw the object
    glDrawArrays(GL_TRIANGLES, 0, vertices.size());

      // Disable data sent to shaders
    glDisableVertexAttribArray(0);
    glDisableVertexAttribArray(1);
    glDisableVertexAttribArray(2);

}
```

References Texture::Display(), Shader::GetLightId(), Engine::GetLightPos(), Engine::GetLightPower(), Shader::Get↩ LightPowerId(), Shader::GetMatrixId(), Shader::GetModelMatrixId(), Transform::GetPosition(), Transform::GetRotation(), 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 293 of file model_data.cpp.

```
293 { 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.

```
                                            {
    std::string modelName_ = reader.Read_String("modelToLoad");

    return Read(modelName_);
}
```

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.

```
{ 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.

```
                                             {
     // Opening the file
    std::string fileToOpen = std::string(getenv("USERPROFILE")) + "/Documents/pEngine/models/" + modelName_;
    FILE* file = fopen(fileToOpen.c_str(), "r");
    if (!file) {
        return false;
     }

      // Setting the name of the file (used in model_data_manager)
     modelName = modelName_;

      // Creating variables for reading
     std::vector<unsigned> vertex_indices, uv_indices, normal_indices;
     std::vector<glm::vec3> temp_vertices;
     std::vector<glm::vec2> temp_uvs;
     std::vector<glm::vec3> temp_normals;

      // Until the whole file is read
     while (true) {
         char line_header[256];

           // Getting next line of the file
         int res = fscanf(file, "%s", line_header);
         if (res == EOF) break;

           // Checking for which data needs to be read in
         if (strcmp(line_header,"v") == 0) {
             glm::vec3 vertex;
             fscanf(file, "%f %f %f\n", &vertex.x, &vertex.y, &vertex.z);
             temp_vertices.emplace_back(vertex);
             continue;
         }

         if (strcmp(line_header, "vt") == 0) {
             glm::vec2 uv;
             fscanf(file, "%f %f\n", &uv.x, &uv.y);
             temp_uvs.emplace_back(uv);
             continue;
         }

         if (strcmp(line_header, "vn") == 0) {
             glm::vec3 normal;
             fscanf(file, "%f %f %f\n", &normal.x, &normal.y, &normal.z);
             temp_normals.emplace_back(normal);
             continue;
         }

         if (strcmp(line_header, "f") == 0) {
               // Connecting face to previous read vertices, uvs, and normals
             unsigned vertex_index[3], uv_index[3], normal_index[3];
             int matches = fscanf(file, "%d/%d/%d %d/%d/%d %d/%d/%d\n", &vertex_index[0], &uv_index[0],
    &normal_index[0],
                 &vertex_index[1], &uv_index[1], &normal_index[1], &vertex_index[2], &uv_index[2],
    &normal_index[2]);//,

               // Expects models split into triangles
             if (matches != 9) {
                 Trace::Message("File is incompatible with this parser. Export using different settings.");
                 return false;
             }

               // Setting vertices for current face
             vertices.emplace_back((temp_vertices[vertex_index[0] - 1]).x);
             vertices.emplace_back((temp_vertices[vertex_index[0] - 1]).y);
             vertices.emplace_back((temp_vertices[vertex_index[0] - 1]).z);

             vertices.emplace_back((temp_vertices[vertex_index[1] - 1]).x);
             vertices.emplace_back((temp_vertices[vertex_index[1] - 1]).y);
             vertices.emplace_back((temp_vertices[vertex_index[1] - 1]).z);

             vertices.emplace_back((temp_vertices[vertex_index[2] - 1]).x);
             vertices.emplace_back((temp_vertices[vertex_index[2] - 1]).y);
             vertices.emplace_back((temp_vertices[vertex_index[2] - 1]).z);

               // Setting uvs for current face
             uvs.emplace_back((temp_uvs[uv_index[0] - 1]).x);
             uvs.emplace_back((temp_uvs[uv_index[0] - 1]).y);

             uvs.emplace_back((temp_uvs[uv_index[1] - 1]).x);
             uvs.emplace_back((temp_uvs[uv_index[1] - 1]).y);
```

```

            uvs.emplace_back((temp_uvs[uv_index[2] - 1]).x);
            uvs.emplace_back((temp_uvs[uv_index[2] - 1]).y);

              // Setting normals for current face
            normals.emplace_back((temp_normals[normal_index[0] - 1]).x);
            normals.emplace_back((temp_normals[normal_index[0] - 1]).y);
            normals.emplace_back((temp_normals[normal_index[0] - 1]).z);

            normals.emplace_back((temp_normals[normal_index[1] - 1]).x);
            normals.emplace_back((temp_normals[normal_index[1] - 1]).y);
            normals.emplace_back((temp_normals[normal_index[1] - 1]).z);

            normals.emplace_back((temp_normals[normal_index[2] - 1]).x);
            normals.emplace_back((temp_normals[normal_index[2] - 1]).y);
            normals.emplace_back((temp_normals[normal_index[2] - 1]).z);
        }
    }

      // Bind vertex data to buffers
    glGenBuffers(1, &vertexbuffer);
    glBindBuffer(GL_ARRAY_BUFFER, vertexbuffer);
    glBufferData(GL_ARRAY_BUFFER, vertices.size() * sizeof(float), &vertices[0], GL_STATIC_DRAW);

      // Bind uv data to buffers
    glGenBuffers(1, &uvbuffer);
    glBindBuffer(GL_ARRAY_BUFFER, uvbuffer);
    glBufferData(GL_ARRAY_BUFFER, uvs.size() * sizeof(float), &uvs[0], GL_STATIC_DRAW);

      // Bind normals data to buffers
    glGenBuffers(1, &normalbuffer);
    glBindBuffer(GL_ARRAY_BUFFER, normalbuffer);
    glBufferData(GL_ARRAY_BUFFER, normals.size() * sizeof(float), &normals[0], GL_STATIC_DRAW);

    return true;
}
```

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.

```
                                                          {
    std::string filename = reader.Read_String("modelToLoad");
      // Checks name of file against other model data objects
    for (Model_Data* model_data : model_data_manager->models) {
        if (model_data->GetModelName().compare(filename) == 0) {
            return model_data;
        }
    }

      // Creates new Model_Data object, then adds it to list
    Model_Data* data = new Model_Data;
    data->Load(reader);
    model_data_manager->models.emplace_back(data);

    return data;
}
```

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.

```
                                              {
    // Checks name of file against other model data objects
    for (Model_Data* model_data : model_data_manager->models) {
        if (model_data->GetModelName().compare(modelName) == 0) {
            return model_data;
        }
    }

    // Creates new Model_Data object, then adds it to list
    Model_Data* data = new Model_Data;
    if (!data->Load(modelName)) {
        delete data;
        return nullptr;
    }
    model_data_manager->models.emplace_back(data);

    return data;
}
```

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.

```
                                 {
    // Initializing model_data_manager
    model_data_manager = new Model_Data_Manager;
    if (!model_data_manager) {
        Trace::Message("Model Data Manager was not initialized.\n");
        return false;
    }

    model_data_manager->models.reserve(10);
    return true;
}
```

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 94 of file model_data_manager.cpp.

```
                                    {
    if (!model_data_manager) return;

      // Deleting all of the Model_Data objects
    for (Model_Data* model_data : model_data_manager->models) {
        if (!model_data) continue;

         delete model_data;
         model_data = nullptr;
     }

     delete model_data_manager;
     model_data_manager = nullptr;
}
```

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 ∗ 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 ()

  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.
- std::string & GetNameRef ()

  Returns reference to the name.
- void SetTemplateName (std::string templateName_)

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

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

  Reads object from file. This includes the components of an object.
- bool 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 Member Functions

- template< typename T >
  T * GetComponentConst () const

  Get a component of the object (const)

Private Attributes

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

  List of components.
- std::string name

  Name of the object.
- std::string templateName

  Name of the template file used.
- int id

  Location of object in object_manager.

4.12.1 Detailed Description

Object class

Definition at line 25 of file object.hpp.

4.12.2 Constructor & Destructor Documentation

4.12.2.1 Object() [1/2] `Object::Object ( )`

Default constructor.

Definition at line 28 of file object.cpp.

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

Referenced by Clone().

4.12.2.2 Object() [2/2] `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.GetComponentConst<Behavior>();
41     if (behavior) {
42         Behavior* newBehavior = new Behavior(*behavior);
43         AddComponent(newBehavior);
44     }
45 
46       // Copying Model component
47     Model* model = other.GetComponentConst<Model>();
48     if (model) {
49         Model* newModel = new Model(*model);
50         AddComponent(newModel);
51     }
52 
53       // Copying Physics component
54     Physics* physics = other.GetComponentConst<Physics>();
55     if (physics) {
56         Physics* newPhysics = new Physics(*physics);
57         AddComponent(newPhysics);
58     }
59 
```

```
    // Copying transform component
    Transform* transform = other.GetComponentConst<Transform>();
    if (transform) {
        Transform* newTransform = new Transform(*transform);
        AddComponent(newTransform);
    }
}
```

References AddComponent(), GetComponentConst(), GetName(), GetTemplateName(), SetName(), and Set↩ TemplateName().

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 95 of file object.cpp.

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

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 273 of file object.cpp.

```
                     {
    Behavior* behavior = GetComponent<Behavior>();
    Model* model = GetComponent<Model>();
    Physics* physics = GetComponent<Physics>();

    if (behavior) {
        delete behavior;
        behavior = nullptr;
    }
    if (model) {
        delete model;
        model = nullptr;
    }
    if (physics) {
        delete physics;
        physics = nullptr;
    }
}
```

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

Clones this object.

Returns

Object∗

Definition at line 73 of file object.cpp.

```
{
    return new Object(*this);
}
```

References Object().

4.12.3.4 GetComponent() `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 44 of file object.hpp.

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

References components.

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

4.12.3.5 GetComponentConst() `template<typename T >`

`T* Object::GetComponentConst ( ) const [inline], [private]`

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 96 of file object.hpp.

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

References components.

Referenced by Object().

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 265 of file object.cpp.

```
                                                              {
    return components;
}
```

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 112 of file object.cpp.
```
112 { return id; }
```

References id.

Referenced by Object_Manager::CheckName(), Behavior::ClassSetup(), Editor::Display_Components(), 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 128 of file object.cpp.
```
128 { return name; }
```

References name.

Referenced by Object_Manager::CheckName(), Object_Manager::FindObject(), Object(), and File_Writer::Write_↩
Object_Data().

4.12.3.9 GetNameRef() `std::string & Object::GetNameRef ( )`

Returns reference to the name.

Returns

std::string&

Definition at line 135 of file object.cpp.
```
135 { return name; }
```

References name.

Referenced by Behavior::ClassSetup().

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

Returns the name of the template file.

Returns

std::string

Definition at line 149 of file object.cpp.

```
{ return templateName; }
```

References templateName.

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

4.12.3.11 Read() `bool Object::Read ( std::string objectFilename )`

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

Parameters

objectFilename	

Returns

true

false

Definition at line 158 of file object.cpp.

```
                                          {
      // Getting data from file
    File_Reader object_reader;
    if (!object_reader.Read_File("objects/" + objectFilename)) return false;

      // Reading Behavior component form file
    Behavior* object_behavior = new Behavior(object_reader);
    AddComponent(object_behavior);

      // Reading Model component from file
    Model* object_model = new Model(object_reader);
    AddComponent(object_model);

      // Reading Physics component from file
    Physics* object_physics = new Physics(object_reader);
    AddComponent(object_physics);

      // Reading Transform component from file
    Transform* object_transform = new Transform(object_reader);
    AddComponent(object_transform);

    return true;
}
```

References AddComponent(), and File_Reader::Read_File().

Referenced by Object_Manager::ReadList().

4.12.3.12 RemoveComponent() `template<typename T >`

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

Removes component from object.

Template Parameters

T	

Definition at line 60 of file object.hpp.

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

References components.

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

4.12.3.13 ReRead() `bool Object::ReRead (`

`std::string objectFilename )`

Reading data into object that already exists.

Parameters

objectFilename	Name of template file

Returns

true

false

Definition at line 189 of file object.cpp.

```
                                              {
      // Getting data from file
    File_Reader object_reader;
    if (!object_reader.Read_File("objects/" + objectFilename)) return false;

    if (name.compare("") == 0)
        SetName(object_reader.Read_String("name"));

    templateName = objectFilename;

      // Reading Model component from file
    Model* object_model = GetComponent<Model>();
    if (!object_model) {
        object_model = new Model;
        AddComponent(object_model);
    }
    object_model->Read(object_reader);

      // Reading Physics component from file
    Physics* object_physics = GetComponent<Physics>();
    if (!object_physics) {
        object_physics = new Physics;
        AddComponent(object_physics);
    }
    object_physics->Read(object_reader);

      // Reading Transform component from file
    Transform* object_transform = GetComponent<Transform>();
    if (!object_transform) {
        object_transform = new Transform;
        AddComponent(object_transform);
    }
    object_transform->Read(object_reader);

      // Reading Behavior component form file
    Behavior* object_behavior = GetComponent<Behavior>();
    if (object_behavior) object_behavior->Clear();
    if (!object_behavior) {
        object_behavior = new Behavior;
        AddComponent(object_behavior);
    }
    object_behavior->Read(object_reader);
    object_behavior->SetupClassesForLua();

    return true;
}
```

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

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

Sets the id of object.

Parameters

id↩ _↩	Position in Object_Manager

Definition at line 105 of file object.cpp.

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

Referenced by Object_Manager::RemoveObject().

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

Sets name of object.

Parameters

name←↩ _	Name of object

Definition at line 119 of file object.cpp.

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

References Object_Manager::CheckName(), and name.

Referenced by Behavior::ClassSetup(), Editor::Display_Scene(), Object(), Object_Manager::ReadList(), and ReRead().

4.12.3.16 SetTemplateName() `void Object::SetTemplateName ( std::string templateName_ )`

Sets the name of the template file.

Parameters

*template←↩ Name_*	Name of the template file

Definition at line 142 of file object.cpp.

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

References templateName.

Referenced by Object().

4.12.3.17 Update() `void Object::Update ( )`

Updates object (only physics for now)

Definition at line 81 of file object.cpp.

```
                       {
    Behavior* behavior = GetComponent<Behavior>();
    if (behavior)
        behavior->Update();
    Physics* physics = GetComponent<Physics>();
    if (physics)
        physics->Update();
}
```

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

Referenced by Object_Manager::Update().

4.12.3.18 Write() `void Object::Write ( )`

Writes the data of the object to a template file.

Definition at line 240 of file object.cpp.

```
                {
    File_Writer object_writer;
    object_writer.Write_String("name", name);
    templateName = name + ".json";

    Model* object_model = GetComponent<Model>();
    if (object_model) object_model->Write(object_writer);

    Transform* object_transform = GetComponent<Transform>();
    if (object_transform) object_transform->Write(object_writer);

    Physics* object_physics = GetComponent<Physics>();
    if (object_physics) object_physics->Write(object_writer);

    Behavior* object_behavior = GetComponent<Behavior>();
    if (object_behavior) object_behavior->Write(object_writer);

    object_writer.Write_File(std::string("objects/" + name + ".json"));
}
```

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 Object ∗ FindObject (std::string objectName)

  Finds object with the matching name.
- 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.

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

References object_manager, and objects.

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

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 172 of file object_manager.cpp.

```
                                                                    {
      // Checking if the name matches any other objects
    int objWithName = 0;
    for (Object* objToCheck : object_manager->objects) {
        if (id != -1 && objToCheck->GetId() == id) continue;
        if (objToCheck->GetName().find(objectName) != std::string::npos)
            ++objWithName;
    }

      // Updating the name
    if (objWithName > 0)
        return objectName + "_" + std::to_string(objWithName);

    return objectName;
}
```

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

Referenced by Object::SetName().

4.13.2.3 FindObject() [1/2] `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.

```
                                  {
    if (id >= (int)object_manager->objects.size()) return nullptr;
    return object_manager->objects[id];
}
```

References object_manager, and objects.

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

4.13.2.4 FindObject() [2/2] `Object * Object_Manager::FindObject ( std::string objectName ) [static]`

Finds object with the matching name.

Parameters

objectName	Name to look for

Returns

Object∗

Definition at line 75 of file object_manager.cpp.

```
                                                {
    for (Object* object : object_manager->objects) {
        if (objectName.compare(object->GetName()) == 0)
            return object;
    }

    return nullptr;
}
```

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

4.13.2.5 GetSize() `unsigned Object_Manager::GetSize ( ) [static]`

Gets the size of the object_manager object list.

Returns

unsigned Size of object list

Definition at line 89 of file object_manager.cpp.

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

References object_manager, and objects.

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

4.13.2.6 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.

```
                                                      {
        // Initializing object_manager
      object_manager = new Object_Manager;
      if (!object_manager) {
          Trace::Message("Object Manager was not initialized.");
          return false; // Failed to initialize
      }

        // Adding objects from preset into engine
      object_manager->objects.reserve(10);
      object_manager->ReadList(preset);

      return true; // Successful initialization
   }
```

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

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

4.13.2.7 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 127 of file object_manager.cpp.

```
                                                      {
        // Track which object we are on
      unsigned object_num = 0;

        // Reads objects until there is a failed read
      while (true) {
            // Getting the name of the objects file
          std::string object_name = preset.Read_Object_Name("object_" + std::to_string(object_num));
          std::string template_name = preset.Read_Object_Template_Name("object_" +
      std::to_string(object_num));
          if (template_name.compare("") == 0) break;
```

```

            // Constructing the object
        Object* object = new Object;
        if (!object->Read(template_name)) {
            delete object;
            continue;
        }

        object->SetName(object_name);
        object->SetTemplateName(template_name);
            // Reading in the objects position
        glm::vec3 position = preset.Read_Object_Position("object_" + std::to_string(object_num));
        glm::vec3 scale = preset.Read_Object_Scale("object_" + std::to_string(object_num));
        Transform* transform = object->GetComponent<Transform>();
        transform->SetPosition(position);
        transform->SetStartPosition(position);
        transform->SetScale(scale);
        Behavior* behavior = object->GetComponent<Behavior>();
        behavior->SetupClassesForLua();

            // Adding the object to the manager
        AddObject(object);

        ++object_num;
    }
}
```

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

Referenced by Initialize().

4.13.2.8 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 194 of file object_manager.cpp.

```
                                        {
    if (id >= (int)object_manager->objects.size()) return;
    Object* objectToDelete = object_manager->objects[id];

      // Moves all the objects to the right of one being deleted to the left
    unsigned offset = 0;
    for (unsigned objectNum = id + 1; objectNum < object_manager->objects.size(); ++objectNum) {
        Object* objectToSwitch = object_manager->objects[objectNum];
        object_manager->objects[id + offset] = objectToSwitch;
        objectToSwitch->SetId(id + offset++);
    }

      // Deleting the object
    delete objectToDelete;
    objectToDelete = nullptr;
    object_manager->objects.pop_back();
}
```

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

Referenced by Editor::Display_Scene().

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

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

Returns

void

Definition at line 107 of file object_manager.cpp.

```
                              {
    if (!object_manager) return; // If the object_manager doesn't exist

      // Deleting each object in the manager
    for (unsigned i = 0; i < object_manager->objects.size(); ++i) {
        Object* object = object_manager->FindObject(i);
        if (object)
            delete object;
    }

      // Deleting the manager
    delete object_manager;
    object_manager = nullptr;
}
```

References FindObject(), object_manager, and objects.

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

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

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

Returns

void

Definition at line 96 of file object_manager.cpp.

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

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

Referenced by Engine::Update().

4.13.2.11 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 218 of file object_manager.cpp.

```
                                         {
    for (Object* object : object_manager->objects) {
        writer.Write_Object_Data(object);
    }
}
```

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

Referenced by Engine::Write().

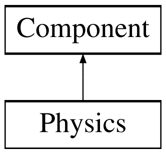
The documentation for this class was generated from the following files:

- 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 SetRotationalVelocity (glm::vec3 rotVel)

  Sets rotational velocity.
- glm::vec3 GetRotationalVelocity () const

  Returns rotational velocity.
- glm::vec3 & GetRotationalVelocityRef ()

  Returns reference to rotational velocity.
- 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.
- glm::vec3 rotationalVelocity

    How fast is the object rotating.
- 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.
```
                    : Component(CType::CPhysics),
    acceleration(glm::vec3(0.f, 0.f, 0.f)), forces(glm::vec3(0.f, 0.f, 0.f)),
    velocity(glm::vec3(0.f, 0.f, 0.f)), rotationalVelocity(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.

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

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.

```
                                    : Component(CType::CPhysics),
    acceleration(glm::vec3(0.f, 0.f, 0.f)), forces(glm::vec3(0.f, 0.f, 0.f)),
    velocity(glm::vec3(0.f, 0.f, 0.f)), rotationalVelocity(glm::vec3(0.f, 0.f, 0.f)), mass(1.f) {
    Read(reader);
}
```

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.

```
{ 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.

```
                                                      {
    direction = glm::normalize(direction);
    direction *= power;

    AddForce(direction);
}
```

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.

```
                              {
    return new Physics(*this);
}
```

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.

```
{ 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.
```
{ 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 281 of file physics.cpp.
```
                          {
    return CType::CPhysics;
}
```

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.
```
{ 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.

```
{ 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.

```
{ 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.

```
{ return mass; }
```

References mass.

Referenced by Editor::Display_Physics().

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

Returns rotational velocity.

Returns

glm::vec3

Definition at line 181 of file physics.cpp.

```
181 { return rotationalVelocity; }
```

References rotationalVelocity.

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

Returns reference to rotational velocity.

Returns

glm::vec3&

Definition at line 188 of file physics.cpp.

```
188 { return rotationalVelocity; }
```

References rotationalVelocity.

Referenced by Editor::Display_Physics().

4.14.3.13 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.

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

Returns reference to velocity of the object.

Returns

glm::vec3&

Definition at line 146 of file physics.cpp.

```
{ return velocity; }
```

References velocity.

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

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

Reads data for Physics object from file.

Parameters

reader	File to be read from

Definition at line 257 of file physics.cpp.

```
                                        {
    initialAcceleration = reader.Read_Vec3("acceleration");
    initialVelocity = reader.Read_Vec3("velocity");
    SetAcceleration(initialAcceleration);
    SetVelocity(initialVelocity);
    SetMass(reader.Read_Float("mass"));
}
```

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

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

4.14.3.16 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().

4.14.3.17 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().

4.14.3.18 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().

4.14.3.19 SetRotationalVelocity() `void Physics::SetRotationalVelocity ( glm::vec3 rotVel )`

Sets rotational velocity.

Parameters

rotVel	New rotational velocity

Definition at line 174 of file physics.cpp.

```
{ rotationalVelocity = rotVel; }
```

References rotationalVelocity.

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

Sets the velocity of the object.

Parameters

vel	

Definition at line 132 of file physics.cpp.

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

References velocity.

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

4.14.3.21 Update() `void Physics::Update ( )`

Updates the physics of the object.

Definition at line 194 of file physics.cpp.

```
                 {
    // Finding the acceleration of the object using F=ma
  acceleration = forces / mass;

    // Updating velocity
  velocity += (acceleration * Engine::GetDt());

    // Updating position
  Transform* transform = GetParent()->GetComponent<Transform>();
  glm::vec3 position = transform->GetPosition();
  transform->SetOldPosition(position);
  position = (velocity * Engine::GetDt()) + position;
  transform->SetPosition(position);

    // Updating rotation
  glm::vec3 rotation = transform->GetRotation();
  rotation = (rotationalVelocity * Engine::GetDt()) + rotation;
  transform->SetRotation(rotation);

    // Resetting the forces acting on the object
  forces = glm::vec3(0.f, 0.f, 0.f);
}
```

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

Referenced by Object::Update().

4.14.3.22 UpdateGravity() `void Physics::UpdateGravity ( )`

Calculates the gravitational pull each object has on each other.

Definition at line 221 of file physics.cpp.

```
221                        {
222        // Gets the needed components for the current object
223      Object* object = GetParent();
224      Transform* transform = object->GetComponent<Transform>();
225      Physics* physics = object->GetComponent<Physics>();
226      glm::vec3 position = transform->GetPosition();
227
228        // For each object
229      for (unsigned i = 0; i < Object_Manager::GetSize(); ++i) {
230          if ((int)i == object->GetId()) continue;
231            // Gets needed components for the object being checked
232          Object* other = Object_Manager::FindObject(i);
233          Physics* otherPhysics = other->GetComponent<Physics>();
234          Transform* otherTransform = other->GetComponent<Transform>();
235          glm::vec3 otherPosition = otherTransform->GetPosition();
236            // Finding the distance between the objects
237          double distance = sqrt(pow(double(otherPosition.x - position.x), 2.0) +
238              pow(double(otherPosition.y - position.y), 2.0) +
239              pow(double(otherPosition.z - position.z), 2.0));
240            // Calculating the force the objects apply on each other
241          double magnitude = Engine::GetGravConst() * ((physics->mass * otherPhysics->mass)) / pow(distance,
       2.0);
242            // Getting the direction (normalized)
243          glm::vec3 direction = otherPosition - position;
244          glm::vec3 normDirection = glm::normalize(direction);
245            // Applying gravitational force to normalized direction
246          glm::vec3 force = normDirection * float(magnitude);
247            // Adding the gravitational force to the forces on object
248          physics->AddForce(force);
249      }
250 }
```

References Object_Manager::FindObject(), Object::GetComponent(), Engine::GetGravConst(), Component::Get↩ Parent(), Transform::GetPosition(), Object_Manager::GetSize(), and mass.

Referenced by Behavior::ClassSetup().

4.14.3.23 Write() `void Physics::Write ( File_Writer & writer )`

Gives physics data to the writer object.

Parameters

writer	

Definition at line 270 of file physics.cpp.

```
                                        {
        writer.Write_Vec3("acceleration", initialAcceleration);
        writer.Write_Vec3("velocity", initialVelocity);
        writer.Write_Value("mass", mass);
}
```

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.
```
                        {
    // Initializing random
    random = new Random;
    if (!random) {
        Trace::Message("Random failed to initialize.");
        return false;
    }

    return true;
}
```

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.
```
                                                {
    // Setup random gen
    std::mt19937 gen(random->rd());
    std::uniform_real_distribution<> dist(low, high);
    // Gen random float
    return dist(gen);
}
```

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.

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

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.

```
                       {
  if (!random) return;

  delete random;
  random = nullptr;
}
```

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.
```
{ 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.
```
                                           {
    shader = new Shader;
    if (!shader) {
        Trace::Message("Shader failed to initialize.\n");
        return false;
    }

    //LoadShader("src/shaders/vertex.glsl", "src/shaders/fragment.glsl");
    LoadShader(std::string(getenv("USERPROFILE")) + "/Documents/pEngine/shaders/" +
    settings.Read_String("vertexShader") + ".glsl",
        std::string(getenv("USERPROFILE")) + "/Documents/pEngine/shaders/" +
    settings.Read_String("fragShader") + ".glsl");
    return true;
}
```

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.

```
                                                                        {
      // Creating shaders
    GLuint vertShader = glCreateShader(GL_VERTEX_SHADER);
    GLuint fragShader = glCreateShader(GL_FRAGMENT_SHADER);

      // Reading shaders
    std::string vertShaderStr = ReadFile(vertexPath);
    std::string fragShaderStr = ReadFile(fragmentPath);
    const char *vertShaderSrc = vertShaderStr.c_str();
    const char *fragShaderSrc = fragShaderStr.c_str();

      // Compiling shaders
    glShaderSource(vertShader, 1, &vertShaderSrc, nullptr);
    glCompileShader(vertShader);

    glShaderSource(fragShader, 1, &fragShaderSrc, nullptr);
    glCompileShader(fragShader);

      // Attaching shaders to engine
    shader->program = glCreateProgram();
    glAttachShader(shader->program, vertShader);
    glAttachShader(shader->program, fragShader);

      // Cleanup
    glDeleteShader(vertShader);
    glDeleteShader(fragShader);

      // Setting up program
    glLinkProgram(shader->program);
    glUseProgram(shader->program);

    shader->matrixId = glGetUniformLocation(shader->program, "MVP");
    shader->viewMatrixId = glGetUniformLocation(shader->program, "V");
    shader->modelMatrixId = glGetUniformLocation(shader->program, "M");
    shader->lightId = glGetUniformLocation(shader->program, "LightPosition_worldspace");
    shader->lightPowerId = glGetUniformLocation(shader->program, "LightPower");
}
```

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.

```
                                         {
    std::string content;

      // Opening the shader file
    std::ifstream file(filepath.c_str(), std::ios::in);
    if (!file.is_open()) {
        Trace::Message("Failed to read file: " + filepath + "\n");
        return "";
    }

      // Saving shader file into std::string
    std::string line = "";
    while (!file.eof()) {
        getline(file, line);
        content.append(line + "\n");
    }

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

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.

```
                       {
    if (!shader) return;

    glDeleteProgram(shader->program);

    delete shader;
    shader = nullptr;
}
```

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.
```
                {
    glUseProgram(shader->program);
}
```

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.
- bool 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 (FILE ∗fp)

  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 24 of file texture.cpp.

```
                    {
    glDeleteTextures(1, &textureNum);
}
```

References textureNum.

4.17.3 Member Function Documentation

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

Setup texture for drawing.

Definition at line 55 of file texture.cpp.

```
                        {
    if (!hasBeenSet) return;

    glActiveTexture(GL_TEXTURE0);
    glBindTexture(GL_TEXTURE_2D, textureNum);
    glUniform1i(textureId, 0);
}
```

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 68 of file texture.cpp.

```
68 { 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 75 of file texture.cpp.

```
75 { return textureNum; }
```

References textureNum.

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

Loads in texture with given filename.

Parameters

*texture↩ Name_*	Filename of texture

Returns

true

false

Definition at line 35 of file texture.cpp.

```
                                      {
    FILE *fp;
    std::string filename = std::string(getenv("USERPROFILE")) + "/Documents/pEngine/textures/" +
    textureName_;

      // Opening the file
    fp = fopen(filename.c_str(), "rb");
    if (!fp) return false;

    textureNum = Texture::LoadDDS(fp);
    textureName = textureName_;
    textureId = glGetUniformLocation(Shader::GetProgram(), "myTextureSampler");
    hasBeenSet = true;

    return true;
}
```

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

Referenced by Texture_Manager::Get().

4.17.3.5 LoadDDS() `GLuint Texture::LoadDDS ( FILE * fp ) [static], [private]`

Loads in the given dds file.

Parameters

fp	The file stream

Returns

GLuint

Definition at line 86 of file texture.cpp.

```
                                     {
    unsigned char header[124];

      // Making sure it is a dds
    char filecode[4];
    fread(filecode, 1, 4, fp);
    if (strncmp(filecode, "DDS ", 4) != 0) {
        fclose(fp);
        return 0;
    }

      // Getting the surface description
    fread(&header, 124, 1, fp);

     unsigned int height      = *(unsigned int*)&(header[8 ]);
     unsigned int width         = *(unsigned int*)&(header[12]);
     unsigned int linearSize     = *(unsigned int*)&(header[16]);
     unsigned int mipMapCount = *(unsigned int*)&(header[24]);
     unsigned int fourCC      = *(unsigned int*)&(header[80]);

     unsigned char * buffer;
     unsigned int bufsize;

     bufsize = mipMapCount > 1 ? linearSize * 2 : linearSize;
     buffer = (unsigned char*)malloc(bufsize * sizeof(unsigned char));
     fread(buffer, 1, bufsize, fp);

       // Close the file
     fclose(fp);

     unsigned int format;
     switch(fourCC) {
         case FOURCC_DXT1:
             format = GL_COMPRESSED_RGBA_S3TC_DXT1_EXT;
             break;
         case FOURCC_DXT3:
             format = GL_COMPRESSED_RGBA_S3TC_DXT3_EXT;
             break;
         case FOURCC_DXT5:
             format = GL_COMPRESSED_RGBA_S3TC_DXT5_EXT;
             break;
         default:
             free(buffer);
             return 0;
     }

     GLuint textureID;
     glGenTextures(1, &textureID);

     glBindTexture(GL_TEXTURE_2D, textureID);
     glPixelStorei(GL_UNPACK_ALIGNMENT,1);

     unsigned int blockSize = (format == GL_COMPRESSED_RGBA_S3TC_DXT1_EXT) ? 8 : 16;
     unsigned int offset = 0;

     for (unsigned int level = 0; level < mipMapCount && (width || height); ++level) {
         unsigned int size = ((width+3)/4)*((height+3)/4)*blockSize;
         glCompressedTexImage2D(GL_TEXTURE_2D, level, format, width, height,
             0, size, buffer + offset);

         offset += size;
         width  /= 2;
         height /= 2;

         if(width < 1) width = 1;
         if(height < 1) height = 1;

     }

     free(buffer);

     return textureID;
 }
```

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.

```
                                                        {
      // Getting texture's filename
    std::string filename = reader.Read_String("textureToLoad");
      // Looking for texture in list of loaded textures
    for (Texture* texture : texture_manager->textures) {
        if (texture->GetTextureName().compare(filename) == 0) {
            return texture;
        }
    }

    // Creating new texture
    Texture* texture = new Texture;
    texture->Load(filename);
    texture_manager->textures.emplace_back(texture);

    return texture;
}
```

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.

```
                                        {
    // Looking for texture in list of loaded textures
    for (Texture* texture : texture_manager->textures) {
        if (texture->GetTextureName().compare(textureName) == 0) {
            return texture;
        }
    }

    // Creating new texture
    Texture* texture = new Texture;
    if (!texture->Load(textureName)) {
        delete texture;
        return nullptr;
    }
    texture_manager->textures.emplace_back(texture);

    return texture;
}
```

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.

```
{
    // Initializing texture_manager
    texture_manager = new Texture_Manager;
    if (!texture_manager) {
        Trace::Message("Texture Manager was not initialized.\n");
        return false;
    }

    // Reserving space in the texture_manager
    texture_manager->textures.reserve(10);
    return true;
}
```

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 95 of file texture_manager.cpp.

```
{
    if (!texture_manager) return;

    for (Texture* texture : texture_manager->textures) {
        if (!texture) continue;

        delete texture;
        texture = nullptr;
    }

    delete texture_manager;
    texture_manager = nullptr;
}
```

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.

```
                        {
  trace = new Trace;

    // Opens output file
  trace->trace_stream.open(std::string(getenv("USERPROFILE")) + "/Documents/pEngine/trace.log",
  std::ofstream::out);
  if (!trace->trace_stream) std::cout « "Trace file wasn't opened successfully.\n";
}
```

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.

```
                              {
    if (!trace->trace_stream) return;

    trace->trace_stream « message;
    std::cout « message;
}
```

References trace, and trace_stream.

Referenced by Graphics::ErrorCallback(), Graphics::ErrorCheck(), Random::Initialize(), Engine::Initialize(), Model_Data_Manager::Initialize(), Object_Manager::Initialize(), Texture_Manager::Initialize(), Editor::Initialize(), Shader::Initialize(), Camera::Initialize(), Graphics::Initialize(), Model_Data::Read(), 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.

```
                        {
      // Closing output file
    if (trace->trace_stream) trace->trace_stream.close();

    delete trace;
    trace = nullptr;
}
```

References trace, and trace_stream.

Referenced by main().

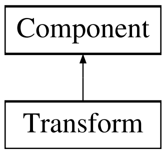
The documentation for this class was generated from the following files:

- 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.
```
                     : Component(CType::CTransform),
    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.

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

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.

```
                                        : Component(CType::CTransform),
    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)) {
    Read(reader);
}
```

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.

```
                                   {
    return new Transform(*this);
}
```

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.

```
                                    {
        return CType::CTransform;
}
```

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.

```
{ 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.

```
{ 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.

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

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.
```
{ 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.
```
                              {
    //SetRotation(reader.Read_Float("rotation"));
}
```

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.
```
{ 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(), and Physics::Update().

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.
- static glm::vec3 add_float (const glm::vec3 vec, float num)

  Adds float to each part of a glm::vec3.
- static glm::vec3 add_vec3 (const glm::vec3 vec1, const glm::vec3 vec2)

  Add two glm::vec3 together.

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 add_float()

```
glm::vec3 Vector3_Func::add_float (
        const glm::vec3 vec,
        float num ) [static]
```

Adds float to each part of a glm::vec3.

Parameters

vec	
num	

Returns

glm::vec3

Definition at line 73 of file vector3_func.cpp.

```
                                                           {
    glm::vec3 returnVec3;

    returnVec3.x = vec.x + num;
    returnVec3.y = vec.y + num;
    returnVec3.z = vec.z + num;

    return vec;
}
```

Referenced by Behavior::ClassSetup().

4.21.2.2 add_vec3() `glm::vec3 Vector3_Func::add_vec3 ( const glm::vec3 vec1, const glm::vec3 vec2 ) [static]`

Add two glm::vec3 together.

Parameters

vec1	
vec2	

Returns

glm::vec3

Definition at line 90 of file vector3_func.cpp.

```
{
    glm::vec3 returnVec3;

    returnVec3.x = vec1.x + vec2.x;
    returnVec3.y = vec1.y + vec2.y;
    returnVec3.z = vec1.z + vec2.z;

    return vec1;
}
```

Referenced by Behavior::ClassSetup().

4.21.2.3 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.

```
{
    return glm::distance(vec1, vec2);
}
```

Referenced by Behavior::ClassSetup().

4.21.2.4 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.

```
{
    return vec1 - vec2;
}
```

Referenced by Behavior::ClassSetup().

4.21.2.5 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.

```
                                                {
    return glm::length(vec);
}
```

Referenced by Behavior::ClassSetup().

4.21.2.6 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.

```
                                                     {
    return glm::normalize(vec);
}
```

Referenced by Behavior::ClassSetup().

4.21.2.7 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.

```
                                    {
    return glm::vec3(0.f, 0.f, 0.f);
}
```

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 "object_manager.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

Copyright (c) 2021

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

Copyright (c) 2021

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

Copyright (c) 2021

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

Copyright (c) 2021

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

Copyright (c) 2021

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

Copyright (c) 2021

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

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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

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5.17 main.cpp File Reference

```
#include "trace.hpp"
#include "engine.hpp"
#include "graphics.hpp"
```

Functions

- int main (int, char ∗[ ])
  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 ,
    char ∗ [] )
```

Main function.

Returns

int

Definition at line 22 of file main.cpp.

```
                           {
     // Initializing systems
    Trace::Initialize();
    if (!Engine::Initialize()) return -1;

     // Engine update loop
    Graphics::Update();

     // Shutting down systems
    Engine::Shutdown();
    Trace::Shutdown();

    return 0;
}
```

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

Copyright (c) 2021

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

Copyright (c) 2021

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

Copyright (c) 2021

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

Copyright (c) 2021

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

Copyright (c) 2021

5.25 object.hpp File Reference

```
#include <unordered_map>
#include <string>
#include "component.hpp"
#include "trace.hpp"
```

Classes

- class Object

5.25.1 Detailed Description

Author

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-06-05

Copyright

Copyright (c) 2021

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

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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

Copyright (c) 2021

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

Copyright (c) 2021

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

Copyright (c) 2021

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

Copyright (c) 2021

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

Copyright (c) 2021

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

Copyright (c) 2021

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

Copyright (c) 2021

5.34 texture.cpp File Reference

```
#include <glew.h>
#include "shader.hpp"
#include "texture.hpp"
#include "trace.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

Kelson Wysocki (kelson.wysocki@gmail.com)

Version

0.1

Date

2021-07-14

Copyright

Copyright (c) 2021

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

Copyright (c) 2021

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

Copyright (c) 2021

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

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Version

0.1

Date

2021-07-14

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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

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Version

0.1

Date

2021-06-05

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5.39 trace.hpp File Reference

```
#include <string>
#include <fstream>
```

Classes

- class Trace

5.39.1 Detailed Description

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Version

0.1

Date

2021-06-05

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5.40 transform.cpp File Reference

```
#include "transform.hpp"
```

5.40.1 Detailed Description

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Version

0.1

Date

2021-06-05

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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

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Version

0.1

Date

2021-06-05

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5.42 vector3_func.cpp File Reference

```
#include "vector3_func.hpp"
```

5.42.1 Detailed Description

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0.1

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2021-07-26

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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

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0.1

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2021-07-26

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Index