

# Documentation

## Objects

### Map

The map is the playable area, where the player and the enemies can move around in. It is lit by torches that are scattered around and a lava pool in the starting room. It has a stone texture.

### Podium

The podium is in the starting room and is used to let the player see the riddle he must solve. It is lit by the lava source and throughs a shadow onto the wall behind it. It has a golden material, which is not a texture, but coloured geometry.

### Lava

The lava is part of the starting room. It lights up the surrounding area and throughs a shadow onto the wall behind the podium. It has a texture and if the player falls into the lava, he gets reset.

### Torches

Scattered around the map are torches. They light up the hallways of the map. They are coloured meshes and therefor do not have a texture file.

### Riddle

The riddle is in the starting room next to the podium. It has a Texture, that shows the text of the riddle. It is lit by the lava source.

### Door

The door is the entry into the maze. It too is a coloured geometry. It is lit by the torches next to the door.

### Spiders

There are four spiders in the game. They are located throughout the maze. They are coloured and have textures. The body is white, while the legs have texture hair. They are lit by the torches in the hallways. The spiders move through the maze and if they get the player, he loses health.

### Player

The player is not an object, but rather a first-person camera. The player has 3 health points and loses them when a spider gets him. He has a short immunity before the next health point is taken. If the player loses all health points, he gets sent back to the starting room and his health is restored.

### Skeleton

The skeleton stands around in the starting room and does his magical animation. He is lit by the ambient light. The skeleton has a texture.

## Used libraries

We have used the provided GCG Framework and have expanded it by PhysX and Assimp.

PhysX is used for Collision Detection of all objects in the scene. (<https://www.nvidia.com/en-us/drivers/physx/physx-9-19-0218-driver/>)

Assimp is used for importing objects into the game. (<https://assimp.org/>)

## Gameplay Implementation Required

### 3D Geometry

There are a few different complex 3D Objects in the game.

- Map
- Spider
- Skeleton
- Podium
- Torches
- Door

They are being imported by Assimp.

### Playable

The Game can be started via the .exe file.

### Game Objective

The Player must solve the riddle and then traverse through the maze. On the way he has to dodge deadly spiders to find the correct way out of the maze.

### Min. 60 FPS and Framerate Independence

The Game can have more than 60FPS and the moving objects are Framerate independent.

Objects that can move and are independent from Framerate:

- Player
- Spiders

They are Framerate independent by using the time since the last Frame to calculate how far they must move.

### Win/Lose Condition

There are win and lose conditions in the game:

Win condition:

- The player finds the correct hallway to escape the maze

Lose condition:

- The player loses too much health by being bitten by the spiders.
- The player goes down a wrong hallway
- The player falls in the lava

## Intuitive Controls

The player can move around the game with WASD. Those are continuous inputs. The player can also jump with Spacebar.

## Debug Controls

There are also extra debug controls built into the game:

- F1: Wireframe Mode
- F2: Backface Culling
- F3: Hide/Show the Map
- F4: Hide/Show the Haze
- F9: Reset the player to starting position
- F10: Print the current location of the player to the console
- F11: Make a checkpoint to be reset to the checkpoint location
- B: Toggle speed boost for the player movement
- ESC: Close the Game

## Intuitive Camera

The camera is its own class and has its own transformation matrix. It is a first-person game, therefore the camera's position is equal with the player position. The player can freely look around.

## Illumination Model

At least one Lightsource:

- Torches
- Lava
- Ambient

Each object has to have an assigned material:

- Either the objects have a texture material, or the mesh is coloured. In either case the object is rendered correctly.

For each object, **normal vectors** have to be provided

- They are provided.

## Textures

The map, riddle and the spiders have textures.

## Moving Objects

There are 4 moving objects in the game:

- 4 spiders

## Adjustable Parameters

The following parameters are adjustable in the setting files (window.ini):

- Screen Resolution
- Fullscreen Mode
- Framerate

## Gameplay Implementation Optional

### Advanced Gameplay

#### Collision Detection

Collision Detection is done via PhysX.

Demonstrated via:

- Running into a wall

### Advanced Physics

Advanced Physics is done via PhysX and the Collision Callbacks

Demonstrated via:

- The spider running into the player

## Effects Implementation

### Shadow Map with PCF

The Shadow Map is implemented on the lava light source and casts a shadow onto the wall behind the podium.

Demonstrated via:

- Looking at the wall behind the podium

### GPU Vertex Skinning

GPU Vertex Skinning is implemented on the skeleton. In the starting room in a corner, there is a skeleton, which does a magical attack move animation.

Demonstrated via:

- Looking at the skeleton.