Game Engines

MGAE-E2013

IT-University of Copenhagen

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1 Introducton

This report has been written as part of a project on the Game Engines E2013 (MGAE-E2013) course on the Games course at the IT-University of Copenhagen.

For this assignment I have created a game engine for a 2D platformer game, written in C++ with the use of the SDL framework[1]. I have worked, and shared ideas, with Jakob Melnyk (jmel).

2 Features

The engine is intended to support simple 2D platform games built in tiles, where jumping and avoiding enemies while trying to reach a goal area are the key points. The engine contains the following features:

- A player that has the ability to walk and jump.
- Enemies that fly or walk. In the case of the walking enemy, it is also affected by gravity.
- Collision detection, both between entities (player/enemies) and the walls, and between the player and the enemies.
- A side-scrolling camera that follows the player.
- Animations for entities.

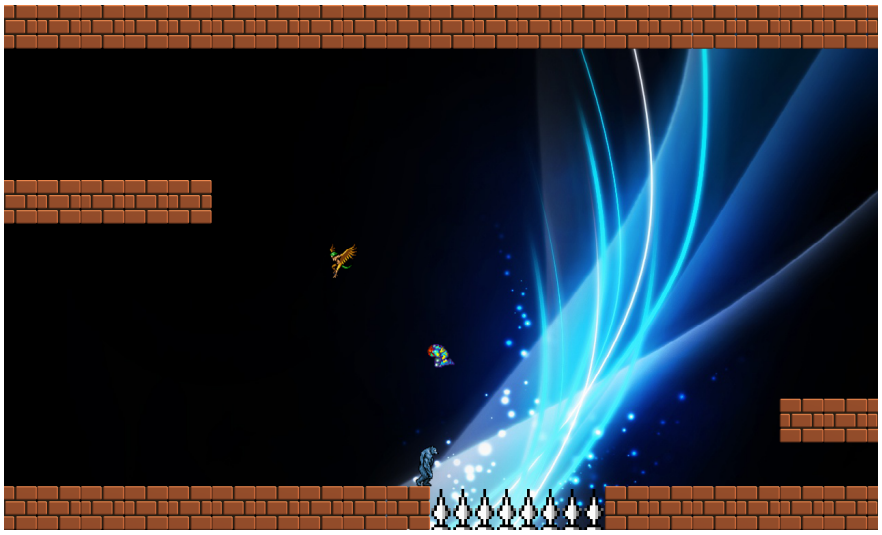

Figure 1: A picture of the game in progress.

3 Overview

In this section, I will go over the general structure of the engine and explain some decisions that I have taken with regards to how the engine works.

3.1 Overall Structure

The engine consists of the following classes: A map, a player, enemies, a level, and a window to display everything to.

[1] http://www.libsdl.org/

3.1.1 Map

The **map** class is a representation of the world the player is traversing. It contains information about the layout of the world, such as where solid blocks and spikes are found, where the goal is, where the player spawns and where enemies spawn. The information about the world is loaded from a .txt file (see section 6.1 for an example and explanation of the data format).

3.1.2 Player

The person playing the game needs to be able to interact with it, which is the purpose of the **player** class. It represents the player character, which can move around the map and collide with other objects. Collision results in different events depending on what is hit (stopping if a wall is hit, dying if something hostile is collided with, etc.).

3.1.3 Enemies

Obstacles in a 2D platformer is important and some kind of enemies are usually used for this purpose. In the engine, enemies are represented by the **enemy** class, which is a very basic enemy. It contains very basic behaviour, but it can be extended by other classes to create specific enemies with their own behaviour. This makes it very easy to implement new enemies.

3.1.4 Level

The **level** class represents an entire level in the engine. It contains a map, a list of the enemies in the map and the player character.
The level handles input from the keyboard tells the player to move depending on the input. The level also updates and moves the enemies according to their behaviour. It also takes care of telling the window class where to draw everything.

3.1.5 Window

The **window** class is the one that handles any form for drawing to the screen. It initializes SDL, creates a window for it to draw on and helps with loading and drawing of images in an easy way. It is used behind the scenes.

3.2 Decisions

Enemies.

Timestep variable (problems)

Level handles input

Map loads files

4 Problems

5 Conclusion

6 Appendix

6.1 Map data file and layout

The map uses the following data format: The first line determines the amount of rows in the map, the second determines the amount of columns. The lines after represents the layout of the map, with the numbers meaning the following things:

- **0**: An empty space.
- **1**: A solid block.
- **2 & 3**: 2 and 3 both represent the goal, but there is a difference: 2 determines the place where the goal texture is drawn and is used for checking for collision with the goal, where 3 is only used for checking for collision with the goal.
  This two-part design is used because drawing the goal texture multiple places looks strange, but collision might be needed for multiple tiles. 3 was introduced to handle that.
- **4**: Spikes.
- **5**: The spawn point of one kind of enemy.
- **6**: The spawn point of another kind of enemy.
- **9**: The spawn point the player.

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