**Brent Gruber**

**CS4250**

**Final Report**

**12/7/16**

**Abstract**

I did not come close to what I wanted to accomplish with this project. It is a survival game where the player fights a group of enemies using a sword, and the goal is to level up and survive as long as possible. I pulled in a sound library to add sound to the game, however I would have liked to pull in more external libraries. Using glut I was able to create a semi-functional game that does allow a player to kill enemies and level up, however it is not a very compelling or exciting game.

**Introduction**

The final project that I implemented was an interactive game. The purpose of the game is to kill enemies with a sword. The enemies will follow you and if they touch you, it will damage you. If your character sustains enough damage it will die and the game will be reset. However, if you damage the enemies and kill them, then you will gain experience points. As you gain experience points your character will level up, giving them a higher attack strength and defense strength, so they will do more damage to the enemies on attacks and sustain less damage from the enemies when hit.

The idea is that as the user player levels up the game should get harder, meaning more enemies will be generated, the enemies will be stronger and faster and harder to kill. The goal of the game is to reach the highest level you can before dying. Sort of a survival game

**Technical**

For this project I stuck to using glut with Angel’s code, as I was most familiar with this and was still learning about using this library. Because of this i did not want to also deal with more overhead of learning another library.

I decided to make this game in the first person perspective, and due to this did not draw the user player on the screen, however the user player is holding a sword that I draw at an offset, so it is slightly visible. For now all of the characters are simple cubes due to putting a large amount of time in getting the characters on the screen and getting the sword to swing properly.

The camera was implemented by simulating a sphere around the character, using the passive motion function I find the point on the sphere that corresponds to where the mouse pointer is on the screen and point the camera at that location. I also used the x and z components of this point as a direction vector for player motion, so the player will move towards where the camera is pointing. I had originally implemented it with the wasd keys, such that w and s only moved in the z direction, a and d only moved in the x direction. This did not offer a very good user experience, so I found the x and z components of where the camera was looking at and used that to create a movement vector for the player.

I implemented a skybox around the character, by drawing a large cube and mapping textures to it. I found the textures that I ended using at <http://www.custommapmakers.org/skyboxes.php>. I read the textures in using the bitmap loader that was in the code-egs directory for the class. The skybox will move with the same movement vector as the player. I implemented this before textures were taught in class and had a lot of trouble getting the textures to map correctly. They were mapping to the triangles that created the face of the square, but they did not get mapped to the entire square.

I also added sound to the game. Upon starting the game will play some background music on a loop. When leveling up it will stop the background music, play a level up sound effect, then resume the background music. I used the irrklang library to play the sound. I implemented the switching between sounds by creating a thread upon leveling up, because in order to stop the background music and resume it I have to wait for the level up sound effect to finish playing. If I do this in the main thread it would halt the entire program until the sound effect has finished, so it made more sense to create a new thread for this.

In all my project consisted of 5 classes and the main file. The 5 classes were, Cube - used to create a simple cube object and perform transformations and collision detection; Player - used to create a player (also used for enemies) with attributes such as attack, defense, level etc.; Sword - class to create a sword to be held by a player and functionality to swing the sword; Camera-handles all the camera functionality; Skybox-Creates the skybox and moves it with player.

**Known Issues**

The collision detection doesn’t always detect a hit on the enemy. A better collision detection system like the ones that were discussed in class would have made this better. Or possibly for this purpose measure the distance between the enemy and the player and see if the player is facing the enemy when the sword is swung to see if it should make contact.

The camera is offset from the player a little bit, so when the player rotates, the camera does not move, but it moves where it’s looking, so sometimes the sword will cross the face of the camera and give a weird effect. This would be fixed by rotating the eye around the y axis of the player when rotating the player.

Sometimes when the enemies are generated one or two of them will be generated far away and hard to find, and the enemies will not come after the player until the player approaches them, so it will not come towards the player. This would be fixed by changing the offset I used to generate the locations of the enemies. however I wanted to make this offset large enough that the enemies were not generated directly on top of each other, since I used rand() to create a location for them.

**Future Implementations:**

The two main things I wanted to get into this game that I did not were some scenery, and using an object loader to get better a better looking game. I had thought I could find some obj files from blender for the characters and the sword. However I did not get a chance to, due to focusing on playability and limited bandwidth.

The scenery I wanted to add was some kind of building that the player could enter and move around with, maybe some interaction with the features on the inside, such as lighting a fireplace, or opening a door. I wanted to use a modeled object to make the characters look more humanoid, but I ran out of time to learn how to use an object loader to do this. I did look into stbimage and assimp, but I ran out of time before I was able to figure out how to use these and implement them in my project.

I also wanted to have things such as powerups, or new swords with higher attack randomly appear and allow the player to pick them up. These power ups could do things such as kill all enemies currently generated, give the player higher attack or defense, or make the player faster/enemies slower.

**Conclusions**

Looking back I think I would have benefited greatly from spending some extra time in the beginning going through tutorials and searching through open source projects online. Instead I tried to jump right in and implement on my own and ran into a big learning curve with opengl, I really struggled with things such as mapping textures, or rotating the sword in a way that looked kind of like a swing. I believe I could have accomplished a lot more if I would have taken more time to teach myself rather than trying to learn from doing.

I enjoy working with computer graphics, though I don’t know that I have knack for it, I sometimes struggle to visualize 3d transformations. Occasionally, something will move on the screen in a way I don’t expect, and I have a hard time visualizing what’s actually happening. For example, it took me a very long time to realize what was happening when the sword was crossing the camera, explained in the known issues section.

I developed this all in ubuntu using sublime text with a gdb plugin. This worked ok, however the gdb plugin did not seem to be much help, and sublime didn’t always offer me the functionality I wanted. I have experience with visual studio and when I first began I attempted to develop in VS, however I struggled getting the shaders to compile and work correctly, in VS it seemed to be adding garbage characters at the end of the file. Eventually I gave up and developed in linux. However, i think VS would have been beneficial to use for this for its features such as goto definition, and in my experience the debugger works better in VS. Although my experience is in C#.

**References**

Irrklang (sound library):

<http://www.ambiera.com/irrklang/downloads.html>

sound files:

<http://www.tannerhelland.com/11/dark-knight/> (background)

<https://www.myinstants.com/instant/victory-fanfare/> (level up)

skybox textures:

<http://www.custommapmakers.org/skyboxes.php>

helpful link for attempting to set up VS, not sure what my problem was:

<http://www.emunix.emich.edu/~evett/GraphicsCourse/working%20with%20visual%20C/Running%20Angel%20code.htm>