Coursework Report

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Abstract

This report will outline the creation and implementation of a graphics coursework project. The aim of this project was to create a "the floor is lava" type scene, essentially a living room which has a floor made of lava.

Keywords – Cameras, Texturing, normal mapping, lighting

1 Introduction

The scene featured in this report, which we shall call, "The floor is lava" was created in Microsoft's Visual studio platform in c++ using OpenGl and a graphics framework created and provided by Edinburgh Napier University.

The scene uses several different graphical techniques to create the overall effect. The main effects featured are grayscale, masking, texturing, lighting and a skybox.

The motivation behind this project

2 Problems encountered

Throughout the course of this project, several problems were encountered. The main problem encountered was an ongoing issue with the scenes lighting. The scene uses point lights and spotlights in an array which has an issue that means the lights are rendered incorrectly. The other issue encountered was an issue where the grayscale effect is rendered incorrectly. Given more time these issues would be fixed but unfortunately given the time constraints, fixing them is unfeasible.

3 Optimisation

Upon completing this project, it was decided that it would be beneficial to investigate the code using facilities offered by Visual studio and its profiler function.The first thing that was done was add to the program, a frame rate counter that outputs to the command prompt as the project is running. This allowed for real time monitoring of the fram rate that the project was achieving and provided the ability to immediately investigate any drops in frame rate that came up.

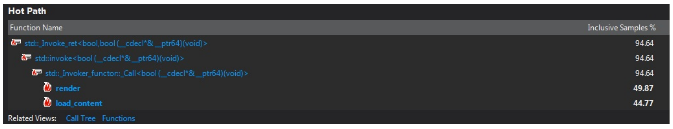

Figure 1: **ImageTitle** - Hot paths

The second thing that allowed for investigation of the code was visual studio's inbuilt profiler. The profiler allows for a graphical representation of your code to facilitate easier optimisation. As you can see from the above figure, the render and load content sections of the project were the areas that took up the most of the CPU, or the "Hottest" parts of the project.

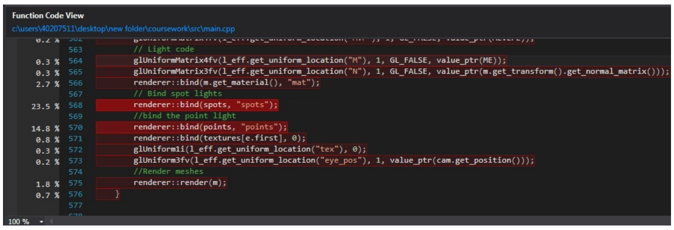

Figure 2: **ImageTitle** - Render function

The first function I looked at was the render function. As you can see by the above figure, there were certain aspects of the render function using a noticeable amount of the CPU There are two noticeable sections of the render function that are using a significant amount of CPU load. They are the lines where we bind the spot lights and the point lights. These binding functions are only partially operational and both caused a frame rate drop to around 30 frames per second. After investigating further I managed to remove the frame rate drop but both functions however I was unfortunately unable to completely remove the issues that cause them to take up significant CPU load and work exactly as I intended. Given more time I would like to fix the issues with these functions to make them fully operational.

After investigating the render function I moved on the load content function. As you can see by the above figure, the profiler picked up on several areas of the function that were using a noticeable amount of CPU load. This can be put down to how doing a lot of loading will tend to use a lot of load however there was one part that the profiler picked up that was using a large amount of load. I assumed this was down to the amount of polygons in the model. After replacing the model with an alternative one the amount

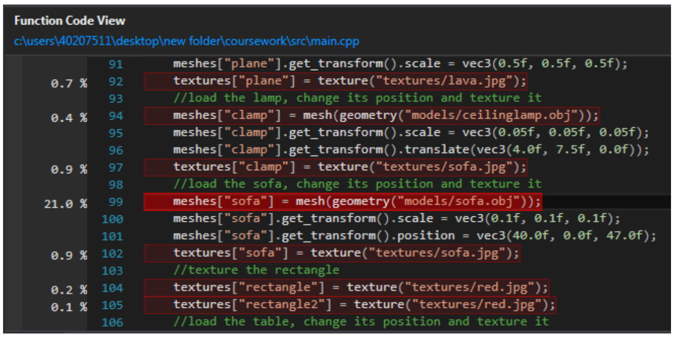

Figure 3: **ImageTitle** - Model using high load

of load on decreased as you can see by the following figure.

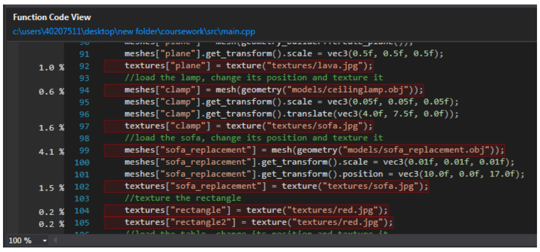

Figure 4: **ImageTitle** - Replacement model using lower load

4 Related work

The inspiration for the scene came from the game that probably everybody played as a child in which the aim was to get around the room by jumping and climbing over the various furniture and by all means, not touching the floor.

Inspiration was also gained from the in-development game from Klei entitled, "Hot lava", which is based on the childhood game. "Hot lava" which is currently in its beta testing phase takes the childhood classic game and takes it a step further with the player being able to see the red hot lava on the ground and become fully immersed in the game of dodging the dreaded lava that has replaced the ground we all know and love.

5 Future work

Between part one of this coursework and part two I was able to add several other features to improve to overall look and quality of the scene, however there are still some things I would like to add to my project. For example, if I had more timeto spend on this I would hope to add a few more houses outside of the window to give the apearence that we are in a house on a street. I would also like to add a day/night cycle to the scene.

6 Conclusion