Graphics Programming Report

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1 Introduction

Solar system simulation choice. For this project we decided to create a simulation of the solar system with the planets acting on each other using gravitational forces. The idea was to have the sun act as a point light and the planets move only with a set starting velocity, having the forces move them accordingly and the lightning of the sun ensure the planets are lit accordingly.

2 Week structure

In the following sections we will go through the work done each week and who did the work on each of the individual task.

2.1 Week one - Initialization and project development

The first week was spent creating the basics of our project. In this week, our goal was to establish the foundation on which we would create the final scene and the interactive objects used in the calculations. On the graphical side of the project, we created a basic scene with two sphere objects to symbolise the final planets of our project. The methods for loading the sphere and very basic lighting of the scene was also implemented. During this week, we also established the basic classes for handling the physics calculations. These would control the calculations regarding gravitational pull of every object towards each other and thereby bestow an acceleration upon the objects, which would in due time become the actual motion of the objects. Most of the work done during this week was preparation. We set up a Git structure to account for the project, and established the fundamental data structure we were aiming to use. This structure was conceived to be a simulation object ("SimObjecT") containing two sub-objects - a graphical ("GraphicsObject") and a physical ("PhysicsObject") representation of the super-object - in separate classes, linked through a common position value kept in the SimObject, see figure 2.1.

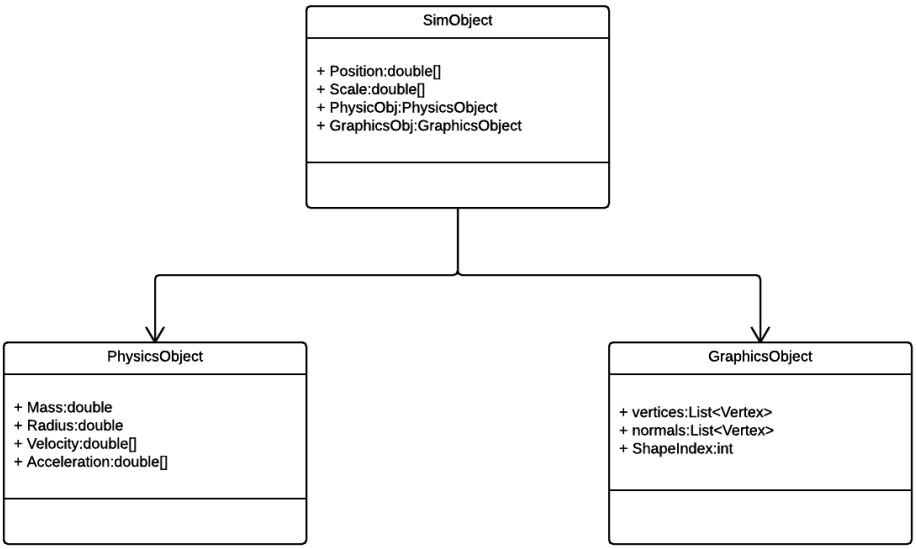

Figure 1: Structure of the simulation objects and their physics and graphic objects

2.2 Week two - Integration and transformation

This week we integrated the different parts of the project for a unified physics and graphical simulation. There was some problems with graphical and physical integration, were the positions were not updated. Even after the integration were completed. There were some problems with moving the camera so that we could follow the moving planets. The physics were updated to produce transformation matrices which should move the objects around in the simulation. These change the current position of the graphical object. They needed to be moved through translation of their vertices which required a translation matrix.

2.3 Week three

Implementation of comet initialisation Shading algorithm.

2.4 Week Four

Polishing of project and preparation for presentation

3 Results

In the end we created a simulation of the solar system where you can see the planets move in real time. In this simulation you can move around and watch the planets move in real time. As the planets are moving quite slow in real time we include a time skip function, meaning you can speed up the time to have the planets move around the sun in a noticeable pace. It clearly visible that the planets are moving around the sun according to the laws of gravity. In order to visualize the system, you can send comets flying which will follow the gravitational pull of the planets and change its trajectory accordingly.

4 Conclusion

Finalization of goal and end result
physics are working