Aalto-University
CS-A1121
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Solar system simulator- General Plan

General description

For the final Y2 course project I will be creating a Solar system simulator. The program will simulate the heavenly bodies and satellites movements by measuring points of their orbits, until either a collision happens or the simulation time runs out. The most important parts for this sim are the effects of gravity and the Newtonian laws of physics. I will not be accounting for the effects of eg. air resistance.

The elements of each body will be velocity, location, size (radius) and mass. For this I will be needing a working 3D coordinate system. In the program I will need to be able to examine the behavior of satellites that start at a certain given point in the Solar system (and time), with a given speed and direction.

The user will be able to control the satellites starting point, speed, direction and mass. Furthermore the user will be able to control the simulation time and speed and possibly other parameters. The initial situation for each simulation will be the same.

I plan to make the project for at least the intermediate level (grade 3) and if I have enough time by the end of the period, maybe even upgrade it to the challenging level. I will first make the 2. Part of the intermediate assignment (graphics interface).

Draft of the user interface

For the user interface I would like to have a large box where the simulation can be viewed. I would like to have eg. buttons that would create a satellite and let the user input the data of it. I would like to have the simulation time and speed settings at the top of the interface, perhaps on top of the simulation box. Next to these I would like to have a button to run the simulation, one to restart it and one to terminate the program.

Files and file formats

Different files I think I might use in this project are perhaps some sort of image files for the visual and graphical part of the program. I.e. the planets, to make them look more realistic. Otherwise I might want to implement a “save - load” function into the program, which would allow the user to save the situation. Or maybe saving the result of a simulation, in order to later open the resulting scenario quickly. The save files would most likely be .txt files in CHUNK format.

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System testing plan

I want the program to restrict the user from doing, is “spawning” satellites into objects that are obscuring the way, i.e. planets or other satellites. Also limiting the simulation times and speeds to usable numbers. Such limits should also exist for the speeds of the satellites. Finally the location of the satellite should be input in a way that the program understands and can work with. So basically anything the user can input wrong, should be tested.