Team Pwnage

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Physics 350 Project Proposal – 3D Gravity Simulator

Introduction

We plan to illustrate the dynamics of the gravitational force by creating an n-body simulation of planets in arbitrary solar system configurations. We plan to do this simulation on a computer using the C++ programming language. An OpenGL graphical front end will be used to display the planets and stars in the system while they are in motion. Physical concepts demonstrated will include: Central Forces, Conservative forces, Newton’s 3rd law, Conservation of momentum, Conservation of Energy, Kepler’s Laws etc.

Modules

There will be two major parts to this project:

1. Simulation Engine

This module will run the numerical algorithms to determine the positions of the various objects in the scene at a certain time. It will be highly optimized by the use of multithreading. The faster this module is, the more planets the program will be able to simulate.

1. Visualization Engine

This module will provide the front-end to the user. It will receive data from the simulation engine and display the planets at the correct positions. This module will also be responsible for allowing the user to modify the scene elements (eg: Abruptly removing the central star to demonstrate centripetal force and Newton’s 1st Law) and handle other forms of user input.

Content Management

A collaboration tool is needed to coordinate the efforts of the team. We will be using Trac to maintain a record of each member’s progress. An SVN repository will be used for revision control.

Current Progress

So far we have managed to put together the basics of the two main modules. What remains is to implementation, testing, debugging of the code. So far, progress is on schedule and we should be able to finish the project on time.