Ps3: Nbody simulation

Assignment Description:

For the 4th assignment of the semester we were tasked to create an Nbody simulation. An Nbody simulation is a physics simulation that takes an objects mass and distance to other objects in order to simulate gravitational forces. We used this type of simulation to make a recreation of the solar system. This program will simulate gravitational forces for a given system over a certain length of time per second. I also received extra points for adding music and creating a new universe for my simulation.

Key Concepts and Algorithms:

This assignment used real physics formulas to calculate accurate simulations of celestial bodies. The main formula used is F = (G * M1 * M2) / R*R this formula calculates the forces on the bodies and uses them to calculate the new acceleration for the bodies. For this project we used 2 classes 1 class called CelestialBodies that holds all of the relevant data members and functions to calculate forces and 1 called Universe that generates and holds the CelestialBodies.

This assignment uses smart pointers which are an object that functions as a pointer and manages the memory allocation for the user. In this assignment we used a vector that hold shared pointers to CelestialBodies. This allows the Universe to hold a near infinite number of objects. These objects are given to the program via an input text file.

What I learned in this assignment:

During this assignment I learned how to use smart pointers a concept in C++ that I had no experience in before starting this assignment. I also learned how to input data into a program from an input file with std::cin using the input stream. Before this assignment the only experience I had with input text files was file pointers in C.