Project Proposal of *Space Panther*

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# Platform

Both team members will be using C/C++ and windows in this project. Platform will be Android.

# Summary of the project including the open source APIs used and links to those APIs

## Synopsis (MVP)

This is a N-body physics based celestial body simulator allowing the user to create, observe, and explore a galaxy composed of simple spherical bodies. Orbital data will be entered from dialogs and textboxes. Galaxies can be saved and loaded.

## API Usage

Framework and UI: Unreal Engine 4, <https://www.unrealengine.com>

Linear Algebra: Eigen, <https://eigen.tuxfamily.org/>

Physics: boost::odeint, <http://headmyshoulder.github.io/odeint-v2/index.html>

File IO: Unreal Engine 4

# User stories

1: As an astronomy hobbyist, I want to see a galaxy from different angles to get a better sense of its depth. My condition of satisfaction is that I do not need to wait longer than few minutes for the simulation to be rendered and the rendition of the galaxy must allow for views from multiple perspectives/points of view. If simulation takes longer than few minutes, I must have a message suggesting to lower number of planets or try again repeatedly till the rendition is produced.

2: as a student, I want to be able to choose any number of planets for the galaxy and enter their coordinates, mass, and velocity for simulation so that I could have a better visual understanding of physically accurate relative position of the planets in my n-bodied galaxy. Condition of satisfaction: I must be able to choose the number of planets that I want to be simulated, must be able to enter their mass. If I entered negative numbers for the weight or mass or invalid coordinates I should be prompted to enter the information again. If I continue using the same information without correcting, I will get the message with the number of the planet I had given and explanation that this planet was not included in to the simulation I will get because of the negative values I had given. I must be able to add one or more planets’ information to the previous simulation right away or later if I need/want to.

3: as a user, I would like to be able to save my galaxy’s information I had entered (such as each planet’s weight, velocity and coordinates) before termination of the app so that I could reuse this galaxy’s information again without entering the data again. Condition of satisfaction: before I terminate the application, I need to be prompted to save my work into a file if I want to.

4: as a user, I would like to be able to use my previous work so that I could continue my work/study. Condition of satisfaction: I need to be able to start the last simulation I had done from where I had left off if I need to/ want to from a previously saved file. If my previous work could not be loaded, I should get the message saying that it is not possible if the file was not accepted by the application.