Pavitthra Pandurangan
TP 1

Problem

I aim to create a tool that will allow users to explore the universe as it evolves from its birth to the present day. As the time increases, the color of the objects in the sky will change color due to the expansion of the universe, and will redshift. In addition, users will be able to rotate in all three planes, and be able to add a point mass at their given location, which will affect the color of other galaxies due to gravitational redshift. Users will be able to view the evolution of the universe from multiple different galaxies.
Users will also be able to explore several planets, which will grow in complexity as time in the universe passes.

Implementation of Visual Output

1. Different galaxy clusters are represented by spheres
2. I will create multiple n^3 size “cubes” in Blender to represent different parts of the universe
    a. I plan to use existing probabilistic formulas to determine the distribution of the nodes
3. I will choose a central “cube” and arrange the other cubes around it in a spherish pattern.
4. When the user selects a new galaxy, it becomes the new central cube and the other cubes will wrap around it
5. At different time points of the universe’s life, different planets will populate some galaxies. Users can pause the animation, and click on the planet to get a closer view of it.
    a. The planet will contain recursively defined natural features.

Modules Used

1. Blender
    a. I will used blender to generate the galaxy maps
    b. I will model elements of the planet on blender
2. Yabee
    a. I will use this add-on export my blender models to panda3D
3. Panda3D
    a. I will run my application with panda3d, which will be able to take user inputs and manipulate my 3D models.

Physics Involved

1. Redshift
    a. Change the rate of change of color based on the rate of expansion of the universe
2. Gravitational Redshift
    a. Able to place point mass in the center to affect this property

User Options

1. Animation automatically starts at year 0 of the universe
2. User can use slider at the top to select age of universe
3. Select galaxy in star map
    a. Regenerates animation based on current view
4. Can rotate view
5. Can click on planets

“Blue Sky” Goals

- Farther stars will be older than the close stars, so they will emit different kinds of light
- Show gaseous blur around each galaxy and create particle vortex in blender