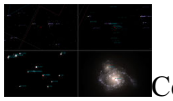
Celestia is a 3D astronomy program created by Chris Laurel. The program is based on the Hipparcos Catalogue (HIP) and allows users to travel through an extensive universe, modeled after reality, at any speed, in any direction and at any time in history. Celestia displays and interacts with objects ranging in scale from artificial satellites to entire galaxies in three dimensions using OpenGL, from perspectives which would not be possible from a classic planetarium or other ground based display.
NASA and ESA have used Celestia in their educational and outreach programs, as well as for interfacing to trajectory analysis software.
Celestia is available for Linux, Mac OS X, and Microsoft Windows. Released under the GNU General Public License, Celestia is free software.

Functions:

 Celestia displays the Hipparcos Catalogue (HIP) of almost 120,000 stars. Celestia uses the very accurate VSOP87 theory of planetary orbits. This makes it possible for it to provide a solar and lunar eclipse finder and to display the orbital paths of planets (including extrasolar planets), dwarf planets, moons, asteroids, comets, artificial satellites, and spacecraft. The user can vary the number of stars that are visible on the screen and have them drawn in different styles.
Celestia users can travel/fly through the Celestia universe using simple keyboard controls, at any speed from 0.001m/s to millions of light years/s. Viewpoints can be set to look forward, backward or at any angle to direction of travel. Controls allow users to orbit stars, planets, moons and other space objects, track space objects such as spacecraft, asteroids and comets as they fly by, or travel to and/or fly through nebula and irregular, elliptical and spiral galaxies (over 10,000 galaxies included).
The time simulated by Celestia can be set at any point in the future or past, although planetary orbits are only accurate within a few thousand years of the present day, and date arithmetic overflows at the year 5874774.
The names and positions of multitudes of objects in space can be displayed, from galaxies, star clusters, nebula, constellations and stars to planets, moons, asteroids, comets and artificial satellites, as well as the names and locations of cities, craters, observatories, valleys, landing sites, continents, mountains, seas and other surface features.
Celestia displays such features as detailed atmospheres on planets and moons, planet shine on orbiting satellites, sunsets and sunrises, moving clouds, planetary rings, eclipse and ring shadows, constellation lines, borders and illustrations, night-side lights, detailed surface textures, specular reflections off water and ice, nebula gases and star flares.
Information about the objects that Celestia draws can also be displayed: the radius, the distance, length of the sidereal day and average temperature of the planets are shown and the distance, luminosity relative to the sun, spectral class, surface temperature and radius of stars are indicated.
The user can change Celestia's field of view from as wide as 120 degrees to a highly magnifying 3.4 seconds of arc, while dividing the window into multiple panes, in order to observe several objects at the same time and including Light time delay if desired.
Graphic screen-shots and movies can be captured in classic or HD resolutions (up to 1920x1080) on Windows and Linux platforms.
Celestia's support for game pads and joysticks is relatively limited, employing many keyboard shortcuts instead.
Celestia can be extended with new objects and there are hundreds of third-party, user-created add-ons available for installation, both fictional and realistic. The extension mechanism uses Lua as its built-in scripting language. Educational lessons and computer lesson plans are available.