Development of a 3D Visualization Engine

Kevin Kassing – Computer Systems Lab 2006-07 – Period 5

Abstract

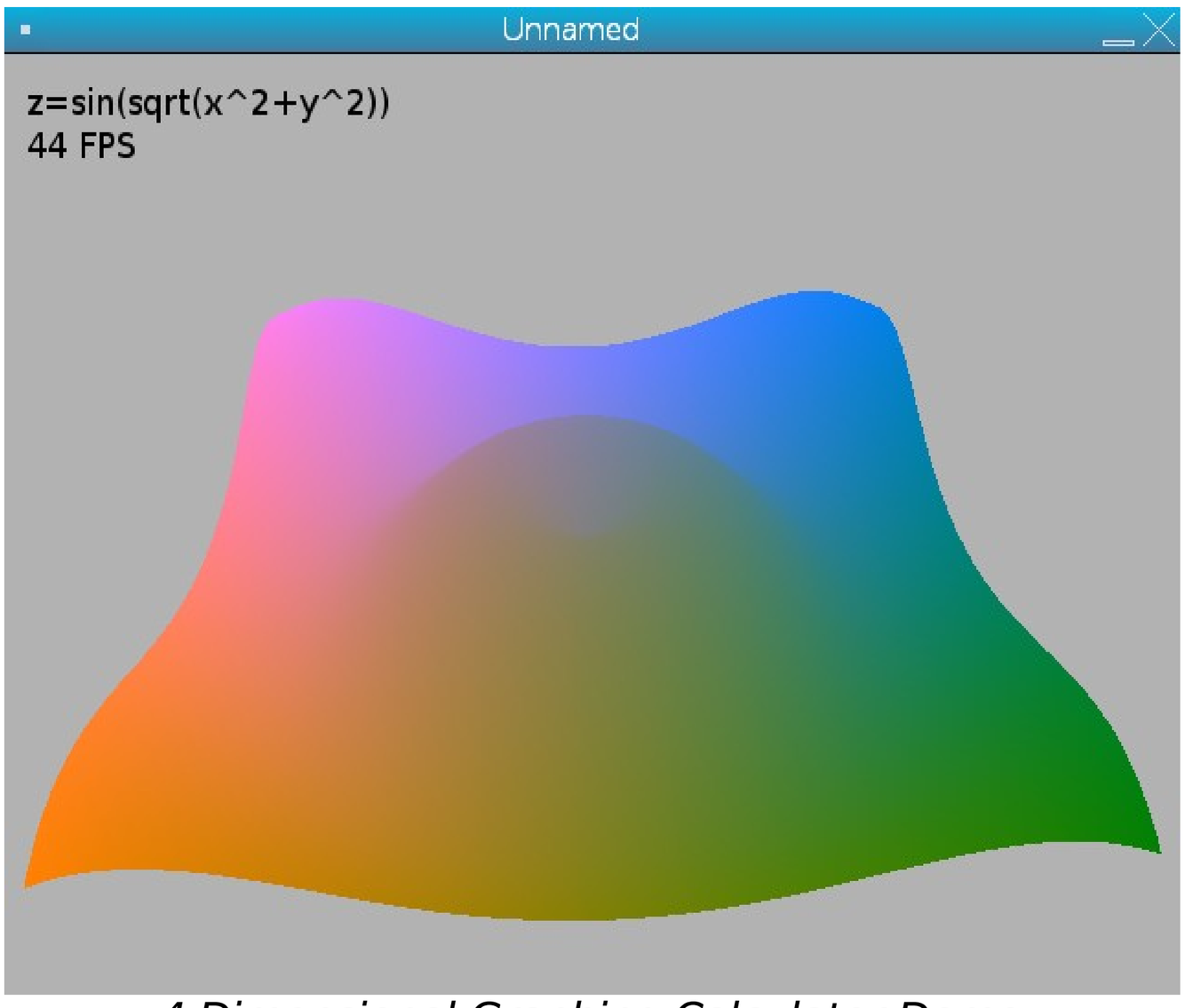
Visualization is an extremely valuable tool in problem solving, especially as problems become more complex. The goal of this project is to create an engine to facilitate three-dimensional visualizations of problems without requiring knowledge of OpenGL. Additionally, the engine should be able to perform at a high level by giving the developer a deeper level of control. The engine architecture is designed to let the developer have as much control over the IO and rendering processes as he or she wants. The modular design of the engine is designed to let the developer customize as much as possible.

Procedures and Methods

The engine is designed around the idea of separating stationary geometry from animated geometry and objects stored by the engine from those completely under the user's control. Managed geometry is stored by the engine ans is rendered automatically. With unmanaged geometry, it is the responsibility of the user to call the render function, which may have the benefit of memory and time efficiency.

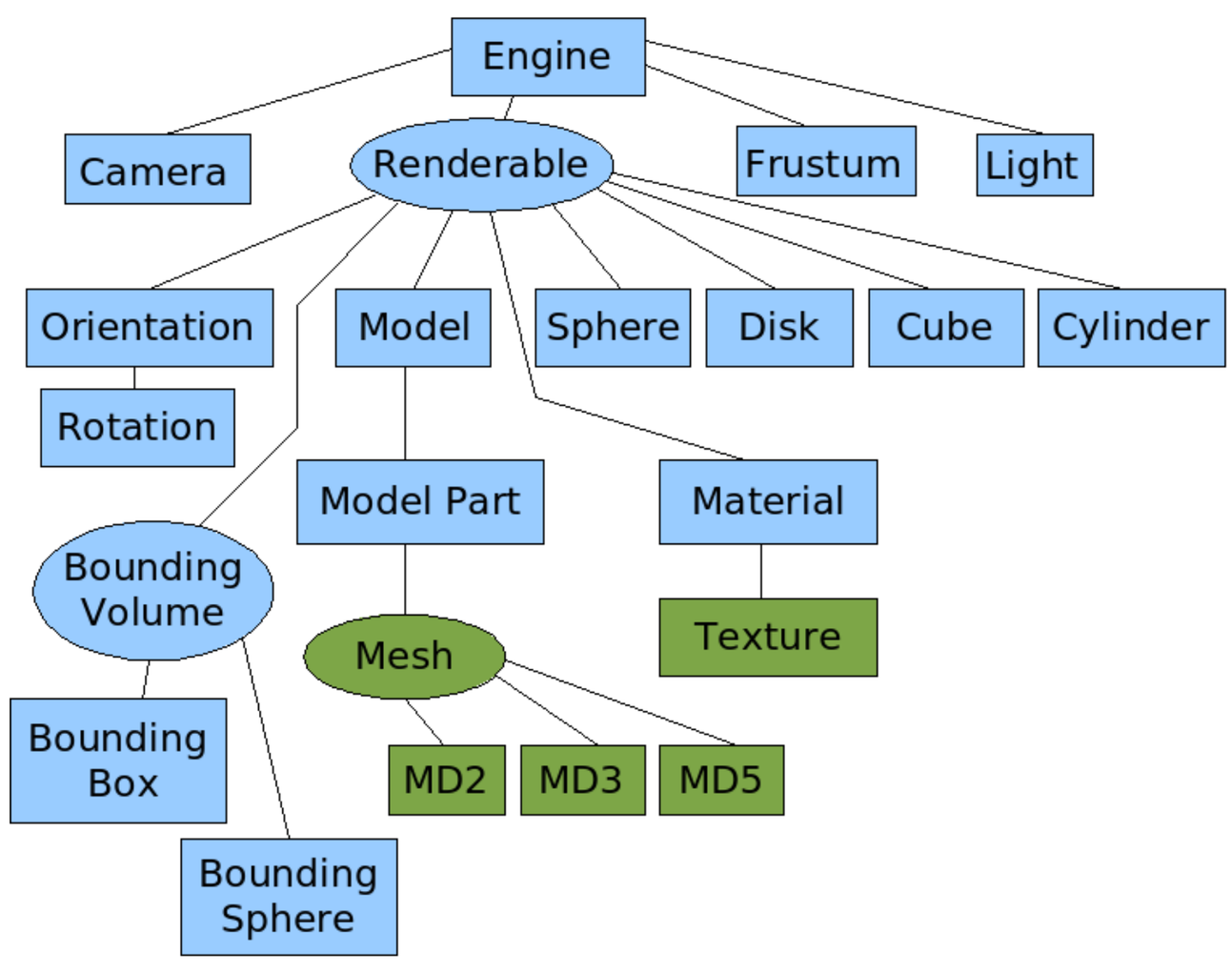
There is also an emphasis on memory efficiency with stored resources, such as texture images, material types, and mesh data. In addition, interoperability with existing formats of these resources is a priority.

Planned features for the engine include a physics engine capable of modeling linear and angular kinematics, ability to load geometry with precomputed visibility rules, and simple control of renderable objects by way of state machines.



4 Dimensional Graphing Calculator Demo

Class Diagram



Expected Results

There is no numeric metric by which I could judge the success or failure of my engine. Rather, the focus is on the idea that, without utilizing the ability to bypass features of the engine, a complex scene should render quickly enough to be visually pleasing (i.e. without flickering). Due to the power of modern graphics cards and results to date, I expect the results to be satisfactory.