

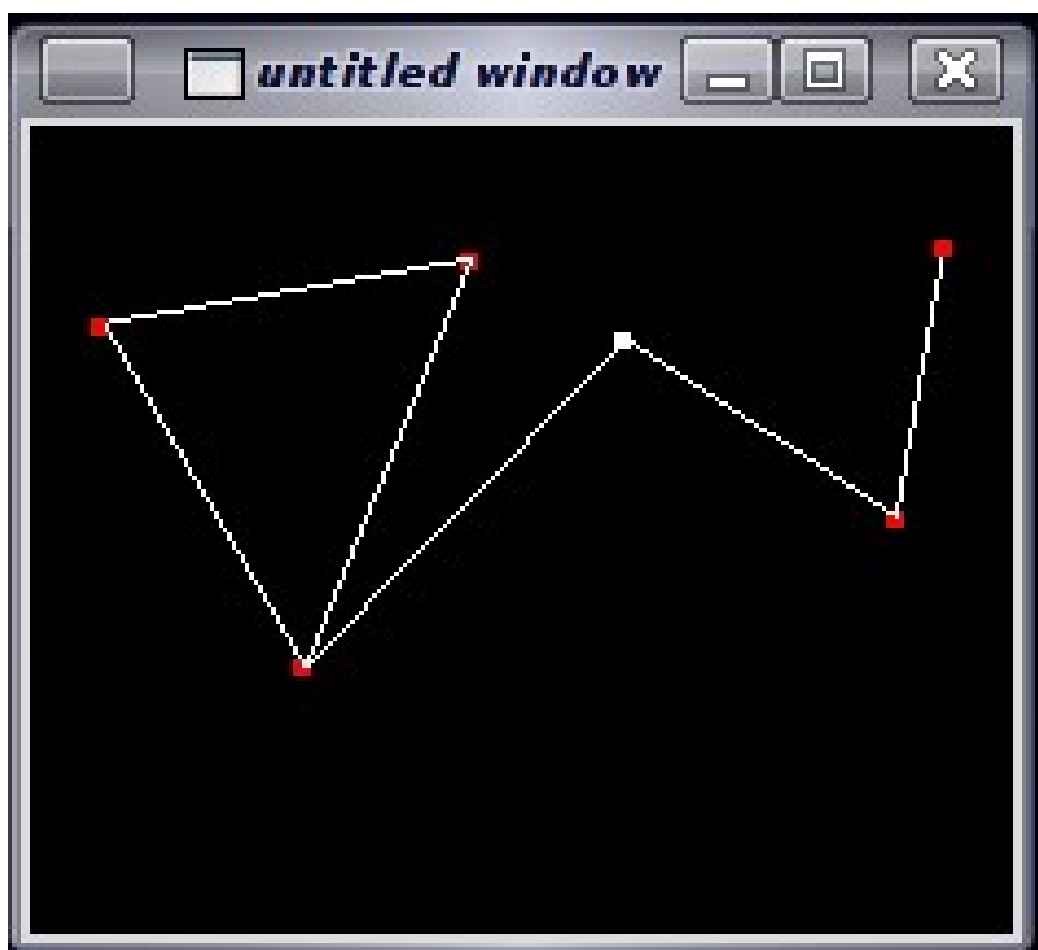
Interactive Geometry in 3D

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Abstract

The goal of this project is to write a program that allows its user to create and manipulate a complex system of geometric objects in space. From a few basic object types, interesting and useful constructions can be built. This could be useful for education, mathematical or scientific research or visualization, or just for fun.



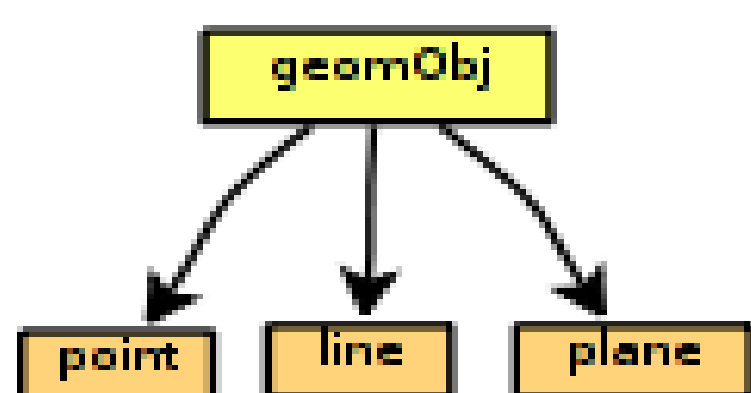
A screenshot showing points and line segments, created by clicking in various locations on the screen in Point and Line modes. The points can be selected and dragged with the mouse, and the lines are redrawn accordingly.

Background

For a while there has been software for computer assisted design (CAD), which utilizes a few basic shapes and techniques such as snapping and numeric entry to create precise, polished diagrams of a product that can then be used in its manufacturing.

A similar sort of program is used for 3D modeling, in which the user constructs polygon meshes in three dimensions: freehand; with snapping; and numerically. My program aims to be more focused on geometric objects and dynamic preservation of their relationships as some are manipulated. The leading example of this is a commercial program called The Geometer's Sketchpad. However, its interface is rather clunky, and it is limited to two dimensions. However, the fact that it is possible to build primitive 3D constructions in it illustrates the power behind the idea of geometric construction. The basic philosophy for the user interface of my program comes from the modeling program Blender and the text editor Vi.

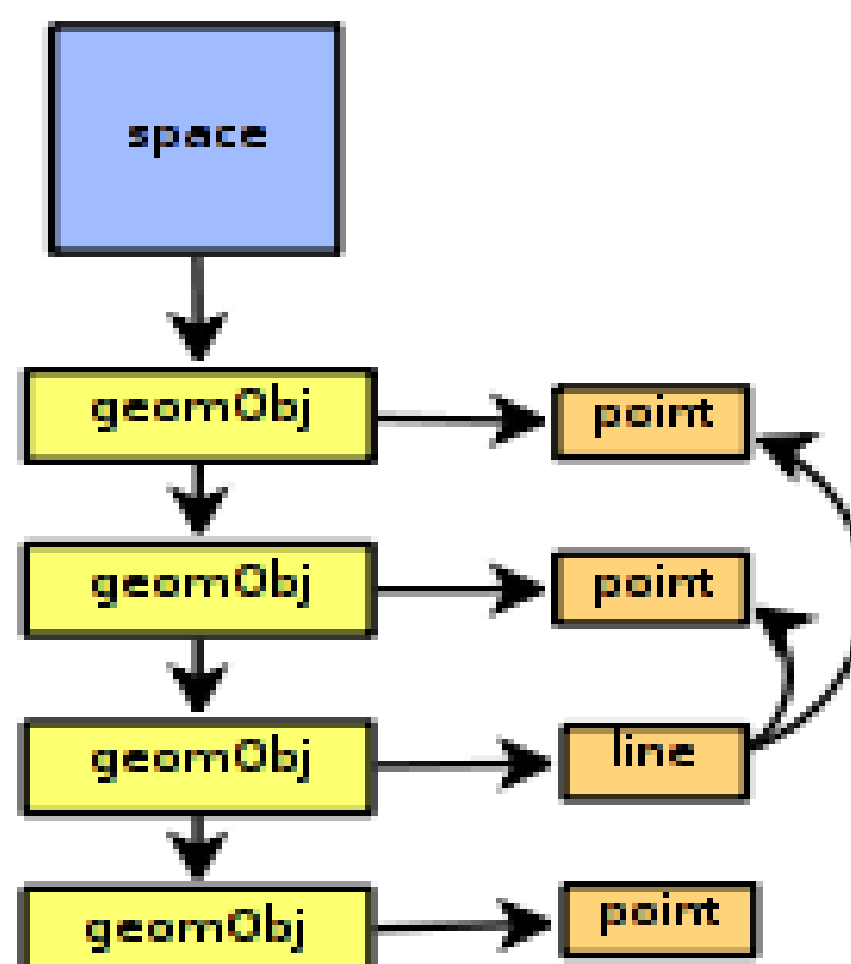
Object Hierarchy



"Object Oriented"

- Inheritance
- Built with structs and pointers

Global Linked List for Drawing



A schematic diagram showing the internal structure of geometric objects, and the structure that stores them for display and calculation purposes.