AC3D Modeler Overview

What I’ll talk about

AC3D terminology
AC3D features
Things to be careful of
I will *not* talk about all the keys or buttons to press for every imaginable operation. See the html documentation!

AC3D Terminology

Vertex: 3D position, possibly with texture coordinates
Surface: a linked list of vertices, which may be displayed as a polygon, a polyline (closed, piecewise linear curve), or a line (open, piecewise linear curve)
Object: a collection of surfaces
Group: a collection of objects that can be organized hierarchically

Terminology Note

AC3D’s definitions for surface, polyline, and line DO NOT correspond to the usual definitions of these terms:

Surface: a smooth or piecewise-linear 2-manifold, with every point homeomorphic to an open disc (e.g. a sphere, torus, polygonal mesh, etc)
Polyline: a piecewise linear curve
Line: either an infinite, linear curve or a bounded linear curve (i.e. a line segment)

Views

3 orthogonal views
  pan around
  zoom, either current view or all orthogonal views
3D view
  spin mode
    vertical mouse spins about horizontal axis
    horizontal mouse always spins about y-axis
  walk mode
    forward/back, left/right, up/down
    turn head left/right

Creating Basic Objects

Polygon, polyline, line, ellipse, rectangle
Cylinder, sphere, box
Disk
Rectangular mesh
More advanced object creation

Extrude a polygon, polyline, or line
  Extruding a polygon yields a closed object

Revolve a polyline or line
  Revolving a line touching the axis at both ends can yield a closed object
  Revolving a polyline that does not touch the axis yields a closed object

Take the convex hull of a set of points
  Useful for joining two objects

Selection, move, resize, rotate

Select either vertices, objects, or groups
  click on vertex or edge
  use selection box

Move in coordinate plane

Resize along coordinate axes (i.e. non-uniform scaling)
  Rotate about coordinate axis

Snapping

Grid snapping available during vertex placement
  Vertices may be snapped together after the fact

Objects may be automatically shifted to make certain vertices line up

Shading properties

Render as polygons, polylines, or lines
  Flat or smooth shade (where possible)

Backface culling on/off
  If rendering is rasterization bound, backface culling speeds things up
  Usually used for closed objects, where back faces are not typically seen anyway

Normals

Polygon vertices on basic, closed shapes are created in CCW order when viewed from outside
  Normals are created to be pointing outward

Surfaces of revolution may be created with wrong orientation
  use flip normals to fix

Shared vertices

Shared vertices allow adjacent polygons to know that they are adjacent
  also allow vertex normals to be computed across adjacent faces for smooth shading

Basic mesh shapes created with shared vertices

Exactly coincident vertices may be shared later
  Grid snapping or vertex-vertex snapping can make them coincident
Output formats

AC3D's format preserves all model info
  several formats also exported, and a few imported
  (importing is harder!)

Eventually, you'll need to export to a format your program can read (not until 2nd homework)

Raw triangle format probably easiest
  but throws away hierarchy, object and shared vertex information
  save individual objects to separate files to preserve object information and allow animation

Watch out!

Avoid using too many triangles or hidden triangles
  more triangles = longer rendering time

revolving polygon or object creates hidden, internal polygons (wasteful)
  the same goes for extruding closed objects

If you want to use backface culling in your HMD application, check for proper normal orientation