

PolyWog

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	<i>TITLE :</i> PolyWog		
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REVISION HISTORY

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Chapter 1

PolyWog

1.1 wog188.guide

PolyWog, a simple 3D editor
Version 1.88 Documentation
(C) 1995 Ben Discoe

If you like this program, or find problems, or want more features, or even find it vaguely interesting, please let me know! Send email to iguana@crl.com!

The main purpose of this program is to play with polyhedra and "geodesic" structures. However, it is fairly general-purpose so you could use it for any sort of polygonal 3D modelling/world-design.

Features

About the Author

Menus

Amiga Version notes

Buttons

History

Keyboard Shortcuts

Legal Stuff

1.2 features

F E A T U R E S

- * Creates and edits 3D polygonal objects
- * Start from a wide variety of regular polyhedra
- * Cut, Copy, Paste, Rotate, Scale, and Stretch
- * Extrude and Stellate
- * Surfaces of Revolution
- * Reads and writes GEO, Sense8 NFF, and PLG format files
- * Writes POV-ray triangle files
- * Detach and attach polygonal meshes
- * Zoom in or out
- * Grid and grid snap
- * Tons of keyboard shortcuts so you don't HAVE to use the GUI
- * Tessellates arbitrary triangles and quadrilaterals to any frequency
- * Constructs the dual of any closed polyhedron
- * Removes redundant vertices or polygons
- * Measure distances
- * Unlimited Undo and Redo!
- * Hide and unhide any part of the object while you're working on it

1.3 buttons

B U T T O N S

VERTEX ADD

Puts you in Add Vertex mode. Click to add vertices anywhere.
They will their third coordinate as zero (no depth).

VERTEX DELETE

Puts you in Delete Vertex mode. Click to delete vertices.
Polywog will prevent you from deleting verts which are being used by
polygons or lines.

VERTEX SELECT

Puts you in Select Vertex mode. In this mode, clicking on a vertex
will toggle its selection. Double-click will do a select-connected
from the indicated vertex.

VERTEX MOVE0

Puts you in Move Single Vertex mode. Click and drag to move a vertex.

CREATE POLY / POLY3 / POLY4 / LINE

Puts you in Create mode.
For a polygon, click on each of the vertices, ending with the first
vertex. For "POLY3" and "POLY4", Polywog knows that you want a 3- or
4-sided polygon, so you don't have to end with the first vertex.
For a line, just click on two vertices.

DESTROY POLY / POLY3 / POLY4 / LINE

Puts you in Destroy mode.
For a polygon, click on each of the vertices, ending with the first
vertex. For "POLY3" and "POLY4", Polywog knows that you want a 3- or
4-sided polygon, so you don't have to end with the first vertex.
For a line, just click on two vertices.

SELECTION STRETCH

In Stretch mode, hold down the mouse and drag to stretch the selected geometry in the two dimensions that the mouse is moving in. Stretching is performed around the selection center.

SELECTION MOVE

In Move mode, hold down the mouse and drag to move the selected geometry in the two dimensions that the mouse is moving in. Holding down SHIFT will snap the starting and ending points to the nearest vertices. This can be extremely useful for lining up parts of an object.

SELECTION SCALE

Scaling is exactly like stretching except that the all three dimensions are stretched by the same factor.

SELECTION ROTATE

In Rotate mode, click to define the point to rotate around, hold down the mouse and drag to define the amount of rotation. Let go and the selection will rotate.

SELECTION SET COLOR

Hitting this button will set all selected polys to the current color.

AREA SELECT

In Area Select mode, drag to define a box. All visible vertices in the box will be selected. Unless you hold down SHIFT to extend the selection, all vertices outside the box will be deselected.

AREA DESELECT

In Area Deselect mode, drag to define a box. All visible vertices in the box will be deselected.

AREA ZOOM INTO

In Area Zoom mode, drag to define a box. You will zoom in to view only the geometry in the box.

VIEW FRONT / SIDE / TOP

Indicates which view.

VIEW FAKE 3D

Adds an orthographic slant to your view. This is useful for getting a sense of depth for telling apart the front and back of objects. You can still do ALL editing in this mode.

Viewing your object from a true 3D perspective requires a separate program, either realtime or nonrealtime, such as WorldToolKit or POV-Ray. Nonetheless, it is often useful to have a "fake" orthogonal slant, as a conceptual or selection aid.

ZOOM

Lets you change the degree of magnification. In Zoom mode, click the first button to zoom in towards a location, second button to zoom out away from a location.

GLUE

Glue will "merge" the the point closest to the pointer and the

point closest to it. All degenerations are handled correctly.

REFERENCE LINE

The Reference Line tool is a "ruler" for measuring distance in 3D space. Both ends can be dragged around, or "attached" to points by double-clicking near the intended point. The distance (length of the reference line) appears in the upper right corner.

PICK COLOR

Not implemented yet. Will set the current color.

UNDO / REDO

You should be able to Undo and Redo ANY operation. If you find a bug in Undo/Redo, let me know. It's a fairly tricky feature. It's also fairly uncommon in 3d editors. Heck, 3D Studio for \$3500 doesn't even have SINGLE-LEVEL UNDO.

GRID

Toggle the visible grid.

SNAP

Toggle snapping to the snap grid.

1.4 menus

M E N U S

Project

Edit

View

Polyhedra

Operations

Options

1.5 project

PROJECT

Load and Save

These are self-descriptive.

Clear

Deletes all geometry from the current object.

Save Defaults

Saves the settings of the "Options" menu to a file called wog.opt, which is automatically loaded the next time you start.

1.6 edit

EDIT

Note: there is no "real" clipboard support yet. Cut, Copy and Paste work by using a temporary Polywog object called "Clipboard".

Duplicate

Makes an exact in-place copy of all selected vertices, polygons, and lines. You should probably move the duplicated geometry right after, so that you don't forget where there is duplicate geometry.

Erase

Kills the selected vertices, polygons, and lines.

Detach Selection

Will "detach" the selected geometry from the unselected. Extras vertices are created as necessary, so that no vertices are shared between the selected and unselected geometry.

Select All

Selects all vertices.

Select Connected

Selects all verts which share polygons/lines with selected verts.

Deselect All

Deselects all vertices.

Cut as a new object

The selected vertices, polygons and lines will be removed from the current object and used to create a new object.

Copy as a new object

Same as Cut as a new object, except that the geometry isn't deleted.

Affect Verts Only

If set, Duplicate and Delete will only duplicate/delete vertices, not polys or lines.

Affect Polys Only

If set, Duplicate and Delete will only duplicate/delete polys and lines.

Require All Verts

If set, polygons and lines will be considered selected only if all their vertices are selected. Otherwise, they are considered selected

if any of their vertices are selected.

1.7 view

VIEW

Zoom All

Adjusts the Zoom factor so that all visible geometry fits in the view.

Zoom In / Zoom Out

Zooms in/out by 20%. The shortcuts 'z' and 'Z' may be more useful because they zoom in/out around the point under the pointer.

Zoom to Selection

Adjusts the Zoom factor so that all selected geometry fits in the view.

Zoom Reset

Restores the Zoom to 1 unit = 1 pixel.

There is no standard on which way the X, Y, and Z axes point. Polywog lets you choose between several popular schemes:

VR386/Vscape Axes

WorldToolKit Axes

AutoCAD Axes

Show Only Selection

Hides any unselected geometry.

Hide Selection

Hides any selected geometry.

Show Everything

Un-hides all geometry.

Hide Backfaces

doesn't currently work very well

Set View Colors...

Lets you set which colors are used for polygons, vertices, lines, the window background, etc.

1.8 polyhedra

POLYHEDRA

Tetrahedron

Octahedron

Cube

Icosahedron

Dodecahedron
(rhombic Dodecahedron)
Cuboctahedron
Globe
Torus
Cylinder
Box (xyz)

These are some basic polyhedra. You can use them as starting points for constructing really wild, complex polyhedra using Polywog's special features. All polyhedra are created initially centered around the origin.

1.9 operations

OPERATIONS

Vertex at Center

Creates a new vertex in the center of the object or selection. Very useful for finding midpoints of faces or solids, bisecting lines and angles, etc.

Stellate...

This will take every face and make a pyramid out of it, giving a "3D star" based on whatever shape you are using. Combining this feature with "Find Dual" can be used to form truncated forms of polyhedra. Try it.

Extrude...

Extrude the selected polygons in the indicated direction.

Frequency Tessellation...

This is one of the two Really Neat features of Polywog.

This will divide each triangular (or quadrilateral) face into a set of smaller triangles, where the number of resultant triangles is frequency squared. Try this on your favorite polyhedra, then Normalize to get pseudo-geodesic structures. The reason why I say psuedo is because if you use this method with any ODD frequency, the resulting location of vertices does not truly correlate to subdividing the geodesic arcs described by the polyhedron edges. It is, however, very close. You could theoretically raise a form to any large frequency, although you are, naturally, limited by your memory size.

Flip/Swap XYZ...

Invert or exchange the X, Y, Z values of the selection (or object, if nothing is selected). Useful for creating the "mirror" of some geometry or converting from one axis convention to another.

Spin (Surface of Revolution)...

The selected lines are spun around the vertical axis to create a polygonal surface.

Normalize

This finds the center of all points and adjusts all points to lie the average distance from that center. Simply stated, it makes all points Spherical. One use is to project flat tessellated faces onto

their geodesic arcs.

Object Center->Origin

Moves all points so that their vector sum is centered on the origin.

Set Clockwisdom of Polys

Most rendering systems determine the front and back faces of a polygon by considering whether the vertices are clockwise or counterclockwise. In case an object has inconsistent ordering, you can use this operation to set the clockwisdom of all polygons to be the same. Note that this assumes the object is convex and centered at the origin.

Subdivide Quads

Splits all 4-sided polygons into triangles.

Subdivide Nonplanar Polys

Splits all non-planar polygons into triangles.

Merge Redundant Vertices

Finds all redundant vertices (two vertices at the exact same point in space) and joins them.

Remove Redundant Polys

Finds all redundant polys (two polys connecting the exact same vertices) and removes the extra poly in each case.

Unfold

Generate Convex Hull

These are future Really Neat Features.

Create Dual as new object

This is the second Really Neat feature.

Every fully-connected polyhedron has a dual, which is formed by exchanging the configuration of faces with vertices. For example, the cube's dual is the octahedron, and the icosahedron's dual is the pentagon dodecahedron. Complex geodesic structures also have their duals, which are typically complex "fly's eye" structures involving many hexagons. Naturally, a dual of a dual is the original shape.

1.10 options

OPTIONS

Display Coordinates

Toggle display of the current X,Y,Z location.

Display Crosshair

Gives you a "+" crosshair, useful for lining up parts of an object. You can set the color of the crosshair with "Set View Colors" under the VIEW menu.

Display Axes

Toggle display of the X, Y, and Z axes.

Display Object List

Toggle display of a list of all objects in a separate window.

Reference Line

Toggle display of the reference line.

Undo Buffer Active

Toggle whether Undo is turned on for the current object.

Grid On

Toggle display of the visible grid.

Snap cursor to Grid

Toggle snapping of the cursor to the snap grid (which can be different from the visible grid).

Poly Normals / Vertex Normals

Ignore these menu items.

Display options...

Sets options having to do with the display:

Visible grid size

Snap grid size

Display grid as dots or lines

How to display geometry when you're dragging it

More options...

Sets other options:

Rotation constraint

Scale/Stretch constraint

Definition of object "center"

"Undo buffer size" affects the undo buffer only at the next time you start Polywog - it doesn't change or damage your current undo buffer.

"Assume a polyhedron" tell the features on the Special menu (notably Find Dual and Normalize) to assume that the shape you're working with is a polyhedron. Set this option whenever you DO have a polyhedron.

1.11 shortcuts

K E Y B O A R D S H O R T C U T S

a - Area:	space bar - full refresh
s - Select	c - Vertex at center
d - Deselect	d - toggle Ref line
z - Zoom into	f - Front view
	F - Fake 3D view
3 - 3-sided poly:	4 - 4-sided poly:
a - Add	a - Add
d - Delete	d - Delete
g - toggle Grid	i - Info
G - toggle Grid-snap	j - Zoom to selection

l - Line:	p - Poly:
a - Add	a - Add
d - Delete	d - Delete
m - Move mode	n - Next object
o - toggle Objectlist	q - Quit
r - Rotate	s - Side view
v - Vertex:	t - Top view
a - Add	u - Undo
d - Delete	U - Redo
s - Select	backspace - kill selected
m - Move	z - zoom in
x - toggle Crosshair	Z - zoom out
Esc - deselect/select All	~ - cycle palette

SHIFT can be used to extend selection in area-select mode.

1.12 about

About the Author

I originally wrote this program while dropping out of Caltech, due to spending too much time with my hobby, 3D geometry, which no one was interested in teaching me about. Much of the original coding was done during a few months of unemployment in Berkeley in early summer 1990. Since then I've been doing small amounts of additional work on weekends, and ported it to the Macintosh and MS Windows.

I am currently (1/13/95) reachable at iguana@crl.com.

1.13 amiga

Amiga version notes

Before running: make sure you have the `reqtools.library` in your `LIBS:` directory. It may be included in this archive case you don't have it already.

There are some command line options from a CLI:

- c to run on a custom screen (default)
- m to run on the default display (workbench screen)
- sm to make the custom screen medium-res
- sp to use the workbench palette

Sorry, Workbench fans, no ToolTypes stuff.
Polywog also doesn't run under AmigaOS V1.3.

1.14 history

H I S T O R Y

Version 1.88

Added POV triangle output

Fixed "Subdivide quads" to preserve colors.

Mlib now converts "*" to "#?" for show-pattern, for Amiga users who aren't using "*" as their wildcard.

The Remove Redundant Polys function now shows the percent done.

Rotate now shows the actual rotation on-scene (rubber-bands just like movement).

Duplicate Selection now states the # of verts copied.

Cylinder constructor now uses radio buttons.

Added key to toggle fake3D.

Zoom in/out menus (used to be key shortcut only)

Undo buffer now stays on by default

Mlib was changed so that custom screens open to default "Text Overscan" size, not the size of the Workbench screen.

Wrote documentation.

Version 1.87

Sent for beta-testing to 18 people. People wanted more file formats and closer adherence to the Amiga Style Guide. Nobody reported bugs!

1.15 legal

Legal Baloney

See the file "license.wog" for the legal status of Polywog and terms under which you can use it. To summarize here, you can copy and use it freely, but all liability is disclaimed blah blah blah.