

GL2PS, an OpenGL to Postscript Printing Library

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1 Introduction

GL2PS is a library for creating postscript output from any OpenGL application. Though it was primarily designed for three-dimensional geometry, mesh and post-processing visualization, it may be useful every time high quality vector output is desired. The main difference between GL2PS and other similar libraries is the use of sorting algorithms capable of handling intersecting and stretched polygons, as well as non manifold objects.

The library, written in C, is released under GNU Library General Public License (see <http://www.gnu.org/> for more details), and is available at <http://www.geuz.org/gl2ps/>. Any corrections, questions or suggestions should be e-mailed to Christophe.Geuzaine@advalvas.be.

The interface consists of five functions, all beginning with the prefix `gl2ps`. All the data structures and the symbolic constants peculiar to GL2PS begin with `GL2PS`.

2 Usage

2.1 gl2psBeginPage and gl2psEndPage

2.1.1 Specification

```
void gl2psBeginPage( char *title, char *producer, GLint sort,
                    GLint options, GLint colormode,
                    GLint colorsize, GL2PSrgba *colortable,
                    GLint buffersize, FILE *stream )
```

```
void gl2psEndPage( void )
```

2.1.2 Parameters

title Specifies the plot title. For Postscript output, this string is placed in the %%Title field.

producer Specifies the plot producer. For Postscript output, this string is placed in the %%For field.

sort Specifies the sorting algorithm, chosen among: GL2PS_NO_SORT, GL2PS_SIMPLE_SORT, GL2PS_BSP_SORT.

options Sets global plot options, chosen among: GL2PS_NONE, GL2PS_DRAW_BACKGROUND, GL2PS_SIMPLE_LINE_OFFSET, GL2PS_SILENT, GL2PS_BEST_ROOT. Multiple options are combined with the bitwise inclusive OR symbol, |.

colormode Specifies the color mode: GL_RGBA or GL_COLOR_INDEX.

colorsiz Specifies the size of the colormap if colormode is GL_COLOR_INDEX.

colortable Contains the colormap if colormode is GL_COLOR_INDEX. This colormap must contain colorsiz elements of type GL2PSrgba.

buffersiz Specifies the size of the feedback buffer.

stream Specifies the stream to which data is printed.

2.1.3 Description

gl2psBeginPage and **gl2psEndPage** delimit the OpenGL commands that will be caught in the feedback buffer and output to **stream**. The parameters given to **gl2psBeginPage** determine the way primitives are handled:

GL2PS_NO_SORT The primitives are not sorted, and are output in **stream** in the order they appear in the feedback buffer.

GL2PS_SIMPLE_SORT The primitives are sorted according to their barycenter. This can be sufficient for simple scenes.

GL2PS_BSP_SORT The primitives are inserted in a BSP tree. The tree is then traversed back to front in a painter-like algorithm. This should be used for complex three-dimensional scenes, but keep in mind that the BSP tree algorithm is quite memory hungry...

GL2PS_DRAW_BACKGROUND The background frame is drawn.

GL2PS_SIMPLE_LINE_OFFSET Adds a small offset in the z-buffer to all lines. This is a simplified version of the **GL2PS_POLYGON_OFFSET_FILL** functionality (cf. section 2.3), putting all lines of the rendered image slightly in front of their actual position. This thus performs a simple anti-aliasing solution, e.g. for finite element like meshes.

GL2PS_SILENT Suppresses all messages written by GL2PS on the error stream.

GL2PS_BEST_ROOT Try to optimize the BSP tree by choosing as root primitives those leading to the minimum number of splits. This is (really) not efficient yet.

2.2 gl2psText

2.2.1 Specification

```
void gl2psText( char *string, char *fontname, GLint fontsize )
```

2.2.2 Parameters

string Specifies the text string to print.

fontname Specifies the name of a valid postscript font (for example "Times" or "HelveticaBoldItalic").

fontsize Specifies the size of the font.

2.2.3 Description

gl2psText permits to include text in the postscript output in a very simple way. The text is inserted at the current raster position (set by one of the **glRasterPos** OpenGL commands). Beware that text will be sorted according to the position of the leftmost element of the string only.

2.3 gl2psEnable and gl2psDisable

2.3.1 Specification

```
void gl2psEnable( GLint mode )
```

```
void gl2psDisable( GLint mode )
```

2.3.2 Parameters

`mode` Specifies the mode to enable, chosen between `GL2PS_POLYGON_OFFSET_FILL`, `GL2PS_POLYGON_BOUNDARY`, `GL2PS_LINE_STIPPLE`.

2.3.3 Description

`gl2psEnable` and `gl2psDisable` delimit OpenGL commands to which a local mode is applied. These modes are:

`GL2PS_POLYGON_OFFSET_FILL` Tries to emulate the `GL_POLYGON_OFFSET_FILL` functionality. The value of the offset is taken as the current value of the corresponding OpenGL offset (set with `glPolygonOffset`). Not fully functional yet.

`GL2PS_POLYGON_BOUNDARY` Not implemented yet.

`GL2PS_LINE_STIPPLE` Tries to emulate the `GL_LINE_STIPPLE` functionality.

2.4 gl2psPointSize and gl2psLineWidth

2.4.1 Specification

```
void gl2psPointSize( GLfloat value )
```

```
void gl2psLineWidth( GLfloat value )
```

2.4.2 Parameters

`value` Specifies the size or the width of points and lines.

2.4.3 Description

`gl2psPointSize` and `gl2psLineSize` emulate the standard `glPointSize` and the `glLineWidth` functions. They are necessary since the point sizes and line widths are not saved in the OpenGL feedback buffer.

3 Example

Here is a typical calling sequence to produce BSP sorted postscript output in the file "MyFile", with all lines slightly shifted front in the z-buffer. The `draw()` function contains all OpenGL instructions.

```
FILE *fp = fopen("MyFile", "w");
int bufsize = 0, state = GL2PS_OVERFLOW;

while( state == GL2PS_OVERFLOW ){
    bufsize += 1024*1024;
```

```

    gl2psBeginPage ( "MyTitle", "MySoftware", GL2PS_BSP_SORT,
                    GL2PS_SIMPLE_LINE_OFFSET | GL2PS_SILENT,
                    GL_RGBA, 0, NULL, buffsize, fp );

    draw();
    state = gl2psEndPage();
}

fclose(fp);

```

To output the text "MyText" at the current raster position, the `draw()` function should contain something like:

```
gl2psText("MyText", "Courier", 12);
```

4 Contributors

Michael Sweet (mike@easysw.com) for the original implementation of the feedback buffer parser; Marc Umé (marc.ume@digitalgraphics.be) for the original list code; Jean-François Remacle (remacle@scorec.rpi.edu) for plane equation fixes; Bart Kaptein (B.L.Kaptein@lumc.nl) for memory leaks fixes.

Projects similar to GL2PS include: Michael Sweet's GLP library (<http://dns.easysw.com/~mike/opengl/index.html>); Mark J. Kilgard's rendereps (<http://reality.sgi.com/opengl/tips/Feedback.html>); the GLpr library from CEI international (<http://www.ceintl.com/>).

5 Versions

- 0.1** (Feb 12, 2000) First distributed version.
- 0.2** (Feb 20, 2000) Added `GL2PS_POLYGON_BOUNDARY` and `GL2PS_BEST_ROOT`. Changed arguments of `gl2psBeginPage` and `gl2psText`. Corrected some memory allocation stuff. First version of this user's guide.
- 0.21** (Mar 16, 2000) Initialization fixes.
- 0.3** (Jul 29, 2000) Code cleaning. Added `GL2PS_LINE_STIPPLE`.
- 0.31** (Aug 14, 2000) Better handling of erroneous primitives.
- 0.32** (May 23, 2001) Fixed memory leaks.
- 0.4** (Jun 12, 2001) Added `gl2psPointSize` and `gl2psLineWidth`. Some code cleaning to allow easier generation of vector file formats other than postscript.
- 0.41** (Aug 6, 2001) Fixed string allocation (1 char too short). Set smaller default line width.