FTGL

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Chapter 1

FTGL User Guide

1.1 Introduction

OpenGL doesn't provide direct font support, so the application must use any of OpenGL's other features for font rendering, such as drawing bitmaps or pixmaps, creating texture maps containing an entire character set, drawing character outlines, or creating a 3D geometry for each character.

More information can be found on the OpenGL website:

- `http://www.opengl.org/resources/faq/technical/fonts.htm`
- `http://www.opengl.org/resources/features/fontsurvey/`

Most of these systems require a pre-processing stage to take the native fonts and convert them into a proprietary format.

FTGL was born out of the need to treat fonts in OpenGL applications just like any other application. For example when using Adobe Photoshop or Microsoft Word you don't need an intermediate pre-processing step to use high quality scalable fonts.

1.2 Documentation

- **FTGL tutorial** (p. **??**)
- C API reference:
  - **FTGlyph.h** (p. 93)
  - **FTFont.h** (p. 80)
  - **FTLayout.h** (p. 96)

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- C++ API reference:
  - class **FTGlyph** (p. 47)
  - class **FTFont** (p. 37)
  - class **FTLayout** (p. 50)

1.3 Additional information

- **Frequently Asked Questions** (p. **??**)
- **Projects using FTGL** (p. **??**)

Chapter 2

Frequently Asked Questions

2.1 FAQ

2.1.1 When I try to compile %FTGL it complains about a missing file from the include: #include <ft2build.h>

FTGL relies on FreeType 2 for opening and decoding font files. This include is the main include for FreeType. You will need to download Freetype 2 and install it. Then make sure that the FTGL project that you are using points to your FreeType installation.

2.1.2 Is it possible to map a font to a "unit" size? My application relies on the fonts being a certain "physical" height (in OpenGL coordinate space) rather than a point size in display space. Any thoughts/-suggestions?

We can do anything:) It would be easy to allow you to set the size in pixels, though I'm not sure this is what you want. Setting the size to 'OpenGL units' may be a bit harder. What does 1.0 in opengl space mean and how does that relate to point size? For one person it might mean scaling the font up, for someone else it may mean scaling down. Plus bitmaps and pixmaps have a pixel to pixel relationship that you can't change.

Here's some guidelines for vector and texture fonts. Take note that I say 'should' a lot :)

- One point in pixel space maps to 1 unit in OpenGL space, so a glyph that is 18 points high should be 18.0 units high.

- If you set an ortho projection to the window size and draw a glyph it's screen size should be the correct physical size ie a 72 point glyph on a 72dpi screen will be 1 inch high. Also if you set a perspective projection that maps 0.0 in the z axis to screen size you will get the same eg.

  ```
  gluPerspective(90, window_height / 2 , small_number, large_number);
  ```

  So basically it all depends on your projection matrix. Obviously you can use glScale but I understand if you don't want to.

Couple of extra things to note:

- The quality of vector glyphs will not change when you change the size, ie. a really small polygon glyph up close will look exactly the same as a big one from far away. They both contain the same amount of data. This doesn't apply to texture fonts.

- Secondly, there is a bug in the advance/kerning code that will cause ugliness at really small point sizes. This is because the advance and kerning use ints so an advance of 0.4 will become zero. If this is going to be a probelm, I can fix this.

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Early on I did a lot of head scratching over the OpenGL unit to font size thing because when I was first integrating FTGL into my engine the fonts weren't the size I was expecting. I was tempted to build in some scaling but I decided doing nothing was the best approach because you can't please everyone. Plus it's 'correct' as it is.

Chapter 3

Projects using FTGL

To add your project to this list, please contact one of the FTGL developers at http://sf.net/projects/ftgl

Projects are listed in alphabetical order.

3.1 %FTGL language bindings

3.1.1 %FTGL#

FTGL# (http://www.paskaluk.com/projects.php) is a collection of .NET bindings for FTGL.

3.1.2 GlGuiA

GlGuiA (http://sourceforge.net/projects/glguia/) is a set of packages for Ada 2006 that can be used to create Graphical User Interfaces, relaying (almost) only on OpenGl. Hence should be rather platform-independant.

3.1.3 Ruby %FTGL

Ruby FTGL# (http://rubyforge.org/projects/ruby-ftgl/) is a collection of Ruby bindings for FTGL.

3.1.4 PyFTGL

PyFTGL (http://code.google.com/p/pyftgl/) wraps the functionality of FTGL into a Python module so that it can be used in conjunction with PyOpenGL.

3.2 Projects currently using %FTGL

3.2.1 Agent World

Agent World (http://code.google.com/p/agentw/) provides tools for simulating and visualizing multi-agent systems and is specially designed for testing machine learning applications (and specially focused on Case Based Reasoning ones). It includes support for representing information using the Feature Term formalism, and provides a series of relational machine learning algorithms that can deal with them. The whole project is created in C++ to maximize efficiency, and uses OpenGL as the visualization library to ensure cross-platformness.

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3.2.2 Amaltheia

Amaltheia (http://home.gna.org/amaltheia/) is a cross-platform game programming API that supports two backends, OpenGL and DirectX. The aim of the Amaltheia project is to create an intuitive and simple to use library, providing core 3d and 2d functionality in a platform independent manner. It also provides platform independence regarding basic network functions, input handling, threads and sound. Currently the GNU/Linux and the Windows OSes are supported.

3.2.3 Armagetron Advanced

Armagetron Advanced (http://www.armagetronad.net/) is a multiplayer game in 3d that attempts to emulate and expand on the lightcycle sequence from the movie Tron. It's an old school arcade game slung into the 21st century. Highlights include a customizable playing arena, HUD, unique graphics, and AI bots. For the more advanced player there are new game modes and a wide variety of physics settings to tweak as well.

3.2.4 Audicle

Audicle (http://audicle.cs.princeton.edu/) is an audio programming environment that integrates the programmability of the development environment with elements of the runtime environment. The result is a duct-taped intersection of a concurrent smart editor, compiler, virtual machine, and debugger.

3.2.5 Battlestar T.U.X.

Battlestar T.U.X. (http://code.google.com/p/battlestar-tux/) is a top-down scrolling shooter project.

3.2.6 BJS

BJS (http://bjs.sourceforge.net/) is a funny arcade 3D multiplayer tank battle. It is fuly playable and very fun in multiplayer. Of course the single player is also possible. There is no story. You just get a tank and go shoot other players. Currently there are 5 different tanks, 6 maps, 9 powerups and 4 weapons.

3.2.7 Blender

Blender (http://blender.org/) is an integrated 3d suite for modelling, animation, rendering, post-production, interactive creation and playback (games).

3.2.8 Breve

Breve (http://www.spiderland.org/) is a free, open-source software package which makes it easy to build 3D simulations of multi-agent systems and artificial life. Using Python, or using a simple scripting language called steve, you can define the behaviors of agents in a 3D world and observe how they interact. breve includes physical simulation and collision detection so you can simulate realistic creatures, and an OpenGL display engine so you can visualize your simulated worlds.

3.2.9 BZFlag

BZFlag (http://BZFlag.org/) is a 3D multi-player multiplatform tank battle game that allows users to play against each other in a network environment.

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BZFlag uses FTGL as of version 2.99.

3.2.10 Capture The Flag

Capture The Flag (`http://capturetf.sourceforge.net/`) is an open source, multi-platform, network game project.

3.2.11 Cello

Cello (`http://common-lisp.net/project/cello/`) is a project to create an open-source, industrial-strength, portable GUI toolkit for Common Lisp. Its features include anti-aliased fonts, accelerated 2d- and 3d-graphics, a standard set of GUI widgets, easy construction of new widgets, and much more. Cello heavily utilizes Cells (a sister project on common-lisp.net), in addition to industry-standard technologies such as OpenGL, FreeType, and ImageMagick.

3.2.12 Chimera

Chimera (`http://www.cgl.ucsf.edu/chimera/`) is a highly extensible program for interactive visualization and analysis of molecular structures and related data, including density maps, supramolecular assemblies, sequence alignments, docking results, trajectories, and conformational ensembles. High-quality images and animations can be generated.

3.2.13 Cinepaint

Cinepaint (`http://www.cinepaint.org/`) is a deep paint image retouching tool that supports higher color fidelity than ordinary painting tools.

3.2.14 Duel

Duel (`http://www.personal.rdg.ac.uk/~sir03me/play/code.html`) is a small overhead perspective spaceship game.

3.2.15 Empty Clip

Empty Clip (`http://emptyclip.sourceforge.net/`) is a top-down 2D Action RPG.

3.2.16 Freebox

Freebox (`http://freebox.sourceforge.net/`) is designed for use in a special type of computer called an 'HTPC', which is connected to a home-theatre system to watch XviD/DivX/DVD movies, play music (MP3, CD, whatever), play some emulated games, or whatever else you want to do with it.

3.2.17 Gem

Gem (`http://gem.iem.at/`) is a loadable library for puredata, which adds OpenGL graphics rendering and animation to Pd. Pd is a graphical programming language and computer music system.

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3.2.18 GLMayan

GLMayan (`http://glmayan.sourceforge.net/`) is an OpenGL screensaver.

3.2.19 Glover

Glover (`http://code.google.com/p/glover/`) is a movie player that renders the content using openGL allowing all kinds of special effects using fragment shaders. The movie decoding is done using ffmpeg.

3.2.20 Ivf++

Ivf++ (`http://ivfplusplus.sourceforge.net/`) is a C++ library encapsulating OpenGL functionality. The primary goal is to make it easier to use the OpenGL library in interactive 3D applications. The second goal is extendibility, providing a set of well defined base classes for different object types to build new classes on. The third goal is portability, primarily between Linux and Windows, but the library should also be easily ported to Mac OS X.

3.2.21 Jahshaka

Jashaka (`http://jahshaka.org/`) is an advanced video editing, animation, visual effects, painting and music tool.

3.2.22 Karaoke FX

Karaoke FX (`http://jeanchristophe.duber.free.fr/karaokefx/`) is a midifile player that can display lyrics in synch whith the sound so as it can be used for karaoke. It relies on plugins for midi output devices as for lyrics display.

3.2.23 Libinstrudeo

Libinstrudeo (`http://sourceforge.net/projects/libinstrudeo`), initially written for the ScreenKast program, provides the necessary logic to capture screen recordings and to process them. Includes a soap-client for the webservice at captorials.com that enables you to share your recordings.

3.2.24 Light Speed!

Light Speed! (`http://lightspeed.sourceforge.net/`) is an OpenGL-based program which illustrates the effects of special relativity on the appearance of moving objects. When an object accelerates past a few million meters per second, these effects begin to grow noticeable, becoming more and more pronounced as the speed of light is approached. These relativistic effects are viewpoint-dependent, and include shifts in length, object hue, brightness and shape.

3.2.25 MySQL GUI Tools

MySQL GUI Tools (`http://dev.mysql.com/downloads/gui-tools/5.0.html`) is a collection of tools for the MySQL database. It consists of MySQL Administrator, MySQL Query Browser and MySQL Migration Toolkit.

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3.2.26 OctPlot

OctPlot (`http://octplot.sourceforge.net/`) is a graphics package for Octave, the free alternative to MATLAB. It provides high quality PostScript and on-screen graphics.

3.2.27 Open ActiveWrl

Open ActiveWrl (`http://open-activewrl.sourceforge.net/`) is a software development toolkit based on a generic software development approach that allows the implementation VRML/X3D browser componentes. These browser components can run within an conventional application or can be linked together for the implementation of parallel immersive VR setups.

3.2.28 OpenEaagles

OpenEaagles (`http://www.openeaagles.org/`) is a multi-platform simulation framework targeted to help simulation engineers and software developers build robust, scalable, virtual, constructive, stand-alone, and distributed simulation applications. It has been used extensively to build applications that demand real-time performance. This includes applications to conduct human factor studies, operator training, and the development of complete distributed virtual simulation systems. OpenEaagles has also been used to build stand-alone and distributed constructive applications oriented at system analysis.

3.2.29 OpenGC

OpenGC (`http://www.opengc.org/`) is a multi-platform, multi-simulator, open-source C++ tool for developing and implementing high quality glass cockpit displays for simulated flightdecks.

3.2.30 OpenSG

OpenSG (`http://www.opensg.org/`) is a portable scenegraph system to create realtime graphics programs, e.g. for virtual reality applications.

3.2.31 Panthera

Panthera (`http://sourceforge.net/projects/panthera`) is a C++ framework for interactive visualization, manipulation, and editing of volume data. Applications developed on top of Panthera can utilize both desktop and immersive user interface devices, such as position trackers and haptic displays.

3.2.32 Planet Penguin Racer

PlanetPenguin Racer (`http://developer.berlios.de/projects/ppracer/`) is a simple OpenGL racing game featuring Tux, the Linux mascot. The goal of the game is to slide down a snow- and ice-covered mountain as quickly as possible, avoiding the trees and rocks that will slow you down.

3.2.33 projectM

projectM (`http://projectm.sourceforge.net/`) is a music visualizer which uses OpenGL for hardware acceleration. It is compatible with Milkdrop presets.

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3.2.34 Puzzle Bobble 3D

Puzzle Bobble 3D (http://homepage.mac.com/eric.lee/puzzle/) is a 3D video game for Linux. The game is similar to Tetris/Connect 4: connect balls of the same colour to make them disappear. Puzzle Bobble 3D is based on an already popular arcade game of the same name by Taito Corporation (see links section at the bottom of this page), but this particular variant is played in a 3D environment (hence the name).

3.2.35 ROOT

ROOT (http://root.cern.ch/) is an object-oriented data analysis framework.

3.2.36 SCIRun

SCIRun (http://software.sci.utah.edu/scirun.html) is a Problem Solving Environment (PSE), for modeling, simulation and visualization of scientific problems. It is available for free and open source.

3.2.37 TINE

TINE, or TINE Is Not ELITE (http://tine.sunsite.dk/en/index.html) is an open source cross-platform remake of the classic space adventure game ELITE.

3.2.38 Tiny Planet

Tiny Planet (http://www.duberga.net/tinyplanet/) is a real-time OpenGL viewer of detailled earth texture such as BlueMarble from Earth Observatory (NASA) or any other planet texture. Vectorial data such as points of interest, boundaries, rivers can be superimposed to the texture.

3.2.39 Truevision

Truevision (http://truevision.sourceforge.net/) is a 3D modeler for GNOME.

3.2.40 Tulip

Tulip (http://tulip.labri.fr/) is a system dedicated to the visualization of huge graphs. It is capable of managing graphs with up to 500,000 nodes and edges on relatively modest hardware (eg. 600MHz Pentium III, 256MB RAM).

3.2.41 Ubit

Ubit (http://www.infres.enst.fr/~elc/ubit/) Ubit is a new GUI toolkit that combines the advantages of scene graph and widget based toolkits. The Ubit3D extension makes it possible to display 2D GUIs in a 3D space.

3.2.42 VRS

The Virtual Rendering System (http://www.hpi.uni-potsdam.de/vrs/) is a computer graphics software library for constructing interactive 3D applications. It provides a large collection of 3D rendering components which facilitate implementing 3D graphics applications and experimenting with 3D graphics and imaging algorithms.

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3.2.43 VTK

VTK, the Visualization Toolkit (`http://www.vtk.org/`), is an object oriented, high level library that allows one to easily write C++ programs, Tcl, Python and Java scripts that do 3D visualization.

3.2.44 XLock

XLock (`http://www.tux.org/~bagleyd/xlockmore.html`) is a screensaver and screen locking utility with additional OpenGL and XPM modes.

3.3 Projects that used to use %FTGL

3.3.1 GNU Backgammon

GNU Backgammon (`http://www.gnubg.org/`) was using FTGL until version 0.14.3+20060520-1.

3.3.2 OpenSceneGraph

OpenSceneGraph (`http://www.openscenegraph.org/projects/osg`) is an open source high performance 3D graphics toolkit, used by application developers in fields such as visual simulation, games, virtual reality, scientific visualization and modelling. Written entirely in Standard C++ and OpenGL it runs on all Windows platforms, OSX, GNU/Linux, IRIX, Solaris, HP-Ux, AIX and FreeBSD operating systems.

3.3.3 Teddy

Teddy (`http://teddy.sourceforge.net/`) was a 3D graphics library. The main purpose was to be a simple scene graph manager.

3.3.4 VigiPac

VigiPac (`http://vigipac.sourceforge.net/`) was a three-dimensional Pacman clone with multiplayer support, written in the C++ language.

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Chapter 4

FTGL tutorial

4.1 Starting to use %FTGL

Only one header is required to use FTGL:

```
#include <FTGL/ftgl.h>
```

4.2 Choosing a font type

FTGL supports 6 font output types among 3 groups: raster fonts, vector fonts, and texture fonts which are a mixture of both. Each font type has its advantages and disadvantages.

4.2.1 Raster fonts

Raster fonts are made of pixels painted directly on the viewport's framebuffer. They cannot be directly rotated or scaled.

- Bitmap fonts use 1-bit (2-colour) rasterised glyphs.
- Pixmap fonts use 8-bit (256 levels) rasterised glyphs.

4.2.2 Vector fonts

Vector fonts are 3D objects that are rendered at the current matrix location. All position, scale, texture and material effects apply to vector fonts.

- Polygon fonts use planar triangle meshes and can be texture-mapped.
- Outline fonts use OpenGL lines.
- Extruded fonts are extruded polygon fonts, with the front, back and side meshes renderable separately to apply different effects and materials.

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4.2.3 Textured fonts

Textured fonts are probably the most versatile types. They are fast, antialiased, and can be transformed just like any OpenGL primitive.

- Texture fonts use one texture per glyph. They are fast because glyphs are stored permanently in the video card's memory.
- Buffer fonts use one texture per line of text. They tend to be faster than texture fonts when the same line of text needs to be rendered for more than one frame.

4.3 Create font objects

Creating a font and displaying some text is really straightforward, be it in C or in C++.

4.3.1 in C

```
/* Create a pixmap font from a TrueType file. */
FTGLfont *font = ftglCreatePixmapFont("/home/user/Arial.ttf");

/* If something went wrong, bail out. */
if(!font)
    return -1;

/* Set the font size and render a small text. */
ftglSetFontFaceSize(font, 72, 72);
ftglRenderFont(font, "Hello World!", FTGL_RENDER_ALL);

/* Destroy the font object. */
ftglDestroyFont(font);
```

4.3.2 in C++

```
// Create a pixmap font from a TrueType file.
FTGLPixmapFont font("/home/user/Arial.ttf");

// If something went wrong, bail out.
if(font.Error())
```

```
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    return -1;

// Set the font size and render a small text.
font.FaceSize(72);
font.Render("Hello World!");
```
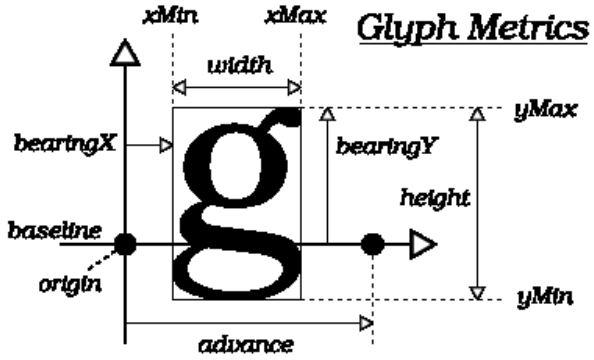

The first 128 glyphs of the font (generally corresponding to the ASCII set) are preloaded. This means that usual text is rendered fast enough, but no memory is wasted loading glyphs that will not be used.

4.4 More font commands

4.4.1 Font metrics



If you ask a font to render at 0.0, 0.0 the bottom left most pixel or polygon may not be aligned to 0.0, 0.0. With **FTFont::Ascender()** (p. 41), **FTFont::Descender()** (p. 44) and **FTFont::Advance()** (p. 40) an approximate bounding box can be calculated.

For an exact bounding box, use the **FTFont::BBox()** (p. 41) function. This function returns the extent of the volume containing 'string'. 0.0 on the y axis will be aligned with the font baseline.

4.4.2 Specifying a character map encoding

From the FreeType documentation:

"By default, when a new face object is created, (FreeType) lists all the charmaps contained in the font face and selects the one that supports Unicode character codes if it finds one. Otherwise, it tries to find support for Latin-1, then ASCII."

It then gives up. In this case FTGL will set the charmap to the first it finds in the fonts charmap list. You can expilcitly set the char encoding with **FTFont::CharMap()** (p. 43).

Valid encodings as of FreeType 2.0.4 are:

- ft_encoding_none
- ft_encoding_unicode
- ft_encoding_symbol
- ft_encoding_latin_1
- ft_encoding_latin_2
- ft_encoding_sjis
- ft_encoding_gb2312

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- ft_encoding_big5
- ft_encoding_wansung
- ft_encoding_johab
- ft_encoding_adobe_standard
- ft_encoding_adobe_expert
- ft_encoding_adobe_custom
- ft_encoding_apple_roman

For instance:

```
font.CharMap(ft_encoding_apple_roman);
```

This will return an error if the requested encoding can't be found in the font.

If your application uses Latin-1 characters, you can preload this character set using the following code:

```
// Create a pixmap font from a TrueType file.
FTGLPixmapFont font("/home/user/Arial.ttf");

// If something went wrong, bail out.
if(font.Error())
    return -1;

// Set the face size and the character map. If something went wrong, bail out.
font.FaceSize(72);
if(!font.CharMap(ft_encoding_latin_1))
    return -1;

// Create a string containing all characters between 128 and 255
// and preload the Latin-1 chars without rendering them.
char buf[129];
for(int i = 128; i < 256; i++)
{
    buf[i] = (char)(unsigned char)i;
}
buf[128] = '\0';

font.Advance(buf);
}
```

4.5 Sample font manager class

```
FTTextureFont* myFont = FTGLFontManager::Instance().GetFont("arial.ttf", 72);

#include <map>
#include <string>
#include <FTGL/ftgl.h>

using namespace std;

typedef map<string, FTFont*> FontList;
typedef FontList::const_iterator FontIter;

class FTGLFontManager
{
    public:
        // NOTE
        // This is shown here for brevity. The implementation should be in the
       source
        // file otherwise your compiler may inline the function resulting in
        // multiple instances of FTGLFontManager
        static FTGLFontManager& Instance()
        {
            static FTGLFontManager tm;
            return tm;
        }
```

```
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        ~FTGLFontManager()
        {
            FontIter font;
            for(font = fonts.begin(); font != fonts.end(); font++)
            {
                delete (*font).second;
            }

            fonts.clear();
        }


        FTFont* GetFont(const char *filename, int size)
        {
            char buf[256];
            sprintf(buf, "%s%i", filename, size);
            string fontKey = string(buf);

            FontIter result = fonts.find(fontKey);
            if(result != fonts.end())
            {
                LOGMSG("Found font %s in list", filename);
                return result->second;
            }

            FTFont* font = new FTTextureFont;

            string fullname = path + string(filename);

            if(!font->Open(fullname.c_str()))
            {
                LOGERROR("Font %s failed to open", fullname.c_str());
                delete font;
                return NULL;
            }

            if(!font->FaceSize(size))
            {
                LOGERROR("Font %s failed to set size %i", filename, size);
                delete font;
                return NULL;
            }

            fonts[fontKey] = font;

            return font;
        }


    private:
        // Hide these 'cause this is a singleton.
        FTGLFontManager(){}
        FTGLFontManager(const FTGLFontManager&){};
        FTGLFontManager& operator = (const FTGLFontManager&){ return *this; };

        // container for fonts
        FontList fonts;
};
```

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Chapter 5

Namespace Documentation

5.1 FTGL Namespace Reference

Enumerations

- enum **RenderMode** { **RENDER_FRONT** = 0x0001, **RENDER_BACK** = 0x0002, **RENDER_SIDE** = 0x0004, **RENDER_ALL** = 0xffff }
- enum **TextAlignment** { **ALIGN_LEFT** = 0, **ALIGN_CENTER** = 1, **ALIGN_RIGHT** = 2, **ALIGN_JUSTIFY** = 3 }

5.1.1 Enumeration Type Documentation

5.1.1.1 enum FTGL::RenderMode

pt3em**Enumerator:**

RENDER_FRONT

RENDER_BACK

RENDER_SIDE

RENDER_ALL

Definition at line 53 of file ftgl.h.

5.1.1.2 enum FTGL::TextAlignment

pt3em**Enumerator:**

ALIGN_LEFT

ALIGN_CENTER

ALIGN_RIGHT

ALIGN_JUSTIFY

Definition at line 61 of file ftgl.h.

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Chapter 6

Data Structure Documentation

6.1 FTBBox Class Reference

FTBBox (p. 23) is a convenience class for handling bounding boxes.

`#include <FTBBox.h>`

Public Member Functions

- **FTBBox** ()

  Default constructor.
- **FTBBox** (float lx, float ly, float lz, float ux, float uy, float uz)

  Constructor.
- **FTBBox** (**FTPoint** l, **FTPoint** u)

  Constructor.
- **FTBBox** (FT_GlyphSlot glyph)

  Constructor.
- ~**FTBBox** ()

  Destructor.
- void **Invalidate** ()

  Mark the bounds invalid by setting all lower dimensions greater than the upper dimensions.
- bool **IsValid** ()

  Determines if this bounding box is valid.
- **FTBBox** & **operator+=** (const **FTPoint** vector)

  Move the Bounding Box by a vector.
- **FTBBox** & **operator|=** (const **FTBBox** &bbox)

  Combine two bounding boxes.
- void **SetDepth** (float depth)
- **FTPoint** const **Upper** () const
- **FTPoint** const **Lower** () const

6.1.1 Detailed Description

FTBBox (p. 23) is a convenience class for handling bounding boxes.

Definition at line 42 of file FTBBox.h.

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6.1.2 Constructor & Destructor Documentation

6.1.2.1 FTBBox::FTBBox ( ) [inline]

Default constructor.

Bounding box is set to zero.

Definition at line 48 of file FTBBox.h.

6.1.2.2 FTBBox::FTBBox (float *lx,* float *ly,* float *lz,* float *ux,* float *uy,* float *uz*) [inline]

Constructor.

Definition at line 56 of file FTBBox.h.

6.1.2.3 FTBBox::FTBBox (FTPoint *l,* FTPoint *u*) [inline]

Constructor.

Definition at line 64 of file FTBBox.h.

6.1.2.4 FTBBox::FTBBox (FT_GlyphSlot *glyph*) [inline]

Constructor.

Extracts a bounding box from a freetype glyph. Uses the control box for the glyph. FT_Glyph_Get_CBox()

pt3emParameters

pt3em pt3em*glyph*	pt3emA freetype glyph

Definition at line 75 of file FTBBox.h.

6.1.2.5 FTBBox::~FTBBox ( ) [inline]

Destructor.

Definition at line 93 of file FTBBox.h.

6.1.3 Member Function Documentation

6.1.3.1 void FTBBox::Invalidate ( ) [inline]

Mark the bounds invalid by setting all lower dimensions greater than the upper dimensions.

Definition at line 100 of file FTBBox.h.

6.1.3.2 bool FTBBox::IsValid ( ) [inline]

Determines if this bounding box is valid.

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pt3em**Returns**

True if all lower values are <= the corresponding upper values.

Definition at line 112 of file FTBBox.h.

6.1.3.3 FTPoint const FTBBox::Lower ( ) const [inline]

Definition at line 165 of file FTBBox.h.

Referenced by FTFont::BBox().

6.1.3.4 FTBBox& FTBBox::operator+= (const FTPoint *vector*) [inline]

Move the Bounding Box by a vector.

pt3em**Parameters**

pt3empt3em*vector*	pt3emThe vector to move the bbox in 3D space.

Definition at line 124 of file FTBBox.h.

6.1.3.5 FTBBox& FTBBox::operator|= (const FTBBox & *bbox*) [inline]

Combine two bounding boxes.

The result is the smallest bounding box containing the two original boxes.

pt3em**Parameters**

pt3em pt3em*bbox*	pt3emThe bounding box to merge with the second one.

Definition at line 138 of file FTBBox.h.

References FTPoint::X(), FTPoint::Y(), and FTPoint::Z().

6.1.3.6 void FTBBox::SetDepth (float *depth*) [inline]

Definition at line 150 of file FTBBox.h.

6.1.3.7 FTPoint const FTBBox::Upper ( ) const [inline]

Definition at line 159 of file FTBBox.h.

Referenced by FTFont::BBox().

The documentation for this class was generated from the following file:

- **FTBBox.h**

pt3em

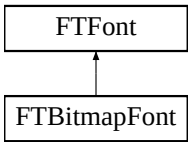
6.2 FTBitmapFont Class Reference

FTBitmapFont (p. 26) is a specialisation of the **FTFont** (p. 37) class for handling Bitmap fonts.

`#include <FTGLBitmapFont.h>`

Inheritance diagram for FTBitmapFont:

pt3em



Public Member Functions

- **FTBitmapFont** (const char ∗fontFilePath)

  Open and read a font file.
- **FTBitmapFont** (const unsigned char ∗pBufferBytes, size_t bufferSizeInBytes)

  Open and read a font from a buffer in memory.
- ∼**FTBitmapFont** ()

  Destructor.

Protected Member Functions

- virtual **FTGlyph** ∗ **MakeGlyph** (FT_GlyphSlot slot)

  Construct a glyph of the correct type.

6.2.1 Detailed Description

FTBitmapFont (p. 26) is a specialisation of the **FTFont** (p. 37) class for handling Bitmap fonts.

pt3emSee also

FTFont (p. 37)

Definition at line 45 of file FTGLBitmapFont.h.

6.2.2 Constructor & Destructor Documentation

6.2.2.1 FTBitmapFont::FTBitmapFont (const char ∗ *fontFilePath*)

Open and read a font file.
Sets Error flag.

`@param fontFilePath  font file path.`

pt3em

6.2.2.2 FTBitmapFont::FTBitmapFont (const unsigned char * *pBufferBytes*, size_t *bufferSizeInBytes*)

Open and read a font from a buffer in memory.

Sets Error flag. The buffer is owned by the client and is NOT copied by **FTGL** (p. 21). The pointer must be valid while using **FTGL** (p. 21).

pt3em**Parameters**

pt3em pt3em *pBufferBytes*	pt3emthe in-memory buffer
pt3em*bufferSize-InBytes*	pt3emthe length of the buffer in bytes

6.2.2.3 FTBitmapFont::~FTBitmapFont ( )

Destructor.

6.2.3 Member Function Documentation

6.2.3.1 virtual FTGlyph* FTBitmapFont::MakeGlyph (FT_GlyphSlot *slot*) [protected], [virtual]

Construct a glyph of the correct type.

Clients must override the function and return their specialised **FTGlyph** (p. 47).

pt3em**Parameters**

pt3em pt3em*slot*	pt3emA FreeType glyph slot.

pt3em**Returns**

An FT****Glyph or `null` on failure.

Implements **FTFont** (p. 45).

The documentation for this class was generated from the following file:

- **FTGLBitmapFont.h**

6.3 FTBitmapGlyph Class Reference

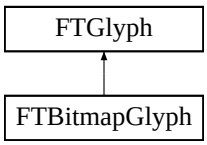
FTBitmapGlyph (p. 27) is a specialisation of **FTGlyph** (p. 47) for creating bitmaps.

`#include <FTBitmapGlyph.h>`

Inheritance diagram for FTBitmapGlyph:

pt3em

pt3em



Public Member Functions

- **FTBitmapGlyph** (FT_GlyphSlot glyph)

  Constructor.
- virtual ∼**FTBitmapGlyph** ()

  Destructor.
- virtual const **FTPoint** & **Render** (const **FTPoint** &pen, int renderMode)

  Render this glyph at the current pen position.

Additional Inherited Members

6.3.1 Detailed Description

FTBitmapGlyph (p. 27) is a specialisation of **FTGlyph** (p. 47) for creating bitmaps.

Definition at line 42 of file FTBitmapGlyph.h.

6.3.2 Constructor & Destructor Documentation

6.3.2.1 FTBitmapGlyph::FTBitmapGlyph (FT_GlyphSlot *glyph*)

Constructor.

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emThe Freetype glyph to be processed

6.3.2.2 virtual FTBitmapGlyph::∼FTBitmapGlyph ( ) [virtual]

Destructor.

6.3.3 Member Function Documentation

6.3.3.1 virtual const FTPoint& FTBitmapGlyph::Render (const FTPoint & *pen,* int *renderMode*) [virtual]

Render this glyph at the current pen position.

pt3em**Parameters**

pt3em pt3em*pen*	pt3emThe current pen position.
pt3em *renderMode*	pt3emRender mode to display

pt3em

pt3em**Returns**

The advance distance for this glyph.

Implements **FTGlyph** (p. 49).

The documentation for this class was generated from the following file:

- **FTBitmapGlyph.h**

6.4 FTBuffer Class Reference

FTBuffer (p. 29) is a helper class for pixel buffers.

`#include <FTBuffer.h>`

Public Member Functions

- **FTBuffer** ()
  Default constructor.
- ∼**FTBuffer** ()
  Destructor.
- **FTPoint Pos** () const
  Get the pen's position in the buffer.
- void **Pos** (**FTPoint** arg)
  Set the pen's position in the buffer.
- void **Size** (int w, int h)
  Set the buffer's size.
- int **Width** () const
  Get the buffer's width.
- int **Height** () const
  Get the buffer's height.
- unsigned char ∗ **Pixels** () const
  Get the buffer's direct pixel buffer.

6.4.1 Detailed Description

FTBuffer (p. 29) is a helper class for pixel buffers.

It provides the interface between **FTBufferFont** (p. 31) and **FTBufferGlyph** (p. 33) to optimise rendering operations.

pt3em**See also**

FTBufferGlyph (p. 33)
FTBufferFont (p. 31)

Definition at line 45 of file FTBuffer.h.

6.4.2 Constructor & Destructor Documentation

6.4.2.1 FTBuffer::FTBuffer ( )

Default constructor.

pt3em

6.4.2.2 FTBuffer::∼FTBuffer ( )

Destructor.

6.4.3 Member Function Documentation

6.4.3.1 int FTBuffer::Height ( ) const [inline]

Get the buffer's height.

pt3emReturns

The buffer's height, in pixels.

Definition at line 98 of file FTBuffer.h.

6.4.3.2 unsigned char∗ FTBuffer::Pixels ( ) const [inline]

Get the buffer's direct pixel buffer.

pt3emReturns

A read-write pointer to the buffer's pixels.

Definition at line 105 of file FTBuffer.h.

6.4.3.3 FTPoint FTBuffer::Pos ( ) const [inline]

Get the pen's position in the buffer.

pt3emReturns

The pen's position as an **FTPoint** (p. 59) object.

Definition at line 63 of file FTBuffer.h.

6.4.3.4 void FTBuffer::Pos (FTPoint *arg*) [inline]

Set the pen's position in the buffer.

pt3emParameters

pt3em	pt3em*arg*	pt3emAn **FTPoint** (p. 59) object with the desired pen's position.

Definition at line 73 of file FTBuffer.h.

6.4.3.5 void FTBuffer::Size (int *w,* int *h*)

Set the buffer's size.

pt3em

pt3em**Parameters**

pt3em	pt3em*w*	pt3emThe buffer's desired width, in pixels.
	pt3em*h*	pt3emThe buffer's desired height, in pixels.

6.4.3.6 int FTBuffer::Width ( ) const [inline]

Get the buffer's width.

pt3em**Returns**

The buffer's width, in pixels.

Definition at line 91 of file FTBuffer.h.

The documentation for this class was generated from the following file:

- **FTBuffer.h**

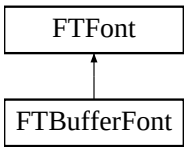
6.5 FTBufferFont Class Reference

FTBufferFont (p. 31) is a specialisation of the **FTFont** (p. 37) class for handling memory buffer fonts.

`#include <FTBufferFont.h>`

Inheritance diagram for FTBufferFont:

pt3em



Public Member Functions

- **FTBufferFont** (const char ∗fontFilePath)

  Open and read a font file.
- **FTBufferFont** (const unsigned char ∗pBufferBytes, size_t bufferSizeInBytes)

  Open and read a font from a buffer in memory.
- ∼**FTBufferFont** ()

  Destructor.

Protected Member Functions

- virtual **FTGlyph** ∗ **MakeGlyph** (FT_GlyphSlot slot)

  Construct a glyph of the correct type.

pt3em

6.5.1 Detailed Description

FTBufferFont (p. 31) is a specialisation of the **FTFont** (p. 37) class for handling memory buffer fonts.

pt3em**See also**

FTFont (p. 37)

Definition at line 43 of file FTBufferFont.h.

6.5.2 Constructor & Destructor Documentation

6.5.2.1 FTBufferFont::FTBufferFont (const char * *fontFilePath*)

Open and read a font file.
Sets Error flag.

```
@param fontFilePath  font file path.
```

6.5.2.2 FTBufferFont::FTBufferFont (const unsigned char * *pBufferBytes,* size_t *bufferSizeInBytes*)

Open and read a font from a buffer in memory.

Sets Error flag. The buffer is owned by the client and is NOT copied by **FTGL** (p. 21). The pointer must be valid while using **FTGL** (p. 21).

pt3em**Parameters**

pt3em pt3em *pBufferBytes*	pt3emthe in-memory buffer
pt3em*bufferSize-InBytes*	pt3emthe length of the buffer in bytes

6.5.2.3 FTBufferFont::~FTBufferFont ( )

Destructor.

6.5.3 Member Function Documentation

6.5.3.1 virtual FTGlyph* FTBufferFont::MakeGlyph (FT_GlyphSlot *slot*) [protected], [virtual]

Construct a glyph of the correct type.

Clients must override the function and return their specialised **FTGlyph** (p. 47).

pt3em**Parameters**

pt3em pt3em*slot*	pt3emA FreeType glyph slot.

pt3em

pt3em**Returns**

An FT****Glyph or `null` on failure.

Implements **FTFont** (p. 45).

The documentation for this class was generated from the following file:

- **FTBufferFont.h**

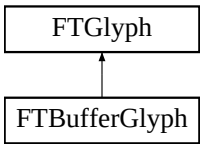
6.6 FTBufferGlyph Class Reference

FTBufferGlyph (p. 33) is a specialisation of **FTGlyph** (p. 47) for memory buffer rendering.

`#include <FTBufferGlyph.h>`

Inheritance diagram for FTBufferGlyph:

pt3em



Public Member Functions

- **FTBufferGlyph** (FT_GlyphSlot glyph, **FTBuffer** *buffer)
  Constructor.
- virtual ~**FTBufferGlyph** ()
  Destructor.
- virtual const **FTPoint** & **Render** (const **FTPoint** &pen, int renderMode)
  Render this glyph at the current pen position.

Additional Inherited Members

6.6.1 Detailed Description

FTBufferGlyph (p. 33) is a specialisation of **FTGlyph** (p. 47) for memory buffer rendering.

Definition at line 40 of file FTBufferGlyph.h.

6.6.2 Constructor & Destructor Documentation

6.6.2.1 FTBufferGlyph::FTBufferGlyph (FT_GlyphSlot *glyph*, FTBuffer * *buffer*)

Constructor.

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emThe Freetype glyph to be processed
pt3em*buffer*	pt3emAn **FTBuffer** (p. 29) object in which to render the glyph.

pt3em

6.6.2.2 virtual FTBufferGlyph::∼FTBufferGlyph ( ) [virtual]

Destructor.

6.6.3 Member Function Documentation

6.6.3.1 virtual const FTPoint& FTBufferGlyph::Render (const FTPoint & *pen,* int *renderMode*) [virtual]

Render this glyph at the current pen position.

pt3em**Parameters**

pt3em pt3em*pen*	pt3emThe current pen position.
pt3em *renderMode*	pt3emRender mode to display

pt3em**Returns**

The advance distance for this glyph.

Implements **FTGlyph** (p. 49).

The documentation for this class was generated from the following file:

- **FTBufferGlyph.h**

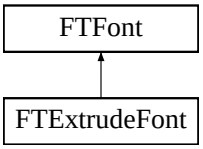
6.7 FTExtrudeFont Class Reference

FTExtrudeFont (p. 34) is a specialisation of the **FTFont** (p. 37) class for handling extruded Polygon fonts.

`#include <FTGLExtrdFont.h>`

Inheritance diagram for FTExtrudeFont:

pt3em



Public Member Functions

- **FTExtrudeFont** (const char ∗fontFilePath)

  Open and read a font file.
- **FTExtrudeFont** (const unsigned char ∗pBufferBytes, size_t bufferSizeInBytes)

  Open and read a font from a buffer in memory.
- ∼**FTExtrudeFont** ()

  Destructor.

pt3em

Protected Member Functions

- virtual **FTGlyph** ∗ **MakeGlyph** (FT_GlyphSlot slot)

  Construct a glyph of the correct type.

6.7.1 Detailed Description

FTExtrudeFont (p. 34) is a specialisation of the **FTFont** (p. 37) class for handling extruded Polygon fonts.

pt3em**See also**

FTFont (p. 37)
FTPolygonFont (p. 65)

Definition at line 46 of file FTGLExtrdFont.h.

6.7.2 Constructor & Destructor Documentation

6.7.2.1 FTExtrudeFont::FTExtrudeFont (const char ∗ *fontFilePath*)

Open and read a font file.

Sets Error flag.

```
@param fontFilePath  font file path.
```

6.7.2.2 FTExtrudeFont::FTExtrudeFont (const unsigned char ∗ *pBufferBytes,* size_t *bufferSizeInBytes*)

Open and read a font from a buffer in memory.

Sets Error flag. The buffer is owned by the client and is NOT copied by **FTGL** (p. 21). The pointer must be valid while using **FTGL** (p. 21).

pt3em**Parameters**

pt3em pt3em *pBufferBytes*	pt3emthe in-memory buffer
pt3em*bufferSize-InBytes*	pt3emthe length of the buffer in bytes

6.7.2.3 FTExtrudeFont::∼FTExtrudeFont ( )

Destructor.

6.7.3 Member Function Documentation

6.7.3.1 virtual FTGlyph∗ FTExtrudeFont::MakeGlyph (FT_GlyphSlot *slot*) [protected], [virtual]

Construct a glyph of the correct type.

Clients must override the function and return their specialised **FTGlyph** (p. 47).

pt3em

pt3em**Parameters**

pt3em	pt3em*slot*	pt3emA FreeType glyph slot.

pt3em**Returns**

An FT****Glyph or `null` on failure.

Implements **FTFont** (p. 45).

The documentation for this class was generated from the following file:

- **FTGLExtrdFont.h**

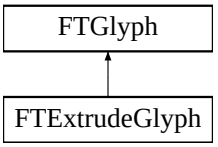
6.8 FTExtrudeGlyph Class Reference

FTExtrudeGlyph (p. 36) is a specialisation of **FTGlyph** (p. 47) for creating tessellated extruded polygon glyphs.

`#include <FTExtrdGlyph.h>`

Inheritance diagram for FTExtrudeGlyph:

pt3em



Public Member Functions

- **FTExtrudeGlyph** (FT_GlyphSlot glyph, float depth, float frontOutset, float backOutset, bool useDisplayList)
  Constructor.
- virtual ∼**FTExtrudeGlyph** ()
  Destructor.
- virtual const **FTPoint** & **Render** (const **FTPoint** &pen, int renderMode)
  Render this glyph at the current pen position.

Additional Inherited Members

6.8.1 Detailed Description

FTExtrudeGlyph (p. 36) is a specialisation of **FTGlyph** (p. 47) for creating tessellated extruded polygon glyphs.

Definition at line 43 of file FTExtrdGlyph.h.

6.8.2 Constructor & Destructor Documentation

6.8.2.1 FTExtrudeGlyph::FTExtrudeGlyph (FT_GlyphSlot *glyph,* float *depth,* float *frontOutset,* float *backOutset,* bool *useDisplayList*)

Constructor.

Sets the Error to Invalid_Outline if the glyph isn't an outline.

pt3em

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emThe Freetype glyph to be processed
pt3em*depth*	pt3emThe distance along the z axis to extrude the glyph
pt3em *frontOutset*	pt3emoutset contour size
pt3em *backOutset*	pt3emoutset contour size
pt3em *useDisplayList*	pt3emEnable or disable the use of Display Lists for this glyph `true` turns ON display lists. `false` turns OFF display lists.

6.8.2.2 virtual FTExtrudeGlyph::~FTExtrudeGlyph ( ) [virtual]

Destructor.

6.8.3 Member Function Documentation

6.8.3.1 virtual const FTPoint& FTExtrudeGlyph::Render (const FTPoint & *pen*, int *renderMode*) [virtual]

Render this glyph at the current pen position.

pt3em**Parameters**

pt3em pt3em*pen*	pt3emThe current pen position.
pt3em *renderMode*	pt3emRender mode to display

pt3em**Returns**

The advance distance for this glyph.

Implements **FTGlyph** (p. 49).

The documentation for this class was generated from the following file:

- **FTExtrdGlyph.h**

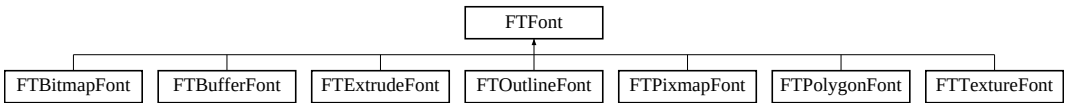
6.9 FTFont Class Reference

FTFont (p. 37) is the public interface for the **FTGL** (p. 21) library.

`#include <FTFont.h>`

Inheritance diagram for FTFont:

pt3em



pt3em

Public Member Functions

- virtual ~**FTFont** ()
- virtual bool **Attach** (const char *fontFilePath)

  Attach auxilliary file to font e.g font metrics.
- virtual bool **Attach** (const unsigned char *pBufferBytes, size_t bufferSizeInBytes)

  Attach auxilliary data to font e.g font metrics, from memory.
- virtual void **GlyphLoadFlags** (FT_Int flags)

  Set the glyph loading flags.
- virtual bool **CharMap** (FT_Encoding encoding)

  Set the character map for the face.
- virtual unsigned int **CharMapCount** () const

  Get the number of character maps in this face.
- virtual FT_Encoding * **CharMapList** ()

  Get a list of character maps in this face.
- virtual bool **FaceSize** (const unsigned int size, const unsigned int res=72)

  Set the char size for the current face.
- virtual unsigned int **FaceSize** () const

  Get the current face size in points (1/72 inch).
- virtual void **Depth** (float depth)

  Set the extrusion distance for the font.
- virtual void **Outset** (float outset)

  Set the outset distance for the font.
- virtual void **Outset** (float front, float back)

  Set the front and back outset distances for the font.
- virtual void **UseDisplayList** (bool useList)

  *Enable or disable the use of Display Lists inside **FTGL** (p. 21).*
- virtual float **Ascender** () const

  Get the global ascender height for the face.
- virtual float **Descender** () const

  Gets the global descender height for the face.
- virtual float **LineHeight** () const

  Gets the line spacing for the font.
- virtual **FTBBox BBox** (const char *string, const int len=-1, **FTPoint** position=**FTPoint**(), **FTPoint** spacing=**FTPoint**())

  Get the bounding box for a string.
- void **BBox** (const char *string, float &llx, float &lly, float &llz, float &urx, float &ury, float &urz)

  Get the bounding box for a string (deprecated).
- virtual **FTBBox BBox** (const wchar_t *string, const int len=-1, **FTPoint** position=**FTPoint**(), **FTPoint** spacing=**FTPoint**())

  Get the bounding box for a string.
- void **BBox** (const wchar_t *string, float &llx, float &lly, float &llz, float &urx, float &ury, float &urz)

  Get the bounding box for a string (deprecated).
- virtual float **Advance** (const char *string, const int len=-1, **FTPoint** spacing=**FTPoint**())

  Get the advance for a string.
- virtual float **Advance** (const wchar_t *string, const int len=-1, **FTPoint** spacing=**FTPoint**())

  Get the advance for a string.
- virtual **FTPoint Render** (const char *string, const int len=-1, **FTPoint** position=**FTPoint**(), **FTPoint** spacing=**FTPoint**(), int renderMode=**FTGL::RENDER_ALL**)

pt3em

Render a string of characters.

- virtual **FTPoint Render** (const wchar_t *string, const int len=-1, **FTPoint** position=**FTPoint**(), **FTPoint** spacing=**FTPoint**(), int renderMode=**FTGL::RENDER_ALL**)

  Render a string of characters.
- virtual FT_Error **Error** () const

  Queries the Font for errors.

Protected Member Functions

- **FTFont** (char const *fontFilePath)

  Open and read a font file.
- **FTFont** (const unsigned char *pBufferBytes, size_t bufferSizeInBytes)

  Open and read a font from a buffer in memory.
- virtual **FTGlyph** * **MakeGlyph** (FT_GlyphSlot slot)=0

  Construct a glyph of the correct type.

Friends

- class **FTBitmapFont**
- class **FTBufferFont**
- class **FTExtrudeFont**
- class **FTOutlineFont**
- class **FTPixmapFont**
- class **FTPolygonFont**
- class **FTTextureFont**
- class **FTFontImpl**

6.9.1 Detailed Description

FTFont (p. 37) is the public interface for the **FTGL** (p. 21) library.

Specific font classes are derived from this class. It uses the helper classes FTFace and FTSize to access the Freetype library. This class is abstract and deriving classes must implement the protected `MakeGlyph` function to create glyphs of the appropriate type.

It is good practice after using these functions to test the error code returned. `FT_Error` **`Error()`** (p. 44). Check the freetype file fterrdef.h for error definitions.

pt3em**See also**

FTFace
FTSize

Definition at line 56 of file FTFont.h.

6.9.2 Constructor & Destructor Documentation

6.9.2.1 FTFont::FTFont (char const * *fontFilePath*) [protected]

Open and read a font file.

Sets Error flag.

```
@param fontFilePath  font file path.
```

pt3em

6.9.2.2 FTFont::FTFont (const unsigned char * *pBufferBytes*, size_t *bufferSizeInBytes*) [protected]

Open and read a font from a buffer in memory.

Sets Error flag. The buffer is owned by the client and is NOT copied by **FTGL** (p. 21). The pointer must be valid while using **FTGL** (p. 21).

pt3em**Parameters**

pt3em pt3em *pBufferBytes*	pt3emthe in-memory buffer
pt3em*bufferSize-InBytes*	pt3emthe length of the buffer in bytes

6.9.2.3 virtual FTFont::~FTFont ( ) [virtual]

6.9.3 Member Function Documentation

6.9.3.1 virtual float FTFont::Advance (const char * *string*, const int *len* = -1, FTPoint *spacing* = FTPoint()) [virtual]

Get the advance for a string.

pt3em**Parameters**

pt3em pt3em*string*	pt3em'C' style string to be checked.
pt3em*len*	pt3emThe length of the string. If < 0 then all characters will be checked until a null character is encountered (optional).
pt3em*spacing*	pt3emA displacement vector to add after each character has been checked (optional).

pt3em**Returns**

The string's advance width.

6.9.3.2 virtual float FTFont::Advance (const wchar_t * *string*, const int *len* = -1, FTPoint *spacing* = FTPoint()) [virtual]

Get the advance for a string.

pt3em**Parameters**

pt3em pt3em*string*	pt3emA wchar_t string
pt3em*len*	pt3emThe length of the string. If < 0 then all characters will be checked until a null character is encountered (optional).
pt3em*spacing*	pt3emA displacement vector to add after each character has been checked (optional).

pt3em**Returns**

The string's advance width.

pt3em

6.9.3.3 virtual float FTFont::Ascender ( ) const [virtual]

Get the global ascender height for the face.

pt3em**Returns**

Ascender height

6.9.3.4 virtual bool FTFont::Attach (const char * *fontFilePath*) [virtual]

Attach auxilliary file to font e.g font metrics.

Note: not all font formats implement this function.

pt3em**Parameters**

pt3em pt3em *fontFilePath*	pt3emauxilliary font file path.

pt3em**Returns**

`true` if file has been attached successfully.

6.9.3.5 virtual bool FTFont::Attach (const unsigned char * *pBufferBytes*, size_t *bufferSizeInBytes*) [virtual]

Attach auxilliary data to font e.g font metrics, from memory.

Note: not all font formats implement this function.

pt3em**Parameters**

pt3em pt3em *pBufferBytes*	pt3emthe in-memory buffer.
pt3em*bufferSize-InBytes*	pt3emthe length of the buffer in bytes.

pt3em**Returns**

`true` if file has been attached successfully.

6.9.3.6 virtual FTBBox FTFont::BBox (const char * *string*, const int *len* = `-1`, FTPoint *position* = FTPoint `()`, FTPoint *spacing* = FTPoint `()`) [virtual]

Get the bounding box for a string.

pt3em**Parameters**

pt3em pt3em*string*	pt3emA char buffer.
pt3em*len*	pt3emThe length of the string. If < 0 then all characters will be checked until a null character is encountered (optional).
pt3em*position*	pt3emThe pen position of the first character (optional).
pt3em*spacing*	pt3emA displacement vector to add after each character has been checked (optional).

pt3em

pt3em**Returns**

The corresponding bounding box.

Referenced by BBox().

6.9.3.7 void FTFont::BBox (const char * *string*, float & *llx*, float & *lly*, float & *llz*, float & *urx*, float & *ury*, float & *urz*) [inline]

Get the bounding box for a string (deprecated).

pt3em**Parameters**

pt3em pt3em*string*	pt3emA char buffer.
pt3em*llx*	pt3emLower left near x coordinate.
pt3em*lly*	pt3emLower left near y coordinate.
pt3em*llz*	pt3emLower left near z coordinate.
pt3em*urx*	pt3emUpper right far x coordinate.
pt3em*ury*	pt3emUpper right far y coordinate.
pt3em*urz*	pt3emUpper right far z coordinate.

Definition at line 251 of file FTFont.h.

References BBox(), FTBBox::Lower(), FTBBox::Upper(), FTPoint::Xf(), FTPoint::Yf(), and FTPoint::Zf().

6.9.3.8 virtual FTBBox FTFont::BBox (const wchar_t * *string*, const int *len* = -1, FTPoint *position* = FTPoint (), FTPoint *spacing* = FTPoint ()) [virtual]

Get the bounding box for a string.

pt3em**Parameters**

pt3em pt3em*string*	pt3emA wchar_t buffer.
pt3em*len*	pt3emThe length of the string. If < 0 then all characters will be checked until a null character is encountered (optional).
pt3em*position*	pt3emThe pen position of the first character (optional).
pt3em*spacing*	pt3emA displacement vector to add after each character has been checked (optional).

pt3em**Returns**

The corresponding bounding box.

6.9.3.9 void FTFont::BBox (const wchar_t * *string*, float & *llx*, float & *lly*, float & *llz*, float & *urx*, float & *ury*, float & *urz*) [inline]

Get the bounding box for a string (deprecated).

pt3em**Parameters**

pt3em pt3em*string*	pt3emA wchar_t buffer.
pt3em*llx*	pt3emLower left near x coordinate.

pt3em

pt3em*lly*	pt3emLower left near y coordinate.
pt3em*llz*	pt3emLower left near z coordinate.
pt3em*urx*	pt3emUpper right far x coordinate.
pt3em*ury*	pt3emUpper right far y coordinate.
pt3em*urz*	pt3emUpper right far z coordinate.

Definition at line 286 of file FTFont.h.

References BBox(), FTBBox::Lower(), FTBBox::Upper(), FTPoint::Xf(), FTPoint::Yf(), and FTPoint::Zf().

6.9.3.10 virtual bool FTFont::CharMap (FT_Encoding *encoding*) [virtual]

Set the character map for the face.

pt3em**Parameters**

pt3em*encoding*	pt3emFreetype enumerate for char map code.

pt3em**Returns**

`true` if charmap was valid and set correctly.

6.9.3.11 virtual unsigned int FTFont::CharMapCount ( ) const [virtual]

Get the number of character maps in this face.

pt3em**Returns**

character map count.

6.9.3.12 virtual FT_Encoding* FTFont::CharMapList ( ) [virtual]

Get a list of character maps in this face.

pt3em**Returns**

pointer to the first encoding.

6.9.3.13 virtual void FTFont::Depth (float *depth*) [virtual]

Set the extrusion distance for the font.

Only implemented by **FTExtrudeFont** (p. 34)

pt3em**Parameters**

pt3em*depth*	pt3emThe extrusion distance.

pt3em

6.9.3.14 virtual float FTFont::Descender ( ) const [virtual]

Gets the global descender height for the face.

pt3em**Returns**

Descender height

6.9.3.15 virtual FT_Error FTFont::Error ( ) const [virtual]

Queries the Font for errors.

pt3em**Returns**

The current error code.

6.9.3.16 virtual bool FTFont::FaceSize (const unsigned int *size*, const unsigned int *res* = 72) [virtual]

Set the char size for the current face.

pt3em**Parameters**

pt3em	pt3em*size*	pt3emthe face size in points (1/72 inch)
	pt3em*res*	pt3emthe resolution of the target device.

pt3em**Returns**

`true` if size was set correctly

6.9.3.17 virtual unsigned int FTFont::FaceSize ( ) const [virtual]

Get the current face size in points (1/72 inch).

pt3em**Returns**

face size

6.9.3.18 virtual void FTFont::GlyphLoadFlags (FT_Int *flags*) [virtual]

Set the glyph loading flags.

By default, fonts use the most sensible flags when loading a font's glyph using FT_Load_Glyph(). This function allows to override the default flags.

pt3em**Parameters**

pt3em	pt3em*flags*	pt3emThe glyph loading flags.

pt3em

6.9.3.19 virtual float FTFont::LineHeight ( ) const [virtual]

Gets the line spacing for the font.

pt3em**Returns**

Line height

6.9.3.20 virtual FTGlyph* FTFont::MakeGlyph (FT_GlyphSlot *slot*) [protected], [pure virtual]

Construct a glyph of the correct type.

Clients must override the function and return their specialised **FTGlyph** (p. 47).

pt3em**Parameters**

pt3em	pt3em*slot*	pt3emA FreeType glyph slot.

pt3em**Returns**

An FT****Glyph or null on failure.

Implemented in **FTExtrudeFont** (p. 35), **FTBitmapFont** (p. 27), **FTOutlineFont** (p. 54), **FTPixmapFont** (p. 58), **FTPolygonFont** (p. 67), **FTTextureFont** (p. 74), and **FTBufferFont** (p. 32).

6.9.3.21 virtual void FTFont::Outset (float *outset*) [virtual]

Set the outset distance for the font.

Only implemented by **FTOutlineFont** (p. 53), **FTPolygonFont** (p. 65) and **FTExtrudeFont** (p. 34)

pt3em**Parameters**

pt3empt3em*outset*		pt3emThe outset distance.

6.9.3.22 virtual void FTFont::Outset (float *front,* float *back*) [virtual]

Set the front and back outset distances for the font.

Only implemented by **FTExtrudeFont** (p. 34)

pt3em**Parameters**

pt3em	pt3em*front*	pt3emThe front outset distance.
	pt3em*back*	pt3emThe back outset distance.

6.9.3.23 virtual FTPoint FTFont::Render (const char * *string,* const int *len* = -1, FTPoint *position* = FTPoint (), FTPoint *spacing* = FTPoint (), int *renderMode* = FTGL::RENDER_ALL) [virtual]

Render a string of characters.

pt3em

pt3em**Parameters**

pt3em pt3em*string*	pt3em'C' style string to be output.
pt3em*len*	pt3emThe length of the string. If < 0 then all characters will be displayed until a null character is encountered (optional).
pt3em*position*	pt3emThe pen position of the first character (optional).
pt3em*spacing*	pt3emA displacement vector to add after each character has been displayed (optional).
pt3em *renderMode*	pt3emRender mode to use for display (optional).

pt3em**Returns**

The new pen position after the last character was output.

6.9.3.24 virtual FTPoint FTFont::Render (const wchar_t * *string*, const int *len* = -1, FTPoint *position* = FTPoint (), FTPoint *spacing* = FTPoint (), int *renderMode* = FTGL::RENDER_ALL) [virtual]

Render a string of characters.

pt3em**Parameters**

pt3em pt3em*string*	pt3emwchar_t string to be output.
pt3em*len*	pt3emThe length of the string. If < 0 then all characters will be displayed until a null character is encountered (optional).
pt3em*position*	pt3emThe pen position of the first character (optional).
pt3em*spacing*	pt3emA displacement vector to add after each character has been displayed (optional).
pt3em *renderMode*	pt3emRender mode to use for display (optional).

pt3em**Returns**

The new pen position after the last character was output.

6.9.3.25 virtual void FTFont::UseDisplayList (bool *useList*) [virtual]

Enable or disable the use of Display Lists inside **FTGL** (p. 21).

pt3em**Parameters**

pt3empt3em*useList*	pt3em`true` turns ON display lists. `false` turns OFF display lists.

6.9.4 Friends And Related Function Documentation

6.9.4.1 friend class FTBitmapFont [friend]

Definition at line 78 of file FTFont.h.

pt3em

6.9.4.2 friend class FTBufferFont [friend]

Definition at line 79 of file FTFont.h.

6.9.4.3 friend class FTExtrudeFont [friend]

Definition at line 80 of file FTFont.h.

6.9.4.4 friend class FTFontImpl [friend]

Definition at line 367 of file FTFont.h.

6.9.4.5 friend class FTOutlineFont [friend]

Definition at line 81 of file FTFont.h.

6.9.4.6 friend class FTPixmapFont [friend]

Definition at line 82 of file FTFont.h.

6.9.4.7 friend class FTPolygonFont [friend]

Definition at line 83 of file FTFont.h.

6.9.4.8 friend class FTTextureFont [friend]

Definition at line 84 of file FTFont.h.

The documentation for this class was generated from the following file:

- **FTFont.h**

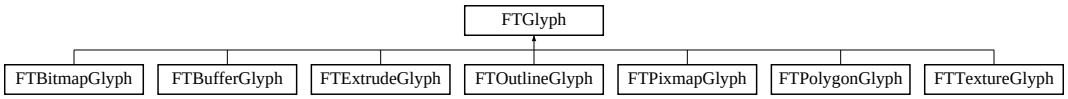
6.10 FTGlyph Class Reference

FTGlyph (p. 47) is the base class for **FTGL** (p. 21) glyphs.

`#include <FTGlyph.h>`

Inheritance diagram for FTGlyph:

pt3em



Public Member Functions

- virtual ~**FTGlyph** ()

  Destructor.
- virtual const **FTPoint** & **Render** (const **FTPoint** &pen, int renderMode)=0

pt3em

Renders this glyph at the current pen position.

- virtual float **Advance** () const

  Return the advance width for this glyph.

- virtual const **FTBBox** & **BBox** () const

  Return the bounding box for this glyph.

- virtual FT_Error **Error** () const

  Queries for errors.

Protected Member Functions

- **FTGlyph** (FT_GlyphSlot glyph)

  Create a glyph.

Friends

- class **FTBitmapGlyph**
- class **FTBufferGlyph**
- class **FTExtrudeGlyph**
- class **FTOutlineGlyph**
- class **FTPixmapGlyph**
- class **FTPolygonGlyph**
- class **FTTextureGlyph**

6.10.1 Detailed Description

FTGlyph (p. 47) is the base class for **FTGL** (p. 21) glyphs.

It provides the interface between Freetype glyphs and their openGL renderable counterparts. This is an abstract class and derived classes must implement the `Render` function.

pt3em**See also**

FTBBox (p. 23)
FTPoint (p. 59)

Definition at line 50 of file FTGlyph.h.

6.10.2 Constructor & Destructor Documentation

6.10.2.1 FTGlyph::FTGlyph (FT_GlyphSlot *glyph*) [protected]

Create a glyph.

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emThe Freetype glyph to be processed

6.10.2.2 virtual FTGlyph::~FTGlyph ( ) [virtual]

Destructor.

pt3em

6.10.3 Member Function Documentation

6.10.3.1 virtual float FTGlyph::Advance ( ) const [virtual]

Return the advance width for this glyph.

pt3em**Returns**

advance width.

6.10.3.2 virtual const FTBBox& FTGlyph::BBox ( ) const [virtual]

Return the bounding box for this glyph.

pt3em**Returns**

bounding box.

6.10.3.3 virtual FT_Error FTGlyph::Error ( ) const [virtual]

Queries for errors.

pt3em**Returns**

The current error code.

6.10.3.4 virtual const FTPoint& FTGlyph::Render (const FTPoint & *pen,* int *renderMode*) [pure virtual]

Renders this glyph at the current pen position.

pt3em**Parameters**

pt3em pt3em*pen*	pt3emThe current pen position.
pt3em *renderMode*	pt3emRender mode to display

pt3em**Returns**

The advance distance for this glyph.

Implemented in **FTExtrudeGlyph** (p. 37), **FTTextureGlyph** (p. 75), **FTPolygonGlyph** (p. 68), **FTOutlineGlyph** (p. 56), **FTBitmapGlyph** (p. 28), **FTPixmapGlyph** (p. 59), and **FTBufferGlyph** (p. 34).

6.10.4 Friends And Related Function Documentation

6.10.4.1 friend class FTBitmapGlyph [friend]

Definition at line 70 of file FTGlyph.h.

pt3em

6.10.4.2 friend class FTBufferGlyph [friend]

Definition at line 71 of file FTGlyph.h.

6.10.4.3 friend class FTExtrudeGlyph [friend]

Definition at line 72 of file FTGlyph.h.

6.10.4.4 friend class FTOutlineGlyph [friend]

Definition at line 73 of file FTGlyph.h.

6.10.4.5 friend class FTPixmapGlyph [friend]

Definition at line 74 of file FTGlyph.h.

6.10.4.6 friend class FTPolygonGlyph [friend]

Definition at line 75 of file FTGlyph.h.

6.10.4.7 friend class FTTextureGlyph [friend]

Definition at line 76 of file FTGlyph.h.

The documentation for this class was generated from the following file:

- **FTGlyph.h**

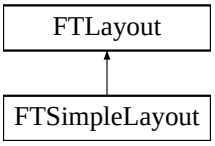
6.11 FTLayout Class Reference

FTLayout (p. 50) is the interface for layout managers that render text.

`#include <FTLayout.h>`

Inheritance diagram for FTLayout:

pt3em



Public Member Functions

- virtual ~**FTLayout** ()

  Destructor.
- virtual **FTBBox BBox** (const char *string, const int len=-1, **FTPoint** position=**FTPoint**())=0

  Get the bounding box for a formatted string.

pt3em

- virtual **FTBBox BBox** (const wchar_t *string, const int len=-1, **FTPoint** position=**FTPoint**())=0

  Get the bounding box for a formatted string.
- virtual void **Render** (const char *string, const int len=-1, **FTPoint** position=**FTPoint**(), int renderMode=**FTGL::RENDER_ALL**)=0

  Render a string of characters.
- virtual void **Render** (const wchar_t *string, const int len=-1, **FTPoint** position=**FTPoint**(), int renderMode=**FTGL::RENDER_ALL**)=0

  Render a string of characters.
- virtual FT_Error **Error** () const

  Queries the Layout for errors.

Protected Member Functions

- **FTLayout** ()

Friends

- class **FTSimpleLayout**

6.11.1 Detailed Description

FTLayout (p. 50) is the interface for layout managers that render text.

Specific layout manager classes are derived from this class. This class is abstract and deriving classes must implement the protected `Render` methods to render formatted text and `BBox` methods to determine the bounding box of output text.

pt3em**See also**

FTFont (p. 37)
FTBBox (p. 23)

Definition at line 52 of file FTLayout.h.

6.11.2 Constructor & Destructor Documentation

6.11.2.1 FTLayout::FTLayout ( ) [protected]

6.11.2.2 virtual FTLayout::~FTLayout ( ) [virtual]

Destructor.

6.11.3 Member Function Documentation

6.11.3.1 virtual FTBBox FTLayout::BBox (const char * *string*, const int *len* = -1, FTPoint *position* = FTPoint()) [pure virtual]

Get the bounding box for a formatted string.

pt3em

pt3em**Parameters**

pt3em pt3em*string*	pt3emA char string.
pt3em*len*	pt3emThe length of the string. If < 0 then all characters will be checked until a null character is encountered (optional).
pt3em*position*	pt3emThe pen position of the first character (optional).

pt3em**Returns**

The corresponding bounding box.

Implemented in **FTSimpleLayout** (p. 70).

6.11.3.2 virtual FTBBox FTLayout::BBox (const wchar_t * *string*, const int *len* = -1, FTPoint *position* = FTPoint()) [pure virtual]

Get the bounding box for a formatted string.

pt3em**Parameters**

pt3em pt3em*string*	pt3emA wchar_t string.
pt3em*len*	pt3emThe length of the string. If < 0 then all characters will be checked until a null character is encountered (optional).
pt3em*position*	pt3emThe pen position of the first character (optional).

pt3em**Returns**

The corresponding bounding box.

Implemented in **FTSimpleLayout** (p. 70).

6.11.3.3 virtual FT_Error FTLayout::Error ( ) const [virtual]

Queries the Layout for errors.

pt3em**Returns**

The current error code.

6.11.3.4 virtual void FTLayout::Render (const char * *string*, const int *len* = -1, FTPoint *position* = FTPoint(), int *renderMode* = FTGL::RENDER_ALL) [pure virtual]

Render a string of characters.

pt3em**Parameters**

pt3em pt3em*string*	pt3em'C' style string to be output.
pt3em*len*	pt3emThe length of the string. If < 0 then all characters will be displayed until a null character is encountered (optional).
pt3em*position*	pt3emThe pen position of the first character (optional).
pt3em *renderMode*	pt3emRender mode to display (optional)

pt3em

Implemented in **FTSimpleLayout** (p. 71).

6.11.3.5 virtual void FTLayout::Render (const wchar_t * *string*, const int *len* = -1, FTPoint *position* = FTPoint (), int *renderMode* = FTGL::RENDER_ALL) [pure virtual]

Render a string of characters.

pt3em**Parameters**

pt3em pt3em*string*	pt3emwchar_t string to be output.
pt3em*len*	pt3emThe length of the string. If < 0 then all characters will be displayed until a null character is encountered (optional).
pt3em*position*	pt3emThe pen position of the first character (optional).
pt3em *renderMode*	pt3emRender mode to display (optional)

Implemented in **FTSimpleLayout** (p. 71).

6.11.4 Friends And Related Function Documentation

6.11.4.1 friend class FTSimpleLayout [friend]

Definition at line 67 of file FTLayout.h.

The documentation for this class was generated from the following file:

- **FTLayout.h**

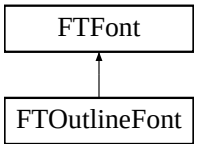
6.12 FTOutlineFont Class Reference

FTOutlineFont (p. 53) is a specialisation of the **FTFont** (p. 37) class for handling Vector Outline fonts.

`#include <FTGLOutlineFont.h>`

Inheritance diagram for FTOutlineFont:

pt3em



Public Member Functions

- **FTOutlineFont** (const char *fontFilePath)

  Open and read a font file.
- **FTOutlineFont** (const unsigned char *pBufferBytes, size_t bufferSizeInBytes)

  Open and read a font from a buffer in memory.
- ~**FTOutlineFont** ()

  Destructor.

pt3em

Protected Member Functions

- virtual **FTGlyph** ∗ **MakeGlyph** (FT_GlyphSlot slot)

  Construct a glyph of the correct type.

6.12.1 Detailed Description

FTOutlineFont (p. 53) is a specialisation of the **FTFont** (p. 37) class for handling Vector Outline fonts.

pt3em**See also**

FTFont (p. 37)

Definition at line 45 of file FTGLOutlineFont.h.

6.12.2 Constructor & Destructor Documentation

6.12.2.1 FTOutlineFont::FTOutlineFont (const char ∗ *fontFilePath*)

Open and read a font file.
Sets Error flag.

```
@param fontFilePath  font file path.
```

6.12.2.2 FTOutlineFont::FTOutlineFont (const unsigned char ∗ *pBufferBytes,* size_t *bufferSizeInBytes*)

Open and read a font from a buffer in memory.

Sets Error flag. The buffer is owned by the client and is NOT copied by **FTGL** (p. 21). The pointer must be valid while using **FTGL** (p. 21).

pt3em**Parameters**

pt3em pt3em *pBufferBytes*	pt3emthe in-memory buffer
pt3em*bufferSize-InBytes*	pt3emthe length of the buffer in bytes

6.12.2.3 FTOutlineFont::∼FTOutlineFont ( )

Destructor.

6.12.3 Member Function Documentation

6.12.3.1 virtual FTGlyph∗ FTOutlineFont::MakeGlyph (FT_GlyphSlot *slot*) [protected], [virtual]

Construct a glyph of the correct type.

Clients must override the function and return their specialised **FTGlyph** (p. 47).

pt3em

pt3em**Parameters**

pt3em	pt3em*slot*	pt3emA FreeType glyph slot.

pt3em**Returns**

An FT****Glyph or `null` on failure.

Implements **FTFont** (p. 45).

The documentation for this class was generated from the following file:

- **FTGLOutlineFont.h**

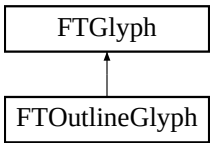
6.13 FTOutlineGlyph Class Reference

FTOutlineGlyph (p. 55) is a specialisation of **FTGlyph** (p. 47) for creating outlines.

`#include <FTOutlineGlyph.h>`

Inheritance diagram for FTOutlineGlyph:

pt3em



Public Member Functions

- **FTOutlineGlyph** (FT_GlyphSlot glyph, float outset, bool useDisplayList)
  Constructor.
- virtual ∼**FTOutlineGlyph** ()
  Destructor.
- virtual const **FTPoint** & **Render** (const **FTPoint** &pen, int renderMode)
  Render this glyph at the current pen position.

Additional Inherited Members

6.13.1 Detailed Description

FTOutlineGlyph (p. 55) is a specialisation of **FTGlyph** (p. 47) for creating outlines.

Definition at line 42 of file FTOutlineGlyph.h.

6.13.2 Constructor & Destructor Documentation

6.13.2.1 FTOutlineGlyph::FTOutlineGlyph (FT_GlyphSlot *glyph,* float *outset,* bool *useDisplayList*)

Constructor.

Sets the Error to Invalid_Outline if the glyphs isn't an outline.

pt3em

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emThe Freetype glyph to be processed
pt3em*outset*	pt3emoutset distance
pt3em *useDisplayList*	pt3emEnable or disable the use of Display Lists for this glyph `true` turns ON display lists. `false` turns OFF display lists.

6.13.2.2 virtual FTOutlineGlyph::~FTOutlineGlyph ( ) [virtual]

Destructor.

6.13.3 Member Function Documentation

6.13.3.1 virtual const FTPoint& FTOutlineGlyph::Render (const FTPoint & *pen,* int *renderMode*) [virtual]

Render this glyph at the current pen position.

pt3em**Parameters**

pt3em pt3em*pen*	pt3emThe current pen position.
pt3em *renderMode*	pt3emRender mode to display

pt3em**Returns**

The advance distance for this glyph.

Implements **FTGlyph** (p. 49).

The documentation for this class was generated from the following file:

- **FTOutlineGlyph.h**

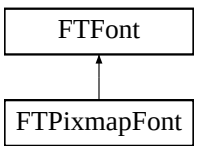
6.14 FTPixmapFont Class Reference

FTPixmapFont (p. 56) is a specialisation of the **FTFont** (p. 37) class for handling Pixmap (Grey Scale) fonts.

`#include <FTGLPixmapFont.h>`

Inheritance diagram for FTPixmapFont:

pt3em



Public Member Functions

- **FTPixmapFont** (const char ∗fontFilePath)

pt3em

Open and read a font file.

- **FTPixmapFont** (const unsigned char ∗pBufferBytes, size_t bufferSizeInBytes)

  Open and read a font from a buffer in memory.

- ∼**FTPixmapFont** ()

  Destructor.

Protected Member Functions

- virtual **FTGlyph** ∗ **MakeGlyph** (FT_GlyphSlot slot)

  Construct a glyph of the correct type.

6.14.1 Detailed Description

FTPixmapFont (p. 56) is a specialisation of the **FTFont** (p. 37) class for handling Pixmap (Grey Scale) fonts.

pt3em**See also**

FTFont (p. 37)

Definition at line 45 of file FTGLPixmapFont.h.

6.14.2 Constructor & Destructor Documentation

6.14.2.1 FTPixmapFont::FTPixmapFont (const char ∗ *fontFilePath*)

Open and read a font file.

Sets Error flag.

```
@param fontFilePath  font file path.
```

6.14.2.2 FTPixmapFont::FTPixmapFont (const unsigned char ∗ *pBufferBytes,* size_t *bufferSizeInBytes*)

Open and read a font from a buffer in memory.

Sets Error flag. The buffer is owned by the client and is NOT copied by **FTGL** (p. 21). The pointer must be valid while using **FTGL** (p. 21).

pt3em**Parameters**

pt3em pt3em *pBufferBytes*	pt3emthe in-memory buffer
pt3em*bufferSize-InBytes*	pt3emthe length of the buffer in bytes

6.14.2.3 FTPixmapFont::∼FTPixmapFont ( )

Destructor.

6.14.3 Member Function Documentation

pt3em

6.14.3.1 virtual FTGlyph* FTPixmapFont::MakeGlyph (FT_GlyphSlot *slot*) [protected], [virtual]

Construct a glyph of the correct type.

Clients must override the function and return their specialised **FTGlyph** (p. 47).

pt3em**Parameters**

pt3em	pt3em*slot*	pt3emA FreeType glyph slot.

pt3em**Returns**

An FT****Glyph or `null` on failure.

Implements **FTFont** (p. 45).

The documentation for this class was generated from the following file:

- **FTGLPixmapFont.h**

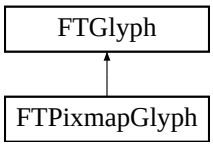
6.15 FTPixmapGlyph Class Reference

FTPixmapGlyph (p. 58) is a specialisation of **FTGlyph** (p. 47) for creating pixmaps.

`#include <FTPixmapGlyph.h>`

Inheritance diagram for FTPixmapGlyph:

pt3em



Public Member Functions

- **FTPixmapGlyph** (FT_GlyphSlot glyph)

  Constructor.
- virtual ~**FTPixmapGlyph** ()

  Destructor.
- virtual const **FTPoint** & **Render** (const **FTPoint** &pen, int renderMode)

  Render this glyph at the current pen position.

Additional Inherited Members

6.15.1 Detailed Description

FTPixmapGlyph (p. 58) is a specialisation of **FTGlyph** (p. 47) for creating pixmaps.

Definition at line 42 of file FTPixmapGlyph.h.

pt3em

6.15.2 Constructor & Destructor Documentation

6.15.2.1 FTPixmapGlyph::FTPixmapGlyph (FT_GlyphSlot *glyph*)

Constructor.

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emThe Freetype glyph to be processed

6.15.2.2 virtual FTPixmapGlyph::∼FTPixmapGlyph ( ) [virtual]

Destructor.

6.15.3 Member Function Documentation

6.15.3.1 virtual const FTPoint& FTPixmapGlyph::Render (const FTPoint & *pen,* int *renderMode*) [virtual]

Render this glyph at the current pen position.

pt3em**Parameters**

pt3em pt3em*pen*	pt3emThe current pen position.
pt3em *renderMode*	pt3emRender mode to display

pt3em**Returns**

The advance distance for this glyph.

Implements **FTGlyph** (p. 49).

The documentation for this class was generated from the following file:

- **FTPixmapGlyph.h**

6.16 FTPoint Class Reference

FTPoint (p. 59) class is a basic 3-dimensional point or vector.

`#include <FTPoint.h>`

Public Member Functions

- **FTPoint** ()

  Default constructor.
- **FTPoint** (const **FTGL_DOUBLE** x, const **FTGL_DOUBLE** y, const **FTGL_DOUBLE** z=0)

  Constructor.
- **FTPoint** (const FT_Vector &ft_vector)

pt3em

Constructor.

- **FTPoint Normalise** ()

  Normalise a point's coordinates.

- **FTPoint** & **operator+=** (const **FTPoint** &point)

  Operator += In Place Addition.

- **FTPoint operator+** (const **FTPoint** &point) const

  Operator +.

- **FTPoint** & **operator-=** (const **FTPoint** &point)

  Operator -= In Place Substraction.

- **FTPoint operator-** (const **FTPoint** &point) const

  Operator -.

- **FTPoint operator**∗ (double multiplier) const

  Operator ∗ Scalar multiplication.

- **FTPoint operator**^ (const **FTPoint** &point)

  Operator ^ Vector product.

- **operator const FTGL_DOUBLE** ∗ () const

  Cast to FTGL_DOUBLE∗.

- void **X** (**FTGL_DOUBLE** x)

  Setters.

- void **Y** (**FTGL_DOUBLE** y)
- void **Z** (**FTGL_DOUBLE** z)
- **FTGL_DOUBLE X** () const

  Getters.

- **FTGL_DOUBLE Y** () const
- **FTGL_DOUBLE Z** () const
- **FTGL_FLOAT Xf** () const
- **FTGL_FLOAT Yf** () const
- **FTGL_FLOAT Zf** () const

Friends

- **FTPoint operator**∗ (double multiplier, **FTPoint** &point)

  Operator ∗ Scalar multiplication.

- double **operator**∗ (**FTPoint** &a, **FTPoint** &b)

  Operator ∗ Scalar product.

- bool **operator==** (const **FTPoint** &a, const **FTPoint** &b)

  Operator == Tests for equality.

- bool **operator!=** (const **FTPoint** &a, const **FTPoint** &b)

  Operator != Tests for non equality.

6.16.1 Detailed Description

FTPoint (p. 59) class is a basic 3-dimensional point or vector.

Definition at line 42 of file FTPoint.h.

pt3em

6.16.2 Constructor & Destructor Documentation

6.16.2.1 FTPoint::FTPoint ( ) [inline]

Default constructor.

Point is set to zero.

Definition at line 48 of file FTPoint.h.

6.16.2.2 FTPoint::FTPoint (const FTGL_DOUBLE *x*, const FTGL_DOUBLE *y*, const FTGL_DOUBLE *z* = 0) [inline]

Constructor.

Z coordinate is set to zero if unspecified.

```
@param x First component
@param y Second component
@param z Third component
```

Definition at line 62 of file FTPoint.h.

6.16.2.3 FTPoint::FTPoint (const FT_Vector & *ft_vector*) [inline]

Constructor.

This converts an FT_Vector to an **FTPoint** (p. 59)

```
@param ft_vector A freetype vector
```

Definition at line 75 of file FTPoint.h.

6.16.3 Member Function Documentation

6.16.3.1 FTPoint FTPoint::Normalise ( )

Normalise a point's coordinates.

If the coordinates are zero, the point is left untouched.

pt3em**Returns**

A vector of norm one.

6.16.3.2 FTPoint::operator const FTGL_DOUBLE * ( ) const [inline]

Cast to FTGL_DOUBLE*.

Definition at line 240 of file FTPoint.h.

6.16.3.3 FTPoint FTPoint::operator* (double *multiplier*) const [inline]

Operator * Scalar multiplication.

pt3em

pt3emParameters

pt3em*multiplier*	pt3em

pt3emReturns

`this` multiplied by `multiplier`.

Definition at line 159 of file FTPoint.h.

6.16.3.4 FTPoint FTPoint::operator+ (const FTPoint & *point*) const [inline]

Operator +.

pt3emParameters

pt3em pt3em*point*	pt3em

pt3emReturns

this plus point.

Definition at line 112 of file FTPoint.h.

6.16.3.5 FTPoint& FTPoint::operator+= (const FTPoint & *point*) [inline]

Operator += In Place Addition.

pt3emParameters

pt3em pt3em*point*	pt3em

pt3emReturns

this plus point.

Definition at line 97 of file FTPoint.h.

6.16.3.6 FTPoint FTPoint::operator- (const FTPoint & *point*) const [inline]

Operator -.

pt3emParameters

pt3em pt3em*point*	pt3em

pt3em

pt3em**Returns**

this minus point.

Definition at line 143 of file FTPoint.h.

6.16.3.7 FTPoint& FTPoint::operator-= (const FTPoint & *point*) [inline]

Operator -= In Place Substraction.

pt3em**Parameters**

pt3em pt3em*point*	pt3em

pt3em**Returns**

this minus point.

Definition at line 128 of file FTPoint.h.

6.16.3.8 FTPoint FTPoint::operator^ (const FTPoint & *point*) [inline]

Operator ^ Vector product.

pt3em**Parameters**

pt3em pt3em*point*	pt3emSecond point

pt3em**Returns**

this vector point.

Definition at line 204 of file FTPoint.h.

6.16.3.9 void FTPoint::X (FTGL_DOUBLE *x*) [inline]

Setters.

Definition at line 249 of file FTPoint.h.

Referenced by FTBBox::operator|=().

6.16.3.10 FTGL_DOUBLE FTPoint::X ( ) const [inline]

Getters.

Definition at line 257 of file FTPoint.h.

6.16.3.11 FTGL_FLOAT FTPoint::Xf ( ) const [inline]

Definition at line 260 of file FTPoint.h.

Referenced by FTFont::BBox().

pt3em

6.16.3.12 void FTPoint::Y (FTGL_DOUBLE *y*) [inline]

Definition at line 250 of file FTPoint.h.

Referenced by FTBBox::operator|=().

6.16.3.13 FTGL_DOUBLE FTPoint::Y ( ) const [inline]

Definition at line 258 of file FTPoint.h.

6.16.3.14 FTGL_FLOAT FTPoint::Yf ( ) const [inline]

Definition at line 261 of file FTPoint.h.

Referenced by FTFont::BBox().

6.16.3.15 void FTPoint::Z (FTGL_DOUBLE *z*) [inline]

Definition at line 251 of file FTPoint.h.

Referenced by FTBBox::operator|=().

6.16.3.16 FTGL_DOUBLE FTPoint::Z ( ) const [inline]

Definition at line 259 of file FTPoint.h.

6.16.3.17 FTGL_FLOAT FTPoint::Zf ( ) const [inline]

Definition at line 262 of file FTPoint.h.

Referenced by FTFont::BBox().

6.16.4 Friends And Related Function Documentation

6.16.4.1 bool operator!= (const FTPoint & *a,* const FTPoint & *b*) [friend]

Operator != Tests for non equality.

pt3emParameters

pt3em	pt3em*a*	pt3em
	pt3em*b*	pt3em

pt3emReturns

true if a & b are not equal

6.16.4.2 FTPoint operator* (double *multiplier,* FTPoint & *point*) [friend]

Operator * Scalar multiplication.

pt3em

pt3em**Parameters**

pt3em pt3em*point*		pt3em
	pt3em*multiplier*	pt3em

pt3em**Returns**

`multiplier` multiplied by `point`.

Definition at line 177 of file FTPoint.h.

6.16.4.3 double operator∗ (FTPoint & *a*, FTPoint & *b*) [friend]

Operator ∗ Scalar product.

pt3em**Parameters**

pt3em	pt3em*a*	pt3emFirst vector.
	pt3em*b*	pt3emSecond vector.

pt3em**Returns**

`a.b` scalar product.

Definition at line 190 of file FTPoint.h.

6.16.4.4 bool operator== (const FTPoint & *a*, const FTPoint & *b*) [friend]

Operator == Tests for equality.

pt3em**Parameters**

pt3em	pt3em*a*	pt3em
	pt3em*b*	pt3em

pt3em**Returns**

true if a & b are equal

The documentation for this class was generated from the following file:

- **FTPoint.h**

6.17 FTPolygonFont Class Reference

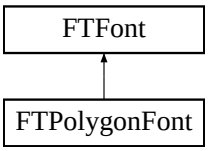
FTPolygonFont (p. 65) is a specialisation of the **FTFont** (p. 37) class for handling tesselated Polygon Mesh fonts.

`#include <FTGLPolygonFont.h>`

Inheritance diagram for FTPolygonFont:

pt3em

pt3em



Public Member Functions

- **FTPolygonFont** (const char ∗fontFilePath)
  Open and read a font file.
- **FTPolygonFont** (const unsigned char ∗pBufferBytes, size_t bufferSizeInBytes)
  Open and read a font from a buffer in memory.
- ∼**FTPolygonFont** ()
  Destructor.

Protected Member Functions

- virtual **FTGlyph** ∗ **MakeGlyph** (FT_GlyphSlot slot)
  Construct a glyph of the correct type.

6.17.1 Detailed Description

FTPolygonFont (p. 65) is a specialisation of the **FTFont** (p. 37) class for handling tesselated Polygon Mesh fonts.

pt3emSee also

FTFont (p. 37)

Definition at line 45 of file FTGLPolygonFont.h.

6.17.2 Constructor & Destructor Documentation

6.17.2.1 FTPolygonFont::FTPolygonFont (const char ∗ *fontFilePath*)

Open and read a font file.
Sets Error flag.

```
@param fontFilePath  font file path.
```

6.17.2.2 FTPolygonFont::FTPolygonFont (const unsigned char ∗ *pBufferBytes,* size_t *bufferSizeInBytes*)

Open and read a font from a buffer in memory.

Sets Error flag. The buffer is owned by the client and is NOT copied by **FTGL** (p. 21). The pointer must be valid while using **FTGL** (p. 21).

pt3emParameters

pt3em pt3em *pBufferBytes*	pt3emthe in-memory buffer
pt3em *bufferSize-InBytes*	pt3emthe length of the buffer in bytes

pt3em

6.17.2.3 FTPolygonFont::∼FTPolygonFont ( )

Destructor.

6.17.3 Member Function Documentation

6.17.3.1 virtual FTGlyph∗ FTPolygonFont::MakeGlyph (FT_GlyphSlot *slot*) [protected], [virtual]

Construct a glyph of the correct type.

Clients must override the function and return their specialised **FTGlyph** (p. 47).

pt3em**Parameters**

pt3em	pt3em*slot*	pt3emA FreeType glyph slot.

pt3em**Returns**

An FT∗∗∗∗Glyph or `null` on failure.

Implements **FTFont** (p. 45).

The documentation for this class was generated from the following file:

- **FTGLPolygonFont.h**

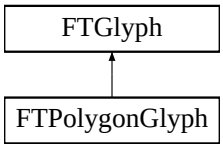
6.18 FTPolygonGlyph Class Reference

FTPolygonGlyph (p. 67) is a specialisation of **FTGlyph** (p. 47) for creating tessellated polygon glyphs.

`#include <FTPolyGlyph.h>`

Inheritance diagram for FTPolygonGlyph:

pt3em



Public Member Functions

- **FTPolygonGlyph** (FT_GlyphSlot glyph, float outset, bool useDisplayList)

  Constructor.
- virtual ∼**FTPolygonGlyph** ()

  Destructor.
- virtual const **FTPoint** & **Render** (const **FTPoint** &pen, int renderMode)

  Render this glyph at the current pen position.

pt3em

Additional Inherited Members

6.18.1 Detailed Description

FTPolygonGlyph (p. 67) is a specialisation of **FTGlyph** (p. 47) for creating tessellated polygon glyphs.

Definition at line 43 of file FTPolyGlyph.h.

6.18.2 Constructor & Destructor Documentation

6.18.2.1 FTPolygonGlyph::FTPolygonGlyph (FT_GlyphSlot *glyph,* float *outset,* bool *useDisplayList*)

Constructor.

Sets the Error to Invalid_Outline if the glyphs isn't an outline.

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emThe Freetype glyph to be processed
pt3em*outset*	pt3emThe outset distance
pt3em *useDisplayList*	pt3emEnable or disable the use of Display Lists for this glyph `true` turns ON display lists. `false` turns OFF display lists.

6.18.2.2 virtual FTPolygonGlyph::~FTPolygonGlyph ( ) [virtual]

Destructor.

6.18.3 Member Function Documentation

6.18.3.1 virtual const FTPoint& FTPolygonGlyph::Render (const FTPoint & *pen,* int *renderMode*) [virtual]

Render this glyph at the current pen position.

pt3em**Parameters**

pt3em pt3em*pen*	pt3emThe current pen position.
pt3em *renderMode*	pt3emRender mode to display

pt3em**Returns**

The advance distance for this glyph.

Implements **FTGlyph** (p. 49).

The documentation for this class was generated from the following file:

- **FTPolyGlyph.h**

pt3em

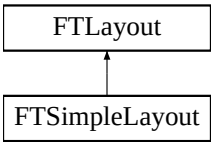
6.19 FTSimpleLayout Class Reference

FTSimpleLayout (p. 69) is a specialisation of **FTLayout** (p. 50) for simple text boxes.

`#include <FTSimpleLayout.h>`

Inheritance diagram for FTSimpleLayout:

pt3em



Public Member Functions

- **FTSimpleLayout** ()

  Initializes line spacing to 1.0, alignment to ALIGN_LEFT and wrap to 100.0.
- ∼**FTSimpleLayout** ()

  Destructor.
- virtual **FTBBox BBox** (const char ∗string, const int len=-1, **FTPoint** position=**FTPoint**())

  Get the bounding box for a formatted string.
- virtual **FTBBox BBox** (const wchar_t ∗string, const int len=-1, **FTPoint** position=**FTPoint**())

  Get the bounding box for a formatted string.
- virtual void **Render** (const char ∗string, const int len=-1, **FTPoint** position=**FTPoint**(), int renderMode=**FTGL::RENDER_ALL**)

  Render a string of characters.
- virtual void **Render** (const wchar_t ∗string, const int len=-1, **FTPoint** position=**FTPoint**(), int renderMode=**FTGL::RENDER_ALL**)

  Render a string of characters.
- void **SetFont** (**FTFont** ∗fontInit)

  Set the font to use for rendering the text.
- **FTFont** ∗ **GetFont** ()
- void **SetLineLength** (const float LineLength)

  The maximum line length for formatting text.
- float **GetLineLength** () const
- void **SetAlignment** (const **FTGL::TextAlignment** Alignment)

  The text alignment mode used to distribute space within a line or rendered text.
- **FTGL::TextAlignment GetAlignment** () const
- void **SetLineSpacing** (const float LineSpacing)

  Sets the line height.
- float **GetLineSpacing** () const

Additional Inherited Members

6.19.1 Detailed Description

FTSimpleLayout (p. 69) is a specialisation of **FTLayout** (p. 50) for simple text boxes.

This class has basic support for text wrapping, left, right and centered alignment, and text justification.

pt3em

pt3em**See also**

FTLayout (p. 50)

Definition at line 49 of file FTSimpleLayout.h.

6.19.2 Constructor & Destructor Documentation

6.19.2.1 FTSimpleLayout::FTSimpleLayout ( )

Initializes line spacing to 1.0, alignment to ALIGN_LEFT and wrap to 100.0.

6.19.2.2 FTSimpleLayout::~FTSimpleLayout ( )

Destructor.

6.19.3 Member Function Documentation

6.19.3.1 virtual FTBBox FTSimpleLayout::BBox (const char * *string*, const int *len* = -1, FTPoint *position* = FTPoint()) [virtual]

Get the bounding box for a formatted string.

pt3em**Parameters**

pt3em pt3em*string*	pt3emA char string.
pt3em*len*	pt3emThe length of the string. If < 0 then all characters will be checked until a null character is encountered (optional).
pt3em*position*	pt3emThe pen position of the first character (optional).

pt3em**Returns**

The corresponding bounding box.

Implements **FTLayout** (p. 51).

6.19.3.2 virtual FTBBox FTSimpleLayout::BBox (const wchar_t * *string*, const int *len* = -1, FTPoint *position* = FTPoint()) [virtual]

Get the bounding box for a formatted string.

pt3em**Parameters**

pt3em pt3em*string*	pt3emA wchar_t string.
pt3em*len*	pt3emThe length of the string. If < 0 then all characters will be checked until a null character is encountered (optional).
pt3em*position*	pt3emThe pen position of the first character (optional).

pt3em

pt3em**Returns**

The corresponding bounding box.

Implements **FTLayout** (p. 52).

6.19.3.3 FTGL::TextAlignment FTSimpleLayout::GetAlignment ( ) const

pt3em**Returns**

The text alignment mode.

6.19.3.4 FTFont* FTSimpleLayout::GetFont ( )

pt3em**Returns**

The current font.

6.19.3.5 float FTSimpleLayout::GetLineLength ( ) const

pt3em**Returns**

The current line length.

6.19.3.6 float FTSimpleLayout::GetLineSpacing ( ) const

pt3em**Returns**

The line spacing.

6.19.3.7 virtual void FTSimpleLayout::Render (const char * *string*, const int *len* = -1, FTPoint *position* = FTPoint (), int *renderMode* = FTGL::RENDER_ALL) [virtual]

Render a string of characters.

pt3em**Parameters**

pt3em pt3em*string*	pt3em'C' style string to be output.
pt3em*len*	pt3emThe length of the string. If < 0 then all characters will be displayed until a null character is encountered (optional).
pt3em*position*	pt3emThe pen position of the first character (optional).
pt3em *renderMode*	pt3emRender mode to display (optional)

Implements **FTLayout** (p. 52).

6.19.3.8 virtual void FTSimpleLayout::Render (const wchar_t * *string*, const int *len* = -1, FTPoint *position* = FTPoint (), int *renderMode* = FTGL::RENDER_ALL) [virtual]

Render a string of characters.

pt3em

pt3em**Parameters**

pt3em pt3em*string*	pt3emwchar_t string to be output.
pt3em*len*	pt3emThe length of the string. If < 0 then all characters will be displayed until a null character is encountered (optional).
pt3em*position*	pt3emThe pen position of the first character (optional).
pt3em *renderMode*	pt3emRender mode to display (optional)

Implements **FTLayout** (p. 53).

6.19.3.9 void FTSimpleLayout::SetAlignment (const FTGL::TextAlignment *Alignment*)

The text alignment mode used to distribute space within a line or rendered text.

pt3em**Parameters**

pt3em pt3em*Alignment*	pt3emThe new alignment mode.

6.19.3.10 void FTSimpleLayout::SetFont (FTFont * *fontInit*)

Set the font to use for rendering the text.

pt3em**Parameters**

pt3em pt3em*fontInit*	pt3emA pointer to the new font. The font is referenced by this but will not be disposed of when this is deleted.

6.19.3.11 void FTSimpleLayout::SetLineLength (const float *LineLength*)

The maximum line length for formatting text.

pt3em**Parameters**

pt3em pt3em *LineLength*	pt3emThe new line length.

6.19.3.12 void FTSimpleLayout::SetLineSpacing (const float *LineSpacing*)

Sets the line height.

pt3em**Parameters**

pt3em pt3em *LineSpacing*	pt3emThe height of each line of text expressed as a percentage of the current fonts line height.

The documentation for this class was generated from the following file:

pt3em

- **FTSimpleLayout.h**

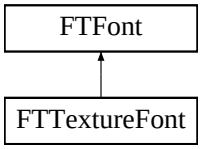
6.20 FTTextureFont Class Reference

FTTextureFont (p. 73) is a specialisation of the **FTFont** (p. 37) class for handling Texture mapped fonts.

`#include <FTGLTextureFont.h>`

Inheritance diagram for FTTextureFont:

pt3em



Public Member Functions

- **FTTextureFont** (const char ∗fontFilePath)

  Open and read a font file.
- **FTTextureFont** (const unsigned char ∗pBufferBytes, size_t bufferSizeInBytes)

  Open and read a font from a buffer in memory.
- virtual ∼**FTTextureFont** ()

  Destructor.

Protected Member Functions

- virtual **FTGlyph** ∗ **MakeGlyph** (FT_GlyphSlot slot)

  Construct a glyph of the correct type.

6.20.1 Detailed Description

FTTextureFont (p. 73) is a specialisation of the **FTFont** (p. 37) class for handling Texture mapped fonts.

pt3em**See also**

FTFont (p. 37)

Definition at line 45 of file FTGLTextureFont.h.

6.20.2 Constructor & Destructor Documentation

6.20.2.1 FTTextureFont::FTTextureFont (const char ∗ *fontFilePath*)

Open and read a font file.
Sets Error flag.

`@param fontFilePath  font file path.`

pt3em

6.20.2.2 FTTextureFont::FTTextureFont (const unsigned char * *pBufferBytes,* size_t *bufferSizeInBytes*)

Open and read a font from a buffer in memory.

Sets Error flag. The buffer is owned by the client and is NOT copied by **FTGL** (p. 21). The pointer must be valid while using **FTGL** (p. 21).

pt3em**Parameters**

pt3em pt3em *pBufferBytes*	pt3emthe in-memory buffer
pt3em*bufferSize-InBytes*	pt3emthe length of the buffer in bytes

6.20.2.3 virtual FTTextureFont::~FTTextureFont ( ) [virtual]

Destructor.

6.20.3 Member Function Documentation

6.20.3.1 virtual FTGlyph* FTTextureFont::MakeGlyph (FT_GlyphSlot *slot*) [protected], [virtual]

Construct a glyph of the correct type.

Clients must override the function and return their specialised **FTGlyph** (p. 47).

pt3em**Parameters**

pt3em	pt3em*slot*	pt3emA FreeType glyph slot.

pt3em**Returns**

An FT****Glyph or `null` on failure.

Implements **FTFont** (p. 45).

The documentation for this class was generated from the following file:

- **FTGLTextureFont.h**

6.21 FTTextureGlyph Class Reference

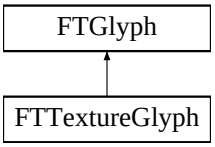
FTTextureGlyph (p. 74) is a specialisation of **FTGlyph** (p. 47) for creating texture glyphs.

`#include <FTTextureGlyph.h>`

Inheritance diagram for FTTextureGlyph:

pt3em

pt3em



Public Member Functions

- **FTTextureGlyph** (FT_GlyphSlot glyph, int id, int xOffset, int yOffset, int width, int height)
  Constructor.
- virtual ∼**FTTextureGlyph** ()
  Destructor.
- virtual const **FTPoint** & **Render** (const **FTPoint** &pen, int renderMode)
  Render this glyph at the current pen position.

Additional Inherited Members

6.21.1 Detailed Description

FTTextureGlyph (p. 74) is a specialisation of **FTGlyph** (p. 47) for creating texture glyphs.

Definition at line 43 of file FTTextureGlyph.h.

6.21.2 Constructor & Destructor Documentation

6.21.2.1 FTTextureGlyph::FTTextureGlyph (FT_GlyphSlot *glyph,* int *id,* int *xOffset,* int *yOffset,* int *width,* int *height*)

Constructor.

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emThe Freetype glyph to be processed
pt3em*id*	pt3emThe id of the texture that this glyph will be drawn in
pt3em*xOffset*	pt3emThe x offset into the parent texture to draw this glyph
pt3em*yOffset*	pt3emThe y offset into the parent texture to draw this glyph
pt3em*width*	pt3emThe width of the parent texture
pt3em*height*	pt3emThe height (number of rows) of the parent texture

6.21.2.2 virtual FTTextureGlyph::∼FTTextureGlyph ( ) [virtual]

Destructor.

6.21.3 Member Function Documentation

6.21.3.1 virtual const FTPoint& FTTextureGlyph::Render (const FTPoint & *pen,* int *renderMode*) [virtual]

Render this glyph at the current pen position.

pt3em

pt3em**Parameters**

pt3em pt3em*pen*	pt3emThe current pen position.
pt3em *renderMode*	pt3emRender mode to display

pt3em**Returns**

The advance distance for this glyph.

Implements **FTGlyph** (p. 49).

The documentation for this class was generated from the following file:

- **FTTextureGlyph.h**

Chapter 7

File Documentation

7.1 faq.dox File Reference

7.2 FTBBox.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTBBox**

  FTBBox *(*p. *23) is a convenience class for handling bounding boxes.*

7.3 FTBitmapGlyph.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTBitmapGlyph**

  FTBitmapGlyph *(*p. *27) is a specialisation of* ***FTGlyph*** *(*p. *47) for creating bitmaps.*

Functions

- **FTGLglyph** ∗ **ftglCreateBitmapGlyph** (FT_GlyphSlot glyph)

  Create a specialisation of FTGLglyph for creating bitmaps.

7.3.1 Function Documentation

7.3.1.1 FTGLglyph∗ ftglCreateBitmapGlyph (FT_GlyphSlot *glyph*)

Create a specialisation of FTGLglyph for creating bitmaps.

pt3em

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emThe Freetype glyph to be processed

pt3em**Returns**

An FTGLglyph∗ object.

7.4 FTBuffer.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTBuffer**

  FTBuffer *(*p. *29) is a helper class for pixel buffers.*

7.5 FTBufferFont.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTBufferFont**

  FTBufferFont *(*p. *31) is a specialisation of the* ***FTFont*** *(*p. *37) class for handling memory buffer fonts.*

Functions

- **FTGLfont** ∗ **ftglCreateBufferFont** (const char ∗file)

  Create a specialised FTGLfont object for handling memory buffer fonts.

7.5.1 Function Documentation

7.5.1.1 FTGLfont∗ ftglCreateBufferFont (const char ∗ *file*)

Create a specialised FTGLfont object for handling memory buffer fonts.

pt3em**Parameters**

pt3em	pt3em*file*	pt3emThe font file name.

pt3em**Returns**

An FTGLfont∗ object.

pt3em

pt3em**See also**

FTGLfont (p. 81)

7.6 FTBufferGlyph.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTBufferGlyph**

  FTBufferGlyph *(*p. *33) is a specialisation of* ***FTGlyph*** *(*p. *47) for memory buffer rendering.*

7.7 FTExtrdGlyph.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTExtrudeGlyph**

  FTExtrudeGlyph *(*p. *36) is a specialisation of* ***FTGlyph*** *(*p. *47) for creating tessellated extruded polygon glyphs.*

Macros

- #define **FTExtrdGlyph FTExtrudeGlyph**

Functions

- **FTGLglyph** ∗ **ftglCreateExtrudeGlyph** (FT_GlyphSlot glyph, float depth, float frontOutset, float backOutset, int useDisplayList)

  Create a specialisation of FTGLglyph for creating tessellated extruded polygon glyphs.

7.7.1 Macro Definition Documentation

7.7.1.1 #define FTExtrdGlyph FTExtrudeGlyph

Definition at line 77 of file FTExtrdGlyph.h.

7.7.2 Function Documentation

7.7.2.1 FTGLglyph∗ ftglCreateExtrudeGlyph (FT_GlyphSlot *glyph,* float *depth,* float *frontOutset,* float *backOutset,* int *useDisplayList*)

Create a specialisation of FTGLglyph for creating tessellated extruded polygon glyphs.

pt3em

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emThe Freetype glyph to be processed
pt3em*depth*	pt3emThe distance along the z axis to extrude the glyph
pt3em *frontOutset*	pt3emoutset contour size
pt3em *backOutset*	pt3emoutset contour size
pt3em *useDisplayList*	pt3emEnable or disable the use of Display Lists for this glyph `true` turns ON display lists. `false` turns OFF display lists.

pt3em**Returns**

An FTGLglyph∗ object.

7.8 FTFont.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTFont**

  FTFont *(*p. *37) is the public interface for the* ***FTGL*** *(*p. *21) library.*

Typedefs

- typedef struct _FTGLfont **FTGLfont**

Functions

- **FTGLfont** ∗ **ftglCreateCustomFont** (char const ∗fontFilePath, void ∗data, **FTGLglyph** ∗(∗makeglyph-Callback)(FT_GlyphSlot, void ∗))

  Create a custom ***FTGL*** *(*p. *21) font object.*
- void **ftglDestroyFont** (**FTGLfont** ∗font)

  Destroy an ***FTGL*** *(*p. *21) font object.*
- int **ftglAttachFile** (**FTGLfont** ∗font, const char ∗path)

  Attach auxilliary file to font e.g.
- int **ftglAttachData** (**FTGLfont** ∗font, const unsigned char ∗data, size_t size)

  Attach auxilliary data to font, e.g.
- int **ftglSetFontCharMap** (**FTGLfont** ∗font, FT_Encoding encoding)

  Set the character map for the face.
- unsigned int **ftglGetFontCharMapCount** (**FTGLfont** ∗font)

  Get the number of character maps in this face.
- FT_Encoding ∗ **ftglGetFontCharMapList** (**FTGLfont** ∗font)

  Get a list of character maps in this face.
- int **ftglSetFontFaceSize** (**FTGLfont** ∗font, unsigned int size, unsigned int res)

  Set the char size for the current face.
- unsigned int **ftglGetFontFaceSize** (**FTGLfont** ∗font)

pt3em

Get the current face size in points (1/72 inch).

- void **ftglSetFontDepth** (**FTGLfont** ∗font, float depth)

  Set the extrusion distance for the font.
- void **ftglSetFontOutset** (**FTGLfont** ∗font, float front, float back)

  Set the outset distance for the font.
- void **ftglSetFontDisplayList** (**FTGLfont** ∗font, int useList)

  *Enable or disable the use of Display Lists inside **FTGL** (*p. *21**).*
- float **ftglGetFontAscender** (**FTGLfont** ∗font)

  Get the global ascender height for the face.
- float **ftglGetFontDescender** (**FTGLfont** ∗font)

  Gets the global descender height for the face.
- float **ftglGetFontLineHeight** (**FTGLfont** ∗font)

  Gets the line spacing for the font.
- void **ftglGetFontBBox** (**FTGLfont** ∗font, const char ∗string, int len, float bounds[6])

  Get the bounding box for a string.
- float **ftglGetFontAdvance** (**FTGLfont** ∗font, const char ∗string)

  Get the advance width for a string.
- void **ftglRenderFont** (**FTGLfont** ∗font, const char ∗string, int mode)

  Render a string of characters.
- FT_Error **ftglGetFontError** (**FTGLfont** ∗font)

  Query a font for errors.

7.8.1 Typedef Documentation

7.8.1.1 typedef struct _FTGLfont FTGLfont

Definition at line 399 of file FTFont.h.

7.8.2 Function Documentation

7.8.2.1 int ftglAttachData (FTGLfont ∗ *font,* const unsigned char ∗ *data,* size_t *size*)

Attach auxilliary data to font, e.g.

font metrics, from memory.

Note: not all font formats implement this function.

pt3em**Parameters**

pt3em	pt3em*font*	pt3emAn FTGLfont∗ object.
	pt3em*data*	pt3emThe in-memory buffer.
	pt3em*size*	pt3emThe length of the buffer in bytes.

pt3em**Returns**

1 if file has been attached successfully.

7.8.2.2 int ftglAttachFile (FTGLfont ∗ *font,* const char ∗ *path*)

Attach auxilliary file to font e.g.

pt3em

font metrics.

Note: not all font formats implement this function.

pt3em**Parameters**

pt3em	pt3em*font*	pt3emAn FTGLfont∗ object.
	pt3em*path*	pt3emAuxilliary font file path.

pt3em**Returns**

1 if file has been attached successfully.

7.8.2.3 FTGLfont∗ ftglCreateCustomFont (char const ∗ *fontFilePath,* void ∗ *data,* FTGLglyph ∗(∗)(FT_GlyphSlot, void ∗) *makeglyphCallback*)

Create a custom **FTGL** (p. 21) font object.

pt3em**Parameters**

pt3em	pt3em *fontFilePath*	pt3emThe font file name.
	pt3em*data*	pt3emA pointer to private data that will be passed to callbacks.
	pt3em *makeglyph-Callback*	pt3emA glyph-making callback function.

pt3em**Returns**

An FTGLfont∗ object.

7.8.2.4 void ftglDestroyFont (FTGLfont ∗ *font*)

Destroy an **FTGL** (p. 21) font object.

pt3em**Parameters**

pt3em	pt3em*font*	pt3emAn FTGLfont∗ object.

7.8.2.5 float ftglGetFontAdvance (FTGLfont ∗ *font,* const char ∗ *string*)

Get the advance width for a string.

pt3em**Parameters**

pt3em	pt3em*font*	pt3emAn FTGLfont∗ object.
	pt3em*string*	pt3emA char string.

pt3em

pt3em**Returns**

Advance width

7.8.2.6 float ftglGetFontAscender (FTGLfont * *font*)

Get the global ascender height for the face.

pt3em**Parameters**

pt3em	pt3em*font*	pt3emAn FTGLfont* object.

pt3em**Returns**

Ascender height

7.8.2.7 void ftglGetFontBBox (FTGLfont * *font,* const char * *string,* int *len,* float *bounds[6]*)

Get the bounding box for a string.

pt3em**Parameters**

pt3em	pt3em*font*	pt3emAn FTGLfont* object.
	pt3em*string*	pt3emA char buffer
	pt3em*len*	pt3emThe length of the string. If < 0 then all characters will be checked until a null character is encountered (optional).
	pt3em*bounds*	pt3emAn array of 6 float values where the bounding box's lower left near and upper right far 3D coordinates will be stored.

7.8.2.8 unsigned int ftglGetFontCharMapCount (FTGLfont * *font*)

Get the number of character maps in this face.

pt3em**Parameters**

pt3em	pt3em*font*	pt3emAn FTGLfont* object.

pt3em**Returns**

character map count.

7.8.2.9 FT_Encoding* ftglGetFontCharMapList (FTGLfont * *font*)

Get a list of character maps in this face.

pt3em**Parameters**

pt3em	pt3em*font*	pt3emAn FTGLfont* object.

pt3em

pt3em**Returns**

pointer to the first encoding.

7.8.2.10 float ftglGetFontDescender (FTGLfont * *font*)

Gets the global descender height for the face.

pt3em**Parameters**

pt3em	pt3em*font*	pt3emAn FTGLfont* object.

pt3em**Returns**

Descender height

7.8.2.11 FT_Error ftglGetFontError (FTGLfont * *font*)

Query a font for errors.

pt3em**Parameters**

pt3em	pt3em*font*	pt3emAn FTGLfont* object.

pt3em**Returns**

The current error code.

7.8.2.12 unsigned int ftglGetFontFaceSize (FTGLfont * *font*)

Get the current face size in points (1/72 inch).

pt3em**Parameters**

pt3em	pt3em*font*	pt3emAn FTGLfont* object.

pt3em**Returns**

face size

7.8.2.13 float ftglGetFontLineHeight (FTGLfont * *font*)

Gets the line spacing for the font.

pt3em**Parameters**

pt3em	pt3em*font*	pt3emAn FTGLfont* object.

pt3em

pt3em**Returns**

Line height

7.8.2.14 void ftglRenderFont (FTGLfont * *font*, const char * *string*, int *mode*)

Render a string of characters.

pt3em**Parameters**

pt3em pt3em*font*	pt3emAn FTGLfont* object.
pt3em*string*	pt3emChar string to be output.
pt3em*mode*	pt3emRender mode to display.

7.8.2.15 int ftglSetFontCharMap (FTGLfont * *font*, FT_Encoding *encoding*)

Set the character map for the face.

pt3em**Parameters**

pt3em pt3em*font*	pt3emAn FTGLfont* object.
pt3em*encoding*	pt3emFreetype enumerate for char map code.

pt3em**Returns**

1 if charmap was valid and set correctly.

7.8.2.16 void ftglSetFontDepth (FTGLfont * *font*, float *depth*)

Set the extrusion distance for the font.

Only implemented by **FTExtrudeFont** (p. 34).

pt3em**Parameters**

pt3em pt3em*font*	pt3emAn FTGLfont* object.
pt3em*depth*	pt3emThe extrusion distance.

7.8.2.17 void ftglSetFontDisplayList (FTGLfont * *font*, int *useList*)

Enable or disable the use of Display Lists inside **FTGL** (p. 21).

pt3em**Parameters**

pt3em pt3em*font*	pt3emAn FTGLfont* object.
pt3em*useList*	pt3em1 turns ON display lists. 0 turns OFF display lists.

pt3em

7.8.2.18 int ftglSetFontFaceSize (FTGLfont * *font,* unsigned int *size,* unsigned int *res*)

Set the char size for the current face.

pt3em**Parameters**

pt3em	pt3em*font*	pt3emAn FTGLfont* object.
	pt3em*size*	pt3emThe face size in points (1/72 inch).
	pt3em*res*	pt3emThe resolution of the target device, or 0 to use the default value of 72.

pt3em**Returns**

1 if size was set correctly.

7.8.2.19 void ftglSetFontOutset (FTGLfont * *font,* float *front,* float *back*)

Set the outset distance for the font.

Only **FTOutlineFont** (p. 53), **FTPolygonFont** (p. 65) and **FTExtrudeFont** (p. 34) implement front outset. Only **FTExtrudeFont** (p. 34) implements back outset.

pt3em**Parameters**

pt3em	pt3em*font*	pt3emAn FTGLfont* object.
	pt3em*front*	pt3emThe front outset distance.
	pt3em*back*	pt3emThe back outset distance.

7.9 ftgl.dox File Reference

7.10 ftgl.h File Reference

```
#include <ft2build.h>
```

pt3em

```
#include <FT_FREETYPE_H>
#include <FT_GLYPH_H>
#include <FT_OUTLINE_H>
#include <FTGL/FTPoint.h>
#include <FTGL/FTBBox.h>
#include <FTGL/FTBuffer.h>
#include <FTGL/FTGlyph.h>
#include <FTGL/FTBitmapGlyph.h>
#include <FTGL/FTBufferGlyph.h>
#include <FTGL/FTExtrdGlyph.h>
#include <FTGL/FTOutlineGlyph.h>
#include <FTGL/FTPixmapGlyph.h>
#include <FTGL/FTPolyGlyph.h>
#include <FTGL/FTTextureGlyph.h>
#include <FTGL/FTFont.h>
#include <FTGL/FTGLBitmapFont.h>
#include <FTGL/FTBufferFont.h>
#include <FTGL/FTGLExtrdFont.h>
#include <FTGL/FTGLOutlineFont.h>
#include <FTGL/FTGLPixmapFont.h>
#include <FTGL/FTGLPolygonFont.h>
#include <FTGL/FTGLTextureFont.h>
#include <FTGL/FTLayout.h>
#include <FTGL/FTSimpleLayout.h>
```

Namespaces

- namespace **FTGL**

Macros

- #define **FTGL_BEGIN_C_DECLS** extern "C" { namespace FTGL {
- #define **FTGL_END_C_DECLS** } }
- #define **FTGL_EXPORT**

Typedefs

- typedef double **FTGL_DOUBLE**
- typedef float **FTGL_FLOAT**

Enumerations

- enum **FTGL::RenderMode** { **FTGL::RENDER_FRONT** = 0x0001, **FTGL::RENDER_BACK** = 0x0002, **FTGL::RENDER_SIDE** = 0x0004, **FTGL::RENDER_ALL** = 0xffff }
- enum **FTGL::TextAlignment** { **FTGL::ALIGN_LEFT** = 0, **FTGL::ALIGN_CENTER** = 1, **FTGL::ALIGN_RIGHT** = 2, **FTGL::ALIGN_JUSTIFY** = 3 }

7.10.1 Macro Definition Documentation

7.10.1.1 #define FTGL_BEGIN_C_DECLS extern "C" { namespace FTGL {

Definition at line 43 of file ftgl.h.

pt3em

7.10.1.2 #define FTGL_END_C_DECLS } }

Definition at line 44 of file ftgl.h.

7.10.1.3 #define FTGL_EXPORT

Definition at line 107 of file ftgl.h.

7.10.2 Typedef Documentation

7.10.2.1 typedef double FTGL_DOUBLE

Definition at line 38 of file ftgl.h.

7.10.2.2 typedef float FTGL_FLOAT

Definition at line 39 of file ftgl.h.

7.11 FTGLBitmapFont.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTBitmapFont**

  FTBitmapFont *(*p. *26) is a specialisation of the* ***FTFont*** *(*p. *37) class for handling Bitmap fonts.*

Macros

- #define **FTGLBitmapFont FTBitmapFont**

Functions

- **FTGLfont** ∗ **ftglCreateBitmapFont** (const char ∗file)

  Create a specialised FTGLfont object for handling bitmap fonts.

7.11.1 Macro Definition Documentation

7.11.1.1 #define FTGLBitmapFont FTBitmapFont

Definition at line 84 of file FTGLBitmapFont.h.

pt3em

7.11.2 Function Documentation

7.11.2.1 FTGLfont∗ ftglCreateBitmapFont (const char ∗ *file*)

Create a specialised FTGLfont object for handling bitmap fonts.

pt3em**Parameters**

pt3em	pt3em*file*	pt3emThe font file name.

pt3em**Returns**

An FTGLfont∗ object.

pt3em**See also**

FTGLfont (p. 81)

7.12 FTGLExtrdFont.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTExtrudeFont**
  FTExtrudeFont *(*p. *34) is a specialisation of the* ***FTFont*** *(*p. *37) class for handling extruded Polygon fonts.*

Macros

- #define **FTGLExtrdFont FTExtrudeFont**

Functions

- **FTGLfont** ∗ **ftglCreateExtrudeFont** (const char ∗file)
  Create a specialised FTGLfont object for handling extruded poygon fonts.

7.12.1 Macro Definition Documentation

7.12.1.1 #define FTGLExtrdFont FTExtrudeFont

Definition at line 85 of file FTGLExtrdFont.h.

7.12.2 Function Documentation

7.12.2.1 FTGLfont∗ ftglCreateExtrudeFont (const char ∗ *file*)

Create a specialised FTGLfont object for handling extruded poygon fonts.

pt3em

pt3em**Parameters**

pt3em	pt3em*file*	pt3emThe font file name.

pt3em**Returns**

An FTGLfont∗ object.

pt3em**See also**

FTGLfont (p. 81)
ftglCreatePolygonFont (p. 92)

7.13 FTGLOutlineFont.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTOutlineFont**

  FTOutlineFont *(*p. *53) is a specialisation of the* ***FTFont*** *(*p. *37) class for handling Vector Outline fonts.*

Macros

- #define **FTGLOutlineFont FTOutlineFont**

Functions

- **FTGLfont** ∗ **ftglCreateOutlineFont** (const char ∗file)

  Create a specialised FTGLfont object for handling vector outline fonts.

7.13.1 Macro Definition Documentation

7.13.1.1 #define FTGLOutlineFont FTOutlineFont

Definition at line 84 of file FTGLOutlineFont.h.

7.13.2 Function Documentation

7.13.2.1 FTGLfont∗ ftglCreateOutlineFont (const char ∗ *file*)

Create a specialised FTGLfont object for handling vector outline fonts.

pt3em**Parameters**

pt3em	pt3em*file*	pt3emThe font file name.

pt3em

pt3em**Returns**

An FTGLfont∗ object.

pt3em**See also**

FTGLfont (p. 81)

7.14 FTGLPixmapFont.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTPixmapFont**

  FTPixmapFont *(p. 56) is a specialisation of the* ***FTFont*** *(p. 37) class for handling Pixmap (Grey Scale) fonts.*

Macros

- #define **FTGLPixmapFont FTPixmapFont**

Functions

- **FTGLfont** ∗ **ftglCreatePixmapFont** (const char ∗file)

  Create a specialised FTGLfont object for handling pixmap (grey scale) fonts.

7.14.1 Macro Definition Documentation

7.14.1.1 #define FTGLPixmapFont FTPixmapFont

Definition at line 84 of file FTGLPixmapFont.h.

7.14.2 Function Documentation

7.14.2.1 FTGLfont∗ ftglCreatePixmapFont (const char ∗ *file*)

Create a specialised FTGLfont object for handling pixmap (grey scale) fonts.

pt3em**Parameters**

pt3em	pt3em*file*	pt3emThe font file name.

pt3em**Returns**

An FTGLfont∗ object.

pt3em

pt3emSee also

FTGLfont (p. 81)

7.15 FTGLPolygonFont.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTPolygonFont**

  FTPolygonFont *(p. 65) is a specialisation of the* ***FTFont*** *(p. 37) class for handling tesselated Polygon Mesh fonts.*

Macros

- #define **FTGLPolygonFont FTPolygonFont**

Functions

- **FTGLfont** ∗ **ftglCreatePolygonFont** (const char ∗file)

  Create a specialised FTGLfont object for handling tesselated polygon mesh fonts.

7.15.1 Macro Definition Documentation

7.15.1.1 #define FTGLPolygonFont FTPolygonFont

Definition at line 84 of file FTGLPolygonFont.h.

7.15.2 Function Documentation

7.15.2.1 FTGLfont∗ ftglCreatePolygonFont (const char ∗ *file*)

Create a specialised FTGLfont object for handling tesselated polygon mesh fonts.

pt3emParameters

pt3em	pt3em*file*	pt3emThe font file name.

pt3emReturns

An FTGLfont∗ object.

pt3emSee also

FTGLfont (p. 81)

pt3em

7.16 FTGLTextureFont.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTTextureFont**

  FTTextureFont *(*p. *73) is a specialisation of the* ***FTFont*** *(*p. *37) class for handling Texture mapped fonts.*

Macros

- #define **FTGLTextureFont FTTextureFont**

Functions

- **FTGLfont** ∗ **ftglCreateTextureFont** (const char ∗file)

  Create a specialised FTGLfont object for handling texture-mapped fonts.

7.16.1 Macro Definition Documentation

7.16.1.1 #define FTGLTextureFont FTTextureFont

Definition at line 84 of file FTGLTextureFont.h.

7.16.2 Function Documentation

7.16.2.1 FTGLfont∗ ftglCreateTextureFont (const char ∗ *file*)

Create a specialised FTGLfont object for handling texture-mapped fonts.

pt3em**Parameters**

pt3em	pt3em*file*	pt3emThe font file name.

pt3em**Returns**

An FTGLfont∗ object.

pt3em**See also**

FTGLfont (p. 81)

7.17 FTGlyph.h File Reference

```
#include <FTGL/ftgl.h>
```

pt3em

Data Structures

- class **FTGlyph**

  FTGlyph *(*p. *47) is the base class for* ***FTGL*** *(*p. *21) glyphs.*

Typedefs

- typedef struct _FTGLglyph **FTGLglyph**

Functions

- **FTGLglyph** ∗ **ftglCreateCustomGlyph** (**FTGLglyph** ∗base, void ∗data, void(∗renderCallback)(**FTGLglyph** ∗, void ∗, **FTGL_DOUBLE**, **FTGL_DOUBLE**, int, **FTGL_DOUBLE** ∗, **FTGL_DOUBLE** ∗), void(∗destroyCallback)(**FTGLglyph** ∗, void ∗))

  Create a custom ***FTGL*** *(*p. *21) glyph object.*
- void **ftglDestroyGlyph** (**FTGLglyph** ∗glyph)

  Destroy an ***FTGL*** *(*p. *21) glyph object.*
- void **ftglRenderGlyph** (**FTGLglyph** ∗glyph, **FTGL_DOUBLE** penx, **FTGL_DOUBLE** peny, int renderMode, **FTGL_DOUBLE** ∗advancex, **FTGL_DOUBLE** ∗advancey)

  Render a glyph at the current pen position and compute the corresponding advance.
- float **ftglGetGlyphAdvance** (**FTGLglyph** ∗glyph)

  Return the advance for a glyph.
- void **ftglGetGlyphBBox** (**FTGLglyph** ∗glyph, float bounds[6])

  Return the bounding box for a glyph.
- FT_Error **ftglGetGlyphError** (**FTGLglyph** ∗glyph)

  Query a glyph for errors.

7.17.1 Typedef Documentation

7.17.1.1 typedef struct _FTGLglyph FTGLglyph

Definition at line 133 of file FTGlyph.h.

7.17.2 Function Documentation

7.17.2.1 FTGLglyph∗ ftglCreateCustomGlyph (FTGLglyph ∗ *base,* void ∗ *data,* void(∗)(FTGLglyph ∗, void ∗, FTGL_DOUBLE, FTGL_DOUBLE, int, FTGL_DOUBLE ∗, FTGL_DOUBLE ∗) *renderCallback,* void(∗)(FTGLglyph ∗, void ∗) *destroyCallback*)

Create a custom **FTGL** (p. 21) glyph object.

FIXME: maybe get rid of "base" and have advanceCallback etc. functions

pt3em**Parameters**

pt3em pt3em*base*	pt3emThe base FTGLglyph∗ to subclass.
pt3em*data*	pt3emA pointer to private data that will be passed to callbacks.
pt3em *renderCallback*	pt3emA rendering callback function.
pt3em *destroyCallback*	pt3emA callback function to be called upon destruction.

pt3em

pt3em**Returns**

An FTGLglyph∗ object.

7.17.2.2 void ftglDestroyGlyph (FTGLglyph ∗ *glyph*)

Destroy an **FTGL** (p. 21) glyph object.

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emAn FTGLglyph∗ object.

7.17.2.3 float ftglGetGlyphAdvance (FTGLglyph ∗ *glyph*)

Return the advance for a glyph.

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emAn FTGLglyph∗ object.

pt3em**Returns**

The advance's X component.

7.17.2.4 void ftglGetGlyphBBox (FTGLglyph ∗ *glyph,* float *bounds[6]*)

Return the bounding box for a glyph.

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emAn FTGLglyph∗ object.
pt3em*bounds*	pt3emAn array of 6 float values where the bounding box's lower left near and upper right far 3D coordinates will be stored.

7.17.2.5 FT_Error ftglGetGlyphError (FTGLglyph ∗ *glyph*)

Query a glyph for errors.

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emAn FTGLglyph∗ object.

pt3em**Returns**

The current error code.

pt3em

7.17.2.6 void ftglRenderGlyph (FTGLglyph * *glyph,* FTGL_DOUBLE *penx,* FTGL_DOUBLE *peny,* int *renderMode,* FTGL_DOUBLE * *advancex,* FTGL_DOUBLE * *advancey*)

Render a glyph at the current pen position and compute the corresponding advance.

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emAn FTGLglyph* object.
pt3em*penx*	pt3emThe current pen's X position.
pt3em*peny*	pt3emThe current pen's Y position.
pt3em *renderMode*	pt3emRender mode to display
pt3em*advancex*	pt3emA pointer to an FTGL_DOUBLE where to write the advance's X component.
pt3em*advancey*	pt3emA pointer to an FTGL_DOUBLE where to write the advance's Y component.

7.18 FTLayout.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTLayout**

  FTLayout *(*p. *50) is the interface for layout managers that render text.*

Typedefs

- typedef struct _FTGLlayout **FTGLlayout**

Functions

- void **ftglDestroyLayout** (**FTGLlayout** *layout)

  Destroy an ***FTGL*** *(*p. *21) layout object.*
- void **ftglGetLayoutBBox** (**FTGLlayout** *layout, const char *string, float bounds[6])

  Get the bounding box for a string.
- void **ftglRenderLayout** (**FTGLlayout** *layout, const char *string, int mode)

  Render a string of characters.
- FT_Error **ftglGetLayoutError** (**FTGLlayout** *layout)

  Query a layout for errors.

7.18.1 Typedef Documentation

7.18.1.1 typedef struct _FTGLlayout FTGLlayout

Definition at line 151 of file FTLayout.h.

pt3em

7.18.2 Function Documentation

7.18.2.1 void ftglDestroyLayout (FTGLlayout ∗ *layout*)

Destroy an **FTGL** (p. 21) layout object.

pt3em**Parameters**

pt3em*layout*	pt3emAn FTGLlayout∗ object.

7.18.2.2 void ftglGetLayoutBBox (FTGLlayout ∗ *layout,* const char ∗ *string,* float *bounds[6]*)

Get the bounding box for a string.

pt3em**Parameters**

pt3em*layout*	pt3emAn FTGLlayout∗ object.
pt3em*string*	pt3emA char buffer
pt3em*bounds*	pt3emAn array of 6 float values where the bounding box's lower left near and upper right far 3D coordinates will be stored.

7.18.2.3 FT_Error ftglGetLayoutError (FTGLlayout ∗ *layout*)

Query a layout for errors.

pt3em**Parameters**

pt3em*layout*	pt3emAn FTGLlayout∗ object.

pt3em**Returns**

The current error code.

7.18.2.4 void ftglRenderLayout (FTGLlayout ∗ *layout,* const char ∗ *string,* int *mode*)

Render a string of characters.

pt3em**Parameters**

pt3em*layout*	pt3emAn FTGLlayout∗ object.
pt3em*string*	pt3emChar string to be output.
pt3em*mode*	pt3emRender mode to display.

pt3em

7.19 FTOutlineGlyph.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTOutlineGlyph**

  FTOutlineGlyph *(p. 55) is a specialisation of* ***FTGlyph*** *(p. 47) for creating outlines.*

Functions

- **FTGLglyph** ∗ **ftglCreateOutlineGlyph** (FT_GlyphSlot glyph, float outset, int useDisplayList)

  Create a specialisation of FTGLglyph for creating outlines.

7.19.1 Function Documentation

7.19.1.1 FTGLglyph∗ ftglCreateOutlineGlyph (FT_GlyphSlot *glyph,* float *outset,* int *useDisplayList*)

Create a specialisation of FTGLglyph for creating outlines.

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emThe Freetype glyph to be processed
pt3em*outset*	pt3emoutset contour size
pt3em *useDisplayList*	pt3emEnable or disable the use of Display Lists for this glyph `true` turns ON display lists. `false` turns OFF display lists.

pt3em**Returns**

An FTGLglyph∗ object.

7.20 FTPixmapGlyph.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTPixmapGlyph**

  FTPixmapGlyph *(p. 58) is a specialisation of* ***FTGlyph*** *(p. 47) for creating pixmaps.*

Functions

- **FTGLglyph** ∗ **ftglCreatePixmapGlyph** (FT_GlyphSlot glyph)

  Create a specialisation of FTGLglyph for creating pixmaps.

pt3em

7.20.1 Function Documentation

7.20.1.1 FTGLglyph∗ ftglCreatePixmapGlyph (FT_GlyphSlot *glyph*)

Create a specialisation of FTGLglyph for creating pixmaps.

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emThe Freetype glyph to be processed

pt3em**Returns**

An FTGLglyph∗ object.

7.21 FTPoint.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTPoint**
  FTPoint (p. *59) class is a basic 3-dimensional point or vector.*

7.22 FTPolyGlyph.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTPolygonGlyph**
  FTPolygonGlyph (p. *67) is a specialisation of* ***FTGlyph*** (p. *47) for creating tessellated polygon glyphs.*

Macros

- #define **FTPolyGlyph FTPolygonGlyph**

Functions

- **FTGLglyph** ∗ **ftglCreatePolygonGlyph** (FT_GlyphSlot glyph, float outset, int useDisplayList)
  Create a specialisation of FTGLglyph for creating tessellated polygon glyphs.

7.22.1 Macro Definition Documentation

7.22.1.1 #define FTPolyGlyph FTPolygonGlyph

Definition at line 74 of file FTPolyGlyph.h.

pt3em

7.22.2 Function Documentation

7.22.2.1 FTGLglyph∗ ftglCreatePolygonGlyph (FT_GlyphSlot *glyph,* float *outset,* int *useDisplayList*)

Create a specialisation of FTGLglyph for creating tessellated polygon glyphs.

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emThe Freetype glyph to be processed
pt3em*outset*	pt3emoutset contour size
pt3em *useDisplayList*	pt3emEnable or disable the use of Display Lists for this glyph `true` turns ON display lists. `false` turns OFF display lists.

pt3em**Returns**

An FTGLglyph∗ object.

7.23 FTSimpleLayout.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTSimpleLayout**

  FTSimpleLayout *(*p. *69) is a specialisation of* ***FTLayout*** *(*p. *50) for simple text boxes.*

Functions

- **FTGLlayout** ∗ **ftglCreateSimpleLayout** (void)
- void **ftglSetLayoutFont** (**FTGLlayout** ∗, **FTGLfont** ∗)
- **FTGLfont** ∗ **ftglGetLayoutFont** (**FTGLlayout** ∗)
- void **ftglSetLayoutLineLength** (**FTGLlayout** ∗, const float)
- float **ftglGetLayoutLineLength** (**FTGLlayout** ∗)
- void **ftglSetLayoutAlignment** (**FTGLlayout** ∗, const int)
- int **ftglGetLayoutAlignement** (**FTGLlayout** ∗)
- void **ftglSetLayoutLineSpacing** (**FTGLlayout** ∗, const float)
- float **ftglGetLayoutLineSpacing** (**FTGLlayout** ∗)

7.23.1 Function Documentation

7.23.1.1 FTGLlayout∗ ftglCreateSimpleLayout (void)

7.23.1.2 int ftglGetLayoutAlignement (FTGLlayout ∗)

7.23.1.3 FTGLfont∗ ftglGetLayoutFont (FTGLlayout ∗)

7.23.1.4 float ftglGetLayoutLineLength (FTGLlayout ∗)

pt3em

7.23.1.5 float ftglGetLayoutLineSpacing (FTGLlayout *)

7.23.1.6 void ftglSetLayoutAlignment (FTGLlayout *, const int)

7.23.1.7 void ftglSetLayoutFont (FTGLlayout *, FTGLfont *)

7.23.1.8 void ftglSetLayoutLineLength (FTGLlayout *, const float)

7.23.1.9 void ftglSetLayoutLineSpacing (FTGLlayout *, const float)

7.24 FTTextureGlyph.h File Reference

```
#include <FTGL/ftgl.h>
```

Data Structures

- class **FTTextureGlyph**

  FTTextureGlyph *(*p. *74) is a specialisation of* ***FTGlyph*** *(*p. *47) for creating texture glyphs.*

Functions

- **FTGLglyph** * **ftglCreateTextureGlyph** (FT_GlyphSlot glyph, int id, int xOffset, int yOffset, int width, int height)

  Create a specialisation of FTGLglyph for creating pixmaps.

7.24.1 Function Documentation

7.24.1.1 FTGLglyph* ftglCreateTextureGlyph (FT_GlyphSlot *glyph,* int *id,* int *xOffset,* int *yOffset,* int *width,* int *height*)

Create a specialisation of FTGLglyph for creating pixmaps.

pt3em**Parameters**

pt3em pt3em*glyph*	pt3emThe Freetype glyph to be processed.
pt3em*id*	pt3emThe id of the texture that this glyph will be drawn in.
pt3em*xOffset*	pt3emThe x offset into the parent texture to draw this glyph.
pt3em*yOffset*	pt3emThe y offset into the parent texture to draw this glyph.
pt3em*width*	pt3emThe width of the parent texture.
pt3em*height*	pt3emThe height (number of rows) of the parent texture.

pt3em**Returns**

An FTGLglyph* object.

7.25 projects_using_ftgl.txt File Reference

7.26 tutorial.dox File Reference

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