

SETTING UP GLUT

CS 148 Fall 2014

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Introduction This document explains how to set up GLUT to work with your development environment. There are three sections, one for each of the major platforms. Each set of instructions is split into two sections. The first section needs to only be performed once to setup GLUT on your computer. The other section needs to be performed each time you set up a new OpenGL project. Note that if you're using the `myth` lab computers then GLUT has already been setup and you only need to add the appropriate compiler options.

Windows In this tutorial, we assume that you are using Visual C++. *As a Stanford student you should be able to download a full version of Visual Studio 2013 Professional from <http://www.dreamspark.com>.* All you will need for CS 148 is the C++ compiler.

- One Time Setup

1. Download the Windows GLUT distribution from <http://www.xmission.com/~nate/glut.html>. Make sure you download the bin zip file. Alternatively you could use freeglut from <http://freeglut.sf.net>. freeglut is simply an open source implementation of GLUT that is kept more up-to-date (Nate Robins' GLUT has not been updated since 1998), so it may be a better option. You can either download and compile the source from the freeglut site or get prepackaged Windows binaries from <http://www.transmissionzero.co.uk/software/freeglut-devel/>.
2. Unzip `glut.h` and `glut32.lib` somewhere to keep them permanently (i.e. not in your project directory). Unzip `glut32.dll` somewhere in your path so it will be accessible by all GLUT programs (C:\Windows\system32) will work, or put it someplace and add that directory to your path by right clicking My Computer, clicking Properties, click the Advanced tab, click the Environment Variables, and either edit or add the `PATH` variable under the User Variables section to contain the location of the file).
3. Copy `glut.h` into your `include\GL` directory. This is usually located inside Program Files (x86)\Microsoft Visual Studio 12.0\VC\include. You may not have a `GL` directory inside of `include`, in which case you should create one.
4. Option 1 – Copy `glut32.lib` into your `lib` directory. This is usually Program Files (x86)\Microsoft Visual Studio 12.0\VC\lib. Using this method will allow you to use the pre-made Visual Studio solution files.
5. Option 2 – Keep your `glut32.lib` elsewhere and:
 - (a) With a project open in Visual Studio, go to View → Other Windows → Property Manager
 - (b) Expand the tree item for your project, then expand either the “Debug” or “Release” folders.
 - (c) Double-click “Microsoft.Cpp.Win32.user.” This is a global “Property Sheet” whose settings affect every Visual Studio project you build.
 - (d) Select “VC++ Directories” and add the directory containing `glut32.lib` to the “Library Directories” field.
6. Now `glut.h` and `glut32.lib` will always be accessible for all of your projects.

- Per Project Setup

1. To add the library to the list of libraries to link to, go to Project → Properties...

2. Select Linker → Input in the tree on the left.
3. Add `glut32.lib` to “Additional Dependencies.”
4. You should now be able to compile a GLUT program. The GLUT header will be `GL/glut.h` (assuming you placed `glut.h` in your GL directory). The GL headers will be `GL/gl.h` and `GL/glu.h`.

Mac OS X

- One Time Setup: You will need to install the developer tools provided by Apple. In previous versions of Xcode and OSX, these may be installed through Xcode via Preferences → Downloads → Command Line Tools. Starting in Xcode 5.0.1 and OSX 10.9, the command line tools must be downloaded and installed from <https://developer.apple.com/downloads/index.action>, which requires a developer account to sign in. After installing the command line tools, you can either use the Xcode projects provided with the assignment starter code directly, or you can create a project from scratch by following the steps below.
- Per Project Setup: Xcode 5
 1. Open Xcode
 2. Create a new project by clicking “Create a new Xcode project”
 3. In the OS X section under Applications, choose “Command Line Tool.” Fill in the project name and finish creating the project. You can specify the language to be either C/C++.
 4. Switch to the “Build Phases” tab and open the section titled “Link Binary w/ Libraries”. Click the “+” and add `OpenGL.framework` and `GLUT.framework`.
 5. The headers for GL, GLU, and GLUT are `OpenGL/gl.h`, `OpenGL/glu.h`, and `GLUT/glut.h` respectively.
- Per Project Setup: Makefile
 1. If you’re building your project using a Makefile, you’ll just need to add the frameworks (OpenGL and GLUT) to the compiler invocation. For example, for a simple project your command line might look like this:


```
g++ -o gl_app -framework GLUT -framework OpenGL main.cpp
```
- Per Project Setup: Eclipse on OS X
 1. Launch Eclipse
 2. Right-click on your Project’s icon in the “Project Explorer” pane.
 3. Choose “Properties” from the context menu
 4. Choose “C/C++ Build:Properties” from the dialog box tree view.
 5. Choose “Tool Settings” from the tab list
 6. Choose “Mac OS X C++ Linker : Miscellaneous”
 7. Add the following text to the “Linker flags” field: `-framework GLUT -framework OpenGL`

Linux

- One Time Setup: Use your package manager to install the GLUT libraries and their development packages. Some distributions may use an updated version or rewrite of GLUT, such as `freeglut` (on Ubuntu, for example, you’ll want package `freeglut3-dev`). Even so, there will probably be a metapackage for `glut` and `glut-dev`. Note that you will likely have to install quite a few dependencies as well. For recent versions of Ubuntu, the command


```
sudo apt-get install freeglut3-dev
```

will install the correct libraries. Once you have installed the correct libraries, the necessary header files should be available in `/usr/include/` and the appropriate libraries in `/usr/lib/`. Note that there will be two options for developing on Linux: Makefiles or CMake. If you choose to develop with the CMake project, you will also need to install the `libxmu` and `libxi` development libraries.

- Per Project Setup: The header files will be `GL/gl.h`, `GL/glu.h`, and `GL/glut.h`. Generally they will all be installed in `/usr/include` which should make them available by default to the compiler. If they are not available you'll have to locate them and add the path to the compiler command line using `-I/path/to/header/files`. To link to the GLUT library simply add `-lglut` to the compiler command line. A sample compiler invocation would be

```
g++ -o gl_app -lglut main.cpp
```

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