

## Programming Assignment 2

Due: November 19, 2008

In this assignment you will learn to use the OpenGL API. C or C++ is the preferred language when using OpenGL. I provide a zip file with one demonstration program. Create a project with Microsoft Visual C++, compile it and run it. Again, you will be working in groups of 2 or 3, as will be suitable for your time and temperament.

For those who do not know how to compile and run the program, here are the instructions. However, most of you probably would be able to do this easily.

### Compile and Run

1. Download the source code.

2. Install glut for win32 on your Windows machine

Download from <http://www.xmission.com/~nate/glut.html>

Copy glut32.dll to c:\windows\system32

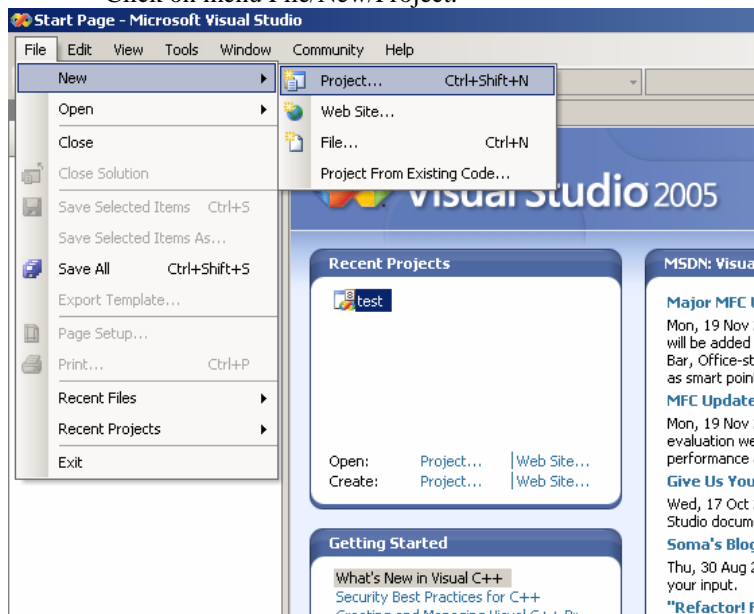
Copy glut32.lib to C:\Program Files\Microsoft Visual Studio 8\VC\PlatformSDK\Lib

Copy glut.h to C:\Program Files\Microsoft Visual Studio 8\VC\PlatformSDK\Include\gl

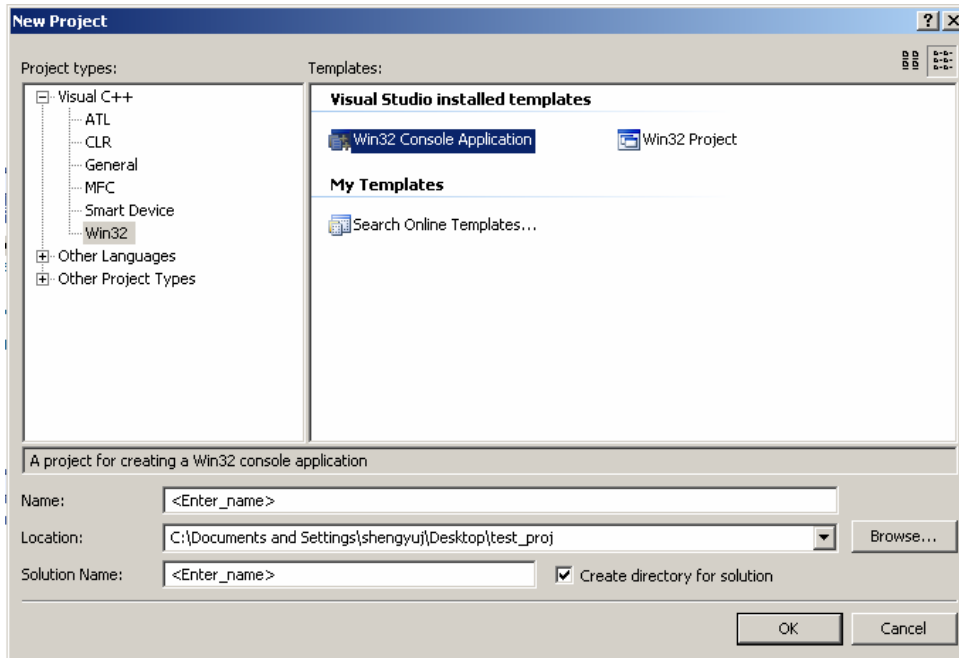
3. Create a Visual Studio project and add the source code

Choose Visual C++ environment if it asks (optional).

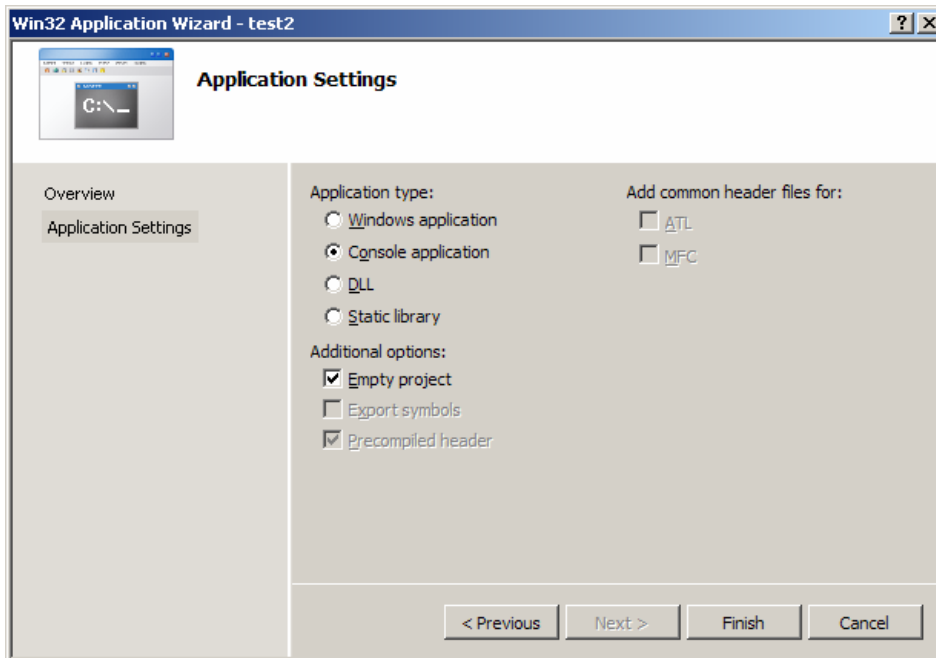
Click on menu File/New/Project.



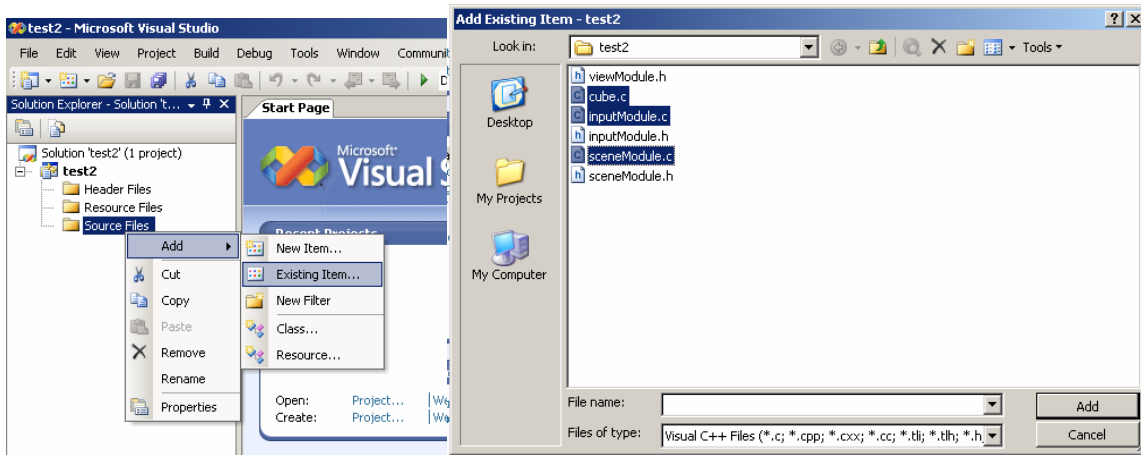
Under Visual C++ projects, select Win32 Console project, enter project name and location. Click OK.



On the Win32 application Wizard window, select Console application and check empty project. Click Finish.



Copy all source files to the project folder (the one with the .vcproj file). Add all .c files to the project.



Compile and run. Click on the tool bar button shown below.



## Check if you can modify the code

Locate in cube.c the line where the window title is set, change it to your login name, compile and run it again and see if you see the change in the window title.

## The Real Assignment

### Part A: Goal: Write an animation using OpenGL

Write a program to display two cubes - Spinner and Revolver, that satisfy the following constraints:

- Spinner should rotate about an axis through its center, parallel to any edge.
- Revolver rotates about the same axis as Spinner revolving around Spinner.
- Revolver DOES NOT rotate about an axis through its own center.
- The frequency of Spinner rotating about its own axis should be the same as that of the rotating Revolver. This means, for every complete revolution of Revolver around Spinner, Spinner should itself have completed 360 degrees.
- Spinner should be larger than Revolver.
- Spinner and Revolver should NOT be of the same color.

Your program should support interactive viewpoint manipulation, i.e., the user should be able to use the mouse select viewpoint position in space. - Use `glLookAt` for this.

### Hints that MIGHT be useful

- Use `glTranslate`, `glRotate`, `glScale` - Look them up in the OpenGL reference
- OpenGL uses a local co-ordinate system, and POST-MULTIPLIES successive transformations.
- Think about how the mouse motion should affect the image. Look up `glLookAt`.
- `glutIdleFunc()` can be used to trigger a refresh of the image every short period of time,

and also update the animation. Read more in the URL:

<http://www.opengl.org/resources/libraries/glut/spec3/node63.html>

**Part B:** Goal: Light your object

Use OpenGL lighting and material to light your object. You should be able add lights or change the position of lights easily. You should be able to create all of ambient, diffused and specular lighting. You should be able to demonstrate your animation with light ON or OFF.

**Part C:** Goal: Write a point renderer

Use the horse model you generated in the first assignment. At every XYZ point you generated in this assignment, you are going to render a sphere. You should be able to change the radius of the sphere interactively.

**Part D:** How to submit?

Send me an email to fix an appointment and show me the demos in person.