OpenGL Programming with Visual Studio & freeglut

本節內容

1. 簡介GLUT以及freeglut工具
2. 設定freeglut在開發環境 Visual Studio 2019
3. 執行測試第一個OpenGL程式

本節目標

1. 認識GLUT以及freeglut
2. 學會設定freeglut在開發環境上
3. 執行第一支OpenGL程式

簡介GLUT以及freeglut工具

GLUT

- OpenGL Utility Toolkit縮寫
  - 幫助OpenGL學習者能夠容易的使用「視窗操作，製作選單，鍵盤、滑鼠功能以及操作輸入輸出」
  - 但仍有問題存在，最新版本為GLUT3.7 (於2001年釋出)

freeglut

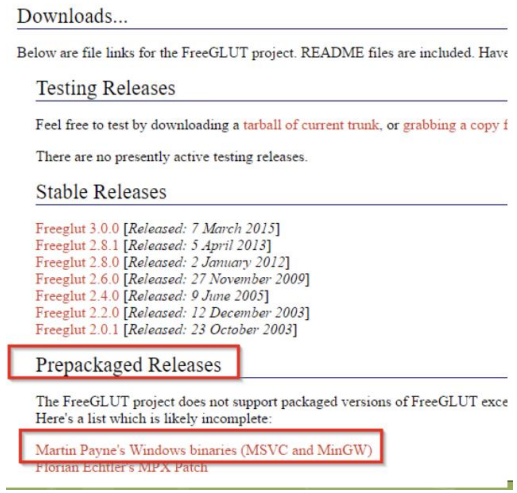
freeglut

- 本堂課主要使用的工具freeglut
  - 取代了GLUT，並改善了不少的缺點且持續在更新.
  - 目前最新版本Freeglut 3.2.1(於2019年釋出).

在開發環境 Visual Studio 2019 設定freeglut

Freeglut

- freeglut download
  - http://freeglut.sourceforge.net/
  - Prepackaged Releases
    - Martin Payne's Windows binaries (MSVC and MinGW)



Transmission Zero

freeglut Windows Development Libraries

Introduction

Whilst at the University of Essex, I took a module called "Interactive Computer Graphics" (or *EE222* as we referred to it). Half of the course consisted of using POV-Ray to create images, and then putting them together to make a high quality animation. The other half of the course consisted of programming real-time interactive graphics using C and OpenGL, with the help the GLUT library *freeglut*. I went on to do my final year project, creating a simulation in C++ and OpenGL. It was the first time I had ever written a real application, and I still have a soft spot for GLUT.

For my university project, I used Nate Robins' GLUT for Win32 project for the Windows build, and freeglut for the Linux build. Windows freeglut binary packages are somewhat hard to find, particularly for the MinGW compiler, so I've created suitable packages and put them online. You can use them to build freeglut applications using Microsoft's Visual C++ and MinGW.

freeglut 3.0.0 MSVC Package

This package contains 32 and 64 bit Windows DLLs, import libraries, and header files, allowing freeglut applications to be written using Microsoft's Visual C++. The package was built from source code using Visual Studio 2013. The DLL is binary compatible with both my MinGW DLL, and the GLUT for Win32 DLL provided by Nate Robins. The DLL has been tested on Windows 98 SE, Windows ME, Windows 2000, Windows XP, Windows Vista, Windows 7 (64 bit), and Windows 8 (64 bit).

Download freeglut 3.0.0 for MSVC (with PGP signature and PGP key)

freeglut 3.0.0 MinGW Package

This package contains 32 and 64 bit Windows DLLs, import libraries, static libraries, and header files, allowing freeglut applications to be compiled using the MinGW compiler. The package was built from source code using MinGW. The DLL is binary compatible with both my MSVC DLL, and the GLUT for Win32 DLL provided by Nate Robins. The DLL has been tested on Windows 98 SE, Windows ME, Windows 2000, Windows XP, Windows Vista, Windows 7 (64 bit), and Windows 8 (64 bit).

The package should also work with the various IDEs which offer frontends to MinGW / gcc, for example Eclipse, Dev-C++, and Code::Blocks. However, you'll need to consult the manual for your IDE for instructions on how to do this.

Download freeglut 3.0.0 for MinGW (with PGP signature and PGP key)

For further details on using freeglut with MinGW, see my GLUT MinGW article.

freeglut

VS2019

環境設定

Include目錄

程式庫目錄

執行第一支程式

解壓縮freeglut.zip準備設定環境用

[要求]

在C碟路徑下自創資料結存放freeglut檔案

Ex: C:\OpenglLib\freeglut…

freeglut

VS2019

環境設定

Include目錄

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執行第一支程式

設定環境變數

freeglut

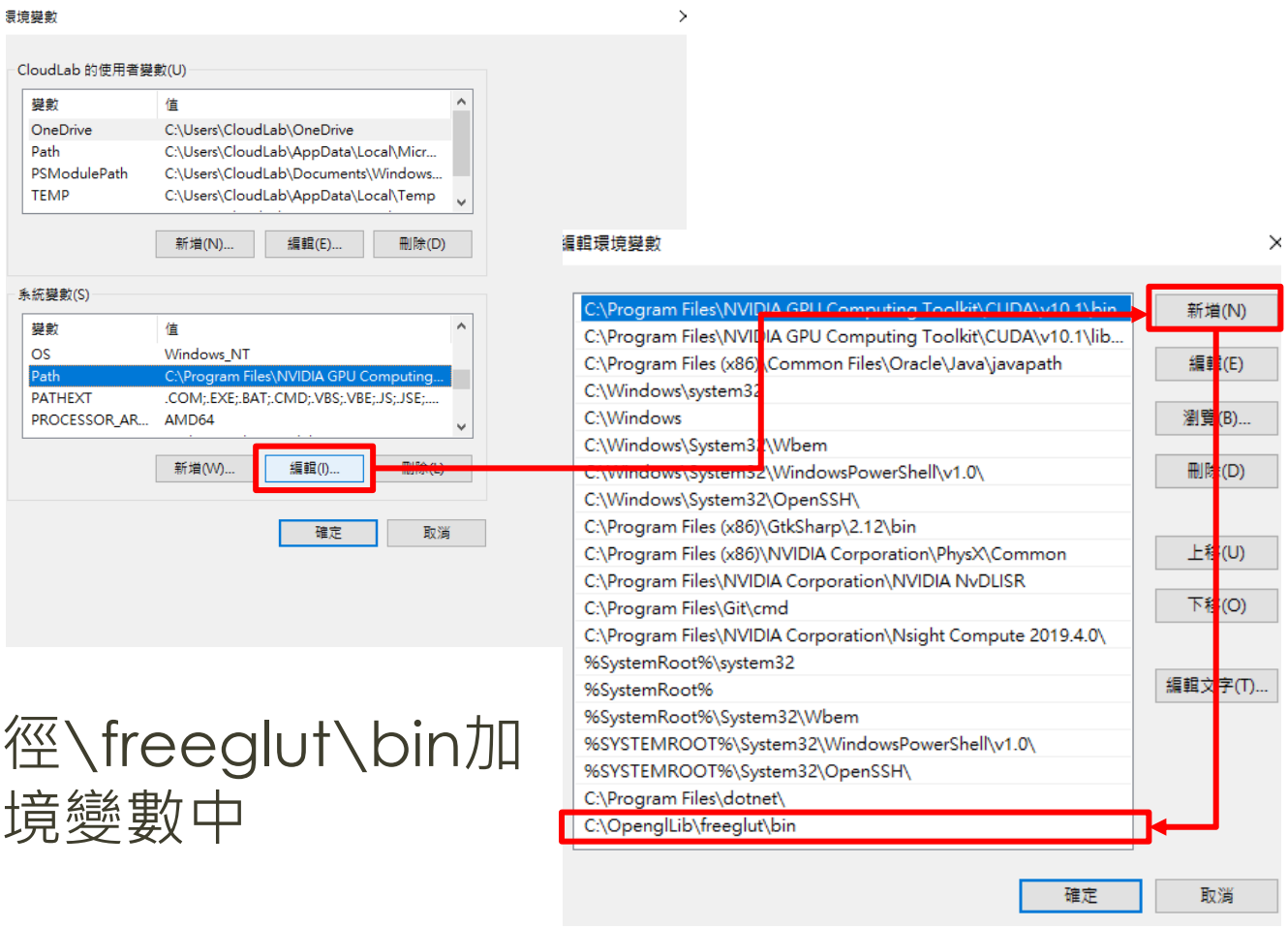
VS2019

環境設定

Include目錄

程式庫目錄

執行第一支程式



將你的路徑\freeglut\bin加入系統環境變數中

freeglut

VS2019

環境設定

Include目錄

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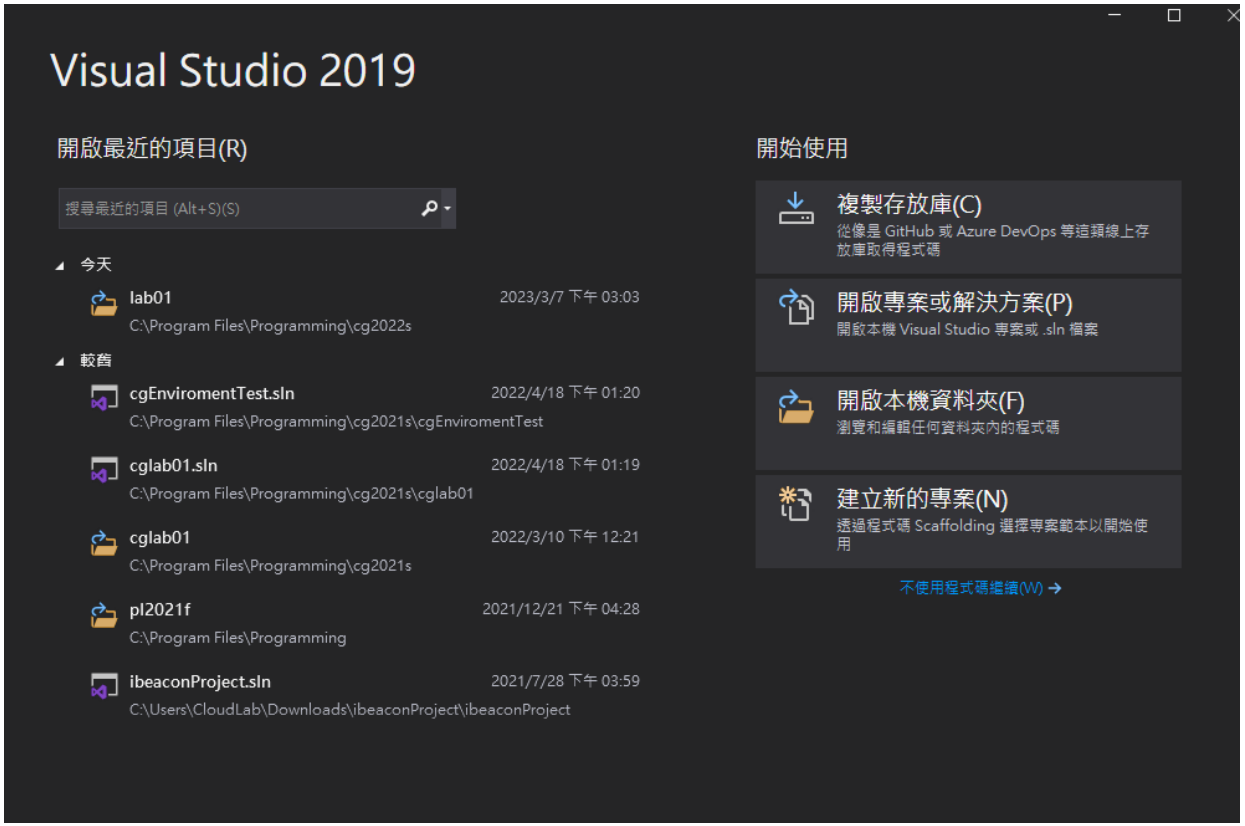
執行第一支程式



建立新專案□　空白專案□　專案路徑自己設定

freeglut

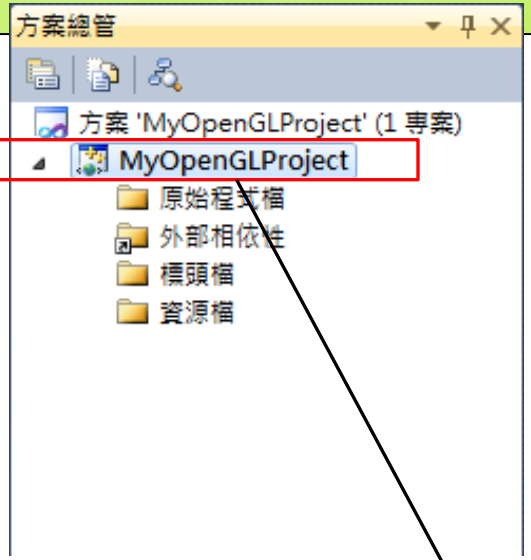
VS2019

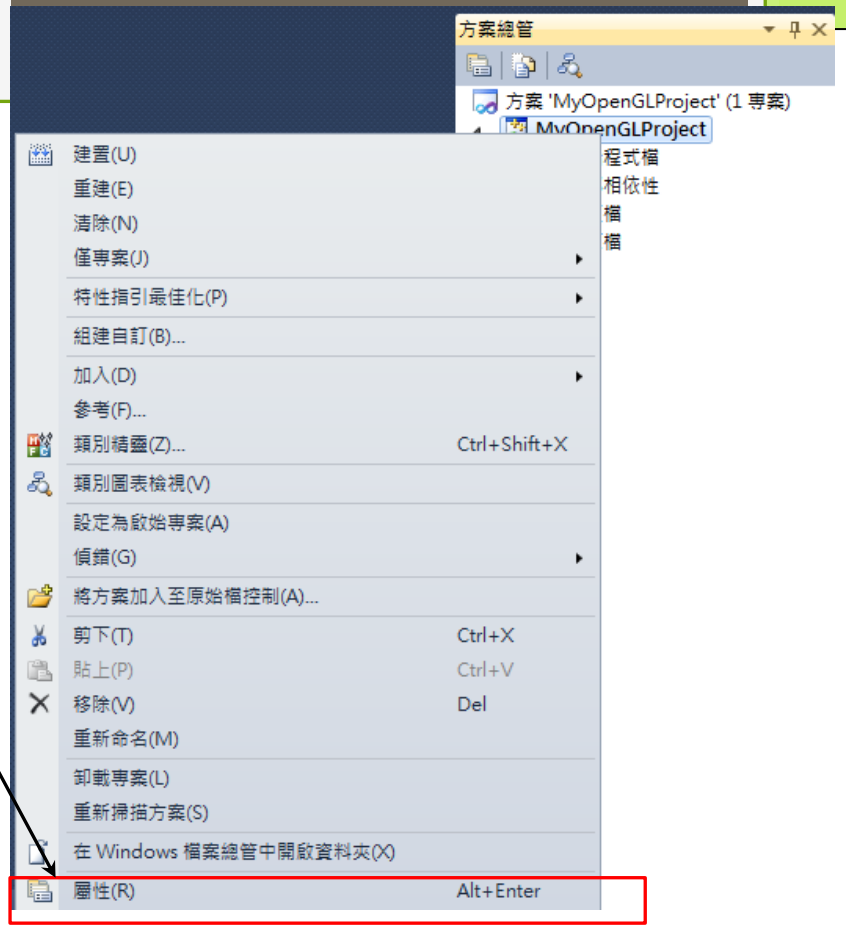
環境設定

Include目錄

程式庫目錄

執行第一支程式





設定專案屬性

→找到方案總管中的專案名稱

→滑鼠右鍵

→屬性

freeglut

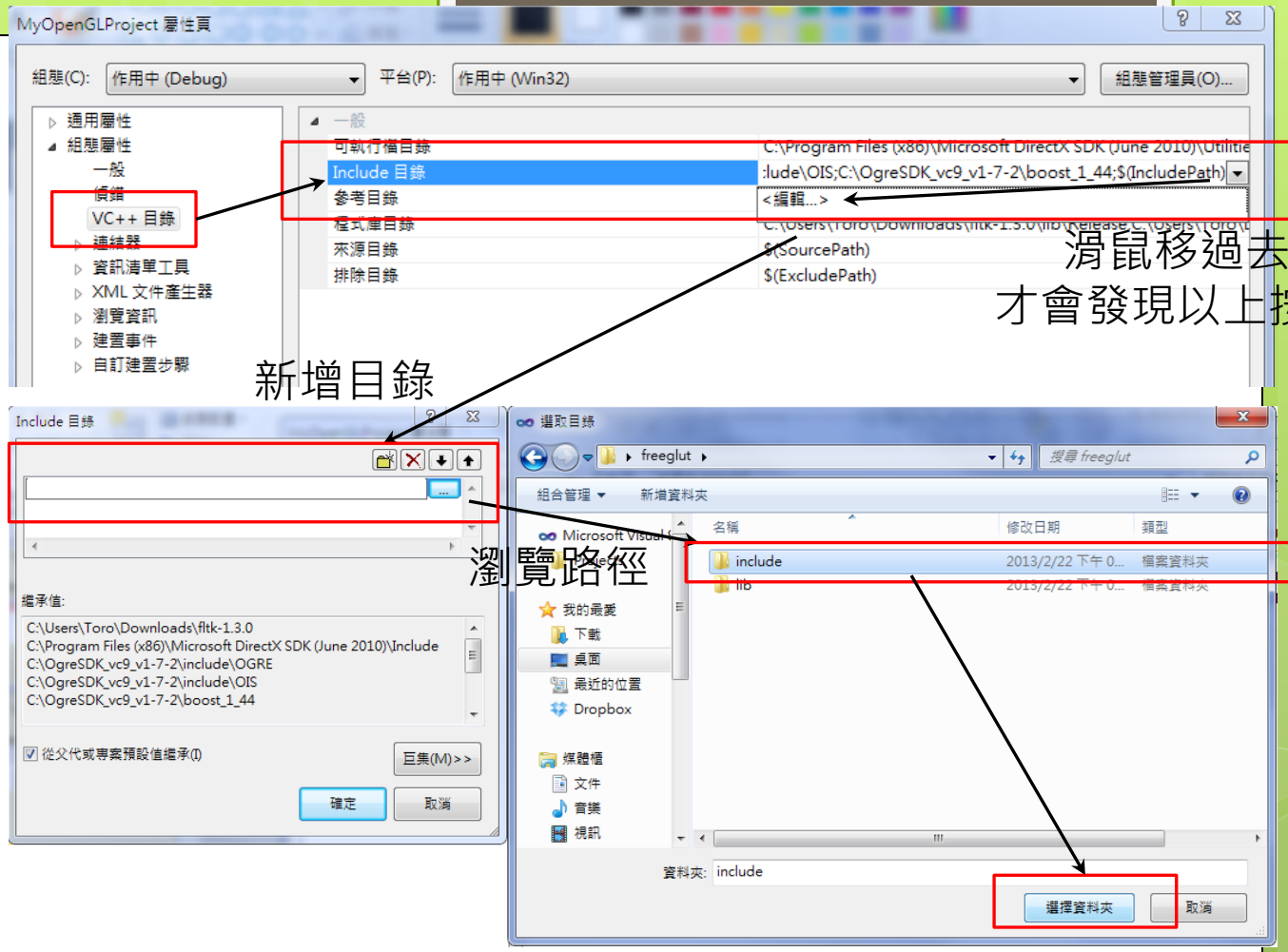
VS2019

環境設定

Include目錄

程式庫目錄

執行第一支程式



進入屬性後，找到VC++目錄點開它

→編輯Include目錄

→設定目錄，找到不久前下載的freeglut裡面有include

→選擇資料夾

freeglut

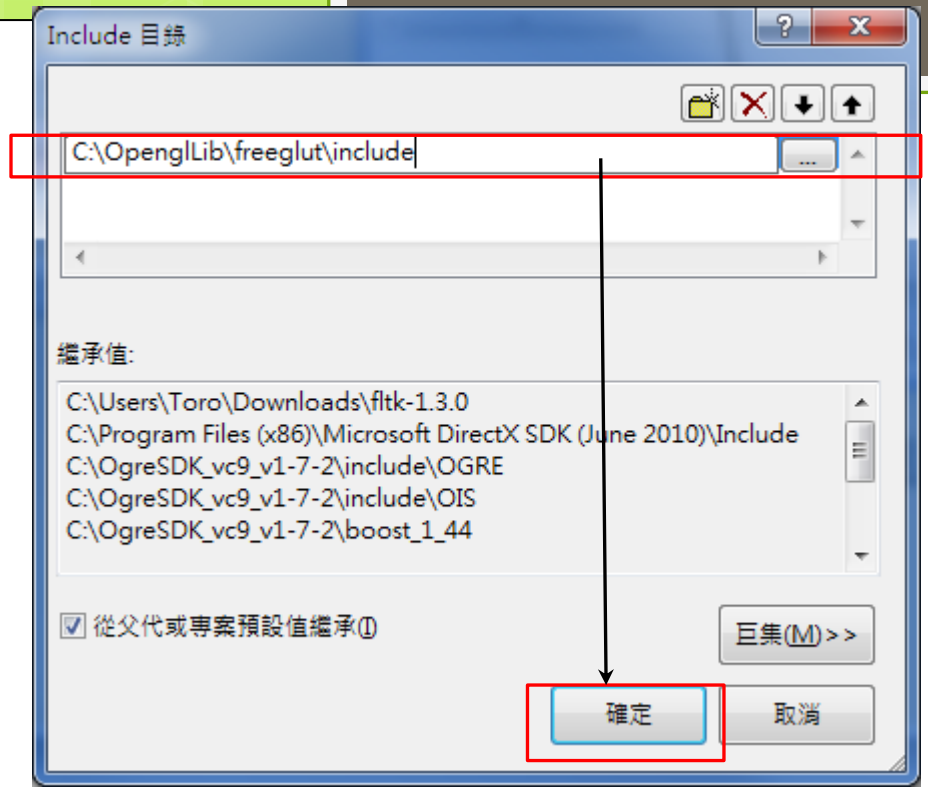
VS2019

環境設定

Include目錄

程式庫目錄

執行第一支程式



設定好include目錄的畫面，點選確定

freeglut

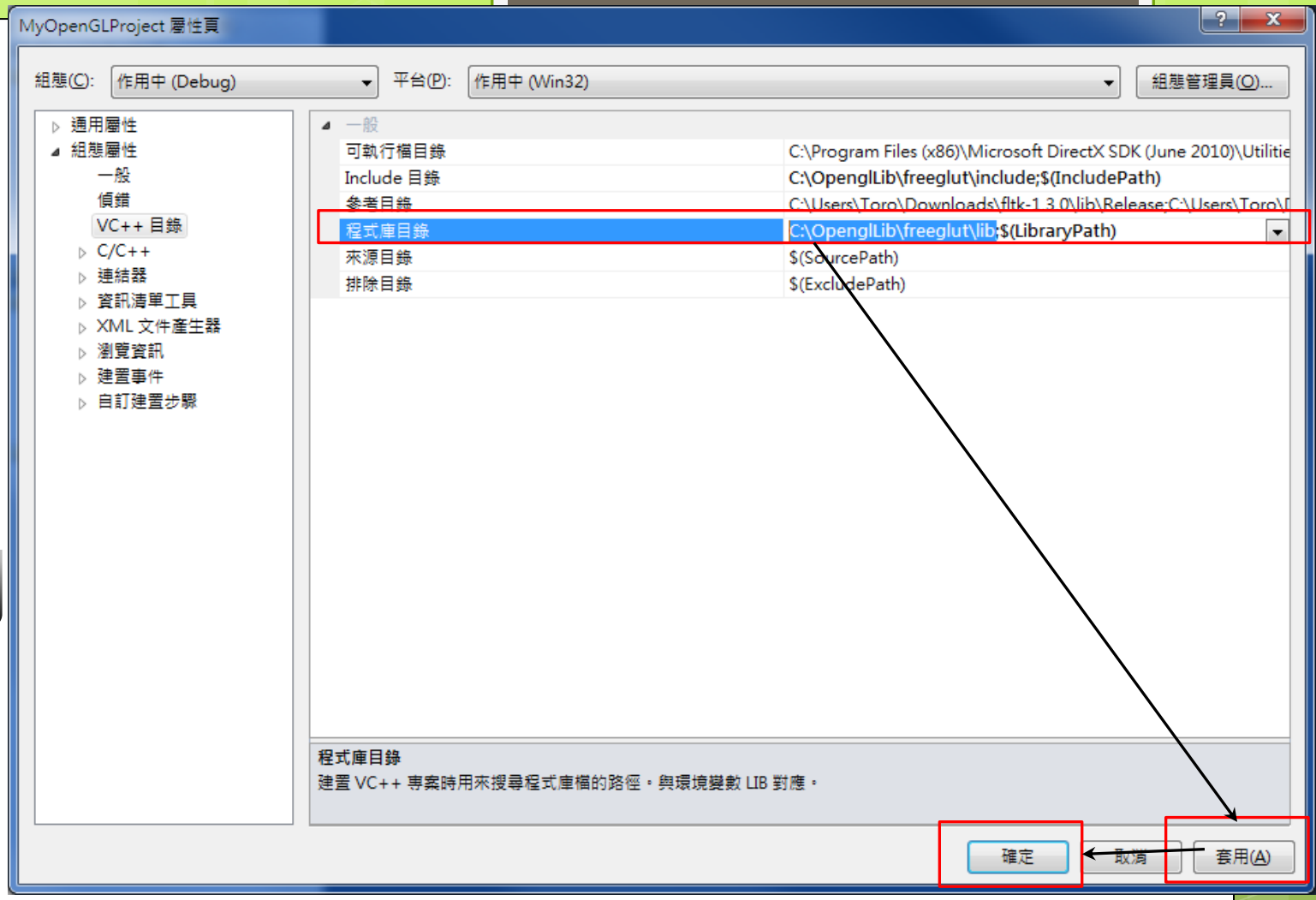
VS2019

環境設定

Include目錄

程式庫目錄

執行第一支程式



同樣操作模式，來設定「程式庫目錄」

→找到路徑freeglut的「lib」資料夾

找不到 “freeglut.h”?

- 調整include位置
  (freeglut.h位於./freeglut/include/GL資料夾底下)

```
#include <stdio.h>
#include <stdlib.h>
/*** freeglut***/
#include ".\GL\freeglut.h"
```

執行測試第一個OpenGL程式

freeglut

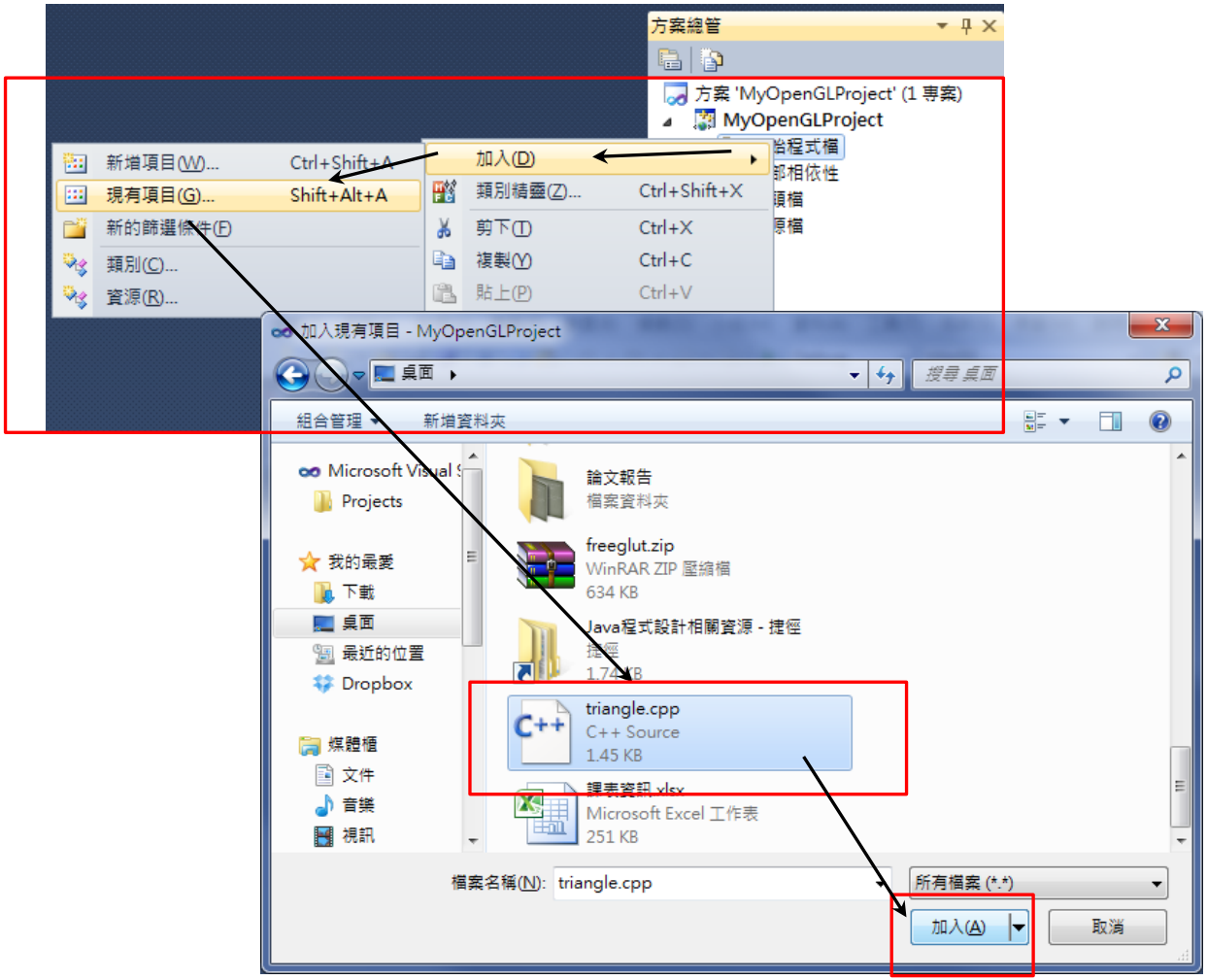
VS2010

環境設定

Include目錄

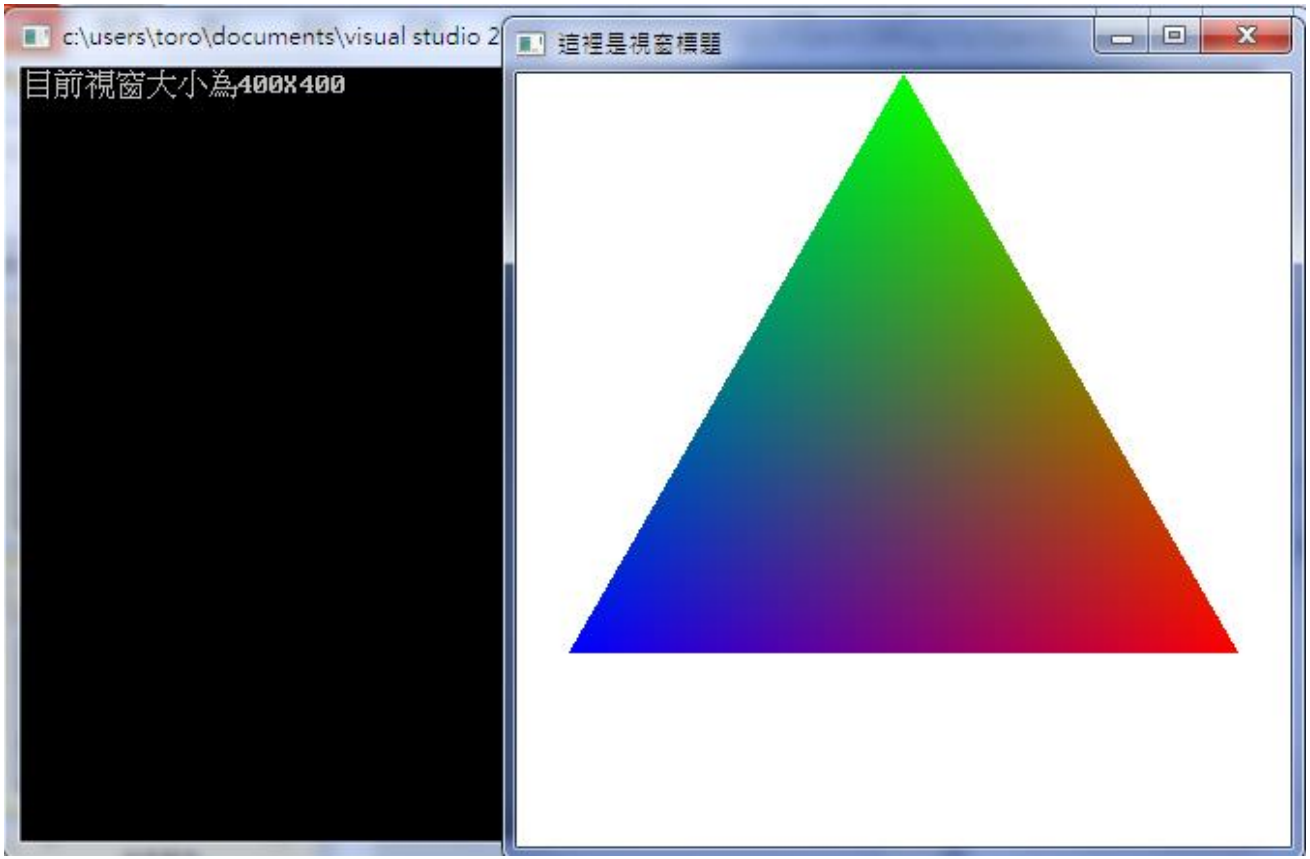
程式庫目錄

執行第一支程式



- 此時對原始程式檔點擊滑鼠右鍵
  →加入 →現有項目→找到範例檔triangle.cpp→點選加入

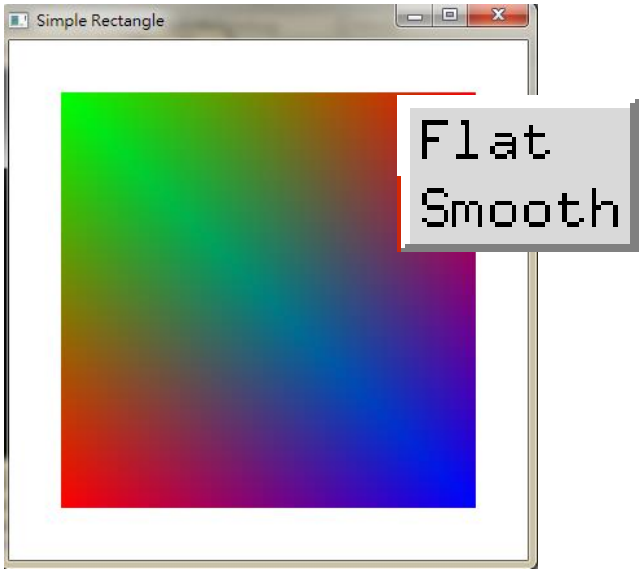
- triangle.cpp



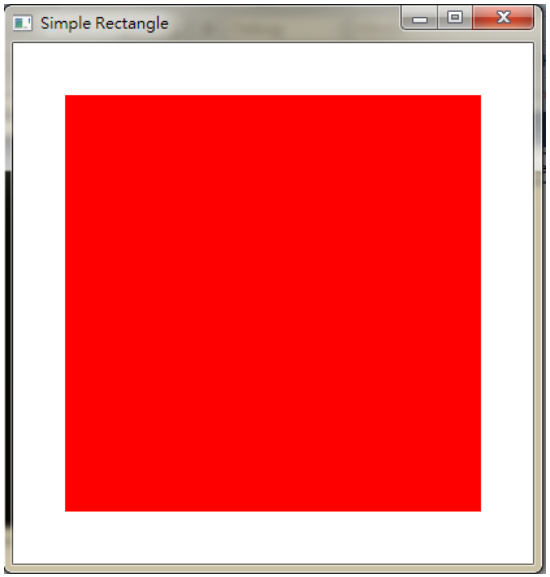
Exercise

- Create a rectangle
- Create a popup menu to select the shadeModel

glShadeModel(GL_SMOOTH);



glShadeModel(GL_FLAT);



Hint

- 如何創建右鍵選單
  - Popup Menu

```
int main(int argc, char** argv)
{
  glutInit(&argc, argv);
  glutInitDisplayMode(GLUT_DOUBLE | GLUT_RGB);
  glutInitWindowSize(400,400);
  glutInitWindowPosition(600,80);
  glutCreateWindow("Simple Triangle");

  BuildPopupMenu();

  glutReshapeFunc(ChangeSize);
  glutDisplayFunc(RenderScene);
  glutMainLoop();  //http://www.programmer-club.com.tw/ShowSameTitleN/opengl/2288.html
  return 0;
}
```

  - 記得在main中加入寫好的popup menu函數

作業繳交方式

1. 現場檢查：100%分數
2. 當日實驗課時未完成，當周補交至北科i學園
   - 學號_姓名.zip
     - Demo影片
     - 程式碼
3. 當周補交：80%分數
4. 超過一周未繳交：0%分數