Windows下openGL安装与运行

【参考】

- opengl安装编译：

  https://blog.csdn.net/linshuhe1/article/details/93976706
- vscode下c++运行调试：

  https://code.visualstudio.com/docs/languages/cpp

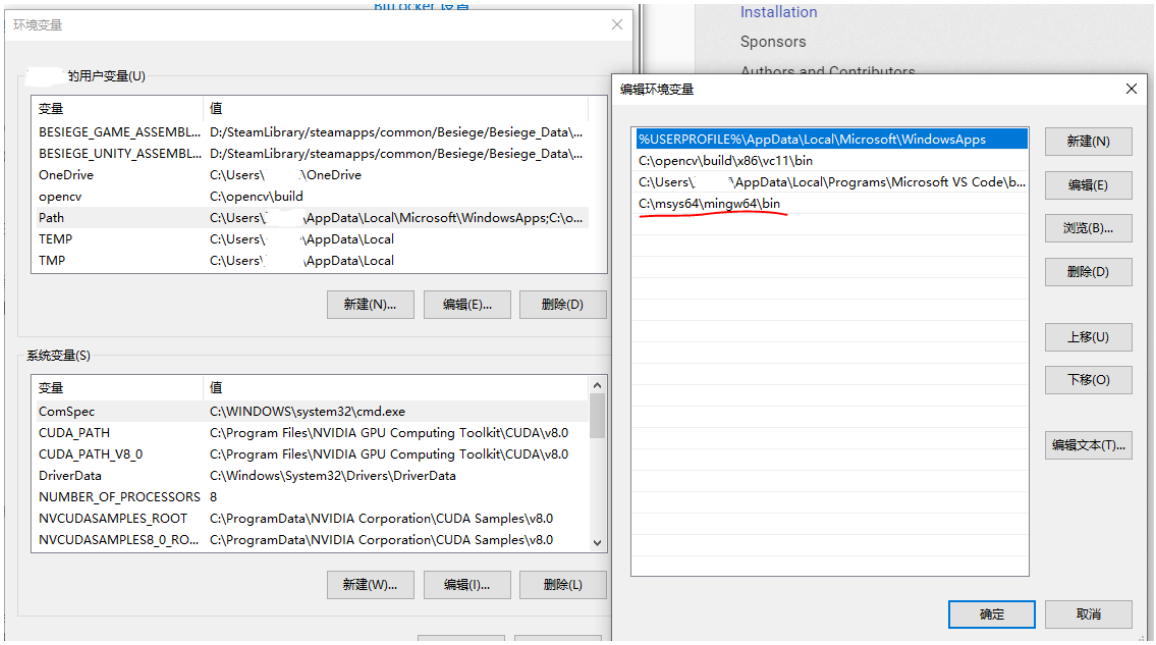
【代码链接】

1. 安装windows下c++编译工具：MinGW、cmake

- 安装MinGW：https://www.msys2.org/

  按照步骤安装即可

  注意修改环境变量



- 安装cmake：https://cmake.org/download/

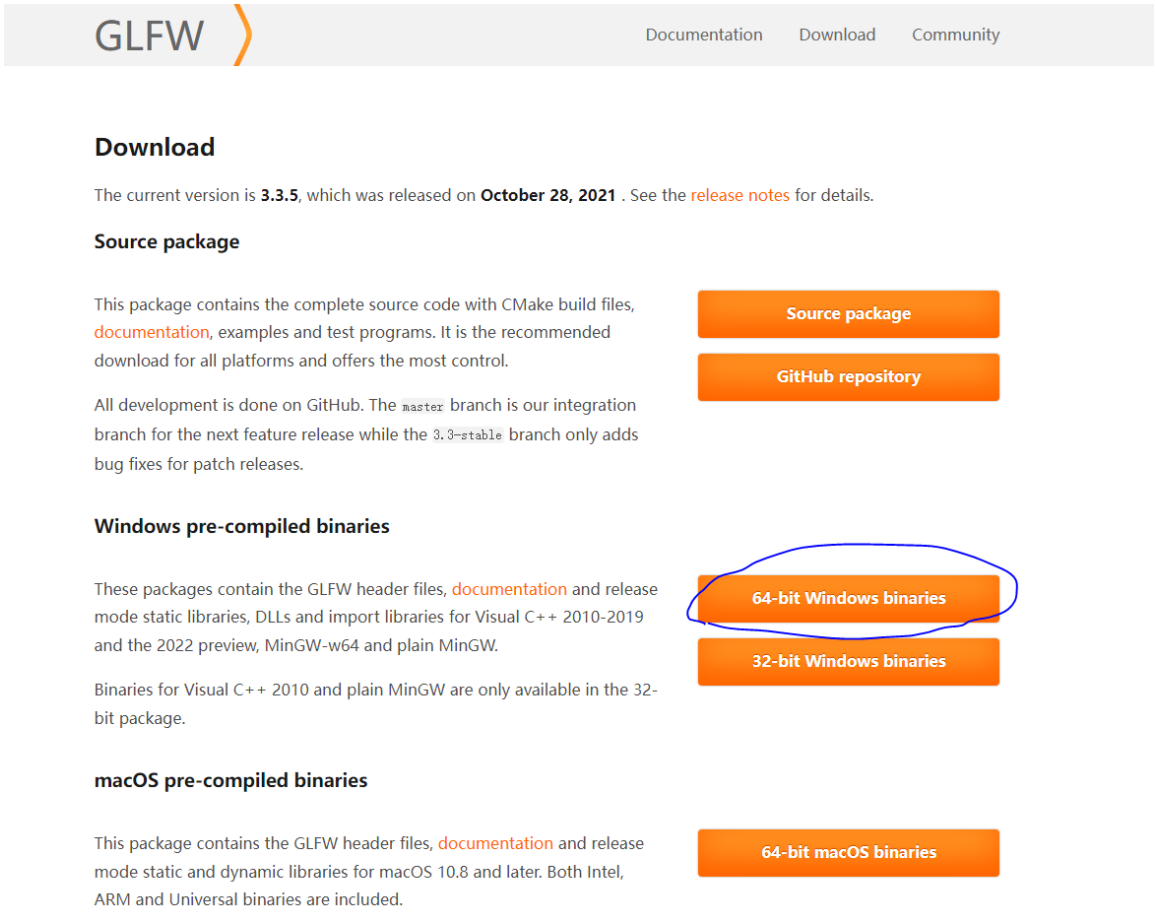
Binary distributions:

Platform	Files
Windows x64 Installer: **Installer tool has changed. Uninstall CMake 3.4 or lower first!**	cmake-3.22.0-windows-x86_64.msi
Windows x64 ZIP	cmake-3.22.0-windows-x86_64.zip
Windows i386 Installer: **Installer tool has changed. Uninstall CMake 3.4 or lower first!**	cmake-3.22.0-windows-i386.msi
Windows i386 ZIP	cmake-3.22.0-windows-i386.zip
macOS 10.13 or later	cmake-3.22.0-macos-universal.dmg
	cmake-3.22.0-macos-universal.tar.gz
macOS 10.10 or later	cmake-3.22.0-macos10.10-universal.dmg
	cmake-3.22.0-macos10.10-universal.tar.gz
Linux x86_64	cmake-3.22.0-linux-x86_64.sh
	cmake-3.22.0-linux-x86_64.tar.gz

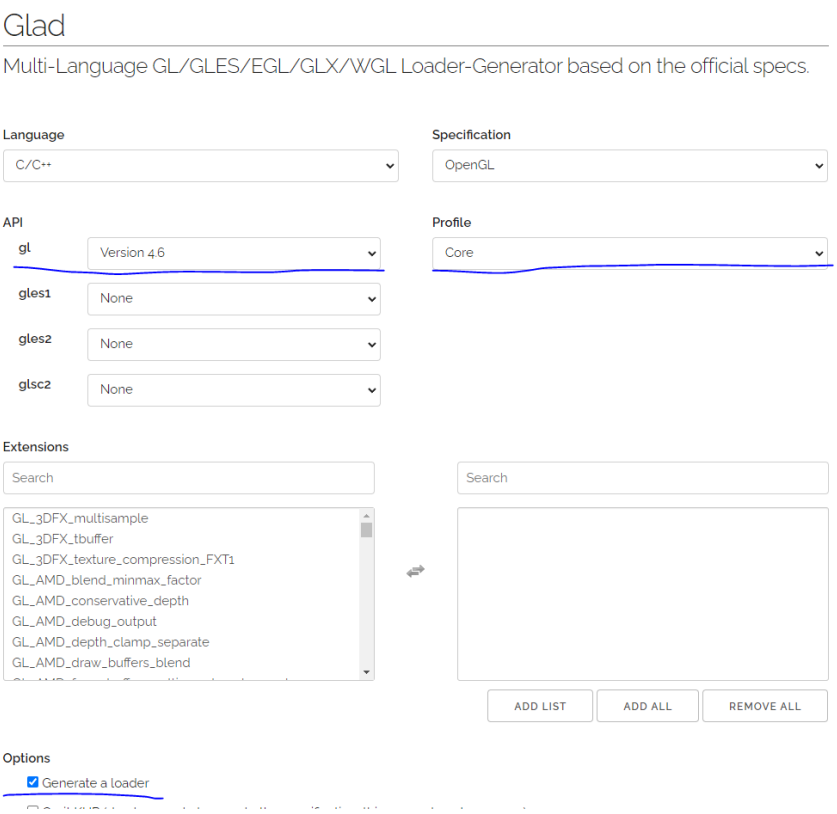
下载之后按照步骤安装即可

2. 安装openGL库：glfw、glad

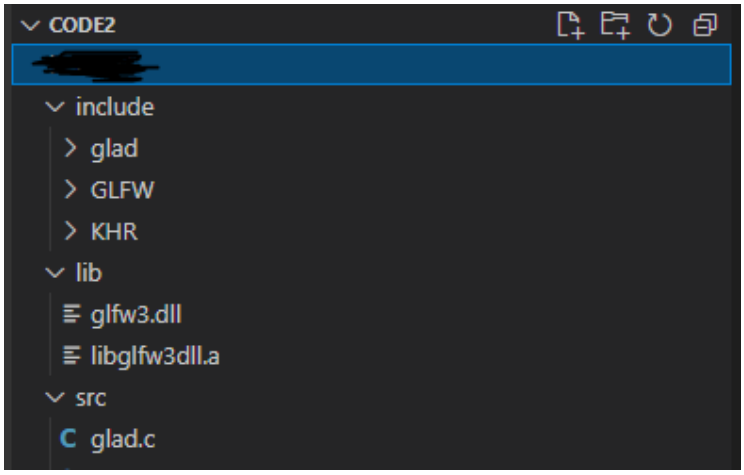
- glfw库支持窗口创建、读取输入、处理事件等功能
- 安装glfw：https://www.glfw.org/download.html



- glad的API包括：窗口操作、窗口初始化、窗口大小、位置调整等；回调函数；响应刷新消息、键盘消息、鼠标消息、定时器函数等；创建复杂三维体；菜单函数；程序运行函数等
- 安装glad：https://glad.dav1d.de/



- 创建工程文件夹，命名为“code2”，在code2下创建lib、src、include
- 复制glad文件：
  - 将glad\include\下的glad、KHR文件复制到code2\include下
  - 将glad\src\glad.c复制到code2\src
- 复制glfw文件：
  1. 将glfw下的include\GLFW复制到code2\include下
  2. 将glfw下的lib-mingw-w64\glfw3.dll、lib-mingw-w64\libglfw3dll.a复制到code2\lib下
- 得到工程目录：



3. 编写cpp程序

- 在code2\src文件下创建main.cpp：

```
#include <glad/glad.h>
#include <GLFW/glfw3.h>

#include <stdio.h>

// settings
const unsigned int SCR_WIDTH = 800;
const unsigned int SCR_HEIGHT = 600;

void key_callback(GLFWwindow* window, int key, int scancode, int action, int mode);
void framebuffer_size_callback(GLFWwindow* window, int width, int height);


int main()
{
  //glfw初始化
  glfwInit();
  glfwWindowHint(GLFW_CONTEXT_VERSION_MAJOR, 4);
  glfwWindowHint(GLFW_CONTEXT_VERSION_MINOR, 3);
  glfwWindowHint(GLFW_OPENGL_PROFILE, GLFW_OPENGL_CORE_PROFILE);

  //glfw创建窗口
  GLFWwindow* window = glfwCreateWindow(SCR_WIDTH, SCR_HEIGHT, "LearnOpenGL", NULL, NULL);
  if (window == NULL)
  {
    printf("创建窗口失败");
    //终止
    glfwTerminate();
    return -1;
  }
  //设置当前OpenGL上下文
  glfwMakeContextCurrent(window);

  //设置回调，当窗口大小调整后将调用该回调函数
  glfwSetFramebufferSizeCallback(window, framebuffer_size_callback);
  //设置回调，当发生按键操作时将调用该回调函数
  glfwSetKeyCallback(window, key_callback);
```

```
  // glad初始化
  if (!gladLoadGLLoader((GLADloadproc)glfwGetProcAddress))
  {
    printf("加载失败");
    return -1;
  }

  // 使用循环达到循环渲染效果
  while (!glfwWindowShouldClose(window))
  {
    //检查事件
    glfwPollEvents();

    //渲染指令
    glClearColor(0.2f, 0.3f, 0.3f, 1.0f);
    glClear(GL_COLOR_BUFFER_BIT);

    //交换缓冲
    glfwSwapBuffers(window);
  }

  //终止渲染 关闭并清理glfw本地资源
  glfwTerminate();
  return 0;
}

void key_callback(GLFWwindow* window, int key, int scancode, int action, int mode)
{
  if (key == GLFW_KEY_ESCAPE && action == GLFW_PRESS)
    glfwSetWindowShouldClose(window, GL_TRUE);
}
void framebuffer_size_callback(GLFWwindow* window, int width, int height)
{
  glViewport(0, 0, width, height);
}
```

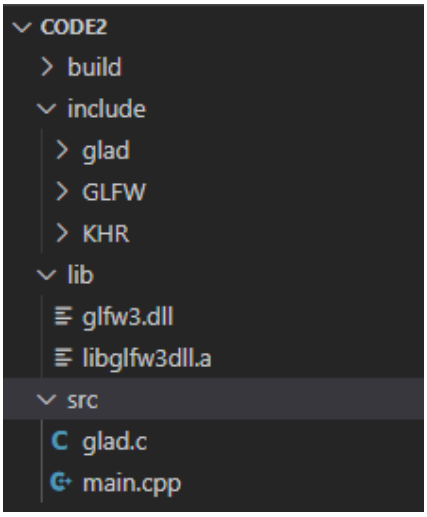
4. 编译链接

- 在code2文件夹下新建CMakeLists.txt：

```
cmake_minimum_required(VERSION 3.0)

project(code2)
link_directories(${PROJECT_SOURCE_DIR}/lib)
message(STATUS "CMAKE_CXX_FLAGS: " ${CMAKE_CXX_FLAGS})
set(CMAKE_CXX_FLAGS "${CMAKE_CXX_FLAGS} -g -std=c++17")
message(STATUS "CMAKE_CXX_FLAGS: " ${CMAKE_CXX_FLAGS})

set(SOURCE_FILES src/main.cpp src/glad.c)
add_executable(main ${SOURCE_FILES})

include_directories(${PROJECT_SOURCE_DIR}/include)
```

```
target_link_libraries(main glfw3)
```

- 在code2文件夹下新建build文件夹，得到目录结构：



- 打开命令行，在build目录下运行：

```
> cmake -G"MinGW Makefiles" ..
```

输出如下：

```
(base) E:\opengl\code2\build>cmake -G"MinGW Makefiles" ..
-- The C compiler identification is GNU 11.2.0
-- The CXX compiler identification is GNU 11.2.0
-- Detecting C compiler ABI info
-- Detecting C compiler ABI info - done
-- Check for working C compiler: C:/msys64/mingw64/bin/gcc.exe - skipped
-- Detecting C compile features
-- Detecting C compile features - done
-- Detecting CXX compiler ABI info
-- Detecting CXX compiler ABI info - done
-- Check for working CXX compiler: C:/msys64/mingw64/bin/g++.exe - skipped
-- Detecting CXX compile features
-- Detecting CXX compile features - done
-- CMAKE_CXX_FLAGS:
-- CMAKE_CXX_FLAGS:  -g -std=c++17
-- Configuring done
-- Generating done
-- Build files have been written to: E:/opengl/code2/build
```

- 继续运行：

```
> cmake --build .
```

输出如下：

```
(base) E:\opengl\code2\build>cmake --build .
Consolidate compiler generated dependencies of target main
[ 33%] Building CXX object CMakeFiles/main.dir/src/main.cpp.obj
[ 66%] Linking CXX executable main.exe
[100%] Built target main
```

5. 运行

- 在code2文件夹下得到“main.exe”文件，再把lib下的glfw3.dll拷贝到code2目录下，双击main.exe，运行结果如下：