

Homework 2: OpenGL

COSC4370 Interactive Computer Graphics (Fall 2022)

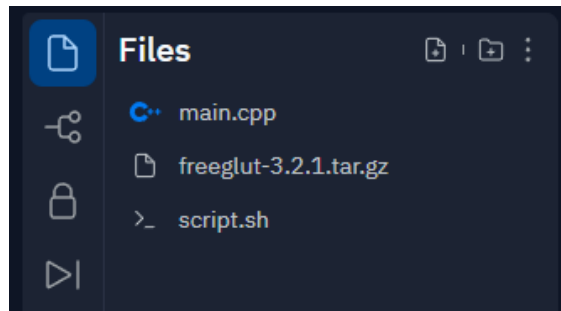
DUE: OCTOBER 6, 2022 AT 11:59 PM

1. Introduction

In this assignment, we will practice some of the basics of OpenGL.

2. Setup

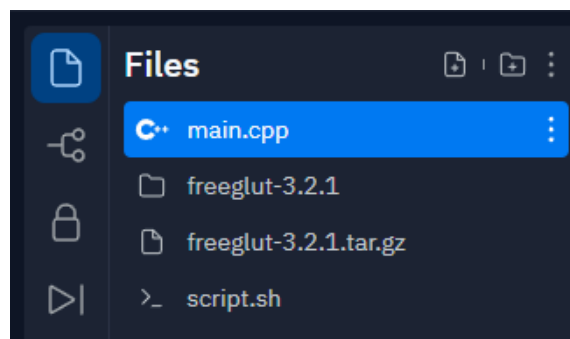
- Fork this repl.it repo: <https://replit.com/@MayTrinh/hw-template>
- Upload the starter files (main.cpp, script.sh) to the project and overwrite the default file with the provided one.
- Upload freeglut library, which is freeglut-3.2.1.tar.gz (don't extract it before upload), and right now, your project directory should be looking like this



- Extract it on repl.it console using the following command:

```
tar -xzf freeglut-3.2.1.tar.gz
```

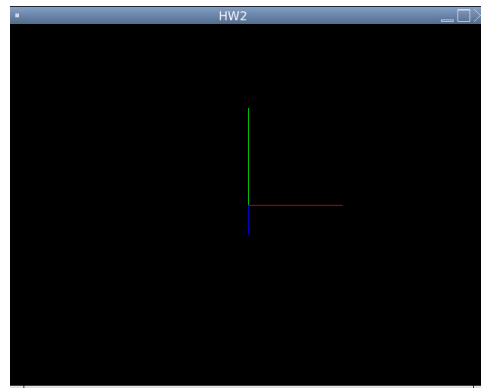
The directory should look similar to this:



- Get permission to read and execute script.sh by using the following command:

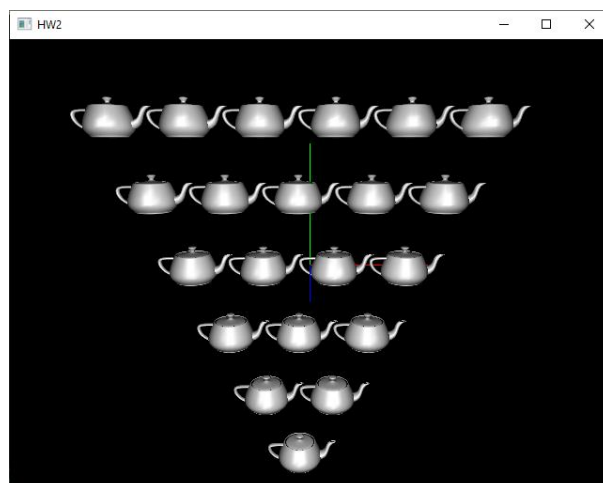
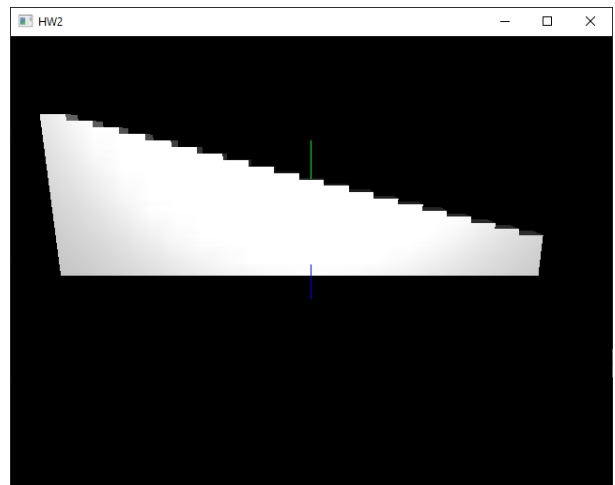
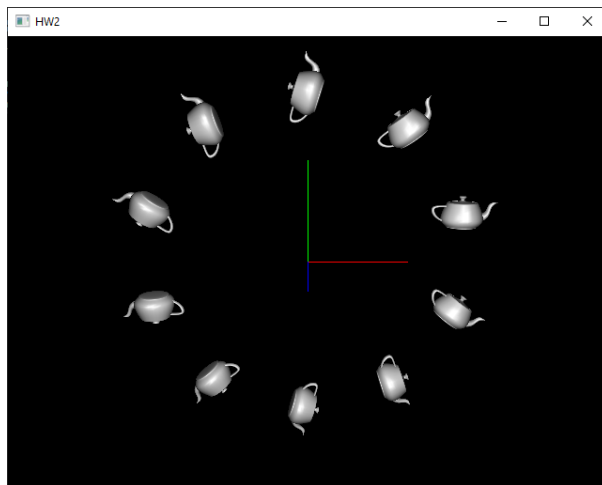
```
chmod u+rx script.sh
```
- Run script.sh by using `./script.sh` (Instead of run button, you must run this command every time to compile.)

It will generate a window with black screen and xyz coordinate. It may take a while for the first execution.



3. The Main Assignment

For this homework, you will be using your newfound OpenGL skills from class, as well as your artistic creativity, to create several 3D scenes with OpenGL. The first part of the assignment is to reproduce each of the following three images:



The second part of the assignment is to create, using similar techniques, a scene of your own imagination. All the code for this homework lives in `main.cpp`; you need to fill in the functions `problem1`, `problem2`, `problem3`, and `problem4`. You can switch between the different examples while the program is running by pressing the 1,2, . . . keys. Hence you don't need to recompile in order to run different examples. Additionally, you can quit the program at any time by pressing 'q', 'Q', or the Escape key.

4. Tips and Requirements

For each of the three reproductions, you should be able to create the image using only `glutSolidTeapot`, `glutSolidCube`, and OpenGL's transformation mechanisms like `glPushMatrix`, `glPopMatrix`, `glTranslatef`, etc. Note that you should not need any custom geometry to reproduce the images.

Your reproductions do not need to match exactly. However, please try to make them match the examples as closely as possible. We used nice numbers in the reference solutions, so if you find yourself using strange fractions etc. to reproduce the examples, you may be trying too hard!

For the open-ended image/scene, we require the following to make sure your image is interesting:

- Make use of OpenGL's transformation mechanisms in a nontrivial way, with at least one instance of nested applications of `glPushMatrix` (i.e., a `glPushMatrix` within another `glPushMatrix`).
- Render at least one triangle by feeding in its coordinates directly (OpenGL immediate mode is okay here, even though it's deprecated). As an example, you could attempt to create a very rough approximation of an articulated hand



5. Deliverables

Submit all deliverables to your Github repository.

- a. Code (main.cpp) for generating each of your four images (30%)
- b. Screenshots (preferably .png) for each of your four images (20%)
- c. You need to write a detailed report in pdf format. You should state the assignment problem, explain the algorithm or method you use, explain details of implementation, discuss your results, etc. (50%)

6. Late submission and plagiarism check

A punishment deduction of 50% credit will be applied if your submission is later than the due date for less than 2 days. Later than that will be treated as give up, and the grade will be 0.

All your submissions will be subject to plagiarism check; if found, your behavior will be reported directly to the department. Any referred materials should be labeled in your source code and declared in your report.