**Quotes Claims:**

1. The project use some open sourced code.
   1. model\_obj.cpp and model\_obj.h
      1. It is for importing .obj file
      2. It is downloaded from <http://www.dhpoware.com/demos/glObjViewer.html>
      3. I added and modified some code of it to make it to accept “group” syntax of .obj file
   2. glm
      1. It is used for some vector computation.
      2. It is downloaded from <http://glm.g-truc.net/>

**Instructions (sorry for this long instructions):**

1. How to compile the project.
   1. You can find one file “Pg1\_raycast\_hyao4.sln” in the unzipped folder.
   2. Open it using Visual Studio 2013
   3. Now you can compile the Pg1\_raycast\_hyao4 using Debug or Release (Recommended) mode.
   4. There are two folders “Debug” and “Release” in the unzipped folder (which is the solution folder indeed, don’t go to the project folder). The two folders are where the complied executable files will be placed.
   5. There is one “inputs” folder in both the “Debug” and “Release”. It is where the .obj files and some configuration files placed. If you want to debug the project, please make sure the files in the “input” folder is correct (Refer to 2.b & 2.c to know more details).
2. How to run the project
   1. Unzip the executableFiles.zip and you get the executable program.
   2. The folder should includes 1 exe file, 1 pdb file and 1 inputs folder
      1. The inputs folder is where the .obj files and some configuration files are placed. The configuration files are listed below:
         1. config.txt – the main configuration file
         2. lights.txt – the configuration file to configure lights
         3. window.txt – the configuration file to configure the size of window
   3. The program only reads “model.obj” file in the “inputs” folder and imports the corresponding .mtl file specified in the obj file. The .mtl file should also be in the “inputs” folder. Please make sure the obj file is renamed to “model.obj” and is placed in the “inputs” folder with its .mtl file. I already placed some .obj files in the folder (most of them need to be scaled down using the “scale” configuration in config.txt), so you can use them for testing.
   4. The default configuration is:
      1. Local illumination is enabled.
      2. Shadow is disabled.
      3. The scale is disabled
      4. The eye is located at (0, 0, -2) and the look up vector is (0,1,0)
      5. The center of viewport is (0, 0, -1)
      6. The top-left corner of viewport is at (-1, 1, 0)
      7. The size of viewport is 256 \* 256 pixels
      8. The default model.obj file is actually renamed from cube.obj file.
   5. Run “Pg1\_raycast\_hyao4.exe” and you will get the default result.
   6. If you think the image is too dark, you can move the light close to the objects (Refer to 3.a). Since I hacked dimming of distance (fatt is 0.2 \* distance^2), the image may look very dim if the light is far from the objects.
   7. The config.txt file in the “inputs” folder includes most configuration items:
      1. The format of configuration item is “paramName paramValue”.
      2. The config.txt treats lines led by “#” as comments.
      3. The explanation of configuration items:
         1. The “scale” parameter:
            1. Available values: enabled or disabled
            2. If you want to render some big objects that cannot be viewed in the viewport, you can enable the scale feature to scale the objects into a 2 \* 2 \* 2 box whose center is at (0,0,0) so that you can view them in the viewport.
         2. The “viewCenter” and “eye” parameters:
            1. The format of value: [x-coordinate] [y-coordinate] [z-coordinate]
            2. If you want to look along the negative direction of z-axis, you can change the z-coordinate of viewCenter and eye to achieve it. (e.g. change the z of viewCenter to “1” and the z of eye to “2”)
            3. Don’t change the x and y of the two parameters. I don’t have enough time to implement the rotation transformation, so the image will look weird if you change them. If you just want to do this because your objects are not rendered in the center of the viewport, you can enable “scale” (refer to the above bullet) to move the objects to the center.
         3. The “shadow” parameter:
            1. Available values: enabled or disabled
            2. If you want to see the shadow effect, you need to enable it.
         4. The “local\_illumination” parameter
            1. Available values: enabled or disabled
            2. If you want to see the local illumination effect, you need to enable it.
         5. The “lenOfXinCoord” & “lenOfYinCoord” parameters
            1. The width and height of the viewport in coordinate system.
3. Extra Credits
   1. How to add/modify lights
      1. There is one file “lights.txt” in the inputs folder. Each line in the file represents a light. The first three values configure the location of the light. The format is “[x-coordinate] [y-coordinate] [z-coordinate]”. The next three values configure the light intensity of R, G, B. The range of the three values are 0~1. The program assumes the intensities are same among ambient reflection, diffuse reflection and specular reflection, so you only need to configure one intensity for R, G, B.
      2. The “lights.txt” treats lines led by “#” as comments.
   2. How to change the window size
      1. There is one file “window.txt” in the inputs folder. You can change the existing “256 256” to any width and height you like. The unit is pixel. The first number is width and the second one is height. (If the shape of the window is no longer a square, the image will look weird if you don’t change the “lenOfXinCoord” & “lenOfYinCoord” accordingly(2.e.iii.5).)
      2. After you change the file, you need to restart the program to make it effective. Don’t resize the window after the program is executed. I have not understood a lot about the window resize APIs, so I only set the size appropriately during the initialization of window.
      3. The “window.txt” treats lines led by “#” as comments
   3. How to enable shadow
      1. Refer to 2.e.iii.3
      2. Recommend disabling it if you are viewing some complicated objects; otherwise you can expect long response time.