COSC 4370 – Homework 2

Dean Ferreira (PSID: 1463211)

October 2021

1 Problem

The assignment serves as a purpose to begin developing 3-D images using OpenGL. The images are generated using functions such as glutSolidTeapot and glutSolidCube and using OpenGL's transformation mechanism such as glPushMatrix an glPopMatrix.

2 Method

There are four functions that need to be modified to generate the 3-D scenes, problem1, problem2, problem3, and problem4; it was not necessary to make any changes to main functions or any other functions. The assignment is an introduction to using OpenGL and combining artistic creativity and programming skills to replicate the scenes that were provided. At first glance the scenes can be overwhelming but once the patterns are recognized they are common programming techniques.

3 Implementation

For each of the three reproductions, understanding the methods and reading over the documentation allows for the composition of the solution. Each method is provided and after reviewing the documentation and what each parameter accomplishes, the 3-D scene is replicated.

3.1 Problem 1

Reproducing this 3-D scene was done using the glutSolidTeapot with a scale of .25. This of course only generates one teapot and in the original 3-D scene we have 10 teapots in a circular form. One can observe that this is the same teapot created 10 times rotated over the circle. The teapots can be generated by writing a for loop that iterates ten times and over 360 degrees to complete the shape of the circle. The rotation is accomplished by using glRotate and using the iterator to increase the angle throughout the for loop. The iterator increases 36 degrees for each iteration to form the teapots with equal spacing.

3.2 Problem 2

This problem required another for loop to create each step in this 3-D scene. The scene is composed of 15 cubes that are scaled appropriately to produce this step like pattern.

3.3 Problem 3

For this problem, I took a similar approach, it is the same teapot that is placed in a triangular form. This requires another for loop however, this time we need a loop for each row in the triangle requiring a nested for loop.

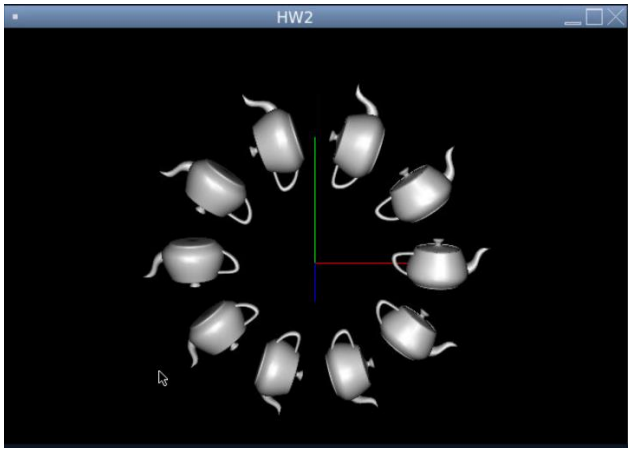
3.4 Problem 4

This is an opened ended image scene that required the use of transformation mechanisms, a nested application, and rendering at least one triangle. My scene depicts the sun rising in the background and beginning to illuminate the pyramid in the valley.

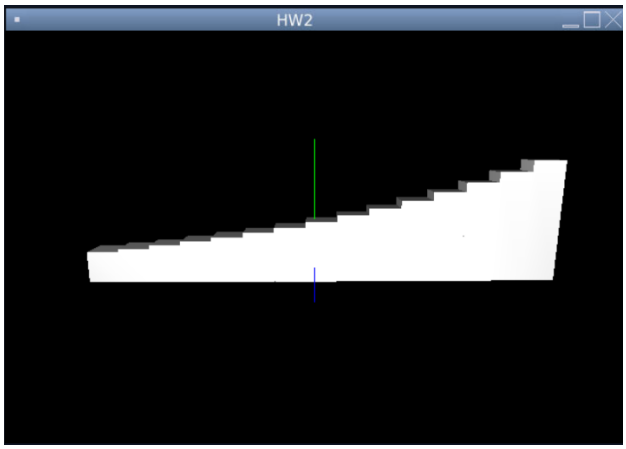
4 Results

The reproduction of the 3-D scenes can be observed by running the script, once the script is running it first displays the first 3-D scene. To cycle through the other scenes pressing 1,2,3, or 4 keys transition to each scene.

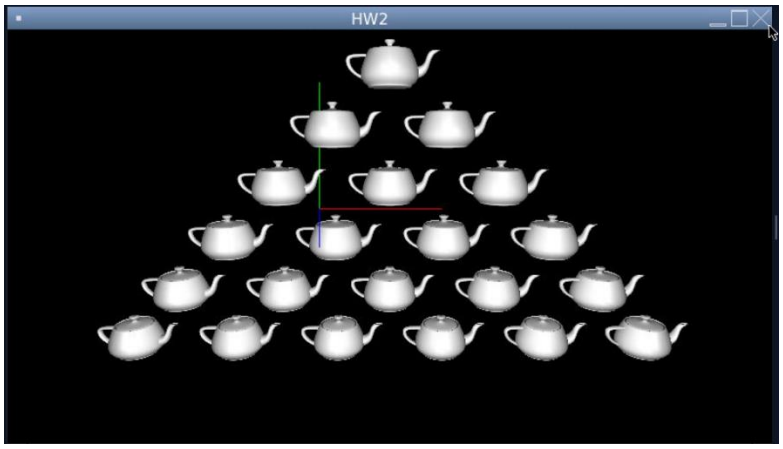
Problem 1



Problem 2



Problem 3



Problem 4