Alex N. Merical

CSC155-01

Professor V. S. Gordon

California State University, Sacramento

Assignment 4 Readme

Scene Description

       This scene takes place off the beautiful coast of Honolulu, Hawaii. The cube map was created on the free-to-use webpage mentioned in the sources below. While the creator recommends a 360° panoramic photo, I used this image because I actually took it. The site automatically separates a single image into six cube map images similar to how they're arranged in the companion files that accompanied the book. While the scene is a continuation of assignment 3, there are many additional features implemented absent from the previous version.

When you first run the program, the camera is translated down the positive z-direction (towards the viewer). The viewer is met with a foggy overview of the scene.

Two of the requirements are featured here, which are the cube map and a noise-mapped spacecraft object.

I added a height map for the ground (grid), which made the mountain object look a little more natural. The mountain also implements environment mapping.

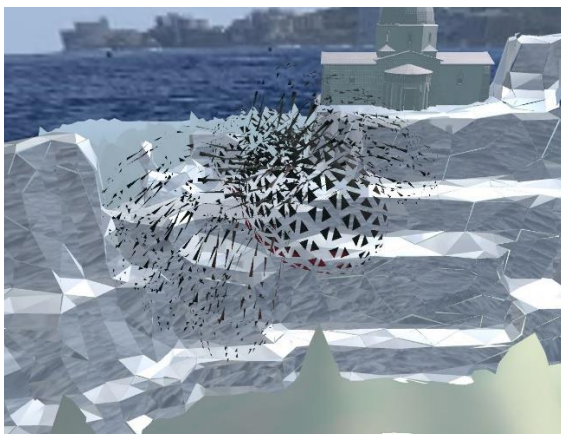The bulldog exhibits the transparency feature.

The church uses the bump mapping as well.

The spider utilizes the geometry shader, however I was not able to implement fog for the spider.

This image (left) displays the environment-mapped, diamond-material mountain, along with the shadow of the spider cast upon the mountain.

The two images below show the exploding spider. This is done by associating mathematical functions to the normal vectors of each primitive in the geometry shader.

Features not Implemented

- I really wanted to have the space ship shoot out lasers (like the axes from previous assignments), but I did not have enough time.
- The picture used for the cube map was not correctly taken in a panoramic setting, so there is a visible vertical line where the beginning of the picture meets the end. I still used this photo because it was taken off the coast of Honolulu on a catamaran during a family trip and has special meaning.
- All **objects** (with the exception of the grid) were downloaded for free from CGTrader.com. The grid was provided from the instructor's companion disk which accompanied the book

Camera Controls

⇧ = Rotate camera up about the x-axis

⇩ = Rotate camera down about the x-axis

⇦ = Rotate camera left about the y-axis

⇨ = Rotate camera right about the y-axis

a = Move (strafe) left

d = Move (strafe right

w = Move forward

s = Move backwards

q = Move up vertically (against gravity in the positive y-direction)

e = Move down vertically (with gravity in the negative y-direction)

Light Controls

Mouse Wheel Up = Move light (lamp object attached) in the positive y-direction

Mouse Wheel Down = Move light (lamp object attached) in the negative y-direction

Mouse Left-Click + Drag:

Left = Move light left

Right = Move light right

Up = Move light forward (down z-axis through the screen away from user)

Down = Move light backwards (down z-axis through screen towards user)

- The light is an edited version of the positional light provided from program 7.3 which implements the Blinn-Phong method described in the book. It also implements a global ambient which is hardcoded in the declarations of the Starter class.

Explosion Controls

Make spider go BOOM = b
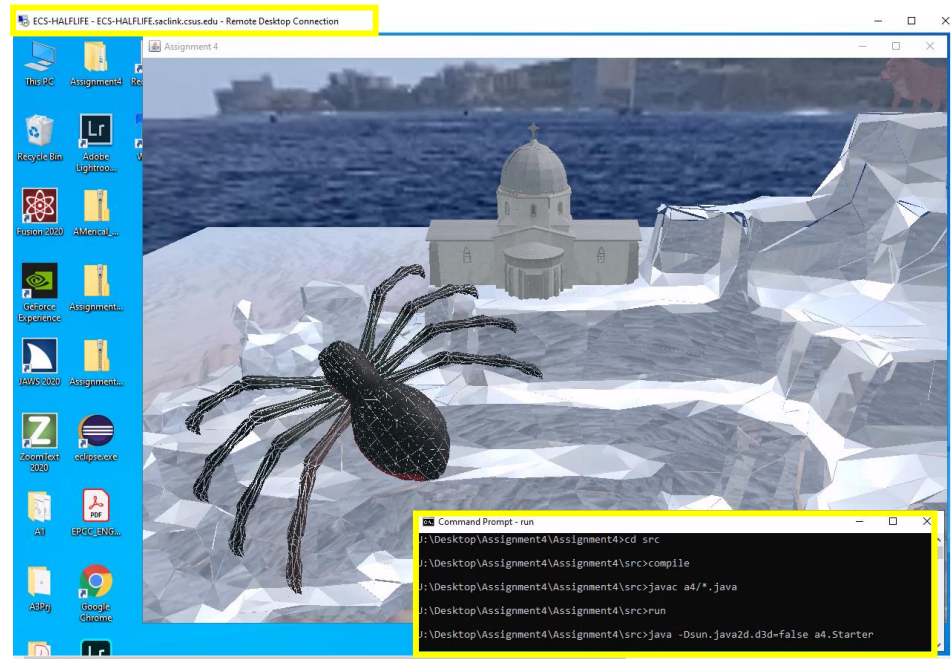
Make spider go back to normal = n

List of objects using shadow-mapping:
- English Bulldog, Black Widow, Church, Spaceship, Diamond Mountain

List of features that go beyond requirements:

- **Height Mapping, 1-Extra Shadow-Mapped Object**

Which 5029 Lab machine program was tested on?

Sources

https://www.cgtrader.com/free-3d-models
Panorama to Cubemap (jaxry.github.io)
Scott Gordon home page (csus.edu)