Assignment 4

COMP 4002

Date: November 21 2014

Due: on December 5, 2014 before 22:00 (10:00 PM)
Submission: Electronic submission on CULearn.

Assignment Objectives:

a. Familiarization with skybox
b. Familiarization with environment mapping
c. Familiarization with reflection and refraction

Grades:

1. Assignment total marks: 100%.

1. Task 1 – Reflection and Refraction vectors (40)

Purpose:

a. Insights of refraction vectors (effect of Snell's law on the visualization).

To do:

1. Download and compile the code. The program shows a sphere in the air which is textured with respect to the surrounding skybox.
2. Look at the keyboard call back function and become familiar with the keys
3. (5) Using the 't' key toggle between reflecting and refracting rays of the sky box
   3.1. Explain what is the difference between the images of the ball
4. Using refracting rays
   4.1. (30) The sphereBox.vert file contains two parameters which specify the coefficient of light between the income ray of light to the outgoing ray of light (see notes on Snell's law). Currently they are set to air and water.

   Change the ratio between the two coefficients to:
   a. inRefractFactor = outRefractFactor = 1.0; Describe what has happens (5). Provide an explanation why did it happen (5).
   b. inRefractFactor = 1.0 outRefractFactor = 4.0; Describe what has happened (5) Provide an explanation why did it happen (5).
   c. inRefractFactor = 4.0 outRefractFactor = 1.0; Describe what has happens? Provide an explanation why did it happen (5).

   4.2. (5) Using a ratio of air and water move the camera forward until you enter the sphere and leave it. What is the effect of moving through the sphere?

2. Task 2 – Create another skybox and object (60)

Purpose:

a. Be familiar with a hidden skybox and creating new object. You can reuse any part of the code. Note, you may want to create an object class.

To do:

1. (15) Create another sphere object in space (make sure that it is visible)
2. (15) Create a new skybox – using any images that you like (as long as they are all the same size, e.g., all 64x64, 128x128, 512x512, etc.).
3. (20) Display the object while texturing the image using the new skybox. (Do not display the new skybox).
4. (10) Try rotating the object. Did it work? If it did not, can you explain why not? Can you fix it? How?

3. Bonus – Create a nice effect using textures and second light source (25)

1. Create a nice rendered image using textures and other object types with a regular texture and or textured skybox. For example using cubes. If your images have a black colour and an alpha then you can use blending to hide the black part of the image.