Graphics Programming with Shaders Report – Daryl Grant

1. Scene Overview

My scene consists of 2 quad planes, a mesh containing several controls points arranged into a cube and an imported model.

All objects in the scene demonstrate correctly transformed normals, lighting calculations and shadows.

The 2 quad planes both demonstrate height mapping, the first one transforming the plane into mountain terrain and the second giving the plane a water surface look. Normals are the transformed using normal maps created using the height map at NORMAL MAP AND HEIGHT MAP SITES.

The control point mesh arranges many 2D meshes into a cube which are drawn so that they always face the camera. The meshes are then positioned under the water surface and their translations updated based on time to give them movement.

The imported model further shows that the calculations for multiple lights and the shadows they produce are correct.

**Requirements**

This section details how I have responded to each of the requirements in the Assessment Brief.

Vertex Manipulation

My scene demonstrates vertex manipulation by using height mapping to transform the 2 quad planes and give them the shapes of a mountain terrain and a water surface. A depth test is done on each of these transformed planes so their shadows can be calculated and normal maps are used so they can be correctly lit.

Post Processing

To show post processing, when the camera is below the surface of the water, the render texture that the final scene is rendered to is passed to a shader which manipulates each pixel in a sine wave pattern. This gives the whole scene an underwater effect, with everything appearing wavy.

Lighting and Shadows

All objects in the scene are lit correctly by normals are calculated as well as transformed appropriately whenever any vertex manipulation happens. For the control point mesh the normals are calculated when each of the 2D meshes are created, these normals always point towards the camera. For the terrain and the water surface normal maps are used alongside the height maps to give each vertex the correct normal. The imported model has already calculated normals.

Each object in the scene is tested for depth from the viewport of any light it is lit by. Shadow mapping is then used to work out where the shadow should appear for that object.

The Lighting and shadows of all objects take into account all lights in the scene.

Tessellation