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Camera:

On this project Rob, Evan, and I decided it would be best to start with the camera. We had trouble getting the height of the terrain on the CPU. This prevented us from being able to make the walk camera so we just used the fly-by camera.

Terrain:

The height of the terrain is created using a height map. We have a normal map that is related to the height map for lighting. For the color of the terrain we have three ground textures and a blend texture. The blend texture determines which textures to use for a location. We also bend the UV for the ground texture with a UV multiplied by a prime to remove repetition. All of these textures have individual normal maps so that they pop out with our lighting equation.

Lighting:

For the world lighting we took the normals from the normal texture relative to the height map and multiplied it by the height multiplier and the normalized it. From here we took the individual normal from the current ground texture and blended it with the world lighting.

Bill boarding:

For both clouds and lens flare we used the bill boarding technique. We decided to save the center position of the bill board on each vertex. This way we can do all of the rotation calculations in the vertex. In order to calculate the rotation of our bill boards we decided to lock the Z. So we just take our look at and cross it with an assumed up to get our x; Normalize that x and get the real up by crossing the look at and the x.

Clouds:

To do clouds we put all of our vertexes in a single mesh and did the rotation calculation in the vertex shared as described in the bill boarding section. Clouds lie along an area and have a range of y values and scale. We tried to have scales wrap when the player moves so that we would never reach a point where we don't have clouds but were not able to get this working.

Lens Flare:

To do lens flare we converted the sun position to a screen position. From here we calculated the direction from the center of the screen to this 2D sun position. We then placed the three lens flare objects along that line in 2D space. From here we converted it back to 3D space using a Z range that made it look good.