Scene Renderer + Weather Effects

CS 4621 Final Project Presentation

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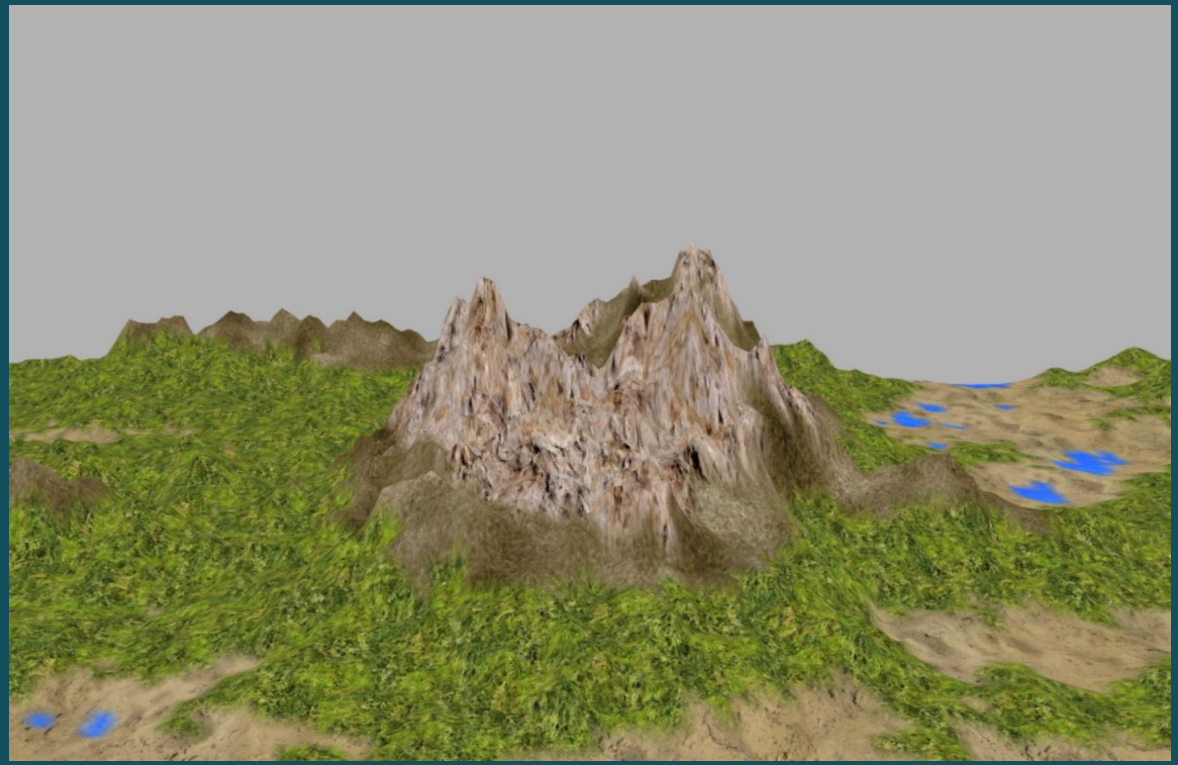
Project Description:

Our project is as the name implies -- a scene renderer. Our main focus for this assignment was to render a nice scene with a procedurally generated terrain, and give it aesthetic effects such as realistic textures, shading, reflective water and simulated weather.

Progress made since last week:

+ Improved terrain generation (island now)
+ Lighting, normal maps, environment map
+ Realistic water with reflection/refraction
+ Weather Systems (snow and rain)
+ Fog, Night/Day modes

Before



After

Features:

+ Procedurally generated terrain
+ Biomes and elevation-based texture mapping
+ Realistic real-time water
+ Particle system weather effects
+ Directional lighting
+ Smooth camera movement
+ Skybox
+ Day/Night modes
+ Simple interface

How it works:

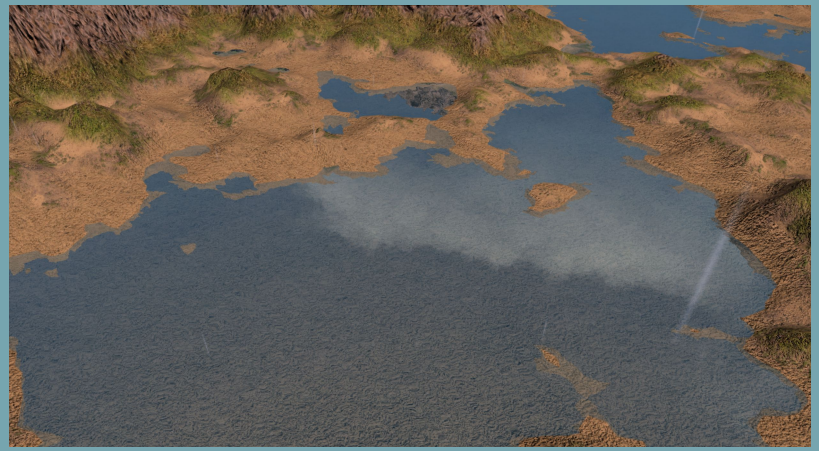
+ Random terrain generation -- Perlin noise algorithm used to generate noise maps for elevation (which is used to build the mesh) and moisture (which is used in conjunction with elevation to map regions of the mesh to different biomes). Various formulas redistribute terrain elevations to create mountains, plains, and islands
+ Particle system for weather particles -- each particle has velocity that is updated per frame. Particles are billboards so geometry is also simple to update

How it works:

+ The water “tiles” are simply rendered as a flat, slightly blue quads
+ Normal mapping, in conjunction with a time based move factor, is used to make it appear that all of the water is moving in the same direction (the “movement” is synchronized between the different water tiles).

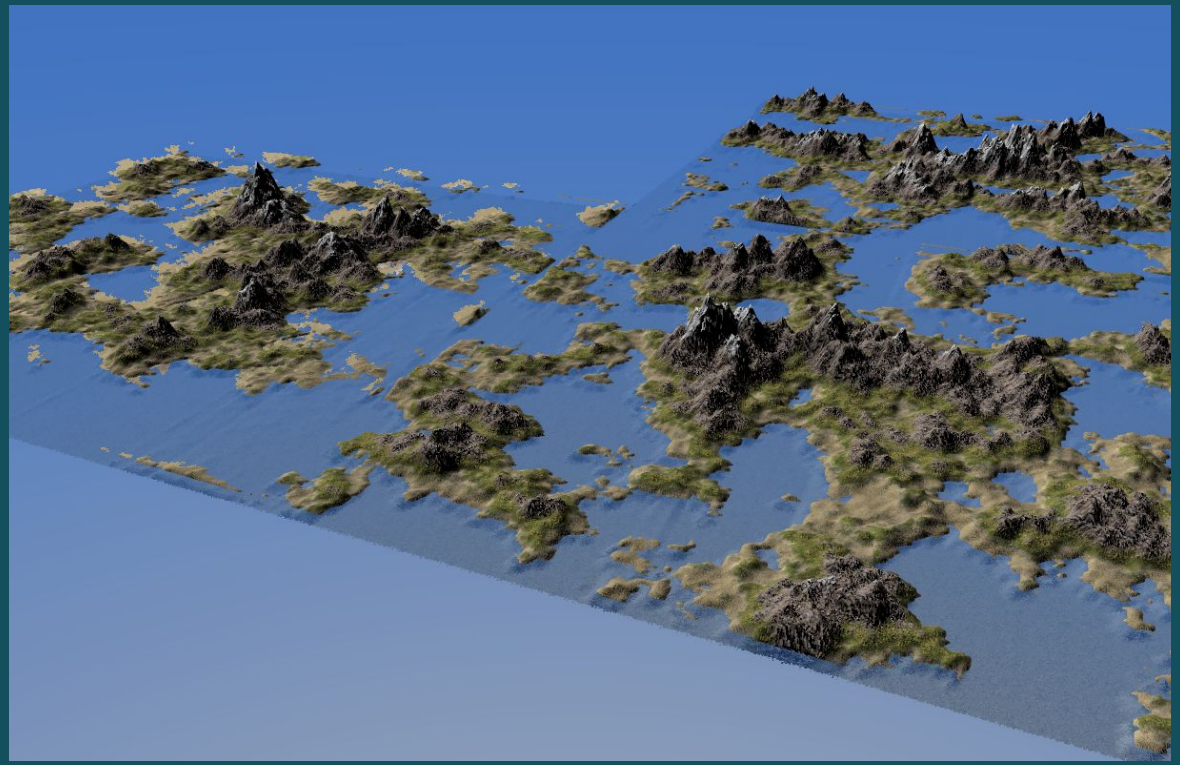
How it works:

+ This blue-ish color is then mixed with colors sampled from a refraction texture (created by copying the canvas to a texture) and a reflection texture (created by moving the camera's position and drawing the scene to a framebuffer object).
+ The texture coordinates are varied based on a DUDV map and the move factor
+ Fresnel effect is also implemented

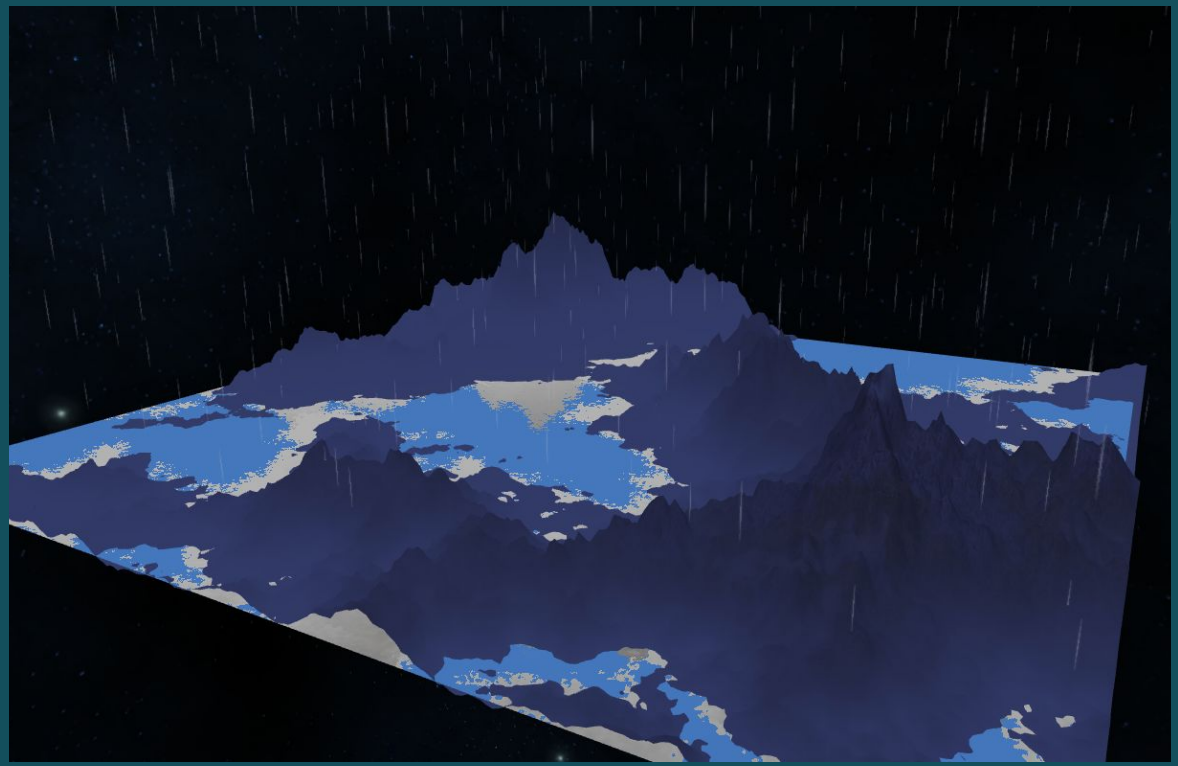


– mockups vs screenshots

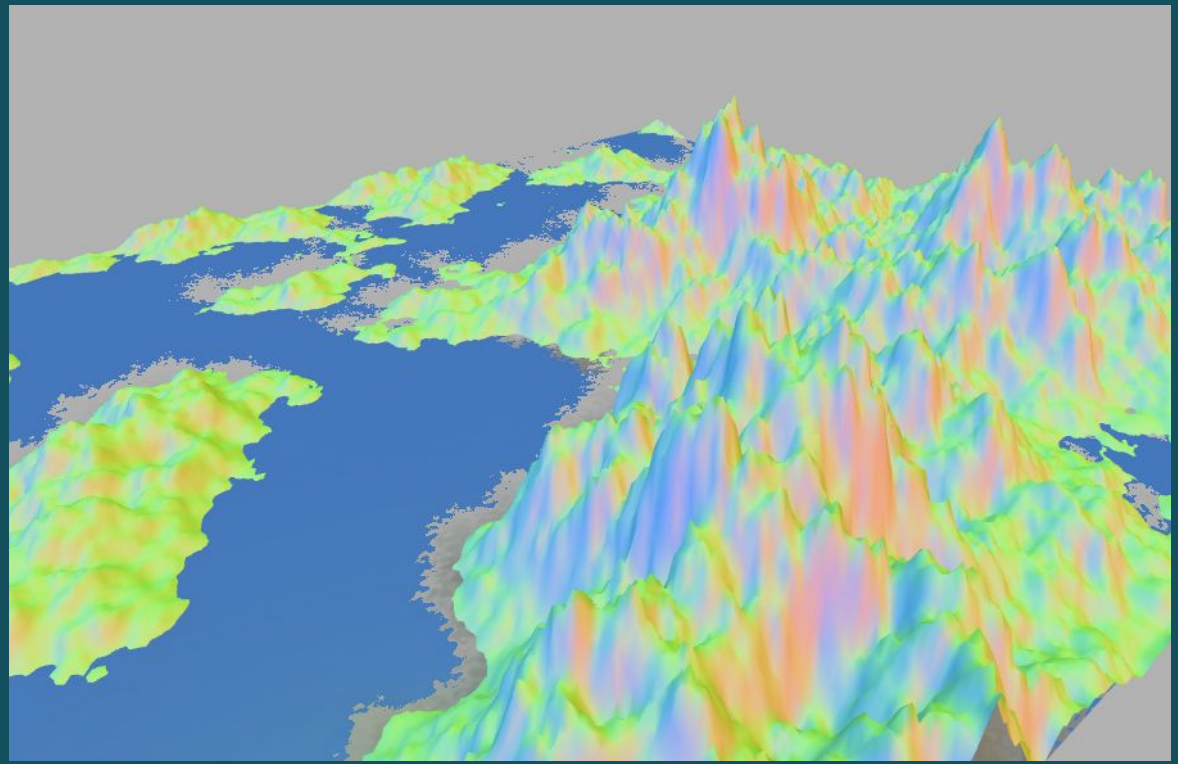
more media



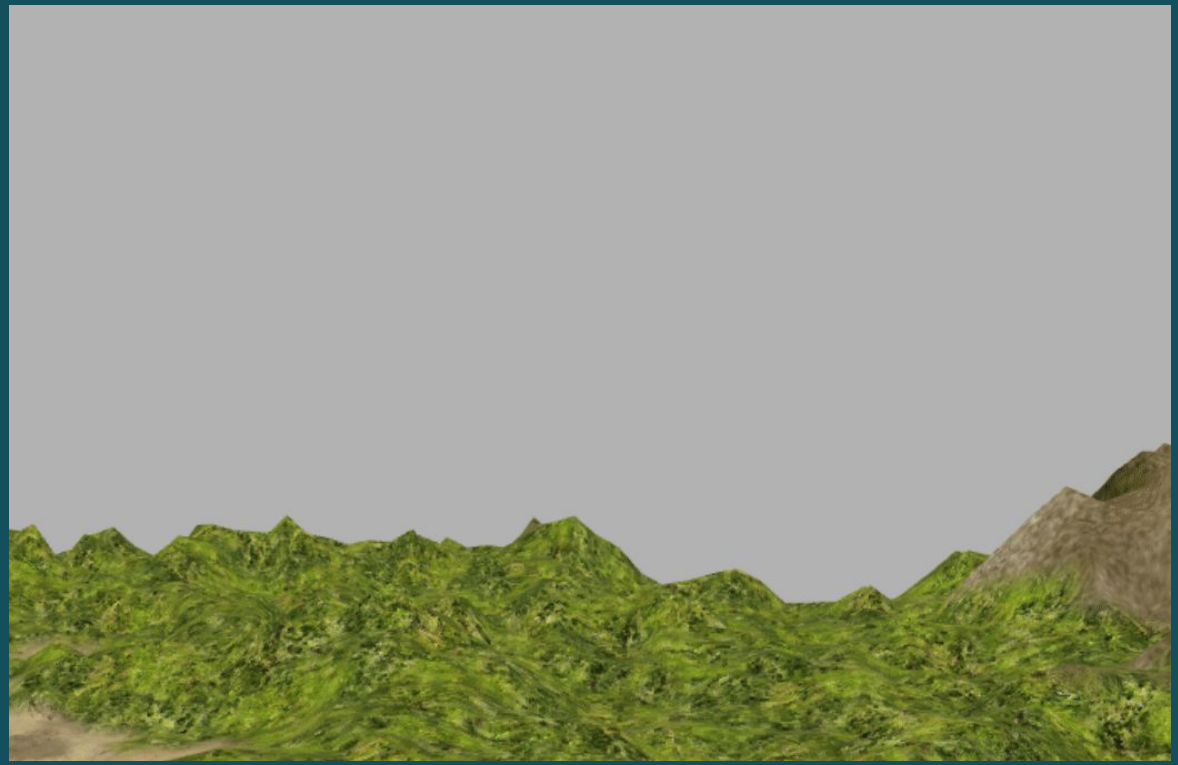
— early rain & fog



– normal mapping

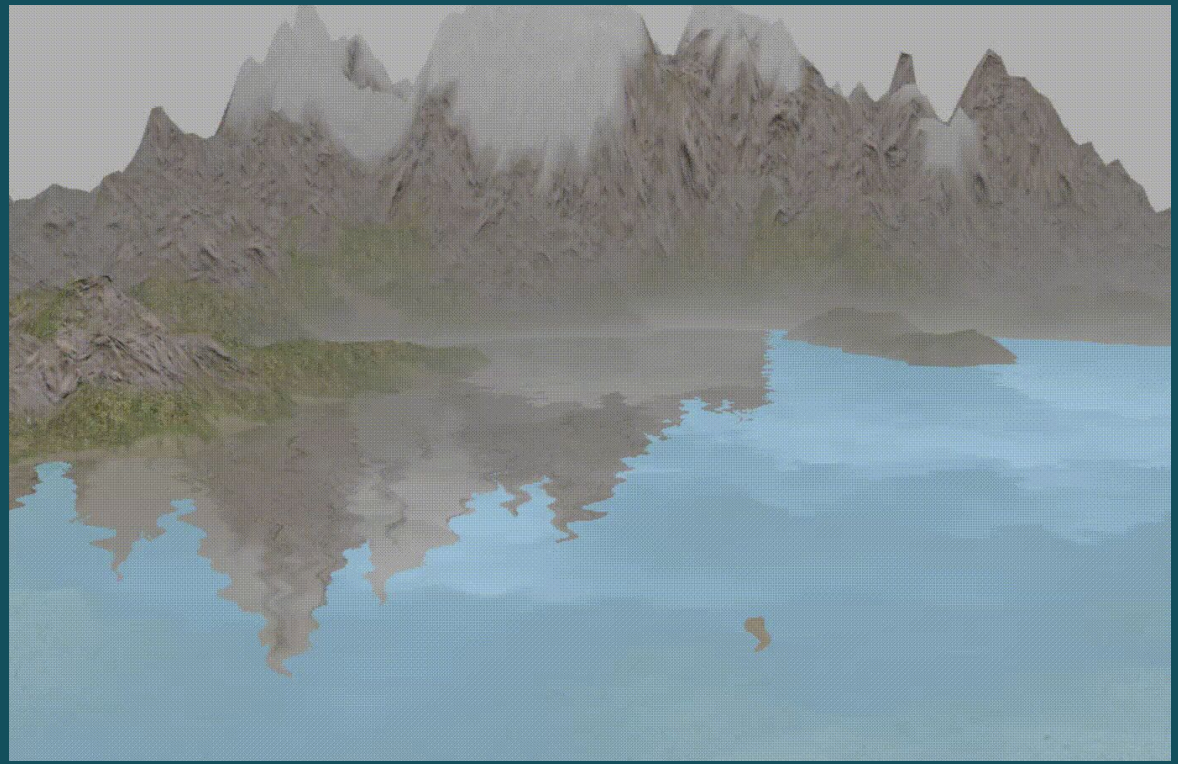


– first sign of winter



– animated water

(there was a bug in this one)



The end :^)

Textures from OpenGameArt

- http://www.custommapmakers.org/skyboxes.php
- https://opengameart.org/content/ground-outdoors-dry-dirt-with-grass-patches-seamless-texture-with-normalmap-1
- https://opengameart.org/content/ground-outdoors-weeds-and-grass-seamless-texture-with-normalmap
- https://opengameart.org/content/3-seamless-grass-textures
- https://opengameart.org/content/tomeks-seamless-snow-textures
- https://opengameart.org/content/arid-ground-textures
- https://opengameart.org/content/stone001-texture-seamless
- https://opengameart.org/content/texture-water