Fantasy Land

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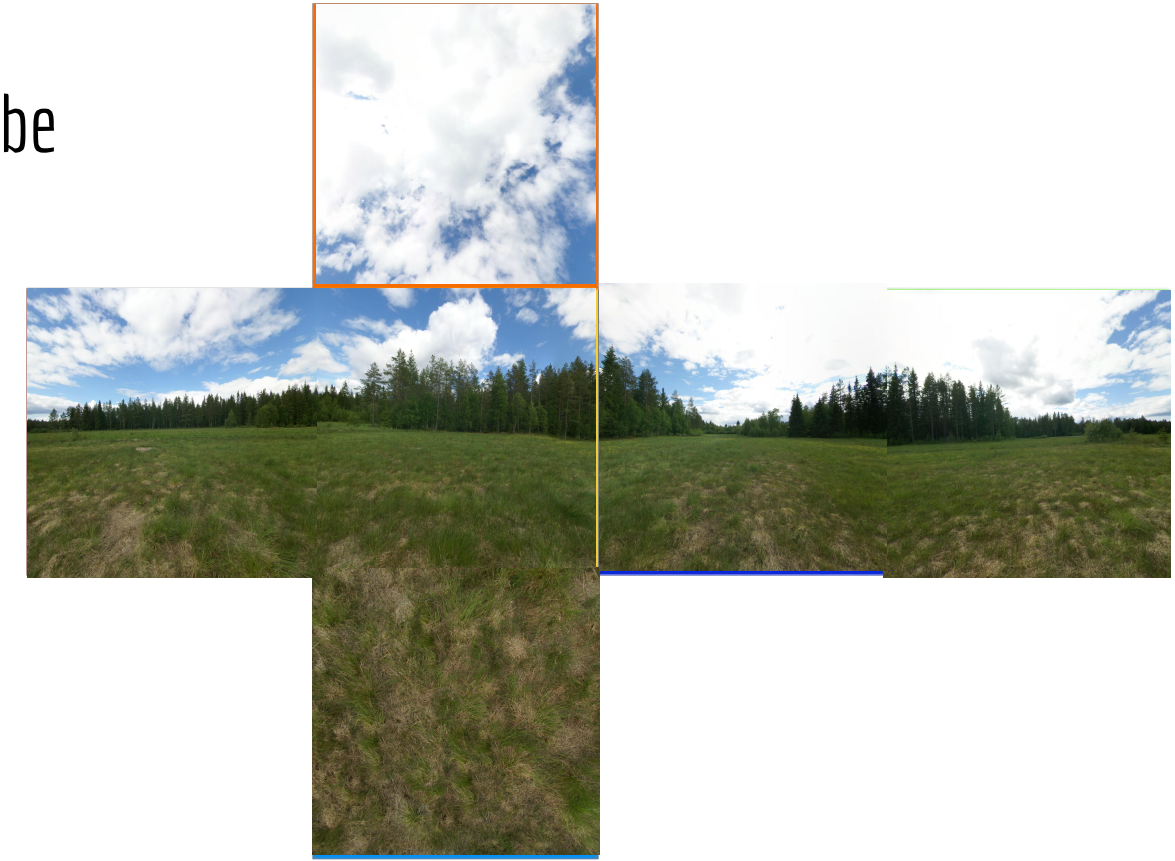
Part I - Skybox

Cubemaps: A textured cube

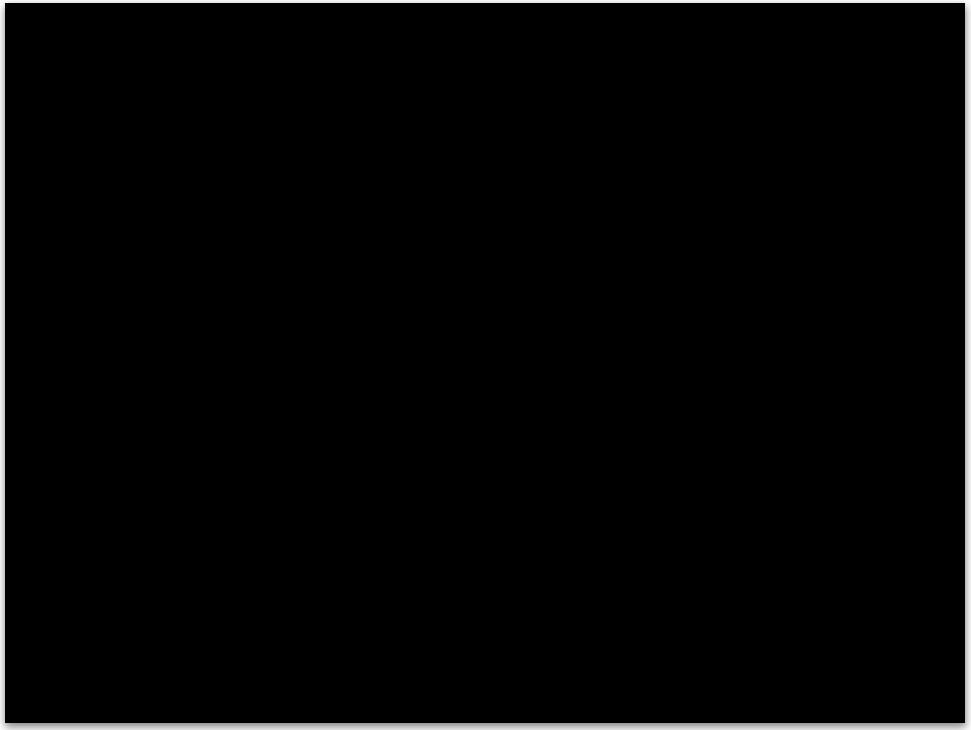
- A texture that contains 6 individual 2D textures that each form one side of a cube
- Can be indexed/sampled using a direction vector



Skybox

A skybox is a

- Large cube
- Contains 6 images of a scene
- Gives illusion to player that he's in a large environment



Part II - Terrain

Creating the terrain

1

We define tile size (distance between consecutive vertices in world units).

Larger tile sizes increase the size of the terrain but lower the resolution by creating larger polygons.

3

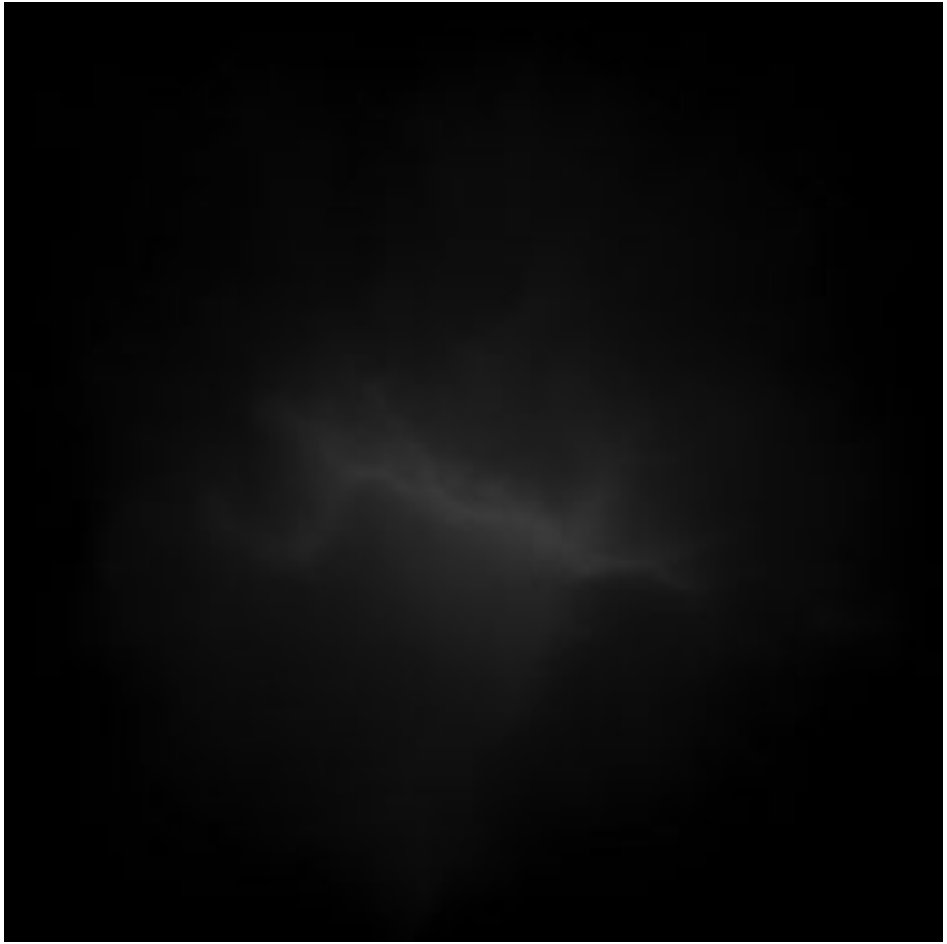
A basic mesh for a terrain consists in using a grid of vertices and manipulating them to conform to a heightmap image

2

Elevate the vertices. We do this by sampling the height map image for each vertex in the grid.

A height map is a gray scale image where the values of the pixels represent altitudes at different positions. The closer the color is to white, the more elevated it is.

Our heightmap image



Part III - Camera

Creating the camera

To define a camera we need its position in world space, the direction it's looking at, a vector pointing to the right and a vector pointing upwards from the camera.

- **W**: Move forward
- **S**: Move backwards
- **D**: Move to the right
- **A**: Move to the left
- **UP arrow**: Move camera upwards
- **Down arrow**: Move camera downwards
- **Right arrow**: Move camera to the right
- **Left arrow**: Move camera to the left
- **Shift** (works with all the buttons): Makes movements of all previous keys faster

Part IV - Animation

Components of an animated model

SKIN

Skin is a mesh that adds visual aspect to the model. It shows how the model looks like.

BONES

A bone is a 3x3 rotation matrix, along with its offset a 4x4 matrix.

Bone is associated with a group of vertices. Each vertex have a weight for each bone.

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KEYFRAMES

Keyframes are snapshots of a mesh with different poses. Keyframes define the start and end points of a transition on translation, rotation, or scale.

Part V - Circular Animation

Adding circular motion

- Moving a character within the screen from start point to end point.
- Changing the translation, rotation, or scale at different time intervals.

Part VI - Light

Adding the light

1

We define light position array where we send 4 point lights and we spread them across the scene.

The 4 point lights represent different sides of the screen, front, side, and back.

3

We introduce multiple lights in the scene to simulate a sun-like light .

For skinned objects, we compute the gl position using a skin matrix, where we sum the bone weights.

2

Change the color array values every a predefined time period.

We send 2 different shades of light, dark and light. Every ‘time period’ we change the values of the array and send it back to the mesh class.

Part VII - Demo