CMPM 163 Notes

Malcolm Riley

Winter 2019 — April 30, 2019

Environment Mapping

- Also known as **Cubemapping**
- Basically, this is the practice of shading the interior of a cube with six seamless textures
- Used for creating skyboxes. Shaders can do neat things with skyboxes, such as reflecting them.
- Skyboxes are typically implemented as being "infinitely far away", such that the character's motion has no impact on the relative positioning of the skybox
- The typical UV mapping for a **cubemap** is spherical, this allows a cube to be used in place of a sphere
- Texture coordinates of the **cubemap** are three dimensional, not two dimensional; however these coordinates map onto the flattened cubic plane
- In Unity, the `Skybox Material` field may be set via the `Lighting` settings. This is how special shaders are applied to the skybox.
- Cg uses `samplerCUBE()` to sample from **cubemap** (In contrast with `sampler2D()`
- Cg/HLSL have built-in `reflect()` and `refract()` functions to return the ray of reflection/refraction of a vector based on the mesh surface normal. `refract()` requires an additional `float` interpreted as an angle of refraction.
- In real-world refractive media, different spectra have different ratios of refraction. This effect is called **Chromatic Dispersion** and is the essential characteristic of the function of prisms. This can be accomplished in shaders by doing different `texCUBE` lookups per chroma. This effect is typically quite subtle in real-world materials, so use sparingly