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Project Proposal

Introduction

I will be working on the shadow mapping topic for my final project. The main problem at hand in this project is implementing shadows for objects in OpenGL. As such, the final goal should be to be able to render shadows for objects given at least one light source.I think initially, a single point light can be most intuitive in checking if shadow mapping is working properly.

Another sub-problem present in the project is that real-time implementations of shadow mapping can cause aliasing issues such as z-fighting or artifacts such as shadow acne. My goal is to resolve these issues by doing perspective shadow mapping (PSM), which utilizes a warped map to better render shadows. While working on this part of the project though, I may find other methods of shadow mapping more intuitive or easier and use those instead, which I will specify in my final project.

Methodology

The general idea of shadow mapping is to render the scene at first from (each) light source to get the depth map of objects from the light. Then, we render the actual scene at the intended camera position, using the sampled depths from the depth map obtained from the first pass to determine where to render shadows. Essentially, comparing the sampled depth from the first pass and the new computed depth from the second pass will allow us to determine if there should be a shadow at all. The rendering of the shadow is then (initially) as simple as omitting the contribution of light to a part of the scene that is under a shadow (keeping ambient shading unaffected). Visualising this depth map can be useful for verifying the correctness of implementation of this subset of the main problem, but otherwise the depth map can be saved as a texture to reference later in the second pass.

Objectives

The project guidelines have good checkpoints to base my progress on, so I will use those for reference. I think a good goal for the checkpoint next week will be to a) more fully understand the intuition behind how this shadow mapping works (as well as PSM) and b) implementing what is necessary to at least generate the depth map, or in other words, get the “first pass” implemented. This will leave me until the final deadline with using the depth map to implement the “second pass” and then implementing PSM to improve the quality of the shadows.