Smooth Cascaded

Shadow Mapping

Course: CMPT 829 – Computer Graphics

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Technique

Shadow mapping is a very popular technique to bring shadow to 3D scenes. This technique gives a relatively good result with comparatively low cost. The main idea of Shadow Mapping, is to looking at the scene from the global light source point of view, and then determine whether the pixel is going to be rendered should be lighted or shadowed. It means each visible pixel from the light source point of view should be considered as a lighted point, and all other pixels should be shadowed.

Because Shadow Mapping is a relatively low cost technique to draw shadows in 3D scenes, many real-time game engines use this technique for video games. The only drawback of this technique is that the shadow receiving parts of the scene is needed to be rendered twice, one extra time to compute the depth of each pixel in these parts and the second time for the regular rendering operation.

There are several extensions that can be applied to Shadow mapping technique which improves it in various ways, one of them is Cascaded Shadow Mapping which is today's popular method for high quality dynamic shadowing of many cutting edge games. In this particular extensions, the generated show is divided to different parts with different precisions depending on the required resolution.

Smoothing the resulted simple shadow map, is the process which eliminated sharp edges of the shadow by giving them a blur effect to look more realistic. Smoothing the presented shadow, would be the second phase of my project which I chose to do.

Although Shadow Mapping is a great technique to represent shadow, one of its drawbacks is that the basic algorithm uses no optimisation technique to avoid computation of unnecessary details in far distances. Cascaded Shadow Mapping is an extension to simple shadow mapping which delivers this performance enhancement. Implementation of this technique is the last phase of my project.

Milestones

Feb. 3 – Initialisation and project start up, gathering a basic test scene.

Feb. 15 – Implementation of the simple Shadow Mapping technique.

Feb. 25 – Implementation of Smoothing technique for the simple Shadow Mapping.

Jan. 15 – Cascaded Shadow Mapping implementation.

Jan. 25 – Producing an illustrative demo of the whole implemented technique.

Development Environment

Most parts of this technique need to be done in the fragment shader. I'm going to implement this technique using OpenGL under a Linux kernel operating system. My main programming language would be C++.