**Overview of the Rendering Passes in kbEngine**

kbEngine uses a deferred lighting system and multiple rendering passes to draw its scenes. In order, the rendering passes are:

**Foreground Pass**



The Foreground Pass includes things like the first person hands and weapons. This pass also renders to the stencil buffer to mask out pixels that later passes should not overwrite. Note: This method of rendering the first person hands and weapons is used in games like Deus Ex : Mankind Divided.

Alternatively, the background pass can be rendered first, followed by a depth buffer clear, and then the Foreground Pass. However, additional work is needed to get the hands to interact correctly with the Lighting Pass and for proper depth-testing of the Translucency Pass.

**Lit World Object Pass**



This pass renders opaque world primitives that are affected by lights. This includes objects like trees, NPCs, and buildings.

**Lighting Pass**



The g-buffer that was generated in the earlier passes is used to render each visible light's effect on the scene.

**Unlit World Object Pass**



Unlit opaque world objects, such skyboxes, are rendered during this pass.

**Translucency Pass**



Particles, FX, glass, and other translucent primitives are rendered during the Translucency Pass. When possible, multiple primitives are combined into a single vertex buffer and their textures are atlased in order to reduce draw calls.

**Post-Process Pass**



Finally, a post-processing + fogging pass is applied to the scene.