Forward+ Renderer in Vulkan

Overview

Forward+ is a method of rendering many lights by culling and storing only lights that contribute to the pixel. And it was done as former CIS565 final project in OpenGL.

We are passionate about learning some cutting-edge APIs and techniques in real-time graphics and games, and we choose to use Vulkan as our graphics API. We want to implement a forward+ shading pipeline in Vulkan based on the paper Forward+: Bringing Deferred Rendering to the Next Level by Takahiro Harada, Jay McKee, and Jason C.Yang.

We are also considering doing a detailed comparison with last year's OpenGL implementation to see how Vulkan and OpenGL are different in performance. After we implemented a basic Forward+ rendered in Vulkan, we want to also implement some techniques that are commonly used in today's video games like Temporal Anti-Aliasing (TAA).

Goals

- Basic Forward+ rendering pipeline in Vulkan with:
  - Blinn-Phong shading
  - Texture & normal mapping
  - Point lights
- Stretch goals:
  - MSAA
  - SSAO
  - Bloom
  - TAA
  - Comparison with OpenGL

References

- https://takahiroharada.files.wordpress.com/2015/04/forward_plus.pdf
- http://advances.realtimerendering.com/s2016/
- https://github.com/bcrusco/Forward-Plus-Renderer