

Forward vs Deferred Rendering

- [Pros and Cons](#)

Pros and Cons

- **Forward Rendering:**
 - Renders each object individually, one by one, during each pass.
 - Lighting calculations performed in the same pass as geometry and material shading calculations.
- **Deferred Rendering:**
 - Renders geometry and material properties into intermediate buffers (G-buffer) first.
 - Lighting calculations performed in a separate pass using information stored in the G-buffer.

Lighting Calculations:

- **Forward Rendering:**
 - Lighting calculations performed per-pixel during rendering of each object.
 - Can be computationally expensive for scenes with many lights and complex shading effects.
- **Deferred Rendering:**
 - Lighting calculations performed per-pixel after rendering all objects into the G-buffer.
 - Allows more efficient lighting calculations, independent of the number of objects in the scene.

Number of Lights:

- **Forward Rendering:**
 - Limited by the number of lights that can be efficiently rendered in a single pass.
 - May result in performance bottlenecks and increased rendering times for scenes with many lights.
- **Deferred Rendering:**
 - Efficiently handles scenes with many lights, as lighting calculations are decoupled from the number of objects.
 - Well-suited for scenes with complex lighting setups and dynamic lights.

Memory Usage:

- **Forward Rendering:**
 - Requires storing per-pixel information in the framebuffer during each pass.
 - Can lead to higher memory usage, especially for scenes with many objects and lights.
- **Deferred Rendering:**
 - Requires storing geometry and material properties in the G-buffer.

- Memory requirements for the G-buffer can be significant for scenes with high-resolution textures or complex materials.

Transparency and Post-Processing Effects:

- **Forward Rendering:**
 - Handles transparency and post-processing effects more naturally.
 - Lighting calculations are performed per-pixel during rendering of each object.
- **Deferred Rendering:**
 - Can struggle with transparency and post-processing effects.
 - These effects typically require access to per-pixel information that may not be available in the G-buffer.