Pipeline Stage 2 Synchronization Stage 1 PER FRAME BUFFER --OWNERSHIP CHANGE--GRAPHICS -> COMPUTE LIGHTS BUFFER --OWNERSHIP CHANGE--GRAPHICS -> COMPUTE SCENE MAT PARAM BUFFER --OWNERSHIP CHANGE--GRAPHICS -> COMPUTE SCENE VERTEX BUFFER --OWNERSHIP CHANGE--GRAPHICS -> COMPUTE SCENE INDEX BUFFER Pipeline Stage 0 --OWNERSHIP CHANGE--Synchronization Stage 0 GRAPHICS -> COMPUTE SCENE MAT PARAM BUFFER --OWNERSHIP CHANGE--SCENE INSTANCE BUFFER COMPUTE -> GRAPHICS --OWNERSHIP CHANGE--GRAPHICS -> COMPUTE SCENE VERTEX BUFFER --OWNERSHIP CHANGE--SCENE MESH INDEX BUFFER COMPUTE -> GRAPHICS --OWNERSHIP CHANGE--GRAPHICS -> COMPUTE SCENE INDEX BUFFER --OWNERSHIP CHANGE--SCENE ALBEDO MAPS COMPUTE -> GRAPHICS --OWNERSHIP CHANGE--GRAPHICS -> COMPUTE SCENE INSTANCE BUFFER --OWNERSHIP CHANGE--SCENE NORMAL MAPS COMPUTE -> GRAPHICS --OWNERSHIP CHANGE--GRAPHICS -> COMPUTE SCENE MESH INDEX BUFFER --OWNERSHIP CHANGE--SCENE AO MAPS COMPUTE -> GRAPHICS --OWNERSHIP CHANGE--GRAPHICS -> COMPUTE SCENE ALBEDO MAPS --OWNERSHIP CHANGE--SCENE ROUGHNESS MAPS COMPUTE -> GRAPHICS --OWNERSHIP CHANGE--GRAPHICS -> COMPUTE SCENE NORMAL MAPS --OWNERSHIP CHANGE--SCENE METALLIC MAPS COMPUTE -> GRAPHICS --OWNERSHIP CHANGE--GRAPHICS -> COMPUTE SCENE AO MAPS --OWNERSHIP CHANGE--BRDF LUT COMPUTE -> GRAPHICS --OWNERSHIP CHANGE--GRAPHICS -> COMPUTE SCENE ROUGHNESS MAPS --OWNERSHIP CHANGE--BLUE NOISE LUT COMPUTE -> GRAPHICS --OWNERSHIP CHANGE--GRAPHICS -> COMPUTE SCENE METALLIC MAPS --OWNERSHIP CHANGE--GBUFFER NORMAL ROUGHNESS METALLIC COMPUTE -> GRAPHICS --TRANSITION FOR READ--GRAPHICS -> COMPUTE GBUFFER ALBEDO AO --TRANSITION FOR WRITE--GBUFFER VELOCITY GRAPHICS -> GRAPHICS --TRANSITION FOR READ--GRAPHICS -> COMPUTE GBUFFER NORMAL ROUGHNESS METALLIC --TRANSITION FOR WRITE--GBUFFER DEPTH GRAPHICS -> GRAPHICS --TRANSITION FOR READ--GRAPHICS -> COMPUTE GBUFFER VELOCITY --TRANSITION FOR WRITE--RADIANCE IMAGE GRAPHICS -> GRAPHICS --TRANSITION FOR WRITE--COMPUTE -> COMPUTE Ray Tracing Render Stage GBUFFER DEPTH Pipeline Stage 1

Render Stage 0

Geometry Render Stage

--TRANSITION FOR WRITE--

GRAPHICS -> GRAPHICS

Pipeline Stage 6 Synchronization Stage 3 PER FRAME BUFFER --OWNERSHIP CHANGE--COMPUTE -> GRAPHICS LIGHTS BUFFER --OWNERSHIP CHANGE--COMPUTE -> GRAPHICS BRDF LUT --OWNERSHIP CHANGE--COMPUTE -> GRAPHICS BLUE NOISE LUT --OWNERSHIP CHANGE--COMPUTE -> GRAPHICS FILTERED RADIANCE IMAGE --TRANSITION FOR READ--COMPUTE -> GRAPHICS GBUFFER ALBEDO AO --TRANSITION FOR READ--GRAPHICS -> GRAPHICS GBUFFER NORMAL ROUGHNESS METALLIC --OWNERSHIP CHANGE--Pipeline Stage 4 COMPUTE -> GRAPHICS Synchronization Stage 2 RADIANCE IMAGE GBUFFER VELOCITY --TRANSITION FOR READ----OWNERSHIP CHANGE--COMPUTE -> COMPUTE COMPUTE -> GRAPHICS FILTERED RADIANCE IMAGE GBUFFER DEPTH --TRANSITION FOR WRITE----OWNERSHIP CHANGE--Pipeline Stage 5 GRAPHICS -> COMPUTE COMPUTE -> GRAPHICS Render Stage 2 - ► Spatial Blur Render Stage

Pipeline Stage 7

Render Stage 3

Shading Render Stage

Pipeline Stage 8

Render Stage 4

Particle Update Render Stage

Pipeline Stage 3

Render Stage 1