

20220809 Project Meeting

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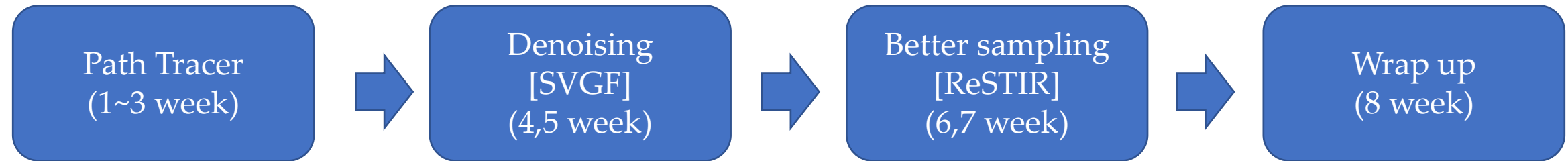
PEARLABYSS

Contents

- (6 Week) Work Progress
 - Render Pass
 - Code Restructuring
- TODO

Project Overview

- Project Goal : Implement a 1-spp real-time path tracer with denoising & better sampling technique.



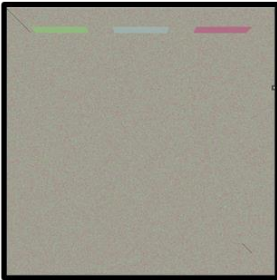
- Implement a **real-time path tracer using DX12**.
- Study basics of DX12 and physically based rendering.
- Implement **denoising** technique for a path-traced image.
- Choose to implement SVGF (2017).
- Implement **sampling quality enhancement** technique.
- Currently working on ReSTIR (2020)
- Try ReSTIR GI (2021) or ReSTIR PT (2022).
- Write a report.
- Wrap up the project.

Recall - (5 Week) Work Progress

- Implemented ReSTIR (temporal reuse only)

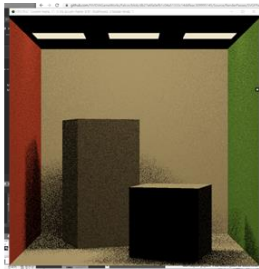
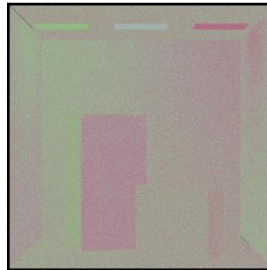
No RIS (uniform)

$$x_i \sim u$$



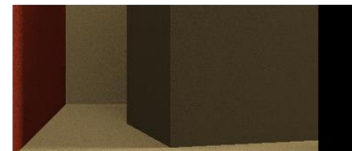
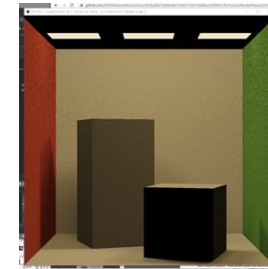
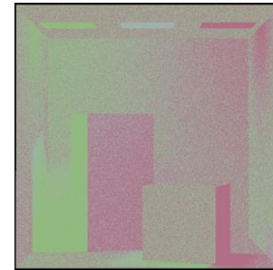
RIS w/o temporal reuse

$$x_i \sim \rho L_e G$$



RIS w/ temporal reuse

$$x_i \sim \rho L_e G V$$



u : uniform pdf
 ρ : BRDF
 L_e : emission
 G : Geometric term
 V : Visibility

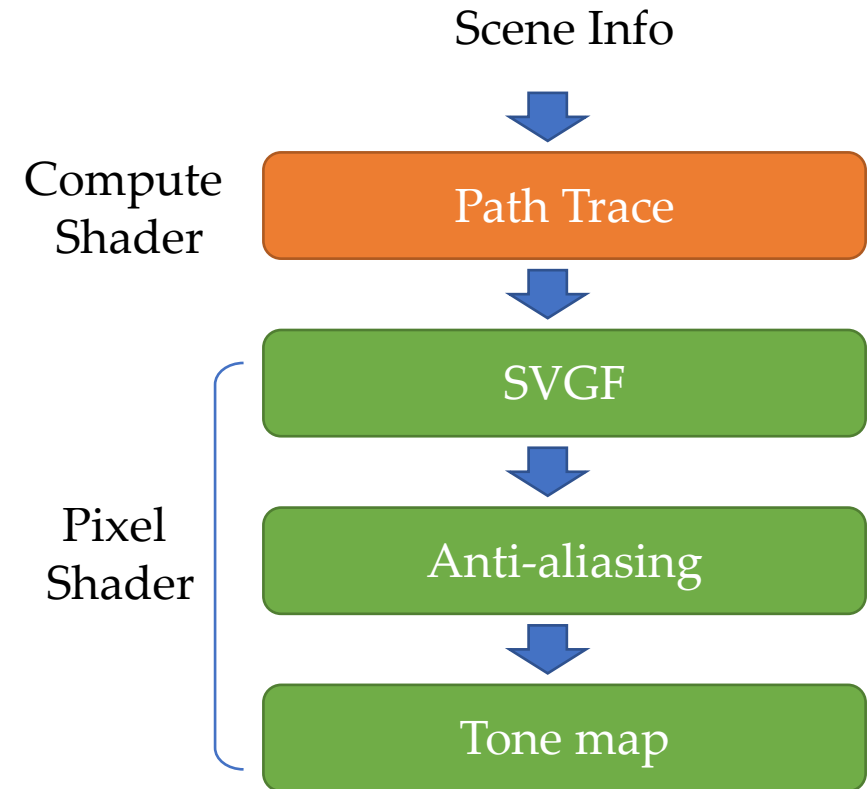
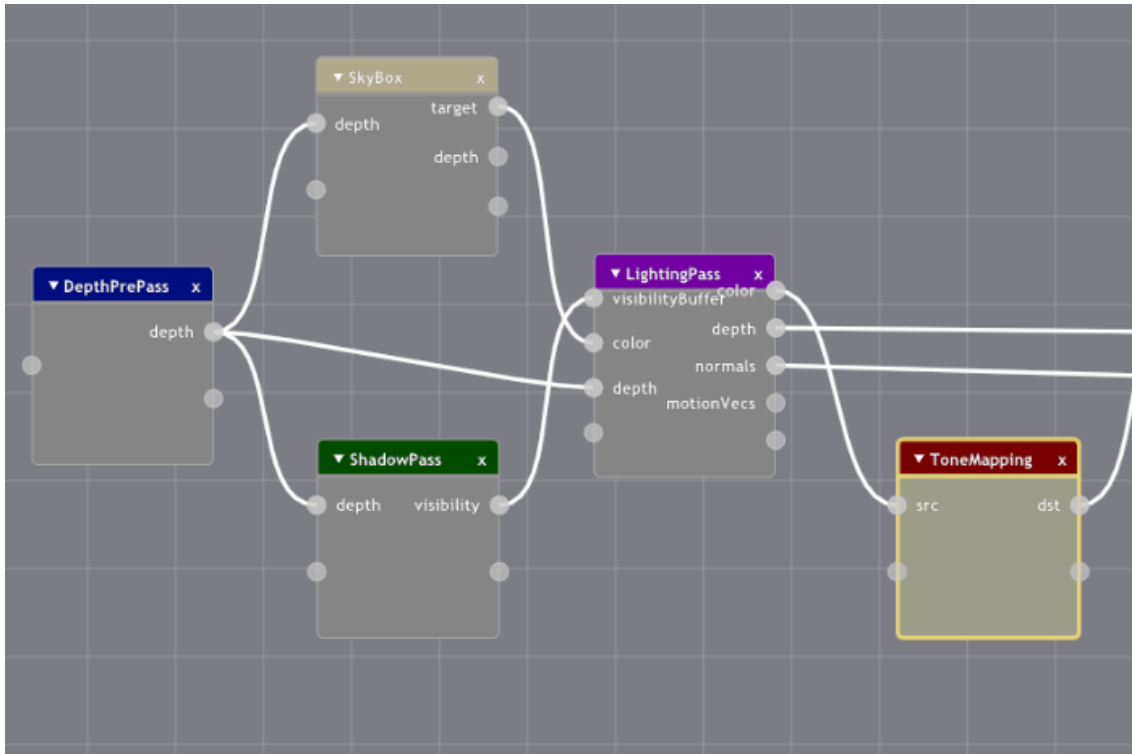
Light Weight

1-spp
 Rendered Image

(no accumulation)

Pipeline Overview

- Falcor-styled RenderPass



Pipeline Overview

※ Why single descriptor heap?

Changing descriptor heaps can incur a pipeline flush on some hardware. Because of this, it is recommended to use a **single shader-visible heap** of each type, and set it once per frame, rather than regularly changing the bound descriptor heaps. Instead, use

SRV / UAV Descriptor Heap

0	Acceleration Structure
1	Material Info
2	Geometry Info
3	Indices Data
4	Vertices Data
5	Envmap
6	Texture 1
7	Texture 2
8	...

Scene Info (SRVs)

0	gHDR
1	gDirectIllum
2	gIndirectIllum
3	gReflectance
4	gPosMeshID
5	gNormal
6	gPosMeshIDPrev
7	gNormalPrev
8	gReservoir
9	gReservoirPrev

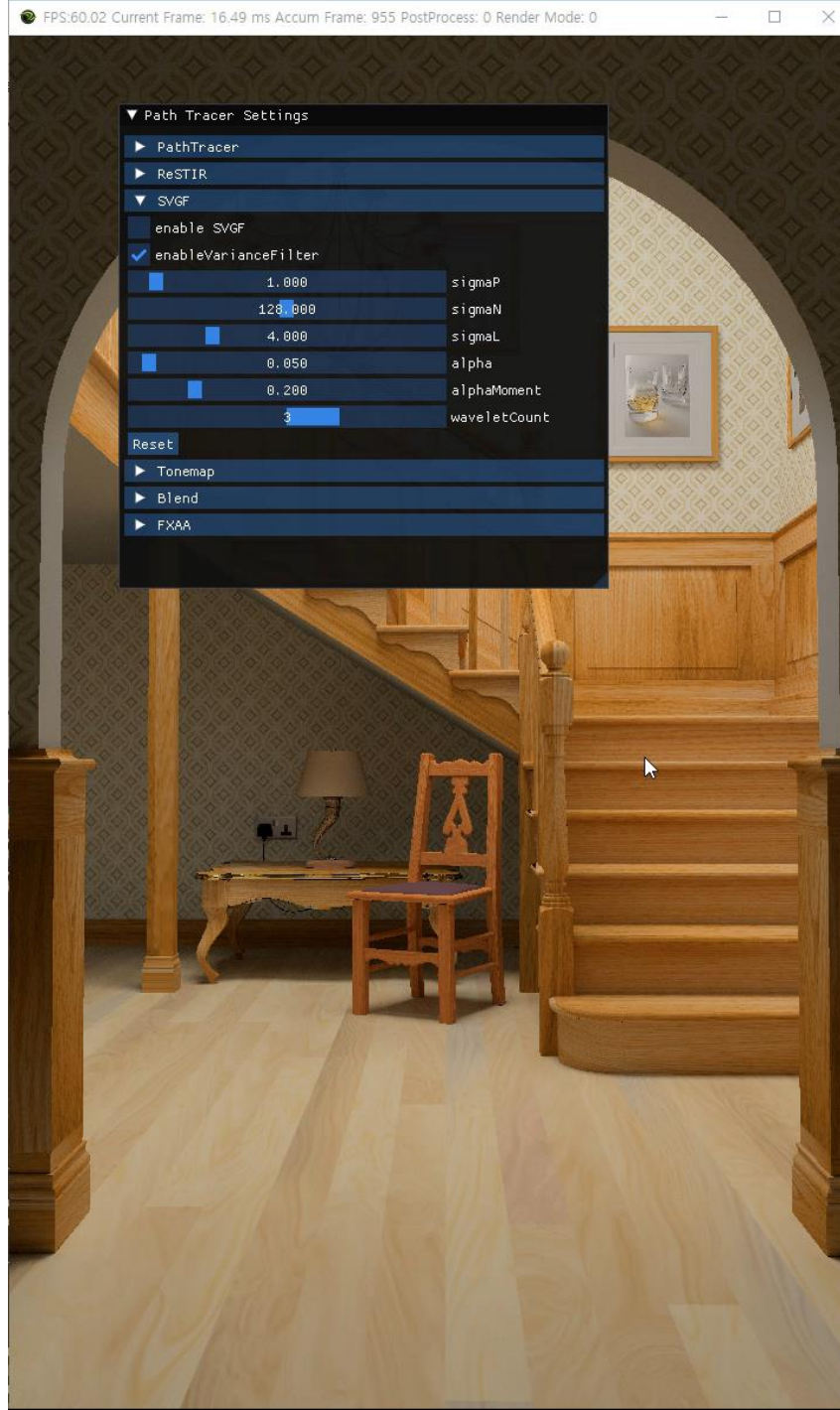
Path Tracer Related (UAVs)

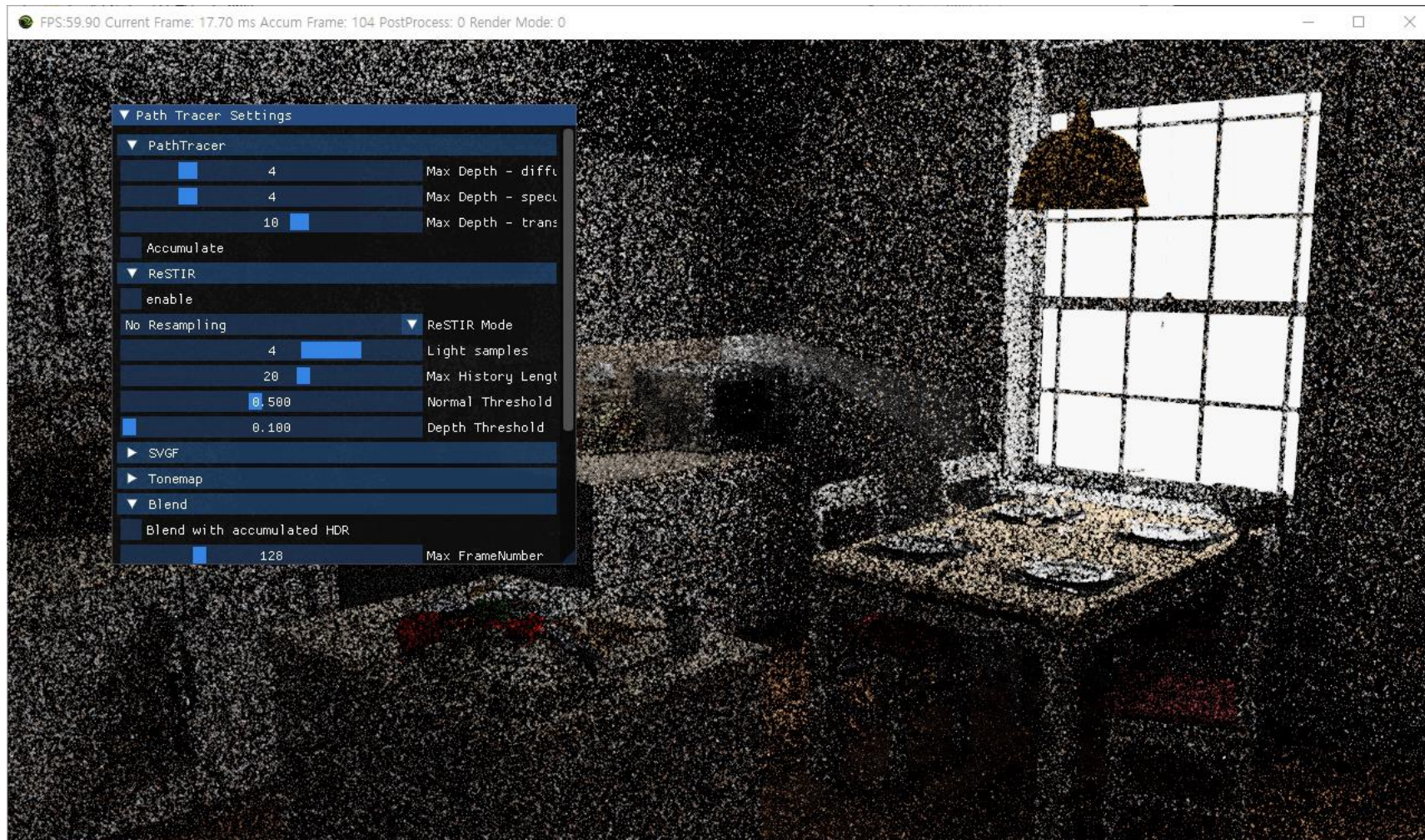
RTV Descriptor Heap

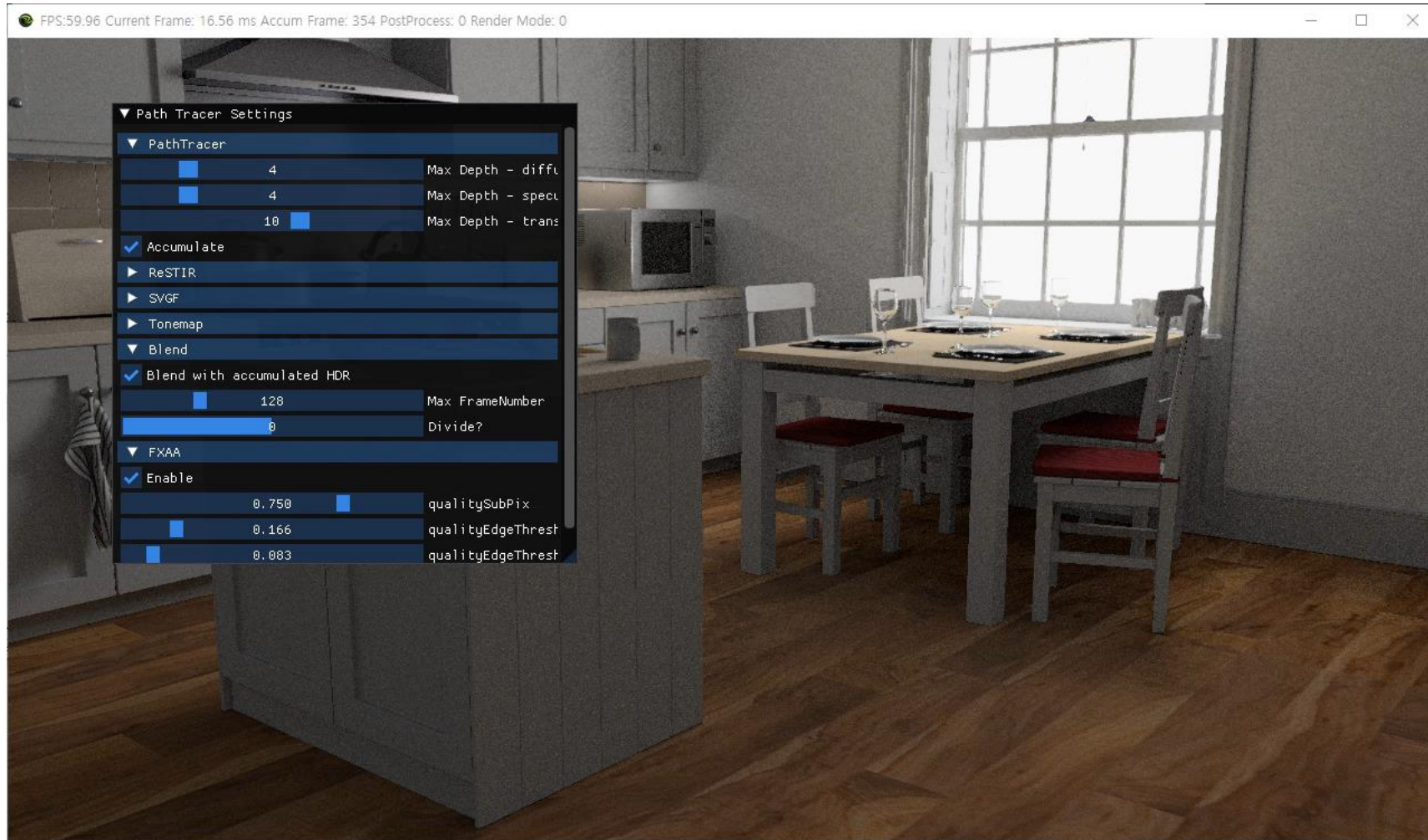
0	gMotionVector
1	gHistoryLength
2	gColorHistory
3	gColorHistoryFiltered
4	gMoment
5	gWaveletPingpong2
6	gWaveletPingpong1
7	gReconstruction

SVGF Related (SRV + RTVs)

All resources (**ID3DResource**) are managed by dictionary → resourceDictionary["gNormal"]







TODO

- A-trous filter seems so blocky
- RELAX Algorithm

