

DXR Photon Mapper

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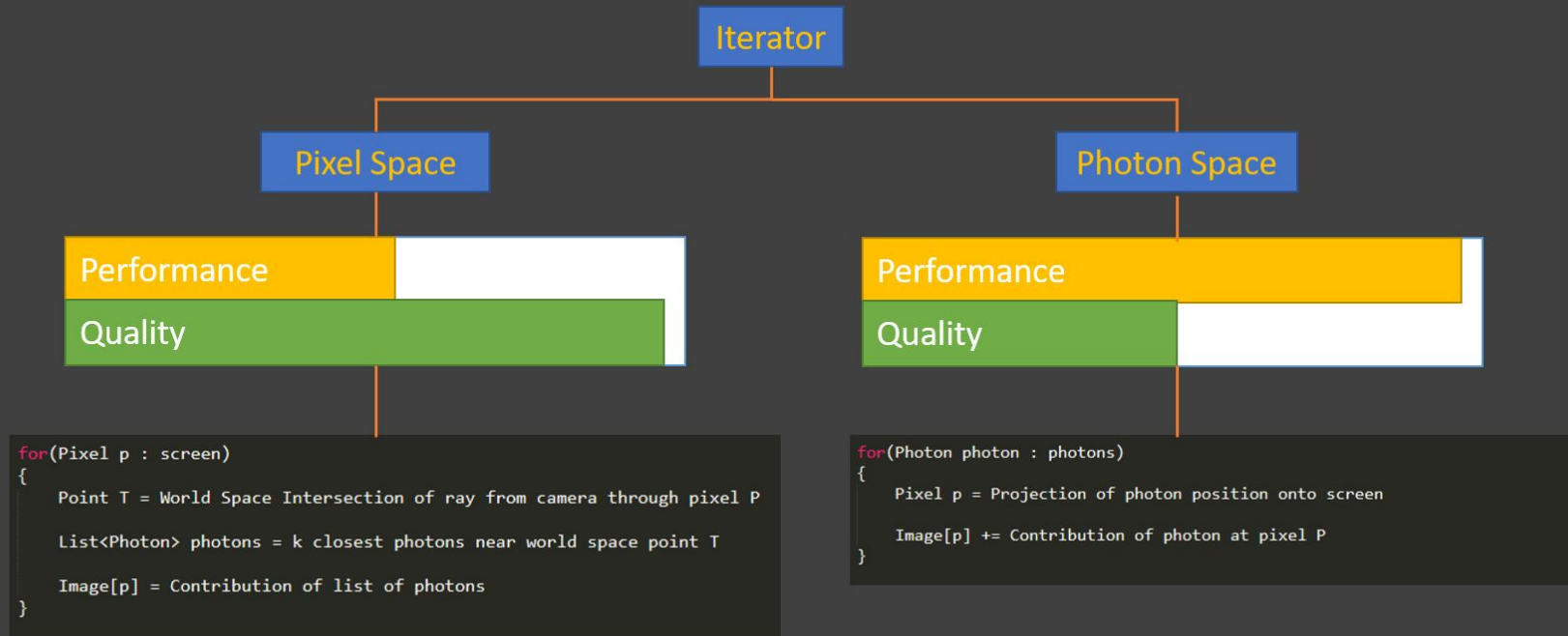
Acknowledgement

Special thanks to **Eric Haines** from NVIDIA for sending the Titan X GPU, we used in this project

Goals of the project

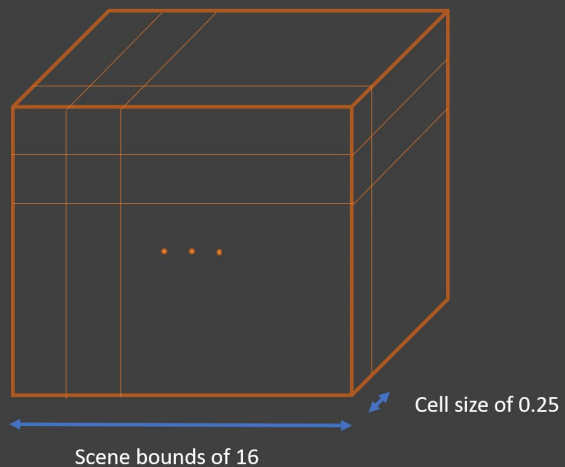
- ❖ *Implementation of Photon Mapping using DXR*
- ❖ *Possible search time optimizations*
- ❖ *Alternate approaches to spatial data structure construction*

Pixel Major vs Photon Major Iterator



Pixel Major Iterator

Scene Division into cell structure



Customization of photon storage

Photon Count per cell

2	0	1	3	5	...
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Exclusive Scan on Count – Starting index for sorted photons

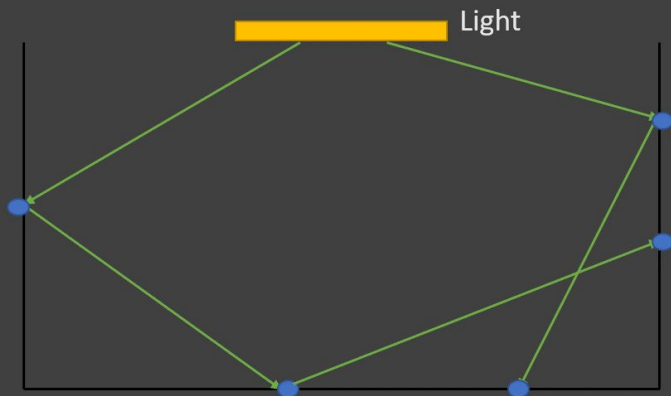
0	2	2	3	6	...
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Photon Map

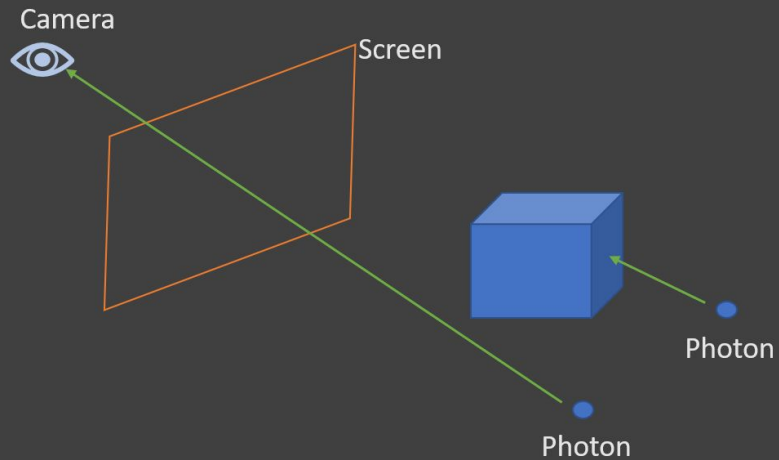
P1	P2	P3	P4	P5	...
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Photon Major Iterator

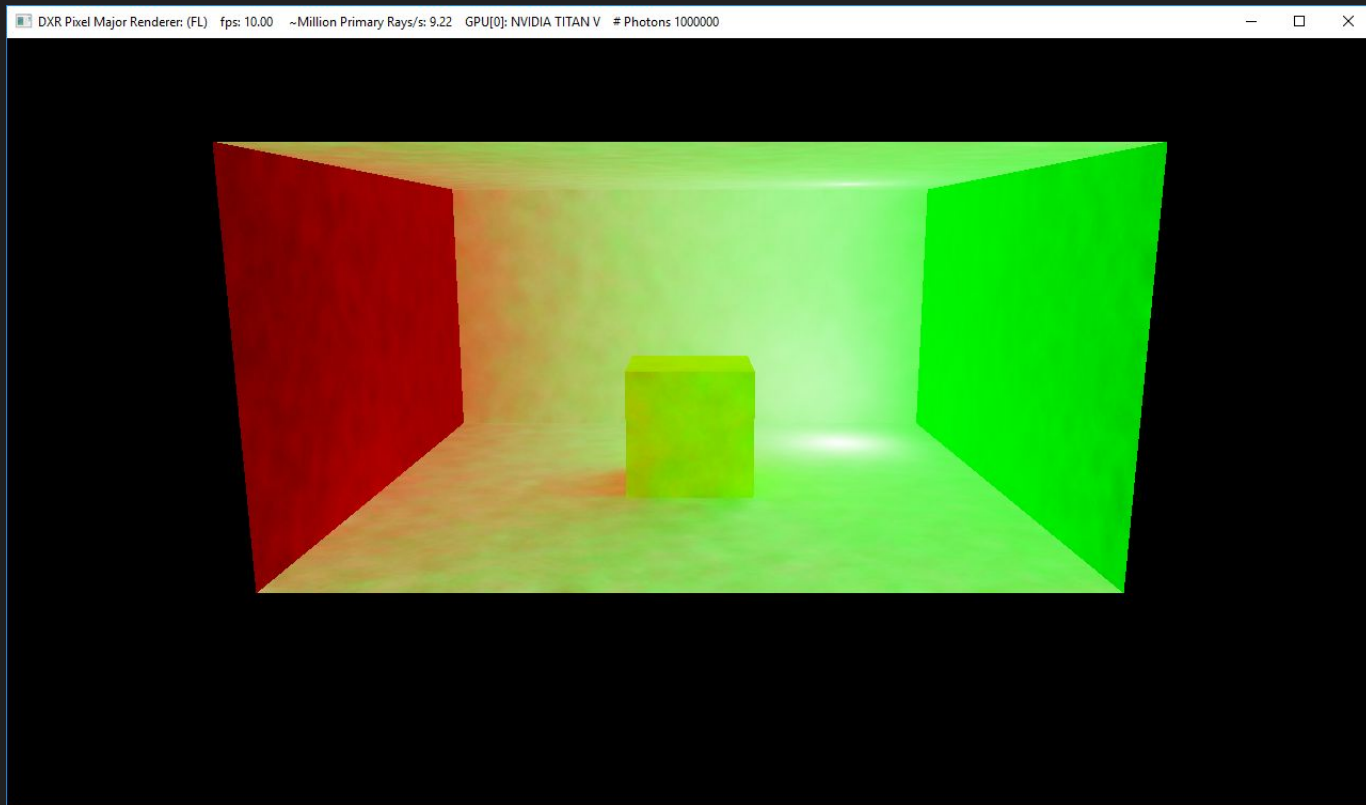
View independent Photon Generation and Traversal



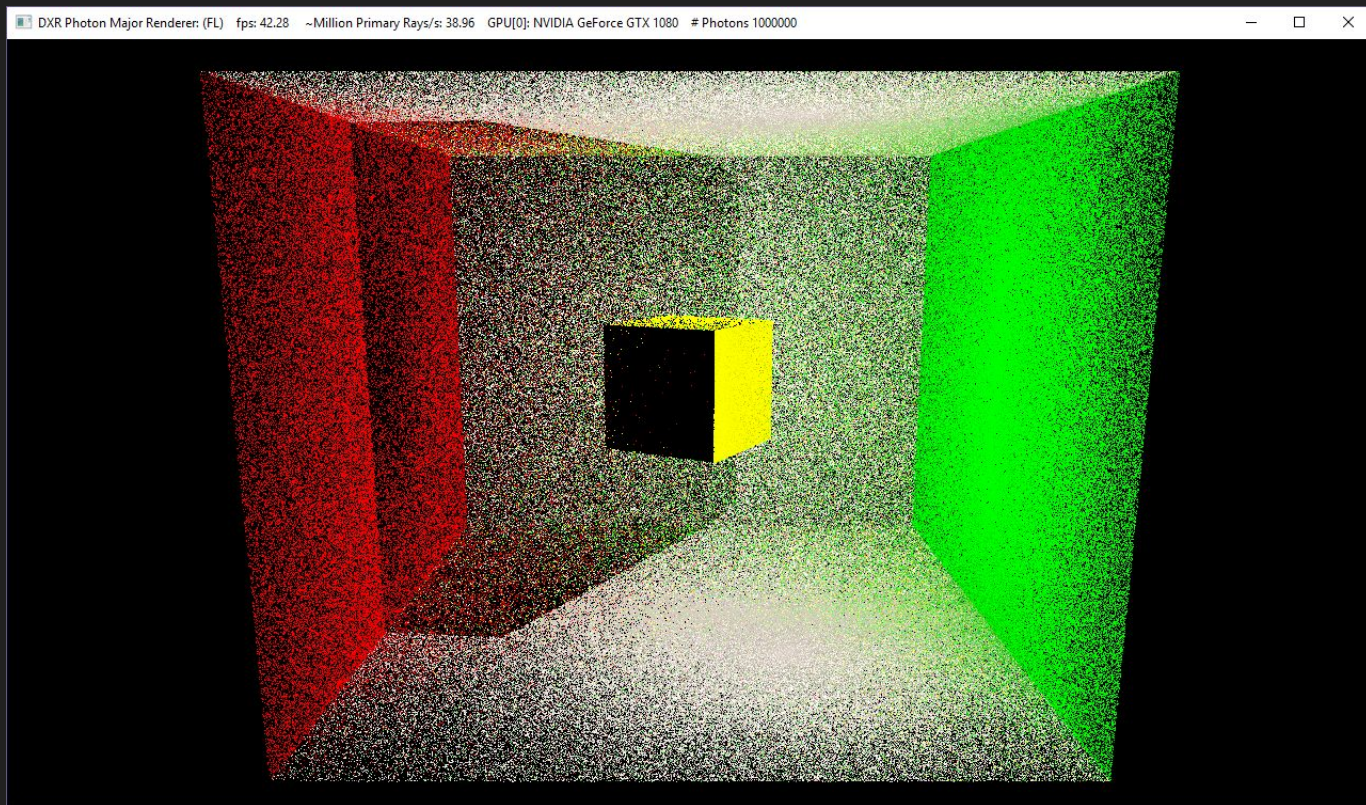
Shadow Ray Culling



Pixel Major Results

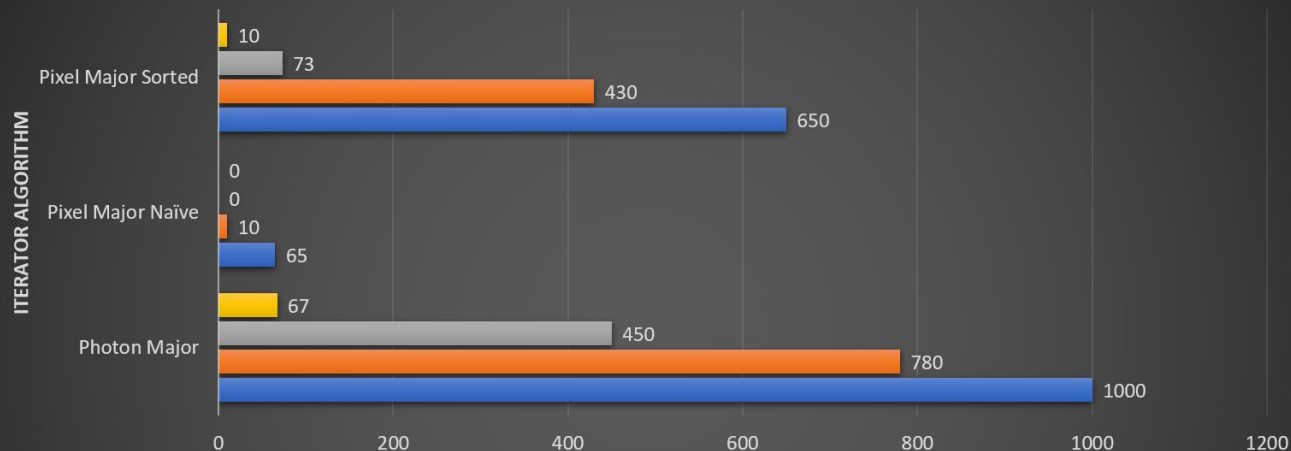


Photon Major Iterator results



Performance Analysis

Performance Comparison between different approaches



	Photon Major	Pixel Major Naïve	Pixel Major Sorted
1 M	67	0	10
100 K	450	0	73
10 K	780	10	430
1 K	1000	65	650

FRAMES PER SECOND (HIGHER IS BETTER)

NUMBER OF PHOTONS 1 M 100 K 10 K 1 K

Test Conditions

- NVIDIA Titan X
- DirectX Fallback Layer
- V-Sync Off
- 8 Bounces per Photon

Possible Future research?

- 1) Improve sorting and searching of photon -
 - a) Better Memory Management
 - b) Faster search
- 2) Denoising in Photon Major

Questions?