

A Brief Overview of Accelerated Raytracing for VR



Real-time Foveated Raytracing

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MOTIVATION

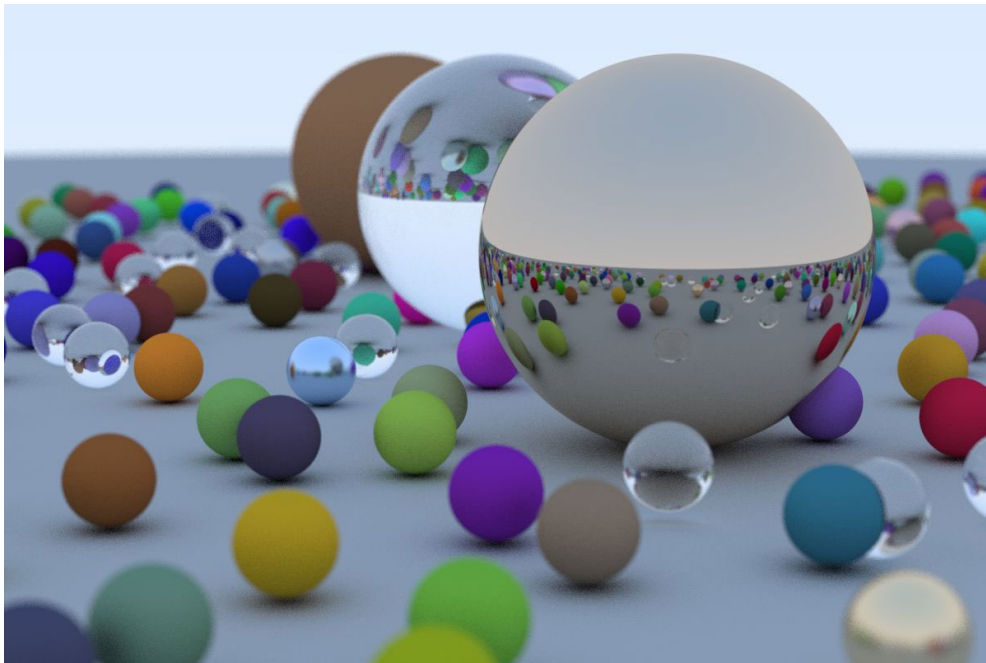


Image: Peter Shirley, raytracing.github.io

10 GRays/s (RTX 1080)

/ 2880 px = ~24 Rays ppx/s

/ 1600 px

/ 90 fps

10 GRays/s

/ 2880 px

/ 1600 px (HTC Vive Pro)

/ 90 fps

= ~24 Rays ppx/s

10 GRays/s

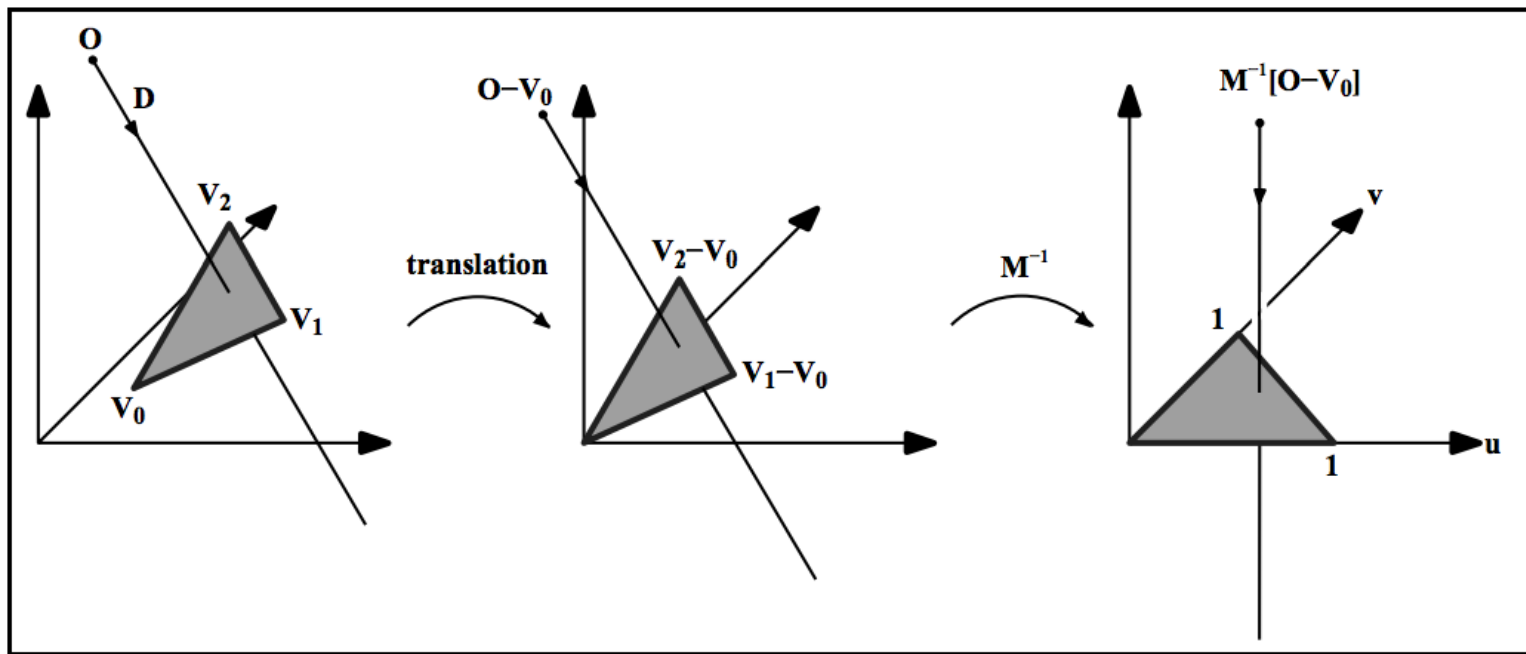
/ 2880 px

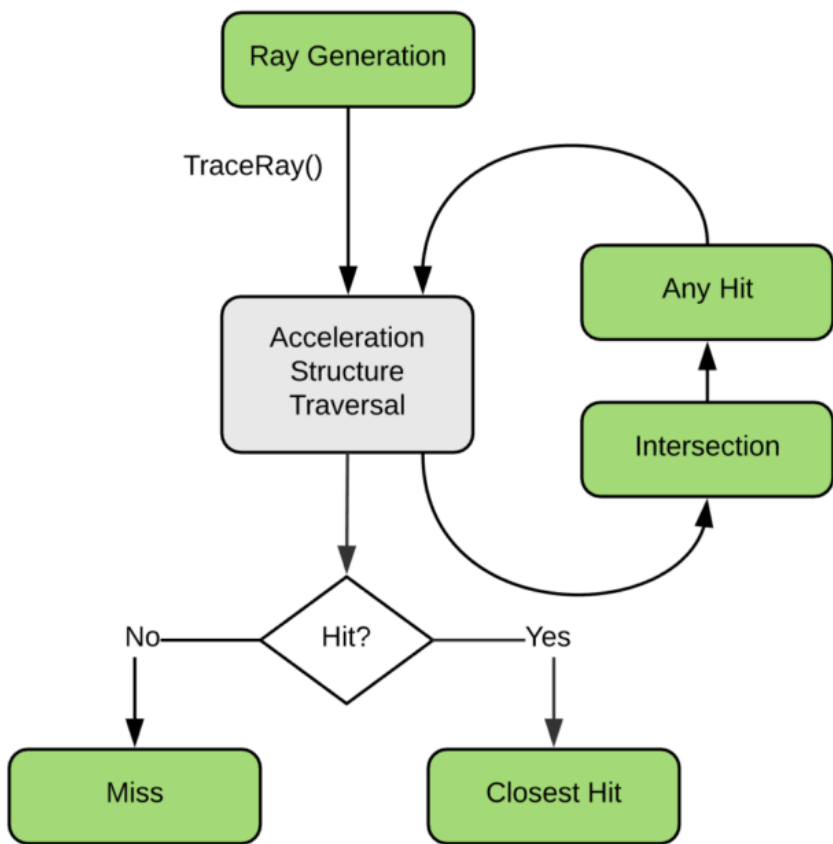
/ 1600 px

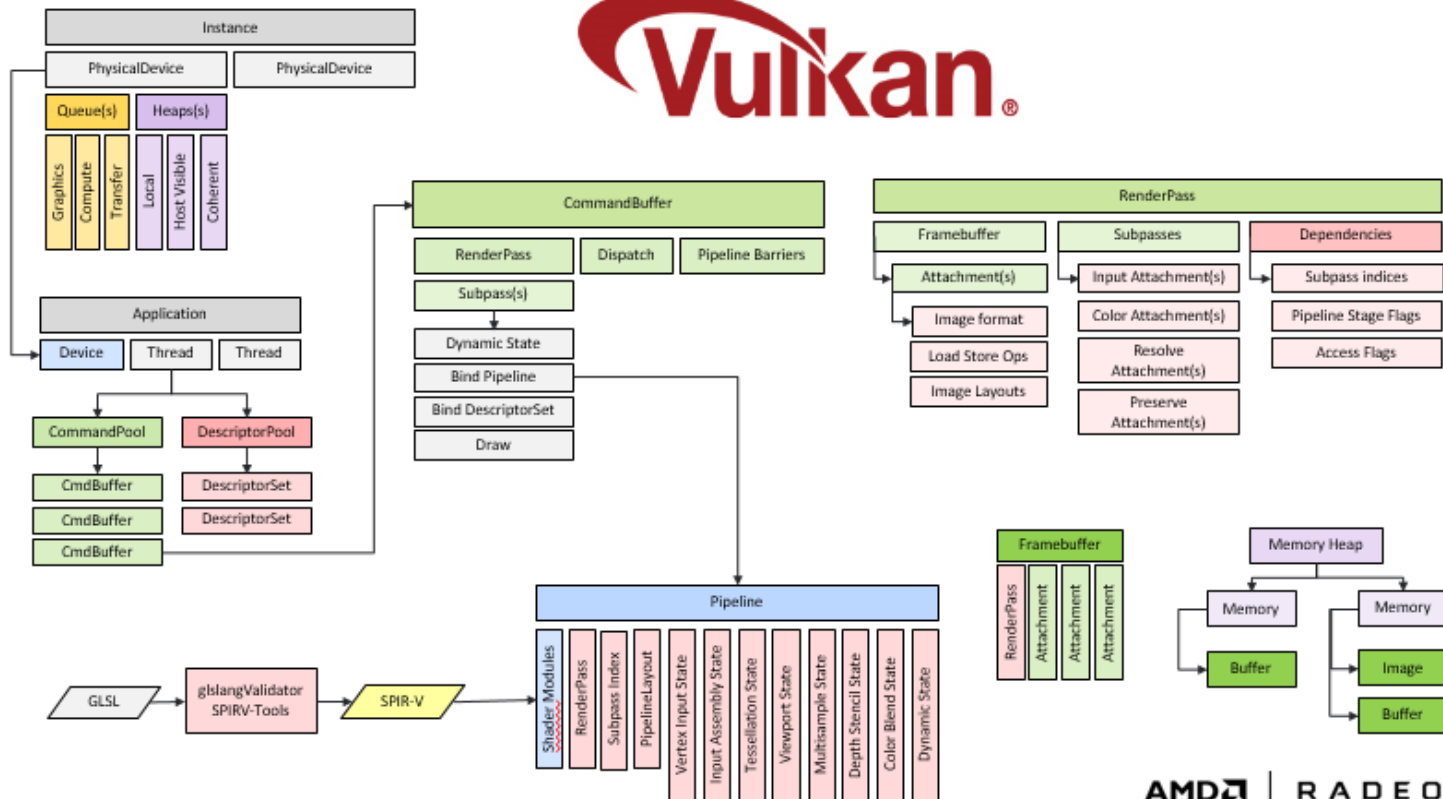
/ 90 fps (Target VR framerate)

= ~24 Rays ppx/s

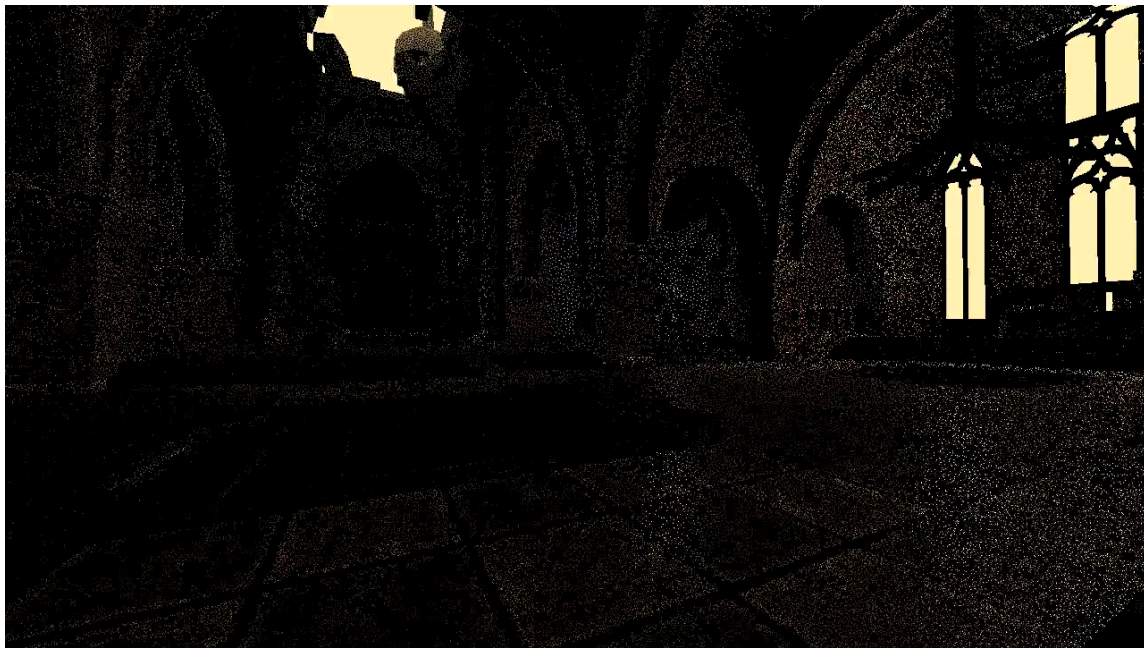
$$\begin{aligned} &10 \text{ GRays/s} \\ &/ 2880 \text{ px} \\ &/ 1600 \text{ px} \\ &/ 90 \text{ fps} \end{aligned} = \sim 24 \text{ Rays ppx/s}$$





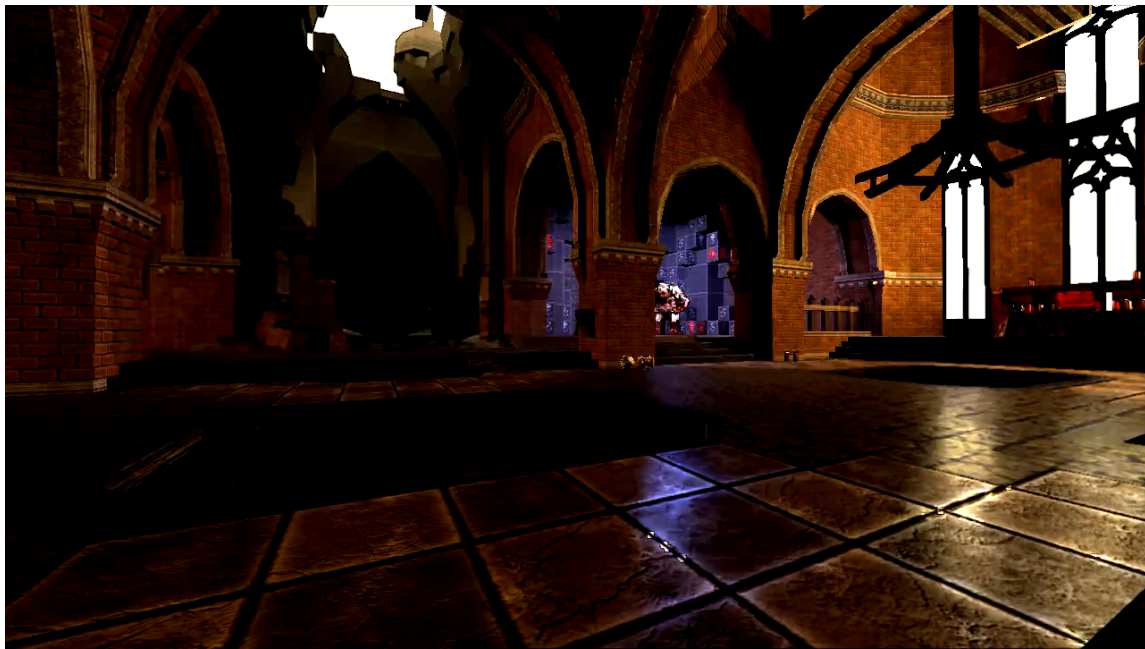


RTX OFF



Source: Schied, et al. 2018

RTX ON



PROJECTED PERFORMANCE

Prior: Spatial Reprojection; Quality Metric Importance Sampling
Due to Siekawa, et al. 2019

Scene Type		# of rays		Re-project	Ray Tracing		Cache Update	Merge	Post	Total Time		Speed-Up Factor
		full	ours		full	ours				full	ours	
Sibenik 75K Triangles Figure. 5a	point light	3.46M	0.81M	1.41	10.74	3.85	0.64	0.84	0.00	10.74	6.74	1.59
	area light (8spp)	15.57M	3.64M	1.51	47.96	14.80	0.67	0.85	0.33	47.96	18.36	2.61
	ao (16spp)	29.42M	6.88M	1.45	94.64	27.96	0.64	0.83	0.32	94.64	31.39	3.02