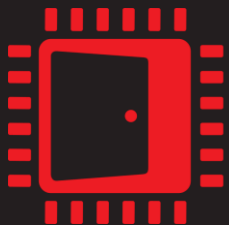




DirectX



ULTIMATE



AMD  
GPU Open

AMD  
RDNA 2

DIRECTX®  
RAYTRACING 1.1

RYS SOMMEFELDT

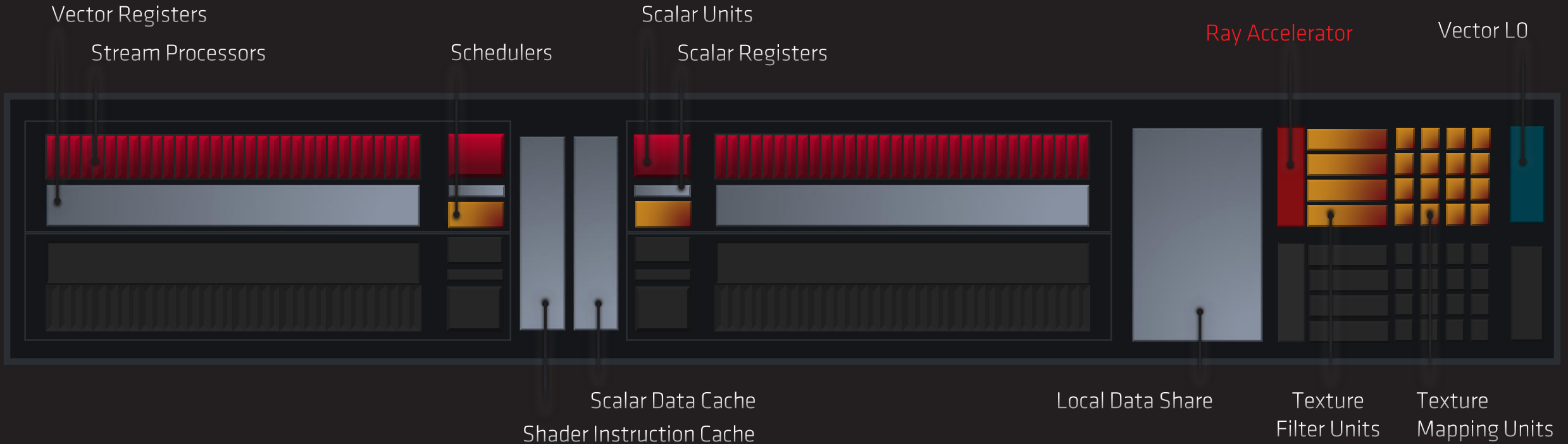
# INTRO

- DirectX® Raytracing 1.1 in DirectX® 12 Ultimate
- AMD RDNA™ 2 PC performance recommendations

# WHAT IS DXR 1.1?

- Adds inline raytracing
- More direct control over raytracing workload scheduling
- Allows raytracing from all shader stages
  
- Particularly well suited to solving secondary visibility problems

# NEW RAY ACCELERATOR



# DXR 1.1 BEST PRACTICES

- Trace as few rays as possible to achieve the right level of quality
- Content and scene dependent techniques work best
- Positive results when driving your raytracing system from a scene classifier
  
- 1 ray per pixel can generate high quality results
- Especially when combined with techniques and high quality denoising systems
  
- Lets you judiciously spend your ray tracing budget right where it will pay off

# USING DXR 1.1 TO TRACE RAYS

- DXR 1.1 lets you call TraceRay() from any shader stage
- Best performance is found when you use it in compute shaders, dispatched on a compute queue
- Matches existing asynchronous compute techniques you're already familiar with
- Always have just 1 active RayQuery object in scope at any time

# RESOURCE BALANCING

- Part of our ray tracing system is run on the WGP
- Makes extensive use of LDS groupshared memory
- Try to limit the use of groupshared memory in your ray tracing compute shaders
  
- Optimal threadgroup size is 8x4
- Allows for optimal mapping to the AMD RDNA™ 2 WGP SIMD width

# TRAVERSAL EFFICIENCY

- Help our traversal system run at optimal efficiency by being explicit in how you drive it
- If you're rendering opaque shadows, terminate traversal after the first hit
- Explicitly pass `SKIP_PROCEDURAL_PRIMITIVES` and `FORCE_OPAQUE` ray flags to `TraceRay()`
- Allows our traversal system to skip the most expensive parts if you don't use them
- Be explicit in your intent to allow the traversal system to do the minimum amount of work



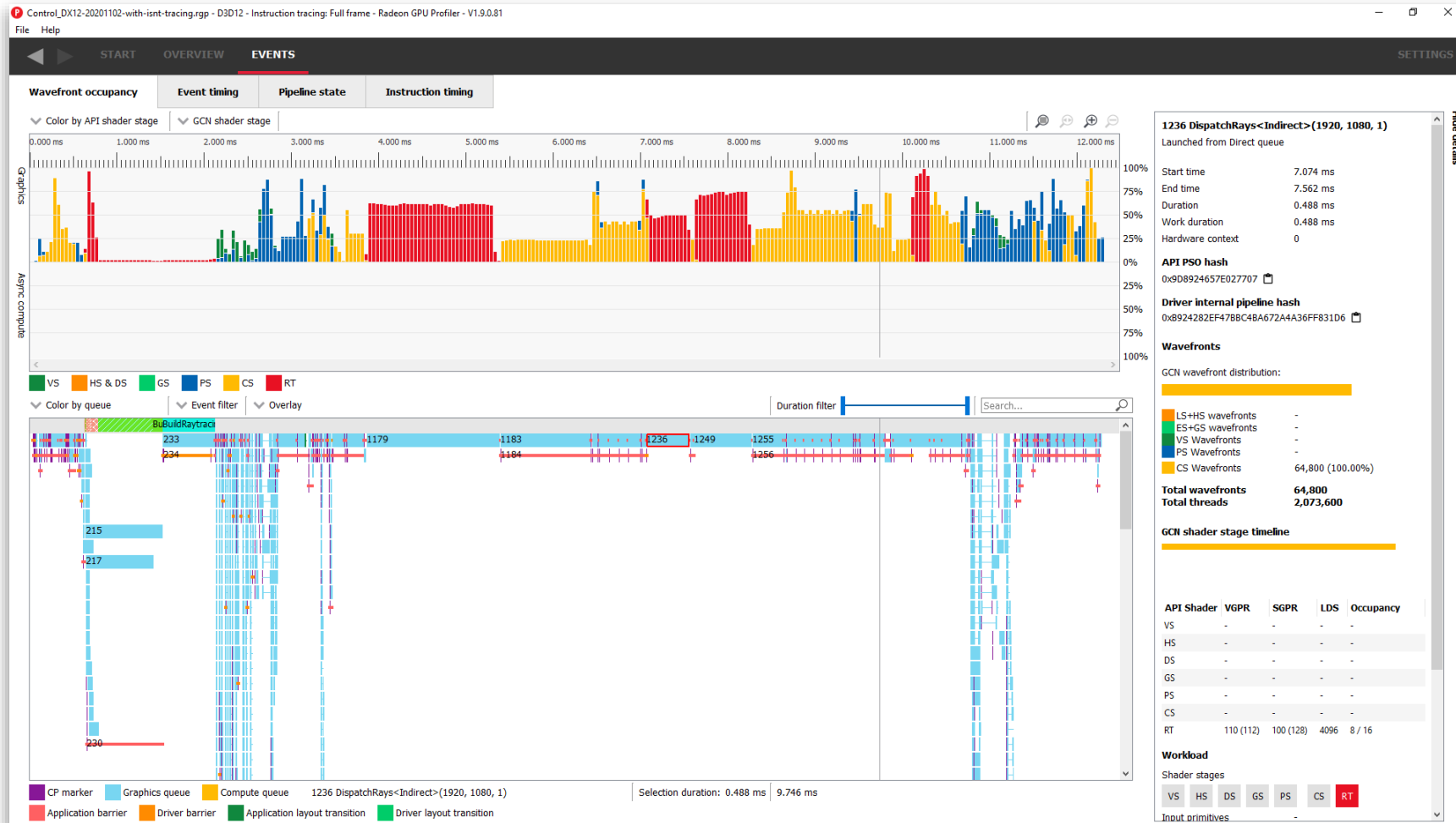
# DENOISING

- High-quality, high-performance denoising is crucial for real-time raytracing systems
- We have developed 2 specialised denoisers for use in games, highly optimised for AMD RDNA™ 2
- Both will be available as open source on GPUOpen under MIT license
- Both are easy to integrate and some are already in shipping titles!

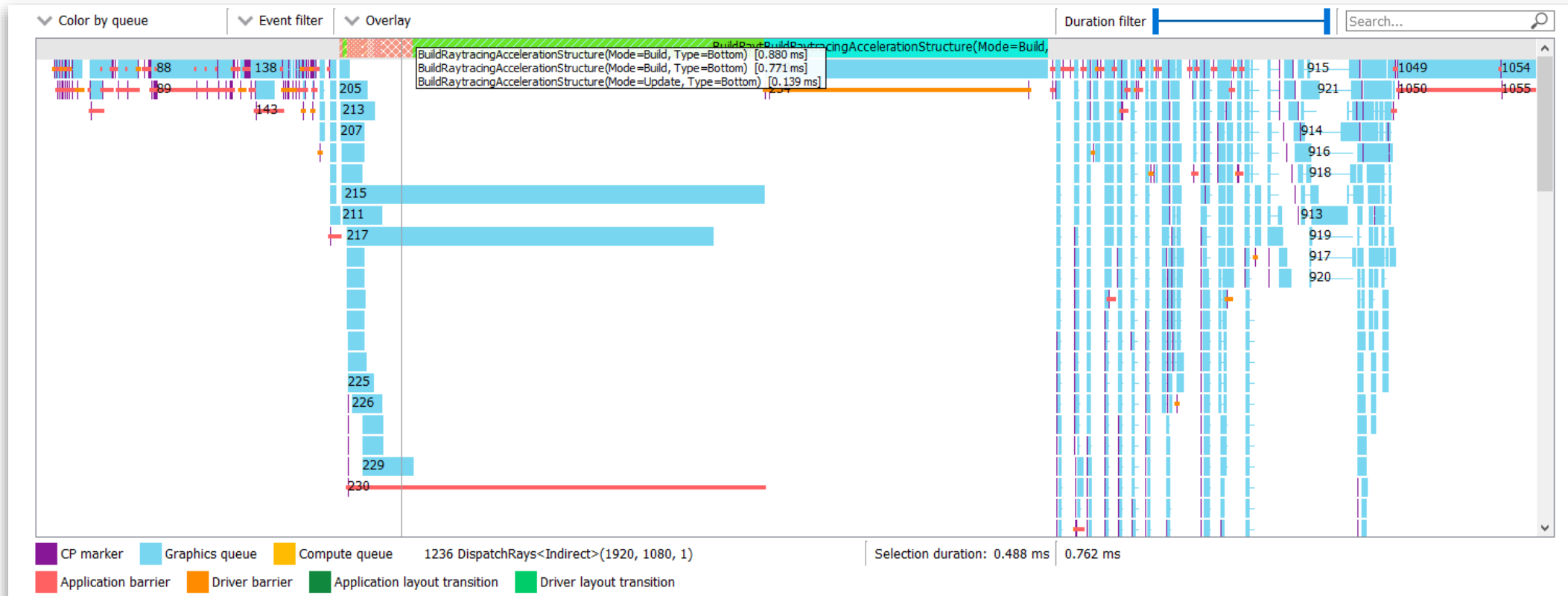
# RGP 1.9

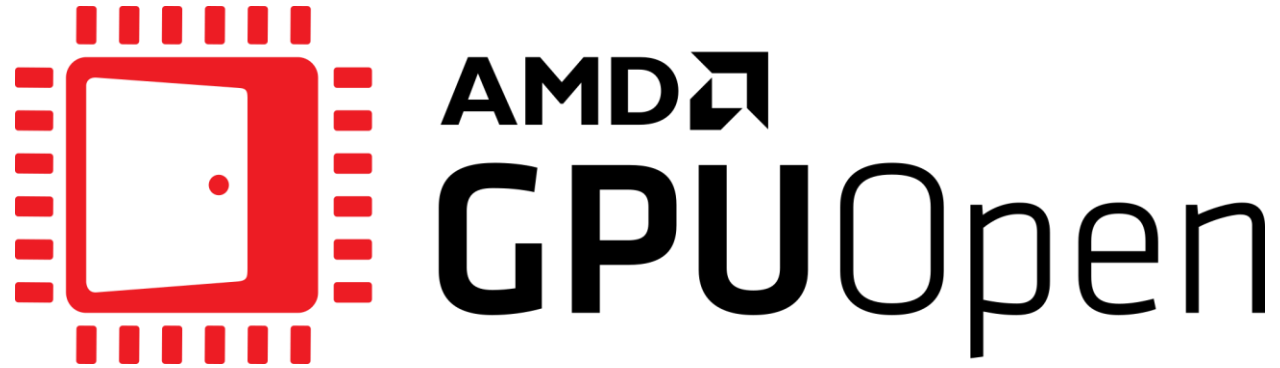
- RGP 1.9 supports profiling DXR workloads
- View the full shader table including relative cost
- See the ray tracing work on the GPU timeline
- View disassembly of ray tracing shaders as you would with all other shader types


# RGP 1.9 DXR SUPPORT



# RGP 1.9 DXR SUPPORT



The logo features a red square with a white dot in the center, surrounded by a red border of small squares. To the right, the text "AMD" is in a bold, black, sans-serif font with a small square icon to its right. Below "AMD" is the word "GPUOpen" in a larger, black, sans-serif font.

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