ReSTIR

In D3D12

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Milestone 1

1. Paper
    a. Study fundamental mathematics
        i. Monte Carlo, IS, MIS, RIS, etc.
    b. Study ReSTIR (paper + talk)
        i. WRS
        ii. Spatiotemporal reuse
        iii. Implementation details
2. D3D12
    a. Select base code (RTX and fallback layer)
    b. Study DXR

Paper

Rendering direct lighting **interactively**, **at high quality** and **without complex data structures.**

Streaming RIS

Initial pdf: Uniform
Target pdf: $p(x)L(x)G(x)V(x)$

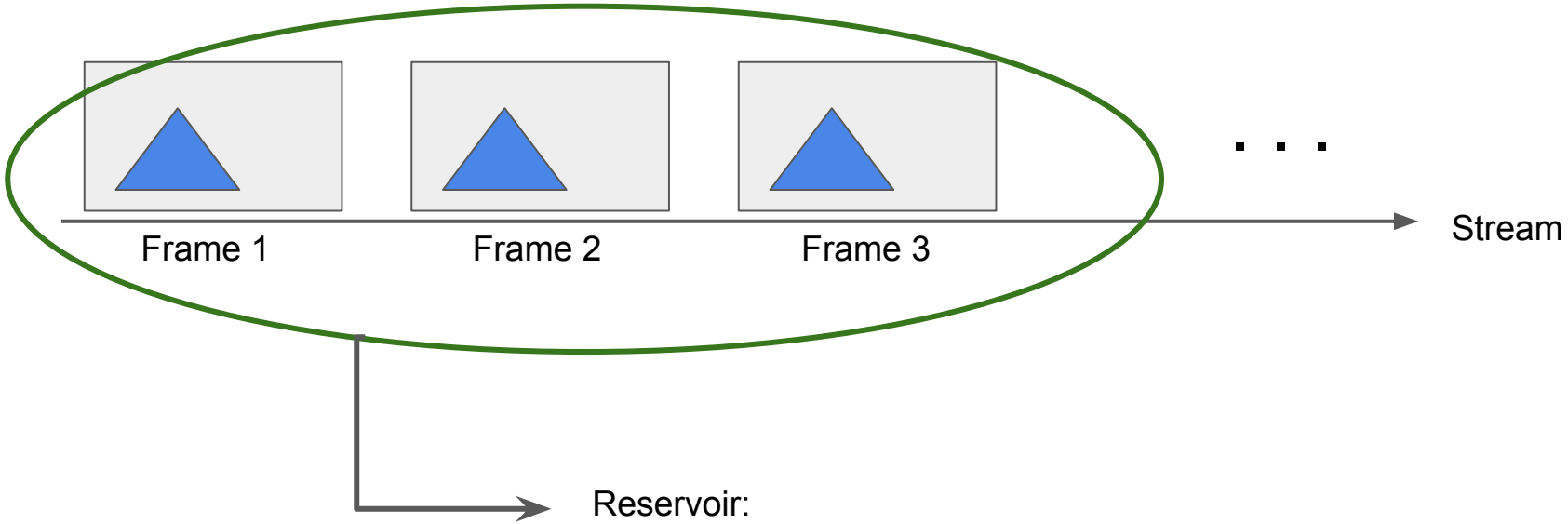
Cast shadow ray
Compute intersection

Use samples from previous frame

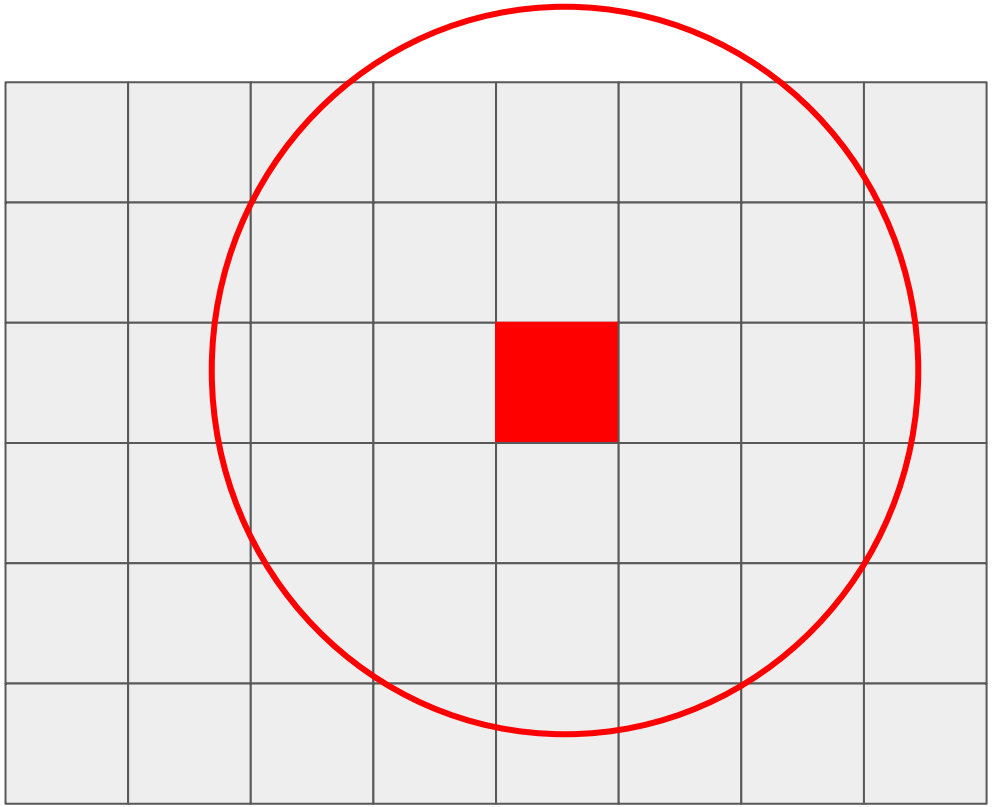
Use samples from neighbor pixels.

Shade :)

Weighted Reservoir Sampling with streaming RIS

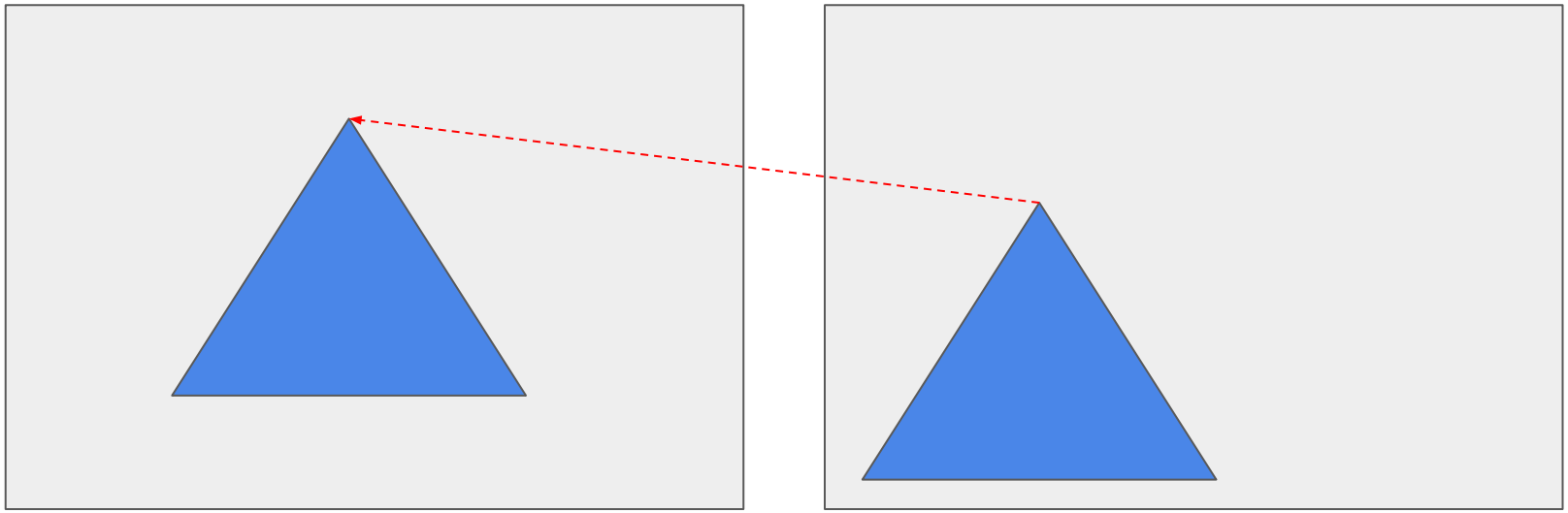


Spatial Reuse

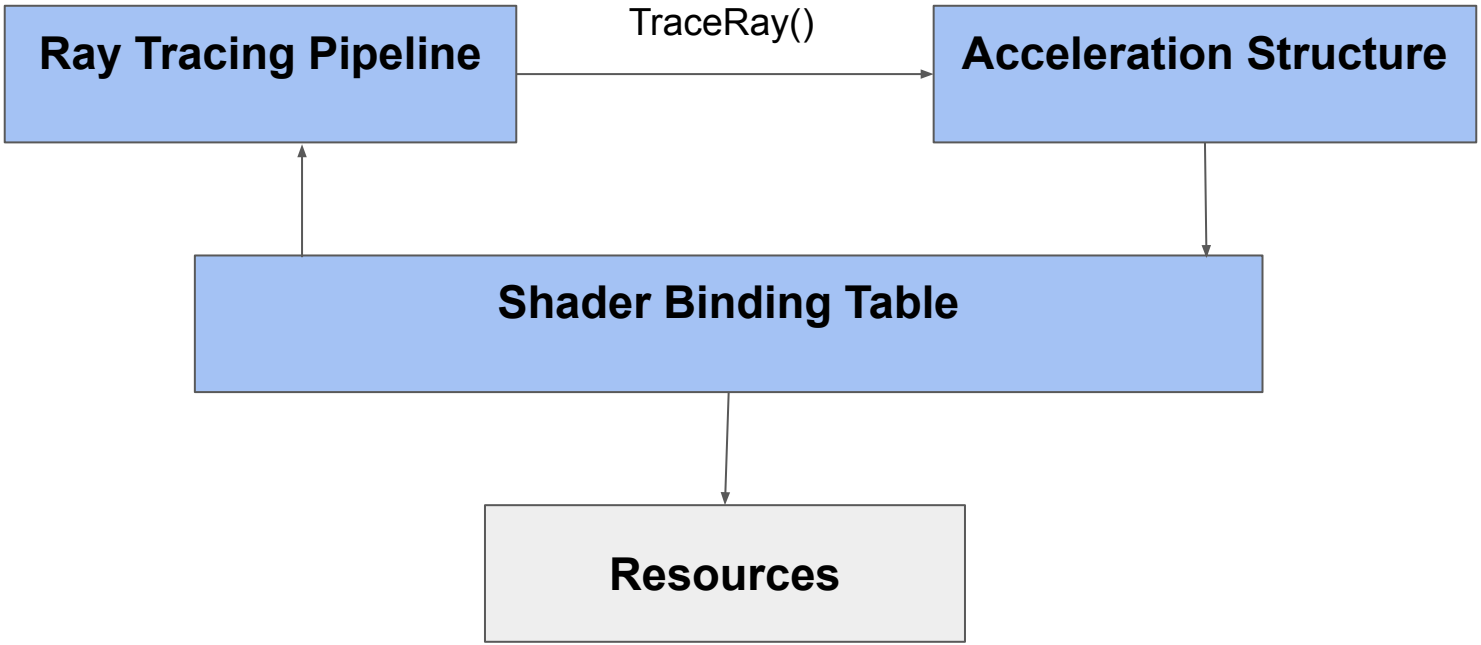


Each pixel has its own reservoir. We can combine them together in a neighborhood.

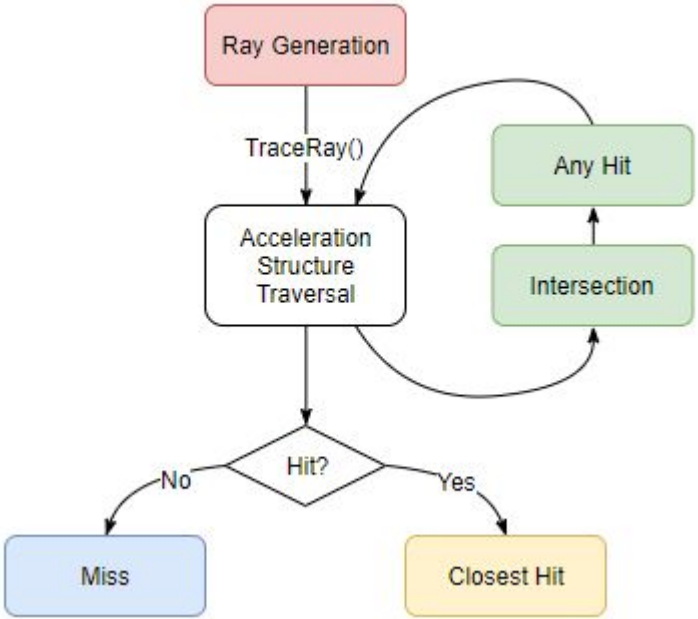
Temporal Reuse



DXR API


Ray Tracing Pipeline
TraceRay()
Acceleration Structure
Shader Binding Table
Resources

Ray Tracing Pipeline



https://developer.nvidia.com/rtx/raytracing/dxr/DX12-Raytracing-tutorial-Part-2

Next...

- Implement biased ReSTIR (MS2)
- Apply Denoising (MS2 + MS3)
- Implement unbiased ReSTIR (MS2 + MS3)
- Optimize the implementation in D3D12 (MS3)