The Need for ANARI

Data visualizations use advanced rendering techniques, including ray tracing, to improve perception of complex 3D geometry and spatial relationships

BUT

Advanced rendering using low level 3D APIs is skill and time intensive!
Often outside the core mission for domain experts

Accelerated rendering engines use proprietary APIs!
Increasing development and porting time and costs
ANARI Portable Access to Rendering Engines

High-level API to describe objects in a scene
Portable access to underlying state-of-the-art rendering engines
Independent of rendering techniques
Scalable high-performance

Visualization Applications and Engines
- e.g. ParaView, VTK, VisIt ...

Renderers
- e.g., Intel OSPRay, Radeon ProRender, NVIDIA VisRTX

Acceleration APIs
- e.g., Embree, OptiX, Radeon Rays, CUDA, OpenCL, Vulkan

Hardware
- CPU
- GPU

Access any ANARI-compatible rendering engine to utilize flexible rendering techniques
Comparing ANARI and Vulkan

High-level API to build scene description
NO rendering details
Not a scene graph
No application-specific structures, traversals, and metadata
Unidirectional
Data flows from the app to ANARI
Same scene description can be used to drive any backend rendering
Code portability

Low-level explicit control of GPU rendering and compute
Can be complex to program
Used to implement back-end rendering engines
Can accelerate a wide diversity of rendering techniques

Scene Description in Memory

-1 billion atom protocell membrane
w/ ~1400 proteins (VMD)
Before and After ANARI

Eliminating Fragmentation
Reducing Porting and Development Costs
Strong ANARI Industry Support

All layers in the scientific visualization stack are represented
GPU Vendors, Rendering Engines, Visualization Libraries and Tools, Applications
Key Visualization Applications
Involved in ANARI’s Design
Leading Rendering Engines

Building ANARI Support

AMD RADEON ProRender

NVIDIA VisRTX

Intel OSPRay
ANARI Developer Benefits

- Portable access to hardware-optimized renderers
  - Easily leverage state-of-the-art renderers and rendering techniques
  - Runtime matchmaking of applications to suitable rendering engines

- Exploit parallel computing for high interactivity visualizations
  - Low overhead API with direct coupling to applications
  - Async API overlaps computation and rendering

- In-situ, visualization of massive memory-resident data sets
  - Render live in-memory using data in-place when possible

- High-performance data visualization with scalable rendering
  - Flexible use of local and distributed compute and rendering resources

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ANARI Specification and Open-Source SDK

Accelerating Ecosystem Adoption
for both Developers and Implementors

Provisional Specification for industry feedback
https://github.com/KhronosGroup/ANARI-Docs
Specification sources available on GitHub
for bug fixes and suggestions

Open-Source beta SDK under Apache 2.0 license
https://github.com/KhronosGroup/ANARI-SDK
Simple CPU ray tracing ANARI implementation
Library of example ANARI applications
Prototype debugging and tracing validation layer
Beta conformance tests

Canonical Specification
https://github.com/KhronosGroup/ANARI-Registry
ANARI Timeline

November 2019
Analytic Rendering Exploratory Group Formed

March 2020
ANARI Working Group Announced

November 2021
ANARI 1.0 Provisional Specification
Beta open source SDK and conformance tests

Mid 2022 TARGET
ANARI 1.0 Final Specification
Open-source SDK
Conformance Tests
Multiple Conformant Implementations
Industry Call to Action!

Provide feedback on the Provisional Specification
https://github.com/KhronosGroup/ANARI-Docs
Influence the final specification to match your workflow

Try out the open-source SDK
https://github.com/KhronosGroup/ANARI-SDK
Sample implementation, example programs, tools and tests

Join Khronos and the ANARI Working Group
Have a voice and a vote in the evolution of the ANARI specification
Fast track your ANARI implementation for your own renderer or hardware

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