Analytic Rendering API
Exploratory Group Call for Participation

KHRONOS® GROUP

The Khronos Group has formed an Exploratory Group to discuss the standardization of an Analytic Rendering API for data visualization. All interested parties are invited to participate, with no cost or IP obligations, to share perspectives, requirements and use cases to help determine whether there is an industry need for such an API and to help set the direction for any standardization activities.
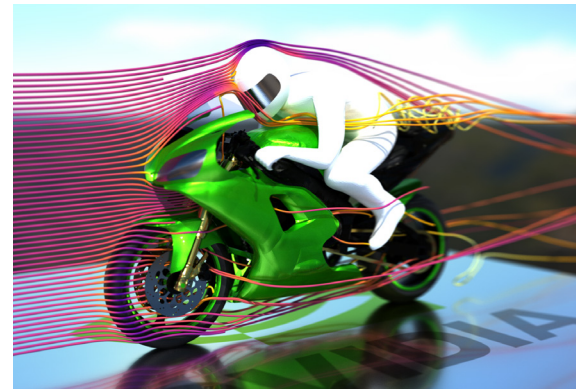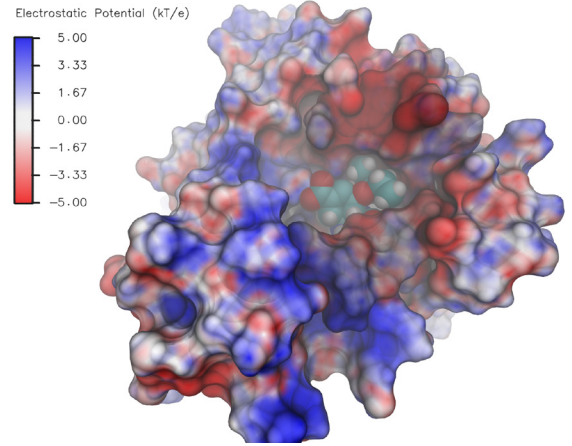
What is Analytic Rendering?

Analytic Rendering is image generation performed primarily to gain and communicate insights into complex data sets. Scientific visualization is the primary application domain using Analytic Rendering today, followed by the emerging data analytics space.

Why is a New Analytic Rendering API Needed?

Recent advances in rendering technology, especially the introduction of real-time ray tracing, has great promise to significantly impact data visualization by providing physically accurate imagery and visual cues for an intuitive understanding of complex data. However, using these graphical techniques can come at the cost of increased application development cost and complexity. Graphics APIs such as Vulkan, and its upcoming ray tracing extension, provide powerful rendering hardware abstractions, but may be too low-level and time-consuming for many visualization applications to utilize effectively.

Consequently, several hardware vendors have developed higher-level rendering APIs, such as Intel's OSPRay and NVIDIA's VisRTX, but this leads to ecosystem fragmentation as visualization applications need to be ported to multiple, incompatible platforms.
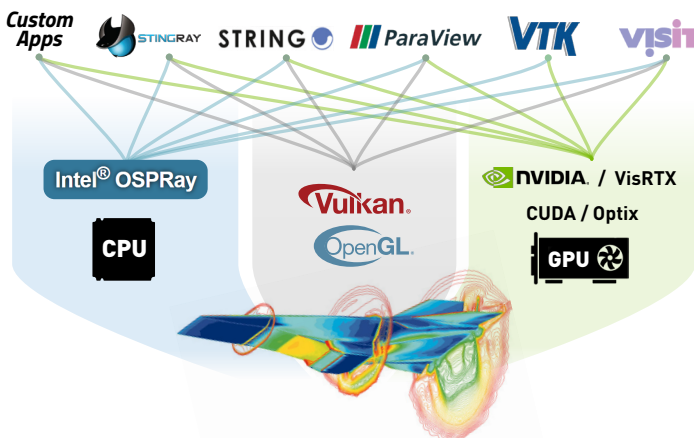
An open, higher-level Analytic Rendering API standard could significantly reduce software development costs while making advanced rendering techniques more accessible and widely used by visualization applications for which rendering is just a necessary technique to be utilized, while providing portability to multiple platforms that support the common API.
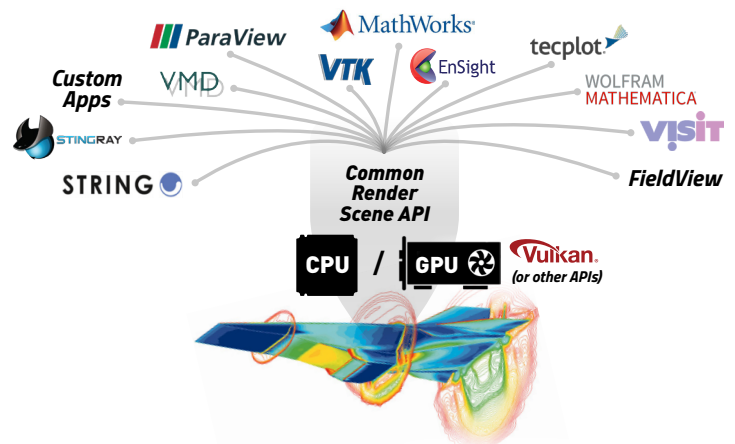

Electrostatic Potential (kT/e)
```
5.00
3.33
1.67
0.00
-1.67
-3.33
-5.00
```


TOP: VMD ray traced visualization of swine flu A/H1N1 neuraminidase bound to Tamiflu – VMD, U. Illinois

BOTTOM: Pathtraced visualization of OpenFOAM motorbike – NVIDIA

SITUATION BEFORE

Custom Apps · STINGRAY · STRING · ParaView · VTK · VISIT

Intel® OSPRay — CPU

Vulkan · OpenGL

NVIDIA / VisRTX — CUDA / Optix — GPU

SITUATION AFTER

ParaView · MathWorks® · tecplot · VTK · EnSight · WOLFRAM MATHEMATICA · Custom Apps · VMD · VISIT · STINGRAY · STRING · FieldView

Common Render Scene API

CPU / GPU · Vulkan (or other APIs)

Goals for an Analytic Rendering API Standard

The goal of this initiative would be to define a high-level API to simplify the development of visualization applications while leveraging the full potential of modern rendering capabilities. The Analytic Rendering Exploratory Group is proposing to define a concise, high-level API as a contract between visualization domain experts and rendering technologists, enabling a "win-win" by simplifying implementation and deployment for both groups. Some key goals include:

- Create an open, royalty-free API that is platform independent – enabling visualization applications to portably access diverse rendering backends

- Provide visualization applications access to the full range of modern rendering capabilities and engines, including – but not restricted to – the latest ray tracing techniques

- Free visualization domain experts from the necessity of dealing with non-trivial rendering details and multiple incompatible backend rendering APIs

- Enable graphics experts developing rendering backends to avoid the need to implement domain-specific functionality and optimizations through supporting a well-designed, cross-platform API standard – and hence making their backend renderers accessible to a wider diversity of disciplines and audiences
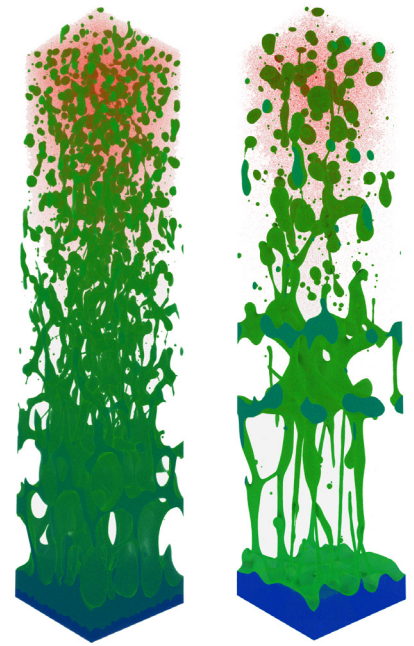
Ray traced visualization courtesy of Oak Ridge Leadership Computing Facility

Analytic Rendering API Design

Rather than specifying the details of the rendering process, the Analytic Rendering API would enable a visualization application to simply describe the relationship between objects in a scene to be rendered and leave the details of the rendering process to a backend renderer. Unlike more general scene graph APIs, the proposed initiative would focus specifically on the needs of the visualization domain - and as with any successful interoperability standard, the proposal would enable and encourage a diverse range of competitive API implementations.
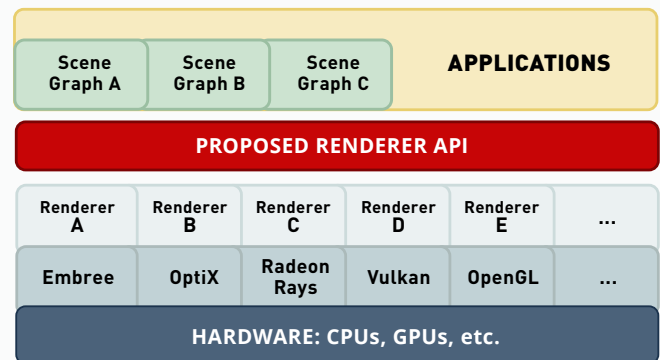
Get Involved !

To gather industry input, the Exploratory Group is open to any company without cost or IP licensing obligations. Those interested in learning more and joining the Exploratory Group are invited to visit the Analytic Rendering Landing page at:

www.khronos.org/exploratory/analytic-rendering

If there is industry support, Khronos will form a Working Group to enable any interested company to join Khronos and participate under its proven multi-company governance process.
If an organization is interested in becoming a Khronos member, please visit **www.khronos.org/members** or contact Membership Services at **memberservices@khronos.org**

EXISTING / EARLY PARTICIPANTS