

Omniverse:

Opening a New World of Virtual Collaboration and Simulation for the Public Sector

Simulating the world around us is key to unlocking new technologies

For many years, workers across federal and civilian agencies have used the compute and graphics performance of NVIDIA Graphics Processing Units (GPUs) to convert vast amounts of data into actionable intelligence or information to complete their missions or tasks.

Advancements in GPU platforms now open a new world of virtual collaboration and simulation for design teams across a large ecosystem of public sector firms and contractors to work in real time in a shared virtual space while using different software applications simultaneously.

The power of an advanced GPU platform lies in its ability to handle very large complex data environments. Many existing modeling solutions just cannot scale, or apply a massive amount of computer hardware, to perform realistic simulations.

Simulation Leads to New Technologies

Simulating the world around us is key to unlocking new technologies. For instance, NVIDIA is creating a realistic environment to validate the artificial intelligence (AI) models used for autonomous vehicles. To do that, designers must provide a very realistic representation of the world to simulate the sensors that will be used in a real-world vehicle.

In fact, there are many use cases across the federal government in which analysts and researchers must perform realistic simulations. For instance, the U.S. is determined to make it back to the Moon and on to Mars. In preparation for the Mars missions, NASA needs to replicate living on the red planet and study how highly motivated individuals respond under the rigor of a long-duration, ground-based simulation. A virtual collaboration and simulation solution such as NVIDIA Omniverse could assist in those efforts.

NVIDIA Omniverse™ is a cloud-native, multi-GPU enabled open platform for 3D collaboration and real-time physically-accurate simulation. Omniverse runs on any NVIDIA RTX™ device—from a laptop to a server—transforming complex 3D production workflows. Built on Pixar's Universal Scene Description (USD), Omniverse celebrates open standards. Creators, designers, and engineers can now unite their assets, libraries, and software applications within Omniverse, freely perform iterative design concepts in real time, and instantly share breathtaking, high-fidelity models to any device.

Real Time Ray Tracing (RTX) is a Game Changer

When it comes to rendering in computer graphics, rasterization is fast, but ray tracing looks far more realistic. Ray tracing is a rendering technique that can realistically simulate the lighting of a scene and its objects by rendering physically accurate reflections, refractions, shadows, and indirect lighting. However, ray tracing is a very computationally intensive technique.

Movie makers have traditionally relied on vast numbers of CPU-based render farms that still can take multiple days to render complex special effects. Although GPUs have traditionally been very good at accelerating rasterization, they have lacked dedicated hardware support for performing the fundamental operations needed for ray tracing.



Until Now...

NVIDIA has solved that problem by putting dedicated silicon on a microchip, known as RT cores, which allows graphics cards to speed up ray tracing by an order of magnitude. AI further accelerates operations by inferring what a final frame rendered image would look like from only a few samples per pixel. Normally, if a designer applies ray tracing to render a scene, it takes hundreds or thousands of pixel samples to “de-noise” that image. Using AI, designers can take a noisy ray traced image that is produced quickly with RT cores and infer how the final image will look.

“With this capability, we can interactively simulate and render exceedingly complex and highly-realistic environments in real time across multiple domains for many use cases from simulation – for training of robots or developing autonomous vehicles – to design and manufacturing,” according to Tim Woodard, a senior solutions architect with NVIDIA. Ray tracing is integrated into Omniverse, which can easily scale across multiple GPUs, enabling even greater performance and fidelity.

The NVIDIA Omniverse™ Platform

There are five major parts of the Omniverse platform: **Nucleus, Connect, Kit, Simulation and RTX Renderer**. These components along with connected third party digital content creation (DCC) tools and additional connected Omniverse microservices make up the full Omniverse ecosystem.

Omniverse Nucleus is a collaboration and database engine that connects users and enables the interchange of 3D assets and scene descriptions. Once connected, designers doing modeling, layout, shading, animation, lighting, special effects, or rendering can collaborate simultaneously on highly complex 3D scenes.

Omniverse Connect libraries are distributed as plugins that enable client applications to connect to Nucleus and to publish and subscribe to individual assets and full worlds. Omniverse Connectors are plugins to 3rd party applications such as Autodesk 3ds Max, Maya, Revit, Epic Games Unreal Engine 4, Trimble SketchUp, and more.

Omniverse Kit is a powerful toolkit for building native Omniverse extensions, applications and microservices. Kit is built to be extremely modular, enabling developers and power users to easily create or modify Omniverse Extensions – small, purpose-built pieces of code that are the building blocks of all Omniverse apps and UI.

Simulation in Omniverse is provided by a collection of NVIDIA technologies as plugins or microservices to Omniverse Kit and includes physically accurate advanced physics simulation from rigid and soft body dynamics in PhysX 5, to combustible fluid, smoke and fire with Flow, to fracture and destruction libraries with Blast.

Omniverse RTX Renderer exploits hardware RT cores in NVIDIA RTX architectures to execute real-time hardware-accelerated ray tracing and referenced path-tracing. Users can easily toggle between render modes for interactive review cycles with ray traced mode, and true-to-reality cinematic rendering with referenced path traced mode.

Deployed Across Any Infrastructure

NVIDIA Omniverse™ Enterprise is a simple to deploy, end-to-end collaboration and true-to-reality simulation platform that fundamentally transforms complex design workflows for organizations of any scale. This enterprise-supported option is easily deployed across any organization scale, from small workgroups on a local area network, to hybrid local and cloud deployments, to globally dispersed teams working from a central data center. Enterprises can unite their teams, tools, and systems while maintaining flexibility in the way their teams prefer to work.

Bringing It All Together

World Wide Technology and NVIDIA are working together to bring this revolutionary 3D collaboration and simulation platform to WWT’s Advanced Technology Center to give users a secure, consistent, and high-quality experience

WWT has extensive experience in helping government agencies define their cloud strategy and building virtualized cloud solutions can bring it all together by helping agencies build collaborative virtualized environments which allow end-users to be more productive remotely and simplify workflow.

About World Wide Technology

World Wide Technology (WWT) is a technology solution provider with \$13.4 billion in annual revenue that provides digital strategy, innovative technology, and supply chain solutions to large public and private organizations around the globe. Based in St. Louis, WWT employs more than 7,000 people and operates over 4 million square feet of warehousing, distribution, and integration space in more than 20 facilities throughout the world. For more information about World Wide Technology, visit www.wwt.com.

About NVIDIA

NVIDIA’s invention of GPU sparked the PC gaming market. The company’s pioneering work in accelerated computing – a super-charged form of computing at the intersection of computer graphics, high performance computing and AI – is reshaping trillion-dollar industries, such as transportation, healthcare and manufacturing, and fueling the growth of many others. Click [here](#) to learn more.