Lockheed Martin, NVIDIA to Help US Speed Climate Data to Researchers

The National Oceanic and Atmospheric Administration selects Lockheed Martin and NVIDIA to build a prototype digital twin of Earth to accelerate environmental monitoring and prediction, including climate research.

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The U.S. National Oceanic and Atmospheric Administration has selected Lockheed Martin and NVIDIA to build a prototype system to accelerate outputs of Earth Environment Monitoring and their corresponding visualizations.

Using AI techniques, such a system has the potential to reduce by an order of magnitude the amount of time necessary for the output of complex weather visualizations to be generated.

The first-of-its-kind project for a U.S. federal agency, the Global Earth Observation Digital Twin, or EODT, will provide a prototype to visualize terabytes of geophysical data from the land, ocean, cryosphere, atmosphere and space.

By fusing data from a broad variety of sensor sources, the system will be able to deliver information that's not just up to date, but that decision-makers have confidence in, explained Lockheed Martin Space Senior Research Scientist Lynn Montgomery.

"We're providing a one-stop shop for researchers, and for next-generation systems, not only for current, but for recent past environmental data," Montgomery said. "Our collaboration with NVIDIA will provide NOAA a timely, global visualization of their massive datasets."

Building on NVIDIA Omniverse

Building on NVIDIA Omniverse , the system has the potential to serve as a clearinghouse for scientists and researchers from a broad range of government agencies, one that can be extended over time to support a wide range of applications.

The support for the EODT pilot project is one of several initiatives at NVIDIA to develop tools and technologies for large-scale, even planetary simulations.

Last November, NVIDIA announced it will build a supercomputer, called Earth-2 , devoted to predicting climate change by creating a digital twin of the planet.

NVIDIA and Lockheed Martin announced last year that they are working with the U.S. Department of Agriculture Forest Service and Colorado Division of Fire Prevention & Control to use AI and digital-twin simulation to better understand wildfires and stop their spread.

And in March, NVIDIA announced an accelerated digital twins platform for scientific computing consisting of the NVIDIA Modulus AI framework for developing physics-ML neural network models and the NVIDIA Omniverse 3D virtual-world simulation platform.

The EODT project builds on these initiatives, relying on NVIDIA Omniverse Nucleus to allow different applications to quickly import and export custom, visualizable assets to and from the effort's central data store.

"This is a blueprint for a complex system using Omniverse, where we will have a fusion of sensor data, architectural data and AI inferred data all combined with various visualization capacities deployed to the cloud and various workstations," said Peter Messmer, director of HPC Developer Technology at NVIDIA. "It's a fantastic opportunity to highlight all these components with a real-world example."

A Fast-Moving Effort

The effort will move fast, with a demonstration of the system's ability to visualize sea surface temperature data slated for next September. The system will take advantage of GPU computing instances from Amazon Web Services and NVIDIA DGX and OVX servers on premises.

The fast, flexible system will provide a prototype to visualize geophysical variables from NOAA satellite and ground data sources from a broad range of sources.

These include temperature and moisture profiles, sea surface temperatures, sea ice concentrations and solar wind data, among other sources.

That data will be collected by Lockheed Martin's OpenRosetta3D software, which is widely used for sophisticated large-scale image analysis, workflow orchestration and sensor fusion by government agencies, such as NASA, and private industry.

NVIDIA will support the development of one-way connectors to import "snapshots" of processed geospatial datasets from Lockheed's OpenRosetta3D technology into NVIDIA Omniverse Nucleus as Universal Scene Description inputs.

USD is an open source and extensible ecosystem for describing, composing, simulating and collaborating within 3D worlds, initially invented by Pixar Animation Studios.

Omniverse Nucleus will be vital to making the data available fast, in part because of Nucleus's ability to relay just what's changed in a dataset, Montgomery explained.

Nucleus will, in turn, deliver those USD datasets to Lockheed's Agatha 3D viewer, based on Unity, allowing users to quickly see data from multiple sensors on an interactive 3D earth and space platform.

The result is a system that will help researchers at NOAA, and, eventually, elsewhere, make decisions faster based on the latest available data.

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