The Past, Present, and Future of Cluster Computing for Climate Simulations

Science Mission Directorate

The NASA Center for Climate Simulation (NCCS) at Goddard Space Flight Center supplies high-performance computing and data services engineered to support climate simulations within the NASA Science Mission Directorate.

Applications run on the Discover supercomputing cluster contribute to the scientific knowledge of climate change. In addition to running large-scale applications, NCCS also provides a data analysis environment tightly coupled to the Discover cluster for scientists to analyze the large amounts of data generated by their models. Furthermore, Discover is closely linked to a set of web services, including a Data Portal and Earth System Grid Data Node, so that the model data may be shared across the scientific community and with the public.

Over the past five years, NCCS has deployed a scalable cluster approach in order to meet the application requirements for large-scale climate simulations. Recently, NCCS deployed an additional scalable unit consisting of 14,400 Intel Xeon Westmere processor cores and 28.8 terabytes of distributed memory.

This upgrade will provide additional processors to allow NASA's climate models to scale to even greater core counts. It also paves the way for incorporating graphics processing units (GPUs) into the computing cluster over the next year, which will create a prototype next-generation computing environment for NASA climate applications.

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A portion of the Discover cluster located at the NASA Center for Climate Simulation at NASA Goddard Space Flight Center. *Pat Izzo, NASA/Goddard*