



GAEA Overview

A supercomputer installed to crunch numbers for the National Atmospheric and Oceanic Administration (NOAA) and its research partners has begun climate simulations at Oak Ridge National Laboratory (ORNL).

“The name of the machine is Gaea, or Mother Earth, from Greek mythology,” says Jim Rogers, Director of Operations at ORNL’s National Center for Computational Sciences (NCCS), which houses the new Cray XT6 machine. Rogers also directs the National Climate-Computing Research Center (NCRC) project at ORNL that includes Gaea. As part of a collaborative Work for Others Agreement, the supercomputer is owned by DOE and operated by ORNL’s managing contractor, UT-Battelle, on behalf of the NOAA customer.



Gaea occupies the same half-acre computer room as Jaguar, the Cray XT5 system run by ORNL and funded by the Department of Energy’s (DOE’s) Office of Science, and Kraken, the Cray XT5 system run by the University of Tennessee and ORNL and funded by the National Science Foundation.

Cray will deliver the Gaea HPC system through a series of upgrades that will culminate in a petascale system by the end of 2011.

In June 2010, installation concluded for a 260-teraflop (trillion calculations per second) Cray XT6 system with 2,576 AMD “Magny-Cours” 12-core, 2.1 GHz processors. After passing a series of acceptance tests, Gaea was released to early users. In September, nearly a dozen users began ramping up their data production.

In June 2011, a 720-teraflop Cray XE6 system will be added to Gaea. It will employ the AMD Interlagos 16-core processor. After the installation of that second system, the original 260-teraflop system will be upgraded with the same AMD Interlagos processor, increasing its peak performance to 386 teraflops.

The aggregate Gaea system will have a total memory size of 248 terabytes and a peak calculating capability of 1.1 petaflops (quadrillion floating point operations per second), bringing the number of petascale systems at ORNL, the world’s most powerful computing complex, to three.

This next-generation HPC system is liquid-cooled using Cray’s ECOPHLEX™ technology, which employs a refrigerant to remove most of the 2.2 MW heat load. The technology is significantly more energy-efficient than the air-cooling systems typically found in other leading-edge HPC systems.

Other elements of the Climate Modeling and Research System (CMRS) anchored by Gaea include two separate Lustre parallel file systems that handle data sets among the world’s largest. The first, the LTFS, is a high-capacity file system based on Data Direct Networks (DDN) SFA10000 that can stage up to 3.6 petabytes of information among ORNL and NOAA facilities. In addition, there is a high-speed file system, also using the DDN SFA10000, with more than a petabyte of storage that provides fast scratch space for the compute partitions.

NOAA research partners access the system remotely through speedy wide area connections. Two 10-gigabit (billion bit) lambdas, or optical waves, pass data to NOAA’s national research network through peering points at Atlanta and Chicago.

For more information, contact:

National Climate-Computing Research Center (NCRC)
Oak Ridge National Laboratory
Phone: 865-241-7202
Fax: 865-241-2850
E-mail: help@ncrc.gov
URL: <http://ncrc.ornl.gov>

