Keeneland project deploys new GPU supercomputing system

Georgia Tech College of Computing

ATLANTA – Nov. 14, 2012 – Georgia Tech, along with partner research organizations on the Keeneland Project, including the University of Tennessee-Knoxville, the National Institute for Computational Sciences and Oak Ridge National Laboratory, announced today that the project has completed installation and acceptance of the Keeneland Full Scale System (KFS). This supercomputing system, which is available to the National Science Foundation (NSF) scientific community, is designed to meet the compute-intensive needs of a wide range of applications through the use of NVIDIA GPU technology. In achieving this milestone, KFS is the most powerful GPU supercomputer available for research through NSF's Extreme Science and Engineering Discovery Environment (XSEDE) program.

"Keeneland provides an important capability for the NSF computational science community," says Jeffrey Vetter, Principal Investigator and Project Director, with a joint appointment to Georgia Tech's College of Computing and Oak Ridge National Laboratory. "Many users are running production science applications on GPUs with performance that would not be possible on other systems."

Scientists will be able to use the resource to create breakthroughs in many fields of science. For the past 20 months, the Keeneland Initial Delivery System (KIDS) has been used for research in both computer science and computational science, and has included applications in astronomical sciences, atmospheric sciences, behavioral and neural sciences, biological and critical systems, materials research and mechanical and structural systems, along with many other application areas. Much of the research will continue on KFS.

Keeneland's early users note how the system's capabilities have significantly advanced their research application areas.

"The Infiniband communication is now fast enough so that I can run my program on more GPUs to achieve better performance," says Jens Glaser, a post-doctoral associate in chemical engineering and materials science at the University of Minnesota. Glaser believes his research results demonstrate that the KFS' hardware is a significant step forward in supercomputing.

Astrophysics researcher Jamie Lombardi, an associate professor in the Department of Physics at Allegheny College, says Keeneland is easily the fastest system he has used. Lombardi uses his hydrodynamics code Starsmasher to simulate the collision and merger of two stars. The dynamics of the gas are parallelized on the CPU cores, while the gravity calculations are parallelized on the GPUs.

"Running on one node of KFS is nearly a factor of three faster than running on one

node of my local cluster," says Lombardi. "The availability of such a large number of nodes on KFS makes it possible for me to run higher resolution simulations than I have ever run before."

The Keeneland Full Scale System is a 615 TFLOPS HP Proliant SL250-based supercomputer with 264 nodes, where each node contains two Intel Sandy Bridge processors, three NVIDIA M2090 GPU accelerators, 32 GB of host memory, and a Mellanox InfiniBand FDR interconnection network. KFS has delivered sustained performance of over a quarter of a PetaFLOP (one quadrillion calculations per second) in initial testing. The system is space efficient in that it occupies about 400 square feet, including the space for in-row cooling and service areas.

During the KFS installation and acceptance testing, the initial delivery system, KIDS, was used to start production capacity for XSEDE users seeking to run their applications on the system and who had received allocations for Keeneland through a peer review process. KIDS was upgraded with newer GPUs and used for software and application development and for pre-production testing of codes that utilize the GPU accelerators in the Keeneland systems. Even before KFS began production, allocation requests for time greater than the total available for its lifecycle had been received from XSEDE application users.

"Our Keeneland Initial Delivery system has hosted over 130 projects and 200 users over the past two years," says Vetter. "Requests for access to Keeneland have far outstripped the planned resource delivery, sometimes by as much as twice the availability."

The Keeneland Project is a five-year Track 2D cooperative agreement, which was awarded by NSF under Contract OCI-0910735 in 2009 for the deployment of an innovative high performance computing system to the open science community. The Georgia Institute of Technology, University of Tennessee-Knoxville, the National Institute for Computational Sciences, and Oak Ridge National Laboratory manage the facility, perform education and outreach activities for advanced architectures, develop and deploy software tools for this class of architecture to ensure productivity, and team with early adopters to map their applications to Keeneland architectures.

To learn more about Keeneland or XSEDE, visit http://keeneland.gatech.edu [1] or https://www.xsede.org/ [2], respectively.

Source: http://www.cc.gatech.edu/news/keeneland-project-deploys-new-gpu-supercomputing-system-national-science-foundation [3]

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Links:

[1] http://keeneland.gatech.edu
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