Case Study
Intel HPC Geek Contest

The Ultimate HPC Geek Contest Brings Supercomputing to Science Education

The Ultimate HPC Geek takes home the prize

With a single screwdriver, concentration developed as an emergency medical technician, and his knowledge of supercomputing clusters, Associate Professor Charlie Peck of Earlham College in Indiana won the title of Ultimate HPC Geek—and a server cluster valued at over USD 35,000. Assembling the cluster node in a blistering 10 minutes amidst the chaos of the 2006 Supercomputing conference, Peck beat his fellow contestants from nonprofit academic and research institutions. Since then, Peck has been putting the server cluster to good use. Says Peck, "The HPC cluster that Intel donated to us after the contest has made a significant difference in terms of what we can do and how quickly we can do it.... Before the Intel® cluster, we had about 100 gigaflops of processing power on campus. The Intel cluster has about 700 gigaflops."

"The Ultimate HPC Geek Contest is a competition where we invite college professors, students, anybody from a university to come and demonstrate their technical skills at building some of the fastest super computers that are available today."

Ned Thanhouser,
Product Marketing Manager,
Board and System Group,
Intel Corporation

A high-performance cluster trains the next generation of computer scientists

Faculty research and student math and science curriculum are being supported by the cluster at Earlham. Science, computing, and mathematics students get what Peck calls a faster "time to science," with immediate feedback on their investigations that allows them to work in an iterative process of discovery. Peck explains that the speed of the cluster has a direct effect on teaching and learning: "In order to teach parallel distributive computing, computational chemistry, and computational science you need a computational resource that is powerful enough to immediately give results back to students in a classroom so they can see what worked and what didn't work so they can adjust things, submit that work again, and see what changes."

In addition, Peck is using the cluster to teach computational science and high performance computing to college and high school science teachers in conjunction with the National Computational Science Institute (NCSI). For example, Peck recently worked with the Navajo Technical College in New Mexico to extend access throughout the hogans (traditional Navajo dwellings) on Crown Point reservation.

Navajo Technical College workshops access advanced computational facilities through a series of Web and command-line interfaces—leapfrogging a generation of students into the 21st century with respect to science, technology, engineering, and mathematics. A series of software stacks make the power of the cluster available to a wide variety of local applications dependent on real-time output, such as data simulations and visualizations. The cluster is also supporting work in the humanities, including a complex preservation project that combines geographic information system (GIS) technology with oral interviews,

and creating mashups (Web application hybrids).

Peck is also joining the Earlham cluster to the Open Science Terra Grid project, which provides access to powerful computational resources for a consortium of U.S. colleges and national laboratories pursuing large-scale scientific research.

Faster, easier, lower-cost clustering

The wide range of applications for clustering technology being explored by Peck and other scientists and educators around the world is being made possible by significant advances in clustering technology. Custom products that had to be hand-built for each cluster are being replaced by off-the-shelf technologies that support open source and Microsoft Windows* operating systems. As one of the leaders in this transformation toward easier, faster, less expensive clustering technologies, Intel is finding its HPC products are having a big impact.

Intel's Enterprise Platform and Services Division (EPSD) is committed to enabling simple, affordable high performance computing—through innovative, powerful clustering technologies and with its support for an ecosystem of hardware and software vendors offering tested server building blocks that can be easily configured based on Intel pre-validated recipes. These recipes are available to system builders worldwide from the Intel® Enabled Server Alliance (Intel® ESAA) program.

Peck confirms that cluster building is easier with the new tools and technologies. "Intel provides really powerful, well-documented, easy-to-use hardware. Intel has good compliers. Intel has good support for their hardware. They make it relatively easy to provision a computational resource for educational or research use." To Peck and others, Intel is demonstrating that its products, tools, and resources, which include breakthrough multi-core performance platforms that can be integrated by ecosystem partners, can help accelerate the development and reduce the cost and speed of deployment for high performance clusters.

"We can use software that runs our clusters to visualize what would have been just a series of equations 20 years ago."

Charlie Peck,
2006 Ultimate HPC Geek Contest winner and Associate Professor of Computer Science, Earlham College

The Ultimate HPC Geek Contest at the SC07 Supercomputing Conference

- Open to faculty, students, and researchers affiliated with nonprofit universities and colleges
- Winner builds and provisions one node of a functioning HPC cluster in the shortest time based on a predefined recipe
- Prize is an HPC cluster, including components, software, and support

Look for a contest application and details at:
www.ultimatehpcgeek.com

Peak's Winning Cluster

- 16-node HPC cluster with each node running Intel® Core™2 Duo Extreme quad-core processor at 2.66 GHz on an Intel® S3000PT server board
- Each node runs at ~35 GFlops peak performance resulting in total cluster peak performance of ~560 GFlops
- The cluster donated to Earlham also included 32 GB of memory, 1,600 GB of hard drive storage, an Infiniband* fabric network with a 16 port Infiniband switch, and a 24 port Gigabit Ethernet switch

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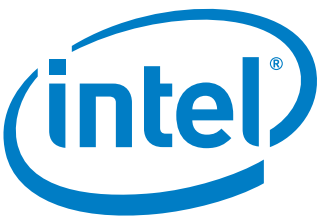

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