

LARGEST BIG TEN SUPERCOMPUTER
ALREADY CRUNCHING AWAY AT PURDUE

Extreme Computing Power in “Coates” Supercomputer Facilitates One-of-a-Kind Research from Unlocking Secrets of Space to Developing Microscopic Electronic Devices

WEST LAFAYETTE, Ind. (Sept. 9, 2009) – What happens after building one of the world’s largest supercomputers? It’s time to get to work.

After constructing a new supercomputer, “Coates,” in a single day, researchers at Purdue University immediately began running research jobs ranging from microtechnology to medicine.

Coates is a 10,000-core computer—meaning the computer was built from 10,000 computer processors—and is the only internationally ranked academic supercomputer wired entirely with superfast 10Gbps Ethernet connections which allow the supercomputer to quickly process large amounts of data for scientific research. Built by more than 200 Purdue University students and staff, the computer fills an entire room and is expected to rank in the top 50 supercomputers worldwide when the next ranking is published in November.

“Coates has allowed us to immediately take part in worldwide research that couldn’t happen without this kind of extreme computing power,” said Gerry McCartney, chief information officer and vice president for information technology at Purdue University. “From our own campus research to collaborating on international physics projects, we now have the ability to process information that puts us on the research forefront.”

From the Universe to the Microverse

Some examples of the kinds of research Purdue is pursuing with Coates include:

- **Finding Answers to Long-Standing Questions about the Universe.** Working with physicists all over the world, Coates will be able to store, process and analyze immense amounts of data collected from a massive international particle accelerator, giving scientists new insight into the very fabric of the universe – dark matter, black holes, and the possibility of additional dimensions.
- **Making Better Microelectromechanical Systems.** On a much, much smaller scale, Coates will help physicists create better microelectromechanical systems (MEMS), tiny electronic devices used in everything from consumer electronics to government systems to control nuclear weapons stockpiles. One reason these mini-electronics often fail is because of problems transferring heat. Scientists at Purdue are using the supercomputer to examine the physics and root-level causes of these failures and create better MEMS that could be used in products ranging from satellites to automotive collision sensors.
- **Modeling Drug Molecules.** Finding the right drug to make a patient feel better is something akin to finding a key in a lock. However, although the key may work, turning the lock can lead to problematic side effects, some of them toxic. Purdue researchers will use Coates to model drug molecules – a method called “computer-aided drug discovery” – to take a multidimensional look at the structure of drugs and figure out how to optimize those molecules to be more effective and less harmful.

Power-Sharing

Beyond the advanced technology, one of the most innovative aspects of Coates is that it was built as a “community cluster,” meaning that many different faculty members purchased computational nodes that are part of the larger machine so they are able to share in the massive computing power of Coates.

Instead of building what could have been dozens of smaller separate computers, Purdue faculty from various departments contributed research funds to purchase a single supercomputer. This unique solution allows the staff to utilize much more computing power than they would have with a smaller, department computer. Instead, they share or borrow idle nodes from other departments when they are free, resulting in a much higher utilization rate of the supercomputer. Where a typical departmental cluster might have a 30- to 45-percent utilization, the community cluster approach brings the cluster up to a 90-percent utilization rate.

Finally, the community cluster is cost efficient. Machines are looked after by the central support staff, saving costs on computer maintenance. Further, faculty members save project money because they are charged for their average use versus peak use – their jobs are run when shared computer nodes are available, and even this process is efficient, guaranteeing computational cycles to faculty members within four hours.

More about Coates

Matrix Integration, a technology solutions provider based in Jasper, Ind., assisted in preparing the groundwork for building Coates by helping design the structure, bringing together various manufacturers and service providers (such as Hewlett-Packard and Chelsio), specifying key components (nodes, processors, memory, low latency network

switching, high-speed NIC's, etc) and working closely with Purdue to design the most effective, high-performance system possible.

Prior to Coates, Purdue had a 6,500-core supercomputer named "Steele." The new supercomputer puts Purdue University in the number-one spot for a Big Ten supercomputer (previously held by the University of Minnesota) and Coates is expected to rank in the top 50 supercomputers worldwide. Coates was named after Clarence L. "Ben" Coates, head of Purdue's School of Electrical Engineering (now Electrical and Computer Engineering) from 1973 to 1983.

About Purdue University

Purdue University is a coeducational, state-assisted system in Indiana. Founded in 1869, Purdue is one of the nation's leading research institutions with a reputation for excellent and affordable education. The West Lafayette campus offers more than 200 majors for undergraduates, over 70 master's and doctoral programs, and professional degrees in pharmacy and veterinary medicine. In addition, Purdue has 18 intercollegiate sports teams and more than 850 student organizations.

About Matrix Integration

Matrix Integration is a woman-owned technology solutions provider based in Jasper, Ind., that has been in business for over 30 years and is an Elite Partner with Hewlett Packard. With clients nationwide and offices in Indiana, Illinois, Kentucky and Ohio, Matrix Integration works closely with businesses and organizations to provide individualized solutions including IT infrastructures, networking services, virtualization, structured

cabling, telephony, and printing and imaging. For more information on Matrix Integration, please visit www.matrixintegration.com.

About HP

HP, the world's largest technology company, simplifies the technology experience for consumers and businesses with a portfolio that spans printing, personal computing, software, services and IT infrastructure. More information about HP (NYSE: HPQ) is available at <http://www.hp.com/>.

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