Research Institute Speeds Cancer Research with High-Performance Computing System

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>
> Dave Billiter, Director, Research Informatics Core, Nationwide Children's Hospital

The Research Informatics Core at Nationwide Children's Hospital wanted to increase the speed at which it could digitize pathology slides and support researchers through faster computation of data. The organization worked with the Ohio Supercomputer Center (OSC) to deploy the Windows® HPC Server 2008 operating system to support its efforts. The hospital has experienced improved performance and enhanced researcher productivity with the new system.

Customer: Nationwide Children's Hospital
Web Site: www.nationwidechildrens.org
Customer Size: More than 6,000 employees
Country or Region: United States
Industry: Healthcare—Provider

Customer Profile
Nationwide Children's Hospital, based in Columbus, Ohio, is one of the largest children's hospitals in the United States.

Software and Services
- Microsoft Server Product Portfolio
  - Windows HPC Server 2008

Hardware
- IBM System x3455 server computer with AMD 2.4 GHz Opteron processor, 2 GB of main memory, and two 70 GB mirrored SATA drives

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Business Needs

Located in central Ohio, Nationwide Children's Hospital is dedicated to improving the health of children and their families through care, advocacy, research, and education. Within its free-standing pediatric research center—one of the largest in the United States—the Nationwide Children's Hospital Research Informatics Core develops custom software solutions to further pediatric research. The Research Informatics Core supports the technical components of scientific research with the creation of databases, software, and data integration solutions to help researchers in their efforts.

Among its many responsibilities, the Core manages pathology imaging. The research institute collects thousands of tissue samples from cancer patients and digitizes them so that researchers can study images using a computer, rather than a microscope. Digitization also makes it easier for researchers to look at groups of samples and share them with each other through a data-sharing approval process.

Ohio Supercomputer Center

Microsoft®

The Research Informatics Core handled digitization through traditional desktop computers, but the sheer size and number of digital images resulted in a considerably slow process. "An individual image may take up gigabytes of space, which meant that it took about an hour to analyze each one," recalls Tom Barr, Biomedical Imaging Manager for the Research Informatics Core at Nationwide Children's Hospital. "We know that research–ers need to look at whole sets of slides at once, so we wanted to come up with a faster computing resource to process all our data."

Adds Dave Billiter, Director of the Research Informatics Core for Nationwide Children's Hospital, "More importantly, it is our aim to provide the digital pathology infrastructure to quickly and accurately process images to enhance translational medicine in the future."

Solution

Nationwide Children's Hospital determined that a high-performance computing (HPC) solution would support its digitization efforts and help it speed research. The Research Informatics Core had an existing relationship with the Ohio Supercomputer Center (OSC)—which provides computational resources for higher-education and industrial users in Ohio—and asked OSC to host its HPC system.

Although OSC maintained a strictly Linux-based environment, the Research Informatics Core decided to adopt the Windows® HPC Server 2008 operating system for its HPC solution. "We certainly considered Linux, but most tools that we use are designed for a Windows environment, and we felt that our researchers would be more effective in that environment," says Bill Beyer, Senior Software Developer for the Research Informatics Core at Nationwide Children's Hospital.

OSC welcomed the opportunity to expand its environment and expertise. "More and more of our user community is requesting code that runs on Windows HPC Server 2008," says Kevin Wohlever, Director of Supercomputing Operations for the Ohio Supercomputer Center. "This system offers all the advantages of an integrated environment—software tools and operating system natively work well together. The environment can be easily maintained by a smaller group of system administrators, which means that we can reallocate them to more strategic work."

In 2008, OSC deployed Windows HPC Server 2008 to a 16-node cluster with 64 cores and 8 gigabytes of memory per core. OSC integrated the system with its existing Linux environment, and users can access image files that are stored in the Linux-based storage share. The system runs a variety of Aperio software for imaging and analysis, and, as of May 2009, the Research Informatics Core continues to optimize the software for an HPC environment.

The Research Informatics Core appreciates several Windows HPC Server 2008 features, including the integrated Job Scheduler for queuing images and the Microsoft® Message Passing Interface (MPI) for communication among nodes. OSC uses built-in tools, such as the Heat Map feature, to easily monitor and maintain the system.

Benefits

Nationwide Children's Hospital is increasing researcher productivity and furthering cancer research, and it expects to increase the number of ways in which it uses HPC. "Using Windows HPC Server 2008 for research enhances cancer detection and optimizes the pathology review process," says Billiter.

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- **Heightened researcher productivity.** In addition to experiencing faster compute times, the hospital has found that its choice of operating systems has made a difference with regard to ease of use. "The system provides a smooth transition from the desktop to the supercomputer for our researchers," says Barr. "They can make greater strides because they're working faster in an environment that they're already comfortable using every day."

- **Impressive performance.** Both the Research Institute and OSC have been pleased with the system's capabilities, such as analyzing a slide 85 percent faster than with previous methods. "We naturally had some skepticism about whether a commodity platform could make the transition to an extremely high-performance environment," says Stan Ahalt, Executive Director of the Ohio Supercomputer Center. "But we've been more than satisfied with its performance and are happy to be using Windows HPC Server 2008—it's a product that works."

- **Easy deployment and management.** Stakeholders appreciate the system's ease of deployment and administration. "It took a fairly junior system administrator only about a day to load the software and integrate the system into our user environment," says Wohlever. "Ease of administration is key for us because we have a small staff. With Windows HPC Server 2008, we have the ability to manage more nodes than we could in other environments. Plus, it's good to have Microsoft there to support us beyond the level that is available with open-source environments."

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