CUSTOMER OVERVIEW

University of Utah's Center for High Performance Computing (CHPC) supports the high-performance computing needs of research projects university-wide. *www.chpc.utah.edu*

CHALLENGE

The CHPC's aging high-performance computing cluster needed an upgrade; increasing demand for scientific research required a powerful cluster within the university's budget

SOLUTION

The CHPC deployed a new high-performance computing cluster based on Dell™ PowerEdge™ servers with two dual-core AMD™ processors running Red Hat® Enterprise Linux® operating system and multiple scientific computing applications

BENEFIT

Increased performance and reliability of the new Dell-based cluster helps the CHPC deliver researchers' results in about half the time; increased computing capacity and scalability supports the growing demand for computing resources and delivers 50 percent more work than previously; the new Dell cluster, with only 160 servers with 640 processor cores, helps lower costs of service and operations

Super Computing

The University of Utah supports cutting-edge research by delivering 50 percent more work with half the power consumption

The University of Utah is well known for its excellence in advanced scientific research. The school, located in Salt Lake City, Utah, supports research in a wide variety of areas, including medicine, genetics, and engineering, and is ranked among the top 35 public research universities in the nation.[1] Several research projects initiated at the University of Utah have since evolved into successful commercial companies, such as Myriad Genetics, Watson Labs, and Evans & Sutherland.

To support the computing needs of the school's wide range of research efforts, the university created the Center for High Performance Computing (CHPC) in 1996 to offer high-performance computing services to departments university-wide. "We support a huge variety of computationally based research projects, including gene sequencing, medical imaging, fluid flow dynamics, computational chemistry, mathematics, fire simulations, geophysics, and meteorological simulations," says Guy Adams, assistant director for systems at the CHPC. "By consolidating resources into the Center for High Performance Computing, we are able to offer the kind of high-performance computing services that many individual departments would be unable to afford."

> "The performance of PowerEdge SC1435 servers is amazing. With only 160 servers with 640 processor cores, we are getting about the same performance that we did with our older cluster, which totaled about 1,200 processor cores. It's a terrific bang for the buck. Plus, we will be able to easily add new servers to the cluster as demand for our services grows. A real bonus is the Dell servers give us this horsepower with about half the power consumption."
>
> — **Guy Adams**, Assistant Director for Systems, Center for High Performance Computing

Recently, however, the high-performance computing cluster (HPCC) that provided the bulk of the computing services available at the center was aging and in need of an upgrade. "In the high-performance computing arena, it is critical to be as close to the cutting edge of technology as possible," states Adams. "The faster we can deliver results, the more effective and efficient our researchers can be. But our 1,200-processor cores in the old cluster were nearing the end of their warranty, and it was time for us to upgrade to a newer architecture."

CHPC selects Dell to provide a high-performance cluster

The CHPC decided to augment the clusters currently in place with a new high-performance computing cluster. In particular, the center was interested in finding a cluster solution that used the AMD Opteron™ processor. "Although we were open to other processors, our first choice was to find a solution based on the AMD Opteron processor," explains Adams. "Our previous clusters were based on the AMD Opteron, and we have been very happy with their performance. Staying with AMD Opteron from an administrative standpoint had time-saving advantages. CHPC has many libraries and software packages that were tested and ready to deploy on AMD Opteron, which allowed us to put the new Dell cluster into production faster."

After evaluating several cluster solutions, the CHPC decided to base the new cluster on the Dell PowerEdge SC1435 server with AMD Opteron processors. "First of all, we were very impressed with the specifications and price-performance of the PowerEdge SC1435 server," Adams notes. "But we were also very impressed with Dell's commitment to supporting the needs of higher-education computing facilities through partnering. Additionally, they brought in a knowledgeable team to help us design and implement our new cluster, and that was a huge benefit."

CHPC deploys new cluster based on Dell PowerEdge servers

The new cluster consists of 160 Dell PowerEdge SC1435 servers with two dual-core AMD Opteron processors running the Red Hat Enterprise Linux operating system and a wide variety of scientific computing applications. This configuration provided CHPC with 640 processor cores. "The performance of PowerEdge SC1435 servers is amazing," says Adams. "With only 160 servers with 640 processor cores, we are getting about the same performance that we did with our older cluster, which totaled about 1,200 processor cores. It's a terrific bang for the buck. Plus, we will be able to easily add new servers to the cluster as demand for our services grows. A real bonus is the Dell servers give us this horsepower with about half the power consumption."

To help manage the new cluster, the CHPC relies on the Standard Baseboard Management Controller that comes with the PowerEdge SC1435 server. The built-in controller provides the Intelligent Platform Management Interface (IPMI) interface for remote management of the nodes. "With the IPMI management capabilities that are built into the PowerEdge SC1435, I can remotely power servers on and off and check vital statistics like temperature, all from my office, as well as use a serial console to diagnose problems," comments Adams. "It's a huge time-saver since my staff and I are spared the effort of running around checking individual servers. Having fewer servers in the cluster compared to our older clusters has also decreased the management burden."

Dell Services offers flexible, dependable support

For ongoing support of the new HPCC, Adams relies on Dell High-Performance Computing Cluster Support with Next Business Day service.[2]

Dell High-Performance Computing Cluster Support also gives Adams and his staff the flexibility to diagnose and correct problems themselves. "We have a lot of in-house expertise, and with Dell cluster support, if we have a bad hard disk or motherboard, for example, we can access the Dell Web site, they will ship us the part overnight, and our technicians can put it in themselves," explains Adams. "We really like the flexibility of the Dell service model because it allows us to take care of things ourselves if we want to, or else Dell will be there for us right away if that's necessary."

Additionally, Adams appreciates the ongoing advice and support of his Dell sales and support team. "With Dell, we have access to so much more than just a sales guy," says Adams. "We have access to a whole team of people who are experts in the educational environment. When we have a

question, for example, regarding a design point, they either help us and give us recommendations directly or immediately escalate the question to the right resource. Dell is truly a partner, and the company's team approach is a real win for us."

Dell cluster delivers faster results, increased scalability

Overall, the performance and reliability of the new cluster allows the center to better serve the computational needs of the university's researchers. "With this cluster, we can get as many jobs done in 6 hours as we could have in 12 with the old cluster," says Adams. "As more researchers migrate their codes to the Dell cluster, we expect this to be the most utilized resource in our center. Researchers want to get as many results as they can in the shortest amount of time, and the new Dell cluster really delivers on that goal."

Furthermore, the scalability of the new cluster will allow the center to support the rapid growth in demand for high-performance computing resources at the university. "Our research programs throughout the university are expanding rapidly, and we are trying to use the Dell cluster in new and innovative ways," explains Adams. "For example, we are adding a new project with MRI 3D medical imaging, which will take a tremendous amount of computing resources. For now, the new Dell cluster gives us the capacity we need. But as we expand and need more horsepower, all we will have to do is add more nodes. With a cluster based on Dell servers, we are perfectly positioned to support our researchers well into the future."

HOW IT WORKS

HARDWARE

- Dell™ PowerEdge™ SC1435 servers with dual-core AMD Opteron™ processors

SOFTWARE

- Red Hat® Enterprise Linux® operating system

SERVICES

- Dell High-Performance Computing Cluster Support with Next Business Day service[2]

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[1] www.unews.utah.edu/?action=research

[2] Service may be provided by third-party. Technician will be dispatched if necessary following phone-based troubleshooting. Subject to parts availability, geographical restrictions, and terms of service contract. Service timing dependent upon time of day call placed to Dell. U.S. only.