University Builds Scalable Data Center

University of Wyoming built a state-of-the-art data center using Nexus and Catalyst, Switches.

EXECUTIVE SUMMARY

University of Wyoming

- Higher Education
- Laramie, Wyoming
- 13,000 students

Challenge

- Accommodate more data center users, applications, and data
- Provide future 10 Gigabit Ethernet access to a remote supercomputer center
- Create a platform for the future

Solution

- Deployed a Cisco Nexus 7000 Switch as the core
- Aggregated server access using Cisco Catalyst 4948 10 GE Switches
- Connected blade servers to the storage network using Cisco Catalyst Blade 3120X Switches

Results

- Built a foundation to support future growth without major upgrades
- Increased availability
- Gained a competitive advantage in attracting faculty and graduate students

Challenge

The University of Wyoming offers undergraduate and graduate education, research, and outreach services. The university data center houses critical administrative applications such as human resources, financial systems, and a portal that students use for email, registration, payments, and calendaring. The data center also houses servers owned by university departments and used for applications ranging from simple databases to seismic processing.

In 2006, the university began planning a brand-new data center facility to accommodate massive growth in scientific and administrative computing. The university collaborates on research projects with the National Center for Atmospheric Research in Boulder, Colorado, which is building a supercomputer center 50 miles away, in Cheyenne, Wyoming.

“We won’t receive this level of data center funding again for many years,” says Brad Thomas, network specialist. “We wanted to make the most of the opportunity by designing a data center architecture with the best possible scalability, availability, and performance.” Requirements included:

- **High port density:** The previous data center used a single Cisco Catalyst® 6500 Switch at the core. The new data center would need higher port density to accommodate more users, applications, and data.
- **10 Gigabit Ethernet access:** University researchers will need 10 Gigabit Ethernet access to the supercomputer center in Cheyenne. What’s more, some university users need 10 Gigabit Ethernet access to the data center’s iSCSI storage area network (SAN) and Fibre Channel SAN. High-speed access would also support the IT department’s transition to blade servers and virtualization. This strategy reduces server and energy costs, but requires more bandwidth.
- **Availability:** “Students don’t restrict their hours from 8:00 a.m. to 5:00 p.m.,” Thomas says. “In fact, we experience some of our heaviest loads late in the evening, so availability, reliability, and ease of maintenance are crucial. For students, network connectivity is as important as electricity.”

> “The Cisco Nexus 7000 allows in-service upgrades. This means that researchers and students can use university and research center applications any time of day or night.”
>
> **— Matt Kelley, Network Administrator, University of Wyoming**

Solution

The IT department selected the Cisco® Nexus 7000 Switch after also evaluating two other data center switches. “The Cisco Nexus 7000 provided superior scalability and availability,” says Thomas. “We were pleasantly surprised that it was also priced competitively.”

Smooth Transition to New Data Center

In December 2008, the new data center went live. “Our new data center is one mile away from the old and about 100 years more advanced,” says Thomas.

The network equipment arrived just 10 days before the move. The university IT group cut over from the old data center to the new in just one evening. They had cabled the new data center beforehand, so the effort was limited to moving and re-racking 160 servers. “The transition went extremely well, and we had excellent support from our reseller, ISC, Inc.,” says Thomas. ISC is a Cisco Certified Gold Partner.

Data Center Architecture

The new data center uses a Cisco Nexus 7000 Switch as the core, initially configured with three modules containing 112 ports. The Cisco Nexus 7000 Switch accommodates up to 18 cards, enabling the university to scale to meet future growth without investing in a new switch. (See “Technical Implementation.”)

Servers and iSCSI storage connect to the Cisco Nexus 7000 Switch through a pair of Cisco Catalyst 4948 10 Gigabit Ethernet Switches at the end of each row. “This design gives servers two paths to the Cisco Nexus 7000, for resiliency,” says Matt Kelley, network administrator.

The university is transitioning from rack-mount servers to blade servers, as part of its virtualization strategy. The blade servers are equipped with Cisco Catalyst Blade Switches 3120X, which connect directly to the Nexus 7000 Switch.

Results

Scalable Platform for Future Growth

The university can accommodate expected increases in users, applications, and data without a platform upgrade. Adding more ports will not increase management burden.

Low Management Requirements

The university IT team manages the Cisco Nexus 7000 Switch using the Cisco NX-OS Software. It is similar enough to the Cisco IOS Software that IT staff needed no additional training.

Increased Availability

Previously, the university IT department had to stop its network devices to perform software upgrades, which meant that researchers, students, and staff were temporarily without data center services. “The Nexus 7000 allows in-service upgrades,” Kelley says. “This means that researchers and students can use university and research center applications any time of day or night.”

Competitive Advantage in Attracting Faculty and Graduate Students

An advanced data center can help to attract graduate students and faculty. “As far as we know, our data center is the most advanced in the state of Wyoming and one of the most advanced in United States higher education institutions,” says Thomas

High Performance for the iSCSI Storage Network

The Cisco Catalyst Blade Switch 3120X, used in the university's blade servers, provides scalable, fast, resilient connectivity to the iSCSI storage network. At first, the university tried another vendor I/O solution for blade server connectivity. The Microsoft Exchange database integrity test still had not completed after 24 hours. "After we deployed the Cisco Blade Switch 3120X, the test completed successfully in just 2.5 hours," Thomas says.

Technical Implementation

The IT department configured the Cisco Nexus 7000 Switch with two 32-port 10 Gigabit Ethernet cards and a 48-port card used to connect to central core network servers such as time servers and load balancers.

Each row of servers connects to the Cisco Nexus 7000 Switch through a pair of redundant Cisco Catalyst 4948-10GbE Switches. The row used for iSCSI storage connects to the Cisco Nexus 7000 Switch through four Cisco 4948 Switches.

The university uses a Cisco MDS 9509 Director Switch for its Fibre Channel SAN.

PRODUCT LIST

Switching and Routing

- Cisco Nexus 7000 Switch
- Cisco Catalyst 6500 Switch
- Cisco Catalyst 4948 10GE Switch
- Cisco Catalyst Blade Switch 3120X

Storage Systems

- Cisco MDS 9509 Multilayer Director Switch

For More Information

To find out more about Cisco Nexus 7000 Switches, visit: http://www.cisco.com/go/nexus

To find out more about Cisco Catalyst Blade Switches, visit: http://www.cisco.com/en/US/products/ps6748/

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