Customer Case Study

University Creates Flexible, Customized Data Storage Solution

Advanced storage allowed University of Minnesota to improve performance, offer tiered storage, and customize storage solutions.

EXECUTIVE SUMMARY

CUSTOMER NAME
- University of Minnesota-Twin Cities

INDUSTRY
- Higher Education

BUSINESS CHALLENGE
- Consolidate direct-attached storage (DAS) into a single centralized SAN.
- Implement information sharing between previously unconnected systems.
- Optimize mission-critical applications to support basic business functions.
- Implement a new disaster recovery plan.

NETWORK SOLUTION
- Three data centers built on Cisco 9509 and 9216 MDS director switches; 12 hub architectures built on 9100 switches

BUSINESS RESULTS
- Improve performance and flexibility; accelerate administration and provisioning
- Implement tiers of storage and storage services to reduce costs.
- Segment individual departmental data for complete security.
- Customize storage solutions for individual department

BUSINESS CHALLENGE

Founded in 1851, the University of Minnesota serves 60,000 students annually, offers a faculty of international repute, and provides a premier research facility. The university has five campuses located in Twin Cities, Duluth, Morris, Rochester, and Crookston, with additional research and outreach centers throughout the state. Consisting of three separate campus sites, the University of Minnesota-Twin Cities is the second largest campus in the United States. The Twin Cities campus also leads the state in providing an advanced data storage environment to support faculty, students, and administrators.

In 2003, the University of Minnesota-Twin Cities campus followed the industry trend by planning to migrate its open systems direct-attached data storage to a centrally managed model. In the process, however, the IT leadership realized that they needed a more reliable, scalable, and cost-effective storage system.

Business requirements mandating data availability also caused IT staff to consider strengthening the university's disaster recovery capabilities. At that time, campus storage was centered in two facilities, as well as in isolated individual departments. Administrators managing student records and university researchers in biology, genetics, and other science and healthcare areas needed better backup facilities in case of emergency.

"It is a typical story for university environments," says Carl Follstad, manager of data management services at the university. "We had a lot of little islands of storage, perfectly reliable, but not scalable. There were also requirements for information sharing between systems that could not be met because they were not connected. The next natural step was to consolidate storage onto a Storage Area Network (SAN)."

NETWORK SOLUTION

Carl Follstad, who was hired specifically to lead the storage upgrade project, considered Cisco storage switches along with other vendors for the initial SAN pilot. Cisco was already a trusted vendor partner, having recently helped the university to upgrade older IP infrastructure with a next-generation IP network. "We had a very good working relationship and a lot of confidence already with Cisco," Follstad says. "For our first SAN effort we chose the Cisco MDS 9216 fabric switches in a dual-fabric configuration, spanning two data centers on the campus." After experiencing success with a few applications on the pilot SAN, the team then decided to move additional applications to the SAN, including e-mail, a real storage hog according to Follstad. "The environment grew quickly, which forced us to learn a lot about gauging and balancing workloads," Follstad says. "We also realized immediate benefits, including improved data availability, performance, and storage provisioning flexibility for high-profile applications. Our initial investment was more than justified."

The IT administration team was especially pleased with the rapid provisioning of storage that was enabled by the new deployment. As the pilot was so successful, more and more of the university's key business functions were migrated to the new SAN: including student registration and records and payroll. With these successes, Follstad and his team began to look at using the two data center SANs for disaster recovery capabilities and expanding the SAN to a core/edge design to accommodate even more applications and data.

Keeping the dual-fabric design, Follstad deployed two Cisco MDS 9509 multilayer directors at the core in each data center's fabric, with the 9216 switches moved to the edge. In addition, with data replicated in real time at both campus sites, each data center could function as a disaster recovery site for the other, providing much greater data security and business continuance for the university. The system utilizes EMC's SRDF replication and MirrorView to provide real-time, SAN-based replication.

"We have grown so much since our first SAN efforts, it is amazing to look back at where we were just two years ago," says Follstad. "In late 2004, we expanded our Fibre Channel core to include our third campus in St. Paul, adding another set of Cisco 9509 directors. We were able to build a triangulated relationship between all three campus cores, so we can take failures to any site or any set of paths and still keep the SAN functional and maintain data integrity." Today's environment includes about 300 TB of storage, 300 ports, and 60 hosts attached to the Fibre Channel. Hosted data can include anything from student content and materials, data warehouses, and imaging applications to production and research databases. In the wake of Hurricane Katrina, Follstad's team is considering an extended disaster recovery plan, which will allow data to be replicated to a site located further from the Twin Cities area.

> **"Our goal was to achieve continuous data availability and we accomplished that. We have not had a single second of downtime on our Cisco-based SAN."**
> **—Carl Follstad, Manager of Data Management Services, University of Minnesota-Twin Cities**

At the University of Minnesota, the storage group acts as a service provider to the various university departments. Several departments, especially those involved in research producing large data sets, have requested Fibre Channel capability to their individual buildings. To accommodate this special need, the storage team developed an affordable solution by building core-hub architectures for individual buildings based on pairs of Cisco MDS 9100 fabric switches. Dark fiber connects these sites to the SAN and also connects the two SAN fabrics. "Universities usually have tight budgets, so we have to be fiscally conservative, invest in the right technology, and develop smart solutions," Follstad says. "The Cisco MDS 9100 switches gave us a cost-effective solution for the edge connectivity that we needed for individual departments."

The IT staff have also helped individual departments by taking advantage of the Cisco capability to create virtual SANs (VSANs) to provide secure, segmented storage for each department within the larger SAN environment. VSANs combined with Inter-VSAN Routing (IVR) allows administrators to provide each department with access to just their assigned storage, enables centralized backup, and helps to isolate fabric events, preventing any failure from affecting multiple departments.

BUSINESS RESULTS

Since 2004, when the SAN was deployed, the university has realized many technical and business benefits from their networked storage. "We have increased application availability, improved performance, and become much more flexible in provisioning storage resources to servers when it is needed," Follstad says. "Scalability is also an important cost benefit for individual departments—storage can be purchased when needed, as needed, and then released when the need has passed."

With the new SAN in place, the staff was able to implement a system of tiered storage and service, which Follstad identifies as delivering the most business value to the university. Key applications such as registration, e-mail, and library systems are given the highest priority and the fastest service. Applications and data that do not require the same high performance levels can be connected to slightly slower, less expensive devices, creating a cost-effective resource hierarchy that helps in budget management. As well, modules can be exchanged in and out of the various sites to allocate or upgrade storage needs, allowing the university to efficiently balance the Cisco MDS 9000 infrastructure to reflect host demand and the SAN workload.

In the near future, this tiered service program will be extended to include the Cisco Small Computer System Interface over IP (iSCSI) capability, based on the MDS IPS-4 and IPS-8 IP services modules. This rollout provides the option to encrypt iSCSI traffic as needed for the public campus IP network, at a lower cost for departments that cannot justify the cost of using Fibre Channel. “I function as a service provider for the university, and Cisco SAN technology lets me offer a customized solution for every department within the university, based on their business requirements,” Follstad says. “That frees up the technical staff for each department to support education-oriented research and other activities that add value to the faculty and students they support.”

FOR MORE INFORMATION

To find out more about Cisco MDS 9000-based intelligent storage networking products and solutions, go to: http://www.cisco.com/go/storagenetworking

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