High marks for IT that packs power and flexibility

Marshall University improves availability while reducing costs with multi-tier iSCSI storage solution

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Ed Aractingi, Assistant Director for IT Infrastructure Systems, Marshall University

Challenge

The university needed a more cost-efficient, manageable and flexible storage platform to support the computing needs of students, faculty and staff.

Solution

A storage solution using multiple tiers of Dell™ EqualLogic™ iSCSI SANs has boosted flexibility and simplified management. Dell PowerConnect™ switches connect the SANs to the Dell PowerEdge™ servers that run the university's virtual infrastructure.

Benefits

- 75 percent less downtime in storage migration
- Lower TCO
- Greater flexibility in meeting varying storage requirements
- Simplified storage management and technical staffing

Application areas

- Backup and Recovery
- Database
- Data Center Virtualization
- IT Support Services
- Networking
- Storage

Out on the field in their kelly green and white, they are the Thundering Herd—Marshall University's finest athletes taking NCAA Division I by storm.

In the classroom and around campus in Huntington, West Virginia, they are an equally formidable flock. Nearly 14,000 students strong, they put the university's Ellucian Banner ERP system to the test, as they apply for financial aid, pay tuition, register for classes and locate housing.

Another 3,000 faculty and staff members add their demands to the mix, relying on the university's Banner applications to support their human resources, financial and other administrative needs. The data that these applications generate is growing fast. At Marshall University, the majority of data lives on virtual machines, requiring centralized storage that can be accessed by 230 virtual machines hosted on 13 physical servers.

Yet, despite rapid changes and growth, Assistant Director for IT Infrastructure Systems Ed Aractingi is relaxed and confident, because his storage platform is as nimble extremely agile. Combining iSCSI-based Dell EqualLogic storage arrays with Dell PowerConnect 10-Gigabit Ethernet switches and Dell PowerEdge rack servers, the university's IT infrastructure allows Aractingi and his team to turn on a dime. They can respond to demands for increased capacity or I/O speed in the most functionally suitable, cost-effective and timely manner.

iSCSI makes more sense
As the university approached the end of the support contract on its previous Fibre Channel-based storage area network (SAN), Aractingi and his team considered other storage options. "We wanted a way to scale incrementally, without affecting the entire system," says Aractingi.

The Fibre Channel SAN provided sufficient performance, but it was costly to purchase, maintain and support, and it was difficult to justify that cost for the university's data storage needs. The Fibre Channel SAN was also cumbersome to manage in-house because it required very specific expertise. Aractingi ultimately decided to renew the support contract

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Technology at work

Services
Dell™ ProSupport™ Mission Critical with Four Hour Onsite Response

Hardware
Dell EqualLogic™ PS6510X, PS6510E, PS6010XVS, PS6500E and PS6000XV iSCSI SANs

Dell PowerConnect™ 8024 10-Gigabit Ethernet switches

Dell PowerEdge™ R710 and R410 servers with Intel® Xeon® processors

Software
Dell EqualLogic SAN HeadQuarters (SAN HQ)

Dell OpenManage™ Server Administrator and IT Assistant

Ellucian™ Banner applications

Microsoft® SQL Server® 2005 database

Oracle® 11*g* database

VMware® vSphere™ 5

Windows Server®

on the Fibre Channel SAN and use that time to build a better, more easily managed storage system.

Aractingi felt that an iSCSI-based SAN would be the best way to provide cost-effective scalability. It would also shorten the learning curve for IT staff, who could leverage the networking skills they already had. Aractingi and his team have worked with Dell engineers on different projects for several years, so he turned to his long-time hardware partner for a solution. That solution turned out to be a mix of Dell EqualLogic iSCSI SANs—some with SATA drives for cost-effective capacity, and others with SAS and solid state drives (SSD) for high performance. Because Dell EqualLogic scales in a modular fashion, the university can add new arrays to the storage pool quickly, without downtime.

"There have been significant savings moving from Fibre Channel to iSCSI and from the single large array that we had to the more flexible Dell EqualLogic arrays," says Aractingi.

Pick, choose and reuse
Marshall University's new storage infrastructure currently comprises two Dell EqualLogic PS6510X arrays with 10K SAS drives to support high-IOPs applications, a Dell EqualLogic PS6510E SATA-based array to provide ample capacity for less frequently accessed data and a hybrid PS6010XVS array for applications that benefit from solid state drives.

Marshall is running its arrays in two storage pools, leveraging the automated load balancing feature of EqualLogic to optimize resource usage. This allows the Infrastructure Systems team to meet or exceed performance requirements while staying within budget.

"We now have the ability to tier storage easily and to add storage where we need it," says Aractingi. "So if we need more SATA, we buy another cost-effective SATA array. And if we want to grow on solid state, say, for our Oracle transaction logs or when we implement virtual desktops, we can add just what we need. We can pick and choose the right storage for the job with Dell EqualLogic."

Before the move to 10-Gigabit Ethernet, Aractingi had installed 1-Gigabit Ethernet Dell EqualLogic PS6000XV and PS6500E arrays. He plans to repurpose these arrays to replicate his production systems offsite for backup and, potentially, for test and development.

Higher availability in transition and beyond
Aractingi and his team experienced a smooth transition to the new storage infrastructure, and users were virtually unaffected. "We barely needed any downtime to migrate to the new storage systems," Aractingi says. Running the old and new systems in parallel, the IT staff used scheduled maintenance windows to migrate applications that required going offline for small periods of time. "Compared to our previous storage array migration," Aractingi says, "we had 75 percent less downtime."

Now that the new systems are up and running, Marshall is ensuring maximum availability by using Dell ProSupport Mission Critical with Four Hour Onsite Response. In the event of a hardware failure, a Dell-trained technician will respond according to severity levels that Marshall defines. Dell provides emergency dispatch for the highest severity outages, priority parts replacement and a single point of contact for escalation management.

A cost-effective, high performance network
Server virtualization is gaining increasing traction at Marshall. Aractingi reports that 80 percent of the infrastructure systems—including the Banner applications, Microsoft SQL Server and Oracle 11*g* databases, main Web

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server, as well as Active Directory® and file servers—reside on virtual machines allocated and managed through VMware vSphere 5.

At present, 13 Dell PowerEdge R710 rack servers, each with 192 gigabytes of RAM, host Marshall's VMware virtual machines. The university also uses Dell PowerEdge R410 servers as a cost-effective solution for smaller applications. In all, the Dell PowerEdge servers house 230 virtual machines.

Marshall's servers are distributed throughout its 100-acre main campus in Huntington, as well as on its other campuses. "We can make storage available to many servers, whether or not they are physically close to a SAN," says Aractingi. He and his team use Dell PowerConnect 8024 10-Gigabit Ethernet switches to connect storage to servers. The university has migrated its entire network infrastructure to 10-Gigabit Ethernet, and yet, even at this bandwidth level, the PowerConnect Ethernet switches are less costly than the Fibre Channel switches the university was using previously.

Consolidation simplifies management
Aractingi uses a two-pronged approach to improve infrastructure management. One is training. Two storage administrators

underwent weeklong training at Dell to master the ins and outs of the Dell EqualLogic arrays. The learning curve isn't as steep as it was in our Fibre Channel environment," he says.

The second prong is systems management technology. Aractingi and his team use Dell OpenManage Server Administrator and IT Assistant to administer all of the university's Dell equipment, including the servers, storage and switches, and also the VMware hypervisors running on the servers. "We're on the road to simplified, consolidated and centralized management for all the systems we use," says Aractingi. "The fact that Dell offers improved VMware integration with the Dell Management Plug-in for VMware vCenter was good news for us. We can go to one console to manage different layers of the environment and get notifications on all the critical aspects of our infrastructure."

The single dashboard view helps the IT staff quickly trace and troubleshoot issues and address inefficiencies. For in-depth reporting and analysis, Marshall IT staffers use Dell EqualLogic SAN HeadQuarters (SAN HQ) which, like all EqualLogic software, is included with the purchase price of the Dell EqualLogic arrays.

Dr. Jan Fox, Marshall's senior vice president for IT and CIO, advocates an IT strategy "to aggressively address financial efficiencies in teaching and learning, advanced teaching and research tools, administrative systems, student services, e-learning, intra-campus and intercampus network infrastructure, while improving quality and access."[1] In doing their part to live up to this efficiency mandate, Aractingi and his team are well positioned to tackle whatever comes next.

"Now I don't worry about future needs for solid state or higher capacity drives, because we don't have to make major investments or technical changes to address those needs," says Aractingi. "We can move with changes in application requirements, supporting the trend toward more dynamic IT environments, because we use Dell EqualLogic storage."

[1] http://www.marshall.edu/it/about-it/welcome-from-dr-jan-i-fox/, accessed 8/22/12

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