University of Connecticut School of Business doubles compute capacity while driving down costs with Dell EqualLogic, Intel and VMware
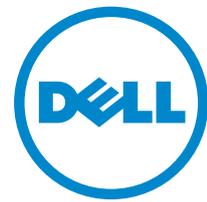
- Backup/Recovery/Archiving
- Clustering
- Consolidation
- Flexible Computing
- Storage
- Virtualization

"Our staff can now spend more time helping the mission of the school, by empowering faculty, helping students— building better business process."

Michael Vertefeuille, Assistant Dean, University of Connecticut School of Business

Customer Profile

Company:	University of Connecticut School of Business
Industry:	Education
Country:	United States
Students:	3,680
Faculty & Staff:	150
Web:	www.business.uconn.edu

Business Need
The University of Connecticut School of Business needed to deploy an efficient IT infrastructure able to provide worldwide, 24x7 online course access for students while gaining resiliency and flexibility to deploy cutting-edge services. The school also wanted to provide a more cost-efficient, streamlined desktop environment for students in its classrooms.

Solution
The school consolidated its data center by migrating to virtualization optimized Dell server and storage solutions built using Dell™ PowerEdge™ servers with Intel® processors and Dell EqualLogic™ virtualized iSCSI storage arrays that are natively integrated with VMware vSphere software.

University of Connecticut
SCHOOL OF BUSINESS

Benefits
- **20% reduction in power and cooling costs**
- **30% savings in storage costs**
- **Server recoveries in minutes instead of days**
- **97% reduction in downtime**
- **Hundredfold faster software upgrade deployments (20 minutes vs. 2 days)**
- **30% increase of staff time available for innovative projects**
- **Twofold faster time to value on new servers**
- **Processing capacity doubled**
- **Tenfold more storage space available**

Here's a modern problem: How do you gain leadership in a highly competitive industry while under constant budget constraints?

Doing more with less is the mantra for the University of Connecticut School of Business, which must maintain and improve its ranking among the top five percent of business schools in order to attract the best students. And it must continually foster academic excellence to produce top graduates—such as those who have already become successful executives at such industry giants as Citigroup Inc., PepsiCo Inc., and UBS Investment Bank.

With limited resources at its disposal, the school achieves these goals and more through innovative uses of technology in its practical learning programs.

Growing IT complexity

The stated mission of the University of Connecticut School of Business is to integrate real world education, outstanding research and strategic outreach. To accomplish this, the school has deployed technologically complex learning environments such as a full financial mock trading floor, a business innovation and entrepreneur center, a public outreach accelerator and edgelab, an applied research facility for solving complex business problems with emerging technologies.

These innovations are part of the school's ongoing drive to improve and excel, which also includes a research and learning center built in Storrs in 2001, and a financial research and learning center added in Hartford in 2004. Besides the main campus in Storrs, the school also supports major satellite campuses in Stamford, Waterbury and in Hartford, as well as an extensive online learning program.

"To be competitive with other top tier business schools, we are often forced to push the envelope regarding technology innovation," says Michael Vertefeuille, Assistant Dean at the University of Connecticut School of Business. "As we investigate new technologies and suffer the pains of innovation, we share our experiences and successes with our peers. In that, one of the major aspects we consider with all technology decisions is teaching pedagogy—how we use technology and the newest teaching

methods, as well as how we effectively integrate technology in the classroom. So my constant focus is on using technology to enhance learning where it makes sense."

Requiring 24x7 availability

The State of Connecticut recently required accountants to complete coursework in order to maintain their state licenses. To serve these busy professionals, the school began offering approved courses online. Today, the school's Master of Science in Accounting is ranked as one of the top in the country for online programs.

"Students are connecting at any hour of the day from all over the world, and they're paying good money to get an education, so we need to provide 24x7 uptime for them," says Vertefeuille. To achieve this goal cost-efficiently, the school migrated from a more conventional one-application-per-server environment and traditional SAN to a VMware vSphere virtualized environment with Dell EqualLogic virtualized PS6000E iSCSI SAN arrays. Virtual machines are hosted on six Dell PowerEdge R710 servers

> "We expect our Dell technology to never go down. The Dell EqualLogic SANs have dual controllers within each chassis, making them completely redundant within themselves."
>
> *Michael Vertefeuille, Assistant Dean, University of Connecticut School of Business*

Technology at Work

Hardware

Dell™ EqualLogic™ PS6000E and PS5000E iSCSI SAN arrays

Dell PowerEdge™ R710 servers with Intel® Xeon® x5570 series processors and 144GB of RAM

Dell PowerVault ™ MD3000i highly available modular disk storage arrays

Software

Microsoft Exchange Server 2010

Microsoft Office 2010

Microsoft® SharePoint® 2010

Microsoft SQL Server® 2005 & 2008 R2

VMware vSphere™ 4.1

VMware vCenter 4.1

VMware View 4.5

connected to clusters of five Dell EqualLogic boxes, with an identical environment in the secondary data center in Hartford providing backup and disaster recovery over the WAN. Future plans to implement 10GB dark fiber between sites will enable geographic vMotion and real-time fault tolerance between physical sites. The Dell PowerEdge R710 servers with Intel Xeon x5570 processors' multi-core technologies offered four to five times the consolidation ratios achieved in the original VMware pilot program.

"We expect our Dell technology to never go down. The Dell EqualLogic SANs have dual controllers within each chassis, making them completely redundant within themselves. With our stack of five EqualLogic systems, they will cluster and auto-load balance within themselves. We could probably lose three of the six Dell PowerEdge R710 servers that act as hosts in our main location, and still be up and running there."

97% reduction in downtime

In the school's data center, the VMotion, High Availability and Fault Tolerance features of VMware are set to move guest servers automatically to load balance across hosts and even instantly fail over to another physical server if hardware fails with zero downtime. Unplanned downtime is minimized—a benefit important for 24x7 online instruction. And using VMotion, planned downtime can be avoided because virtual machines can be moved to a different host on the fly when the host they're on requires maintenance.

"With the virtualized environment, we're able to eliminate most of our unplanned outages," says Vertefeuille. "And because virtual servers are so easy to create, we're creating more clustered virtual servers so that we can leave one member of the cluster up while we patch the other, and then reverse the process, avoiding downtime."

Vertefeuille adds that total downtime, both planned and unplanned, averaged three to five hours per month in the previous environment. "We're down to hardly any downtime now, around five minutes per month," he says. "That's a 97 percent reduction."

Recovery in minutes instead of days

Another advantage virtualization brings the school is an improvement in data protection and disaster recovery capabilities. "In the past, we needed to depend on a single physical server being backed up to tape or disk," says Vertefeuille. "With EqualLogic SANs, we have a multi-tiered disaster recovery and backup approach. We also replicate data between clusters in two different locations to provide redundancy and disaster recovery."

Vertefeuille adds that IT is now able to recover a server in minutes, versus two days prior to virtualization. "That's if we need to restore at all," he says. "In most cases, the system just doesn't go down, which is huge." One example Vertefeuille gives is with the school's Microsoft Exchange 2010 server. "Because we added additional clusters of servers in multiple locations, that application layer will keep the product up and running without going down."

Driving SAN costs down by 30%

Built-in snapshot, replication and VMware DR agents in Dell EqualLogic arrays allow the school to backup and restore data quickly with no downtime. "Snapshotting and replication give us the redundancy of multiple layers of backup. They allow us to image the entire server without bringing the server down at all," says Vertefeuille. "And we can do it at whatever frequency we need—every half-hour, every day, whatever." All of the benefits and features of a Dell EqualLogic array are bundled with the initial system, eliminating future costs to implement new features. Application and VMware backups at the business school are to a Dell PowerVault MD3000i modular disk storage array, which offers a very desirable price/GB in a backup environment. And being iSCSI, they can be geographically separate from the source servers, providing further redundancy.

Snapshotting and replication capabilities are included with Dell EqualLogic SANs at no extra cost. This saves the school about 30 percent—five figures in savings—over a typical cost of licensing those capabilities with a traditional SAN, Vertefeuille says.

Scalability in a snap

The school is now able to add storage capacity on demand, without expensive, disruptive forklift upgrades. "What I like most about the Dell EqualLogic SANs is the ease with which we can add capacity. When we need to add more capacity, we are able to buy another and add it right to the

"What I like most about the Dell EqualLogic SANs is the ease with which we can add capacity."

Michael Vertefeuille,
Assistant Dean, University of
Connecticut School of Business

cluster, adding capacity, redundancy and throughput to the entire system," says Vertefeuille. "We started with Dell EqualLogic PS5000E clusters, and added a couple Dell EqualLogic PS6000Es this past year without any downtime. With the EqualLogic's clustering capabilities, we can even patch firmware without ever shutting down our cluster. And we've also added servers to our VMware cluster as well."

It's also now seamless to add servers, notes Vertefeuille. "Because everything is virtualized, adding a server is as simple as going into the console and turning on a new server image and configuring it," he says. "When you're able to virtualize, you can just bring up a new server on the fly and not worry about that extra physical box. We're at least 10 times as fast now in getting a server up and running."

Twice the compute power 85% less space

By virtualizing its environment, the school reduced the number of physical servers it uses from 65 to 10, shrinking rack space by 85 percent. Power and cooling costs have dropped 20 percent. Yet the school has doubled its processing capacity and has 10-fold more storage space available. "And we have at least three years' headroom to expand," says Vertefeuille, "with everything that we have now, and for everything we have planned on the horizon."

The IT team has more time for new projects. "It's much easier to manage 10 servers versus 65," says Vertefeuille. "We don't have as many service contracts, and there are fewer moving parts to break." As a result, time spent managing physical server infrastructure has been reduced by 75 percent.

Classrooms ready 100 times faster

Besides the school's online courses, its live on-campus classes run from 8 a.m. to 10 p.m., with instruction via computer an integral part. The school made it mandatory for students to lease a laptop—but that created time-consuming IT support issues. "When faculty would go in to teach, the students could have 30 different types of laptops and operating systems," says Vertefeuille. "Support is an absolute nightmare for any non-standard support structure." To streamline endpoint administration, the IT team is deploying VMware View to provide students with virtualized desktops.

Students will be able to log on to a virtual desktop session that is hosted on the Dell PowerEdge R710 servers and Dell EqualLogic SANs. Because the operating system and user data are hosted in the school's data center instead of locally on the client machine, students can use whatever laptop they want, as long as it meets minimum specifications. "It saves support time immensely because we don't have to support hundreds of different types

of machines," says Vertefeuille. "And it allows students to buy less expensive machines—even a netbook—because virtually all the processing takes place in the cloud."

In this new environment, IT will maintain a master desktop image that is used to generate each student desktop image. "If we need to load a patch, we patch the master image and all the student images are patched immediately by default," says Vertefeuille. "So upgrading software in the lab or classroom will go from a process that previously could take two days, down to 10 minutes."

Innovation: flipping the ratio

Prior to virtualization, IT spent 80 percent of its time on maintenance, and 20 percent on innovation. "Now that the school's storage and server environments are virtualized, IT spends 50 percent on innovation and 50 on maintenance," Vertefeuille reports.

Everyone can focus more on what matters. "With a virtualized environment from Dell, Intel and VMware, my staff can now spend more time helping the mission of the school," says Vertefeuille. "Which means helping faculty, helping students—building better business process—and spending less time on fixing day-to-day hardware problems."

(intel)

University of Connecticut
SCHOOL OF BUSINESS

View all Dell case studies at: dell.com/casestudies

DELL