Long Beach City College earns $53,000 rebate for energy efficiency while offering 119% more distance education 'seats' with help from Dell

- Consolidation
- Power & Cooling
- Storage
- Virtualization—Server

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Arne Nystrom,
Senior Network Administrator,
Long Beach City College

Customer Profile

Company:	Long Beach City College
Industry:	Education
Country:	United States
Employees:	1,500
Students:	27,000
Web:	www.lbcc.edu

Institutional Need

More than 100 servers of disparate makes and models were overtaxing the power and air conditioning resources in the aging data center at Long Beach City College. System availability was already suffering, and increasing student demand for distance education threatened to push the infrastructure past its breaking point.

Solution

The college virtualized almost all of its servers on a VMware platform running on Dell™ PowerEdge™ servers supported by Dell/EMC and Dell EqualLogic™ SANs. Not only are business-critical applications more available, but they also run faster. Plus, the flexibility that virtualization offers for building test environments is enabling the college to improve students' learning opportunities through expanded distance learning offerings.

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Benefits

- $53,000+ efficiency rebate received from power company
- More than 200,000 kWh saved annually
- 82% reduction in physical server footprint (11 racks down to 2)
- New test servers deployed in 5 minutes, vs. minimum 1 month previously
- Faculty can test out more educational software since virtual servers are cost free
- IT staff has more time to focus on improving technology for students and faculty
- 119% more 'seats' for distance education offerings now available
- Improved performance for student administration system
- Hardware refreshes in hours thanks to virtual environment
- New server technology every year due to leasing through Dell Financial Services
- 45 minutes to install Dell EqualLogic iSCSI SAN
- Able to run at least 12 virtual machines per host server with 15% average CPU utilization
- 80% decrease in server administration time

For more than 80 years, Long Beach City College (LBCC) in Long Beach, California, has provided an alternative to four-year universities. Through two campuses, the college offers associate's degrees, career certificates and courses that prepare students to transfer to another institution to pursue a bachelor's degree. But demand for a new type of curriculum—distance education—has been building over the past decade.

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The Internet enables LBCC to extend its educational offerings to students whose work schedules, family obligations or other obstacles prevent them from attending traditional classes. However, as demand for distance education ballooned, IT administrators realized that the college's data center couldn't handle the growth. The status quo was already pushing the 30-year-old infrastructure to its limits.

Grappling with power and cooling challenges

"The biggest battles we faced were with air conditioning and power," says Arne Nystrom, senior network administrator. "We had an electrician come in a few times to add more circuits because we didn't have enough power to keep our servers running. What's worse, we had one air conditioning unit. When it went down—which happened at least once every six months—the entire data center heated from 72 to well over 100 degrees Fahrenheit within 15 minutes. Once, the air conditioner failed at night when no one was around, and the data center temperature reached 137 degrees. At 2 a.m., I was getting alerts saying that the data center was overheating."

Even when the air conditioner was on, much of the college's hardware was unreliable. Most of the servers were old, and their warranties were expiring. "We only had a couple of people to manage the servers," he says. "Managing more than 100 machines through remote desktop KVM switches and making sure they were all in the right VLANs and running correctly was very tedious."

The goal: a $53,000 rebate for energy efficiency

The college began exploring virtualization as a possible solution. "We purchased four Dell PowerEdge 2950 servers to experiment," says Nystrom. "We were impressed with the results, so we decided to virtualize as many servers as possible." Nystrom and his supervisor, Mark Guidas, deputy director for network services,

Technology at Work

Solutions

Dell™ Financial Services

Services

Dell Support Services

Hardware

Dell/EMC CX3-40 storage arrays

Dell EqualLogic™ PS6000XV storage arrays

Dell PowerEdge™ R710 servers with Intel® Xeon® X5550 processors

Dell PowerEdge 2950 servers with Intel Xeon X5355 processors

Software

Microsoft® Exchange Server 2007

PeopleSoft® Enterprise Student

Ubuntu Linux®

VMware® vSphere® 4.0

Windows Server® 2008 R2, 2008, 2003

discovered that LBCC's power supplier, Southern California Edison, was willing to help finance the project: Edison offered a financial incentive worth more than $53,000 if the university could meet its goal for reducing power consumption.

LBCC rolled out Dell PowerEdge R710 and 2950 servers running VMware ESXi, with a Dell/EMC CX3-40 SAN for centralized storage. "We worked closely with Dell to make sure that we used best practices for purchasing VMware hosts, and Dell also helped us choose the right storage for our needs," says Nystrom.

Over the following six months, the team converted 95 servers from physical to virtual, opened a second data center and deployed two Dell EqualLogic PS6000XV SANs with high-performance serial-attached SCSI (SAS) disk drives. They also created more than 150 new servers. Now LBCC runs 264 virtual servers on 22 Dell PowerEdge boxes, for an average of 12 virtual machines per host running at only 15 percent CPU utilization.

The consolidation allowed LBCC to shrink its physical server footprint from 11 racks down to 2, or an 82 percent reduction in floor space. The resulting power savings amounted to more than 200,000 kilowatt hours (kWh) annually, earning LBCC its full incentive from Edison.

Better education through virtualization

One of the biggest benefits LBCC has realized through virtualization is improved flexibility in deploying new services to students. "Before, we were always locked into the physical restraints of our servers," Nystrom says. "If there was a new idea we wanted to test, we had to make a business case so that we could buy a server to try out the idea. But with virtualization, if an idea looks good, we run it on a virtual server and see how it works. If it works well, we can move to the next level and get funding. If it doesn't, we haven't spent money buying servers to test it."

The IT staff needs only a few minutes to create a test environment. "In the physical world, procuring, racking and stacking a new server took us three to six months," says Nystrom. "Even for projects that were top priority, procurement alone took about a month. Then we'd have to install the software and troubleshoot. Now spinning up a virtual server takes us five to ten minutes."

This flexibility is already producing tangible results for students. LBCC offers around 200 online classes in nearly 40 different disciplines, from business law to biology and nursing to dance and theater arts. Of the college's 27,000 students, many attend only distance education classes. "Our distance education program has grown enormously thanks to the virtualization project," Nystrom reports. "We've been able to expand our distance education classes by approximately 119 percent more 'seats' over four years."

Refreshing hardware in hours

The IT staff can also bring new hardware online much faster. "Outside of the virtual environment, when you replace an older machine with a new one, installing software can be challenging because the hardware is different," says Nystrom. "Getting servers running, getting the operating system the way we wanted it, dealing with drivers and installing applications was often time-consuming and labor-intensive."

Virtualization has changed that. "Now that we're virtual, replacing physical servers takes no time," says Nystrom. "We use Microsoft Windows PowerShell scripts to create virtual switches and handle configuration. Once the hosts are running, we use VMware VMotion to move the virtual application servers over to the new hardware. We can install ten host servers in one day, and we don't have to worry about technical issues after the fact because we didn't reinstall any software. Configuration doesn't have to change. A full hardware refresh takes hours."

Installing the Dell EqualLogic SANs was also extremely straightforward. "Setting up the Dell EqualLogic SAN took just 45 minutes," says Nystrom. "It's very impressive."

Because implementing new hardware is simplified now, the school is leasing its servers through Dell Financial Services. "VMotion makes it so seamless to move virtual machines from one physical box to another that it makes sense to get

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a new set of servers every year to take advantage of the latest technology," says Nystrom. "We have three leases that are staggered a year apart, so we get new technology every year."

18 servers, 1 host, 10% CPU utilization

For LBCC, the Dell PowerEdge R710 is an ideal platform for VMware virtualization. "PeopleSoft Enterprise Student Administration is a massive application," says Nystrom. "Before, it required four application servers, four Web servers and two database servers. Through virtualization, we now run all 10 of those servers on just one Dell PowerEdge R710 host, and the system actually runs better because all the network traffic between the different servers goes through a single virtual switch."

Nystrom attributes the performance of the PowerEdge R710 to its RAM capacity, the higher bandwidth of its DDR3 memory and its Intel Xeon 5500 series processors. "The Intel Xeon 5500 processors are a great platform for virtualization; they're very fast," he says "That's the reason we have as many virtual machines as we do. One of our PowerEdge R710 servers is running 18 Web and infrastructure servers, on both Windows Server and Ubuntu Linux platforms. Still, it's only using 10 percent of its CPU processing power, and it's only using half its RAM. We're so impressed by the performance of the Dell PowerEdge R710 servers that we've decided to standardize on them in the future."

The college is similarly pleased with its Dell EqualLogic SANs. Because the SANs use iSCSI connectivity, Nystrom expected to take a performance hit compared with the Fibre Channel SANs he was used to. "I'm surprised, but the performance of iSCSI is as good as, or even better than, Fibre Channel," Nystrom says. "It's proven to be one heck of a platform. Not only can we use our storage more efficiently, but we can re-slice our storage any way we want. In the future, I'd like to move away from Fibre Channel to iSCSI."

80% less server administration time

LBCC's two data center managers no longer spend exorbitant amounts of time managing servers and all the networking equipment that used to connect its 100-plus physical machines. "One benefit of this project is simplified server management," Nystrom says. "Before the consolidation, we spent at least 10 hours a week on server administration. With virtualization, it's down to two hours a week. We can power machines on and off, install operating systems, monitor server performance and tweak the virtual infrastructure to address issues—for example, giving a virtual server more RAM—all through the VMware management console."

Because the college procured all its infrastructure components through Dell, support is a single phone call away. "Dell Support Services is always very professional and helpful," Nystrom says. "And having one vendor to turn to when we have an issue avoids the finger-pointing that can happen when different vendors are supporting different components."

IT staff now have more time for strategic activities. "We have more time for initiatives like upgrading Microsoft Exchange, and we can create new environments for the Web developers and distance education team."

Moving forward with Dell

LBCC is now evaluating a virtual desktop infrastructure (VDI) that would give students remote access to virtual computer labs. Whether VDI becomes a reality at the college depends in part on how it performs in a test environment. But the fact that it's being tested—and seriously considered—is a direct result of the efficiency and stability of the VMware platform on the Dell PowerEdge servers.

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