Boston Medical Center cuts data center power bill by 50% and saves up to $3.2 million with virtualized storage, server and desktop solutions

- Backup/Recovery/Archiving
- Consolidation
- Power & Cooling
- Virtualization

"Boston Medical Center has saved a lot of money over competing systems, while being more responsive to patients."

Brad Blake, Chief Technology Officer, Boston Medical Center

Customer Profile

Company:	Boston Medical Center
Industry:	Healthcare
Country:	United States
Employees:	4,723
Web:	www.bmc.org

Business Need

Boston Medical Center (BMC) needed to find ways to lower its operational costs to work within smaller budgets despite exploding data volumes, a sprawling server farm and 6,000 desktop users who needed access to clinical applications for patient care.

Solution

The hospital pursued a data center virtualization strategy to simplify and consolidate storage, servers and desktops into an easy-to-manage, centralized solution that helps drive down operating costs. BMC used Dell™ PowerEdge™ servers with Intel® Xeon® processors, Dell EqualLogic™ storage and VMware.

EXCEPTIONAL CARE. WITHOUT EXCEPTION.

Benefits

- Hours to install iSCSI SAN storage versus days previously
- Up to $150,000 per year saved by eliminating Fibre Channel SAN port costs
- $3.2 million saved in equipment avoidance costs
- $150,000 savings annually from 50% cut in power bill for data center
- Reduced licensing costs for desktops with desktop virtualization solution
- Improved security with desktop virtualization
- Continued green initiatives with desktop virtualization
- Ability to manage storage without specialized training
- Ability to more effectively tier data and delay storage purchases using virtualized iSCSI storage with thin provisioning

"Exceptional care without exception" is the motto of Boston Medical Center (BMC). It means that anyone can receive medical treatment in the award-winning teaching hospital regardless of their ability to pay, and whether or not they have health insurance.

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In a time of falling budgets, that free care creates a tough financial challenge for the 639-bed hospital in Boston's South End. Created in a 1996 merger between the former Boston City Hospital—the first municipal hospital in the United States—and Boston University Medical School, Boston Medical Center has 4,723 employees, including 1,400 physicians and 1,600 nurses. With its long history of serving the local urban community and low-income families, the hospital has special facilities, including a food pantry against which doctors can write prescriptions. It also boasts state-of-the art technology such as the CyberKnife System for treating tumors that were once thought inoperable, which attracts patients from all over the country.

In keeping with its mission, the hospital views its IT infrastructure as an opportunity to improve efficiency and lower the cost of care while providing the best clinical and administrative systems available. "We don't have the money and the budgets that we've had in the past," says Brad Blake, chief technology officer for Boston Medical Center. "When we perform our work processes, we have to ensure that we execute on them as efficiently and as effectively as possible. Information technology provides us the ability to run our processes just as well as we've done in the past, but in a much more efficient and effective manner."

Virtualization has turned out to be the key strategy behind the changes the hospital is making. Virtualization of storage, servers and desktops is bringing down operational costs while providing more powerful systems than the hospital had before.

Controlling Rising Costs

BMC, like most healthcare facilities, has seen an explosive growth of data volumes from CAT scans and MRI images. At the same time, BMC's costs have been rising to build and expand existing Fibre Channel storage. BMC couldn't cut corners to reduce storage costs, because these images and the clinical applications around them can't have failures, so BMC's underlying storage platforms have to be highly reliable, stable, high performing—in a nutshell—enterprise-class. However, just maintaining the switching infrastructure of its SAN storage cost too much.

"Every time we added a new server to our Fibre Channel SAN there was a port cost at the server end and a port cost at the switch end," says Joseph Ciccolo, systems manager for information technology, Boston Medical Center.

"In addition, we needed to bring in people with specific knowledge of Fibre Channel connectivity," adds Blake. "With hiring freezes in place, we have to increase the productivity of each employee to take on additional responsibilities as we continue to manage the increase in volume and storage. We needed to see how we could put our storage data onto the regular network using iSCSI connectivity to take advantage of our available

Technology at Work

Services

Dell™ Consulting Services for storage assessment

Hardware

Dell EqualLogic™ PS6510X, PS6500E, PS6000E, PS5000XV, and PS5500E iSCSI SAN arrays

Dell OptiPlex™ 755 desktops with Intel® Core 2 Duo processors

Dell PowerEdge™ R710 servers with Intel Xeon® 5500 series processors

Dell PowerEdge R910 servers with Intel Xeon 7500 series processors

Dell PowerEdge 2950 servers with Intel Xeon processors

Software

Microsoft® Windows Server® 2008 R2 with Remote Desktop Services

Microsoft Windows Active Directory®

VMware vSphere 4.0

network bandwidth—and at the same time complexity of all these switches."

Assessing Storage Needs

In order to get a handle on the current state of its storage environment and its utilization, BMC engaged Dell Consulting Services to do a SAN assessment.

"In just a few weeks, Dell delivered an easy-to-understand and comprehensive snapshot of where we stood from a storage perspective: what was being used, what was not being used, and the report showed that our expensive Fibre Channel SAN was only 20-40 percent utilized," says Blake.

"Going forward, we needed to make sure that we squeezed every bit of processing power out of all our equipment, whether it was servers, storage, networks or desktops," says Blake. "Dell Consulting Services helped us get that information on paper, which was really tangible and allowed us to take that information and share it with senior leadership."

BMC held a "bake-off" with all the major storage providers including Dell and its EqualLogic SAN platform. The BMC IT team used a desktop virtualization pilot project as a test to see whether iSCSI could provide the same performance as Fibre Channel at a lower cost. "I'm a person that really needs to see something in order to believe it. In desktop virtualization all the data sits on the centralized storage, so performance is critical," says Blake. "So, when we actually ran our tests on EqualLogic iSCSI, we were absolutely blown away by the results. EqualLogic was head and shoulders above the rest."

Storage Savings Add Up

BMC installed Dell EqualLogic PS6510X, PS6500E and PS5000XV arrays, which support a virtual desktop deployment and a large database cluster. "Immediately we began saving between $100,000 and $150,000 in Fibre Channel port costs which corresponds to a three-year payback for our investment," says Blake.

In addition, operational costs are going down because the hospital does not have to hire Fibre Channel specialists to maintain its storage.

"We're able to delegate a lot of the storage allocation tasks to server engineers because we don't have the complexity that is associated with a Fibre Channel SAN," says Blake. "Previous storage solutions took days for installation of switches, cables and host bus adapter drivers, but a regular server engineer installed the Dell EqualLogic storage in a matter of hours."

Another management benefit that BMC is deriving from its EqualLogic iSCSI storage comes from the boot-from-SAN concept, which takes advantage of the shared storage and more importantly the high performance of the EqualLogic scale-out architecture. According to Blake, "All the information that's needed, including the server operating system, resides on the SAN. If a server were to have an issue, we can simply swap that out. EqualLogic provides the spread of I/O across all the drives—in one array and across multiple arrays—much faster than the server itself, and we get the performance we need at a very reasonable cost."

Savings From Virtualized Storage

BMC is able to drive further operational cost savings out of its EqualLogic investment by implementing tiered storage and using thin provisioning.

"A lot of our applications have huge databases and most of the data doesn't get touched—it's all past references, past visits, and just sits on the expensive disk," says Ciccolo. With the EqualLogic virtualized architecture, BMC can add different arrays for three or more tiers of storage within a single SAN for the different application requirements. At the same time, it can flexibly expand the SAN on demand and move volumes on the fly between tiers without any disruption to the application.

Thin provisioning within the virtualized EqualLogic architecture also helps BMC save on storage costs. "With thin provisioning, my capital buying becomes much smaller and I can save that money as a whole for BMC," Ciccolo continues. "I no longer have to buy huge amounts of space right from day one. I can wait a little and invest the money when drives are bigger, less expensive and have more cache."

$150,000 Savings In Power Costs

A key part of BMC's IT strategy is server virtualization. With a goal of virtualizing 550 physical servers, the hospital has decommissioned 300 physical servers to date, and is running their workloads on just 15 physical servers.

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BMC is virtualizing the servers on Dell PowerEdge R710 servers with Intel Xeon 5500 series processors and Dell PowerEdge 2950 servers. "The Dell PowerEdge R710 server is ideal for virtualization because the Intel Xeon 5500 processors provide faster memory, faster processing clock speeds, and it all integrates a lot better," says Ciccolo. "Many of our applications are memory- and processor-intensive, and communication between the two bogs down when you add pieces between them. Integrating those pieces together makes everything a lot faster for us."

The hospital is virtualizing applications such as cardiac, respiratory, rehabilitation, pharmacy services and even core infrastructure such as Microsoft Windows Active Directory using VMware vSphere 4.

"We're saving a significant amount of money," notes Blake. "Before we started virtualization, our data center electric bill was higher than our lease costs at the data center. One of the big goals of virtualization was to drive those electrical costs down. We've cut the electrical bill in half since virtualizing the 300 servers, and we're saving $150,000 in power costs."

$3.2 Million In Equipment Costs Avoided

Thus far, the hospital has achieved savings in equipment avoidance costs of $2.4 million at $8,000 per server. And the 100 new servers that have been acquired since the virtualization project began are within the virtual environment, saving $800,000. Furthermore, the time it takes to set up a virtual server is much shorter than the turnaround time for physical servers—seven minutes versus two to three weeks turnaround.

Operational costs also decrease with a virtualized environment because of the tight integration between virtual servers and virtual storage. "Performance is much faster with the Intel 5500 series processors, especially with 10 Gigabit Ethernet iSCSI SAN storage," Ciccolo says. "And by automating storage management tasks like provisioning, snapshots and replication, Dell EqualLogic storage with powerful Dell PowerEdge servers helps reduce operating costs and lowers the risk of human error."

"If I can implement a system that is going to help drive operating costs down year to year, then our senior management group is very excited about these opportunities," adds Blake.

Improving Security With Desktop Virtualization

BMC's project in desktop virtualization is being rolled out, running on Dell PowerEdge R710 servers with Intel Xeon 5500 series processors, Dell PowerEdge R910 servers with Intel Xeon 7500 series processors and EqualLogic PS6500E arrays. Microsoft Windows Servers 2008 R2 Remote Desktop Services provides the platform for a virtual desktop infrastructure.

"Desktop virtualization presents users with a standard desktop that they're used to, but because we're only sending keystrokes, screen shots and mouse clicks back and forth over the wire—and we have the beefy servers on the back end doing the processing rather than relying on a workstation's horsepower—improvements in performance have been significant," says Blake.

Desktop virtualization has reduced logons from minutes to seconds, which adds up to notable productivity savings across thousands of workers per year.

Improvements in security are also significant. Data resides on the powerful Dell EqualLogic storage and not on desktop hard drives, so if a client machine is stolen, no hospital or patient data goes with it.

"Desktop virtualization also cuts down on a lot of licensing costs," says Ciccolo. "For any of the software that you put on a desktop, you now have the software centralized on the server." Maintenance costs also will decrease because the third-party desktops will be maintained centrally, saving time.

Serving Patients, Serving The Community

Dell technology and services are helping BMC to increase security and performance to provide the cutting-edge systems that the state-of-the-art medical center needs to deliver exceptional care to patients. Virtualization technology is responsible for the organization's ability to lower its costs and provide those services without exception to the Boston families that depend upon the safety-net institution.

"I think Dell's a great company," says Blake. "Dell knows us and they know our pain points. They've garnered our trust. I have recommended to several other CTO's that they invite Dell to come in to look at their existing systems and examine the cost effectiveness, the speed and the increased management efficiency that Dell systems can provide. Boston Medical Center has saved a lot of money over competing systems, while being more responsive to patients."

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