



Baptist Healthcare System's VMware Virtual Infrastructure Maximizes Uptime, Flexibility and Responsiveness

Baptist Healthcare System Uses Full Line of VMware Products for Cost Savings, Ease of Management and High Performance



KEY HIGHLIGHTS

INDUSTRY: **HEALTHCARE**

CHALLENGE

Downsize hundreds of servers to reduce power consumption and simplify networking and overall management

SOLUTION

VMware virtual infrastructure provided server consolidation streamlined management, VMware ACE enabled remote desktop management

RESULTS

- Hardware savings include \$45,000 for a single application's server requirements
- Achieved 8:1 server consolidation ratio
- Decreased operational costs, including labor, maintenance, cost of space, power consumption
- Reduced server deployment time from weeks to minutes
- Increased flexibility and responsiveness to business needs
- Optimized management with VirtualCenter
- Maximized uptime with VMotion
- Streamlined networking connections with ESX Server features

"Ever since we first looked at VMware technology, each time a new product has come out, we've found a role for the software."

Tom Taylor Senior Client Server Analyst, Baptist Healthcare System

A Healthcare System's Need for Efficiency

Baptist Healthcare System (BHS) is one of the largest not-for-profit healthcare systems in Kentucky. BHS owns five acute-care hospitals with more than 1,500 licensed beds in Louisville, Lexington, Paducah, Corbin and La Grange, and manages a 300-bed acute-care hospital in Elizabethtown.

With numerous applications supporting its hospitals, BHS was constantly deploying new servers. "As a healthcare company with a large number of critical applications, we don't like running more than one application on the same server," says Tom Taylor, a senior client server analyst who works on technical infrastructure initiatives as well as application implementation. "But we were having to buy too many and the costs were too high."

Baptist Healthcare is split between two time zones, with its operations center and four facilities in the Eastern time zone, and the other facility in the Central time zone. Because most of its applications did not have built-in features to accommodate multiple time zones, BHS had to install duplicate servers.

The organization turned to server consolidation to streamline processes and conserve resources. "Like many companies, we're under a power and networking crunch," Taylor explains. "We wanted to downsize our hundreds of servers to a considerably smaller footprint to reduce power consumption and simplify networking and overall management." BHS also wanted to speed up server deployment times for quicker response to business needs. Typical server procurement time was six to eight weeks, from ordering the hardware, to installation, to configuration, to release. "That was a long time to wait to start a new project," says Taylor.

VMware Product Line Meets BHS' Needs

BHS was first impressed by the advantages of virtualization with VMware Workstation when it was introduced in 1999. "We used VMware Workstation for test and development because we were tired of having multiple machines at our desks," he says. "We knew there had to be a better way. That's how we got our feet wet with VMware virtualization technology."

When VMware introduced server products, Taylor realized the technology would address BHS' server consolidation needs. "We got GSX Server when it came out, focusing on Web development to reuse boxes for testing," he says. "In November 2003, we looked at ESX Server to go to the next level for a development platform, one that could host more machines. After a few months of experience with ESX Server, we decided it would also be a good production solution."

Taylor worked with VMware Premiere Partner New Age Technologies to deploy BHS' virtual infrastructure. New Age Technologies assisted Taylor with planning and strategy design as well as training and implementation of multiple ESX Servers and VirtualCenter. "VMware software is a key element in BHS' IT strategy, allowing them to optimize resource use, while giving them the scalability to grow," says Michael Paynter, virtualization practice manager for New Age Technologies.

According to Paynter, working with Tom Taylor and his manager Mark Bos has been a rewarding opportunity for New Age Technologies. "It has been a true partnership because they are so focused on answering the question, 'How can VMware technology help us help our end users?'"

VMware software enables BHS to consolidate computing resources by partitioning and isolating server resources in secure and portable virtual machines. "VMware software allows us to combine servers on a single physical host, while each virtual machine maintains its isolation from the others," Taylor explains. "We gain the benefits of having separate machines to meet any of our needs, but we reduce our need for physical hardware. We don't need separate servers for different applications, or different time zones; we just create new virtual machines. We also don't have to wait to order the hardware."

New Age Technologies Senior Engineer Brian Perry, a former healthcare IT manager, VCP and VMware instructor says, "If time to market were a major concern in the healthcare industry then BHS's use of virtualization would truly be the poster child. They've taken a huge amount of time out of the server provisioning process that has allowed them to focus limited resources on activities that improve patient care. That's the most important issue in all of this."

BHS has plans to use VMware's newest product – VMware ACE – to allow 50-60 employees to work from home. "We have some clerical positions that currently take up office space and other resources," Taylor says. "Allowing them to work at home would free up space for patient care. It would also provide flexibility to our employees."

"Ever since we first looked at VMware technology, each time a new product has come out, we've found a role for the software," Taylor says. "Basically, if VMware sells it, we bought it."

VMWARE VIRTUAL INFRASTRUCTURE AT WORK

- VMware Workstation on 2-CPU HP XW8000s
- GSX Server on 2-CPU HP ProLiant 380 G2
- ESX Server on 2-CPU HP ProLiant 380 G3s
- ESX Server on 4-CPU HP ProLiant 580 G2s
- VirtualCenter on 2-CPU HP ProLiant 380 G3
- Host operating systems: Microsoft® Windows® 2000, Windows 2003, Windows XP
- Guest operating systems: Windows 98, Windows 2000 Pro, Windows 2000 Server, Windows 2003, Windows XP, RedHat™
- Applications in virtual machines include: Sharepoint, IIS Web, Microsoft SQL and Citrix

Proven Results With Virtual Infrastructure

Taylor explains that the multiple benefits of VMware software include:

- **Hardware Cost Savings.** Taylor estimates a hardware savings of about \$5,000 per server, for a total savings of about \$300,000. On one application alone, BHS was able to save \$45,000 because without VMware software, BHS would have needed to buy eight servers. "That was a \$45,000 investment for one test system that we didn't have to incur because we virtualized the servers."
- **Server Consolidation.** Using VMware software, BHS achieves an average consolidation ratio of about 8:1. "It works very well," Taylor says. "In fact, during our proof of concept, we put 28 virtual machines on one 2-CPU ESX Server and ran it for two months with no problems."
- **Resource Cost Savings.** Operational costs have also decreased for BHS. "It saves money on power consumption in the server room, and it saves on contracting electricians, new cable pools and port costs on the SAN; instead of having 40, we can have two," Taylor says.
- **Time Savings.** Before using VMware software, server procurement took six to eight weeks. Now, BHS can deploy servers for testing or production in a matter of minutes.
- **Increased Flexibility.** Taylor says virtualization gives him more flexibility because he can control his resources. "For testing, I have four servers with ESX Server licenses running today," he explains. "I can have as many as 50 virtual machines set up on those servers. If we don't need to use them, we don't keep them running. For production, we have virtual machines running a variety of applications, from a third-party vendor's database to IIS Web. I am able to allocate memory, CPU, and network resources to each virtual machine according to what it needs."
- **Ease of Management.** VMware VirtualCenter gives BHS a central point of control for workload management, provisioning and availability. "We take full advantage of the technology so we can leverage our SAN storage and our network, and manage our resources," says Taylor. "It maximizes efficiencies, increasing our responsiveness to business needs."
- **Increased Uptime.** VMware VMotion technology and ESX Server features allow BHS to meet its goals of maximum uptime. "With VMotion and ESX Server, we have an abstract hardware layer so we can move virtual machines from one place to another to do hardware upgrades and other updates without having to take systems or servers down," he says. "If there is a server failure, we have a quick mediation plan to get those servers up and running because we can move resources around in our farmed environment."
- **Streamlined Networking.** BHS' ESX Server virtual machines are dual-path connected to an HP EVA SAN for virtual disk sharing. There are six NICs in the ESX Servers: one for the service console, one segmented backup network for backup traffic, one for VMotion and three NICs bonded within an ESX Server virtual switch. "We take advantage of VLAN tagging technology so we're tagging multiple VLANs to the three-NIC bond. It is a lean system."
- **Disaster Recovery.** Although BHS has more extensive plans for its disaster recovery process using VMware software, New Age Technologies has worked with the hospital system and implemented Snap Enterprise Data Replicator scripts to do automatic backups of virtual machines as they run. "Instead of restoring from tape, we were able to recover and replace a server in minutes instead of waiting hours for the restore," says Taylor.

Future Plans for VMware Software

Because of the flexibility VMware software provides, Taylor says he expects virtualization at BHS to grow ten-fold by next year. Plans include building out the disaster recovery process, implementing VMware ACE, and migrating more physical servers to virtual machines. "By the end of February, we will be supporting the lab and pathology systems in virtual machines," he says. "We used to have a well-defined line separating clinical and financial systems, but we're progressing toward having everything on one network. The maximum uptime will be valuable to the medical staff accessing clinical applications."

Taylor adds that he is constantly finding new ways to take advantage of VMware's product innovations. "We use it for all kinds of things," he says. "If a vendor needs a station or needs to come in through the VPN to do support, we create a virtual XP station for the vendor, lock it down, and they use it as their toolbox."

He also recommends that others utilize a VMware virtual infrastructure to maximize scalability. "VMware software is great," he says. "VMware keeps improving each product. It's best to keep up with all the latest products to see how it can fit into your infrastructure."

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