



KEY HIGHLIGHTS

INDUSTRY: EDUCATION

**CHALLENGE**

Develop a reliable, economical and easily managed infrastructure to run mission-critical applications, including Microsoft Exchange Server 2007

SOLUTION

Leverage the benefits of VMware Infrastructure 3 so that key computing assets—including 50,000 Exchange Server 2007 mailboxes—run on virtual, not physical, machines

VMWARE AT WORK

VMware Infrastructure 3 Enterprise, featuring:

- ESX 3.0.2
- Virtual Center 2.0.2
- VMotion
- High Availability (HA)
- Distributed Resource Scheduler (DRS)

DEPLOYMENT ENVIRONMENT

- ESX 3.0.2 running on four HP c-7000 blade enclosures with a total of 14 x BL685c 4 CPU Dual Core Servers and 64GB RAM, and 16 x BL685c 4 CPU Dual Core Servers with 32GB RAM
- Mission-critical applications running in production on virtual machines: a wide range of internally developed applications, Microsoft Exchange Server 2007, Microsoft SQL Server 2000 and 2005
- Pre-production applications: Windows Terminal Services 2008, Oracle 10i and 11 databases
- Guest operating systems: Windows 2000 Standard and Enterprise, Windows 2003 Standard and Enterprise 32 and 64 bit, Red Hat Enterprise Linux 4.0

“The university has virtualized 50,000 Exchange 2007 mailboxes on VMware Infrastructure. We not only have a more manageable and flexible Exchange environment, but we have replaced Microsoft clustering with VMware’s built-in high availability solutions such as HA and VMotion. We couldn’t be happier with the uptime and performance of our Exchange implementation on VMware. VMware technology works for small companies all the way up to massive financial institutions. And clearly, it has worked for us.”

Adrian Jane, Infrastructure and Operations Manager

The University of Plymouth

The University of Plymouth in the south west of England has developed some innovative strategies to nimbly and economically deliver the computing resources its students and faculties need for research, experimentation and communication. VMware software plays a pivotal role in that effort, including the rollout of an ambitious virtualized implementation of the university’s messaging platform, Microsoft Exchange Server 2007.

The university had been using Exchange Server 2003, but there were performance problems, including those caused by the heavy disk I/O generated by Exchange 2003. The hardware that housed Exchange 2003 was aging, providing the opportunity to replace those boxes with more powerful 64-bit machines. To further augment the University of Plymouth’s hardware and software upgrade, the university decided to incorporate VMware technology into its messaging infrastructure.

In June 2007 the University of Plymouth, which had been using VMware software for development and production applications for two years, used it to test Exchange 2007. Pleased with both Exchange 2007 and the way it ran in a virtualized environment, it began running Exchange 2007 in a virtualized production environment in September. The phased migration started out slowly, with 150, then another 500, users moved to the new system.

Buoyed by positive performance monitor reports, the migration went into overdrive. “In our previous experience with migrating from Exchange 2000 to 2003, the mailbox migrations were quite slow,” reports Adrian Jane, the university’s infrastructure and operations manager. “With the VMware implementation of Exchange 2007, we found we could move between 1,000 and 5,000 mailboxes a night. It was about ten times faster. I suspect it was a combination of the optimization in Exchange 2007, the new 64-bit hardware, VMware’s efficiency, and the new storage layer – but the overall effect was a much better experience, despite having about 2.5 times the amount of data to migrate.” The entire Exchange migration process, which was overseen by an operations administrator, an Exchange administrator/architect, and their respective managers, was complete by mid-October.

Benefits

Fast migration was just the beginning of the improvements Jane and his team have seen. "Exchange 2007 works very well under a virtualized environment, and we've seen that running 50,000 mailboxes," he says. "Exchange 2007 is much less I/O intensive than Exchange 2003, so we don't have the I/O performance problems that we had in the past."

Indeed, even more than previous versions, Exchange Server 2007 is an excellent candidate for virtualization. Besides the improved I/O performance Jane cites, the application has a multiple role architecture, which makes management and provisioning simpler. These functional server roles in Exchange 2007 are ideally suited to the benefits of an architecture based on virtual machines. With today's new 64-bit servers containing multiple processor cores and increased memory capacity, there's even more reason to use VMware virtualization software for hardware consolidation, including in the Exchange environment.

"Not only does Exchange run smoothly on virtual machines, but thanks to VMware, we now have a much simpler implementation," Jane says. Part of that simplicity comes from replacing clustering with ESX 3's High Availability (HA) and VMotion features: "We used Microsoft clustering with our physical implementation of Exchange 2003, but we now use VMware for high availability, which takes away the complexity that clustering added to our system. The VMware platform also provides high availability for every virtual machine, not just the mailbox server."

VMotion also comes in handy when Jane and his team are patching and updating the BIOS and firmware on their blade servers. "VMotion allows us to migrate a virtual machine onto another physical host, shut down that first host to perform required maintenance, all without our users knowing what's going on. If we were going to do that on a physical implementation of Exchange 2007, I'd have to go out and say, 'Sorry, there will be some downtime while we do this restart,'" Jane reports. "It makes so much difference to me that we can just get on with our work during the day, without having to inconvenience our users."

Jane says that by using VMware templates, he and his team can provision a virtual machine in about twenty minutes--as opposed to the months-long process of getting a physical machine up and running. And those virtual machines are far easier to manage than their physical counterparts. "The ability to fine-tune, to increase and decrease the resources that you give to a virtual machine is of real benefit to us," he says. "If you don't have an idea of what the performance envelope is going to be on an application, you can start with a relatively lean VM and then, if necessary, push the resources up until you find the level that the application runs best at."

For instance, with Exchange Server 2007 running in ESX 3, he and his team started off with a relatively low memory setting, and then adjusted it slightly to improve performance. "VMware technology takes away any worries that I have about having to size the system correctly right at the start," Jane adds. "We've got an environment now where we can scale up and down to meet whatever requirements come along."

"VMware software is a perfect platform for mission-critical applications like Exchange Server 2007. VMware Virtual Infrastructure has been around long enough that it's a very stable product. And when your mission-critical applications are running in VMware, they're running in a much more protected way. You have much more rapid recovery in the event of something going wrong. So for us, it was the only choice for our virtualized environment."

Adrian Jane, Infrastructure and Operations Manager

Disaster recovery is another area where the University of Plymouth has seen significant improvements thanks to VMware Virtual Infrastructure. Until recently the university's disaster recovery plan was a somewhat cumbersome process involving restoring data from tape. "We reckoned recovery would take somewhere between five days and three months," Jane explains, "depending on the scale of disaster." But now, based on tests he and his team have done, he estimates that the applications housed on the university's virtual machines would be fully operational less than an hour after a major disaster.

The university splits its VMware HA clusters, including the one running Exchange 2007, between its two data centers. "We are running things in such a way that we have spare capacity on both sides," Jane explains, "so in the event that one of our physical hosts fails, it will migrate across using the HA recovery feature. Even if an entire data center fails, operations will migrate across to the other one, and they'll have all the resources required."

The improved disaster recovery and systems management afforded by VMware's Virtual Infrastructure doesn't just give Jane and his team peace of mind, they also free up their schedules a bit. "The system manages itself," he says. "The IT team and I can get on with doing things that are much more productive for the university."

When asked what advice he has for others contemplating running key applications like Exchange 2007 on Virtual Infrastructure 3, Jane's answer is succinct: "Just go ahead and do it. It will work. It will work very well."

Results:

- Nearly 50,000 virtualized Exchange Server 2007 mailboxes
- The number of server racks reduced from 32 to 2—a 93 percent saving on floor space
- Estimated annual savings on their electricity bill of about \$90,000, saving about 170 tonnes of CO2 per year from being produced.
- Exchange Server 2007 runs better in ESX 3—and is easier to manage—than the university's previous non-virtualized Exchange implementations
- VMware's VMotion and High Availability (HA) improve resource availability and flexibility--without the complexity of Microsoft Cluster Server
- Server provisioning time cut from months to minutes
- Disaster recovery time cut from weeks or months to less than an hour
- Successes have led to a virtualization-first policy; the university hopes to have all of its systems running on VMware by summer 2008. "VMware is a strategy for us," Jane says, "not a product."

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