



## KEY HIGHLIGHTS

INDUSTRY: HEALTHCARE

**CHALLENGE**

Reverse server sprawl and reduce hardware, power, and cooling costs at an overcrowded data center; protect mission-critical applications and databases from outages and disasters; increase application availability and performance; and expand client services.

**SOLUTIONS**

Migrate applications and databases from outdated physical servers to virtual machines, thereby minimizing server procurement costs, dramatically reducing energy usage, providing reliable disaster recovery, and reallocating resources to enhance patient care.

**VMWARE AT WORK**

VMware Infrastructure 3 Enterprise, featuring:

- VMware ESX 3.5
- VMware VMotion
- VMware VCenter
- VMware High Availability (HA)
- VMware Distributed Resource Scheduler (DRS)
- VMware Converter

**DEPLOYMENT ENVIRONMENT**

- ESX 3.5 running on IBM x3850 and x366 quad-core servers with 32 GB memory and IBM x3850 M2 4 x quad-core servers with 64 GB memory
- Guest operating systems: Microsoft Windows Server 2003, Microsoft Windows Server 2000, and Linux Red Hat 5
- Virtualized applications in production: Microsoft SQL Server 2005, 200, 7, 6.5, Microsoft SharePoint Portal Server 2003, Microsoft Office SharePoint Server 2007, Microsoft BizTalk Server 2004, Visual Studio 2003, Oracle Database versions 9 and 10, Blackberry Enterprise Server, IBM Director, Vocera, and various healthcare-specific applications
- Virtualized applications in pre-production: Same as virtualized applications in production

*"IHA has advocated green IT initiatives for many years, so it was very rewarding to see the reduction in energy and power that resulted from implementing VMware virtualization technology. We were able to reduce carbon emissions and save about \$70,000 annually in energy costs alone. Add to that the cost savings from minimizing the purchase of new physical servers, and our ROI is outstanding, yet we are sacrificing nothing with regard to application performance. With VMware, green IT and enhanced application performance, availability, and reliability go hand in hand."*

Kris Jmaeff

Senior Server Analyst and Information Systems Security Specialist  
Interior Health Authority

## Interior Health Authority

Canada's Interior Health Authority (IHA) was formed in 2001, as a result of the British Columbian government's mandated merger of the 19 regional health authorities of British Columbia's Southern Interior. Today, IHA provides health services to more than 750,000 residents of southeastern British Columbia. The agency has 17,300 employees and 1,300 physicians across a network of 183 regional hospitals and offices.

As a result of the merger, all of the servers, applications, and patient data from the various regional health centers were amalgamated into one main data center in Kelowna, BC. The extraordinary server sprawl that ensued was taxing the space and resources of the main data center. "At one point, we were adding about ten servers a month to keep up with the expansion of client services," recalls Kris Jmaeff, senior server analyst and information systems security specialist at IHA. "The pace was unsustainable—there was no way that we could continue to accommodate all of those servers in our main data center. Plus, the power and cooling costs were astronomical."

IHA began investigating alternative solutions in 2005, and, by 2006, had settled on VMware virtualization technology as the best solution for the storage crisis. "We tested the three major competitors in the market at the time, which were VMware, Microsoft, and Xen, and we decided that VMware provided the most solid solution. With VMotion and all of the other management tools, along with outstanding customer support, VMware was clearly the way to go," says Jmaeff.

### Phasing in Virtualization

Phase one of IHA's virtualization project focused on 60 older physical servers that were out of warranty and needed to be updated. All 60 servers, along with the applications and data they housed, were moved to a cluster of six VMware ESX servers. According to Jmaeff, there was initial resistance to virtualization at first: "Three and half years ago, virtualization was still relatively new, and we had to convince our directors and analysts that the technology was safe and reliable and that it could actually improve application performance and availability." Jmaeff and his team proved that and much more. "Everyone was very pleased with the initial roll-out. Application performance and availability was better than ever, and we experienced absolutely no downtime. By the time we were ready to implement phase two, everyone was on board."

Perhaps most convincing were the dramatic energy and cost savings that virtualization afforded IHA. Jmaeff continues, "IHA has advocated green IT initiatives for many years, so it was very rewarding to see the reduction in energy and power that resulted from implementing VMware virtualization technology. We were able to reduce carbon emissions and save about \$70,000 annually in energy costs alone. Add to that the cost savings from minimizing the purchase of new physical servers, and our ROI is outstanding - yet we are sacrificing nothing with regard to application performance. With VMware, green IT and enhanced application performance, availability, and reliability go hand in hand."

IHA is currently implementing phase two of its virtualization project, which involves the progressive virtualization of the remaining physical servers as their warranties expire, as well as virtualizing all new servers unless it is proven that a particular server needs to be physical. "We currently have roughly 500 total servers, 250 of which are virtual—so about 50%. Going forward, there will be more physical to virtual conversions and more new projects. We are targeting 75% virtualization by the end of 2010, and that percentage will keep growing," says Jmaeff.

### Virtualizing Critical Applications

IHA has virtualized hundreds of its applications, including many mission-critical applications, such as Microsoft SQL Server 6.5, 7, 200, 2005 and Oracle Database versions 9 and 10. "Microsoft SQL Server is running on 30 virtual machines, with databases ranging in size from 10 GB to over 150 GB. Performance and availability have been outstanding, which is essential, because SQL is critical to our day-to-day operations. Our virtualized Oracle databases are average-sized, up to 70 GB, and are also running flawlessly. Our scheduling software and many of our surgical applications are connected to these databases, so it really is imperative that they are up and running 24 x 7. The handful of times that we have encountered problems and have needed to contact Oracle for support, we have had absolutely no issues," remarks Jmaeff.

IHA's most recent virtualization project was the virtualization of Blackberry Enterprise Server version 4.1. Jmaeff explains, "We used VMware Converter to perform the Blackberry migration. We have approximately 200 Blackberry users, and none of them experienced any disruption or downtime during the conversion. Everything is completely transparent to the end-user, similar to when we perform upgrades and install patches. VMware Infrastructure's conversion tools and cloning capabilities make conversions and upgrades fast and easy."

Another application that was recently upgraded is Vocera 4.1, the communications system used by IHA's nursing staff. The Vocera Communications System consists of a clip-on wireless communications badge, as well as VoIP and speech-recognition software. According to Jmaeff, "Vocera is a very important application, because the nurses rely on it for communication. The Vocera badge enables the nurses to quickly and easily communicate with other

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Kris Jmaeff

Senior Server Analyst and Information Systems Security Specialist

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hospital staff within a networked facility. When we upgraded the Vocera software, we made a virtual clone, tested it, and then rolled out the upgrade with very little impact to the users. If the Vocera system was to go down and the nurses were to lose communication, there could be serious problems, particularly in Emergency and ICU. VMware virtualization technology allows us to relax and rest assured that upgrades will go smoothly.”

Other critical applications that IHA is running in its virtual environment include Microsoft Office SharePoint Server, Microsoft BizTalk Server 2004, web applications, video conferencing software, as well as various healthcare-specific applications. “Our virtualized health applications include InfoMed, Hedgehog public health officer software, OPS manager scheduling software, Aperio ScanScope, which is a microscope slide database repository system; and many smaller medical applications, such as specific applications used by audiologists or transplant surgeons” says Jmaeff. “There is no application, no matter how complex or mission-critical, that I would not feel 100% comfortable deploying on VMware.”

### Recovering from Mishaps and Disasters

Since implementing virtualization nearly three years ago, Jmaeff has had the opportunity to experience the many benefits and features of VMware Infrastructure first-hand, although not always in the best of situations. Jmaeff describes two such occasions: “One time, a daughterboard on the motherboard of a server went down. Another time, there was a power outage on one of the circuits. In both cases, VMware HA kicked in, and the virtual machines were immediately brought up in another part of the cluster. If the servers had been physical, they would have stayed down until the server was repaired or replaced in the first case or the power was restored in the second case. Thanks to HA, the failover was seamless, all our applications were back up in minutes, and the users didn’t even notice.”

As for disaster recovery, IHA runs its 250 virtual machines in two fully redundant data centers—the main data center in Kelowna, BC, and a secondary data center in Kamloops, BC. “Both data centers have EMC Symmetrix SANs, and we are also planning to have a cluster of virtual servers in Kamloops as backup and to bring up the most important servers in the event of a disaster. Our applications are fully protected, and we can continue to provide patient care in case of a disaster,” explains Jmaeff. IHA also has Windows host-based tape backup of their servers as a third line of defense.

### Looking toward a Greener Future

As IHA continues to migrate its physical servers to virtual machines, virtualization’s impact on energy consumption and carbon emissions will become increasingly profound. Major projects, such as the partial virtualization of MEDITECH, IHA’s core hospital information system, will further strengthen this impact. “Over the next three years, we will be upgrading our MEDITECH system. A great deal of the applications will be migrated to virtual machines.” Jmaeff predicts that IHA will continue to virtualize its IT environment indefinitely: “As the technology improves, there should be no reason not to virtualize everything.”

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## Results

- Virtualized mission-critical software, including Microsoft SQL Server and Oracle Database, while increasing performance and reliability
- Performed conversions and upgrades quickly and easily with no disruption to users
- Experienced zero downtime with applications by implementing features such as HA and DRS
- Virtualized 250 of 500 servers, with a target of 375 virtual machines by the end of 2010
- Achieved 85 percent power savings and 93 percent reduction in cooling, resulting in \$70,000 annual savings
- Considerably reduced carbon emission
- Expanded computing capacity without increasing footprint

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