

# University of British Columbia



**INFORMATION TECHNOLOGY**  
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*“When I talk to people about VMware virtualization, I tell them ‘don’t believe everything you think.’ We’re proving here at UBC that VMware is very viable. It works in production environments, it works for Oracle database servers, and everywhere in-between. VMware technology lets you architect a very reliable, very dynamic solution to your computing needs.”*

– Michael Thorson,  
Director of Infrastructure,  
University of British Columbia

#### KEY BENEFITS

##### Challenge

Twenty years after decentralizing its IT infrastructure, the University of British Columbia wanted to gain better control of its server management and costs.

##### Solution

A VMware virtualized server environment, configured for optimal Oracle performance by House of Brick Technologies, enables a more responsive model for offering IT services, helping to drive acceptance of centralized IT.

- UBC on pace to achieve 100 percent virtualization
- Virtualized environment encompasses both applications servers and Oracle database servers

##### Results

- Hardware maintenance costs reduced by up to \$300,000 per year
- IT has tripled the number of servers within its existing data center space
- Provisioning times reduced from 3-6 months to 15 minutes
- Departments can provision multiple virtual servers for the same cost as a single physical system

## Virtualizing Oracle Database Servers Readies University of British Columbia to Achieve Infrastructure Goals

### VMware Virtualized Infrastructure, with Best-Practice Configuration from House of Brick, Leverages NetApp Storage to Provide Flexibility and Increased Efficiency

Around twenty years ago, the University of British Columbia (UBC) decided to decentralize their IT.

At first, University staff loved having their department-level control of its IT systems. Faculties and departments are beginning to realize that managing their own IT infrastructure can be costly. Faculties are focused on academic and research priorities.

The University had other concerns about its IT infrastructure as well. In the decentralized model, hundreds, if not thousands of physical servers were deployed across the UBC campus—a hodgepodge of nearly every possible hardware brand and operating system. The central IT organization, meanwhile, operating as a for-profit IT services provider, was managing over 350 physical servers for the services they were providing and for a few of the other faculties and departments. Because everyone had their own business drivers, it was nearly impossible to keep things patched and up-to-date. Even for Central IT, it was difficult to keep the physical hardware up-to-date, because the decentralized focus was on delivering new solutions, not necessarily updating systems/solutions preciously deployed.

The only answer for Central IT was to bring the University’s IT systems back under a collaborative control. But as long as central IT couldn’t offer UBC departments cost-efficient, customer-centric IT services, the faculties and departments were reluctant to give up control of their servers.

What Central IT needed was a way to provide a responsive, customer focused, and cost effective solution for the University’s computing needs.

So UBC’s IT organization implemented a VMware virtualized server environment, starting with its applications layer but now, with the help of services from House of Brick Technologies, encompassing its Oracle database servers as well. This infrastructure, in turn, allows IT to offer services that are compelling and cost effective, thereby encouraging a shift back to a more centralized—and manageable—IT architecture.

### Inviting Departments to Virtualize

Virtualization is, of course, a technology that can transform the way IT is deployed and consumed. But at UBC, the transformation began not with technology, but with a top-down reset of the IT organization itself.

In 2006, the University, concerned about the state of its server infrastructure, decided the IT department would no longer operate as a for-profit organization. Instead, it would

## VMWARE AT WORK

**VMware vSphere™ 4.0**

- VMware ESX® 4.0

**VMware View™ 4.5**

## DEPLOYMENT ENVIRONMENT

**Primary application**

- VMware vSphere virtual server infrastructure

**Primary hardware**

- HP ProLiant BL 490c G6 Blade Servers
- NetApp Storage Area Network

**Primary software**

- Microsoft Exchange 2007
  - 7000 mailboxes
- Oracle PeopleSoft
- Student information systems
- Library management systems
- Various teaching/learning applications
- Linux RedHat
- NetApp SnapManager
- Oracle Real Application Testing software
- Oracle Swingbench

function as an auxiliary IT service provider, tasked with devising an IT services model that would benefit the University as a whole.

Key members of the IT department were already intrigued by VMware technology. “We had attended conferences and VMware presentations, and had talked to other organizations that had started down the virtualization path,” explains Michael Thorson, Director of Infrastructure within UBC IT.

Now that the IT group’s mandate had been shifted, it began to explore VMware as an enabling technology. “We wrote a business case proposing to invite departments to replace their physical systems with centrally-managed virtual machines,” Thorson says.

The University approved the plan, and IT began replacing legacy applications servers with a VMware vSphere environment.

## Improved Capacity, Faster Provisioning—and Lower Cost Servers

VMware virtualization immediately solved a number of problems that had hampered the IT group in the past. Some were based on space constraints. The University’s data center is 40 years old. It was running out of space and electrical capacity. But because multiple VMware virtualized machines can reside on a single physical host, virtualizing gave the IT department additional capacity within its existing space. This meant it could accommodate departments’ requests for new servers without the expense of building out a new physical facility.

The IT department can also provision new servers more quickly. “It used to take three months or more to provision a server, mostly because we were so short on space,” Thorson says. “We’d have to wait for a server to die before we could add a new one.” With the VMware environment, IT can provision a new server in about 15 minutes.

The VMware environment is more reliable. Part of this is due to the inherent characteristics of VMware technology itself. Should a piece of hardware fail, for instance, VMware automatically rolls any virtual servers affected by the failure onto another server. Users are less likely to experience server outages, or even notice if there are any. In addition, when the IT group provisions new servers, it connects them to NetApp storage. Back-ups (snapshots) of server data are mirrored in two locations, lowering the risk of data loss.

Each of these benefits of VMware technology, in turn, allows UBC’s IT group to better meet the needs of the University’s technology users—and to top it off, the IT organization can also offer virtual machines inexpensively. This gives departments a way to greatly reduce their IT costs. “Instead of budgeting \$15,000 for a single server, our customers can use the money to buy multiple servers,” Thorson says. “They can deploy additional production servers for redundancy, or a development environment. They get much more value for their money.”

Needless to say, offering inexpensive servers, super-fast provisioning, and reliability has sparked growing demand for UBC’s IT services. “Our first year, we provisioned 100 virtual servers,” notes Lois Cumming, Systems Administrator, UBC. “The second year we provisioned 200.”

The year after that, the number of virtual servers nearly doubled again. There are over 1,000 virtual servers in the UBC infrastructure today.

The University is also exploring desktop virtualization. It has rolled out a pilot of VMware View virtualized desktops, with plans to implement around 1,000 a year, including 800 kiosks for student use.

## Virtualizing Oracle Database Servers

Although the department was making good progress in virtualizing its lower-level workloads, it hit a speed bump when it came to the University's 150 Oracle database servers. These were running on aging Sun SPARC servers that were becoming increasingly expensive to maintain. Some were so old, in fact, that Sun could no longer guarantee availability of replacement parts.

To achieve its goal of 100 percent virtualization, the UBC IT department needed to redeploy its Oracle servers as virtualized systems. But first, it had to verify that the databases could be successfully ported from the SPARC environment to the data center's VMware platform, which is hosted on Intel-based HP Blade Servers running Linux. In addition, it wanted to know if it could leverage its existing NetApp SnapManager tool within the virtualized environment.

UBC didn't have the expertise and resources to perform a proof of concept itself, so it engaged with VMware Professional Services and VMware partner House of Brick to help it develop and validate a methodology for porting its SPARC databases to Oracle. "Our House of Brick consultants provided an invaluable service in answering key questions about how we could architect a virtual environment," notes Thorson.

To address the question about porting Oracle databases from SPARC to VMware, House of Brick evaluated a half dozen available tools, comparing attributes such as price, complexity, and how much downtime would be required to perform a data stream. The consultants also ran a proof of concept on one of the tools so that UBC could more fully understand its capabilities. In the end, UBC used the information as the basis for its decision to use an Oracle utility for the data migration.

House of Brick also broke new ground in understanding how well VMware virtual server environments integrate with NetApp storage. "We determined that it is possible to present a NetApp Network File System directly to a VMware virtualized guest," explains Jim Ogborn, VP, Client Services, House of Brick. "We now consider this to be a valid best practice within VMware virtualized environments."

First, the House of Brick findings validated that UBC can continue to use a Network File System (NFS) protocol for capturing on-the-fly Oracle database snapshots, as well as self-service restores and cloning operations. "We favor the NFS protocol because it lets us grow or shrink storage volumes dynamically without service interruptions," Cumming explains. "It's also easy to repoint storage from one virtual machine or server to another. And it's a protocol that has been around for a long time. It's well-understood. When House of Brick determined that we can use NFS with our VMware environment, it removed a potential obstacle to virtualizing our Oracle databases."

Perhaps more important, the ability to leverage the NFS protocol means the University's Oracle databases can be restored on physical servers if required—for example, to help with troubleshooting. For UBC database administrators, that provided an extra measure of security about virtualization. "Many of our Oracle databases are mission-critical components of our HR and student information systems," Cumming notes. "Understandably, our database administrators are risk-averse. With the help of House of Brick we showed that we can return to a physical environment if they are not happy with their database performance under VMware."

With its uncertainties about virtualizing Oracle databases put to rest, UBC is now on track to achieve its virtualization goals—as well as the broader organizational goal of encouraging a recentralization of its IT infrastructure. Some of these are straight cost-savings. The University will reduce its maintenance costs by up to \$300,000 per year once it has virtualized its last 150 Oracle database servers, for instance.

The University's relationship with House of Brick Technologies also paid off in another area. UBC's e-learning environment had been experiencing stability issues. House of Brick correctly determined that the issues could be resolved by moving the environment from a legacy physical platform to a virtualized one running a new version of Linux RedHat. With the help of the House of Brick consultants, UBC redeployed its e-learning applications under the VMware, and the applications became more stable.

Embracing virtualization technology has also delivered a number of intangible benefits to the university. "We've made it easy for our customers to order servers and select from our IT services," Thorson says. "VMware technology lets us operate as a cloud-based IT service provider. And it has helped us earn people's trust. They see the services we can offer and our rock-bottom prices, and they realize they can really benefit from the changes we've made to our University infrastructure."

