



Australian Bureau of Statistics Crunches Numbers on Virtualization

Government agency eyes desktop virtualization following server project



KEY HIGHLIGHTS

INDUSTRY: PUBLIC SECTOR

CHALLENGE

Deploy a flexible, robust and reliable infrastructure that supports expanding business requirements.

SOLUTION

VMware virtualization reduced datacenter costs while enhancing manageability and performance.

VMWARE AT WORK

- VMware Infrastructure 3, featuring:
 - ESX 3.5
 - VMotion
 - Distributed Resource Scheduler (DRS)
 - High Availability (HA)
- VDI
- ACE

RESULTS

- No unplanned downtime
- Reduced staff from 30 to 20 by natural attrition and rotation
- Achieved a server consolidation ratio of 3:1
- Cut business waiting time for access to testing servers from two months to one day
- Enabled removal of a A\$140,000 per year third party server maintenance contract

“Deploying VMware has enabled us to eliminate the two-month delays that our business clients often experienced before gaining access to a piece of testing hardware, while ensuring we can optimize performance for databases and applications.”

Tony Marion, Director of Servers, Operating Systems and Storage
Australian Bureau of Statistics

Managing a sprawling infrastructure

First established in 1905 as the Commonwealth Bureau of Census and Statistics, the Australian Bureau of Statistics (ABS) operates within the Treasury portfolio. The agency provides statistics on the economy, industry, environment and energy, people and regional areas. These figures span government, business and the community. The ABS also leads and coordinates the statistical activities of other official bodies in Australia and overseas.

The ABS supports 3,000 employees and its external partners through eight datacenters—one primary facility and one in each state office.

By 2004, demand from internal ABS clients was requiring the agency’s servers, operating systems and storage unit to operate an infrastructure incorporating 360 servers, most using direct attached storage, as well as tape backup.

ABS kicks off with GSX Server

“Managing that infrastructure was pretty labor-intensive,” said Tony Marion, Director of Servers, Operating Systems and Storage at the ABS. “To reduce the load in the short term, we purchased some system management tools and a storage area network that we pointed to an existing deployment of VMware GSX Server.”

The ABS had already implemented GSX Server as a point solution to run IBM Lotus Sametime and IBM Lotus Domino at the host level in Microsoft Windows without purchasing new hardware.

“Because the ABS was running incompatible versions, these applications would not run on a single physical server. We did not want to purchase additional hardware in our regional offices so we decided to use GSX to create partitioned virtual machines,” said Marion. “These virtual machines enabled the applications to run seamlessly without requiring us to increase our investment.”

Having adopted a low-key start to virtualization, the ABS then decided to ramp up its investment. On March 1, 2005, the ABS installed an ESX 2.5 environment on four to six physical hosts to support test and development.

“We found we could get better and more robust performance from ESX,” said Marion. “Also, rather than waiting up to two months for programmers to access scarce hardware resources, clients found they could get an application into a testing environment within a day.”

This relatively small ESX 2.5 deployment paved the way for the ABS to implement virtualization across its production infrastructure.

“We used our experience with ESX 2.5 to plan our production environment,” said Marion. This included installing storage and servers that optimized the performance, flexibility and efficiency that VMware could deliver.

“We went into production with our eyes wide open and ensured our environment was tailored to virtualization,” he said. “This included being a beta site for ESX 3.0, which enabled us to see that the new version combined the agility benefits of 2.5 with a new level of performance and availability.

“We faced some skepticism from our clients that virtualization really was beneficial,” said Marion. “We spent a long time—about 12 months—with ESX 2.5 really learning about the technology and perfecting the procedures for going into a production environment.

“All in all, we were a lot more thorough than a number of other organizations and this ensured that when we went down the path we did, we had the right procedures and methodology in place.”

High Availability critical to success

VMware High Availability—a utility that monitors all physical servers in a resource pool and restarts virtual machines impacted by server failure—played a key role in securing user acceptance.

The feature has also delivered substantial cost savings. “We used to use a third party to give us a four-hour maintenance response and 24-hour turnaround on physical servers,” said Marion. “We’ve just dropped that down to inherent warranty.

“That is probably a 10 percent saving per physical server for us, or A\$140,000 per year in total maintenance costs.”

DEPLOYMENT ENVIRONMENT

- ESX on HP DL580 G5 servers with quad-core, quad-socket 2.93GHz Intel Xeon processors each with 128GB RAM
- ESX on HP ProLiant DL585 G2 servers with four-way, dual-core AMD Opteron processors each with 64GB RAM
- HP EVA8000 series SANs
- Guest operating systems: Microsoft Windows Server 2003, Microsoft Windows Server 2008, SuSE Linux
- Virtualized production applications: IBM Domino, Spacetime Research statistical product (Superstar), SAS statistical product, Oracle Database 10g, and several homegrown in-house applications

V2P guarantee

Marion said one of the ABS' major tests internally was to ensure that virtualized applications recorded at least 90 percent of the performance they achieved in a physical environment.

The organization would benchmark an application on server hardware before migrating it across to the virtualized infrastructure

"We guaranteed to our clients that, in the event of a problem, we would shift the application back to a physical server within a day," said Marion.

ABS leads the way with ESX 3.0

The hard work paid off on June 1, 2006 when the ABS became the first site in Australia to deploy ESX 3.0 in production.

"We installed ESX 3.0 in a planned rollout that started with the purchase of a new HP EVA 8000 storage area network (SAN) and four dedicated HP ProLiant DL585 G2 servers with four-way, dual-core AMD Opteron processors and 64GB RAM," said Marion. "Over time, we ramped this infrastructure up to two clusters of six DL585 servers, each linked to a dedicated SAN environment."

The ABS has adopted a tiered architecture whereby prime applications run in a virtualized infrastructure on a cluster of four to six of the organization's newest and most powerful servers. Second-tier applications are hosted on clusters of the ABS' next-best servers, and so on.

Marion conceded that despite the extensive planning, the ABS underestimated its ability to roll out ESX 3.0 quickly and the speed at which benefits could accrue to the organization.

"We had to ramp up the deployment to meet demand," he said.

ABS takes another step forward with ESX 3.5

The ABS elected to migrate its production, test and development environments to ESX 3.5 just before Christmas 2007 to exploit newer features and improve performance.

"We have a benchmark for our Oracle database that yielded an 18 percent improvement in an ESX 3.5 environment over our ESX 3.0 environment," said Marion.

The ABS' status as a beta site allows Marion and his staff to look closely at the latest VMware product features that could help the agency move forward.

"We've spoken to some of their American developers and they're very interested in our experience with the beta trials, what the direction of our business is and how we benefit from certain features in the products," Marion said. "We always tie our discussions with them to how we can take our business forward and make us more efficient."

The ABS is now running two production clusters of HP DL580 G5

servers with quad-core, quad-socket 2.93GHz Intel Xeon processors, with the DL585s now moved into a second-tier production cluster. A third-tier cluster is being used for test and development, as well as testing of desktop virtualization.

Simplicity reduces staff costs

The deployment of ESX has played a role in allowing the ABS to reduce staff numbers in its servers, operating systems and storage division from 30 to 20 over the 18 months to September 2008. This reduction has occurred through rotation and attrition as the environment becomes easier to manage.

“We strive for simplicity and performance in our operation,” said Marion. “We have achieved this by reducing the numbers and types of physical servers in our datacenters and being able to manage our infrastructure as a single entity.”

The ABS is currently consolidating those applications run in a Unix mid-range Sun Solaris operating environment to a single ESX environment running the Microsoft Windows operating system.

“ESX has given us high availability in a Windows x-series environment, which has not been available in the past,” said Marion. “We have historically run our very critical applications using Unix. Now we have surety that the business can run 24x7 in an exclusively Windows-based environment.”

The ABS is now running its entire file serving needs on three virtual machines, down from three four-way dedicated servers.

“The new environment is a lot more reliable with less downtime,” said Marion. “While we have not significantly reduced our electricity consumption as the newer servers consume more power than older hardware and we have increased our storage capacity by about 700 percent during the period, we have managed to reduce our datacenter real estate and rack space requirement.”

Most applications virtualized

Since 2006, the ABS has converted most of its existing applications to a virtualized environment and

deployed new applications within VMware under a ‘virtualize first’ policy.

Existing servers are being virtualized as they reach end of life. Overall, physical server numbers are down from 360 to 156, including 76 ESX hosts supporting about 950 virtual machines.

A further 60 physical servers—down from a peak of 100—are scheduled to be decommissioned when the ABS’ existing gateway is shut down at the end of 2008.

“The gateway is our demilitarized zone that hosts our Web site and number of applications that support it,” said Marion. “It is where we release our consumer price index data and so on, so it is very important it remains active.

By virtualizing the infrastructure supporting the gateway, the ABS can now ensure that it can conduct full testing and development of an application before it goes into production. Previously, the physical environment was too large to be duplicated for user or infrastructure testing.

“We could undertake testing, but we still sometimes experienced surprises when an application went into production,” said Marion.

“Now we have a test environment that is an exact duplicate of our production gateway environment, so we can eliminate a lot of uncertainty when it comes to the behavior of applications in the gateway. In addition, if we want to change the production environment, we retain a complete copy in our test environment that we can roll back to in the event of a problem.”

VDI planning underway

Each ABS state office has had its server infrastructure consolidated from four servers to two hosts running a virtualized environment and “mini-SAN” storage. However, Marion and his team do not plan to stop there.

“Our long-term plan is to adopt a thin client model using VMware Virtual Desktop Infrastructure across our 1,600 state office users,” said Marion. “This again goes to improving performance and increasing the simplicity of our environment.

"If we deploy desktops without an operating system, we can dramatically reduce the administration task. For users, if one device fails, they can just walk over to the storage cupboard and get another one, while if a virtual machine fails, they can just restart and another virtual machine kicks in."

Remote access already enabled

VMware is already enabling remote access at the ABS through the ACE product. The ABS has deployed about 100 USB keys to a range of staff, including the head of the organization.

Staff can access a virtual desktop environment using a USB key storing a standard ABS VPN client, remote desktop client and cut-down version of Windows XP.

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