



CASE STUDY

DATA CENTRE CONSOLIDATION AND VIRTUALIZATION ACCOMMODATION AND REAL ESTATE SERVICES

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Data Centre Consolidation and Virtualization Accommodation and Real Estate Services

EXECUTIVE SUMMARY

Accommodation and Real Estate Services (ARES) is a division of Shared Services BC within the Ministry of Citizens' Services. ARES provides accommodation and real estate services to government ministries and broader public sector customers.

MYRA has delivered Technology Infrastructure Management Services (TIMS) to ARES since 1996, continually achieving 99.9% availability for all critical servers. The IT environment is comprised of 105 Windows and UNIX servers. MYRA supported a four VMware ESX server farm, and several application servers for over 400 users at eight sites province-wide. The UNIX servers support five Oracle applications as well as Cognos Data Warehousing services.

Beginning in March 2006, MYRA and ARES launched a server consolidation and virtualization initiative that increased the total number of servers from 44 to 105 as of February 2008, while reducing physical servers from 44 to 24. This was achieved at no increase in cost to ARES.

This growth in the number of servers is due to Cornerstone Project, which was intended to replace the existing applications with a product from Tririga.

The table below summarizes the savings in hardware and energy consumption:

	March 2006	February 2008
Hardware		
Server Total	44	105 (138% increase)
Physical Servers	44 physical	24 physical (81 virtual)
Server Racks	10 (2 for disk)	5
Future capacity	Very limited to none	"Virtually" unlimited with some planning
Facilities		
Power consumption	34.52 KVA	17.3 KVA (49.9% saving)
Air Conditioning	2 ton and 5 ton units had reached capacity	5 ton unit required
Equipment weight	7,721 lbs	6,345 lbs (1376 lbs less)



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BACKGROUND

ORIGINAL SITUATION

- 44 Physical servers, many at/approaching end of life
- no growth capacity in physical space
- server room at upper limits for air conditioning capabilities and space, over capacity for weight (already resorting to wall mounted racks)

CATALYSTS FOR CHANGE

- server maintenance costs skyrocketing as technology reaching end of life
- corporation downsizing, yet business application requirements increasing
- urgent business requirement for new application needing 33 additional servers
- current physical capacities already surpassed limits

SOLUTION

GOALS

- consolidate servers
- provide DEV/TEST/PROD environments for specific applications
- ability to move operating systems without user impact
- provide an environment that supports both Solaris and Intel servers
- standardize technology to reduce maintenance and support costs
- provide scalable solutions for future business needs
- redeploy retired servers for disaster recovery infrastructure

SCOPE

- solutions must combine Windows and UNIX environment requirements
- hardware solution must complement multi threading in application design

APPROACH

1. Evaluate possible solutions, costs and benefits
2. Identify natural progressions (e.g. Solaris 10 on UNIX boxes) and existing vendor (MYRA) expertise, then examine parallel solutions
3. Compare to alternative vendor solutions for new application environment
4. Pick solution, present purchase justification
5. Implement in stages over a year

KEY ELEMENTS OF SOLUTION

- VMware and Solaris 10 Containers
- Reduce number of physical servers by two-thirds by implementing virtual servers and leveraging global software platforms



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PROCESS

PROJECT PLAN (TASKS, TIMELINES, RESOURCES)

- upgrade all Windows Servers to 2003
- consolidate on VMware under ESX virtual servers
- upgrade all Solaris servers to Solaris 10 and utilize container functionality
- procure T2000 for new application install and build over period of one year

CHALLENGES AND MITIGATIONS

Challenge	Mitigation
Learning curve for staff implementing and supporting new technologies, such as: <ul style="list-style-type: none"> • Running different subnets from one server • Understanding resource allocation (memory and processors) • Understanding new network configurations • Overcoming configuration challenges for DMZ servers 	Ensure staff receive adequate training before implementation. Include time for earning certifications where appropriate. Obtain demo copies of software for hands on experience prior and during implementation.
Adopting a new methodology for server support which requires a change in stakeholders' expectations on server management	Conduct workshops with IS department to develop and document a common understanding of virtual servers, how to manage them and impacts on their applications and usage.
Getting buy in from stakeholders	Provide comparative costs (including lifecycle costs) of recommended solution to alternative vendor solutions.
Planning for storage	Perform benchmarking of protocols, performance and comparative costs.
Planning for consolidation of services to minimize the number of servers	Where beneficial and without impact, amalgamating services on one server, e.g. WebTracker web monitoring, secondary domain controller services and other services reside on same host.
Determining how backup works and defining rollback strategies	Physical servers were left intact until such time as the virtual instance was deemed to be stable and exactly as it was prior to virtualization. Snap technology was utilized to perform restores later.
Determining how to minimize work involved in each migration	Templates were designed to develop a somewhat cookie cutter approach to installs on virtual, Solaris were built but hand, but a portion of the build could be scripted.



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OUTCOMES

NEW ENVIRONMENT (AS OF FEBRUARY 2008)

- New hardware configuration
 - 5 Sun T2000s
 - 1 M4000
 - 1 M5000
 - 2 Sun V440
 - 1 Sun 280R
 - 4 HP DL380 G3's
 - 4 HP DL580 G3's
 - 2 Nokia Firewall appliances
 - 3 NetApp Disk Filers
 - 1 E3500 server
 - Total: 24 physical servers plus 81 virtual servers
 - 105 servers (net increase of 61 servers since March 2006)
- Dramatic reduction in space, costs and labour
- Easier and dynamic reallocation and sharing of server resources, including for disaster recovery and standard maintenance cycle
- Servers do not require permanent homes; can be moved to another virtual ESX server with simple drag and drop using V-Motion (with no down time required)
- Linux OS reduces need for patches on the host
- Virtual elimination of server-specific memory and processing upgrades as resource balancing and future capacity requirements increase (share other virtual servers' surplus)
- Capacity planning simplified
- Taxpayer received benefit of 15 usable servers diverted free of charge to fill another ministry need, and 8 servers were redeployed in-house for DRP



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SAVINGS

	March 2006	March 2007	February 2008
Hardware			
Server Total	44	73	105 (138% increase since 2006)
Physical Servers	44 physical	19 physical (54 virtual)	24 physical (81 virtual)
Server Racks	10 (2 for disk)	5 - down 50% (2 for disk)	5
Technology	Dated, end-of-life	Up-to-date	Up-to-date
Future capacity	Very limited to none	"virtually" unlimited with some planning	"virtually" unlimited with some planning
Facilities			
Power consumption	34.52 KVA	16.2 KVA (down 53%)	17.3 KVA (49.9% since March 2006)
Equipment weight	7,721 lbs	5,622 lbs (down 27.2% or one ton)	6,344 lbs
Air Conditioning	2 ton and 5 ton units had reached capacity	Only the 5 ton unit is required	5 ton unit required
Performance			
Efficiency	Older slower technology	Processor chip provisions multiple channels and facilitates efficiencies	Processor chip provisions multiple channels and facilitates efficiencies
Shared Resources	Minimal to 0	Servers share CPU and Memory reducing requirements to purchase additional.	Servers share CPU and Memory reducing requirements to purchase additional.
Software			
O/S Scalability	None	Solaris 10 provides container functionality	Solaris 10 provides container functionality
		VMware allows UNIX and Windows "servers" to run Windows.	VMware allows UNIX and Windows "servers" to run Windows.
Maintenance			
Patch maintenance	Required impact analysis by server	Patches are applied in global zone and are applicable to all servers per T2000 server	Patches are applied in global zone and are applicable to all servers per T2000 server
	Higher degree of security risk if something missed Labour requirements higher	ESX virtual guests all W2003, allowing easier updates using GUI ESX from mgmt console however windows servers do need to have the MS patches applied.	ESX virtual guests all W2003, allowing easier updates using GUI ESX from mgmt console however windows servers do need to have the MS patches applied.



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GLOSSARY & VENDOR INFORMATION

VMWARE ESX SERVER:

- A virtual infrastructure for partitioning, consolidating and managing systems in mission-critical environments

HOST OPERATING SYSTEM:

- OS platforms on which you can install VM software

GUEST OPERATING SYSTEM:

- OS on which the virtual servers can run

VIRTUALIZATION:

- Virtualization is an abstraction layer that allows multiple virtual machines, with heterogeneous operating systems to run in isolation, side-by-side on the same physical machine. By decoupling the physical hardware from the operating system, virtualization allows you to:
 - Run multiple virtual machines with heterogeneous operating systems at the same time on the same physical machine
 - Create fully configured isolated virtual machines with their own set of virtual hardware to run an operating system and applications
 - Rapidly save, copy and provision virtual machines that can be moved from one physical server to another for workload consolidation and zero downtime maintenance

Vendor Information: <http://vmware.com/virtualization/>

SERVER CONSOLIDATION:

- Today's IT organizations face the costly management of server sprawl. This includes the hardware, maintenance and people resources needed to manage, operate and administer those servers on a daily basis. VMware server consolidation and containment solutions allow enterprises to enable workload isolation and granular resource control for all of the system's computing and I/O resources.
- Using virtual infrastructure to consolidate physical systems in the data centre, enterprises gain:
 - Lower total cost of ownership of servers
 - Higher server utilization
 - Increased operational efficiency



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USING CONTAINERS

- With the escalating costs of managing vast networks of servers and software components, attention is shifting towards finding new ways to reduce IT infrastructure costs and better manage end-user service levels. While server consolidation and virtualization techniques help by enabling systems within data centres to be visualized and managed as interconnected computing resources rather than as individual systems, better ways must be found to provision applications and ensure shared resources are not compromised. For these resource management techniques to be effective, companies must be able to manage their applications.
 - System resources can be allocated where business need is greatest
 - Maximize resource utilization by managing applications independently, as if they are running on a dedicated system
 - Lower administrative costs by safely combining multiple applications on a single system
 - Reduce conflicts between applications running on the same system by isolating them from one another
 - Combine containers and predictive self-healing to minimize fault propagation and unplanned downtime
 - Enhance security by preventing unauthorized access and unintended intrusions

Vendor Information: <http://www.sun.com/software/solaris/ds/containers.jsp>