

Server Consolidation and Containment

With Virtual Infrastructure

Computing Challenges Today

To meet the constant demand to deploy, maintain and grow a broad array of services and applications, IT organizations must continually add new servers. However, as a consequence of purchasing more and more servers, organizations face a growing server sprawl presenting challenges that include:

- **Rising costs.** In addition to the expense of adding new servers, organizations face the added costs associated with increasing hardware—rising costs for power, cooling, network infrastructure, storage infrastructure, server administration, data center upgrades and new data centers.
- **Poor return on investment.** The common practice of dedicating a single server to each x86 application and sizing it for peak loads has led to severe underutilization of server assets in most data centers. IDC estimates that there is currently more than \$140 billion in server overcapacity, or a three-year supply of server capacity.² While servers typically run at 5-15% CPU utilization, traditional business process and technology limitations make it difficult to improve these utilization rates.
- **Decreasing manageability.** Managing servers becomes increasingly difficult as the number of servers grows and the number of applications continue to multiply. Adding to that challenge is the heterogeneous mix of hardware, server models, operating systems and configurations that IT departments need to support.
- **Reduced efficiency.** As server sprawl increases, IT organizations are forced to spend more time on reactive tasks such as server provisioning, configuration, monitoring and maintenance. This leaves less time for proactive, strategic projects to improve infrastructure and service levels.

Consolidating and Containing Servers

Consolidation and containment solutions implemented with VMware Infrastructure meet the challenges of server sprawl and underutilization by reducing hardware and operating costs by as much as 50%. A virtual infra-

“VMware software probably saved us several hundred thousand dollars within a year on hardware purchases alone. As QUALCOMM grows, we anticipate even greater savings.”

Paul Poppleton, IT Manager, QUALCOMM

SERVER SPRAWL

- **36M** physical x86 servers by 2011—a ten-fold increase in 15 years¹
- **\$140B** in excess server capacity—a 3-year supply²

OPERATING COST

- **\$8** in maintenance for every \$1 spent on new infrastructure²
- **20-30 :1** server-to-admin ratio³

POWER & COOLING

- **50c** for every \$1 spent on servers²
- **\$29B** in power and cooling industry wide²

Server sprawl leads to poor utilization, excessive operating expense and rampant power and cooling costs.

structure also simplifies server deployment and automates resource management to optimize capacity and infrastructure management.

VMware virtualization technology makes it possible to package a complete x86 server—hardware, operating system, applications, and configurations—into a portable virtual machine package. Multiple virtual machines can then run simultaneously and independently on a single x86 server with consolidation ratios often exceeding 5 virtual machines per host processor.

Over 40% of VMware's enterprise customers have made virtual machines the default platform for all newly provisioned servers. Fulfilling requests for new servers with virtual machines does not require purchasing new physical servers and improves utilization.

Maximize Resources through Virtualization

VMware technology is used by more than 20,000 enterprise customers and provides a simple, proven solution for consolidating servers. Each workload that previously required a dedicated physical server can be placed in a virtual machine, making it simple to consolidate multiple workloads onto each physical server. The conversion process is made simple with VMware® Converter, which automates the conversion of Windows servers into virtual machines.

In addition to consolidating servers today, implementing VMware virtual infrastructure provides a solution to contain future server

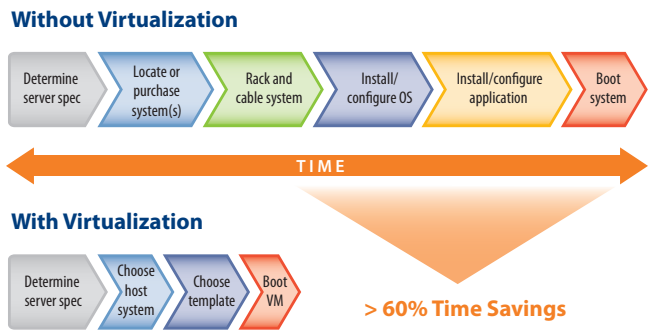
growth. More than 40% of VMware customers have made virtual machines the default platform for all newly provisioned servers. Fulfilling requests for new servers with virtual machines defers the need to purchase new servers and improves utilization. This ability makes it possible to accurately forecast and strategically manage future growth in computing capacity.

Consolidating applications and hardware is the first step to creating IT infrastructure that can better respond to business needs and provide more reliable and robust services.

Simplify Infrastructure Management with VMware VirtualCenter

VMware Infrastructure offers a level of control not possible with other virtualization solutions. It gives complete visibility into an organization’s virtual resources, letting the IT department monitor and maintain high levels of service across the virtual infrastructure.

VMware technology makes it fast and simple to provision new server applications using virtual machine templates. These templates are reusable images that allow IT organizations to eliminate many repetitive installation and configuration tasks. When coupled with the hardware independence made possible by virtualization, virtual machine templates can reduce the time it takes to deploy new IT services by as



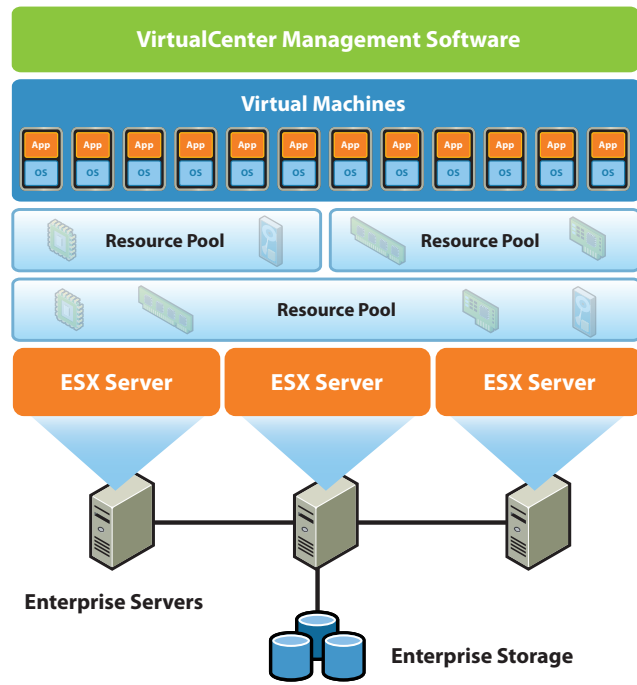
Virtualization accelerates the server provisioning process by as much as 60%.

much as 50% - 70%.

VMware Infrastructure provides the tools to monitor and analyze virtual machines, resource pools, server utilization and availability with detailed performance graphs. Performance metrics can be defined with several levels of granularity and can be viewed in real time, or across a specified time interval.

Automate Capacity Management with Resource Pools and VMware DRS

VMware virtual infrastructure enables a whole new way to consolidate, manage and automate computing resources.



Consolidate many virtual machines on each VMware Infrastructure resource pool.

Leveraging the power of VMware virtualization, organizations can create an IT infrastructure that increases operational efficiency, flexibility and IT service levels. The VMware Infrastructure suite allows many x86 physical servers to be combined into a single resource pool that aggregates processor, memory, disk and networking capacity. Virtual machines are deployed to the resource pool rather than to particular machines. VMware Distributed Resource Scheduler (DRS) continuously balances virtual machine workloads across resource pools based on rules that can be adjusted as conditions change. When load increases, VMware DRS automatically allocates additional resources and uses VMware VMotion to transparently migrate virtual machines between hosts in the resource pool to ensure that service level agreements are met.

VMware Infrastructure resource pools and VMware DRS allow companies to focus on strategically managing services rather than servers. With pre-set policies, applications get the resources they need, without requiring spare capacity for spikes in demand. IT managers can now guarantee application service levels to their business partners.

Benefits of Server Consolidation and Containment with VMware Infrastructure

Over 20,000 VMware corporate customers have benefited from implementing a server consolidation and containment solution using VMware Infrastructure software. Among the benefits that they have realized are the following:

- **Dramatically lower costs.** IT organizations can reduce hardware and operating costs by as much as 50% from implementing a VMware server consolidation solution. In addition to the significant reductions in server hardware expenses made possible by improving server utilization, they have realized savings in costs for administration, power, cooling and data center infrastructure. These savings have provided customers a rapid return on their VMware software investment.

3-YEAR COST SAVINGS/WORKLOAD	
Server Hardware	\$5,816
Power Costs	\$759
Cooling Costs.....	\$949
Data Center Real Estate.....	\$431
Network Infrastructure	\$296
TOTAL	\$8,253

VMware Infrastructure greatly reduces an organization's physical servers and related infrastructure overhead, translating to a dramatic reduction in physical infrastructure costs.

- **Boost utilization.** VMware Infrastructure aggregates x86 server resources into pools that can reliably support CPU utilization exceeding 80% with the continuous virtual machine load balancing provided by VMware DRS.
- **Significantly improved manageability.** Server consolidation and containment with VMware software reduces data center complexity by reducing the number of servers that IT organizations need to manage. With VMware management tools, organizations can also simplify and centralize the monitoring and management of large virtual infrastructure environments.
- **Simplified Server Provisioning.** IT departments can reduce the time it takes to provision new servers by 50-70%. Virtual machines are as easy to copy as software files and are hardware independent, so deploying new workloads takes minutes instead of days.
- **Increased IT efficiency.** A VMware solution streamlines and eliminates common administrative tasks such as enabling IT to manage a growing server environment with existing resources.
- **Greater responsiveness.** By streamlining common tasks and continuously balancing workloads, VMware software makes it possible for IT to respond more rapidly to requests for new servers and maintain service levels as resource demands fluctuate.

Key Components Available for Building a VMware Server Consolidation and Containment Solution

- VMware Infrastructure is the most widely deployed software suite for optimizing and managing IT environments through x86 server virtualization. VMware Infrastructure includes the proven ESX Server virtualization layer, VMotion for live virtual machine migrations and VMware DRS for continuous load balancing.
- VMware VirtualCenter delivers centralized management, operational automation, resource optimization and high availability to IT environments based on VMware infrastructure.
- Tools including VMware Converter automate conversion of existing Windows servers into virtual machines.
- Professional services from VMware and our partners will accelerate implementation of consolidation and containment projects with VMware Infrastructure. Our Virtualization Assessment services will inventory existing data center systems and resource usage to assess where and how to implement consolidation.

- **Improved ability to handle future growth.** Because a VMware solution eliminates the need to dedicate a physical server to each workload and makes it possible to fully utilize existing server resources, organizations can more effectively monitor growth in utilized capacity and strategically plan for additional growth to meet future business needs.

Summary

VMware Infrastructure provides a proven server consolidation and containment solution used by organizations of all types and sizes worldwide, including all of the Fortune 100. These customers have realized significant and rapid returns on their investment in server consolidation and containment with VMware virtual infrastructure.

To learn more about how your organization can benefit from a VMware server consolidation and containment solution, visit the VMware Web site at <http://www.vmware.com> or contact VMware at 1-877-4VMWARE.

¹IDC, U.S. and Worldwide Server Installed Base 2007–2011 Forecast, Doc #207044, May 2007; ²IDC, Virtualization And Multicore Innovations Disrupt The Worldwide Server Market, Doc #206035, March 2007; ³Source: VMware

