



WHITE PAPER

VMware vSphere **Raising Data Centers Closer to the Cloud**

By Mark Bowker

April, 2009

Table of Contents

Table of Contents	i
Businesses Will Spend Money to Save Money	1
VMware vSphere 4.0 Aligns with Virtualization Priorities	2
IT Operations Focus on Virtualization Management and Automation	4
VMware’s Extension into the Data Center	5
A Broader Pricing Structure	6
Alignment with IT and Business Goals	6
Improvements on the Horizon.....	7
ESG’s View	8

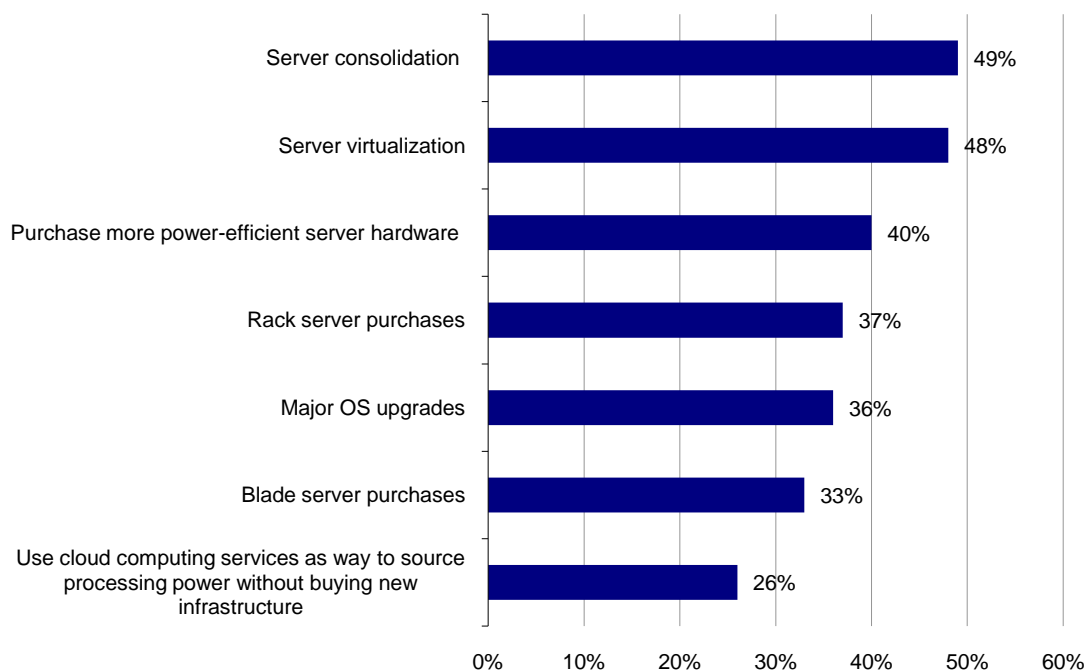
All trademark names are property of their respective companies. Information contained in this publication has been obtained by sources The Enterprise Strategy Group (ESG) considers to be reliable but is not warranted by ESG. This publication may contain opinions of ESG, which are subject to change from time to time. This publication is copyrighted by The Enterprise Strategy Group, Inc. Any reproduction or redistribution of this publication, in whole or in part, whether in hard-copy format, electronically, or otherwise to persons not authorized to receive it, without the express consent of the Enterprise Strategy Group, Inc., is in violation of U.S. copyright law and will be subject to an action for civil damages and, if applicable, criminal prosecution. Should you have any questions, please contact ESG Client Relations at (508) 482-0188. This ESG White Paper was developed with the assistance and funding of VMware.

Businesses Will Spend Money to Save Money

In a recent ESG study of IT users, server virtualization and data center consolidation initiatives were viewed as the top two server-related priorities. Consequently, it follows that consolidation and virtualization are considered to be two of the most “recession-proof” areas of IT spending over the next 12-24 months (see Figure 1). Equally consistent is the message that cloud computing remains in the eyes of many respondents as a future technology at this time. Yet, while 26% of respondents do, in fact, indicate that it will be an area of spending in 2009, the topic ranked last on respondents’ overall list of server-related priorities.

FIGURE 1. 2009 SPENDING PLANS FOR SERVER INFRASTRUCTURE

Server infrastructure initiatives on which organizations will increase or maintain spending in 2009. (Percent of respondents, N=492, multiple responses accepted)



Source: Enterprise Strategy Group, 2009

This dichotomy highlights an intriguing trend: in spite of the success of server virtualization, customers continue to use only its basic functionality. The industry keeps talking about how virtualization is the onramp to the data center of the future, but how will we get there?

- Operational Efficiency:** In the current economic climate, no IT project—no matter how critical—will be funded without significant management review and approval. ESG’s respondents believe that ongoing operational cost reduction is, by a significant margin, the most important justification for IT investment now and over the next 12 - 24 months. This reinforces the notion that customers will favor products and services that allow them to reduce infrastructure maintenance, improve management processes, reduce headcount, consolidate data centers, reduce power consumption, or otherwise streamline operations.
- Infrastructure Management:** Recent IT infrastructure and software architecture changes require more coordination and automation across management processes at all layers of the IT environment. Over one-third (38%) of ESG survey respondents state that they expect server virtualization to extensively impact their organization’s management strategy in the next 24 months.

- **Application Transparency:** Application and line of business owners need to understand the benefits of taking existing applications and net new applications and migrating them to a virtualized platform, as well as the benefits of deploying a workload into a virtualized environment in terms of both today and in the future. Businesses currently have the option of hosting their applications on a cloud infrastructure, but this often requires a total re-write of the application and does not necessarily address the multitude of windows applications being virtualized today. IT organizations are looking for a better way to build internal IT service models to automate routine IT tasks and deliver improved service to the business.

VMware, as a leading technology vendor, has guided over 140,000 customers in transforming their data centers. While we have seen many improvements and new product releases in the recent past, VMware is now turning over a new leaf to achieve its next milestone in the virtual world.

VMware vSphere 4.0 Aligns with Virtualization Priorities

In April 2009, VMware unveiled vSphere 4.0, the company's next iteration of what was formerly called VMware Infrastructure. Most customers know and love VMware for ESX, its core bare metal hypervisor that is installed directly on a physical server and used as a launch pad to create multiple virtual machines. VMware is billing vSphere as a lot more than a virtualization platform, promoting the offering as the first "operating system for building the cloud." Aspirations aside, vSphere offers customers quite a bit in terms of advances in scalability, availability, and security—along with some leaps in compute, storage, and network performance and functionality.

VMware has positioned vSphere as an operating system "for building the internal cloud," specifically designed to manage large collections of IT infrastructure. This warrants further explanation. For an individual server, the category is "operating system," which is a collection of components that include CPU, memory, and I/O resources manipulated and controlled by the OS based on application needs. A data center is essentially a larger collection of higher-level subsystems, which contain the same components that perform the exact same functions—only more frequently. Thus, the term "data center operating system" (DCOS) or what VMware has chosen to refer to as a cloud operating system

VMware describes vSphere 4.0 in terms of Infrastructure Services and Application Services managed with VMware's vCenter Server. At first blush, it may not be obvious which products map to which service layer, but if you keep the bigger picture in mind—that is, VMware's vision of a giant computer built with software—it is much easier to understand how the individual pieces fit together and the importance of their interrelationships.

Infrastructure Services focus on what you might expect: compute, storage, and networking resources. VMware leverages the underlying physical hardware to create virtual pools of resources that are provisioned to virtual machines, higher-level applications, and a collection of business workloads. This is where the core hypervisors, VMware ESX, and ESXi demonstrate their full strength—what VMware has become well known for in the industry. VMware Infrastructure Services are then extended to the storage layer with the VMFS file system and network capabilities with its virtual switching capabilities. VMware vSphere 4.0 expands and improves on these areas with:

- **vStorage Thin Provisioning:** Efficient storage capacity utilization helps businesses reduce storage costs while delivering the same quality of service to the application. Thin provisioning enables administrators to create virtual disks that only consume the physical capacity in use by the virtual machine. This eliminates the need to overprovision disks and fully alerts the administrator regarding allocation and consumption thresholds.
- **vStorage APIs for Data Protection:** These APIs are the next generation of VMware Consolidated Backup (VCB). The APIs for data protection enable backup tools to easily integrate with vSphere and

offload the backup processing from the core ESX infrastructure. New features will only be available with backup software that leverages these APIs.

- **Distributed Power Management:** VMware DPM automatically consolidates workloads on fewer physical servers based on application demand. Utilizing policies, virtual machines can be migrated off of a physical server and that server can be shut down to minimize power consumption
- **vNetwork Distributed Switch:** The vNetwork Distributed Switch aggregates data center-level virtual networking. VMware has already announced partnerships with Cisco and its Nexus 1000V and plans to continue partnering to build a rich set of networking services and extend its virtual networking foundation.

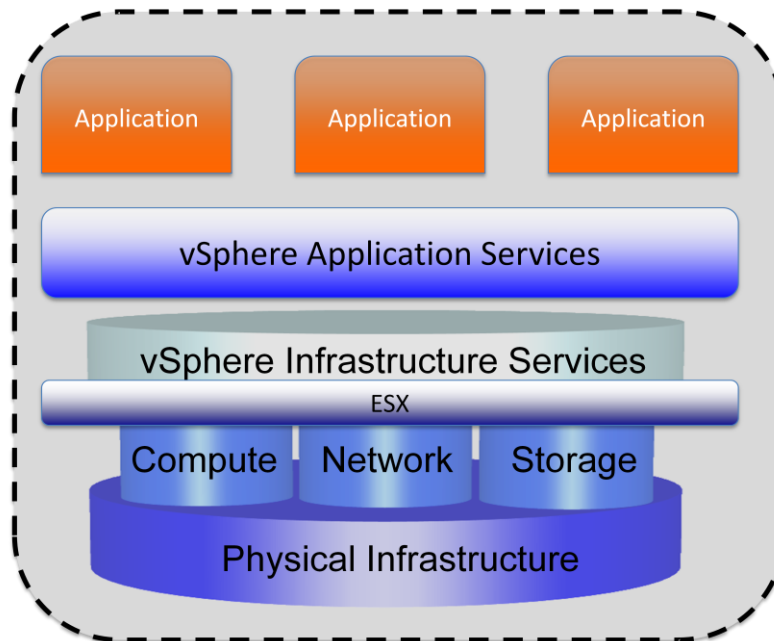
Additional improvements include performance gains to improve virtual machine scalability, increased I/O throughput for greater IOPS, vStorage API for multipathing, and hot virtual disk extend that enables administrators to expand virtual disks online.

Application Services provide virtual machines with supporting capabilities—such as availability, security, and scalability—with built in controls to apply policies. VMware Application Services are available to all virtual machines running on vSphere. This encompasses traditional VMware application services such as VMotion, VMware HA, and VMware DRS, as well as these new application services found in vSphere 4.0:

- **Fault Tolerance:** VMware Fault Tolerance is the next level of virtual machine protection beyond VMware HA, ensuring continuous availability of virtual machines against hardware failure. A pair of virtual machines runs in lock step and, when a hardware failure occurs, application access is maintained.
- **Data Recovery:** This is a brand new tool that provides customers with built in backup and recovery. It is a disk based backup tool that enables administrators to protect virtual machines directly through the vCenter Server interface and has built in de-dupe, granular file recovery, and full virtual machine recovery.
- **VMsafe:** Announced in early 2008, VMware VMsafe is a set of APIs that create an interface into vSphere. The goal of VMsafe is to work with partners to provide higher levels of security and improved data protection with a broad range of coverage that has visibility into virtual machine CPU, memory, storage, and networking transactions.
- **vShield Zones:** IT administrators can enforce basic firewalling capability of virtual machines without having to divert network traffic outside the virtualized infrastructure. VMware vShield Zones makes it easier for administrators to manage and enforce security and compliance policies in a virtualized environment
- **Storage vMotion:** A new GUI interface allows administrators to move capacity across different types of storage (FC, iSCSI, NFS, and local storage). Storage vMotion can be performed while the virtual machine remains online.

These new additions, combined with VMware Site Recovery Manager, and the ability to hot add CPU and memory resources to a live virtual machine, help IT organizations achieve their ultimate goal: an always on data center.

FIGURE 2. VMWARE VSPHERE APPLICATION AND INFRASTRUCTURE SERVICES



Source: Enterprise Strategy Group, 2009

IT Operations Focus on Virtualization Management and Automation

Management of the virtualized environment is critical and will have an impact across IT domain practices including server, network, storage, applications, and general IT operations. As previously stated, server virtualization and, ultimately, cloud management, will extensively impact IT organizations management strategy—thus the importance of VMware’s focus on management. VMware vCenter Suite provides central management and control of the vSphere environment and includes a new version of VMware’s vCenter Server formerly known as Virtual Center Server.

VMware vCenter Server is at the heart of IT operations for virtual environments. As more and more functionality is built into it to help IT operations streamline daily operations and lower operational costs, it is where administrators turn to provision new virtual machines, view vSphere analytics, and create automation policies that can be finely tuned to maximize an investment in virtualization. VMware, along with its partners, are moving common tasks such as backup/ restore, P2V (physical to virtual) migrations, and even disaster recovery with Site Recovery Manger and its networked storage adaptors into the vCenter Server interface. VMware also views vCenter Suite as the management tool that will ultimately manage the private cloud as federation between internal and external cloud infrastructures takes place.

VMware vCenter Server introduces these new (and very welcome) features:

- **Orchestrator:** The vCenter Orchestrator is a workflow for automating what have previously been manual tasks. It will ship with pre-defined workflows that automate snapshots, scan HBAs when a storage LUN is added, and send an e-mail to an administrator when a virtual machine is powered on. This is a powerful tool that will help IT further reduce time consuming routine maintenance and streamline IT operations.

- **Host Profiles:** Maintaining standard ESX host configurations is greatly simplified with vCenter Host Profiles. A VMware ESX reference host is maintained with a “golden profile” that is shared with all ESX hosts in the cluster. This simplifies setup, detects non-compliant ESX hosts, and automates remediation.
- **Linked Mode:** With vCenter Server Linked Mode, multiple vCenter servers are joined so that administrators can use a standard vCenter Client to access an inventory of multiple vCenter Servers. Administrators can view and search across vCenters from a single pane of glass.

VMware is also working with enterprise system management frameworks to round out data center orchestration to include physical environments and leverage existing investments in data center management tools. VMware will continue to focus on its core expertise in a virtualized environment and work with its partners to bridge the gap into the rest of the IT infrastructure. With vSphere, license management has been simplified with new centralized license key administration in vCenter that eliminates the need to have a separate license server to manage and monitor licenses. Lastly, VMware has improved its activation process to help customers reduce the number of steps required to activate the product.

VMware’s Extension into the Data Center

VMware’s existing customers are at different stages of adoption. As such, they represent a giant potential for new business as they climb the maturity ladder. On the other side of the coin, mature installations using the full suite of products VMware offers today may be in a position to rapidly adopt the new features of vSphere since they will see an immediate value and be able to advance their virtualization initiatives. VMware started at the core server compute platform, and as virtualization matured, the company had become more infrastructure savvy by working with other technology partners to extend value while remaining transparent enough to allow users to run their existing applications. To become a data center class infrastructure that can truly deliver IT as a service, the company cannot solely rely on bolt-in technology—it has to climb the ladder and closer to the applications as well as interoperate with the underlying infrastructure through advances in:

- **Application confidence** that assures application owners and developers that VMware is the best platform for x86 based applications. VMware continues to deliver availability services with VMware HA and FT that demonstrate the company’s capability to build trust and show how customers can create IT as a service using VMware vSphere to provide improved SLAs and ultimately better productivity for application end-users.
- **Infrastructure interoperability** that balances VMware vSphere capabilities with the existing features and functionality of the underlying server, networking, and storage infrastructure. Customer requirements will vary widely, depending on size of deployment, maturity of installation, and existing investments. VMware has to be ready for all these scenarios. Smaller, SMB type, organizations will want to see the majority of functionality in vSphere and larger enterprises need to address the challenge of being able to seamlessly work across IT infrastructure domains to achieve a common goal.
- **Strategic guidance** that helps customers “crawl, walk, run.” Not all businesses are ready for the cloud just yet. The majority of customers are still focused on consolidation and moving more applications to the virtualized infrastructure. Virtualization is a journey and VMware has demonstrated its commitment to helping customers on this journey, enabling them to see immediate benefits and long term goals of a self service IT organization where application owners and CIOs pay on a consumption basis with a pay-as-you go financial model.

VMware vSphere is addressing a market demand that aligns with the fact that as customers consolidate workloads on a virtualized platform, they are relatively pleased with the current set of offerings. As more and more workloads are consolidated, it demands greater sophistication as companies look to deploy hundreds and thousands of virtual machines with vSphere.

VMware vSphere tackles the growing maturity of the virtualized data center with advances in:

- Application performance and availability requirements to handle a broad range of Tier 1 workloads
- Simplified license management and vSphere activation process
- A virtualization platform that moves well beyond the company's core ESX offering to deepen vSphere's impact in a highly dynamic environment run by business policies
- Expanded packaging and pricing to match individual customer requirements in the SMB and enterprise data center

A Broader Pricing Structure

VMware vSphere packaging and pricing is modeled to address customers that are just getting started, those that are rapidly growing their deployments, and advanced enterprise customers requiring the full gambit of solutions. Since there are such distinct customer segments in the market, VMware vSphere packaging and pricing are set accordingly to help customers consolidate, add availability features, automate policies, and simplify IT operations. VMware starts with initial offerings oriented for the small office with limited scalability features and grows to full-featured packages with unlimited scalability.

- **Essentials:** Smaller deployments looking to leverage free ESXi that scales up to 3 physical servers with basic management for \$995. Essentials PLUS adds integrated availability solutions for \$2,995.
- **Standard:** Targeted for simple consolidation initiatives and priced at \$795 per processor.
- **Advanced:** Adds high availability, live migration, network security zoning, and data protections for \$2,245 per processor.
- **Enterprise:** Includes additional functionality on top of the Advanced Edition for automated resource management with dynamic resource allocation, power management, and storage live migration for \$2,875 per processor.
- **Enterprise Plus:** For the mature customer requiring third party multipathing and distributed switch and host configuration controls for \$3,495 per processor.

VMware will also work with its largest customers to create ELAs (Enterprise License Agreements) that advance them down the road onto the vSphere platform.

Alignment with IT and Business Goals

VMware has rallied its messaging for vSphere 4.0 around “**efficiency, control, and choice,**” which it uses to categorize each of the new feature sets. These ideas fit well with what vSphere offers customers in terms of improving their lives and building a business where IT is a strategic asset. Customers adopting vSphere will quickly find that VMware has moved in to consume fairly large chunks of real-estate inside the data center. In some extreme cases, this has actually reached nearly 100% virtualization. This, in turn, means that vSphere as a platform has to be prepared to accommodate an increasing workload demand and has to be recognized as the platform of choice for all existing and new applications.

Businesses are focused on improving IT operational effectiveness, **efficiency,** and reducing the operational costs consumed by the IT organization. This means automating routine and mundane tasks, utilizing the right tools for the job that streamline operational tasks, and eliminating the intervention of an IT administrator with an infrastructure that automatically responds to change. In a recent ESG survey, reduction in operation costs led the list (62%) of responses as the most important justification to ongoing IT investments.¹

The goal from an application perspective is to have a plug and play architecture where applications are migrated or created on the virtualized platform and, by default, inherent all of its benefits. Application owners and CIOs still

¹ Source: ESG Research Report, *2009 Data Center Spending Intentions*, March 2009.

maintain **control** of the applications as well as quality of service, availability, security, compliance, and application response time. They are simply empowered by new tools that present IT as a service so they can continue to run existing applications and confidently predict infrastructure usage and elasticity that match overall business goals and objectives.

As customers seek the benefits of a virtualized platform and gain confidence in the operating environment, they also want to maintain **choice**. This means IT wants the flexibility to run mission critical, business critical, and even IT infrastructure applications on a platform that is independent of physical infrastructure, operating system dependency, and service providers when the true federation of virtualized data centers comes to fruition. Many IT decisions are stalled even if they have favorable benefits simply because not going ahead is easier than forklift upgrades, service interruptions, or application stability nightmares. IT organizations will just keep living with what they have rather than take the risk, regardless of the benefits. Virtualization stands out from the crowd and, although it is met with various degrees of apprehension at the beginning, it quickly moves into the fast lane thanks largely to its IT and business benefits.

Improvements on the Horizon

VMware continues to race ahead with a strong strategic vision and improvements in vSphere as customers embrace virtualization as a consolidation initiative and a platform for x86 workloads. Advanced customers that share strategic visions of cloud computing and IT as a service will quickly embrace vSphere—and have the most to gain. Customers that are not as advanced or just beginning their virtualization initiatives will also recognize VMware's strength in performance, availability, automation, and operational efficiency even if they do not adopt the full set of features from the very beginning. Current VMware Infrastructure customers have been waiting for many of the new vSphere features and can begin planning upgrade paths to the new platform for improved application support, simplified management, and enhanced infrastructure integration.

It seems clear that, with the advances in vSphere, VMware understands the customer requirements, which it proves by continuing to enhance its virtualization platform. VMware vSphere is timely in the fact that the technology community is buzzing with activity despite economic uncertainty. To maximize the value of vSphere, VMware must:

- **Focus on the SMB.** The SMB may not be the first segment of the market to grasp cloud computing and IT as a service, but it does have the most to gain from improved efficiency, reduced operational costs, and lower IT costs. VMware needs to continue working with its technology partners to deliver turnkey solutions to SMBs so they can achieve a quick time to value, reduced TCO, and improved ROI.
- **Extend value beyond basic virtualization.** VMware is well known as a server virtualization solution and now needs to become known as a virtualization platform. IT organizations need to think of vSphere as the default data center platform for all x86 based workloads. This requires not only the cloud and IT as a service visions shared at VMworld events, but also closer high touch education directly to existing customers and new prospects.
- **Increase training and certification.** Server administrators typically drive server virtualization, but there is an enormous opportunity to train and empower IT data center architects and IT executives with the value of vSphere and the knowledge of how it fits into the overall IT operations strategy. VMware has had great success driving virtualization at the IT server administrator level. Now it needs to engage with senior IT decision makers; CIOs responsible for Oracle, SAP, and specialty applications; and IT architects to demonstrate how vSphere fits into the overall IT and business goals.
- **Set the stage to beat the competition.** The virtualization competition landscape has significantly changed since VMware originally introduced ESX. Microsoft, Citrix, Oracle, and others have all rapidly ramped their products to compete with VMware. VMware needs to be cognizant of the competition and beat them to the customer by presenting a solution that solves an immediate IT problem. While it is important that VMware shares a high level future direction, it also has to remain bullish to continue to expand its footprint.

ESG's View

Although it has experienced great success in bringing virtualization technology into the mainstream, VMware is not about to sit back and rest on its laurels, content to watch customers reap the benefits of server virtualization as they consolidate servers and share stories of tremendous cost savings. In fact, one could even argue that VMware is actually 12 -18 months ahead of the virtualization mainstream in terms of delivering technology and sharing a strategic vision.

It is important that as businesses design, provision, optimize, and protect new IT infrastructure—and use server virtualization as one of the key drivers—they understand the individual building blocks needed to lay the foundation while having a clear model to follow that provides a framework for long term business goals. This is a balancing act for VMware as it must speak to a long-term future direction in the data center as well as demonstrate its value as a leading virtualization platform.

The definitive success of VMware vSphere will be when CIOs and line of business owners look at all the IT assets as one large resource pool that is highly utilized, cost effective, efficient, and automated. As businesses build the optimized data center, VMware vSphere can deliver consolidation as well as cost effective business continuity, disaster recovery, and high availability for mass application adoption with packaging and pricing that matches individual market segments. Since businesses are still trying to figure out the definition of cloud computing, they are not going to necessarily run off to deploy vSphere for its IT as a service capabilities, but you can anticipate IT organizations anxious to leverage the advances in vSphere to continue to accelerate virtualization deployments and rapid workload adoption.



20 Asylum Street
Milford, MA 01757
Tel: 508-482-0188
Fax: 508-482-0218

www.enterprisestrategygroup.com