Why Choose VMware for Server Virtualization?

A Comparative Analysis for New Virtualization Customers

vmware®

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Introduction

Server virtualization improves the efficiency and availability of IT resources and applications. It frees IT administrators from repetitive server management tasks, allowing them to drive business-building innovation. Given the significant cost savings from reduced hardware requirements and improved server efficiency, the server virtualization market has expanded quickly and multiple virtualization platforms are available. However, the differences between vendor platforms are considerable. VMware delivers a secure and reliable platform that enables IT to meet Service Level Agreements (SLAs) for the most resource-intensive, business-critical applications, at the lowest Total Cost of Ownership (TCO). This white paper describes the distinct advantages of VMware virtualization, which are summarized below:

• **Most Trusted Virtualization Platform** – VMware vSphere® with Operations Management forms the rock-solid platform on which all other solutions are built. vSphere is the industry's most widely adopted and deployed virtualization platform with over 500,000 customers across the globe. Customers' trust in VMware begins with a secure and reliable hypervisor architecture that is purpose-built for virtualization.

• **Best Platform for Business-Critical Applications** – Applications that are fundamental to a business require maximum availability and the highest service levels. vSphere with Operations Management provides a fully resilient, scalable, secure, and performance-rich environment to support the most important business-critical applications. vSphere also supports a broad set of applications along with a comprehensive management solution to maximize the performance of these applications, making it the best platform for all types of customers.

• **Lowest Total Cost of Ownership** – IT departments are under constant pressure to do more with less. vSphere with Operations Management reduces both capital expenditures (CapEx) and operational expenses (OpEx) by delivering high hardware utilization, simple resource management, and greater administration efficiency. Intelligent automation also reduces the need for IT intervention resulting in the overall lowest TCO.

"VMware technology helps us, as a business, support business growth. It has helped us evolve our IT infrastructure so that we can provide more dynamic computing. It has also enabled us to truly 'think outside the box' and find ways to deliver computing resources that drive the most value to our company's bottom line."

— Tony Vaden, CIO, American Tire Distributors

Most Trusted Virtualization Platform

As more and more workloads are virtualized, it becomes critically important that the virtualization layer is both reliable and secure. While competitors like to spread the notion that the hypervisor is a commodity and that virtualization platforms are all the same, VMware has pioneered and perfected a hypervisor architecture and management platform that is unique in this space. The purpose-built vSphere hypervisor provides a radically different approach to virtualization—one that has led VMware vSphere to be recognized as the industry's most robust and production-proven hypervisor.

"VMware is the clear and obvious leader in virtualization products. We tried both the Microsoft and Oracle virtualization products and found them lacking in features and performance compared to the VMware product."

— David Greer, Director of Information Services, HelioVolt Corp

A Secure and Reliable Hypervisor

vSphere includes the ESXi hypervisor platform. ESXi, the industry's first "bare-metal" hypervisor for x86 systems, was launched in 2001 and is now in its fifth generation. This hypervisor is designed for the sole purpose of virtualization. Competing vendors, on the other hand, make the hypervisor rely on a general-purpose operating system—usually in the form of a parent partition or Dom0. In Microsoft's case Hyper-V is a feature of the Windows Server operating system, a strategy that sacrifices performance and reliability of the hypervisor for the sake of expanding the OS market share.
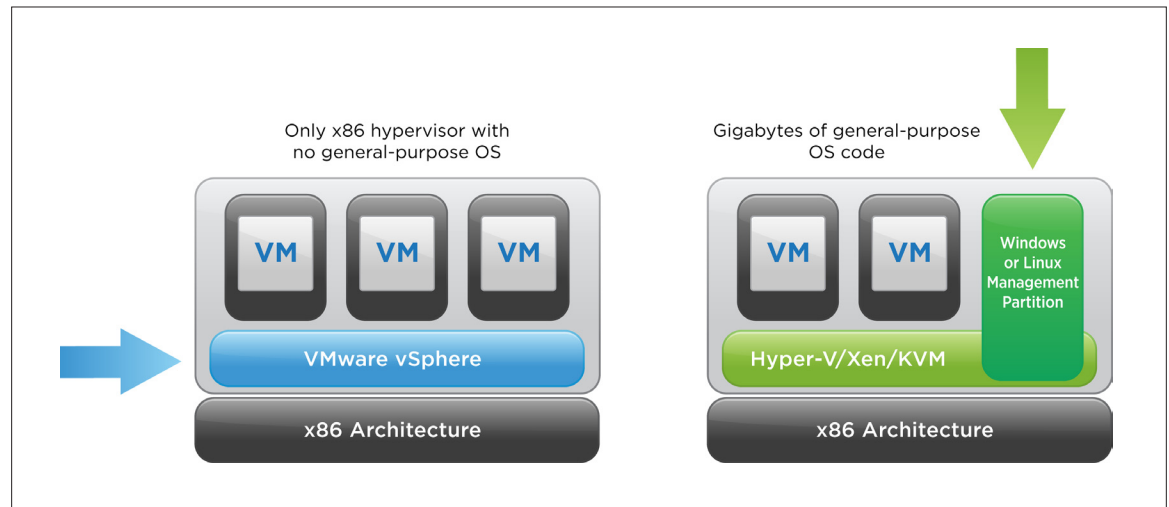

Figure 1. Comparing Hypervisor Architectures

Being purpose-built, VMware completely eliminated any dependence on a general-purpose operating system or management console, achieving the smallest code size by far of any virtualization product. By stripping out the tens of millions of lines of code required by a management operating system, vSphere 5.5 delivers a full x86/x64 virtualization platform in a tiny (<200MB) disk footprint. This smaller hypervisor disk footprint reduces the attack surface for external threats and can drastically lower the number of patches required, providing a more reliable product and a more stable datacenter.

Competing hypervisors have a thicker architecture that introduces reliability concerns as the parent operating system has a much larger attack surface and more unrelated code to patch and maintain. That dependency means that a flaw or vulnerability anywhere in the management OS—even in components unrelated to virtualization—puts the entire virtualization platform at risk. Windows Server with Hyper-V, Xen and KVM all have architectures that depend on a large, general-purpose server operating system. That also means that users of those products must cope with the more numerous and frequent patches issued to secure Windows and Linux operating systems, resulting in more downtime and disruption.

The thin hypervisor architecture also allows vSphere to be run stateless—a capability that Windows Hyper-V cannot support. This allows for easier deployment of vSphere onto bare-metal hosts, easier configuration management, and cleaner and simpler patching. Advanced virtualization features like Host Profiles and Auto Deploy are all possible because of the lightweight design of the vSphere hypervisor.

VMware is also building security directly into the hypervisor with innovative solutions designed specifically for virtualized environments. VMware vShield™ Endpoint, now included in vSphere 5.5, allows leading third-party antivirus solutions to offload antivirus and anti-malware processing, protecting guest virtual machines without the use of bulky agents. With VMware vCloud™ Networking and Security, security services like edge and vNIC-level firewalls, NAT, and SSL VPN can be applied exactly where they are needed without hardware. Software-defined security helps automate and scale out security, reducing the need for specialized devices, lowering costs, and simplifying management. VMware is the only virtualization vendor leading the innovation and development in

virtualization- and cloud-ready security and the major security vendors have implemented their technologies on the VMware platform. All other virtualization vendors continue to recommend legacy physical solutions that are static and difficult to manage at cloud scale.
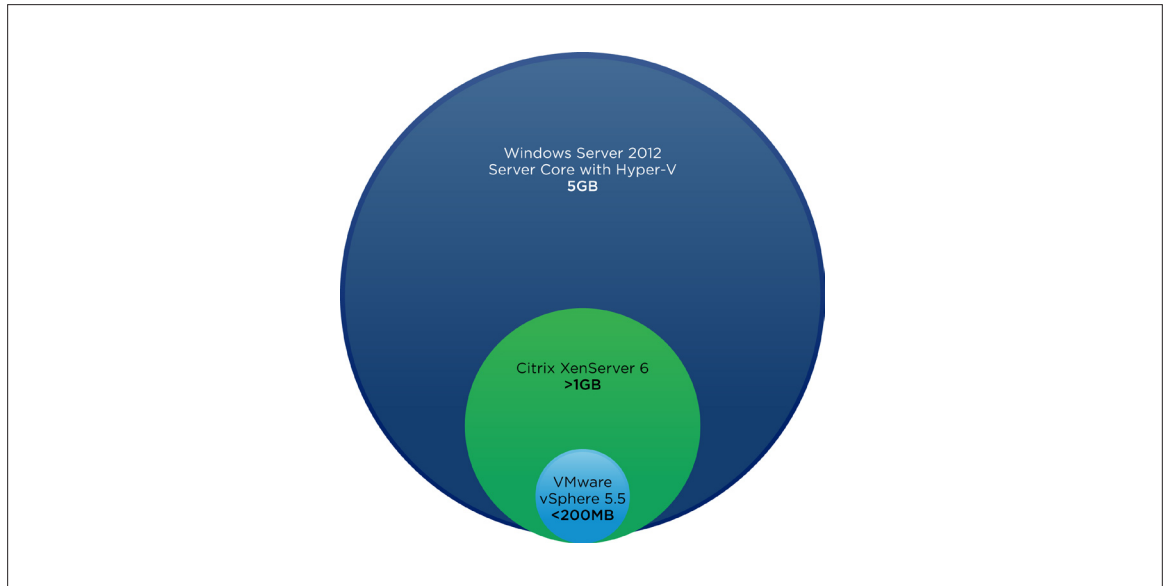

Figure 2. Relative Disk Footprints of Various Hypervisors

	KEY VIRTUALIZATION FEATURES	VMWARE VSPHERE 5.5	MICROSOFT WINDOWS SERVER 2012 R2 WITH HYPER-V
Hypervisor Architecture	Scalability	✓ Host: 320 CPUs, 4TB RAM Virtual machine: 64 vCPUs, 1TB vRAM	✓ Host: 320 CPUs, 4TB RAM Virtual machine: 64 vCPUs, 1TB vRAM
	Purpose-built hypervisor	✓ No reliance on general purpose operating system	⊘ Hyper-V requires Windows Server OS
	Simplified patching	✓ No unrelated patching; automated, image-based with rollback capabilities. Only two important security patches for vSphere 5.1 since release in 2012	⊘ Subject to unrelated Windows patching (i.e., Patch Tuesday). 27 critical and important patches from September 2012 to August 2013
	Advanced memory management	✓ Ballooning, transparent page sharing, memory compression, swap to disk/SSD	~ Dynamic Memory: no Linux support, disables NUMA
Platform Security	Small attack surface area	✓ <200MB disk footprint	⊘ >5GB disk footprint
	Centralized security management	✓ Unified policy-based approach, managed via vCenter	⊘ Lacks single interface; requires mix of System Center tools (VMM, EP)
	Agentless virtual machine protection	✓ Built-in vShield Endpoint offloads AV and antimalware to secure appliance	⊘ No introspection capabilities; relies on agents in every virtual machine, legacy physical security
	Software-defined security	✓ vCloud Networking and Security*: built-in edge and vNIC-level firewall, NAT, SSL VPN	⊘ Nothing comparable—requires third-party solutions
		* vCloud Networking and Security can be purchased separately or as a part of the vCloud Suite	

Table 1. Comparison of Key Hypervisor and Security Features Among Virtualization Platforms

All of these architectural decisions are designed to keep the virtualization layer secure and reliable. The focus on making vSphere the best hypervisor also helps explain why vSphere is the industry-leading virtualization solution.

Most Proven, Trusted and Widely Deployed

The technology and innovation behind VMware vSphere has made it one of the fastest growing infrastructure software solutions in the world. Over a decade of innovation has firmly established vSphere as the virtualization industry leader as recognized by customers, press, and analysts.

Among the hundreds of awards given to VMware products over the past years, the 2012 InfoWorld Technology of the Year award for Best Virtualization Platform stands out. It further validates the position of VMware as the best platform for IT and clearly illustrates the technology gap between VMware and its competitors.

Customers find vSphere to be extremely reliable and it is being deployed in production in a variety of customers, industries, and segments.

World's Most Successful Companies Run VMware

VMware is the proven choice for virtualization from the desktop through the datacenter to the cloud. More than 500,000 customers of all sizes have chosen VMware as their virtualization platform, including

• 99 percent of Fortune 100

• 99 percent of the Fortune 500

• 99 percent of Fortune Global 100

• 99 percent of Fortune Global 500

VMware's virtualization leadership extends to large and small enterprises. Within small and medium-sized businesses (less than 1,000 employees), VMware has between 74 and 82% market share according to Spiceworks MarketView data from April 2012. VMware has also been adopted across all industries of all types around the world.

Ducati

"VMware has never failed us. We have grown in terms of demands and requirements, and VMware has grown in capabilities and ability to support us."

— Daniel Bellini, CIO, Ducati

Corporate Express

"VMware virtual machines took the pain of managing hardware off our hands; and virtual appliances can eliminate the pain of managing operating systems and application deployment. Everyone is trying to do more with less and VMware software is helping us to do exactly that."

— Travers Nicholas, Infrastructure Services Manager, Corporate Express

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PCMS

"PCMS chose VMware virtualization technologies as an optimal platform to make it easy and efficient to provide centralized POS services to retail customers conveniently in a manner that is agile, and one that can be managed effectively."

— Paul Kaye, Group CTO, PCMS Group

Best Platform for Business-Critical Applications

As adoption of virtualization expands, companies begin to look at their business-critical applications. These are the applications that are absolutely fundamental to the day-to-day operations of the company or organization, including email, collaboration, ERP/CRM, and database systems. Because these applications are vital to the core business, they must be highly available and resilient while delivering the performance required to meet strict service level agreements. Choosing the right platform to support these applications becomes critically important to the overall virtualization decision.

"Microsoft Exchange is seen as a 'canary in the coal mine' when it comes to virtualization—one of the harder use cases. We've proven that people's hesitation is unfounded. Exchange can be virtualized, it works, and it works well."

— Sue Werner, Systems Engineer, Raymond James Financial

Maximizing Application Availability and Business Continuity

VMware offers a broad set of business continuity and disaster recovery solutions to keep business-critical and mission-critical applications up and running. While many virtualization platforms offer similar-sounding features and capabilities, the VMware solutions are the most complete and robust against planned and unplanned downtime and major disasters:

• **vSphere High Availability (HA)** – vSphere HA was recently re-architected to provide even better, cost effective failover protection. It is designed to enhance or replace other expensive high availability solutions, such as Exchange DAGs or Oracle RACs, but is simple to configure with a single click and requires minimal resources. Because it was designed specifically for a virtualized environment, vSphere HA is not hindered by legacy clustering technology that can oftentimes be brittle and complex. The architecture of vSphere HA is incredibly robust and can identify management network failures with the use of a secondary datastore heartbeat. vSphere 5.5 adds App HA to further improve availability by enabling vSphere to recognize when key applications become unresponsive so they can be restarted automatically. vSphere App HA builds on application monitoring APIs also used by partner products like Symantec Application HA to track the health of applications within the guest OS. In total, vSphere HA effectively recovers from hardware, operating system, and application failures. While other vendors offer their own high availability solutions, they often come up short when compared to vSphere HA.

• **vSphere Fault Tolerance (FT)** – For the most vital applications that cannot tolerate even a small amount of downtime, VMware offers vSphere Fault Tolerance. FT provides continuous availability by creating a live shadow instance of a virtual machine that is in virtual lockstep with the primary instance. By allowing instantaneous failover between the two instances in the event of hardware failure, FT eliminates the smallest chance of data loss or disruption. Neither Microsoft nor Citrix have built-in FT.

• **Data Protection** – vSphere Data Protection (VDP) protects against data loss in your virtual environment by enabling fast backups to disk and fast and complete recovery. VDP uses an agentless architecture and has built-in de-duplication to minimize the backup disk space used. Windows Hyper-V relies on System Center Data Protection Manager for virtual machine backups. Agents must be installed on all protected virtual machines, and agents only exist for Windows-based virtual machines and a small set of Linux guests. Citrix and Red Hat recommend using agent-based, third-party backup solutions as they both lack agentless backup capabilities.

• **vMotion, Storage vMotion** – HA and FT are great options to protect against unplanned downtime, but regular maintenance is often necessary. vMotion and Storage vMotion can be used to migrate virtual machines and virtual machine disk files to other resources to perform maintenance on a server or storage array—all without any downtime to the end user. These features also enable dynamic rebalancing of workloads across available resources, maximizing efficiency and ensuring SLAs are met. While most virtualization platforms support some form of live migration, the VMware solutions are the most proven and tested in production environments and only VMware provides the time-saving automation of Storage DRS.

- **Live Resource Expansion** – Applications sometimes require more resources than originally expected. VMware vSphere with Operations Management 5.5 provides the ability to dynamically add CPU, memory, and storage resources to running virtual machines. Microsoft Windows Hyper-V and Citrix XenServer require the virtual machines to be shut down to add more computing power (CPUs). XenServer does not support hot-plug or hot-extend of virtual disks.

- **Replication** – vSphere Replication allows powered-on virtual machines to be replicated over the network from one vSphere host to another without the need of storage array–based native replication. It is a bandwidth- and cost-efficient solution for disaster recovery at the virtual machine disk level. Windows Hyper-V has a Replica feature, but it can only be managed one virtual machine at a time. The other virtualization vendors do not have anything comparable, relying only on expensive storage array-based solutions.

- **Site Recovery Manager** – For major disasters where an entire datacenter can be affected, VMware provides vCenter Site Recovery Manager (SRM). SRM provides simple and reliable disaster protection for all virtualized applications. It leverages cost-efficient vSphere Replication or storage-based replication to provide centralized management of recovery plans, enable non-disruptive testing, and automate site recovery and migration processes. Microsoft's Hyper-V Recovery Manager lacks support for high-performance SAN-based replication needed for large-scale DR failovers. Only VMware vCenter SRM provides a proven, out-of-the-box disaster recovery solution.

Providing Deep Management Insight

The robust and resilient vSphere architecture improves the overall uptime of business-critical applications, but IT is still responsible for the ongoing management of the performance and security of these important applications. vSphere with Operations Management delivers a comprehensive solution that provides deep visibility into the health and efficiency of the underlying infrastructure to ensure that applications have the highest service levels. vSphere with Operations Management also makes it easier for IT to proactively address infrastructure issues before they impact the end users' experience.

- **Proactive Smart Alerts** – In a highly virtualized and/or cloud environment, a server hardware issue, like a failing NIC, will impact the network traffic of all of the virtual machines running off that server. With traditional management tools, this type of failure triggers a storm of alerts as each individual virtual machine being monitored will cause an alert. vSphere with Operations Management is designed specifically for a virtualized environment and correlates all of the data to identify the real problem. IT is notified by a single smart alert about the failed NIC rather than a storm of alerts that IT must sift through.

- **Super Metrics** – When managing a complex, dynamic environment IT needs to be able to understand what is happening in their environment. With traditional management tools that highlight low-level metrics, IT can be overwhelmed by the amount of information. vSphere with Operations Management makes it easier for IT to focus on problem areas that require their attention by rolling up the data into super metrics for Health and Efficiency. These super metrics make it easier for IT to see growing problems with recommendations to resolve them before they impact application performance.

- **Heat Maps** – Troubleshooting a problematic application can be very time-intensive. vSphere with Operations Manager reduces the time spent looking for the source of the problem with real-time heat maps that clearly indicate the problem areas. IT can "click into" the highlighted areas to further investigate. Other management tools like System Center Operations Manager do not offer this type of clear, actionable information.

- **Capacity Management & Optimization** - Accurately plan and optimize your vSphere environment with capacity analytics that identify overprovisioned resources so they can be rightsized for most efficient use of virtualized resources. What-if scenarios eliminate the need for spreadsheets, scripts and rules of thumb.

The combination of a resilient platform and deep management insight allows customers to trust the VMware platform to virtualize business-critical applications. Over the span of past four years, VMware customers significantly increased the virtualization of tier 1 applications like Microsoft SharePoint and Oracle databases.

The table below shows the steadily increasing levels of business critical workload virtualization achieved by VMware customers:
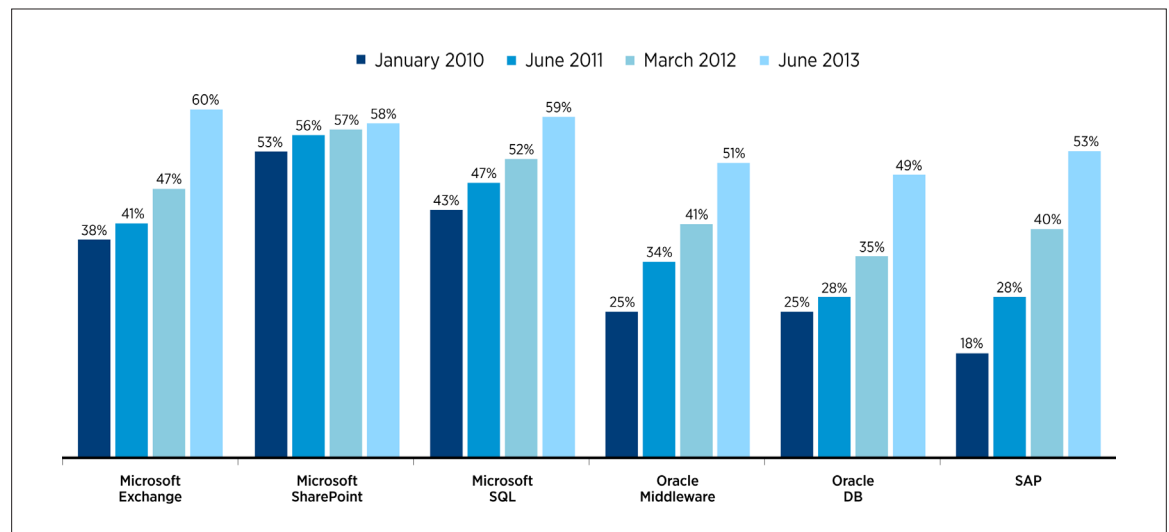

Figure 3. VMware Customers are Virtualizing Most of Their Business-Critical Workloads

Delivering the Most Flexibility and Choice

Business-critical applications vary from industry to industry, company to company. Applications come from large independent software vendors (ISVs) like SAP, Symantec, and Microsoft and from vertical-specific players like Epic for healthcare or Epicor for retail. The VMware approach to virtualization provides customers with the most choice and flexibility in selecting hardware and application components that best suit their needs, and customers know that VMware solutions integrate well with their existing technology investments. VMware follows a workload-agnostic approach with no "preferred" workload, delivering uniformly high performance across all virtualized applications. This makes it possible to have one platform support all business-critical applications instead of having to manage multiple silos.

"We looked at some of the features of competitive products, be we didn't want to get hung up on limitations. We didn't want solutions that we could use for this but not for that. With VMware infrastructure, we didn't see those types of limitations. We could use it to host Windows, Linux, or any of the operating systems we were using, and that was important for us."

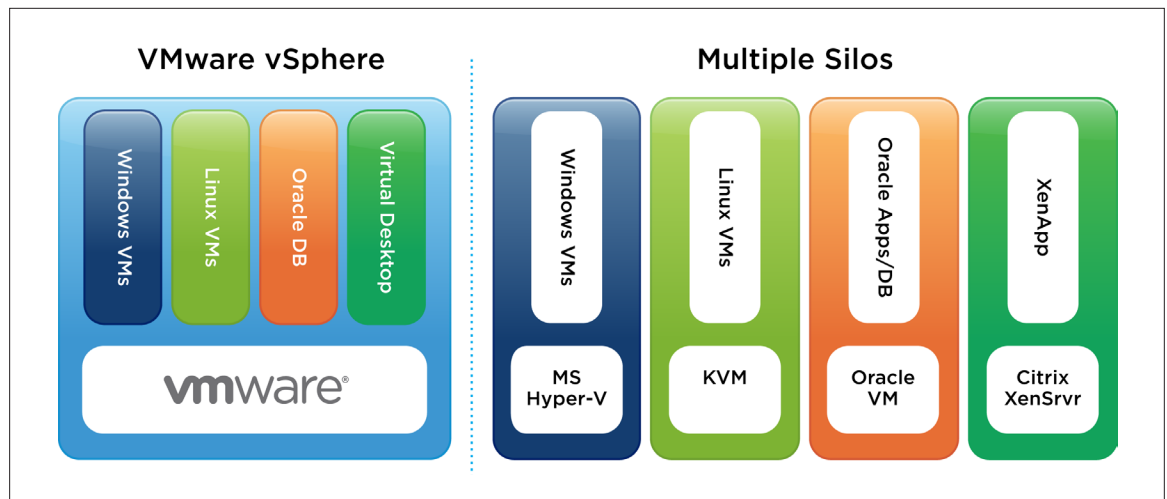— Mike Conlon, Director of Data Infrastructure, University of Florida

Figure 4. Comparing VMware Workload-Agnostic Approach to Competitors

VMware works closely with its large ecosystem of partners (software vendors, system OEMs and peripheral manufacturers) to certify their products with VMware vSphere—usually delivering certification when those products are first released. The result of working with such a wide variety of technology vendors is that VMware technology works across a broad array of IT environments. vSphere supports more guest operating systems than both Microsoft and Citrix; in fact, it supports more versions of Windows than Microsoft does. vSphere is certified on more than 1,500 server models for very broad hardware support, and over 2,000 software providers have explicitly issued support statements for 3,600 applications running on the vSphere platform.

More and more ISVs test their software on VMware even before they release it. Most major global software vendors support customers running their applications in and with VMware environments, including

• Adobe	• IBM
• Apple	• Juniper Networks
• Avaya	• McAfee
• BMC Software	• Microsoft
• Cisco Systems	• Oracle
• Computer Associates	• Red Hat
• Dell	• SAP
• EMC	• Symantec
• HP	• TIBCO

	KEY VIRTUALIZATION FEATURES	VMWARE VSPHERE WITH OPERATIONS MANAGEMENT 5.5	MICROSOFT WINDOWS SERVER 2012 R2 WITH HYPER-V
Business Continuity	Zero downtime for most critical applications	Fault Tolerance	Nothing comparable
	Robust high availability	Single-click HA, withstands multiple host failures	Failover Clustering: based on legacy network-dependent heartbeats
	Agentless backups	Data Protection (VDP): built-in de-dupe for both Windows and Linux virtual machines	System Center DPM: requires agents, de-dupe is done only after back-up; limited Linux guest support
	Live resource expansion	Hot-add vCPU, vRAM; hot-plug / extend virtual disk	No hot-add vCPU
	Host-based replication	vSphere Replication	Hyper-V Replica: single virtual machine management only, no option for SAN based DR replication
Broad Support and Choice	Guest operating systems	96 guest OSs including more versions of Windows than Hyper-V	27 guest OSs
	Compatible service providers	7,200+ VMware Service Providers	Fewer than 50 Hyper-V service providers worldwide
	ISV support statements	3,600+ applications explicitly supported by 2,000+ software providers	Microsoft certifies on Windows, but not specifically Hyper-V

Table 2. Comparison of Key Business Continuity and Ecosystem Features Among Virtualization Platforms

Lowest Total Cost of Ownership

VMware delivers the best virtualization platform in the market—a solution that is based on a rock-solid hypervisor that can virtualize even the most challenging business-critical workloads and a management solution that is designed specifically for virtualization. However, other vendors like to portray VMware as too expensive. In fact, they commonly claim that VMware is five to sixteen times more expensive than their own offerings. A closer look reveals that these vendors' claims are shortsighted. Much like owning a car, there is more to the cost than the sticker price. The car's fuel efficiency, maintenance costs and overall reliability can have a large impact on the owner's wallet. A better way to assess the economic value of various virtualization platforms is to look at the total cost of ownership (TCO).

A common way to measure TCO is to look at the capital expenses (CapEx) and the ongoing operating expenses (OpEx) related to a solution. For virtualization decisions, the CapEx includes all of the acquisition costs associated with implementing a solution while OpEx includes the time your IT administrators spends managing that solution. A company doing a TCO analysis for virtualization must include the following in its calculations:

• Virtual-machine density per physical server – How many virtual machines can run per host, and how many servers and software licenses must you buy?

• Operational cost savings – IT administration and maintenance costs dominate IT budgets today. How does each solution improve your IT staff efficiency and reduce operational costs?

"We've already saved $2.1 million since moving to VMware vSphere, and expect to see these savings grow over the next few years. We've consolidated our servers at a 20:1 ratio, significantly reducing hardware costs. We've saved energy and space. We've even saved time because VMware technology has eliminated the extra time, steps, and costs of procuring and provisioning physical servers. From an operational and capital expense standpoint, going with VMware vSphere made a lot more sense."

— Tom Hines, Chief Information Officer, Trilliant

Maximize Data Center Efficiency

Virtualization makes it simpler to provision new applications and services and that actually introduces a new concern—virtual machine sprawl. With an unconstrained virtualized environment, users can easily over-provision resources and IT departments will find themselves having to spend more to support the environment as adoption grows. That is why capacity management is vital. Companies using vSphere with Operations Management will get the most out of available resources by understanding how to appropriately size virtual machines and how to appropriately increase consolidation ratios without impacting performance. IT will also be able to eliminate waste by identifying virtual machines that are unused and reclaim those resources for other use. Having deep visibility into data center capacity and also understanding scenario-based capacity issues will help IT departments save on CapEx by allowing the environment to grow in a sustainable fashion. Based on a study of customers who've adopted vCenter Operations Management Suite, Management Insights concluded that the VMware operations management tools improve capacity utilization by 40% and consolidation ratios by 37%.

Other virtualization platforms do not have built-in capacity planning capabilities and rely on 3rd party solutions. At best, these vendors' tools are limited to capacity reporting based on past capacity consumption. They do not provide the additional insight required to help IT actually understand the capacity a virtual machine actually needs. That is because most other tools were designed for physical environments where capacity management was not critical.

KEY VIRTUALIZATION FEATURES	VMWARE VSPHERE WITH OPERATIONS MANAGEMENT 5.5	MICROSOFT WINDOWS SERVER 2012 R2 WITH HYPER-V
Advanced Memory Management	✓ Ballooning, transparent page sharing, memory compression, swap-to-disk/SSD	⊘ Dynamic Memory uses only ballooning and has limited Linux guest support, disables NUMA
Resource Optimization	✓ Identify over-provisioned resources and reclaim unused resources	⊘ Nothing comparable, requires complex scripting
SLAs (Service Level Agreements)	✓ Advanced Network and storage IO controls	⊘ No storage "noisy neighbor" protection
Improved Utilization	✓ Optimize VM density and right-size VMs	⊘ Nothing comparable, requires complex scripting
Proactive Planning	✓ Identify future capacity issues and plan for future growth with "what if" scenarios	~ Capacity usage reports only; no advanced analytics provided for real-time advice

Table 3. Comparison of Key Capacity Management Features Among Virtualization Platforms

Operational Efficiency Through Advanced Automation and Storage Management

Ongoing IT management and operational costs can be several times greater than hardware and software acquisition costs over the lifetime of a server. This must be factored into any TCO analysis.

Intelligent automation and storage management features built into vSphere with Operations Management and related solutions like vCenter Site Recovery Manager boost efficiency by automating manual processes and simplifying administration tasks. This, in turn, reduces the time IT administrators spend maintaining the existing infrastructure and frees their resources for more important and valuable strategic projects.

One specific area of strength for VMware is its patented, self-learning operations analytics. Demand on applications can vary throughout the day, but they often follow time-based patterns. For example, companies may see heavier demand on email systems on Monday mornings. Most traditional operations management tools monitor performance based on simple, static thresholds. This means that normal behavior, such as cyclical demand peaks, can trigger false alerts in these traditional management tools, making it difficult for IT to distinguish expected behavior from out-of-band behavior. vSphere with Operations Management uses advanced analytics to learn what "normal" is for the business. It correlates data from multiple sources to reduce the "alert storms" that are common with tools such as System Center Operations Manager. This, in turn, allows IT to respond faster to real performance or capacity issues. vSphere with Operations Manager also assists with troubleshooting by identifying the likely root causes for problems and providing recommendations to the administrator on how to fix the problem. Traditional tools require the administrator to manually drill down to find the source of the problem.

KEY VIRTUALIZATION FEATURES	VMWARE VSPHERE WITH OPERATIONS MANAGEMENT	MICROSOFT WINDOWS SERVER 2012 WITH HYPER-V
Automated Host Provisioning	✓ Auto Deploy: Initial deployment and ongoing host configuration management	⊘ Legacy bare-metal provisioning: Initial deployment only
Automated Server Workload Balancing	✓ DRS and DPM	⊘ Dynamic Optimization does not adhere to affinity and anti-affinity rules
Automated Storage Workload Balancing	✓ Storage DRS: Integrated with vCloud Director for private cloud storage automation	⊘ Nothing comparable
Automated Operations Management	✓ Dynamic thresholds are self-learning, automatically adjust to environment	⊘ Self-tuning thresholds require manual setup/admin overhead
Automated Root-Cause Analysis	✓ Problems identified and recommendations provided	~ Relies on manual drill down

Table 4. Comparison of Key Automation Features between Virtualization Platforms.

When these OpEx savings are combined with the CapEx savings from higher data center efficiency, it becomes quite clear that VMware delivers the lowest Total Cost of Ownership, reducing overall cost savings by 31%. Using the car analogy, vSphere with Operations Manager is similar to a car that is more fuel efficient, more reliable, and requires less maintenance than other cars. While other vendors focus only on the sticker price, VMware is delivering more value and lowering the overall cost of implementing a virtualization solution.

VMware: The Proven Leader in Virtualization

This whitepaper covered several technology-related advantages of VMware vSphere with Operations Management 5.5—from its secure hypervisor architecture to its ability to keep the most important applications up and running to its built-in automation. Many of those advantages are a result of the culture of innovation at VMware that continues to propel virtualization and cloud computing into the future. VMware was first to market with time- and money-saving technology such as VMware vMotion, Distributed Resource Scheduler (DRS), and Storage DRS.

Competitors are mainly copying these VMware features and roadmap or trying to graft technology best suited for a physical environment onto a virtual one, but VMware has not been resting on its laurels. With vSphere with Operations Management 5.5, VMware combines the world's leading virtualization platform with VMware's award winning management capabilities.

VMware vSphere's demonstrated capabilities, trustworthiness, and cost efficiency has led to it being the most proven and widely adopted virtualization solution in the market. Once virtualized, VMware customers find that they are able to get more out of their existing resources, reduce costs, increase availability, and gain operational flexibility. But why stop there? Virtualization is also an enabling technology for cloud computing and allows customers to accelerate and amplify these benefits in a new computing model. By selecting VMware for virtualization and operations management, customers can also begin their journey to the next IT transformation of cloud computing.

vmware®