Top 10 Reasons Why VMware vSphere 5 is Years Ahead of the Competition

vmware®

The Most Trusted Virtualization Platform for Building Cloud Infrastructures

VMware virtualization solutions are built on a robust foundation proven in production environments and chosen by over 250,000 customers, including 100% of the Fortune 100. VMware pioneered x86 server virtualization over ten years ago and our continuous innovation has brought capabilities to our latest vSphere 5 release that are years ahead of competitors such as Microsoft, Citrix and Red Hat. This paper highlights some of those unique innovations that make VMware vSphere 5 the clear platform choice for datacenter virtualization and cloud computing.

"VMware has the best, most feature-rich solution on the market. It's years ahead of the competition in many ways and will likely continue to lead the field for many years to come."

— InfoWorld, April 2011

1. The Most Trusted Hypervisor in the Industry Just Got Better – VMware ESXi 5

VMware® ESXi™ 5 extends the VMware legacy of highly reliable, highly scalable virtualization by delivering even better robustness, security and performance. Already, over 94 percent of ESX and ESXi deployments are in production environments—an example of how both large and small companies trust VMware for their business-critical workloads. ESXi 5 has an exclusive thin virtualization form factor with no dependence on a general-purpose server operating system in the virtualization layer. With a 144MB disk footprint, ESXi 5 dramatically shrinks the code base that needs to be maintained and secured, ultimately resulting in a more secure environment. In contrast, all versions of Microsoft Hyper-V R2 rely on Windows Server 2008 running inside the parent partition. Therefore, the smallest version of Hyper-V R2 (Windows Server 2008 R2 with Server Core installation) still has a disk footprint of approximately 3.6GB—representing millions more lines of code to maintain and secure. Hyper-V R2's dependence on Windows means it faces performance and scalability limitations, especially when running many concurrent virtual machines on the same host. With Hyper-V, the security and stability of your datacenter will always be dependent on the security and stability of Windows.

2. Virtualize 100 Percent of Your Applications – Support for 32 Virtual CPUs and 1TB per Virtual Machine

Per-virtual-machine CPU and memory maximums four times greater than previous versions allow companies to virtualize the most resource-intensive Tier 1 applications in their datacenters on vSphere 5. vSphere 5 enables a single virtual machine to simultaneously use up to 32 logical processors (32-way virtual SMP) and 1TB of RAM. With 32-way virtual SMP, even the most processor-intensive applications, such as databases and messaging servers, can be virtualized with no impact on performance. With 1TB per virtual machine, companies can run the most memory-intensive workloads in virtual machines. Microsoft Hyper-V R2 SP1 is limited to 64GB of RAM per virtual machine. It only supports up to 4-way virtual SMP on Windows Server 2008 virtual machines, and all other guest operating systems are limited to 2-way virtual SMP. Citrix XenServer 5.6 is limited to 8-way virtual SMP and 32GB. These limitations mean that users can virtualize only a subset of their applications.

3. Get Reliable, Cost-Effective Solutions for Small Offices – vSphere Essentials Editions

The robust, proven capabilities of VMware vSphere are also available in two cost-effective packages designed for small offices, starting at just $83 per processor. vSphere Essentials Edition enables server consolidation and centralized provisioning, management, and patching for immediate savings on hardware and operational costs. It also includes integrated physical-to-virtual conversion. vSphere Essentials Plus Edition is an easy-to-deploy "Always on IT" package that includes everything from Essentials and adds vMotion™ live migration, High Availability to dramatically improve application uptime, and Data Recovery for fast backup and recovery of virtual-machine data with built-in data deduplication to save on storage costs. With vSphere Essentials and

Essentials Plus, small offices get the industry's most proven, complete virtualization platform in an integrated package that solves their most pressing needs—application uptime and data protection. The "free" Hyper-V R2 offering from Microsoft is just a hypervisor missing key management features, and small businesses must add the cost and complexity of Microsoft System Center to make it manageable.

4. Use a Better Way to Enforce Security in a Virtual Environment – VMware vShield 5

Virtualization offers new and better ways to secure applications and networks. Rather than inheriting legacy approaches based on costly physical appliances, brittle network settings and performance-sapping agents, VMware vShield applies security policies at the virtualization layer, where every aspect of virtualized applications can be inspected and protected using a single vShield Manager interface. The vShield approach makes security simpler, more adaptive and more virtualization-aware. vShield Zones (included with certain vSphere editions) makes security-zone settings a logical construct so you can safely mix virtual machines from different trust zones on common hosts and keep those settings intact, even as virtual machines are migrated. The rest of the vShield product family (available separately) applies unique hypervisor-level introspection to protect virtual machines and networks with no need for hardware appliances or in-guest agents. The new vShield App Sensitive Data Discovery feature automates regulatory-compliance scans with more than 80 templates that identify protected data. Microsoft Hyper-V R2 and Citrix XenServer support only legacy physical-machine approaches to security and have nothing comparable to VMware vShield. Users deploying those products can only enforce security zones by setting up wasteful silos of physical hosts. Hyper-V and XenServer network security is dependent on VLANs—an approach that cannot scale to meet the needs of even midsize clouds, and their users are also dependent on in-guest agents that can trigger "antivirus storms."

5. Enable Automated Private Clouds in the Datacenter – Logical Resource Pools and Storage DRS

VMware vSphere 5 cluster-level management capabilities (e.g., vSphere Distributed Switch, vShield Zones, and Distributed Power Management)—and the automation provided by vSphere Distributed Resource Scheduler (DRS) and the new Storage DRS—all improve the effectiveness and flexibility of VMware Logical Resource Pools. These resource pools aggregate and share resources across many servers—the essence of cloud computing. Companies can create a logical, shared pool of resources for a specific business group and guarantee resource availability while maintaining isolation from other pools. vSphere DRS enables intelligent, automated load balancing so applications get the right level of resources at the right time. New Storage DRS extends that load balancing to dynamically automate placement of virtual disks on available datastores to balance disk use and prevent storage bottlenecks. DRS and Storage DRS are essential to enabling logical resource pools that comply with SLAs. Microsoft Hyper-V R2 SP1 and Citrix XenServer have nothing comparable. Hyper-V and XenServer deployments require dedicated silos of hosts or clusters for each business group—a rigid infrastructure that is time-consuming and costly to maintain. The Microsoft and Citrix products also lack the virtual-machine and virtual-disk affinity and antiaffinity rules found in vSphere, so they cannot guarantee datacenter policies and licensing compliance when load balancing is automated.

6. Achieve Higher Consolidation Ratios at Lower Cost – Virtual-Machine Density Optimizations

Better performance and utilization lead to higher virtual-machine consolidation ratios, which lead to lower capital expenditures. vSphere 5 employs unique performance and resource management features to let customers reliably run production workloads at the highest virtual-machine densities. vSphere 5 uses four levels of memory management technology—in-guest ballooning, memory compression, transparent page sharing and fast host paging—to accommodate the highest densities with any supported guest operating systems. The "Dynamic Memory" features in Microsoft Hyper-V R2 and Citrix XenServer use only a simple ballooning method that works with a select few guests and can't deliver comparable virtual-machine densities, as shown by independent testing. vSphere further adds a more efficient direct driver I/O model, true logical resource pools with Dynamic Resource Scheduler for dynamic load balancing and a high-performance "gang" CPU scheduler to extend its cost advantage over even "free" versions of Hyper-V, Xen and Red Hat KVM.

7. Match Applications to Appropriate Storage Tiers – Profile-Driven Storage

Operating multiple tiers of storage lets enterprises reduce costs by matching applications to storage hardware, providing just the right service levels. But assigning virtual machines to the correct storage tiers as they are provisioned is a manual operation prone to misconfiguration. vSphere 5 Profile-Driven Storage streamlines and automates storage provisioning by letting administrators classify their datastores into Storage Profiles based on the service levels they provide. Virtual machines are assigned a Storage Profile when provisioned, and vSphere then ensures that they are initially placed on a matching datastore and that any Storage DRS migrations are limited to eligible storage tiers. vSphere Storage Profiles can even use Storage vMotion to move virtual disks on noncompliant datastores to the correct storage tiers. Microsoft and Citrix have nothing equivalent for the critical task of managing storage. In fact, Hyper-V and System Center Virtual Machine Manager 2008 R2 have no storage-management features at all.

8. Reduce OpEx Costs During Planned Maintenance – High-Performance Live Migrations with vMotion and Storage vMotion

The need to perform planned maintenance during nonpeak hours is a significant contributor to higher operational costs. Overtime pay for nights and weekends is compounded with time spent coordinating among business owners to schedule a maintenance window. vSphere 5 improves on the market-proven vMotion and Storage vMotion capabilities that allow IT administrators to perform planned maintenance during normal business hours without a maintenance window. vMotion supports up to eight concurrent live migrations per host, greatly reducing time to evacuate virtual machines prior to maintenance. Microsoft Hyper-V, Citrix XenServer and Red Hat KVM are limited to a single live migration per host. vMotion also distributes migration traffic across multiple 1Gb or 10Gb links to further shorten maintenance windows, and it now supports high-latency links. Only vSphere Storage vMotion allows virtual-machine storage to be live-migrated between datastores—even across different types of storage (Fibre Channel, iSCSI, NFS, DAS)—with no downtime to accommodate storage maintenance and upgrades during production hours. Storage vMotion now even supports virtual machines with snapshots and linked clones. For storage migration, Hyper-V R2 has an inferior capability called "Quick Storage Migration" that requires application downtime, and Citrix and Red Hat have no storage-migration solution at all.

9. Ensure Service Levels for Business-Critical Applications – Network and Storage I/O Control

Enterprises running critical applications in private or public clouds need assurance that those workloads are protected from "noisy neighbors"—badly behaved virtual machines sharing the same hosts or clusters that indiscriminately consume resources. Microsoft Hyper-V and Citrix XenServer offer only basic CPU and memory controls for virtual machines that are insufficient to protect critical applications. Only vSphere 5 provides control for all key resources—CPU, memory, network and storage—needed to guarantee that service levels are met at the virtual-machine, virtual switch, datastore and resource pool levels. vSphere 5 Network I/O Control lets you prioritize vSphere Distributed Switch traffic, and new per-virtual-machine settings ensure that I/O-intensive workloads get the network bandwidth they need. vSphere 5 Storage I/O Control enforces virtual-machine storage I/O shares and limits on any type of datastore, including new NFS support, to ensure the storage performance of important applications even in times of congestion.

10. Centrally Manage Provisioning of Diskless Hosts – New vSphere Auto Deploy

Easily and quickly add capacity to a vSphere 5 cluster by simply booting a diskless server. vSphere Auto Deploy uses Host Profiles, vSphere host images and your custom provisioning rules centrally managed by vCenter to bring a new host online in minutes. Auto Deploy also lets you rapidly upgrade hosts to the latest vSphere release. Microsoft makes it much more difficult to provision Hyper-V hosts with requirements to purchase and install System Center Configuration Manager and apply complex configuration settings. Citrix XenServer can do basic PXE boot of hosts, but —unlike vSphere Auto Deploy—it has no features to automate selection and customization of fully configured host images.

Ten More Reasons Why VMware vSphere is the Best Choice...

11. Enable Shared Storage for Everyone – vSphere Storage Appliance

Until now, the cost of shared storage arrays has kept the high-availability and virtual-machine mobility benefits of virtualization out of reach for small businesses. The new vSphere Storage Appliance changes that by enabling virtual shared storage volumes spanning low-cost internal disks on up to three vSphere hosts. Advanced vSphere features including vMotion, High Availability, Fault Tolerance, DRS and Storage vMotion are supported after just a five-click configuration and without the need for dedicated shared storage hardware. The vSphere Storage Appliance is implemented entirely in software and can be added to any vSphere host or acquired in an attractively priced vSphere Enterprise Plus bundle. Using live migration and high availability with Microsoft Hyper-V and Citrix XenServer requires expensive Fibre Channel or iSCSI arrays, making vSphere a lower-cost and more capable solution for small businesses that want the best protection and automation for their applications.

12. Manage Virtual Networking for Private Clouds – vSphere Distributed Switch

With vSphere Distributed Switch, IT can manage one virtual switch that spans an entire cluster instead of managing a separate virtual switch for each host—a time-saving way to manage virtual networks. It creates a single distributed switch that spans a cluster of vSphere hosts and retains network runtime state when virtual machines move between hosts. This capability is a critical enabler for building private clouds, because it allows cluster-level network settings to be managed and policies to be enforced centrally. Networking vendors have built third-party virtual switches, such as the Cisco Nexus 1000V, based on vSphere Distributed Switch to make it easier to integrate virtualized environments and manage physical and virtual networks with a common set of tools. Microsoft Hyper-V R2 has nothing comparable to vSphere Distributed Switch. Those who deploy Hyper-V R2 must manually manage virtual networks on a host-by-host basis. Each time a Hyper-V virtual machine migrates from one host to another, the administrator will need to manually reconfigure network settings for the virtual machine. Citrix offers a vSwitch, but it is not fully integrated with XenServer and lacks third-party support from networking vendors.

13. Configure Virtualization Hosts the Easiest Way – VMware Host Profiles

VMware Host Profiles greatly simplify vSphere host configuration management, thereby reducing operational costs because IT administrators spend less time manually configuring and compliance-checking each individual host. Host Profiles automatically apply a "gold" host configuration profile (includes networking, storage and security settings) to multiple vSphere hosts. They also monitor compliance to "gold" host configuration profiles and can remediate noncompliant hosts with the push of a button. Microsoft Hyper-V R2 has no automated, out-of-box host- profiling capability. Host configuration and remediation requires a manual installation and complex configuration of System Center Configuration Manager.

14. Ensure Zero Downtime, Zero Data Loss for Applications – vSphere Fault Tolerance

With VMware vSphere Fault Tolerance (FT) ensuring that protected applications are always available, even in the event of hardware failure, your applications may never go down again. FT creates a shadow copy of a protected virtual machine and automatically triggers a seamless stateful failover if the virtual machine stops responding because of hardware failure. After the failover, FT automatically creates a new shadow copy on another host to ensure continuous protection. FT works with all types of shared storage (Fibre Channel, NAS or iSCSI) and with all operating systems supported by VMware vSphere. No complex setup is required, and applications do not need to be cluster-aware. Microsoft, Oracle and Red Hat have no equivalent functionality. Microsoft claims that active-active clustering can address the same need, but active-active clustering is complex to set up and only works with a small set of cluster-aware guest operating systems and applications. Citrix offers only a poorly integrated and much more expensive fault-tolerance solution from Marathon Technologies.

15. Add Virtual Machine Resources with No Downtime – Hot-Add CPU/Memory, Hot-Extend Disks

Even with the best planning, applications sometimes require more resources than originally expected. VMware vSphere 5 delivers hot-add virtual CPU and memory and hot-add/extend virtual disks to dynamically add virtual machine resources. The ability to hot-add and hot-extend allows IT to increase the resources available to an application by provisioning additional CPU, memory and disk to the virtual machine without disrupting the application or the end users. Hot-add/extend of virtual disk is supported on all virtual machines. Hot-add of virtual CPU/memory is supported on any guest operating system that natively supports hot-add CPU/memory on a physical server. Microsoft Hyper-V R2 SP1 supports hot-add memory only with certain guests. Neither Microsoft nor Citrix supports hot-add virtual CPU or hot-extend disks.

16. Reduce Storage Costs – vSphere Storage Thin Provisioning with Comprehensive Alerts

VMware vSphere Storage Thin Provisioning lowers capital and operating expenditures by reducing storage needs and cutting the power and cooling costs of excess storage. Thin provisioning enables IT administrators to create virtual machines without needing to dedicate all the storage up front. When a virtual machine is created, the thin-provisioned disk only consumes what's needed. Then, the virtual disk grows over time when more storage space is required. Now with vSphere 5, thin provisioning (and other storage tasks) can be offloaded to arrays having their own integrated thin storage features that support the vSphere Storage APIs for Array Integration. vSphere Storage Thin Provisioning comes with comprehensive consumption-based monitoring and alerting. IT administrators can set alerts to trigger when they need to procure more storage or rebalance virtual machines across the available storage with Storage vMotion or Storage DRS. These monitoring and alerting capabilities prevent systems from accidentally running out of storage space. Microsoft Hyper-V R2 has thin provisioning of disks but lacks the built-in monitoring and alerting capabilities that make it safe to use.

17. Save Even More Energy – vSphere Distributed Power Management

vSphere Distributed Power Management (DPM) reduces datacenter energy consumption during nonpeak hours by consolidating workloads within a cluster and turning off unneeded servers. Think of it as cluster-wide power management. Whereas other offerings only focus on power savings for individual servers, DPM provides a holistic, cluster-wide approach to power savings that is built into vSphere. To conserve energy during periods of low utilization, such as evenings and weekends, DPM consolidates workloads and powers off unused host servers. When utilization is expected to increase before the next work day, DPM brings servers back online to ensure that service levels are met. Microsoft Hyper-V R2 has nothing comparable. The Core Parking feature in Hyper-V R2 achieves only minimal power savings, and the PRO Tips approach that requires complex integration with System Center Operations Manager does not work at the host cluster level and has been dropped from Microsoft's product roadmap. Power management with Citrix XenServer requires additional servers and lacks the affinity rules needed to control virtual-machine placement.

18. Run the Operating Systems You Want – Broadest Guest OS Support, New vSphere Web Client and vCenter Server Appliance

VMware has always supported the broadest set of guest operating systems in the industry—including new and old versions of Windows, Linux, Solaris, Mac OS, NetWare, FreeBSD, OS/2 and more—so companies can virtualize their existing applications and maintain flexibility for future applications. In all, vSphere supports more than 80 guest operating systems or versions—more versions of Windows than even Microsoft Hyper-V R2 supports and more versions of Linux than Citrix XenServer supports. Unlike other hypervisors, vSphere 5 achieves full performance with unmodified guest operating systems without the need for paravirtualized guests that limit support options. vSphere 5 also gives more choice in platforms for management servers and clients with the new option of a Linux-based vCenter Server Appliance and the vSphere Web Client. which can run in any browser. Microsoft and Citrix support only thick Windows clients with their hypervisors and management servers, and even Red Hat KVM requires a Windows management server.

19. Leverage Built-In Network Adapter Failover and Load Balancing – Integrated NIC Teaming

vSphere provides built-in network-adapter failover and load balancing to each networked virtual machine, enabling greater hardware availability and fault tolerance in case of network-adapter failure. It works with any network adapter that vSphere supports. NIC teaming policies allow users to configure multiple active and standby adapters, and teaming configurations can vary per port groups on the same virtual switch and uplinks. Microsoft Hyper-V R2 still does not have integrated NIC teaming and relies instead on third-party network-adapter drivers for this functionality. The third-party approach is unsatisfactory because the drivers only work with network adapters from that same third party; it requires a separate installation; and it is unclear whether Microsoft or the third-party provides support should an issue arise.

20. Use the Latest Hardware and Software with Your Virtual Machines – New vSphere 5 Virtual Device Support

Sometimes you need virtual machines that support the latest computing features, such as: 3D graphics for Windows Aero on virtual desktops; USB 3.0 devices for hardware testing and USB devices connected through the vSphere Client; smart-card readers for virtual desktop infrastructure in secure environments; or Mac OS X support for virtualizing on Apple server platforms. vSphere 5 adds those capabilities so enterprises can now virtualize even those more specialized cases that once required dedicated hardware. With Microsoft Hyper-V R2, features such as 3D support require expensive graphics cards on each host, and virtual machines do have not USB support. Mac OS X guest support in Hyper-V is missing as well. Citrix XenServer virtual machines have the same limitations. Enterprises embarking a program to virtualize 100 percent of desktop and server workloads will find that only vSphere 5 meets their requirements.

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