VMware Infrastructure 3
Data center management and optimization suite

VMware® Infrastructure is the most widely deployed software suite for optimizing and managing IT environments through virtualization – from the desktop to the data center. The only production-ready virtualization software suite, VMware Infrastructure is proven to deliver results at more than 20,000 customers of all sizes, used in a wide variety of environments and applications. The suite is fully optimized, rigorously tested and certified for the widest range of hardware, operating systems and software applications. VMware Infrastructure provides built-in management, resource optimization, application availability and operational automation capabilities that deliver transformative cost savings as well as increased operational efficiency, flexibility and IT service levels.

Key Features and Benefits Summary

	Not included and cannot be added a-la-carte
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Key Features and Benefits	VMware Infrastructure Starter	VMware Infrastructure Standard	VMware Infrastructure Enterprise
Architecture			
• **Bare-metal architecture** inserts a robust virtualization layer directly on the server hardware for near-native virtual machine performance, reliability and scalability.	X	X	X
• **CPU virtualization**. Increase server utilization without the risk of critical services being starved for CPU resources. ESX Server uses intelligent process scheduling and load balancing across available processors to manage the execution of virtual machine processing	X	X	X
• **Virtualization for storage**. Leverage high performance shared storage to centralize virtual machine file storage for greater manageability, flexibility and availability.	X	X	X
– **Virtual disk files**. Simplify virtual machine storage management. Virtual machines see their own private virtual disk files. However, outside the virtual machine, the virtual disks are simply large files that can be copied, moved, archived and backed up as easily as any other file.	X	X	X
– **VMFS cluster file system.** Store virtual disk files on high performance shared storage such as Fibre Channel or iSCSI SAN. Since virtual machines are hardware independent and portable across servers, VMFS ensures that individual servers are not single points of failure and enables resource balancing across multiple servers. • **Shared data file system.** Enable multiple installations of ESX Server to read and write from the same storage location concurrently**.** • **Online insertion or deletion of nodes.** Add or delete an ESX Server from a VMFS volume without pausing or halting the processing of other ESX Server installations. • **On-disk disk file locking**. Ensure that the same virtual machine is not powered on by multiple servers at the same time		X	X
– **Logical volume manager**. Manage the interaction between the physical storage arrays and VMFS with flexibility and reliability. • **Dynamic volume resizing**. Aggregate multiple storage disks into a single VMFS volume. Resize LUNs and add new heterogeneous LUNs to a VMFS volume on the fly. • **Automatic volume re-signaturing**. Simplify the use of array-based snapshot technology. Re-signaturing automatically recognizes snapshot VMFS volumes. • *New*- **Partial online operation**. Volume continues to function even if some LUNs are lost.		X	X
– **Raw device mapping**. Optionally, map SAN LUNs directly to a virtual machine in order to enable application clustering[1] and array-based snapshot technology while profiting from the manageability benefits of VMFS.		X	X
– **Fibre Channel HBA consolidation**. Share expensive storage network components across many virtual machines while maintaining hardware fault tolerance.		X	X
– **Write-through I/O.** Ensure precise recovery of virtual machines in the event of server failure. Write-through I/O enables virtual machines to have the same recovery characteristics as a physical system running the same operating system.	X	X	X
– **Boot from SAN.** Run multiple installations of ESX Server on diskless configurations of blade and rack mount servers by booting from SAN. Simplify backups and disaster recovery by eliminating the need to separately backup local attached server disks.		X	X

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[1] Microsoft Clustering Services requires direct access to a SAN LUN.

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• **Virtualization for Networking**. Network virtual machines like physical machines. Build complex networks within a single ESX Server or across multiple installations of ESX Server for production deployments or development and testing purposes.	X	X	X
– **Virtual NICs**. Configure each virtual machine with one or more virtual NICs. Each of those network interfaces can have its own IP address and even its own MAC address. As a result, virtual machines are indistinguishable from physical machines from a networking standpoint.	X	X	X
– **Virtual switches**. Create a simulated network within an ESX Server with virtual switches that connect virtual machines.	X	X	X
– *New* – **Expanded port configuration policies**. Simplify port configuration by utilizing a single configuration object across large groups of ports. The configuration object specifies all information needed to enable a port: NIC teaming policy (now per port instead of per virtual switch), VLAN tagging, Layer 2 security, and traffic shaping.	X	X	X
– **VLAN**. Overlay a logical LAN on top of physical LANs to isolate network traffic for security and load segregation purposes. ESX Server VLANs are compatible with standard VLAN implementations from other vendors. Modify network configurations without having to change actual cabling and switch setups. VLANs keep broadcast traffic limited to the VLAN, reducing the network load of broadcast packets on other switches and network segments.	X	X	X
Performance and Scalability Leveraging eight years of R&D and experience from more than 20,000 customer deployments, VMware Infrastructure 3 delivers unparalleled performance and scalability. With VMware Infrastructure 3, even the most resource intensive production applications such as databases, ERP and CRM, can be virtualized.			
• *New* – **Enhanced virtual machine performance.** Benefit from better virtual machine performance across the board in VMware Infrastructure 3. Performance improvements have been achieved through: – multi-virtual machine scalability – improved memory management unit (MMU) handling – significant networking enhancements – Linux native posix thread library (NPTL) support	X	X	X
• **VMFS performance optimization**	x • On local storage only Does not include cluster file system	X	X
– **Optimized for virtual machine I/O.** Store and access the entire virtual machine state efficiently from a centralized location with virtual disk performance close to native SCSI.		X	X
– *New* - **Adaptive block sizing.** Uses large block sizes favored by virtual disk I/O. Use sub-block allocator for small files and directories.		X	X
– *New*- **Dynamic increase of VMFS volume size.** Create new virtual machines without relying on a storage administrator. Adaptive block sizing and addressing for growing files allows to increase a VMFS volume on the fly.		X	X
– *New* – **Increased number of ESX Server per VMFS volume**. Connect up to 32 ESX Server installations to a single VMFS volume.		X	X
– *New* – **Extended block size and file limits.** Run even the most data intensive production applications such as databases, ERP and CRM in virtual machines • Maximum volume size: 64 TB • Maximum virtual disk size: 2 TB • Maximum file size: 2 TB max • Block size: 1 MB to 8 MB		X	X
– *New* – **Caching**. VMFS uses volume, device, object and buffer caching to improve performance		X	X
• **Advanced memory management**	X	X	X
– **RAM over-commitment.** Increase memory utilization by configuring virtual machine memory that safely exceeds the physical server memory. For example, the sum of the memory of all virtual machines running on a server with 8GB physical memory can be 16GB.	X	X	X
– **Transparent page sharing.** Utilize available memory more efficiently by storing memory pages identical across multiple virtual machines only once. For example, if several virtual machines are running Windows Server 2003, they will have many identical memory pages. Transparent page sharing consolidates those identical pages into a single memory location.	X	X	X
– **Memory ballooning.** Shift memory dynamically from idle virtual machines to active ones. Memory ballooning artificially induces memory pressure within idle virtual machines, forcing them to use their own paging areas and release memory for active virtual machines.	X	X	X
• *New* – **Improved power management.** Lower the data center utility bill with improved power management. ESX Server enters a low power "halt" state when a CPU is not scheduled.	X	X	X
• *New* - **4-way Virtual SMP™.** Enable a single virtual machine to use up to four physical processors simultaneously. ESX Server 3 extends this unique feature from two to four processors. With 4-way Virtual SMP even the most processor intensive software applications like databases and messaging servers can be virtualized.		X	X
• *New* - **16GB RAM for** virtual machines**.** Run the most memory-intensive workloads in virtual machines with a memory limit extended to 16GB.	(limited to servers with up to 8 GB physical memory)	X	X

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• *New* – **Support for powerful physical server systems**. Take advantage of very large server systems with up to 32 logical CPUs and 64GB RAM for large scale server consolidation and DR projects.	(limited to servers with up to 4 physical CPUs)	X	X
• *New* – **Support for up to 128 powered-on** virtual machines. Take advantage of very large server systems for server enterprise-class server consolidation and containment. The maximum number of powered-on virtual machines per ESX Server has been extended from 80 to 128.	(limited to servers with up to 4 physical CPUs and 8GB of physical memory)	X	X
• *New* – **Flexible virtual switches.** Scale up to handle more virtual machines. Virtual switches can be created with any number of ports from 8 to 1016, and the maximum number of virtual switches has been raised from 128 to 248.	X	X	X
• *New* – **Wake-on LAN.** Enable higher consolidation ratios by allowing virtual machines to go on stand-by mode when not used.	X	X	X
• *New* -**Large-scale management with VirtualCenter 2.** Manage hundreds of servers and thousands of virtual machines. VirtualCenter 2 starts up faster, is more responsive and is designed from the ground up to handle the largest IT environments.	X	X	X
Interoperability VMware Infrastructure 3 is optimized, rigorously tested and certified across the complete IT stack of servers, storage, operating systems and software applications allowing for enterprise-wide hardware and operating system independent standardization.			
• **Hardware.** VMware Infrastructure 3 is rigorously tested and certified with industry-leading rack, tower and blade servers from Dell, Fujitsu Siemens, HP, IBM, NEC, Sun Microsystems and Unisys.			
– *New* – **Support for Sun Microsystems and Unisys hardware systems**	X	X	X
– *New* – **Support for Intel White-Box standard specifications**	X	X	X
– *New* – **Support for dual core processors**.	X	X	X
• **Storage.** VMware Infrastructure 3 is rigorously tested and certified with a wide range of storage systems from Dell, EMC, EqualLogic, Fujitsu, Fujitsu Siemens, HP, Hitachi Data Systems, IBM, NEC, Network Appliance, StorageTek, Sun Microsystems and 3PAR.			
– *New* - **NAS and iSCSI SAN support.** By supporting lower-cost, more easily managed shared storage, ESX Server 3 further reduces total cost of ownership of IT environments. Advanced VMware Infrastructure capabilities like VMotion™, DRS and VMware HA are fully supported with NAS and iSCSI environments.	(NAS only, no iSCSI support)	X	X
– *New* – **4GB Fibre Channel SAN support.**		X	X
• **Operating systems**. VMware Infrastructure 3 supports a wide range of unmodified operating systems including Windows, Linux, Solaris and Novel NetWare.	X	X	X
– *New* – **64-bit guest operating system support**	X	X	X
– *New* - **Solaris 10 operating system support**	X	X	X
• **Software applications.** Run software applications from hundreds of software vendors in VMware virtual machines.	X	X	X
• **Support for other virtual machine formats.** ESX Server 3 can run virtual machines created in non-VMware formats. Using the free VMware Virtual Machine Importer, users can run Microsoft® Virtual Server and Virtual PC, and Symantec® LiveState Recovery virtual machines in ESX Server.	X	X	X
Management The advance management capabilities of VMware Infrastructure 3 reduce the operating cost of IT environments			
• **Storage Management**	X	X	X
– **LUN discovery and management**. Discover LUNs in the shared storage and map those LUNs to a VMFS volume.		X	X
– *New* – **File directories.** Enable easy virtual machine administration with file directories. All files for a virtual machine are stored in a separate directory.	X	X	X
– **Direct pass through of virtual machine data.** Ensure correct application behavior and data integrity for applications running in virtual machines. VMFS preserves the internal file system semantics of the operating system running inside the virtual machine.	X	X	X
– *New* – **Unified hierarchical namespace**. Manage all available physical disks, logical volumes and VMFS volumes with a consistent namespace that eliminates potential conflicts.	X	X	X
– *New* - **SMI-S-compliant management interfaces.** Monitor virtual storage using any standard SMI-S-aware storage management tool.	X	X	X
• **Virtual machine provisioning and migration.**	X	X	X
– **Deployment wizard**. Create new virtual machines with a user friendly wizard. Customize network identities and operating system parameters to make new instances unique.	X	X	X
– *New* – **Re-designed virtual machine templates.** Save virtual machines as templates that can be instantiated in minutes. Minimize errors and downtime by establishing configuration standards for virtual machines. Re-designed templates support easy virtual machine patching and updating. Templates are stored on shared storage for greater reliability.	X	X	X
– **Virtual machine cloning.** Copy existing virtual machines when a new instance of a server is needed.	X	X	X
– **PXE (Pre-boot Execution Environment) support**. Use your server provisioning tools to deploy existing system images to empty virtual machines.	X	X	X
– **Cold migration of virtual machines.** Move a powered off virtual machine from one	X	X	X

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physical server to another by dragging and dropping the virtual machine icon.			
– **Live migration of virtual machines**. Migrate running virtual machines from one physical server to another with VMware VMotion while maintaining continuous service availability and transaction integrity.			X
• **Server and virtual machine management**	X	X	X
– *New* - **Virtual Infrastructure Client.** Manage multiple installations of ESX Server, virtual machines, and VirtualCenter Server with a common user interface.	X	X	X
– *New* – **Virtual Infrastructure Web Access.** Manage virtual machines and access virtual machine graphical consoles without installing a client.	X	X	X
– **ESX Server configuration**. Centralize management and configuration of all ESX Server installations in VirtualCenter.	X	X	X
– *New* – **Virtual machine shortcuts.** Enable self-help for end users with direct access to virtual machines through a Web browser.	X	X	X
– *New* – **Remote devices.** Install software in a virtual machine running on a server from the CD-ROM of a desktop without leaving your desk.	X	X	X
– *New*- **Centralized storage of virtual machine configuration files.** Increase deployment flexibility with centralized storage of virtual machine configuration files	X	X	X
– *New* – **Enhanced inventory model**. Manage the complete inventory of virtual machines, resource pools and physical servers with greater visibility into object relationships. The new inventory model provides the flexibility to organize objects into folders and create two separate hierarchical views.	X	X	X
– *New* – **Enhanced object model**. Manage virtualized IT environment with a consistent object model covering all entities such as virtual machines, physical servers, and resource pools.	X	X	X
– *New* – **Interactive topology maps**. Visualize the relationships between physical servers, virtual machines, networks and storage. Topology maps allow to easily verify correct configuration for distributed services such as VMotion, DRS and HA.	X	X	X
– *New* – **Centralized licensing**. Manage all VMware software licenses with an embedded FlexNet licensing server and a single license file.	X	X	X
• **System monitoring.** Continuously monitor physical servers and virtual machine availability and utilization from a single interface.	X	X	X
– **Alerts and notifications.** Set green, yellow and red level alarms for CPU, memory and heartbeat states to manage and pre-empt problems. Alarm triggers generate automated notifications and alerts. Schedule automatic execution of system management tasks such as sending SNMP traps, sending emails, running management scripts, suspending, powering off, and resetting virtual machines.	X	X	X
– *New* – **Enhanced performance graphs.** Monitor and analyze virtual machines, resource pools and 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.	X	X	X
– **Reports**. Export VirtualCenter data to HTML and Excel formats for integration with other reporting tools and offline analysis.	X	X	X
• *New* - **Maintenance mode for servers** with VMware DRS. Perform maintenance on physical servers without disruption to virtual machines and end users. When a physical server is placed in maintenance mode, DRS automatically moves virtual machines to alternative servers in the resource pool.			X
• *New* – **Programmatic interfaces** through the VMware Infrastructure SDK. Provide Web Services APIs to access the functionality and data provided through the graphical user interfaces in order to integrate with third party systems management products and to extend of the core functionality	X	X	X
Distributed resource optimization			
• **Resource management for virtual machines.** Define advanced resource allocation policies for virtual machines to improve service levels to software applications. Establish minimum, maximum, and proportional resource shares for CPU, memory, disk and network bandwidth. Modify allocations while virtual machines are running. Enable applications to dynamically acquire more resources to accommodate peak performance.	X	X	X
– **CPU capacity prioritization**. CPU capacity is assigned to virtual machines on a "fair share" basis and CPU resource controls also allow an absolute minimum level of CPU capacity to be provided to critical virtual machines.	X	X	X
– **Storage I/O traffic prioritization**. Ensure that critical virtual machines receive priority access to storage devices. I/O traffic from virtual machines to disk can be prioritized on a "fair share" basis.	X	X	X
– **Network Traffic Shaper**. Ensure that critical virtual machines receive priority access to network bandwidth. Network traffic from virtual machines can be prioritized on a "fair share" basis. Network Traffic Shaper manages virtual machine network traffic to meet peak bandwidth, average bandwidth and burst size constraints.	X	X	X
• *New* - **Dynamic resource optimization** across resource pools with VMware DRS. Align computing resources with business goals while ensuring flexibility and efficient utilization of hardware resources. VMware DRS continuously monitors utilization across resource pools and intelligently allocates available resources among virtual machines based on pre-defined rules			X

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and policies.			
– **Abstraction of resources from hardware**. Manage resources independently of the physical servers that contribute the resources.			X
– **Flexible hierarchical organization**. Organize resource pools hierarchically to match available IT resources to the business organization. DRS ensures that resource utilization is maximized while business units retain control and autonomy of their infrastructure. Resource pools can be flexibly added, removed, or reorganized as business needs or organization change.			X
– **Isolation between resource pools**. Make allocation changes within a resource pool without impacting other unrelated resource pools. For example, any allocation changes in the resource pool dedicated to a given business unit do not impact other resource pools.			X
– **Management of sets of virtual machines running a distributed application.** Optimize the service level of distributed applications by controlling the aggregate allocation of resources for the entire set of virtual machines running the distributed application.			X
– **Manual and Automatic Migration Mode**. Execute recommendations for virtual machine resource optimization either manually or automatically with VMware VMotion.			X
– **Affinity Rules.** Create rules that govern the allocation of virtual machines to physical servers. For example, certain virtual machines can always be kept on the same server for performance reasons**.** Alternatively**,** certain virtual machines can always be kept on different servers for high availability.			X
High Availability			
VMware Infrastructure 3 delivers data center-class high availability			
• **Shared storage.** Eliminate single points of failure by storing virtual machine files on shared storage such as Fibre Channel or iSCSI SAN, or NAS.	(NAS only)	X	X
• **SAN transparency.** Use native SAN storage for virtual machines with the same ease and flexibility as virtual disk files. Raw device mapping lets virtual machines use standard SAN LUN data stores in addition to special-purpose VMFS formatted LUNs for virtual disk files. Offload file-level backup and replication of virtual machine data to SAN-based utilities. Easily configure clusters of virtual and physical machines with shared SAN data stores for cost effective high availability.		X	X
• **Built-in storage access multipathing.** Ensure shared storage availability with SAN multipathing for Fibre Channel or iSCSI SAN, and NIC teaming for NAS.	(NAS only)	X	X
• *New* – **Virtual machine snapshots**. Increase application availability while reducing backup windows using virtual machine snapshots. Create a point-in-time copy of virtual machine data that can be used for testing, backup, and recovery operations,	X	X	X
• *New* - **Hot add virtual disk.** Add virtual disk to a running virtual machine to increase available resources or for backup**.**	X	X	X
• *New* - **Distributed journaling.** Recover virtual machines faster and more reliably in the event of server failure**.**	X	X	X
• *New* – **Enhanced NIC teaming.** Give each networked virtual machine built-in NIC failover and load balancing enabling greater hardware availability and fault tolerance. New NIC teaming policies allow users to configure multiple active and standby adapters. Teaming configuration may be different for different port groups on the same virtual switch and different groups can even select different teaming algorithms for the same team.	X	X	X
• **Support for Microsoft® Clustering Services.** Cluster virtual machines running Microsoft® Windows operating system across physical hosts.		X	X
• *New* - **Automatic restart of** virtual machines with VMware HA. Provide an easy to use and cost-effective failover solution			X
– **Automatic detection of server failures**. Automate the monitoring of physical server availability. HA detects server failures and initiates the virtual machine restart without human intervention.			X
– **Resource checks**. Ensure that capacity is always available in order to restart all virtual machines affected by server failure. HA continuously monitors capacity utilization and "reserves" spare capacity to be able to restart virtual machines.			X
– **Automatic restart of** virtual machines**.** Protect any application with automatic restart in a different physical server in the resource pool.			X
– **Intelligent choice of servers** (when used with VMware DRS). Automate the optimal placement of virtual machines restarted after server failure.			X
• *New* – **VMware Consolidated Backup.** Provide an easy to use, centralized backup facility for virtual machines that simplifies backup administration and reduces the load for multiple installations of ESX Server.			X
– **Fibre Channel tape support**. Eliminate backup traffic with LAN-free virtual machine backup.			X
– **Backup proxy server**. Remove load from ESX Server installations by consolidating backup load and management onto a backup proxy server.			X
– **File level full and incremental backup (**for virtual machines running Microsoft® Windows operating system)**.** Recover individual files and directories			X
– **Image level backup** (for virtual machines running any operating system). Recover entire virtual machine image.			
– **Built in integrations** with most major backup providers. Leverage existing investment in			X

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backup agents to move virtual machine data from the Consolidated Backup proxy server to tape devices			
Security			
• **Compatibility with SAN security practices**. Enforce security policies with LUN zoning and LUN masking.		X	X
• **VLAN tagging**. Enhance network security by tagging and filtering network traffic on VLANs. Limit the scope of broadcast domains.	X	X	X
• **Layer 2 network security policies**. Enforce security for virtual machines at the Ethernet layer. Disallow promiscuous mode sniffing of network traffic, MAC address changes, and forged source MAC transmits.	X	X	X
• **Fine-grained access control**. Secure the environment with configurable, tiered group definitions and fine-grained permissions.	X	X	X
• **Integration with Microsoft® Active Directory**. Base access controls on existing Microsoft® Active Directory authentication mechanisms.	X	X	X
• *New* – **Custom roles and permissions.** Enhance security and flexibility with user-defined roles. VirtualCenter users with appropriate privileges can create custom roles such as night shift operator or backup administrator. Restrict access to the entire inventory of virtual machines, resource pools and servers by assigning users to these custom roles.	X	X	X
• *New* - **Resource pool access control and delegation**. Secure resource allocation at different levels in the company. For example, when a top-level administrator makes a resource pool available to a department-level use, all virtual machine creation and management can be performed by the department administrator within the boundaries assigned to the resource pool.			X
• *New* – **Audit trails.** Maintain a record of significant configuration changes and the administrator who initiated them. Export reports for event tracking.	X	X	X
• *New* – **Session management.** Discover and, if necessary, terminate VirtualCenter user sessions.	X	X	X