



What's New in VMware® vSphere™ 4.1 — VMware vCenter™

VMware vSphere 4.1

WHITE PAPER

VMware® vSphere™ 4.1 ("vSphere") continues to improve on its industry-leading virtualization platform, continuing the journey to cloud computing — transforming datacenters into dramatically simplified environments and enabling the next generation of flexible, reliable IT services. VMware vCenter™ Server 4.1 (vCenter Server) is a critical component of a complete VMware vSphere deployment and provides centralized management, provisioning, updating and orchestration of VMware vSphere hosts.

vCenter Server 4.1 greatly simplifies virtualization management, enabling users to:

- Scale to meet the needs of the most demanding enterprise environments with support of as many as 15,000 virtual machines.
- Improve IT responsiveness by proactively managing vSphere environments with rapid provisioning, automated load balancing of virtual machine workloads and out-of-box workflows for automation.
- Analyze and remediate issues quickly with deep visibility into vSphere and its underlying infrastructure.

This paper provides a technical overview of new virtualization management capabilities in the vCenter Server 4.1 release, including enhancements in VMware vCenter Orchestrator (Orchestrator), VMware Host Profiles (Host Profiles), VMware vCenter Update Manager (Update Manager), VMware vSphere 4 Management Assistant (vSphere Management Assistant) and VMware vCenter Converter 3 (Converter).

vCenter Server

vCenter Server 4.1 includes the following significant enhancements compared to earlier versions:

- 64-bit transition
- Performance and scalability improvements
- Support for ESX®/ESXi™ integration with Active Directory

64-bit Transition

With vSphere 4.1, vCenter Server will ship as a 64-bit version only and will need a 64-bit operating system. There are two key reasons for this transition. First, as vSphere becomes the virtualization platform for cloud deployments, the limitations of a 32-bit OS have increasingly constrained the scalability and performance of vCenter Server. The transition to a 64-bit OS essentially eliminates the memory limits associated with a 32-bit OS such as the 4GB virtual memory address space and other kernel memory limits. This enables vCenter Server to scale to the larger vSphere-based cloud deployments we envision for the future. Second, all servers shipping today use 64-bit processors. Moving to a 64-bit version makes it easy for R&D and QA to deliver product faster to market because they have fewer interoperability and backward-compatibility requirements to meet. This 64-bit transition should not come as a surprise. It is in line with what's happening for enterprise-server applications in IT datacenters. Windows Server 2008 R2, SQL Server 2008 R2, and Exchange 2007 and 2010 are available only as 64-bit.

To upgrade an existing 32-bit vCenter environment, users can install vCenter Server 4.1 on a new machine, and migrate the existing vCenter database. In-place upgrades on 64-bit systems from vCenter Server 4.0 to vCenter Server 4.1 are also supported. Please refer to the vSphere 4.1 Upgrade Guide for further details.

Users can run vCenter Server in a virtual machine or on a physical server. We recommend running vCenter inside a virtual machine to leverage benefits of virtualization such as VMware High Availability (VMware HA), VMware Distributed Resource Scheduler (VMware DRS) and vMotion.

Performance and Scalability Enhancements

vCenter Server 4.1 includes significant performance and scalability enhancements compared to its 4.0 version. In addition to improved scalability benefits resulting from 64-bit transition, vCenter Server also includes a number of performance optimizations, such as:

- Faster vCenter Server startup
- Faster vSphere client login

- Better vSphere client responsiveness and snappier user interaction
- Faster add-host operations
- Better performance at higher vCenter limits
- Larger numbers of concurrent operations supported with lowered latencies and increased throughput
- Lower resource usage by vCenter Server agents
- Faster virtual-machine recovery in response to host failures with VMware HA
- Better load balancing due to improved VMware DRS/VMware Distributed Power Management (VMware DPM) algorithm
- Better integration between VMware HA/VMware Fault Tolerance (VMware FT) and VMware DRS/VMware DPM

The results of these performance and scalability enhancements are evident in the number of inventory objects that vCenter Server 4.1 can support per vCenter Server instance or per datacenter. You can see that vCenter Server 4.1 scales 2x–6x better than vCenter Server 4.0. Note that a single vCenter Server can now support as many as 10,000 powered-on virtual machines and as many as 15,000 registered virtual machines. These new scalability limits are important especially when planning large-scale cloud deployments based on VMware vSphere.

LIMITS	VSPHERE 4	VSPHERE 4.1	IMPROVEMENT
VMs per host	320	320	None
Hosts per cluster	32	32	None
Virtual machines per cluster	1,280	3,000	3x
Hosts per vCenter Server	300	1,000	3x
Registered VMs per vCenter Server	4,500	15,000	>3x
Powered-on VMs per vCenter Server	3,000	10,000	3x
Concurrent vSphere clients	30	120	4x
Hosts per datacenter	100	500	5x
VMs per datacenter	2,500	5,000	2x
Linked Mode	10,000	30,000	3x

In vSphere 4.1, vCenter Server can handle as many as 500 concurrent tasks at a time depending on the tasks being performed. Similarly, several supported limits for vSphere 4.1 also have been enhanced compared to vSphere 4.0. Some of the major improvements related to vCenter Server include:

FEATURE	VSPHERE 4	VSPHERE 4.1	IMPROVEMENT
vCenter Server concurrent operations	100	500	5x
Port Groups per vCenter Server	512	1,016	~2x
Distributed switches per vCenter Server	16	32	2x
Hosts per distributed switch	64	350	>5x

For virtual-machine migration tasks, vSphere typically imposes stricter limits in order to prevent the network, datastore or host from experiencing a bottleneck, because it can affect migration performance. Most of these limits are also increased in vSphere 4.1, as shown in Table 3.

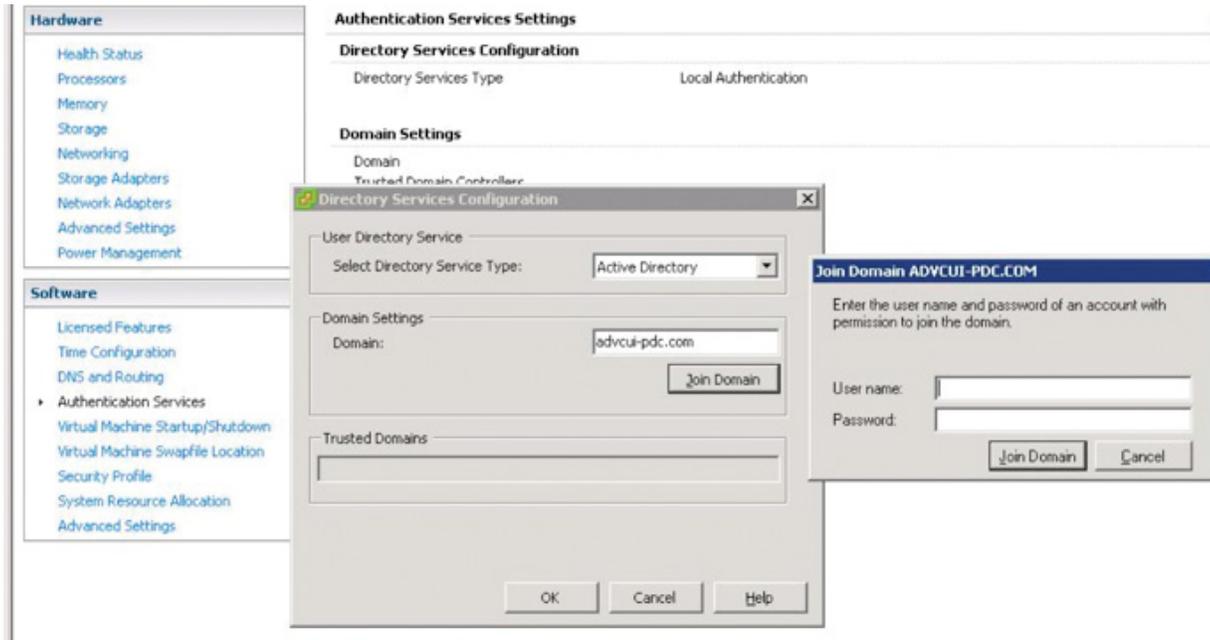
LIMITS	OPERATIONS	VSPHERE 4	VSPHERE 4.1	IMPROVEMENT
Network	vMotion over 1G	2	4	2x
	vMotion over 10G	2	8	4x
Datastore*	vMotion over FC, iSCSI, NFS	8	128	16x
	Storage vMotion over FC, iSCSI, NFS	8	8	1x
Host	vMotion	2	8	4x
	Storage vMotion	2	2	1x

* Assuming all FC and iSCSI disks are in VMFS3 format.

A number of vCenter optimizations have resulted in significantly reduced latencies of common provisioning operations. Some operations, such as registering virtual machines and reconfiguring virtual machines, have improved by as much as 3x since vSphere 4.0. Check the *vCenter Server Performance Best Practices* paper for a detailed benchmark study.

Active Directory Integration Support

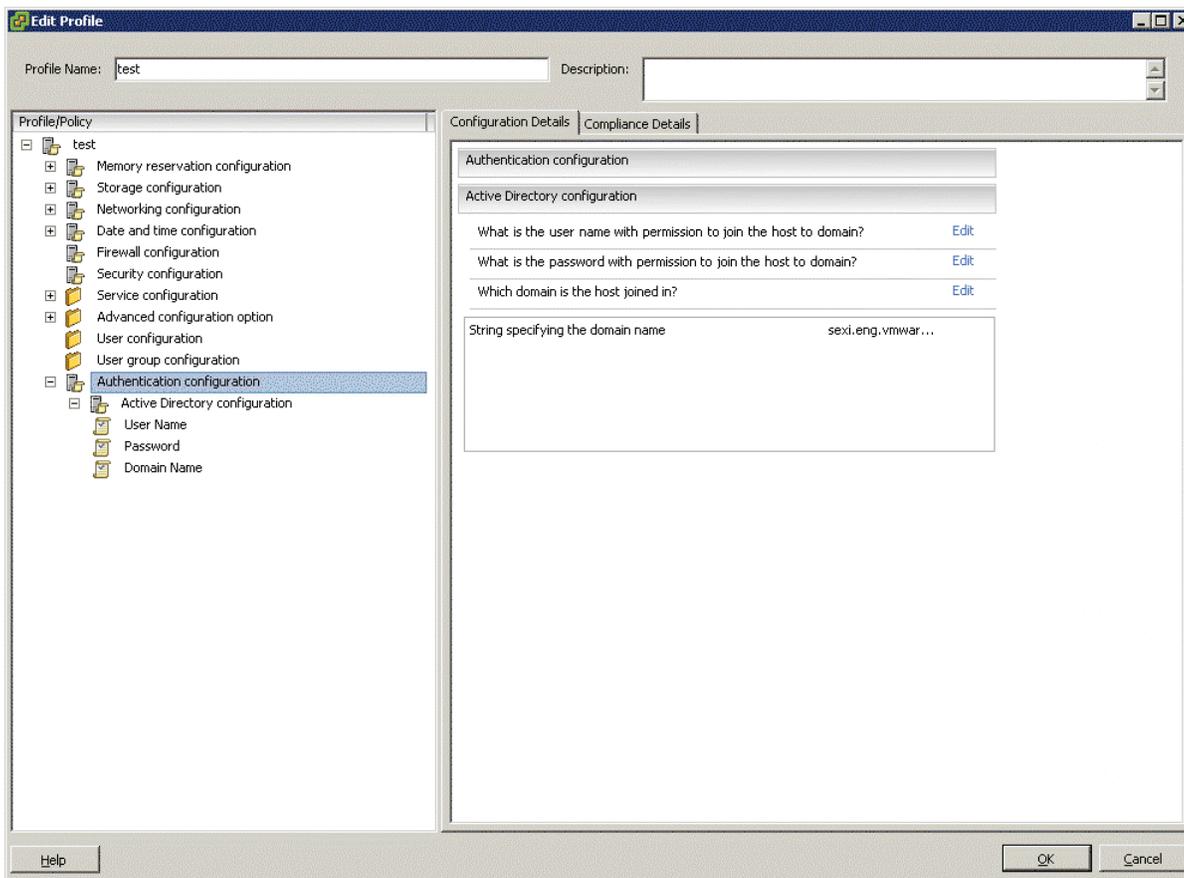
vSphere 4.1 provides integration with Microsoft Active Directory to allow seamless user authentication for ESX/ESXi servers. You can maintain users and groups in Active Directory for centralized user management, and can also assign privileges to users or groups on ESX/ESXi hosts. This integration makes it unnecessary to maintain static user information on ESX/ESXi hosts. Customers do not want to manage user accounts on ESX or ESXi, as this results in additional work that they typically do not do in a physical environment. The Active Directory integration lowers the operating expenses managing a vSphere environment; in addition, it is a step toward making the ESX/ESXi server plug-and-play and stateless. The vCenter Server 4.1 user interface has been updated to support this Active Directory integration. The following screenshot shows how users can select Active Directory as the user directory service using the authentication services configuration for a vSphere host.



VMware Host Profiles

VMware Host Profiles, introduced in vCenter Server 4.0, greatly simplifies ESX/ESXi host configuration management, and enables centralized compliance monitoring and reporting against a desired host configuration. With Host Profiles, users can quickly and easily make host configuration changes across a large population of hosts. In vCenter Server 4.1, Host Profiles includes multiple enhancements to support additional configuration settings:

- With the support for administrator password configuration, users can quickly roll out administrator password changes to vSphere hosts in their deployment.
- You can now configure the privilege settings for a user using Host Profiles. All user privileges that you can configure from the vSphere client can now be configured through Host Profiles.
- Host Profiles now enables users to select and configure specific physical NICs using PCI device ID. This will simplify network configuration for environments in which separate physical NICs are assigned to different network traffic, for example, vMotion, IP-based storage and so on.
- Host Profiles has been enhanced to support the ESX/ESXi integration with Active Directory. Using Host Profiles, users can provide all required information — the Active Directory domain name and user credentials required to join the domain — to complete Active Directory configuration for the vSphere host. The following screenshot shows how you can use a host profile for Active Directory configuration.



VMware vCenter Orchestrator

Orchestrator, a powerful orchestration engine that is part of vCenter Server, simplifies management by enabling automation of administrative tasks using out-of-the-box workflows, or by assembling workflows using an easy drag-and-drop interface. Similar to vCenter Server, the Orchestrator server is 64-bit only starting with the 4.1 version. The Orchestrator client is also 64-bit by default, but users do have an option to use a 32-bit client. If users are running an earlier version of Orchestrator on a 32-bit platform, they can use the data-migration tool included in the vCenter Server 4.1 installation media to migrate the existing 32-bit Orchestrator configuration settings to the 64-bit environment. The VMware vCenter Orchestrator Installation and Configuration Guide provides step-by-step guidance on this process.

In vCenter Server 4.1, VMware has significantly improved the performance and scalability of Orchestrator. Orchestrator benefits from the improved memory limits in the 64-bit version — it can now scale up to match the higher limits supported by vCenter Server 4.1. In addition, there are many performance optimizations in the areas of CPU usage, memory and thread management, and caching. As a result, users will notice better performance and scalability with the vCenter Orchestrator — from 5x-10x faster depending on usage scenario — in the vSphere 4.1 release.

Orchestrator also includes additional enhancements, such as new workflows in the out-of-the-box library, ability to use vCenter Server as a license server, and a new vSphere 4.1 plug-in that allows dynamic adding of vCenter Server instances, and eliminates the need to restart the configuration server when importing certificates.

vCenter Update Manager

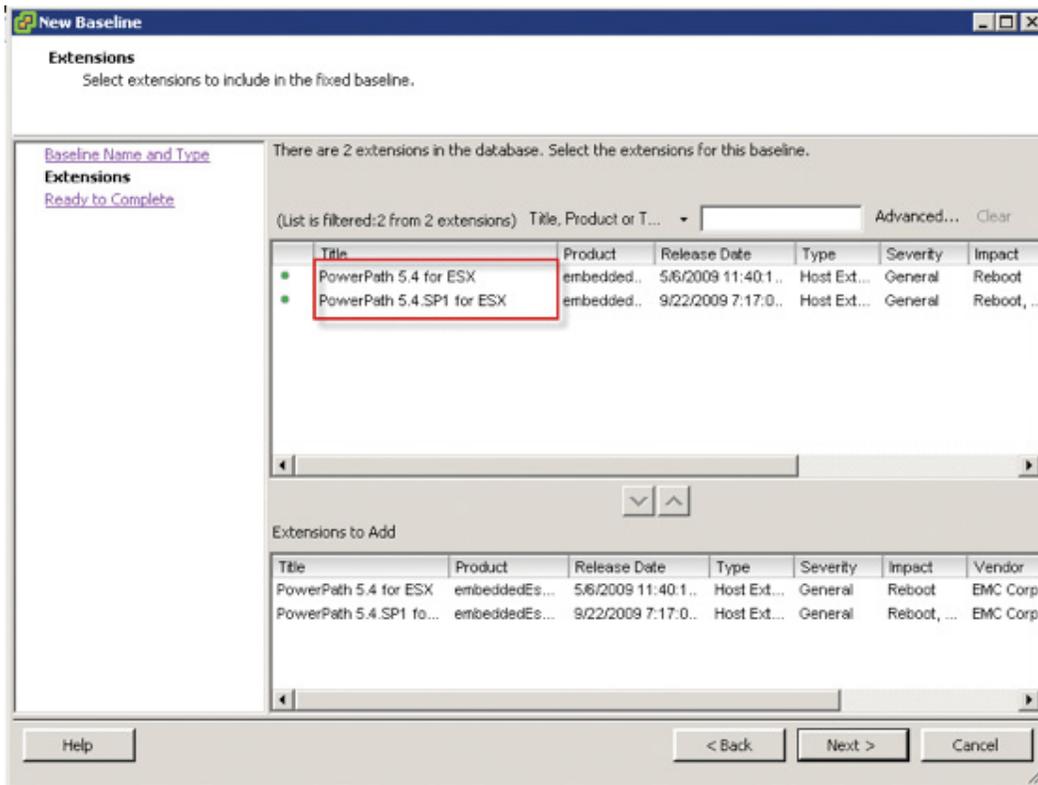
Update Manager automates scanning and patching of vSphere hosts and virtual machines. In vCenter Server 4.1, Update Manager introduces several key enhancements:

- Provisioning, patching and upgrade support for third-party ESX/ESXi modules
- Improved support for notification and installation of recalled patches
- Enhanced compatibility with VMware DRS, VMware DPM and VMware HA for cluster-level patch operations
- Cluster-level pre-remediation check analysis and report
- Importing of offline patch bundles
- Performance and scalability enhancements to match vCenter Server

Provisioning, Patching and Upgrade Support for Third-Party Modules

With the recent architectural changes in vSphere, third-party software and hardware vendors are increasingly developing modules and plug-ins that integrate with ESX/ESXi. In vCenter Server 4.1, Update Manager introduces a framework to support such third-party modules. Using Update Manager, users can now provision, patch and upgrade EMC's PowerPath/VE multipathing software installed on ESX. Update Manager uses a newly created Host Extension baseline to support the first-time installation and subsequent patching and upgrade of the EMC module. The Host Extension baseline also provides all operations supported by other existing Update Manager baselines, such as:

- Inclusion of updates corresponding to extensions in the baseline
- Inclusion of baseline in a baseline group
- Attachment of baseline to hosts/host containers/cluster
- Scanning of the host to determine and view the compliance of updates
- Staging of extensions in the baseline that cause the package for the updates to be copied to the host in preparation of an installation
- Remediation of the baseline that causes the extensions to be installed on the host



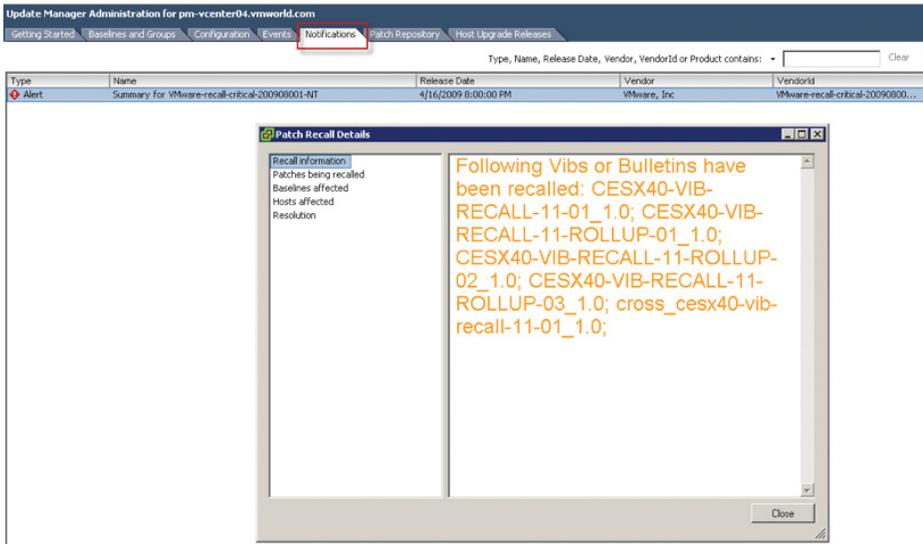
Once the EMC PowerPath 5.4.1 update is available as a patch source in Update Manager, a vSphere administrator can create a Host Extension baseline containing this update. This baseline can be attached to one or more hosts in the vSphere inventory to install EMC PowerPath 5.4.1:

- If a host does not have a prior installation of PowerPath, Update Manager reports the compliance status of the EMC PowerPath update as missing and that of the baseline as not compliant. Remediation of the vSphere host against the baseline will perform a fresh installation of PowerPath 5.4.1 on the host.
- If a host has PowerPath 5.4 installed, Update Manager reports the compliance status of the update as missing and that of the baseline as not compliant. In this case, remediation of the host against the baseline will perform patching of PowerPath 5.4 to 5.4.1 on the host.

Thus Update Manager can now simplify provisioning, patching and upgrade of third-party ESX modules at scale using the convenient patch-policy capabilities provided by the host extension baseline construct and the comprehensive compliance dashboard.

Improved Support for Notification and Installation of Recalled Patches

Update Manager 4.1 includes improved support to immediately send critical notifications about recalled ESX and related patches. When Update Manager receives a notification from VMware about a patch recall, it will generate an alert in the Notifications tab. Users can check the patch recall details to list the recalled patches as well as the Update Manager baselines and vSphere hosts impacted by the recalled patches. Users can also set up automatic email notification for the recalled patches. This feature helps users quickly identify hosts where recalled patches might already be installed by marking such hosts as non-compliant. In addition, Update Manager deletes the recalled patches from its own repository to prevent any future installation. Furthermore, Update Manager informs users when the solution patches are available and provides information on how to resolve the issues caused by the recalled patches.

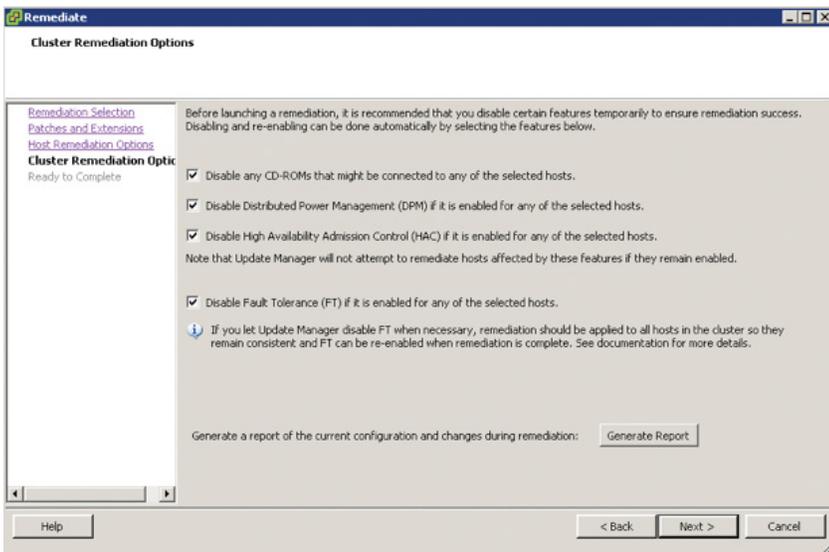


Enhanced Compatibility with VMware DRS, VMware DPM and VMware HA for Cluster-Level Operations

Update Manager now gives users the ability to configure cluster settings, such as VMware DPM, VMware HA admission control and VMware FT to ensure that cluster-level operations, such as scanning, staging and remediation, complete successfully. For example, even if VMware DPM has put hosts in standby mode, the Update Manager scan, stage and remediate operations will succeed for all applicable hosts in the cluster. Furthermore, Update Manager also includes pre-remediation checks to detect and report on conditions that can prevent a vSphere host from entering maintenance mode during remediation. These checks can be set from the cluster remediation options screen, and allow users to automatically disable the following features during the remediate operation:

- CD-ROMs connected
- VMware DPM
- VMware HA admission control
- VMware FT

Once the remediation is complete, Update Manager will re-enable these features to restore the earlier settings.



Import Offline Patch Bundles

Update Manager now supports the import of offline bundles. Offline bundles are ZIP files that can contain VMware and third-party patches. Users download these patches from the Internet or copy them from a media drive, and then save them as offline bundle ZIP files on a local drive. Users can import the patches to the Update Manager patch repository later.

VMware vCenter Converter 3

Converter now supports virtual-to-virtual (V2V) conversion of Hyper-V virtual machines. When pointed to a Hyper-V machine, Converter will display the virtual machines running on the Hyper-V machine and will allow the user to select a powered-off virtual machine. It will then allow the user to import that virtual machine to a VMware destination.

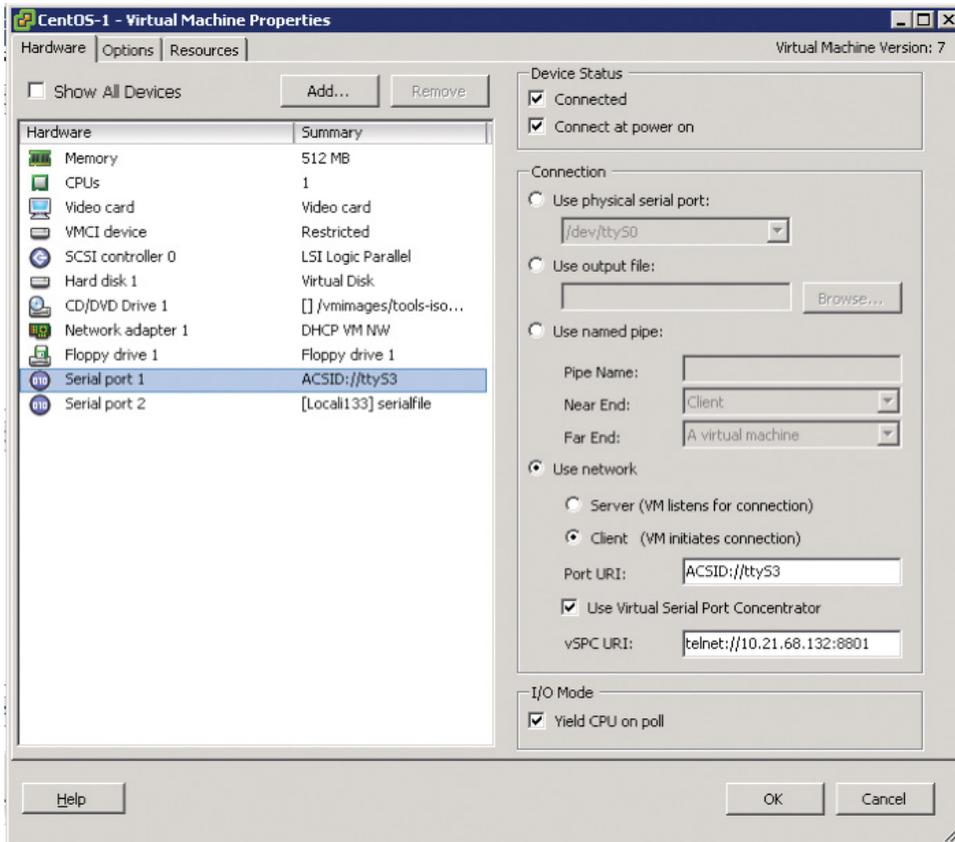
VMware vSphere 4 Management Assistant (vSphere Management Assistant)

VMware vSphere Management Assistant (vSphere Management Assistant) is a prepackaged Linux virtual machine through which administrators and developers can deploy scripts and select third-party agents to manage ESX and ESXi systems. vSphere Management Assistant includes VMware vSphere 4 PowerCLI, VMware vSphere 4 SDK for Perl, an authentication component (vi-fastpass) that supports non-interactive login, and a log collection component (vi-logger). vSphere Management Assistant can be used to manage ESX/ESXi 3.5 Update 2 and later, as well as ESX/ESXi 4.0 and later servers. vi-fastpass allows direct connection to established target servers without user intervention. vi-logger allows users to collect logs from ESX/ESXi and vCenter Server systems and stores the logs on vSphere Management Assistant for analysis. Users can use vSphere Management Assistant to perform most of the tasks commonly performed in the ESX service console. In vSphere 4.1, vSphere Management Assistant includes the following enhancements:

- Updated deployment environment in vSphere Management Assistant — the updated deployment environment in vSphere Management Assistant 4.1 is fully compatible with vSphere Management Assistant 4.0. The new vSphere Management Assistant appliance now uses a CentOS-based Linux distribution, instead of a RHEL-based distribution used in the earlier 4.0 version. This change is in line with the other VMware appliance-based products.
- Unattended authentication in vSphere Management Assistant — vSphere Management Assistant 4.1 offers improved authentication capability, including integration with Active Directory and command-line interface commands to configure the connection. vSphere Management Assistant is pre-installed with the tools necessary to integrate with Active Directory. If vSphere Management Assistant and vCenter share an Active Directory domain, users logged into vSphere Management Assistant will not have to re-authenticate against vCenter to run their monitoring and management scripts and tools.

Virtual Serial Port Concentrator

Many customers rely on using serial port console connections to manage physical servers. These connections usually provide a non-graphical and hence low-bandwidth remote console approach for administering physical servers. Administrators use physical serial port concentrators to multiplex connections to several hosts. vSphere 4.1 enables support for virtual serial port concentrators to provide similar functionality for virtual machines. The feature allows users to redirect a virtual machine's serial ports over a standard network link using telnet or SSH. This enables solutions such as third-party virtual serial port concentrators, for virtual machine serial console management or monitoring. Providing a suitable way to remote a virtual machine's serial port(s) over a network connection, and supporting a virtual serial port concentrator utility, thus, gives VI administrators first-class support for the traditional server-management approach. Furthermore, these console connections are also considered more secure for virtual machines because the traffic is only on the management network. The Virtual Machine Properties settings user interface has been modified to allow serial port configuration.



Summary

VMware vCenter Server 4.1 provides a scalable and extensible platform that forms the foundation for virtualization management – delivering centralized control and visibility into every level of the virtual infrastructure. VMware innovations continue to make VMware vSphere 4.1 the industry-leading virtualization platform to enable cloud computing in datacenters of all sizes and across all industries.

