RESEARCH Directions on Microsoft

issue

Virtual Machine Manager 2008 Supports Hyper-V

Virtual Machine Manager 2008 Supports Hyper-V

Virtual Machine Manager 2008 supports Microsoft and VMware virtualization technologies, patches virtual machines offline, and is better integrated with Operations Manager

By Michael Cherry

The May 2008 beta of System Center Virtual Machine Manager (VMM) 2008, combined with a second Hyper-V release candidate, shows that Microsoft is likely to release both products before the end of 2008. VMM aims to manage both an organization's library of virtual machines (VMs) and the physical servers hosting the VMs because management will ultimately be as important to successful server consolidation as actual virtualization features are. Although VMM can manage Microsoft and VMware virtualization products and has good features for day-to-day management of VMs, a key feature requires tight interaction with System Center Operations Manager.

Managing Large-Scale Virtualized Datacenters

VMM is a software tool for provisioning, managing, and storing VMs for hardware virtualization. Hardware virtualization enables multiple OS instances to run simultaneously on a single physical host computer. Each such "guest" OS instance runs in a VM that emulates a complete computer in software, including the processor, memory, graphics card, network interface, and storage devices (such as disk and CD-ROM drives). This emulation gives the guest what appears to be exclusive control of the hardware, but in reality the hardware is shared with other OS instances. Although hardware virtualization was initially used to test applications and application configurations, organizations are now using virtualization to consolidate production applications onto fewer, better utilized servers.

VMM can manage VMs that run on several different hardware virtualization products, including the following:

- Hypervisor products, such as Windows Server 2008 Hyper-V or VMware ESX, which are thin software layers that run directly on the server's hardware
- VM monitors, such as Microsoft Virtual Server or VMware Server, which are applications that run on a host OS.

Administrators can manage VMs from a VMM management console (which resembles the Operations Manager console), or through the PowerShell scripting environment. Console tasks are executed as PowerShell scripts that are displayed by the console, and administrators can save these scripts, then edit and reuse them as command-line scripts, which are easier to automate than console actions. PowerShell scripts can also be called by other scripts.

VMM relies on SQL Server (VMM includes the free SQL Server Express) to store VMM configurations; VM resources (such as hardware and OS profiles) that describe the environment in which VMs can run; and VM templates, which are used as models for deploying new VMs.

The VMM library stores and catalogs the many large files generated by virtualization products, including the following:

- VHD files for inactive VMs
- CD or DVD images (e.g., ISO files) used as alternatives to physical media for software distribution
- Hardware profiles, which are hardware specifications for a specific VM and contain information such as CPU type, amount of memory, and the priority given to the VM when it is running
- OS profiles, which provide the most common OS settings, such as the computer name and domain or workgroup settings.

Profiles and templates are created in the VMM administrator console either by wizards or from the PowerShell command line.

Authorized users can manage their own VMs with a VMM self-service Web application called the Delegated Provisioning User Interface. For example, developers could be allowed to create and deploy VMs for testing applications during the development process. The VMM administrator configures self-service policies to determine which users can use the self-service portal and which VMs they can create on specified physical host servers.

What's New?

New features for VMM 2008 include support for more virtualization technologies, improved performance and optimization monitoring, and offline VM patching.

More Supported Virtualization Technologies

VMM 2007 supported VMs running on Microsoft Virtual Server. The new version adds support for Windows Server 2008 with Hyper-V (currently available as a release candidate), Hyper-V Server (announced but not yet available publicly), Virtual Server 2005 R2 SP1, and VMware

ESX with Virtual Center (VMware's tool for provisioning VMs and monitoring performance of physical servers and VMs).

VMM support for VMware includes support both for intelligent placement of VMs on VMware servers and for VMware Vmotion, which allows administrators to move running VMware VMs from one physical server to another. Management of VMware products will probably continue with future versions of VMM because it makes Microsoft's management products better able to displace incumbent systems management or virtualization vendors. Although Microsoft has not provided a specific list of other VM products it will support, it is expected that Citrix's XenServer will be among them.

Performance and Resource Optimization (PRO)

PRO helps organizations optimize the resources available for different VM workloads on Hyper-V by providing tools to help administrators manage the physical servers and the VMs running on them. If an organization is using Operations Manager to monitor both the physical servers and the VMs and is also using PRO-enabled management packs (application-specific modules that tell Operations Manager which events or services to monitor) on the Operations Manager server, then administrators can use VMM PRO to set rules or policies so that VMM takes the appropriate action when Operations Manager reports a condition requiring action.

For example, an administrator could set a threshold for the performance of a VM on a physical server. PRO continually monitors the Operations Manager information. When it detects that a VM's performance has fallen below the preset threshold, PRO could be configured to raise an alarm, increase the resources (such as memory available) to the VM, or move the VM to a different server that meets the performance requirement.

Hyper-V does not enable movement of VMs including VMs running on VMware. Although Hyper-V's quick migration is not the same as the VMware VMotion feature, Hyper-V's quick migration feature (automated by PRO) may provide a workable solution for moving VMs. (For an illustration, see "Performance and Resource Optimization" on this page.)

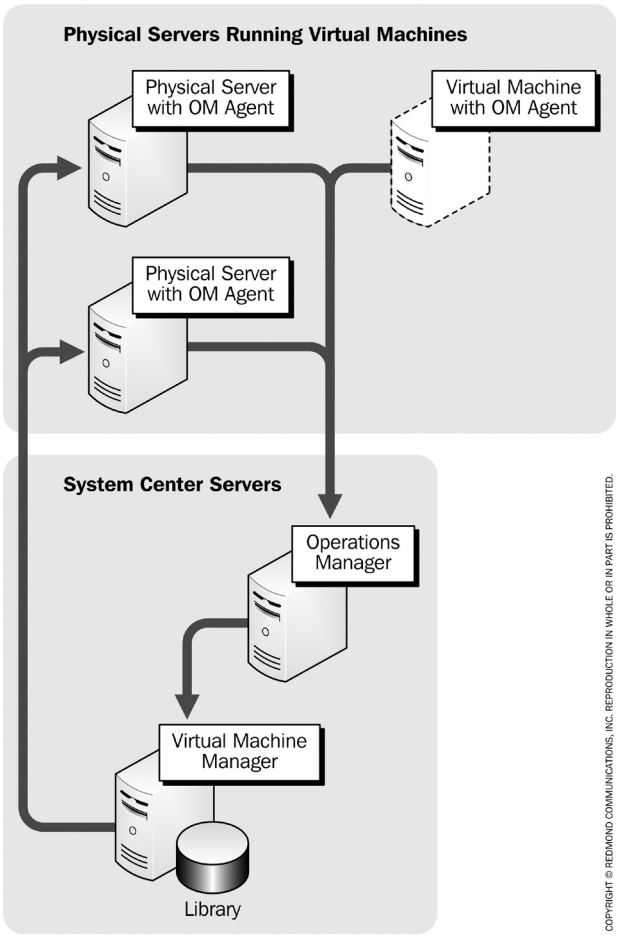
It should be noted that although PRO can automate the movement of VMs across physical servers, it cannot tell whether a physical server is properly licensed for the software being moved. Microsoft licenses are applied to physical devices, not VMs, and license transfers are subject to restrictions. Administrators will need to keep separate records to ensure that moving a VM does not violate licensing provisions, or they will have to implement policies that restrict movement of specific VMs to specific, licensed machines.

Offline Virtual Machine Servicing Tool

VMs can be stored in the VMM library when they are not needed in production, which frees up server resources for the current set of production applications. However, this creates a problem—keeping VMs patched and updated while they are offline. If moved into production, an out-of-date VM may be vulnerable to attack. Although not technically a part of VMM, but rather a solution accelerator that works with VMM, the Offline Virtual Machine Servicing Tool provides a way to automate the process of updating virtual machines.

The Servicing Tool uses a process called *servicing job*s to manage update operations based on lists of existing VMs stored in the VMM library. Using Windows Workflow Foundation and the Windows Task Scheduler, a servicing job runs PowerShell scripts to do the following:

Performance and Resource Optimization



When an organization deploys both Systems Center Operations Manager (OM), and System Center Virtual Machine Manager (VMM), it can take advantage of VMM's Performance and Resource Optimization (PRO) feature.

The OM agents on the physical servers and virtual machines (VMs) report information on the OS and the applications and on infrastructure components such as processors, disks, and the network back to an OM server running the VMM and PRO-enabled management packs.

The OM server reports the status of the physical servers and the VMs to VMM, where the status is compared against parameters set by the administrator.

If a VM falls out of the range set by the administrator, VMM can either alert the administrator of the condition or it can take action, such as performing a quick migration to move the VM to a better server or increasing the resources available to the VM.

• Create groups of VMs to be serviced and schedule servicing jobs

• Deploy each VM to a physical maintenance server and start it

• Trigger the appropriate software update cycle with either System Center Configuration Manager or Windows Server Update Services (WSUS)

• Shut down the updated VM and return it to the VMM library.

Although the current offline serving tool works with VMM 2007, it will be updated for VMM 2008. (For an illustration of the update process, see "Offline VM Patching" on this page.)

Other Features

Other notable VMM 2008 capabilities include the following:

Physical-to-Virtual (P2V) Conversion Wizard. VMM provides a task-based wizard to guide administrators through the process of creating a virtual version of a physical server, including creating images of physical hard disks, preparing the images for use in a VM, and creating the final VM. The wizard can create virtual servers from physical servers running the following OSs:

• Windows Server 2008 (without Hyper-V role enabled)

• Windows Server 2003 with SP1 (32-bit only)

• Windows 2000 with SP4

• Windows XP with SP2 (32-bit only)

• Windows Vista (64-bit only).

In addition to the wizard-driven P2V conversions, PowerShell can be used to script the conversion process. For P2V conversion of other OSs, such as Linux or legacy versions of Windows, Microsoft recommends partners such as PlateSpin or Portlock.

Virtual-to-Virtual (V2V) conversion tools. VMM provides administrators with tools to convert a VM stored in VMware's file format to Microsoft's virtual hard drive (VHD) format.

VMM does not support converting a VM to a physical machine—virtual to physical (V2P) conversion—which is often needed because many support organizations provide better support for problems when the problems can be replicated on a physical computer. Third parties such as PlateSpin have tools that can support V2P conversion.

Intelligent placement. Based on performance data gathered from the physical hosts, VMM helps administrators decide on which physical host to place a VM. Two default load-balancing algorithms are available to help administrators distribute VM workloads across multiple host servers. Intelligent placement of VMs can be automated by using the VMM PRO feature or PowerShell scripts.

PowerShell support. VMM contains more than 170 PowerShell scripts, each of which has extensive help entries and code samples. By using "view code" buttons throughout the administrator's console, administrators can easily see and modify PowerShell scripts for future command-line use. Administrators can also use the centralized library to store and share commonly used PowerShell scripts.

System Requirements and Licensing

VMM 2008 Server will run on only a 64-bit version of Windows Server 2008 with Hyper-V. Other prerequisites include the following:

• .NET Framework 2.0 and 3.0

• SQL Server 2005 Express Edition with SP2 (included with installation) or Microsoft SQL Server 2005 Standard or Enterprise Editions with SP2

• PowerShell 1.0

• Windows Remote Management

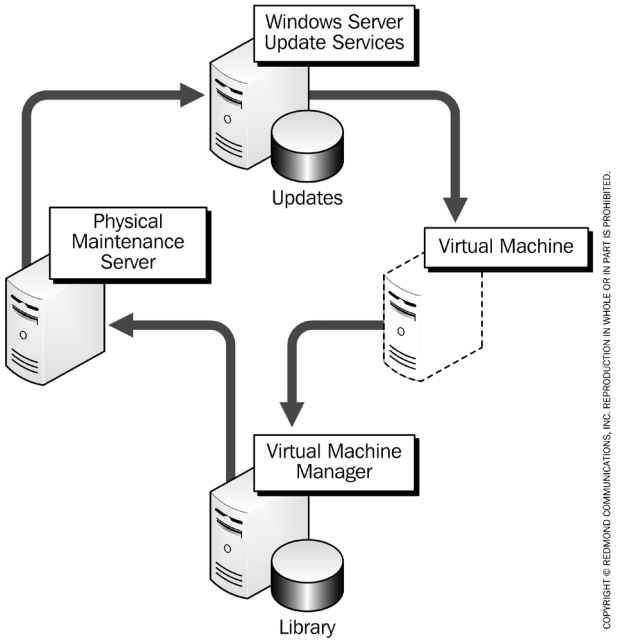
• Internet Information Server 7.0 (needed for Delegated Provisioning User Interface only)

• Windows Automated Installation Kit (WAIK).

The management console and PowerShell do not require x64 Windows Server 2008.

In addition, Active Directory is required for security purposes to ensure that access to images on the network is authenticated and secure. Active Directory also helps the VMM administrator identify and view details for all of the physical servers running VMs that are installed in the customer environment. The Distributed File System can also be used to replicate images automatically across the network.

Offline VM Patching



The Offline VM Patching Solution Accelerator works with Virtual Machine Manager (VMM) and maintenance servers to keep virtual machines patched and up to date.

By using Windows Task Manager, the Windows Workflow Foundation, and PowerShell, the Offline VM Patching Solution Accelerator can keep virtual machines (VMs) that are stored in the VMM library up to date and safe to deploy by doing the following:

• Determining whether or not a VM needs patching

• Creating groups of VMs to be serviced and scheduling servicing jobs

• Getting each VM's virtual hard disk (VHD) file from the VMM library and running it on a maintenance server

• Triggering an update cycle from either Windows Server Update Service (WSUS) or System Center Configuration Manager

• Shutting down the VM and storing the updated VHD in the VMM Library.

Licensing

VMM requires a separate management license for each server being managed. VMM management licenses are assigned per physical host and cover an unlimited number of VMs running on each host.

Customers have the following two ways to license VMM:

Workgroup Edition. A Workgroup Edition includes a single VMM product license and five management licenses for managed servers; this is intended for small and midsize organizations.

System Center Server Management Suite Enterprise. Organizations managing more than five physical servers must license VMM through a new System Center Server Management Suite Enterprise, which includes a product and management license for VMM as well as management licenses only for Configuration Manager 2007, Data Protection Manager 2007, and Operations Manager 2007. The management suite does not include product licenses for Configuration Manager, Operations Manager, or Data Protection Manager, which must be purchased separately.

Organizations should also examine how they deploy SQL Server for these tools. If an organization were using all of these tools, it would likely add a per-processor license for SQL Server Standard (US$5,737) or Enterprise (US$23,910). Several of the System Center products are sold with a license that includes SQL Server—including VMM, which includes SQL Server Express—but those SQL licenses are restricted for use only with the accompanying product. Rather than run multiple SQL Servers, organizations may want to license SQL Server separately and consolidate the various management databases onto a single server.

Final pricing of VMM 2008 Workgroup Edition and System Center Server Management Suite Enterprise will be announced closer to the product's release date, which is expected to be before the end of 2008.

Resources

The Virtual Machine Manager Web site, which includes a link to a downloadable beta version of VMM 2008, is at www.microsoft.com/systemcenter/scvmm.

For in-depth analysis of the issues related to licensing and virtualization, see "Virtualization Licensing Adapts to New Challenges" on page 46 of the June 2007 *Update*.

Microsoft's Web site for its virtualization technologies is at www.microsoft.com/windowsserversystem/virtualization.

The TechNet library of technical documentation on VMM is at technet.microsoft.com/en-us/library/bb740737(TechNet.10).aspx.

The System Center Server Management Suite Enterprise is detailed at www.microsoft.com/systemcenter/svrmgmtsuites/howtobuy/default.mspx.