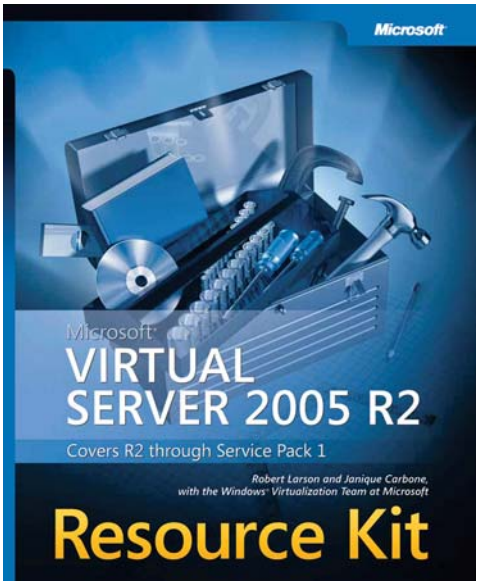

Microsoft® Virtual Server 2005 R2 Resource Kit

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Chapter 10

Virtual Machine Migration Process

In this chapter:

This chapter focuses on the physical-to-virtual (P2V) migration process using the Virtual Server Migration Toolkit (VSMT), a free downloadable software tool used with Microsoft Virtual Server 2005 Release 2 (R2) to convert physical workloads into virtual machines (VMs). You will learn how to determine which workloads are good candidates for migration to a virtual machine and discover important factors to consider when defining workload resource requirements. The VSMT requirements, features, and deployment procedures are presented in detail, followed by step-by-step instructions to perform a physical to virtual machine migration. Additionally, the sequence to complete a virtual-to-virtual (V2V) machine migration is described.

Whereas VSMT is a viable tool to use for personal and small test and development environments where only a select number of P2V migrations must be accomplished and budget is limited, more robust and automatable tools are required for larger scale departmental, branch office, and data center environments. Microsoft System Center Virtual Machine Manager (VMM) is an enterprise-level application that can perform individual wizard-based P2V migrations or PowerShell-based scripted migrations. If you are interested in learning about VMM, you should review Chapter 19, "System Center Virtual Machine Manager 2007." There are also Independent Software Vendor (ISV) applications that support physical to virtual workload migrations, and these are covered in Chapter 20, "Additional Management Tools."

Assessing Physical Workload Virtualization Potential

The first step in the process to virtualize a physical workload is the assessment of its virtualization potential. The virtualization potential is determined by considering two major categories: workload requirements and workload limitations. The workload requirements are

defined by the physical memory, processor, network, and storage resources needed to achieve the required level of performance. The workload limitations include specific hardware or operational dependencies that could prevent workload execution in a constrained virtual machine environment. This section focuses on the assessment for a single workload. In Chapter 14, "Virtualization Project: Assessment Phase," the concept is extended to encompass workloads on an enterprise scale.

Defining the Workload Memory Requirement

To define the workload memory requirement for a virtual machine, you must identify peak memory usage on the physical system. The information should be distilled from performance data captured over a sufficiently long period of time to reflect an accurate workload memory usage profile. In computing environments that operate at a fairly constant level, data collection over a one- to two-week period might be sufficient. In other environments that experience regular periodic activity spikes (monthly, bi-monthly, and so on), data collection over a two- to four-week period might be necessary. Longer data collection periods might be required to capture activity spikes, if there are seasonal or other parameters that drive more irregular fluctuations.

Using the peak memory usage as the basis to calculate the required virtual machine memory allocation ensures that performance under peak load can be sustained. In fact, virtual machine memory allocation must also account for a 32-MB virtualization overhead that is a result of video random access memory (VRAM) emulation and code cache of recently translated nonvirtualizable instructions. Therefore, virtual machine memory allocation is calculated using the following formula:

VM Memory = Workload Peak Memory Usage + 32 MB

The Workload Peak Memory Usage is the value that you should allocate when you create a virtual machine. This value actually defines the maximum amount of memory that the virtual machine can use while it is running. If sufficient physical memory is not available during virtual machine start-up, an error is logged in the Virtual Server 2005 R2 event log and the virtual machine cannot start. Once a virtual machine is started, it remains loaded in memory until it is shut down.

Important If the virtual machine memory allocation calculation yields a result greater than 3.6 GB, you should perform a thorough review to determine if this peak value is sustained and disqualifies the workload or whether the peak value is of short enough span to qualify the workload as a viable virtualization candidate. Virtual Server 2005 R2 limits maximum memory allocation to 3.6 GB per virtual machine.

Once you have defined the virtual machine memory allocation requirement, you must determine the total amount of memory needed for the physical server host. Because Virtual Server 2005 R2 runs as an application above the host operating system, you must also consider the

Virtual Server host operating system memory requirements in addition to those of the virtual machine. Consequently, the total memory specification for the physical server is calculated as follows:

Server Memory = [Host Memory + VM Memory] × 1.25

Best Practices At minimum, you should add 25 percent to the server memory calculation for capacity planning. It is important for you to tune the percentage based on specific growth projections. Nonetheless, this approach provides a buffer to manage virtual machine memory growth requirements and handle additional virtual machines. For example, if a Microsoft Windows Server 2003 R2 host server running Virtual Server 2005 R2 requires 1 GB of memory and the virtual machine allocation was calculated as 3 GB, the formula yields the following:

Server Memory (rounded up to even number) = [1 GB (Host) + 3 GB (VM) + 32 MB (Overhead)] × 1.25

Server Memory (rounded up to even number) = 6 GB

Defining the Workload Processor Requirement

There are two factors to take into account when defining the workload processor requirement for a virtual machine: processor scaling and peak processor utilization. Understanding the processor scaling requirements for a specific workload is crucial to defining the workload virtualization potential. Although Virtual Server 2005 R2 can scale across multiple processors, a virtual machine can be allocated a maximum of only one processor core. Hence, a workload with symmetric multiprocessing (SMP) requirements might not be a good candidate for virtualization in a production environment. However, it might be acceptable to virtualize the workload for a test or training environment where performance is not the primary driver or the required performance can be achieved when running on a single, more powerful processor core.

The maximum sustained processor utilization is used to define the virtual machine processor allocation requirement. Maximum sustained processor utilization should be captured in the same set of performance data as the peak memory usage. Use the following formula to calculate the virtual machine processor requirement:

Processor Requirement = number of CPU Cores × CPU Speed × Utilization (maximum sustained)

For example, using a physical server with two single-core 2-GHz processors and a maximum sustained utilization of 10 percent, the formula yields:

Processor Requirement = 2 × 2000 MHz × 10% = 400 MHz

Caution This calculation assumes that the source and target processor architectures are similar enough to provide a valid processor performance comparison. If this is not the case, you need to include a performance factor in the calculation that corrects for the processor performance differences. You should also consider using a tool like System Center Virtual Machine Manager or another third-party tool that considers processor differences when determining virtual machine processor requirements.

Once the virtual machine processor requirement is known, you can determine the virtual machine CPU resource allocation settings to configure in Virtual Server 2005 R2. You should adjust these settings in anticipation of hosting additional virtual machines on the Virtual Server host. For example, if the Virtual Server 2005 R2 physical server includes two single-core processors running at 3.0 GHz, the server processor capacity is as follows:

Server Processor Capacity = 2 × 3000 MHz = 6000 MHz = 6GHz

Of course, processor capacity for the host operating system must be taken into account. Consider reserving at least 25 percent of the server processor capacity (or at least a single processor core, whichever is less) to determine the processor capacity available for allocation to virtual machines:

Available Processor Capacity = Server Processor Capacity × 0.75

You should fine-tune the reserved processor capacity if you intend to run other applications on the host operating system in addition to Virtual Server 2005 R2.

Best Practices The general recommendation is to dedicate a physical server as a Virtual Server host and to not run additional applications. There are scenarios, such as in branch offices, where only a single server can be deployed and must support multiple applications. However, you should only deploy this configuration in such instances and not as a broad virtualization solution.

For the dual-processor server with 6 GHz of processor capacity and a 25 percent host operating system processor capacity reservation, the available processor capacity to allocate to virtual machines is as follows:

Available Processor Capacity = 6000 MHz × 0.75 = 4500 MHz = 4.5 GHz

There is now sufficient information to define the virtual machine processor resource allocation relative weight, reserved capacity, and maximum capacity settings. Table 10-1 lists the basic definitions for each of these parameters. Chapter 2, "Virtual Server 2005 R2 SP1 Product Overview," contains more detailed information on the processor resource allocation settings

available in Virtual Server 2005 R2. Chapter 15 contains in-depth configuration guidance on setting these parameters in a multiple workload environment.

Table 10-1 CPU Resource Allocation Parameter Definitions

Parameter	Description
Relative Weight	A value used to determine additional processor resource allocation for a virtual machine compared to all other virtual machines in execution. By default, the relative weight is set to a value of 100, making all virtual machine resource requirements equal to each other.
Reserved Capacity (% of one CPU)	A value used to define the capacity of a single processor reserved for a virtual machine. The processor capacity allocated to the virtual machine is never less than this value.
Maximum Capacity (% of one CPU)	The maximum processor capacity that can be used by a virtual machine.

Continuing with the example of the single workload requiring a 400-MHz processor peak utilization and available processor capacity of 4.5 GHz, the CPU resource allocation settings are as follows:

Relative Weight = 100 (default setting)

Reserved Capacity (rounded up) = 4500 MHz / 400 MHz = 12 percent

Maximum Capacity = 100 percent (default setting)

There is no need to modify the default settings for relative weight and maximum capacity in the case of a single virtual machine. These settings should be revised based on workload priorities if additional virtual machines are hosted on the Virtual Server 2005 R2 machine.

Caution If you allocate processor resources that exceed available processor capacity, Virtual Server 2005 R2 will not turn on a virtual machine that would result in processor capacity overallocation. An error with Event ID 1042, indicating an unexpected error occurred, will be recorded in the Virtual Server application log.

Defining the Workload Network Requirement

The workload network requirement is another essential component in the identification of virtual machine resource needs. Analogous to the memory and processor requirements, the virtual machine network requirement is based on peak network utilization data captured from the workload executing on the physical server. This data is fundamental to determining whether the virtual machine requires one or more dedicated network interface cards (NICs), or if it can achieve desired performance levels using a shared network interface card.

In the case of a single virtual machine, if the workload on the physical server requires one or more dedicated network interface cards, you can implement the same configuration for the virtual machine. Depending on the fine points of the configuration, one or more virtual networks should be defined and connected to the appropriate network interface card to provide the required connectivity.

Important As a general rule, use a dedicated network interface card for the host operating system. This will ensure consistent communication with Virtual Server 2005 R2 and other applications installed directly on the host operating system. Also, unbind the Virtual Machine Network Service from the network interface card dedicated to the host to prevent any association to a virtual network within Virtual Server 2005 R2.

If multiple workloads without dedicated network interface card requirements will be hosted in virtual machines, use the following formula to determine the total network bandwidth utilization:

Total Network Requirement = SUM (NIC Speed × Peak Network Utilization)

As indicated, the total network requirement is simply based on the sum of the peak network bandwidth utilization of each workload. For example, consider four workloads running on physical servers configured with 100-Mb-per-second (Mb/s) network interface cards, and peak network utilization of 50 percent. Using the formula, the total network requirement is as follows:

Total Network Requirement = 4 × (100 Mb/s × 0.5) = 200 Mb/s

The result indicates that the combined virtual machine network requirement for the four workloads can be met using a single gigabit network interface card. Because network interface cards do not operate at 100 percent of capacity, assuming 75 percent network interface card efficiency, the remaining network capacity is as follows:

Remaining Network Capacity = (1000 Mb/s × 0.75) − 200 Mb/s = 550 Mb/s

Note If needed, use the Microsoft Loopback Network Adapter to enable connectivity between the Virtual Server 2005 R2 host and virtual machines. This will create a purely internal, isolated network that does not require configuration of a physical network interface card. Ensure that only the Virtual Machine Network Service is bound to the Loopback Network Adapter to dedicate it to Virtual Server networking. For further details, read the Microsoft Loopback Network Adapter configuration section in Chapter 4, "Installing Virtual Server 2005 R2 SP1."

As new workloads are hosted on the Virtual Server 2005 R2 machine, you should consistently review each workload's network requirement to determine whether there is sufficient bandwidth capacity provided by existing network interface cards.

Defining the Workload Storage Requirements

Defining the virtual machine workload storage requirement depends on the specification of storage capacity and performance. To properly configure and size the storage capacity, a number of aspects need to be considered besides the physical disk space profile. The workload performance requirement determines whether shared or dedicated storage configuration is needed to attain disk throughput levels.

Virtual machine storage capacity planning must account for additional disk space to store a Save State file coupled with the disk space needed for differencing and undo disks, if they are to be used in conjunction with the virtual machine. The Save State file (.vsv) size is directly dependent on the virtual machine memory allocation. For example, if a virtual machine has a 3-GB memory allocation, the Save State file size allocation will be 3 GB. In actuality, Virtual Server compresses the virtual machine memory content prior to saving it to the .vsv file; therefore, the size of the data saved to the .vsv file should always be smaller than the virtual machine memory allocation.

Note In Virtual Server 2005 R2 SP1, a blank save state file is created when you start a virtual machine. The file size is based on the virtual machine memory allocation. The file is deleted when the virtual machine is turned off. This feature prevents data loss in a scenario where a virtual machine runs out of space on the physical hard disk where its VHD is located. Basically, Virtual Server 2005 R2 SP1 pre-allocates a large enough save state file for each running VM such that it can perform a save state for each affected running virtual machine.

Defining additional disk space to account for differencing and undo disks is a little more complex. Differencing disks and undo disks are special-purpose dynamically expanding virtual hard disks that allow virtual machine state changes to be saved in files that are separate from a base virtual hard disk. Differencing disks and undo disks both have the ability to grow as large as the base virtual hard disk. If a differencing or undo disk attempts to expand and causes the underlying physical drive to run out of disk space, Virtual Server 2005 R2 will suspend the virtual machine and place it in a saved state. Hence, to avoid virtual machine downtime, make sure to size storage capacity taking into account the size of each differencing and undo disk that will be used with the virtual machine.

Allowing for these factors, the virtual machine workload storage capacity requirement is defined as the aggregate of the following:

- Disk space used by the virtual machine VHDs on the physical server environment

- Disk space to be used by a Save State file, equivalent to the virtual machine memory allocation
- Disk space to be used by all differencing disks and undo disks associated with the virtual machine
- Disk space overhead no less than 25 percent of the total to provide additional storage and defragmentation capacity

In conjunction with storage capacity, you must also consider the workload storage performance requirement. The peak disk utilization for the physical workload and throughput attributes for the physical storage system are the key characteristics to consider when designing the physical storage environment to host virtual hard disks. Keep the following items in mind throughout the process:

- Use a fast access disk subsystem or storage area network (SAN).
- Use RAID 1+ 0 for the best disk performance or RAID 5 as an alternative in terms to support virtual hard disk storage.
- Dedicate disks and I/O channels for applications with very high throughput requirements.
- Dedicate disks for the host operating system and page file.
- Perform regular disk defragmentation.

As you add new virtual machines to Virtual Server 2005 R2, you must reassess whether the storage configuration and performance is sufficient to host additional workloads. If it is not, determine whether additional or dedicated disk resources are required and configure the storage environment to meet the new requirements.

Important To achieve the highest performance within the virtual machine, use fixed-size virtual hard disks connected to virtual SCSI adapters. Fixed-size virtual hard disks support up to 2 terabytes of data and will have less fragmentation than dynamically expanding disks. The SCSI protocol allows for multiple simultaneous operations, leading to higher throughput than IDE-connected virtual hard disks.

Defining the Workload Hardware Limitations

Because virtual machines execute within a constrained emulated hardware environment, some physical server workloads are precluded from a physical to virtual machine migration. In particular, disqualify any workloads that require the following items:

- USB devices (other than a keyboard and mouse)
- IEEE 1394 devices
- Non-Ethernet network interface cards

- Specialized SCSI adapters
- Specialized video or audio adapters
- Hardware dongles

The list is not exhaustive. However, it is evident that if a workload requires a specialized hardware device, it is not a suitable candidate for migration to Virtual Server 2005 R2.

Defining the Workload Operational Limitations

Finally, you must also consider any workload operational limitations in the assessment of a physical workload's suitability for migration to a virtual machine. For example, the following Microsoft server applications are not supported in a Virtual Server 2005 R2 production environment:

- Microsoft Speech Server
- Microsoft ISA Server 2000
- Microsoft ISA Server 2004
- Microsoft SharePoint Portal Server 2003
- Microsoft Identity Integration Server 2003
- Microsoft Identity Integration Feature Pack

If an application vendor does not support deployment of an application in a Virtual Server 2005 R2 production environment, it is not recommended that you do so. However, you can still leverage Virtual Server 2005 R2 to deploy the application in a testing or training environment.

Understanding the Physical to Virtual Workload Migration Process

The migration of a physical workload to a virtual machine consists of the three main phases described in Table 10-2. These phases are common to most migration tools available on the market, including the free, downloadable VSMT mentioned earlier in the chapter.

Table 10-2 Physical-to-Virtual Workload Migration Phases

Migration phase	Description
System Preparation	In the first phase, the source system is prepared for the migration process. If needed, the target system configuration is modified to comply with migration tool prerequisites and settings.
Workload Image Capture	In the second phase, migration tools collect source system configuration data, validate that the source system configuration is suitable for migration, and complete the workload image capture.
Virtual Machine Creation and Deployment	In the last phase, the migration tool creates, configures, and deploys a new virtual machine using the captured workload image.

The details of each phase presented in this section describe the process specifically implemented by VSMT to perform a physical-to-virtual workload migration. VSMT is a set of tools and customizable scripts used to collectively complete the migration process.

To use VSMT, you must be proficient with the Dynamic Host Configuration Protocol (DHCP), Pre-boot Execution Environment (PXE), and Windows Server 2003 Automated Deployment Services (ADS). If you are unfamiliar with one or more of these technologies, training material suggestions are provided at the end of this chapter in the "Additional Resources" section.

System Preparation Phase

Before using VSMT to perform a workload migration, the source system configuration must be evaluated to ensure compliance with the prerequisites listed in Table 10-3. These requirements specify not only the infrastructure protocols that the source system must support, but also characteristics—such as the operating system and file system type—that are driven by the boundaries of applicability of ADS and VSMT.

Table 10-3 Virtual Server Migration Toolkit Prerequisites

Prerequisite	Description
Pre-boot Execution Environment	The source system primary network interface card must support the PXE 0.99c protocol and allow a PXE boot from ROM or using a Remote Boot Disk Generator (RBFG) disk.
Dynamic Host Configuration Protocol	The source system must be able to obtain a network address and network configuration parameters from a DHCP server.

Table 10-3 Virtual Server Migration Toolkit Prerequisites

Prerequisite	Description
Hardware Abstraction Layer (HAL)	The source system must use one of the following hardware abstraction layer types: ■ Advanced Configuration and Power Interface (ACPI) PC - ACPI, PIC ■ ACPI Uniprocessor PC ■ ACPI Multiprocessor PC ■ Standard PC ■ MPS Uniprocessor PC - APIC, Non-ACPI ■ MPS Multiprocessor PC - APIC, Non-ACPI
Operating System	The source system must be running one of the following operating systems: ■ Microsoft Window NT Server 4.0, Service Pack 6a ■ Microsoft Windows 2000 Server, Service Pack 4 ■ Microsoft Windows 2000 Advanced Server, Service Pack 4 ■ Microsoft Windows Server 2003, Standard Edition ■ Microsoft Windows Server 2003, Enterprise Edition
Memory	The source system must have a minimum of 96 MB of physical memory.
Network Adapter	The MAC address of the primary network interface card that will be used during the migration must be identified. VSMT requires specification of the network interface card MAC address when multiple devices are present.
Disk Type	The source system must use basic disks. Dynamic disks cannot be migrated using VSMT.
File System	The source system drives must use NTFS. File allocation table (FAT) partitions cannot be migrated using VSMT.
Storage Area Network (SAN)	The source system must not have any SAN connections to migrate. If any such connections exist, the data must be copied to a virtual hard disk using either a backup and restore procedure or standard file copy process.
Windows Management Instrumentation (WMI)	The source system must have Windows Management Instrumentation installed and functional.
Security Account	An account with local Administrator rights on the source system must be used to execute the various VSMT utilities and scripts.

If the source system boot partition profile does not conform to the requirements, the discrepancies must be fixed prior to starting the actual migration process. Otherwise, the migration procedure will not be successful. Data partitions can be migrated separately to individual VHD files using a file copy or disk imaging tool.

Workload Image Capture Phase

The next phase of the migration process consists of several tasks that conclude with the workload image capture. VSMT uses a set of tools and scripts to complete this objective. Following are the four key actions taken during this phase of the migration process:

1. Inventory source system configuration
2. Validate source system configuration
3. Generate migration scripts
4. Capture source system image

Inventory Source System Configuration

The first step in this phase is accomplished by running the GatherHW.exe utility, included in VSMT, on the source system. GatherHW.exe conducts an inventory of the source system configuration and stores it in an XML file. GatherHW.exe collects the following type of information:

- Operating system configuration (version, language, service packs, HAL, and so on)
- General system configuration (BIOS, processors, memory, and so on)
- Storage configuration (controllers, physical disks, logical drives, and so on)
- Network configuration (adapters, TCP/IP settings, MAC address, and so on)
- Secondary hardware configuration (video, audio, serial port, CDROM, and so on)
- Software configuration (services, drivers, updates, and so on)

The GatherHW.exe utility uses the Windows Management Instrumentation interface to collect system configuration information.

Validate Source System Configuration

The second step in the workload capture phase uses VMScript, which is a VSMT script, to analyze the XML configuration file created by the GatherHW.exe utility and report on issues that could cause a migration failure. In fact, VMScript is a dual-purpose tool used not only to validate the source system configuration information prior to migration, but also to generate necessary migration scripts and files, as you will see in the next step.

In this step, VMScript is invoked to parse the XML file, determine whether any component or setting incompatibilities exist, and create a report similar to the following example:

```
Microsoft Virtual Server Migration Toolkit - VmScript Tool ver.5.2.5149.0
Copyright (C) 2004 Microsoft Corporation. All rights reserved.
Parsing System Configuration
        Name:         CONTOSO-ADS
        Memory:       1015MB
        Processors:   1
        HAL type:     acpipic_up
        OS Version:    5.2.3790 Service Pack 1
Parsing Network Configuration
        Network Card[0]
                MACAddress:  000AE45A7D1B
                DHCPEnabled:  True
                PrimaryNic : True
Parsing Storage Controller Configuration
        Controller ide[0]: PCI\VEN_8025&REV_03\3&61AAA01&0&F9
Parsing Logical Drive Configuration
        Found 1 logical disk drives
                Logical Drive[C:]
                        Size:                    12584644608
                        Hosts Windows Partition: True
Parsing Hard Disk Configuration
        Found 1 disk drives
        Disk Drive[0]: (\\.\PHYSICALDRIVE0)
                Size:      100027630080
                Partitions found: 1
                Partition[1]
                        Primary:                 True
                        Bootable:                True
                        Hosts Windows Partition: True
                        Able to Capture:         True
                        Extended Partition:      False
                        BootIni:                 True
                        Logical Drives:          C:
Parsing CDROM Configuration
        Found 1 cdrom drives
        CDROM Drive[0]: (IDE\CDROMPIONEER_DVD-RW_DVR-K13RA02020202)
Parsing Services Configuration
        Found 88 services
Parsing Drivers Configuration
        Found 174 drivers
Parsing Auto Run Programs Configuration
        Found 2 auto run programs
Parsing System File information
        Found 11 system files
Parsing Hotfix information
        Found 56 hotfixes
Parsing MountedDevices information
        Found 6 mounted device entries
Mapping Storage Devices
Using Windows Partition: \device\harddisk0\partition1 Disk:0 Partition:1
Using MAC[1]=000AE45A7D1B for PXE (Admin)
Checking configuration for incompatibilities.
No incompatibilities found.
Success.
```

VMScript also checks for problematic services or drivers, auto-run programs, key system files, and missing patches. The script then determines the primary operating system partition and MAC address of the network interface card that it should use for the workload image capture.

Direct from the Source: Identify and Load Missing System Files, Service Packs, and Updates

In the course of the source system configuration validation, VMScript reports whether any required system files are missing. The report includes the name of operating system files, service packs, or updates that contain system files that VSMT will need to perform a successful migration.VMScript uses an XML-based file, PatchFiles.xml, that is included with VSMT to determine which files are missing.

For English-language versions of supported operating systems, only files with updates and service packs available prior to the VSMT release are included with the toolkit. Equivalent files for non-English operating systems are not included by default. If you perform an operating system migration that requires an update or system file that was not included with VSMT, you must load the system files prior to initiating the migration.

To update the VSMT system file cache, use the Vmpatch.exe utility that comes with the toolkit. Vmpatch.exe loads required system files from the operating system driver cache or any folder where the source files are stored.

Because Vmpatch.exe is unable to directly copy service pack or updated binary files into the file system cache, begin by extracting the service pack or update file from the binaries and placing them into a folder. Then use Vmpatch.exe to load the required files into the VSMT system file cache.

Once all missing files have been loaded, you should run VMScript again to verify that you remedied all file issues and that no other incompatibilities exist. If the VMScript reports no further issues, you can proceed with generating migration scripts.

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Lead Program Manager, System Center Virtual Machine Manager

Generate Migration Scripts

Once VMScript has validated the source system configuration, the next step is to generate the scripts and files needed to capture the workload image and complete the migration. Table 10-4 lists the predefined scripts and task sequence files generated by VMScript based on the XML configuration file created by the GatherHW.exe utility.

Table 10-4 Migration Scripts and Task Sequence Files

Script/File	Description
*Source*_commonInit.cmd	Sets common environment variables.
*Source*_capture.cmd	Calls *Source*_commoninit.cmd to set common environment variables. Adds the source computer as a device in the ADS database. Initiates the ADS task sequences in capture-disk.xml to capture an image for each hard disk partition on the source system. Releases control of the device, and removes it from the ADS database when the capture is complete. Fixes certain system files on the captured images to make them compatible with the virtual machine environment.
*Source*_CreateVM.cmd	Creates a virtual machine on Virtual Server. Removes all network adapters from the virtual machine. Adds network adapters, the last one is the network adapter that will be used for PXE. Connects the Remote Installation Services (RIS) virtual floppy disk. Creates virtual hard disks, and attaches them to the virtual machine. Adds CD-ROM and DVD. Adds SCSI controllers, as required. Adds the virtual machine as a device in the ADS database. Creates a series of ADS actions to set a number of variables. Uses discovery to get information from the virtual machine. Opens the Virtual Server Administration Website.

Table 10-4 Migration Scripts and Task Sequence Files

Script/File	Description
*Source*_DeployVM.cmd	Calls *Source*_commoninit.cmd to set common environment variables. Connects the RIS boot floppy. Starts the virtual machine. Boots the virtual machine into the ADS Deployment Agent, runs the ADS deployment disk sequence in DeployVM.xml, and deploys the images to the virtual machine. Updates storage drivers. Runs the ADS task sequences, HAL.xml and Uniproc.xml, as needed to update the HAL and NTOSKRNL to single-processor versions compatible with the virtual machine environment. Runs the ADS service task sequence, *Source*_ServiceDriver.xml, to set the start state of devices and services in the virtual machine.
*Source*_PostDeploy.cmd	Resets attributes of the boot.ini file to System, Hidden, and Read-Only. For a source Windows NT 4.0 Server SP6a, the following tasks are also performed: ■ Runs fixsetup.cmd to update the Setup.log file in the winnt\repair directory to reflect that the operating system is running on a single-processor computer. ■ Service packs and hotfixes use the information in the Setup.log file to install the appropriate components.
*Source*_CleanupVM.cmd	Invokes only in the case of a failed migration attempt. Calls *Source*_Commoninit.cmd to set common environment variables. Stops running jobs, and turns off the virtual machine. Removes the virtual machine from Virtual Server. Releases control of the device in ADS. Removes the device from ADS. Deletes the virtual machine configuration file, as well as any virtual hard disk files associated with the virtual machine.

Table 10-4 Migration Scripts and Task Sequence Files

Script/File	Description
*Source*_captureDisk.xml	Boots the source system to the ADS Deployment Agent. Gets disk geometry (cylinders, heads, and sectors) for each disk. Captures an image for each partition. Shuts down the source system.
*Source*_DeployVM.xml	Obtains disk geometry (cylinders, heads, and sectors) for each physical hard disk. Initializes virtual hard disks. Creates disk partitions for the virtual hard disks. Obtains geometry for disk partitions. Deploys ADS images to the virtual machine.
*Source*_internalState.xml	Captures the state of internal hardware for each device.
*Source*_ServiceDriver.xml	Configures the starting state of services and devices in a virtual machine.

By default, the scripts are configured to create an unencrypted workload image. When migrating a physical system that stores sensitive or protected data, edit *Source*_captureDisk.xml and *Source*_DeployVM.xml and remove all instances of the following statement:

```
<parameter>-nonetencrypt</parameter>
```

Doing so will cause workload images to be encrypted when captured and deployed using VSMT.

Capture Source System Image

The last step in this phase is to capture the workload image from the source system. The process starts by executing the *Source*_capture.cmd script. This script invokes ADS, and by using the *Source*_capturedisk.xml sequence file, it completes four basic tasks.

The first task adds the source system to the device database controlled by ADS. Second, the source system is booted using PXE and ADS uploads the Deployment Agent to the source system. The Deployment Agent is a small-footprint, memory-resident operating system that provides an execution shell that can run additional commands to capture and deploy system images to ADS-controlled devices. The third task consists of retrieving source system disk information and capturing an image of each disk. Finally, once an image has been captured for each disk, ADS initiates a shutdown of the source system, releases control of it, and removes it from the device database.

Additionally, the attribute settings of specific system files in the captured images are modified to ensure compatibility with the virtual machine environment.

Note The time required for the image capture process varies, ranging anywhere from 0.5 to 1.5 GB per minute. For source systems with large disks, use a conservative transfer rate to estimate planned downtime and user impact as well as the number of concurrent migrations that can be supported by your network.

Virtual Machine Creation and Deployment

In the last phase of the migration process, a new virtual machine is created and then deployed after the source system disk images are restored to attached virtual hard disks. The process begins with the execution of the *Source*_CreateVM.cmd script to check the status of the target system in the ADS database. To perform the virtual machine creation tasks, the *Source*_CreateVM.cmd invokes the VMClient.exe utility from VSMT. VMClient.exe creates and configures virtual machines on Microsoft Virtual Server 2005 R2 through the Virtual Server Component Object Model (COM) interface.

VMClient uses a multistep procedure to create a virtual machine on Microsoft Virtual Server 2005 R2. First, VMClient constructs and registers a virtual machine configuration file (.vmc) to create a new virtual machine. When the new virtual machine is registered with Virtual Server, VMClient adds virtual network adaptors with corresponding source system MAC addresses to the new virtual machine and connects them to a pre-created virtual network. Finally, a Remote Installation Services (RIS) floppy disk image is assigned to the virtual machine, the virtual hard disks are created and initialized, and a virtual CD drive is attached to the virtual machine.

The virtual machine is created using the memory, disk size, network adapters, and MAC address information collected from the source system configuration file. By default, the processor allocation is 100 percent of a single CPU. Unless otherwise specified, virtual hard disks are created as fixed-size disks. Because the virtual hard disks are created sequentially, the disk initialization period can be quite long.

Important Modifications to the virtual machine creation options and resource allocations are made by updating the appropriate VMClient command lines in the *Source*_CreateVM.cmd script. For complete details on the VMClient.exe options and parameters, review the Microsoft Virtual Server 2005 Migration Toolkit help file, VSMT.chm, which can be found in %systemdrive%\Program Files\Microsoft VSMT\Help.

The *Source*_CreateVM.cmd script completes after adding the new virtual machine to the ADS database, ensuring it is ready for deployment.

Virtual machine deployment is controlled by the *Source*_DeployVM.cmd script and the task sequence file, *Source*_DeployVM.xml. The *Source*_DeployVM.cmd script invokes the VMClient utility to start the virtual machine from the RIS virtual floppy disk. The virtual machine

acquires an IP address, and PXE boots into the ADS Deployment Agent. Once the virtual machine is booted, source system disk images are restored sequentially to the virtual hard disks. After the image restore procedure completes, the hardware-dependent system files are swapped for virtual machine–compatible versions and the virtual machine is powered off. At this point, the workload migration from source system to virtual machine is complete.

Using Automated Deployment Services and the Virtual Server Migration Toolkit

In this section, you will learn how to install ADS and VSMT to perform a physical to virtual machine migration. A full installation of ADS is described, including all the tools, samples, and templates needed to manage devices, capture disk images, and deploy disk images. As described in the previous section, VSMT leverages ADS to capture source system disk images, create virtual machines, and deploy source system disk images to virtual machines.

The following procedures are based on the assumption that ADS, VSMT, and Microsoft Virtual Server 2005 R2 SP1 are installed on a single physical server, referred to as the *Controller server*. This is not a requirement, but it is recommended as the quickest way to deploy and familiarize yourself with the tools and migration steps using a small footprint test environment. You will also need a second physical machine running the Windows Server 2003 operating system to represent a source system workload that will be migrated to a virtual machine.

Installing Automated Deployment Services

ADS is a Windows Server 2003 add-on that is available as a free download from the Microsoft Web site. The installation is straightforward with minimal requirements, as shown in Table 10-5.

Table 10-5 Automated Deployment Services Prerequisites

Requirement	Specification
Operating System	Windows Server 2003, Enterprise Edition.
DHCP Server	Any existing DHCP server that can provide TCP/IP network configuration settings to devices on the same network as the ADS server. Alternatively, install DHCP on the ADS server.
Database	Access to an existing Microsoft SQL Server to host the managed device database. Alternatively, install the Microsoft SQL Server Desktop Engine using the Automated Deployment Services Setup Wizard.
Storage	Size the disk space allocated to store source system images based on the physical disks that will be imaged.

The ADS installation includes the Controller Service, Image Distribution Service, and Network Boot Services. Once the installation package is downloaded, run the self-extracting executable and ensure that all the files are successfully extracted and placed into a new directory. To complete a full installation of ADS, follow these steps:

1. On the Controller server, use Windows Explorer to navigate to the directory that contains the extracted Automated Deployment Services installation files.
2. To begin the installation, locate and double-click the ADSSetup.exe file.
3. In the Welcome To Microsoft Windows Server 2003 Automated Deployment Services dialog box, click Install Microsoft SQL Server Desktop Engine (MSDE) SP4 (Windows) to create the Automated Deployment Services device database.
4. Once MSDE is installed, click Install Automated Deployment Services to start the Automated Deployment Services Setup Wizard.
5. In the Welcome To The Automated Deployment Services Setup Wizard dialog box, click Next.
6. In the License Agreement dialog box, review the license agreement. If you agree to the terms of the license, click I Accept The Terms Of The License Agreement and then click Next.
7. In the Setup Type dialog box, select Full Installation and then click Next.
8. In the Installing PXE dialog box, click OK.
9. In the Setup Type dialog box, click Next.
10. In the Configure The ADS Controller dialog box, use the default settings and click Next.
11. In the Network Boot Service Settings dialog box, select Prompt For The Path When Required and then click Next.
12. In the Windows PE Repository dialog box, click Do Not Create A Windows PE Repository and then click Next.
13. In the Image Location dialog box, use the default path or type a new path in the Path To Folder box, and then click Next.
14. If ADS Setup detects more than one network adapter in your computer, it displays the Network Settings For ADS Services dialog box. In the Bind To This IP Address text box, specify the IP address to bind the services and click Next.
15. In the Installation Confirmation dialog box, click Install.
16. In the Installing ADS dialog box, a progress bar appears to indicate the status of the installation.
17. When the Completing The Automated Deployment Services Setup Wizard dialog appears, click Finish.

18. During the installation process, a certificate is created to authenticate devices that interface with Automated Deployment Services. After the installation is complete, create a shared folder and copy %systemdrive%\Program Files\Microsoft ADS\Certificate \adsroot.cer into the shared folder.

19. Using Windows Explorer, navigate to %systemdrive%\Program Files\Microsoft ADS \Samples\Sequences and double-click on create-templates.bat. This will install sample job templates that are available to run and test the services.

To verify that the ADS installation was successful, use the Microsoft Management Console (MMC) snap-in to check whether the services are in the Connected state as shown in Figure 10-1.

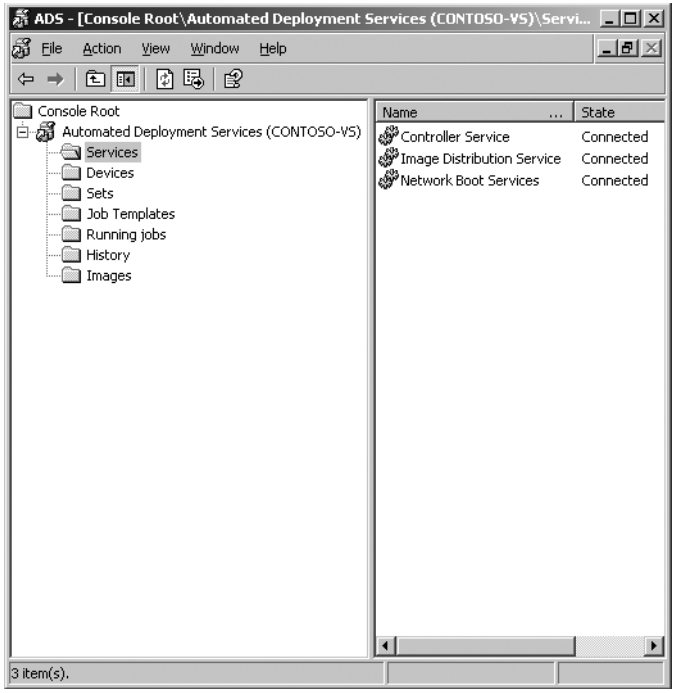

Figure 10-1 Automated Deployment Services connected state

To use the Automated Deployment Services MMC snap-in, follow these steps:

1. Click Start, click Run, in the Run dialog box, type **ads.msc**, and then click OK.

2. In the ADS-[Console-Root], click Automated Deployment Services in the left-hand pane to expand the tree structure, and then click the Services entry.

If all the service bindings were successful, the Controller Service, Image Distribution Service, and Network Boot Services states should display "Connected."

Installing the Virtual Server Migration Toolkit

VSMT is included in the Automated Deployment Services 1.1 installation package. Prior to installing the toolkit, ensure that you have already installed Microsoft Virtual Server 2005 R2 SP1 and ADS on the physical server.

To complete a full installation of VSMT, follow these steps:

1. On the Controller server, use Windows Explorer to navigate to the directory that contains the extracted Automated Deployment Services installation files.
2. To begin the installation, locate and double-click the ADSSetup.exe file.
3. In the Welcome To Microsoft Windows Server 2003 Automated Deployment Services dialog box, click Install Virtual Server Migration Toolkit.
4. In the Welcome To The Microsoft Virtual Server 2005 Migration Toolkit Setup Wizard dialog box, click Next.
5. In the License Agreement dialog box, review the license agreement. If you agree to the terms of the license, click I Accept The Terms Of The License Agreement and then click Next.
6. In the Setup Type dialog box, select Full Installation and then click Next.
7. In the Installation Confirmation dialog box, click Install.
8. In the Installing VSMT dialog box, a progress bar appears to indicate the status of the installation.
9. When the Completing The Microsoft Virtual Server 2005 Migration Toolkit Setup Wizard dialog box appears, click Finish.

At this time, you should also pre-create the default virtual network (VM0) that the *Source*_CreateVM.cmd script attaches to a new virtual machine. The virtual network is not created by default during the VSMT installation because the setup process does not assume that it is installed on the same physical system as Microsoft Virtual Server 2005 R2.

A script is provided with VSMT to automatically create the default virtual network. If the default virtual network does not exist, the virtual machine deployment will fail. To create the default virtual network using the script, follow these steps:

1. Using Windows Explorer, navigate to %systemdrive%\Program Files\Microsoft VSMT \Samples.
2. Locate and double-click the CreateVirtualNetwork.vbs file.
3. Open the Microsoft Virtual Server 2005 R2 Administration Website in your browser.
4. In the Virtual Networks pane, click Configure and verify that there is an entry for VM0 in the list of virtual networks.

Alternatively, you can execute the script by opening a command window and typing the following:

```
Cscript "%systemdrive%\Program Files\Microsoft VSMT\Samples\createvirtualnetwork.vbs"
```

Note You can also use a VMScript command-line option called /vsHostNet when generating the migration scripts to specify a different virtual network to use during the migration.

Performing a Physical to Virtual Machine Migration

Once the ADS and VSMT installations are completed, you are ready to begin the physical-to-virtual machine migration. The migration procedure consists of ten steps:

1. Preparing the source system.
2. Gathering the source system configuration information.
3. Validating the source system configuration information.
4. Generating the migration scripts.
5. Reviewing the migration scripts.
6. Loading drivers into ADS.
7. Capturing the source system disk images.
8. Creating the virtual machine.
9. Deploying the source system disk images to the virtual machine.
10. Completing the migration process.

To prevent any loss of data during the migration process, make a backup of the source system prior to starting the migration process. This step is particularly critical if you intend to migrate Windows NT 4.0 servers because the NTFS file system will be upgraded during the migration procedures.

Preparing the Source System

As part of the source system preparation, use the requirements list in Table 10-3 and Table 10-5 to ensure that the source system satisfies the conditions imposed by ADS and the VSMT for a successful migration. In addition, use the Chkdsk.exe utility to verify and resolve any disk errors, delete irrelevant or outdated files, and defragment the disks prior to the migration.

Note On a system running Windows NT Server 4.0, Service Pack 6a, you must install hotfix 872952 to ensure that the Chkdsk.exe utility still functions after the physical to virtual machine migration. Hotfix 872952 is available at *http://support.microsoft.com/kb/872952*.

If for any reason you intend to perform a migration from a source system configured with hardware drivers or services that are incompatible with the virtual machine environment, change the startup state to Disabled before starting the migration. Leaving incompatible drivers or services in an automatic startup state can cause the virtual machine to function improperly or fail to start.

Important If you use ADS to manage the source system, release control of the source system and delete the source system record prior to initiating the migration.

Gathering the Source System Configuration Information

When the system preparation is complete and the source system meets all the defined requirements, the next step is to run the GatherHW.exe tool from the VSMT. GatherHW.exe collects the source system information and creates an XML file that contains the system configuration data. Follow these steps to run GatherHW.exe on the source system:

1. Log on to the source system running Windows Server 2003.
2. Map a network drive to the root of the system drive on the Controller server.
3. Navigate to the Virtual Server Migration Toolkit installation folder, which is by default %systemdrive%\Program Files\Microsoft VSMT.
4. Copy GatherHW.exe to a directory on the source system.
5. Double-click GatherHW.exe on the source system to collect the configuration information.
6. GatherHW.exe creates an XML file with the name of the source system (*Source*.xml) in the directory from which GatherHW.exe was executed.
7. Copy *Source*.xml to the Controller server. If you followed the recommended procedure, Microsoft Virtual Server 2005 R2, VSMT, and ADS are installed on the Controller server.

Validating the Source System Configuration Information

After executing GatherHW.exe to collect the source system configuration information, you need to validate the data using the VMScript.exe utility. When VMScript.exe completes the configuration information analysis, it will indicate whether any errors or issues were encountered. Follow these steps to run VMScript.exe on the source system:

1. Log on to the Controller server and open a command window.
2. In the command window, change the directory to the Virtual Server Migration Toolkit installation folder, which by default is %systemdrive%\Program Files\Microsoft VSMT.

3. In the command window, start the VMScript execution by typing the following:

   ```
   VMScript.exe /hwvalidate /hwinfofile:"path\Source.xml"
   ```

   where *path\Source.xml* is the full path to the XML file.

Examine the VMScript output for any flagged issues, warnings, or errors. Correct any system discrepancies, and copy any missing system files, service packs, or hotfix files using VMPatch.exe before continuing to the next step.

Note For complete details on the VMPatch.exe options and parameters, review the Microsoft Virtual Server 2005 Migration Toolkit help file, VSMT.chm, located in %systemdrive%\Program Files\Microsoft VSMT\Help.

Generating the Migration Scripts

Once VMScript.exe has validated the source system configuration information, the next step is to execute VMScript.exe with a different set of options that generate the migration scripts that control disk image capture, virtual machine creation, and disk image deployment to the virtual machine. Follow these steps to generate the migration scripts using VMScript.exe:

1. Log on to the Controller server and open a command window.
2. In the command window, change the directory to the Virtual Server Migration Toolkit installation folder, which by default is %systemdrive%\Program Files\Microsoft VSMT.
3. In the command window, start the VMScript execution by typing the following text:

   ```
   VMScript /hwgeneratep2v /hwinfofile:"path\Source.xml" /name:vm_name /vmconfigpath:"vm
   path" /virtualDiskPath:"vm path" /hwdestvs:controller_server
   ```

   where *path\Source.xml* is the full path to the XML file, *vm_name* is the name to assign to the virtual machine, *vm path* is %systemdrive%\Program Files\Microsoft VSMT\VMs, and *controller_server* is the name of the Controller server.

Important By default, the migration scripts are configured to create fixed-size virtual hard disks. If the physical disks on the source system have an extensive amount of unallocated free space or you do not want to use fixed-size virtual hard disks, execute VMScript with the /virtualDiskDynamic option. This option directs VMScript to generate migration scripts that create dynamically expanding virtual hard disks. Forcing the migration scripts to create dynamically expanding virtual hard disks also reduces the total time to complete the migration by minimizing the virtual hard disk initialization process.

VMScript.exe generates the migration scripts in a subdirectory of %systemdrive%\Program Files\Microsoft VSMT\p2v. The subdirectory is given the same name assigned to the virtual machine. For example, if you provide *TestMigration* as the parameter to the VMScript /name

option, the migration scripts are created in %systemdrive%\Program Files\Microsoft VSMT\p2v\TestMigration. All the generated migration files are also prefixed with the name of the virtual machine. Before moving to the next step, verify that the VMScript.exe output indicates that the migration files were created successfully.

Reviewing the Migration Scripts

Once the migration scripts are generated, you should familiarize yourself with each script and XML task sequence file. If any problems arise during the remaining migration tasks, it will be more difficult to troubleshoot issues if you are unfamiliar with the contents and actions contained within the generated migration scripts and files.

Loading Drivers into Automated Deployment Services

Even if VMScript successfully validates the source system configuration information, you must determine whether the network interface card installed in the source system is directly supported by ADS. If you had to load external network interface card drivers when you installed the operating system on the source system, you will most likely have to copy the same driver files into the Automated Deployment Services file cache before you can proceed and capture the source system disk image.

Follow these steps to copy and process the network interface card drivers into the Automated Deployment Services file cache:

1. Log on to the Controller server.
2. Download the latest network interface card drivers for the source system to a temporary directory.
3. Copy the driver files into %systemdrive%\Program Files\Microsoft ADS\NBS \Repository\User\PreSystem.
4. Open a command window.
5. In the command window, type **net stop adsbuilder** and then press Enter.
6. In the command window, type **net start adsbuilder** and then press Enter.

When you copy the network interface card driver files into the Automated Deployment Services file cache, do not create any subdirectories or include Txtsetup.oem files.

Note For more details on the issues that you can encounter when ADS lacks network interface card drivers for the source system, review Microsoft Knowledge Base article 841550 at *http://support.microsoft.com/kb/841550*.

Capturing the Source System Disk Image

At this stage, you are ready to capture the source system disk images. The *Source*_Capture.cmd migration script executes and leverages ADS to capture each source system disk image sequentially.

Follow these steps to start the source system disk image capture process:

1. Log on to the Controller server and open a command window.
2. In the command window, change directory to the Virtual Server Migration Toolkit subdirectory where the generated migration files are stored.
3. In the command window, execute the *Source*_capture.cmd script.
4. When prompted, log on to the source system, restart it, and PXE boot it.

ADS takes control of the source system and boots it into the Deployment Agent to initiate the disk image capture. You can follow the progress of each disk image capture using the Automated Deployment Service MMC snap-in on the Controller server. In the MMC snap-in, explore Devices and Running Jobs to view the status of the capture tasks.

When the image captures are complete, ADS shuts down and removes the source system from the device database. The last task before the script terminates is changing system file attributes, as shown in Figure 10-2.

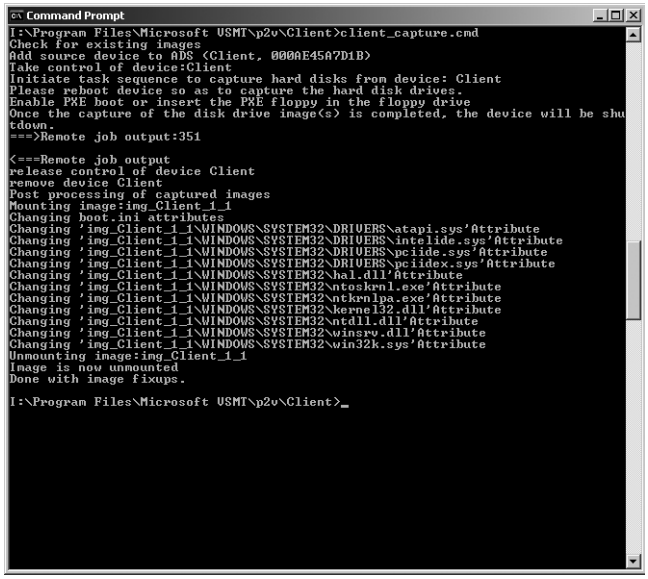

Figure 10-2 Sample output from the Source_capture.cmd script

Creating the Virtual Machine

The next step in the migration procedure is to execute the *Source*_CreateVM.cmd script and start the creation of the virtual machine in Virtual Server 2005 R2. Follow these steps to start the virtual machine creation:

1. Log on to the Controller server and open a command window.
2. In the command window, change the directory to the Virtual Server Migration Toolkit subdirectory where the generated migration files are stored.
3. In the command window, execute the *Source*_CreateVM.cmd script.

You can follow the progress of the virtual machine creation using the Virtual Server 2005 R2 Administration Website on the Controller server. You will see the creation of a new virtual machine configuration file, virtual machine creation, connection of the virtual machine to the default virtual network, creation and connection of the virtual hard disks to the virtual machine, and configuration of the virtual machine to attach an RIS virtual floppy drive.

When all these tasks are complete, check the ADS device database using the MMC snap-in. The virtual machine should have been added to the ADS device database and prepped for source system disk deployment. The script terminates after opening a browser window to the Virtual Server 2005 R2 Administration Website.

Deploying the Source System Disk Images to the Virtual Machine

After the virtual machine is created, the source system disk images must be restored to the attached virtual hard disks. The Source_DeployVM.cmd controls this part of the migration procedure. Follow these steps to restore the source system disk images and deploy the virtual machine:

1. Log on to the Controller server and open a command window.
2. In the command window, change the directory to the Virtual Server Migration Toolkit subdirectory where the generated migration files are stored.
3. In the command window, execute the Source_DeployVM.cmd script.

You can follow the progress of the virtual machine deployment using the Virtual Server 2005 R2 Administration Website on the Controller server. You will see the virtual machine boot into the Deployment Agent and the disk images restore to the virtual hard disks. The hardware-dependent system files are then swapped for virtual machine–compatible versions, and required operating system configuration settings are applied.

If you check the ADS device database using the MMC snap-in, you will see that the virtual machine is still in the device database. The script terminates after removing the RIS virtual floppy disk from the virtual machine. The virtual machine remains booted in the Deployment Agent.

Note You can specify the state of the virtual machine after deployment is complete by using the VMScript /postDeployAction parameter when generating the migration scripts. In this manner, you can choose to leave the virtual machine device in the Deployment Agent, restart the virtual machine, or shut down the virtual machine. If you decide to bring the virtual machine online, you will have to ensure that the physical server remains offline. Since both the physical server and virtual machine utilize the same SID, active directory computer account, and so on, conflicts arise if both machines are online simultaneously.

Completing the Migration Process

To complete the source system to virtual machine migration process, there are a few final tasks to perform:

1. Open the Virtual Server 2005 R2 Administration Website, and verify that the Event Viewer does not report any errors.
2. Open the Automated Deployment Services MMC snap-in, and send a reboot command to the virtual machine.
3. In the Automated Deployment Services MMC snap-in, release control and delete the virtual machine from the device database.
4. Log on to the virtual machine, and install the Virtual Machine Additions.
5. Complete any remaining virtual machine configuration modifications.
6. Test the virtual machine connectivity and performance to ensure that it is running as expected.

Important Once the virtual machine testing is complete, you can back up and delete the source system disk images from the Automated Deployment Services image store.

Performing a Virtual Machine to Virtual Machine Migration

You can use VSMT to migrate a VMware virtual machine to Virtual Server 2005 R2, provided that the VMware virtual machine is running one of the operating systems supported for migration. The migration procedure is the same as in the physical to virtual machine scenario. However, there are a couple of matters to consider prior to performing a VMware to Virtual Server virtual machine migration.

If the VMware virtual machine uses SCSI disks, you must copy the VMware SCSI drivers into the Automated Deployment Services file cache. Once you obtain the VMware SCSI drivers from the VMware Web site, follow the instructions in the "Loading Drivers into Automated Deployment Services" section earlier in this chapter.

Important If you encounter problems with the VMware SCSI drivers not loading correctly, there are two ADS hotfixes that you might have to apply to your installation. Review Microsoft Knowledge Base articles 829053 and 830413 found at *http://support.microsoft.com/kb/829053* and *http://support.microsoft.com/kb/830413*, respectively, for details.

In addition, you have to change the startup state of the VMware Tools Service to Disabled in the migrated virtual machine. Follow these steps to ensure that the VMware Tools Service is disabled automatically after the migration to Virtual Server 2005 R2:

1. Log on to the Controller server.
2. Using Windows Explorer, navigate to %systemdrive%\Program Files\Microsoft VSMT\Patches.
3. Right-click P2Vdrivers.xml and choose Edit.
4. Verify that the VMware Tools Service startup state is set to Disable.

The default P2Vdrivers.xml file specifies the startup state of drivers and services following the migration procedure. When generating the migration scripts, the VMScript.exe utility reads P2Vdrivers.xml and adds an entry in the generated task sequence that changes the start mode of the service or driver in the deployed virtual machine.

Summary

Before migrating a physical workload to a virtual machine, evaluate the workload memory, processor, network, and storage requirements to determine whether it is a good candidate for virtualization. To properly size the Virtual Server 2005 R2 physical host, consider the resource requirements of the host operating system in combination with the resource requirements of all the virtual machines that the system must support. A good rule of thumb is to add a 25-percent supplemental resource capacity to account for workload growth and additional virtual machines. Hardware and operational limitations must also be taken into account to ensure successful workload virtualization.

To understand the basic physical-to-virtual machine migration process, learn and use the free, downloadable VSMT in conjunction with ADS. Prior to starting the migration procedure, verify that the physical system configuration meets the requirements imposed by the tools. It is critical to review and understand the tools and scripts that are provided and created using the VSMT.

Once a migration procedure is complete, make sure to test the virtual machine under load to validate that performance and functionality meet production requirements. Finally, use VSMT to test the migration of virtual machines from VMware to Virtual Server 2005 R2.

Additional Resources

The following resources contain additional information related to the topics in this chapter:

- Knowledge Base article 829053, "Vendor-supplied drivers that you add to the ADS Deployment Agent Builder service repository are not installed," at *http://support.microsoft.com/kb/829053*
- Knowledge Base article 872952, "You cannot run the Chkdsk.exe program on NTFS file system volumes on a Windows NT 4.0 Service Pack 4-based computer," at *http://support.microsoft.com/kb/872952*
- Knowledge Base article 897614, "Windows Server System software not supported within a Microsoft Virtual Server environment," at *http://support.microsoft.com/kb/897614*
- Knowledge Base article 888794, "Considerations when hosting Active Directory domain controller in virtual hosting environments," at *http://support.microsoft.com/kb/888794*
- Knowledge Base article 830413, "The ADS Deployment Agent Builder Service does not correctly parse the latest .inf file formats," at *http://support.microsoft.com/kb/830413*
- Knowledge Base article 841550, "You receive an error message when you start a Windows Server 2003-based computer by using the ADS Deployment Agent," at *http://support.microsoft.com/kb/841550*
- Whitepaper, "Solution Accelerator for Consolidating and Migrating LOB Applications," at *http://www.microsoft.com/technet/solutionaccelerators/ucs/lob/lobsa/lobsaimg.mspx*
- Whitepaper, "Automated Deployment Services Technical Overview," at *http://www.microsoft.com/windowsserver2003/techinfo/overview/ads.mspx*
- Whitepaper, "Server Consolidation and Migration with VSMT," at *http://www.microsoft.com/windowsserversystem/virtualserver/overview/vsmtwhitepaper.mspx*
- ADS and VSMT Download, "Automated Deployment Services (ADS) 1.1," at *http://www.microsoft.com/downloads/details.aspx?FamilyID=d99a89c9-4321-4bf6-91f9-9ca0ded26734&DisplayLang=en*