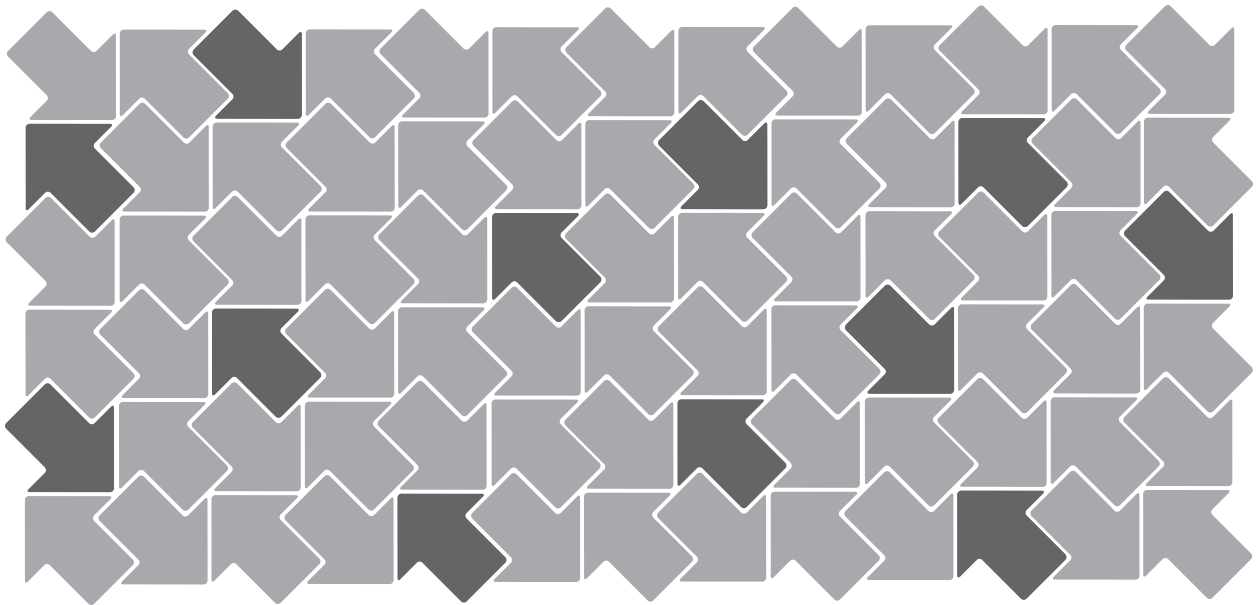# Virtual Machine Mobility
Planning Guide

vmware®

Virtual Machine Mobility Planning Guide
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http://www.vmware.com/support/pubs

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Contents

Preface

This preface provides information about the *Virtual Machine Mobility Guide* and links to VMware technical support and educational resources.

About This Book

This manual, the *Virtual Machine Mobility Planning Guide*, provides users and administrators of ESX Server, GSX Server, VMware Server, VMware ACE, and Workstation with information about moving virtual machines between VMware products.

Document History

Virtual Machine Mobility Planning Guide, Revision 20060824, Item No. VM-ENG-Q306-056

This manual is revised with each release of the product or when necessary. A revised version can contain minor or major changes.

Revision	Date	Description
20060614: includes information for ESX Server 3.0 and VirtualCenter 2.0	June 14, 2006	PDF on web
20060706 includes information for VMware Server 1.0	July 6, 2006	PDF on web
20061002 includes information for Virtual Machine Importer 2.0	October 2, 2006	PDF on web

To view the most current version of the manual, refer to the VMware Web site: **http://www.vmware.com/pdf/mobility_guide.pdf**.

Document Feedback

If you have comments about this documentation, submit your feedback to: **docfeedback@vmware.com**

Conventions

The following conventions are used in this manual.

Style	Purpose
blue boldface (online only)	Used for cross references, links
`Monospace`	Used for `commands`, `filenames`, `directories`, `paths`.
`Monospace bold`	Used to indicate **`user input`**.
Italic	Used for *book titles*.
< name >	Angle brackets used for variable and parameter names.

Technical Support and Education Resources

The following sections describe the technical support resources available to you:

Self-Service Support

Use the VMware Technology Network for self-help tools and technical information:

- Product Information – **http://www.vmware.com/products/**

- Technology Information – **http://www.vmware.com/vcommunity/technology**

- Documentation – **http://www.vmware.com/support/pubs**

- Knowledge Base – **http://www.vmware.com/support/kb**

- Discussion Forums – **http://www.vmware.com/community**

- User Groups – **http://www.vmware.com/vcommunity/usergroups.html**

For more information about the VMware Technology Network, go to **http://www.vmtn.net**.

Online and Telephone Support

Use online support to submit technical support requests, view your product and contract information, and register your products. Go to **http://www.vmware.com/support**.

Customers with appropriate support contracts should use telephone support for the fastest response on priority 1 issues. Go to **http://www.vmware.com/support/phone_support.html**.

Support Offerings

Find out how VMware's support offerings can help you meet your business needs. Go to **http://www.vmware.com/support/services**.

VMware Education Services

VMware courses offer extensive hands-on labs, case study examples, and course materials designed to be used as on-the-job reference tools. For more information about VMware Education Services, go to **http://mylearn1.vmware.com/mgrreg/index.cfm**.

Virtual Machine Mobility

You might need to move virtual machines around for a variety of reasons—to move them from one host computer to another, to run them under different VMware products, or to run them under different versions of the same VMware product.

This guide helps you plan a virtual computing environment that allows maximum mobility for your virtual machines. It also covers key issues you must deal with when moving virtual machines that must be modified to run in the new environment. Topics include:

Mobility Basics

There are two approaches to virtual machine mobility with VMware products. One approach entails moving your virtual machines manually, by copying the files that make up a virtual machine from one location to another or by using a different VMware product to run the virtual machine. The second approach is to use the VMware Virtual Machine Importer 2 stand-alone utility to import virtual machines from different source formats into several VMware product destinations.

Considerations If You Move to or from ESX Server

VMware ESX Server uses a virtual disk file format different from the format used by VMware products that run on a host operating system—such as VMware GSX Server, VMware Server, VMware Player, and VMware Workstation. As a result, when you move a virtual machine from a system running a different VMware product to an ESX Server host system, you must import the virtual disks following the instructions in the ESX Server documentation (or you can use VMware Virtual Machine Importer in those instances when it is applicable). And when you move a virtual machine from an ESX Server system to a system running a different VMware product, you must export the disks.

Keep the following points in mind:

- If the virtual disks on the ESX Server system are in undoable or append mode, you must either discard or commit the redo-log files when you export the disks.

- If you plan to import disks from a Workstation or GSX Server virtual machine that has a snapshot, you must first remove the snapshot. See your product manual for details on how to ensure that the virtual machine is in the desired state before you remove the snapshot.

- You cannot import a suspended virtual machine. Be sure the virtual machine is powered off before you import it into ESX Server.

Considerations If You Use Virtual Machine Importer 2.0

VMware Virtual Machine Importer 2.0 is a freely available product that can be used to move virtual machines between certain generation 5 and generation 4 products (see "Understanding Product Generations" on page 3 for descriptions of the generations). The following table lists the sources and destinations Virtual Machine Importer supports.

Table 1-1. Source and Destination Machines Supported by Virtual Machine Importer 2.0.

Import from VMware Products (Source)	Export to VMware Hosted or Datacenter Products (Destination)
Workstation 5.x virtual machine (compatible with VMware Player and VMware Server	Workstation 5.x virtual machine (compatible with VMware Player and VMware Server
Workstation 4.x virtual machine (compatible with GSX Server 3.x)	Workstation 4.x virtual machine (compatible with GSX Server 3.x)
ESX Server 3.x	ESX Server 3.x (standalone)
VirtualCenter 2.x	ESX Server 3.x (when managed by VirtualCenter 2.x)
ESX Server 2.5.x (when managed by VirtualCenter 2.x)	VirtualCenter 2.x
	ESX Server 2.5.x (when managed by VirtualCenter 2.x)

NOTE   Virtual Machine Importer 2.0 also can import virtual machines created in Microsoft Virtual PC and Virtual Server, and import system images from Symantec Backup Exec System Recovery (formerly LiveState Recovery). For details, see the *Virtual Machine Importer 2 User's Manual*.

Virtual Machine Importer 2.0 can be installed on the Windows 2000 Professional, Windows 2000 Server, Windows XP Professional, and Windows 2003 Server platforms. Fully supported guest operating systems are Windows NT, Windows 2000 Professional, Windows 2000 Server, Windows XP Professional, and Windows 2003 Server.

Virtual Machine Importer has Experimental support for Linux, Windows NT 3.x, Windows Me, Windows 98, Windows 95, MS-DOS, and 64-bit guest operating systems. Virtual Machine Importer can clone source images containing these operating systems, but the destination virtual machine might not work without additional configuration after importing.

For specific instances of where you can use Virtual Machine Importer, see "Moving to Generation 5 Products" on page 5 and "Moving to Generation 4 Products" on page 9. More more information on Virtual Machine Importer in general, see the *Virtual Machine Importer 2 User's Manual.*

You can download VMware Virtual Machine Importer at **http://www.vmware.com/products/vmimporter**.

Considerations About Virtual IDE and SCSI Hard Disk Types

Hosted products support emulation of IDE hard disks as well as SCSI hard disks using virtual BusLogic and LSI Logic HBAs. ESX Server supports only SCSI. This means that, without some form of reconfiguration or change, you cannot migrate a virtual machine from a hosted product (any generation) to ESX Server (any generation) if the virtual machine uses IDE virtual disks. For some guest operating system types, the New Virtual Machine Wizard in hosted products configures IDE disks by default. In order to create an ESX Server-compatible virtual machine, you must deliberately override the default and choose to create SCSI virtual disks.

If you use Virtual Machine Importer 2 to migrate a hosted product virtual machine to ESX Server, the process is much simpler, for generation 4 and generation 5 products. For virtual machines with IDE disks and Windows NT, Windows 2000, Windows XP, or Windows 2003 guest operating systems, Virtual Machine Importer reconfigures them into SCSI disks if you designate ESX Server as the virtual machine destination.

Because Virtual Machine Importer does not reconfigure certain guest operating systems (Linux, Windows 95, Windows 98, Windows Me), IDE virtual machines running these guest operating systems might import successfully, but will not work without modification, such as that described in VMware knowledge base article 1881, "Converting a Virtual IDE Disk to a Virtual SCSI Disk"
http://kb.vmware.com/vmtnkb/supportcentral/.

Special Mobility Tools

If you need to move virtual machines between host systems running ESX Server, GSX Server, or some combination of these products, you should investigate the capabilities of VMware VirtualCenter. VirtualCenter significantly simplifies the tasks involved in moving virtual machines. For host systems running ESX Server, the VirtualCenter enhancement known as VMotion™ makes it possible to move virtual machines while they are powered on and performing transactions.

NOTE   VirtualCenter 1.x supports ESX Server, and GSX Server. VirtualCenter 2.x supports only ESX Server.

Same Product and Version

The simplest environments, as far as mobility is concerned, are those in which all users are running the same VMware product and version. In such an environment, moving a virtual machine is primarily a matter of moving its files to the new location.

For details on how to perform these simple moves, see the documentation for your VMware product.

Understanding Product Generations

If you are moving virtual machines between different VMware products, the simplest working environment uses VMware products of the same generation. And in general, cross-product mobility is best in the most recent generations.

Because different products were launched at different times, you cannot determine corresponding generations by matching product version numbers.

The following list provides a quick guide to the generations of currently supported products. Earlier products are no longer supported.

■   **Generation 2**—GSX Server 1.x, ESX Server 1.0 and 1.1

■   **Generation 3**—Workstation 3.x, GSX Server 2.x, ESX Server 1.5

■   **Generation 4**—Workstation 4.x, GSX Server 3.x, ESX Server 2.x (uniprocessor and SMP)

■   **Generation 5**—Workstation 5.x, VMware Player 1.x, VMware Server 1.x, ESX Server 3.x

Products in the same generation provide similar capabilities and similar virtual hardware, making it easier to move virtual machines from one product to another. In the simplest cases, the virtual machines are interoperable—they can be moved back and forth without modification and they run without problems. However, even within the same generation there might be differences that require you to take some special steps when moving a virtual machine from one product to another.

The most obvious example is Symmetric Multiprocessing (SMP), a capability available only under ESX Server with Virtual SMP, and Workstation 5.5 and higher. When you install a guest operating system in a multiprocessor virtual machine, the installer typically configures the guest operating system with a kernel or hardware abstraction layer that provides special support for using multiple processors. A guest operating system installed in this way generally cannot run in a uniprocessor virtual machine.

Cross-Generation Mobility

The following table gives a high-level view of the effort required to move virtual machines from one generation of products to another. The references in each table cell point you to more detailed information on special steps that might be needed to move virtual machines between particular generations of products.

Table 1-2. Cross-Generation Mobility

		Moved to Host System Running			
		Generation 5	**Generation 4**	**Generation 3**	**Generation 2**
Virtual Machine Created Under	**Generation 5**	Easy in most cases See "Generation 5 to Generation 5" on page 5	Easy in most cases with Virtual Machine Importer 2, otherwise special steps needed See "Generation 5 to Generation 4" on page 9	Not supported See "Generation 5 to Generation 3" on page 13	Not supported See "Generation 5 to Generation 2" on page 15
	Generation 4	Easy in most cases with Virtual Machine Importer 2, otherwise special steps needed, or not supported See "Generation 4 to Generation 5" on page 7	Easy in most cases See "Generation 4 to Generation 4" on page 10	Special steps needed in most cases See "Generation 4 to Generation 3" on page 13	Not supported See "Generation 4 to Generation 2" on page 15
	Generation 3	One-way or not supported See "Generation 3 to Generation 5" on page 8	Special steps needed or not supported See "Generation 3 to Generation 4" on page 11	Easy in most cases See "Generation 3 to Generation 3" on page 13	Not supported in most cases See "Generation 3 to Generation 2" on page 16
	Generation 2	Not supported See "Generation 2 to Generation 5" on page 9	One-way or not supported See "Generation 2 to Generation 4" on page 12	Varies See "Generation 2 to Generation 3" on page 14	Easy in most cases See "Generation 2 to Generation 2" on page 16

In general, you can set up a working environment with products from the same generation or from two adjacent generations—4 and 5, for example, or 3 and 4. If you make appropriate choices, you can move virtual machines back and forth between VMware products of the two generations.

In general, you cannot set up a working environment that allows you to move virtual machines around freely if you skip a generation—from generation 2 to generation 4, for example. In such an environment, you need to upgrade the virtual hardware so it will run under the generation 4 product. This is a one-way move. After you upgrade the virtual hardware, you can no longer run the virtual machine under the generation 2 product.

VMware ACE

Although VMware ACE is a generation 4 product, it has special characteristics that affect your ability to move virtual machines between VMware ACE and other VMware products.

You can use virtual machines created with Workstation 4.x or GSX Server 3.x in VMware ACE projects. But because of the security features in VMware ACE, you can move a virtual machine created in VMware ACE to other VMware products only if the virtual machine has not been added to a package and does not have any policies set.

VMware Player

VMware Player runs virtual machines created by other VMware products. It cannot create virtual machines.

VMware Player runs virtual machines created under generation 4 and generation 5 products. If you want to use VMware Player to run a virtual machine created by a VMware product from generation 3 or earlier, you

must first upgrade that virtual machine using a generation 4 or generation 5 product capable of creating virtual machines.

NOTE   To run ESX Server virtual machines under hosted products—including VMware Player—you must export the virtual disk files. For details on exporting the virtual disk files, see the *ESX Server 2.x Administration Guide* or Virtual Infrastructure 3 *Basic System Administration* or the *Virtual Machine Importer 2 User's Manual,* depending on your product.

Moving to Generation 5 Products

This section summarizes the points you need to consider when moving virtual machines to a generation 5 product.

Generation 5 to Generation 5

Moving virtual machines between generation 5 products requires no special steps, as shown in the following table.

Table 1-3. Moving Virtual Machines between Generation 5 Products

		Moved to Host System Running		
		Workstation 5.x	**VMware Server 1**	**ESX Server 3**
Virtual Machine Created Under	**Workstation 5.x**	OK in most cases	OK in most cases	OK in most cases with Virtual Machine Importer 2 Otherwise, import virtual disks
	VMware Server 1	OK in most cases	OK in most cases	OK in most cases with Virtual Machine Importer 2 Otherwise, import virtual disks
	ESX Server 3	OK in most cases with Virtual Machine Importer 2 Otherwise, export virtual disks	OK in most cases with Virtual Machine Importer 2 Otherwise, export virtual disks	OK

Interoperable Configurations

In most cases, Virtual Machine Importer 2 is the easiest way to move virtual machines between generation 5 products. See "Considerations If You Use Virtual Machine Importer 2.0" on page 2, and the *Virtual Machine Importer 2 User's Manual*.

If you are not using Virtual Machine Importer, virtual machines created on Workstation 5.x are simple to move between host systems running Workstation 5.x . In general, moving a virtual machine from one host to another means copying all the files in the virtual machine's folder from the source computer to the destination computer.

For more details, see the *Workstation 5 User's Manual*.

NOTE   Workstation 5.5, and ESX Server 3 supports two key capabilities that are not supported in Workstation 5.0—64-bit guest operating systems and Virtual SMP. A virtual machine that uses either or both of these capabilities cannot be moved to Workstation 5.0.

NOTE	To take advantage of the experimental 3-D capabilities of Workstation 5.0 and 5.5, the virtual machine must be running the version of VMware Tools that corresponds to the version of Workstation you are using to run it. So a virtual machine running on Workstation 5.0 must be running the version of VMware Tools provided with Workstation 5.0. A virtual machine running on Workstation 5.5 must be running the version of VMware Tools provided with Workstation 5.5. If you move the virtual machine and want to use the 3-D capabilities, be sure you have the correct version of VMware Tools installed.

Exporting an ESX Server Virtual Machine to a Hosted Product

ESX Server has its own file format for storing virtual disk files. The hosted products—Workstation, VMware Player, VMware Server, and GSX Server—typically store virtual disk files on the host computer's file system or on a network server that can be accessed by the host operating system. When you move a virtual machine from ESX Server to one of the hosted products, you must export the virtual disks so they are in a format that can be used by the hosted product.

For details on moving virtual machines using Virtual Machine Importer 2, see the *Virtual Machine Importer User's Guide*.

For details on exporting the virtual disk files without using Virtual Machine Importer 2, see the Virtual Infrastructure 3 *Basic System Administration*.

Generation 4 to Generation 5

Special steps are needed to move virtual machines from generation 4 to generation 5 products, as shown in the following table.

Table 1-4. Moving Virtual Machines from Generation 4 to Generation 5 Products

		Moved to Host System Running			
		Workstation 5.0.x	**Workstation 5.5.x**	**VMware Server 1**	**ESX Server 3**
Virtual Machine Created Under	**ESX Server 2.x with Virtual SMP**	Not supported	OK in most cases with Virtual Machine Importer 2 if ESX Server is managed in VirtualCenter 2 Otherwise, export virtual disks Upgrade virtual hardware (one-way) or run in legacy mode	OK in most cases with Virtual Machine Importer 2 if ESX Server is managed in VirtualCenter 2 Otherwise, export virtual disks Upgrade virtual hardware (one-way) or run in legacy mode	OK in most cases with Virtual Machine Importer 2 if ESX Server is managed in VirtualCenter 2 Otherwise, upgrade virtual hardware (one-way) or run in legacy mode
	ESX Server 2.x	Export virtual disks Upgrade virtual hardware (one-way) or run in legacy mode	OK in most cases with Virtual Machine Importer 2 if ESX Server is managed in VirtualCenter 2 Otherwise, export virtual disks Upgrade virtual hardware (one-way) or run in legacy mode	OK in most cases with Virtual Machine Importer 2 if ESX Server is managed in VirtualCenter 2 Otherwise, export virtual disks Upgrade virtual hardware (one-way) or run in legacy mode	OK in most cases with Virtual Machine Importer 2 if ESX Server is managed in VirtualCenter 2 Otherwise, upgrade virtual hardware (one-way) or run in legacy mode
	GSX Server 3.x or Workstation 4.x	Upgrade virtual hardware (one-way) or run in legacy mode	OK in most cases with Virtual Machine Importer 2 Otherwise, upgrade virtual hardware (one-way) or run in legacy mode	OK in most cases with Virtual Machine Importer 2 Otherwise, upgrade virtual hardware (one-way) or run in legacy mode	OK in most cases with Virtual Machine Importer 2 Otherwise, import virtual disks, and create a new virtual machine in ESX Server 3 using the imported virtual disks Upgrade virtual hardware (one way) Note that ESX Server 3 does not support copying hosted configuration files to ESX Server 3 and registering the virtual machine.

SMP Guest Operating Systems in Uniprocessor Virtual Machines

When you install a guest operating system in a multiprocessor virtual machine, the installer typically configures the guest operating system with a kernel or hardware abstraction layer that provides special support for using multiple processors. A guest operating system installed in this way generally cannot run in a uniprocessor virtual machine.

As a result, VMware supports moving virtual machines from ESX Server with Virtual SMP only to other VMware products that support Virtual SMP: Workstation 5.5 and later.

Moving ESX Server 2.x Virtual Machines to ESX Server 3

Before moving a virtual machine from ESX Server 2.x to ESX Server 3, you should decide whether you want to be able to move back to ESX Server 2.x again. If you want to run the virtual machine under ESX Server 2.x at some later time, you should run the virtual machine in legacy mode under ESX Server 3 (without upgrading the virtual hardware).

If you are making a one-way move and don't need to run the virtual machine under ESX Server 2.x at a later time, you should upgrade the virtual hardware after you move the virtual machine. This approach gives you access to improvements in the virtual hardware that were introduced in ESX Server 3. For details, see the Virtual Infrastructure 3 *Basic System Administration*.

If you manage ESX Server 2.x using VirtualCenter 2, you can use Virtual Machine Importer 2 to move virtual machines.

Exporting an ESX Server Virtual Machine to a Hosted Product

ESX Server has its own file format for storing virtual disk files. The hosted products—Workstation and GSX Server—typically store virtual disk files on the host computer's file system or on a network server that can be accessed by the host operating system. When you move a virtual machine from ESX Server to one of the hosted products, you must export the virtual disks so they are in a format that can be used by the hosted product.

For details on exporting the virtual disk files, see the *ESX Server 2.x Administration Guide*.

If you manage ESX Server 2.x using VirtualCenter 2, you can use Virtual Machine Importer 2 to move virtual machines.

Generation 3 to Generation 5

Special steps are needed to move virtual machines from generation 3 to generation 5 products, as shown in the following table.

Table 1-5. Moving Virtual Machines from Generation 3 to Generation 5 Products

		Moved to Host System Running		
		Workstation 5.x	VMware Server 1	ESX Server 3
Virtual Machine Created Under	ESX Server 1.5.x	Export virtual disks Upgrade virtual hardware (one-way)	Export virtual disks Upgrade virtual hardware (one-way)	Upgrade virtual hardware (one-way)
	GSX Server 2.x or Workstation 3.x	Upgrade virtual hardware (one-way)	Upgrade virtual hardware (one-way)	Import virtual disks, and create a new virtual machine in ESX Server 3 using the imported virtual disks Upgrade virtual hardware (one way)

Moving from Generation 3 Hosted Products to Generation 5 Hosted Products

If you move a virtual machine from GSX Server 2 or Workstation 3 to Workstation 5, ESX Server 3, or VMware Server 1, the process is one-way. You cannot move back to the previous product again. After you move the virtual machine, you must upgrade the virtual hardware. This gives you access to improvements in the virtual hardware that were introduced in Workstation 5.

For details, see the *Workstation 5 User's Manual*.

Exporting an ESX Server Virtual Machine to Workstation

ESX Server has its own file format for storing virtual disk files. Workstation typically stores virtual disk files on the host computer's file system or on a network server that can be accessed by the host operating system.

When you move a virtual machine from ESX Server to Workstation, you must export the virtual disks so they are in a format that can be used by the hosted product.

For details on exporting the virtual disk files, see the *ESX Server 1.5 User's Manual*.

Generation 2 to Generation 5

Moving virtual machines from generation 2 products directly to generation 5 products is not supported.

You can use an intermediate product to move the virtual machines in a two-stage process. For example, if you have a generation 3 product, first move each virtual machine to the generation 3 product and upgrade the virtual hardware. Then move each virtual machine to the generation 5 product and upgrade the virtual hardware again.

You can follow the same procedure using a generation 4 product as the intermediate product.

Moving to Generation 4 Products

This section summarizes the points you need to consider when moving virtual machines to a generation 4 product.

Generation 5 to Generation 4

Prior to the release of Virtual Machine Importer 2 moving native generation 5 virtual machines to a generation 4 product was not supported. If you do not use Virtual Machine Importer (for instance, if you are moving the virtual machine to a 2.x ESX Server not managed by VirtualCenter 2), Workstation 5 allows you to create a legacy virtual machine—a generation 4 virtual machine. You can use this capability to create virtual machines for use on most generation 4 products, as shown in the following table.

Table 1-6. Moving Virtual Machines from Generation 5 to Generation 4 Products

		Moved to Host System Running		
		ESX Server 2.x with Virtual SMP	ESX Server 2.x	GSX Server 3.x or Workstation 4.x
Virtual Machine Created Under	**Workstation 5.x**	OK in most cases with Virtual Machine Importer 2 if ESX Server is managed in VirtualCenter 2 Otherwise, possible only if you create a legacy virtual machine Import virtual disks	OK in most cases with Virtual Machine Importer 2 if ESX Server is managed in VirtualCenter 2 Otherwise, possible only if you create a legacy virtual machine Import virtual disks	OK in most cases with Virtual Machine Importer 2
	VMware Server 1	OK in most cases with Virtual Machine Importer 2 if ESX Server is managed in VirtualCenter 2	OK in most cases with Virtual Machine Importer 2 if ESX Server is managed in VirtualCenter 2	OK in most cases with Virtual Machine Importer 2
	ESX Server 3	OK in most cases with Virtual Machine Importer 2 if ESX Server is managed in VirtualCenter 2	OK in most cases with Virtual Machine Importer 2 if ESX Server is managed in VirtualCenter 2	OK in most cases with Virtual Machine Importer 2

Uniprocessor Guest Operating Systems in SMP Virtual Machines

Some operating systems installed in a uniprocessor virtual machine will run successfully in an SMP virtual machine. Check the documentation for your guest operating system to see whether it supports such a move.

Importing a Virtual Machine from a Hosted Product to ESX Server

ESX Server has its own file format for storing virtual disk files. The hosted products—Workstation and GSX Server—typically store virtual disk files on the host computer's file system or on a network server that can be

accessed by the host operating system. When you move a virtual machine from one of the hosted products to ESX Server, you must import the virtual disks so they are in a format that can be used by ESX Server.

For details on importing virtual disk files into ESX Server, see the *ESX Server 2.x Administration Guide*.

For details on importing a virtual machine into ESX Server managed with VirtualCenter 2, see the *Virtual Machine Importer 2 User's Manual*.

Generation 4 to Generation 4

Moving virtual machines between generation 4 products requires relatively few special steps, as shown in the following table.

Table 1-7. Moving Virtual Machines between Generation 4 Products

		Moved to Host System Running		
		ESX Server 2.x with Virtual SMP	ESX Server 2.x	GSX Server 3.x or Workstation 4.x
Virtual Machine Created Under	ESX Server 2.x with Virtual SMP	OK	OK in most cases with Virtual Machine Importer 2 if ESX Server is managed in VirtualCenter 2 Otherwise, not supported	OK in most cases with Virtual Machine Importer 2 if ESX Server is managed in VirtualCenter 2 Otherwise, not supported
	ESX Server 2.x	Maybe, depending on guest operating system	OK	OK in most cases with Virtual Machine Importer 2 if ESX Server is managed in VirtualCenter 2 Otherwise, export virtual disks
	GSX Server 3.x or Workstation 4.x	Maybe, depending on guest operating system Import virtual disks	OK in most cases with Virtual Machine Importer 2 if ESX Server is managed in VirtualCenter 2 Otherwise, import virtual disks	OK

Interoperable Configurations

Virtual machines created on generation 4 hosted products—Workstation 4 and GSX Server 3—are interoperable. You can move them freely from one product to another. In general, moving a virtual machine from one host to another means copying all the files in the virtual machine's folder from the source computer to the destination computer.

For more details, see the manuals for Workstation and GSX Server.

Similarly, you can freely move virtual machines between servers running ESX Server 2 with Virtual SMP. You can also freely move virtual machines between servers running the standard version of ESX Server 2.

For details, see the *ESX Server 2.x Administration Guide*.

SMP Guest Operating Systems in Uniprocessor Virtual Machines

When you install a guest operating system in a multiprocessor virtual machine, the installer typically configures the guest operating system with a kernel or hardware abstraction layer that provides special support for using multiple processors. A guest operating system installed in this way generally cannot run in a uniprocessor virtual machine.

As a result, VMware supports moving virtual machines from ESX Server with Virtual SMP only to other VMware products that support Virtual SMP: Workstation 5.5 or higher.

Uniprocessor Guest Operating Systems in SMP Virtual Machines

Some operating systems installed in a uniprocessor virtual machine will run successfully in an SMP virtual machine. Check the documentation for your guest operating system to see whether it supports such a move.

Exporting an ESX Server Virtual Machine to a Hosted Product

ESX Server has its own file format for storing virtual disk files. The hosted products—Workstation and GSX Server—typically store virtual disk files on the host computer's file system or on a network server that can be accessed by the host operating system. When you move a virtual machine from ESX Server to one of the hosted products, you must export the virtual disks so they are in a format that can be used by the hosted product.

For details on exporting the virtual disk files, see the *ESX Server 2.x Administration Guide*.

For details on exporting a virtual machine from ESX Server managed with VirtualCenter 2, see the *Virtual Machine Importer 2 User's Manual*.

Importing a Virtual Machine from a Hosted Product to ESX Server

The considerations for this case are the inverse of those for exporting an ESX Server virtual machine. For details on importing virtual disk files into ESX Server, see the *ESX Server 2.x Administration Guide*.

For details on importing a virtual machine into ESX Server managed with VirtualCenter 2, see the *Virtual Machine Importer 2 User's Manual*.

Generation 3 to Generation 4

Moving virtual machines between generation 3 and generation 4 products is possible in most cases. You might need to take some special steps, as shown in the following table.

Table 1-8. Moving Virtual Machines from Generation 3 to Generation 4 Products

		Moved to Host System Running		
		ESX Server 2.x with Virtual SMP	ESX Server 2.x	GSX Server 3.x or Workstation 4.x
Virtual Machine Created Under	**ESX Server 1.5.x**	Upgrade virtual hardware (one-way) or run in legacy mode. Cannot add second CPU	Upgrade virtual hardware (one-way) or run in legacy mode	Export virtual disks
	GSX Server 2.x or Workstation 3.x	Not supported	Import virtual disks	Upgrade virtual hardware (one-way) or run in legacy mode

Generation 3 Virtual Machines and ESX Server with Virtual SMP

Importing generation 3 virtual machines into ESX Server with Virtual SMP is not supported. Among the problems with such an import, guest operating systems installed in a uniprocessor virtual machine might not run correctly in an SMP virtual machine.

Moving ESX Server 1.5.x Virtual Machines to ESX Server 2.x

Before making the move from ESX Server 1.5.x to ESX Server 2.x, you should decide whether you want to be able to move back to ESX Server 1.5.x again.

If you do want to be able to move the virtual machine back—to run it under ESX Server 1.5.x at some later time—you should run the virtual machine in legacy mode under ESX Server 2.x.

If you are making a one-way move and don't need to run the virtual machine under ESX Server 1.5.x at a later time, you should upgrade the virtual hardware after you move the virtual machine. This approach gives you access to improvements in the virtual hardware that were introduced in ESX Server 2.x.

For details, see the *ESX Server 2.x Administration Guide*.

Moving from Generation 3 Hosted Products to Generation 4 Hosted Products

Before making the move from GSX Server 2.x or Workstation 3.x to GSX Server 3.x or Workstation 4.x, you should decide whether you want to be able to move back to the previous product again.

If you do want to be able to move the virtual machine back—to run it under the previous product at some later time—you should run the virtual machine in legacy mode under GSX Server 3.x or Workstation 4.x.

If you are making a one-way move and don't need to run the virtual machine under GSX Server 2.x or Workstation 3.x at a later time, you should upgrade the virtual hardware after you move the virtual machine. This gives you access to improvements in the virtual hardware that were introduced in GSX Server 3.x and Workstation 4.x.

For details, see the manual for the generation 4 product to which you are moving the virtual machine—GSX Server 3.x or Workstation 4.x.

Exporting an ESX Server 1.5.x Virtual Machine to a Hosted Product

ESX Server has its own file format for storing virtual disk files. The hosted products—Workstation and GSX Server—typically store virtual disk files on the host computer's file system or on a network server that can be accessed by the host operating system. When you move a virtual machine from ESX Server to one of the hosted products, you must export the virtual disks so they are in a format that can be used by the hosted product.

For details on exporting the virtual disk files, see the *ESX Server 1.5 User's Manual*.

Importing a Virtual Machine from a Hosted Product to ESX Server 2.x

The considerations for this case are the inverse of those for exporting an ESX Server virtual machine.

For details on importing virtual disk files into ESX Server, see the *ESX Server 2.x Administration Guide*.

Generation 2 to Generation 4

Special steps are needed to move virtual machines from generation 2 products to GSX Server 3.x or Workstation 4.x, as shown in the following table. Moving virtual machines from generation 2 products to ESX Server 2.x or to ESX Server 2.x with Virtual SMP is not supported.

Table 1-9. Moving Virtual Machines from Generation 2 to Generation 4 Products

		Moved to Host System Running		
		ESX Server 2.x with Virtual SMP	ESX Server 2.x	GSX Server 3.x or Workstation 4.x
Virtual Machine Created Under	**ESX Server 1.0.x**	Not supported	Not supported	Export virtual disks
	GSX Server 1.x or Workstation 2.x	Not supported	Not supported	Upgrade virtual hardware (one-way)

Moving from Generation 2 Hosted Products to Generation 4 Hosted Products

If you move a virtual machine from GSX Server 1.x or Workstation 2.x to GSX Server 3.x or Workstation 4.x, the process is one-way. You cannot move back to the previous product again. After you move the virtual machine, you must upgrade the virtual hardware. This gives you access to improvements in the virtual hardware that were introduced in GSX Server 3.x and Workstation 4.x.

For details, see the manual for the generation 4 product to which you are moving the virtual machine—GSX Server 3.x or Workstation 4.x.

Exporting an ESX Server Virtual Machine to a Hosted Product

ESX Server has its own file format for storing virtual disk files. The hosted products—Workstation and GSX Server—typically store virtual disk files on the host computer's file system or on a network server that can be accessed by the host operating system. When you move a virtual machine from ESX Server to one of the hosted products, you must export the virtual disks so they are in a format that can be used by the hosted product.

For details on exporting the virtual disk files, see the *ESX Server User's Manual*.

Moving to Generation 3 Products

This section summarizes the points you need to consider when moving virtual machines to a generation 3 product.

Generation 5 to Generation 3

Although you cannot move virtual machines from generation 5 products to generation 3 products, you can move virtual machines in the opposite direction. The general rule is that you should create the virtual machine under the generation 3 product, and then import it so it will run under the generation 5 product. For details, see "Generation 3 to Generation 5" on page 8.

Generation 4 to Generation 3

Although you cannot move virtual machines from generation 4 products to generation 3 products, you can create virtual machines that run under products of both generations. The general rule is that you should create the virtual machine under the generation 3 product, and then run it in legacy mode under the generation 4 product.

Environments Combining Generation 4 and Generation 3 Products

For more information on creating virtual machines so they can be used under both generation 3 and generation 4 products, see "Generation 3 to Generation 4" on page 11.

Generation 3 to Generation 3

Moving virtual machines between generation 3 products requires relatively few special steps, as shown in the following table.

Table 1-10. Moving Virtual Machines between Generation 3 Products

	Moved to Host System Running	
	ESX Server 1.5.x	**GSX Server 2.x or Workstation 3.x**
ESX Server 1.5.x	OK	Export virtual disks
GSX Server 2.x or Workstation 3.x	Import virtual disks	OK

(Row header, rotated: Virtual Machine Created Under)

Interoperable Configurations

Virtual machines created on generation 3 hosted products—Workstation 3.x and GSX Server 2.x—are interoperable. You can move them freely from one product to another. In general, moving a virtual machine from one host to another means copying all the files in the virtual machine's folder from the source computer to the destination computer.

For details, see the manuals for Workstation and GSX Server.

Similarly, you can freely move virtual machines between servers running ESX Server 1.5.x.

For details, see the *ESX Server 1.5 User's Manual*.

Exporting an ESX Server Virtual Machine to a Hosted Product

ESX Server has its own file format for storing virtual disk files. The hosted products—Workstation and GSX Server—typically store virtual disk files on the host computer's file system or on a network server that can be accessed by the host operating system. When you move a virtual machine from ESX Server to one of the hosted products, you must export the virtual disks so they are in a format that can be used by the hosted product.

For details on exporting the virtual disk files, see the *ESX Server 1.5 User's Manual*.

Importing a Virtual Machine from a Hosted Product to ESX Server

The considerations for this case are the inverse of those for exporting an ESX Server virtual machine.

For details on importing virtual disk files into ESX Server, see the *ESX Server 1.5 User's Manual*.

Generation 2 to Generation 3

Moving virtual machines from ESX Server 1.0.x to ESX Server 1.5.x should work smoothly. Some special steps are needed to move virtual machines from generation 2 hosted products to generation 3 hosted products, as shown in the table below. Moving virtual machines from generation 2 hosted products to ESX Server 1.5.x or from ESX Server 1.0.x to generation 3 hosted products is not supported.

Table 1-11. Moving Virtual Machines from Generation 2 to Generation 3 Products

<table>
<tr><td rowspan="2"></td><td colspan="2">**Moved to Host System Running**</td></tr>
<tr><td>**ESX Server 1.5.x**</td><td>**GSX Server 2.x or Workstation 3.x**</td></tr>
<tr><td>**ESX Server 1.0.x**</td><td>OK</td><td>Not supported</td></tr>
<tr><td>**GSX Server 1.x or Workstation 2.x**</td><td>Not supported</td><td>Upgrade virtual hardware or run in legacy mode</td></tr>
</table>

Virtual Machine Created Under (left side vertical header)

Moving ESX Server 1.0.x Virtual Machines to ESX Server 1.5.x

In general, ESX Server 1.0.x virtual machines can be used interoperably under ESX Server 1.5.x. For details on using ESX Server 1.0.x virtual machines under ESX Server 1.5.x, see the *ESX Server 1.5 User's Manual*.

Moving from Generation 2 Hosted Products to Generation 3 Hosted Products

Before making the move from GSX Server 1.x or Workstation 2.x to GSX Server 2.x or Workstation 3.x, you should decide whether you want to be able to move back to the previous product again.

If you do want to be able to move the virtual machine back—to run it under the previous product at some later time—you should run the virtual machine in legacy mode under GSX Server 2.x or Workstation 3.x.

If you are making a one-way move and don't need to run the virtual machine under GSX Server 1.x or Workstation 2.x at a later time, you should upgrade the virtual hardware after you move the virtual machine. This gives you access to improvements in the virtual hardware that were introduced in GSX Server 2.x and Workstation 3.x.

For details, see the manual for the generation 3 product to which you are moving the virtual machine—GSX Server 2.x or Workstation 3.x.

Moving to Generation 2 Products

This section summarizes the points you need to consider when moving virtual machines to a generation 2 product.

Generation 5 to Generation 2

You cannot move virtual machines from a generation 5 product to a generation 2 product and you cannot create virtual machines that run under products of both generations.

You can move virtual machines in the opposite direction with the help of an intermediate product. For details, see "Generation 2 to Generation 5" on page 9.

Generation 4 to Generation 2

Although you cannot move virtual machines from generation 4 products to generation 2 products, you can move virtual machines in the opposite direction. The general rule is that you should create the virtual machine under the generation 2 product, and then upgrade it so it will run under the generation 4 product. For details, see "Generation 2 to Generation 4" on page 12.

SMP virtual machines cannot be moved to generation 2 products.

Generation 3 to Generation 2

Although you cannot move virtual machines from generation 3 hosted products to generation 2 products, you can create virtual machines that run under products of both generations. The general rule is that you should create the virtual machine under the generation 2 product, and then run it in legacy mode under the generation 3 product. For details, see "Generation 2 to Generation 3" on page 14.

ESX Server 1.5.x virtual machines are not supported under generation 2 hosted products.

Table 1-12. Moving Virtual Machines from Generation 3 to Generation 2 Products

		Moved to Host System Running	
		ESX Server 1.0.x	GSX Server 1.x or Workstation 2.x
Virtual Machine Created Under	**ESX Server 1.5.x**	OK	Not supported
	GSX Server 2.x or Workstation 3.x	Not supported	Not supported

Moving ESX Server 1.5.x Virtual Machines to ESX Server 1.0.x

In general, ESX Server 1.5.x virtual machines can be used interoperably under ESX Server 1.0.x. For details on using ESX Server 1.5.x virtual machines under ESX Server 1.0.x, see the *ESX Server 1.5 User's Manual*.

Generation 2 to Generation 2

Moving virtual machines between generation 2 products requires relatively few special steps, as shown in the following table.

Table 1-13. Moving Virtual Machines between Generation 2 Products.

		Moved to Host System Running	
		ESX Server 1.0.x	GSX Server 1.x or Workstation 2.x
Virtual Machine Created Under	**ESX Server 1.0.x**	OK	Export virtual disks
	GSX Server 1.x or Workstation 2.x	Import virtual disks	OK

Interoperable Configurations

Virtual machines created on generation 2 hosted products—Workstation 2.x and GSX Server 1.x—are interoperable. You can move them freely from one product to another. In general, moving a virtual machine

from one host to another means copying all the files in the virtual machine's folder from the source computer to the destination computer.

For more details, see the manuals for Workstation and GSX Server.

Similarly, you can freely move virtual machines between servers running ESX Server 1.0.x.

For details, see the *ESX Server 1.0 User's Manual*.

Exporting an ESX Server Virtual Machine to a Hosted Product

ESX Server has its own file format for storing virtual disk files. The hosted products—Workstation and GSX Server—typically store virtual disk files on the host computer's file system or on a network server that can be accessed by the host operating system. When you move a virtual machine from ESX Server to one of the hosted products, you must export the virtual disks so they are in a format that can be used by the hosted product.

For details on exporting the virtual disk files, see the *ESX Server 1.0 User's Manual*.

Importing a Virtual Machine from a Hosted Product to ESX Server

The considerations for this case are the inverse of those for exporting an ESX Server virtual machine.

For details on importing virtual disk files into ESX Server, see the *ESX Server 1.0 User's Manual*.

Index

Numerics

3-D capability
    in Workstation 5 virtual machines **6**
64-bit guests operating systems
    in Workstation 5 **5**

A

append mode
    ESX Server disks **1**

E

ESX Server
    append mode disks **1**
    exporting virtual disks **1**
    exporting virtual machine to a hosted product **6**,
        14, **17**
    exporting virtual machines to a hosted
        product **8**, **11**–**13**
    importing suspended virtual machine **1**
    importing virtual disks **1**, **9**, **11**–**12**, **14**, **17**
    product generations **3**
    redo-log files **1**
    SMP **3**
    undoable mode disks **1**
    virtual disk file format **1**–**2**
exporting
    ESX Server virtual machines to a hosted
        product **6**, **8**, **11**–**14**, **17**
    virtual disks from ESX Server **1**

G

generations
    moving to generation 2 **15**
    moving to generation 3 **13**
    moving to generation 4 **9**
    moving to generation 5 **5**
    of particular VMware products **3**
GSX Server
    product generations **3**

H

hardware abstraction layer
    SMP virtual machines **3**

I

IDE virtual hard drives not supported in ESX
        Server **2**
importing
    for ESX Server and snapshots **1**
    virtual disks for ESX Server **1**, **9**, **11**–**12**, **14**, **17**
interoperable configurations
    generation 2 **16**
    generation 3 **14**
    generation 4 **10**
    generation 5 **5**

K

kernel
    SMP virtual machines **3**
knowledge base
    accessing **vi**

L

legacy virtual machines
    creating in Workstation 5 **9**

M

multiprocessor virtual machines
    mobility **3**

R

redo-log files
    ESX Server **1**

S

SMP (symmetric multiprocessing)
    ESX Server mobility **3**
    in Workstation 5 virtual machines **5**
    moving guest to uniprocessor virtual machine **7**,
        10
snapshots
    and imports for ESX Server **1**
suspended virtual machines
    importing for ESX Server **1**

T

technical support resources **vi**

U

undoable mode