Virtual Disk Manager User's Guide

Virtual Disk Development Kit

vmware®

Virtual Disk Manager User's Guide
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About This Book

This VMware® manual, the *Virtual Disk Manager User's Guide*, provides an introduction to using the `vmware-vdiskmanager` command-line utility.

Revision History

This book is revised with each release of the product or when necessary. A revised version can contain minor or major changes. Table P-1 summarizes the significant changes in each version of this guide.

Table P-1. Revision History

Revision Date	Description of Changes
20070420	First version of the *Virtual Disk Manager User's Guide*.
20070607	Update with support for Linux hosts and remote virtual disks.
20080128	Added `-t` option 5 for the compressed stream virtual disk type.
20080407	Added `-S` option to switch remote system from target to source.
20080407	Reissued with VMware Workstation 6.5 and VMware Server 2.0.

Intended Audience

This book is intended for anyone who uses VMware Virtual Disk Manager. Users typically include people who do software development and testing or work with multiple operating systems or computing environments: system administrators, application developers, QA engineers, and anyone who wants to create, manage, and modify virtual disk files from scripts or at the command line.

Documentation Resources

To access the current versions of VMware API and SDK documentation, go to:

http://www.vmware.com/support/pubs/sdk_pubs.html

To access the current versions of other VMware manuals, go to:

http://www.vmware.com/support/pubs

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Technical Support and Education Resources

The following sections describe the technical support and educational resources available to you.

Online Support

You can submit questions or post comments to the Developer Community SDKs and APIs forum, which is monitored by VMware technical support and product teams. To access the forum, go to:

http://communities.vmware.com/community/developer

Support Offerings

To find out how VMware support offerings can help meet your business needs, go to:

http://www.vmware.com/support/services

VMware Professional Services

VMware Education Services courses offer extensive hands-on labs, case study examples, and course materials designed to be used as on-the-job reference tools. Courses are available onsite, in the classroom, and live online. For onsite pilot programs and implementation best practices, VMware Consulting Services provides offerings to help you assess, plan, build, and manage your virtual environment. To access information about education classes, certification programs, and consulting services, go to:

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Using VMware Virtual Disk Manager

VMware Virtual Disk Manager (`vmware-vdiskmanager`) is a utility that allows you to create, manage, and modify virtual disk files from within scripts or at the command line. It runs on Windows and Linux systems, and has the same command-line options on both.

This chapter contains the following sections:

About Virtual Disk Manager

Virtual Disk Manager manipulates virtual machine disk (VMDK) files, which in VMware systems substitute for physical disk. One of Virtual Disk Manager's key features is the ability to clone and convert virtual disks from the local system to a remote system, or from a remote system to the local system.

Another feature allows you to enlarge a virtual disk so that its maximum capacity is larger than when you created it. If you need more disk space on a given virtual disk but do not want to add another virtual disk or use ghosting software to transfer the data on a virtual disk to a larger virtual disk, you can alter the maximum size of the disk. This is not possible with physical hard drives.

Another feature allows you to change disk types. When you create a virtual machine, you specify how disk space is allocated. You have two choices for a total of four options:

- Preallocated or growable – All space for the virtual disk is allocated in advance (flat), or allocated space begins small but grows as needed for the virtual disk (sparse).
- Single or multiple files – Virtual disk is stored in one big file (monolithic), or stored as a series of smaller virtual disk files (split).

With Virtual Disk Manager you can change whether the virtual disk type is flat or sparse, monolithic or split. You can change preallocated disk into growable disk as needed, and change whether the virtual disk is stored in a single file or split into multiple 2GB files.

For example, you might allocate all the disk space for a virtual disk, but later you might need to reclaim hard disk space on the host. You can convert the preallocated virtual disk into a growable disk, and remove the original virtual disk file. The new growable virtual disk is large enough to contain all the data in the original virtual disk, and moreover is able to grow when you add data to it.

As another example, you could move a virtual machine from an old VMware server that could not handle files larger than 2GB, converting the split virtual disk into a single growable file.

As a third example, you can convert hosted disk to managed disk in a VMFS file system on an ESX host.

NOTE Virtual disk must be offline, with the virtual machine powered off, for most operations.

Uses of Virtual Disk Manager

You can use Virtual Disk Manager to:

- Automate the management of virtual disks with scripts.
- Create virtual disks that are not yet associated with a particular virtual machine. This is useful for making templates to speed creation of virtual machine.
- Convert an existing local virtual disk to a remote ESX virtual disk.
- Create a compressed disk optimized for streaming.
- Switch the virtual disk type from preallocated to growable, or from growable to preallocated. When you change the disk type to growable, you reclaim some disk space. You can shrink the virtual disk to reclaim even more disk space.
- Expand the size of a virtual disk so it is larger than the size specified when you created it.
- Defragment virtual disks.
- Prepare and shrink virtual disks without powering on the virtual machine.
- Rename and move virtual disks.

NOTE You cannot use Virtual Disk Manager to create or to shrink physical hard drives.

You can use Virtual Disk Manager with virtual disks created under VMware Server, VMware Workstation 5 or higher, VMware Fusion, VMware Player, VMware GSX Server, VMware ACE (unencrypted disks only), and VMware ESX/ESXi server (only preallocated disks of type 4).

VMware Disk Mount

Some disk management activities require you to mount a VMDK as a volume or file system available to the host or guest operating system. See the related manual *VMware Disk Mount User's Guide* for more information.

Running Virtual Disk Manager

Back up your virtual disk files by copying them elsewhere before making changes with Virtual Disk Manager.

To run Virtual Disk Manager

1 Open a command prompt or terminal on the host.

Path is probably set correctly by the VMware installation, but you might have to change to the directory where you installed VMware Virtual Disk Manager.

2 Type the `vmware-vdiskmanager` command to display usage information.

The command syntax is one of:

```
vmware-vdiskmanager <options> <diskname>
vmware-vdiskmanager <options> <drive|mountpoint>
```

Use `<diskname>` to specify the name of a virtual disk file (VMDK) that you want to create, manage, or modify. The virtual disk file must have a `.vmdk` extension. You may specify a path in front of the filename. For example: `C:\Documents and Settings\<user>\My Documents\My Virtual Machines\VMname\newvmdisk.vmdk` (on a Windows host) or `/path/to/disk/newvmdisk.vmdk` (on a Linux host). If you mapped a network share on the host, you can create the virtual disk on that share by providing path information with the disk name.

Use `<drive|mountpoint>` to specify the drive letter or mount point associated with a virtual disk that was mounted using VMware Disk Mount. You must mount a virtual disk to prepare it for shrinking.

See Table 1, "VMware Virtual Disk Manager Options," on page 9 for a description of command-line options.

See "Examples Using Virtual Disk Manager" on page 10 for sample commands to perform various tasks.

Table 1. VMware Virtual Disk Manager Options

Option Parameters	Description
`-c`	Creates a local virtual disk. The `-a`, `-s`, and `-t` options, and a virtual disk name specified by `<diskname>`, are required when creating a virtual disk.
`-d`	Defragments the virtual disk specified by `<diskname>`. You can defragment only growable virtual disks, not preallocated or remote virtual disks.
`-k`	Shrinks the virtual disk specified by `<diskname>`. Before you can shrink a virtual disk, you must prepare all its volumes for shrinking using the `-p` option. You can shrink only growable virtual disks, not preallocated or remote virtual disks.
`-n <sourcedisk> <targetdisk>`	Renames the virtual disk named by `<sourcedisk>` to the virtual disk named by `<targetdisk>`. By specifying directory paths, you can place the renamed virtual disk in a different directory, either with its original name or with a new name.
`-p`	Prepares the virtual disk mounted at `<drive>` (Windows) or at `<mountpoint>` (Linux) for shrinking. If the virtual disk is partitioned into different volumes or file systems, you must separately mount and prepare each one for shrinking.
`-r <sourcedisk> <targetdisk>`	Converts (clones) the virtual disk named by `<sourcedisk>`, creating a new virtual disk named by `<targetdisk>`. For local `<targetdisk>` the `-t` option is required to specify type. For remote `<targetdisk>` on an ESX host, use the `-h`, `-u`, and `-f` options. For the virtual machine to recognize the converted virtual disk, edit the virtual machine settings to remove the existing virtual disk from the virtual machine, then add the converted disk to the virtual machine.
`-x <n>[GB|MB|KB]`	Expands (grows) the virtual disk specified by `<diskname>` to the given capacity `<n>`, which you can specify in gigabytes (GB), megabytes (MB), or kilobytes (KB). The new capacity must be greater than the original capacity. You can expand local virtual disks only. You cannot change the size of a physical hard drive.
`-q`	Disables Virtual Disk Manager logging. Otherwise, messages that Virtual Disk Manager generates are recorded in a log file `vdiskmanager.log` stored in a temporary directory.
`-a [ide|buslogic|lsilogic]`	Specifies the disk adapter type. This option is required when you create a virtual disk. Choose one of the following adapter types: ■ `ide` – an IDE adapter, for compatibility with old software. ■ `buslogic` – a BusLogic SCSI adapter, for high performance. ■ `lsilogic` – LSI Logic SCSI adapter, for high performance on new systems.
`-s <n>[GB|MB|KB]`	Specifies the size of the virtual disk. This option is required when you create a virtual disk. You can specify disk size `<n>` in gigabytes (GB), megabytes (MB), or kilobytes (KB). Size must be 1 MB (2000 sectors) or greater. Do not use the `-s` option when you expand a virtual disk; specify disk size using the `-x` option instead.
`-t [0|1|2|3|4|5]`	Specifies the virtual disk type. This option is required when you create or convert a virtual disk. Choose one of the following types: ■ 0 – create a growable virtual disk contained in a single file (monolithic sparse). ■ 1 – create a growable virtual disk split into 2GB files (split sparse). ■ 2 – create a preallocated virtual disk contained in a single file (monolithic flat). ■ 3 – create a preallocated virtual disk split into 2GB files (split flat). ■ 4 – create a preallocated virtual disk compatible with ESX server (VMFS flat). ■ 5 – create a compressed disk optimized for streaming.
`-h <hostname>`	Specifies the host name or IP address of a remote ESX host.
`-u <username>`	Specifies the user name for connecting to a remote ESX host.
`-f <passwordfile>`	Specifies the name and location of a plain-text file that contains the password for connecting to a remote ESX host.
`-P <portNumber>`	Specifies a TCP port number for communicating with the remote ESX host. This is optional and defaults to `902`.
`-S`	Switches to make the source virtual disk remote, instead of the target disk remote.

Examples Using Virtual Disk Manager

The following examples illustrate how to use Virtual Disk Manager.

NOTE Always back up (copy) your virtual disk files before changing size, defragmenting, or renaming them.

Creating a Virtual Disk

To create a new virtual disk

Change directory to the location where you want the new VMDK and type this command:

```
vmware-vdiskmanager -c -a lsilogic -s 40GB -t 0 mydisk.vmdk
```

This creates a 40 GB SCSI virtual disk named `mydisk.vmdk`. Type zero means that the space is contained in a single virtual disk file, and that disk space is growable, not preallocated.

Converting a Virtual Disk

To convert a virtual disk from preallocated to growable

Assuming `sourceDisk.vmdk` exists as type 2 or 3, type this command to convert it:

```
vmware-vdiskmanager -r sourceDisk.vmdk -t 0 targetDisk.vmdk
```

This converts the disk from its original preallocated type to a growable virtual disk consisting of one VMDK file. Virtual Disk Manager reclaims some space in the virtual disk, so the VMDK needs to be only about as large as the data it contained at conversion time.

To convert a local virtual disk to a remote ESX virtual disk

For this conversion, specify type 4 for VMFS virtual disk, with remote disk options:

```
vmware-vdiskmanager -r sourceDisk.vmdk -t 4 -h esx3.example.com -u admin -f password.txt
              "[storage1] <VMname>/targetDisk.vmdk"
```

This converts the local virtual disk to remote virtual disk located on the specified ESX host. After conversion is complete and you have tested the converted virtual disk to make sure it works as expected, you may delete the original virtual disk file. If you delete the original file, also remove it from any virtual machine that uses it. To remove it, choose **VM > Settings > Hardware**, select the virtual disk, and click **Remove**.

For the ESX host to recognize the converted virtual disk, you must add the disk to the virtual machine. Choose **Inventory > Virtual Machine > Edit Settings**, click **Add**, and follow the wizard prompts to add the converted virtual disk file.

CAUTION When cloning to a remote ESX host, Virtual Disk Manager overwrites any preexisting VMDK file. This could result in loss of data. When cloning to local disk, the destination VMDK is not overwritten.

Increasing the Size of an Existing Virtual Disk

To expand (grow) a virtual disk

Specify size and give the full path to the VMDK, or change directory to its location:

```
vmware-vdiskmanager -x 80GB mydisk.vmdk
```

This increases the maximum capacity of the virtual disk to 80GB. Unlike defragmenting and shrinking, you may increase the size of preallocated virtual disks (flat type 2 or 3).

Virtual Disk Manager expands the virtual disk but does not modify its contents, so the partition information remains the same. Many operating systems cannot alter partition size after creation, so you might have to obtain third-party software, such as Partition Magic or GNU Parted, to do this. Such software allows you to alter disk partitions so a virtual machine can access the additional disk space.

Another method of increasing partition size, easier in some cases, would be to use VMware Converter.

Renaming or Relocating a Virtual Disk

To rename or relocate a virtual disk

1 Remove the virtual disk from any virtual machine that contains the disk.

Choose **VM > Settings > Hardware**, select the virtual disk, and click **Remove**.

2 Type one of the following commands:

- To rename the virtual disk and keep it in the same location, type:

```
vmware-vdiskmanager -n mydisk.vmdk myNewDisk.vmdk
```

- To rename the virtual disk and locate it in a different directory, type:

```
vmware-vdiskmanager -n mydisk.vmdk "..\<Another Path>\myNewDisk.vmdk"
```

On Linux hosts, type:

```
vmware-vdiskmanager -n mydisk.vmdk ../<anotherPath>/myNewDisk.vmdk
```

- To keep the same name but locate the disk in a different directory, type:

```
vmware-vdiskmanager -n mydisk.vmdk "..\<Another Path>\mydisk.vmdk"
```

On Linux hosts, type:

```
vmware-vdiskmanager -n mydisk.vmdk ../<anotherPath>/
```

3 Add the virtual disk back to any virtual machines that use it.

Choose **VM > Settings > Hardware**, click **Add**, and follow the instructions in the wizard.

Defragmenting a Virtual Disk

To defragment a virtual disk

To defragment a local virtual disk, type this command.

```
vmware-vdiskmanager -d myDisk.vmdk
```

Defragment consolidates sparse disk, moving data to lower-numbered sectors. This is independent of any defragmentation tools in the guest operating system, which work on volumes stored inside the VMDK. Defragmenting does not reclaim unused space on a virtual disk; to do this, you must shrink the disk.

You cannot defragment:

- Preallocated virtual disks (flat type 2 or 3)
- Physical hard drives
- Virtual disks that are associated with snapshots.

Follow this order of steps when defragmenting and shrinking virtual disk:

1 Run a disk fragmentation tool inside the virtual machine. For example, with a Windows98 guest operating system, run the Windows98 defragmentation tool.

VMware recommends that you defragment a guest's virtual disk before taking the first snapshot of a guest, or after deleting snapshots. Otherwise you lose the ability to defragment the guest's virtual disk, because after a snapshot, changes are made to the redo log, not the original virtual disk. Moreover, defragmentation can heavily modify the virtual disk image, resulting in a very large redo log.

2 Power down the virtual machine and use `vmware-vdiskmanager -d` to defragment its virtual disk. This is the same as clicking **Hard Disk > Utilities > Defragment** in the user interface.

3 Run a disk fragmentation tool on the host computer, if needed. Modern file systems such as NTFS and Linux `ext2` and especially `ext3` are relatively resistant to defragmentation.

4 Shrink the virtual disk as described in "Shrinking a Virtual Disk" on page 12.

Shrinking a Virtual Disk

If you have a virtual disk that grows as you add data, you can shrink the disk in order to reclaim unused space. If there is empty space in the virtual disk, shrinking reduces the amount of space that the VMDK file occupies on the host. Shrinking a virtual disk does not change the maximum capacity of the virtual disk itself.

Power off the virtual machine before using Virtual Disk Manager to prepare and shrink growable virtual disks. You cannot shrink:

- Preallocated virtual disks (flat type 2 or 3)
- Physical hard drives
- Virtual disks that are associated with snapshots.

To prepare and shrink the virtual disk in its current state, first use the snapshot manager to delete existing snapshots. To discard changes made since you took a snapshot, revert to the snapshot.

To shrink a virtual disk

1 Use the VMware Disk Mount utility to mount a volume of the virtual disk. The VMware Disk Mount utility and the *VMware Disk Mount User's Manual* are available on the VMware Web site.

Change directory to the location of the virtual machine, for example `Windows98`, and run `vmware-mount`:

```
cd C:\Documents and Settings\user\My Documents\My Virtual Machines\Windows98
vmware-mount M: Windows98.vmdk
```

On Linux hosts, type:

```
vmware-mount /path/to/vmware/guest/Windows98.vmdk /mnt/win98
```

2 Use Virtual Disk Manager to prepare the volume for shrinking.

On Windows type this command, where `M:` is the drive letter with the mounted volume:

```
vmware-vdiskmanager -p M:
```

On Linux hosts, specify the mount point instead of the drive:

```
vmware-vdiskmanager -p /mnt/win98
```

The prepare operation zeroes out unused sectors so that shrink recognizes these sectors as unused space.

3 Unmount the volume using the VMware Disk Mount utility:

```
vmware-mount /d M:
```

On Linux hosts, type:

```
vmware-mount -d /mnt/win98
```

4 Repeat the mounting, preparing, and unmounting steps for each volume of the virtual disk.

5 Now use Virtual Disk Manager to shrink the virtual disk:

```
vmware-vdiskmanager -k Windows98.vmdk
```