



EMC[®] Avamar[®] 6.1 for Windows Server

User Guide

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PREFACE

As part of an effort to improve its product lines, EMC periodically releases revisions of its software and hardware. Therefore, some functions described in this document might not be supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information on product features.

Contact your EMC representative if a product does not function properly or does not function as described in this document.

Note: This document was accurate at publication time. New versions of this document might be released on the EMC online support website. Check the EMC online support website to ensure that you are using the latest version of this document.

Purpose

This guide describes how to install the Avamar Client for Windows, and how to back up and restore data on a Windows Server in both standalone and clustered environments.

Other uses of the Avamar Client for Windows and the Avamar Client for Windows Clusters are covered in complete detail in other Avamar documentation available on the EMC online support website:

- ◆ User-initiated on-demand backup and restore from the client machine is described in the *EMC Avamar Backup Clients User Guide*.
- ◆ Other Avamar backup clients running on Windows servers may require the installation of the Avamar Client for Windows as well as the application-specific backup client. For example, the *EMC Avamar for SQL Server User Guide* provides complete system requirements and instructions for installing the Avamar Client for Windows and the Avamar Plug-in for SQL Server, as well as configuration for SQL Server clusters.

For Lotus Notes, Oracle, Microsoft Exchange Server, Microsoft SharePoint Server, and Microsoft SQL Server backup clients, consult the respective backup client guide for complete instructions on installing both the Avamar Client for Windows and the application-specific backup client.

Audience

The information in this document is primarily intended for:

- ◆ System administrators who are responsible for installing software and maintaining servers and clients on a network.
- ◆ Microsoft Windows Server system administrators who are responsible for backing up and maintaining Microsoft Windows Servers.

Persons using this document should have current practical experience with the following:

- ◆ Operating system shell commands on the specific Windows Server platform (root permission required).
- ◆ The specific versions of Microsoft Windows and Windows Server deployed at the site.

Revision history

The following table presents the revision history of this document.

Table 1 Revision history

Revision	Date	Description
03	October 25, 2012	Updates for release 6.1 Service Pack 1: <ul style="list-style-type: none"> • Added topics for backup and recovery of DFS shares. • Added note about Microsoft VSS framework limitation of 64 volumes and shadow copies. • Added feature support information for Windows Server 2012 and Windows 8. • Updated Windows disaster recovery references to Windows Bare Metal Recovery. • Removed information about optional Avamar Enhanced Server Recovery product, which is no longer available.
02	July 31, 2012	Updated “Where to get help” on page 12 in the Preface.
A01	April 25, 2012	Initial release of Avamar 6.1

Related documentation

The following EMC publications provide additional information about Avamar administration and environment:

- ◆ *EMC Avamar Administration Guide*
- ◆ *EMC Avamar Release Notes*
- ◆ *EMC Avamar Operational Best Practices*
- ◆ *EMC Avamar Backup Clients User Guide*
- ◆ *EMC Avamar Product Security Guide*

The Avamar Client for Windows described in this guide is required for Avamar operations and operating system protection on Windows servers. Avamar offers plug-ins to provide protection for the application data, databases, and settings. The following guides provide information on installing and using the application-specific plug-ins:

- ◆ *EMC Avamar for Exchange VSS User Guide*
- ◆ *EMC Avamar for Hyper-V VSS User Guide*
- ◆ *EMC Avamar for IBM DB2 User Guide*
- ◆ *EMC Avamar for Lotus Domino User Guide*
- ◆ *EMC Avamar for Oracle User Guide*
- ◆ *EMC Avamar for SAP with Oracle User Guide*
- ◆ *EMC Avamar for SharePoint VSS User Guide*
- ◆ *EMC Avamar for SQL Server User Guide*
- ◆ *EMC Avamar for Sybase ASE User Guide*
- ◆ *EMC Avamar for Windows Server User Guide*
- ◆ *EMC Avamar Config Checker for Microsoft Windows Technical Note*

Note: Some applications are available on multiple platforms and require the client for the specific operating system. The *EMC Avamar Backup Clients User Guide* provides information about installing and using other operating system clients such as AIX, FreeBSD, HP-UX, Linux, MacOS X, NetWare, SCO, and Solaris.

Conventions used in this document

EMC uses the following conventions for special notices:



DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



NOTICE is used to address practices not related to personal injury.

Note: A note presents information that is important, but not hazard-related.

IMPORTANT

An important notice contains information essential to software or hardware operation.

Typographical conventions

EMC uses the following type style conventions in this document:

Normal	Used in running (nonprocedural) text for: <ul style="list-style-type: none"> Names of interface elements, such as names of windows, dialog boxes, buttons, fields, and menus Names of resources, attributes, pools, Boolean expressions, buttons, DQL statements, keywords, clauses, environment variables, functions, and utilities URLs, pathnames, filenames, directory names, computer names, links, groups, service keys, file systems, and notifications
Bold	Used in running (nonprocedural) text for names of commands, daemons, options, programs, processes, services, applications, utilities, kernels, notifications, system calls, and man pages Used in procedures for: <ul style="list-style-type: none"> Names of interface elements, such as names of windows, dialog boxes, buttons, fields, and menus What the user specifically selects, clicks, presses, or types
<i>Italic</i>	Used in all text (including procedures) for: <ul style="list-style-type: none"> Full titles of publications referenced in text Emphasis, for example, a new term Variables

<i>Courier</i>	Used for: <ul style="list-style-type: none"> • System output, such as an error message or script • URLs, complete paths, filenames, prompts, and syntax when shown outside of running text
Courier bold	Used for specific user input, such as commands
<i>Courier italic</i>	Used in procedures for: <ul style="list-style-type: none"> • Variables on the command line • User input variables
<>	Angle brackets enclose parameter or variable values supplied by the user
[]	Square brackets enclose optional values
	Vertical bar indicates alternate selections — the bar means “or”
{ }	Braces enclose content that the user must specify, such as x or y or z
...	Ellipses indicate nonessential information omitted from the example

Where to get help

The Avamar support page provides access to licensing information, product documentation, advisories, and downloads, as well as how-to and troubleshooting information. This information may enable you to resolve a product issue before you contact EMC Customer Service.

To access the Avamar support page:

1. Go to <https://support.EMC.com/products>.
2. Type a product name in the **Find a Product** box.
3. Select the product from the list that appears.
4. Click the arrow next to the **Find a Product** box.
5. (Optional) Add the product to the **My Products** list by clicking **Add to my products** in the top right corner of the **Support by Product** page.

Documentation

The Avamar product documentation provides a comprehensive set of feature overview, operational task, and technical reference information. Review the following documents in addition to product administration and user guides:

- ◆ Release notes provide an overview of new features and known limitations for a release.
- ◆ Technical notes provide technical details about specific product features, including step-by-step tasks, where necessary.
- ◆ White papers provide an in-depth technical perspective of a product or products as applied to critical business issues or requirements.

Knowledgebase

The EMC Knowledgebase contains applicable solutions that you can search for either by solution number (for example, esgxxxxxx) or by keyword.

To search the EMC Knowledgebase:

1. Click the **Search** link at the top of the page.
2. Type either the solution number or keywords in the search box.

3. (Optional) Limit the search to specific products by typing a product name in the **Scope by product** box and then selecting the product from the list that appears.
4. Select **Knowledgebase** from the **Scope by resource** list.
5. (Optional) Specify advanced options by clicking **Advanced options** and specifying values in the available fields.
6. Click the search button.

Live chat

To engage EMC Customer Service by using live interactive chat, click Join Live Chat on the Service Center panel of the Avamar support page.

Service Requests

For in-depth help from EMC Customer Service, submit a service request by clicking Create Service Requests on the Service Center panel of the Avamar support page.

Note: To open a service request, you must have a valid support agreement. Contact your EMC sales representative for details about obtaining a valid support agreement or with questions about your account.

To review an open service request, click the Service Center link on the Service Center panel, and then click View and manage service requests.

Facilitating support

EMC recommends that you enable ConnectEMC and Email Home on all Avamar systems:

- ◆ ConnectEMC automatically generates service requests for high priority events.
- ◆ Email Home emails configuration, capacity, and general system information to EMC Customer Service.

Your comments

Your suggestions will help us continue to improve the accuracy, organization, and overall quality of the user publications. Send your opinions of this document to:

BSGDocumentation@emc.com

Please include the following information:

- ◆ Product name and version
- ◆ Document name, part number, and revision (for example, A01)
- ◆ Page numbers
- ◆ Other details that will help us address the documentation issue

CHAPTER 1

Installation

The following topics describe how to install and register EMC® Avamar® client software for Microsoft Windows on a client computer:

- ◆ Capabilities and limitations 16
- ◆ System requirements 20
- ◆ Before you install 22
- ◆ Installing and running the Avamar Config Checker for Microsoft Windows 23
- ◆ Installing the Avamar Client for Windows 24
- ◆ Registering the Avamar Client for Windows 27
- ◆ Uninstalling and upgrading the Avamar Client for Windows 27
- ◆ Windows Server 2008 and 2012 Core Installation and maintenance 28
- ◆ Uninstalling the Avamar Client for Windows 30
- ◆ Upgrading the Avamar Client for Windows 30

Capabilities and limitations

The following topics discuss capabilities and limitations of this release of Avamar Client for Windows.

Windows Server 2012 data deduplication feature support

Avamar supports backup and recovery of volumes that have Windows Server 2012 data deduplication enabled. When Avamar encounters a Windows deduplicated file during backup, Avamar will temporarily re-inflate the file back to its full size before backing up the file to the Avamar server. After the backup operation, the file will still be deduplicated on the source volume, but the backup of the file will be full size on the Avamar server. When the file is restored with Avamar, the file is not re-deduplicated, and occupies as much disk space as the full-size file.

Window Server 2012 Scale-out File Servers are not supported

Avamar does not support Windows Server 2012 Scale-Out File Server, where all nodes are active nodes (active-active). Avamar does support traditional cluster file servers in Windows Server 2012, where one node is online at a time (active-passive or dual-active).

Windows Server 2012 ReFS is not supported

Avamar 6.1.101 does not support Resilient File System (ReFS) volume file system backup and recovery or disaster recovery. To ensure full protection of data on a volume, make sure the volume does not use ReFS.

Cluster shared disk data is not backed up in disaster recovery backups

Avamar does not back up cluster shared disk data when performing disaster recovery backups of Windows Server 2012 and Windows Server 2008 clusters. Avamar disaster recovery will not restore "critical" cluster disks. Perform separate file system backups of cluster disks so that the data can be restored after the disaster recovery, if necessary.

Disaster recovery of uEFI partitions is not supported

Avamar 6.1.101 does not support disaster recovery of uEFI-enabled partitions.

Windows Storage Server, deduplication, and SIS support

Avamar provides the following Windows Storage Server, deduplication, and SIS support:

Table 2 Windows Storage Server deduplication and SIS support

Version	Including
Microsoft Windows Storage Server 2012	<ul style="list-style-type: none"> Clustering Windows Deduplicated volumes
Microsoft Windows Storage Server 2008, 2008 R2	<ul style="list-style-type: none"> Clustering Single Instance Storage (SIS)-enabled volumes
Microsoft Windows Storage Server 2003 R2	<ul style="list-style-type: none"> Clustering

Note: SIS-enabled volumes are not supported for Microsoft Windows Storage Server 2003 R2.

Hardware-based providers are not supported

All Avamar backup operations with the Windows VSS plug-in use the Microsoft Software Shadow Copy provider, also known as the Microsoft system provider. Hardware providers are not supported.

Windows Server 2008 and 2012 Core Installations

If you deploy Windows Server 2008 or 2012 using the Core Installation feature, you do not have access to the traditional full graphical user interface (GUI). Therefore, you must install and maintain the Avamar Client for Windows software entirely from a DOS prompt using the `msiexec` utility. [“Windows Server 2008 and 2012 Core Installation and maintenance” on page 28](#) provides additional information.

Disabling NTFS Last Access Time inhibits backing up changed ACLs

If the NTFS Last Access Time feature is disabled on a Windows backup client, the Avamar Client for Windows software is not able to detect any further Windows ACL changes. This means that the ACL setting stored during the original file backup is the ACL setting that is applied on all future restores.

The NTFS Last Access Time feature is enabled by default, but is sometimes disabled for performance purposes.

To re-establish proper Avamar Client for Windows ACL backup behavior:

1. Enable the NTFS Last Access Time feature using one of the following methods:

- Specify a value of 0 in the following registry entry:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\FileSystem\
NtfsDisableLastAccessUpdate.
```

A value of 0 enables Last Access Time, while a value of 1 disables Last Access Time.

- On Windows 7, Windows Storage Server 2008, Windows Server 2008 R2, Windows Storage Server 2008 R2, Windows Server 2008, Windows XP, Server 2003, and Vista platforms, type the following command from a command prompt:

```
fsutil behavior set disablelastaccess 0
```

2. Delete the following local Avamar Client for Windows cache files:

- C:\Program Files\avs\var\f_cache.dat
- C:\Program Files\avs\var\p_cache.dat

This causes the re-creation of the files the next time that a backup occurs for the client.

NTFS softlinks are skipped by default in Windows VSS backups

Avamar Windows File System backups using the Avamar Windows VSS client will skip NTFS softlinks (also known as symbolic links or symlinks). In addition, if an Exchange, SharePoint, or Windows Server is configured to save either database files or log files to a softlink path, backup will fail. EMC plans to fix this in a future release.

Avamar does make an exception, as noted in *Backing up a single directory or file on a mount point, directory junction, or directory symbolic link*.

Backing up a single directory or file on a mount point, directory junction, or directory softlink

Avamar supports backup and restore of individual files and directories on a:

- ◆ Mount point
- ◆ Directory junction
- ◆ Directory symlink
- ◆ File symlink (hardlink or softlink)

This is only supported for local file systems; it does not apply to network drives. It is recommended that you recreate the mount point, directory junction, or directory softlink before performing the restore. The content will be restored to the original location as long as the mount point, directory junction, or directory softlink exists. If it does not exist, Avamar creates a directory path matching the backup path and the content is restored to a local directory with the link name.

Use Avamar Client for Windows to back up SQL Server Resource database

The SQL Server Resource database is a read-only database that contains all the system objects that are included with SQL Server. The Avamar Plug-in for SQL Server cannot back up the Resource database, `mssqlsystemresource.mdf`, or its log file, `mssqlsystemresource.ldf`, because SQL Server cannot back up the Resource database. To back up Resource database files, use the Avamar Client for Windows.

VSS writers supported by Avamar Client for Windows

The following Windows System Component VSS writers are supported by the Avamar Client for Windows:

- ◆ ASR (Automated System Recovery) Writer
- ◆ BITS (Background Intelligent Transfer Service) Writer
- ◆ Certificate Authority Writer
- ◆ Cluster Database Writer
- ◆ COM+ REGDB (Registration Database) Writer
- ◆ DFSR (Distributed File System Replication) Writer
- ◆ DHCP (Dynamic Host Configuration Protocol) Jet Writer
- ◆ FRS (File Replication Server) Writer
- ◆ FSRM (File Server Resource Manager) Writer
- ◆ IIS Configuration Writer
- ◆ IIS Metabase Writer
- ◆ MSSearch Service Writer
- ◆ NPS (Network Policy and Access Service) Writer
- ◆ NTDS (Active Directory Schema) Writer
- ◆ Performance Counter Writer
- ◆ Registry Writer
- ◆ RSM (Removable Storage Manager) Writer
- ◆ System Writer
- ◆ Task Scheduler Writer
- ◆ TSG (Terminal Services Gateway) Writer
- ◆ TSL (Terminal Services Licensing) Writer
- ◆ VSS Metadata Store Writer
- ◆ WID Writer
- ◆ WINS (Windows Internet Name Service) Writer
- ◆ WMI (Windows Management Instrumentation) Writer

Add avtar.exe to anti-virus application safe lists

Some anti-virus (AV) applications may reduce the performance of Avamar backup operations. In most cases with AV applications, when a program opens a file, the AV application scans the file to check for viruses. If the AV application scans each file as it is backed up, then the disk and backup program performance will be slow.

To reduce backup times and prevent the AV application from performing a scan of each file as Avamar backs it up, add the avtar.exe file to the exclusion or safe list for the AV application. The settings and user interfaces to do this depend on the AV application. For example, McAfee refers to these exceptions as low-risk processes.

System requirements

The client computer on which you install the Avamar Client for Windows software must meet the minimum requirements in the following table.

Table 3 System requirements (page 1 of 2)

Requirement	Minimum
Operating system	<p>The Avamar Client for Windows supports most editions of the following versions of Windows:</p> <ul style="list-style-type: none"> • Windows 8 • Windows 7 • Windows Vista • Microsoft Windows XP • Microsoft Windows Server 2012 • Microsoft Windows Storage Server 2012 • Microsoft Windows Server 2008 and Windows Server 2008 R2, including clustering • Microsoft Windows Storage Server 2008 and Windows Storage Server 2008 R2, including clustering • Microsoft Windows Cluster Server 2003 • Microsoft Windows Server 2003, 2003 x64 Edition • Microsoft Windows Storage Server 2003 R2, including clustering <p>Note: Avamar supports backup and restore of files that use Windows Server 2012 data deduplication. "Windows Server 2012 data deduplication feature support" on page 16 provides more information.</p> <p>Note: Avamar supports SIS-enabled volumes for Microsoft Windows Storage Server 2008, 2008 R2. SIS-enabled volumes are not supported for Microsoft Windows Storage Server 2003 R2.</p> <p>Note: Microsoft Server 2008 and Microsoft Windows Cluster Server 2003 both support active/passive and active/active cluster configurations.</p> <p>The <i>EMC Avamar Compatibility and Interoperability Matrix</i>, available on the EMC Online Support website, provides the most up to date and accurate listing of versions supported.</p>
.NET Framework 4	<p>The Avamar 6.1.100.xxx for Windows VSS plug-in requires Microsoft .NET Framework 4. You can download and install the .NET Framework 4 from the Microsoft Download Center, "Microsoft .NET Framework 4" http://www.microsoft.com/download/en/details.aspx?displaylang=en&id=17851.</p>
Filesystem	<ul style="list-style-type: none"> • FAT16 • FAT32 • NTFS

Table 3 System requirements (page 2 of 2)

Requirement	Minimum
RAM	512 MB
Hard drive space	250 MB permanent hard drive space is required for software installation. 1 GB is recommended. The Avamar client software also requires an additional 12 MB of permanent hard drive space for each 64 MB of physical RAM. Additional disk space might be required by a snapshot technology. Backing up the Windows System State requires an additional 1 GB of free disk space.
Network interface	10BaseT or later, coax, or optical cable, configured with the latest drivers for the platform.

Unsupported configurations

Windows Small Business Server not supported

Avamar does not support backup and recovery of Windows Small Business Server.

Microsoft Exchange and Microsoft SharePoint Server installations on same machine not supported

Avamar does not support Microsoft Exchange Server and Microsoft SharePoint Server installed on the same machine. This configuration is not supported by Microsoft, and Microsoft best practices advise to install these roles on separate machines.

Windows XP Mode on Windows 7

The Avamar Client for Windows does not support backup and recovery of Windows XP Mode components.

Before you install

Perform the following steps before you install any Avamar software on a client computer:

1. Ensure that you have Administrator privileges on the client computer.
2. Ensure that the Avamar server is operational and present on the same network as the client computer.
 - a. To verify that the server is connected to the network, open a command shell on the client computer and type the following:

ping AVAMARSERVER

where AVAMARSERVER is the network hostname as defined in DNS or the IP address of the Avamar server.
 - b. To verify that the server is operational, log in to the Avamar server as **admin** and run the **dpnctl status** command.
3. Make note of the network hostname for:
 - Avamar server
 - Avamar utility node

These DNS entries should have been added during installation of the Avamar server.

The *EMC Avamar 6.1 Administration Guide* provides full documentation for using `dpnctl` commands.

Installing and running the Avamar Config Checker for Microsoft Windows

The Avamar Config Checker for Microsoft Windows is an optional tool that you can use before or after Avamar client and plug-in installation. You can use the Config Checker to verify if your setup is properly configured for backup and recovery when using Avamar.

This section provides an overview of the Config Checker, and instructions on how to download and install it. The *EMC Avamar Config Checker for Microsoft Windows Supplemental Notes* provides complete instructions for running and uninstalling the Config Checker, as well as examples of HTML results files.

The Config Checker checks and captures configuration errors that may lead to failure in Avamar installation, data backup, or data recovery for:

- ◆ Application host (operating system environment)

Note: Config Checker does not support checking the operating system configuration of Windows Server 2012.

- ◆ Microsoft SharePoint
- ◆ Microsoft Exchange
- ◆ Microsoft SQL Server
- ◆ Microsoft Hyper-V

The Config Checker is supported on only English operating systems (OS).

The Config Checker runs in the following modes:

- ◆ Preinstall mode:
 - If Avamar is not installed.
 - If upgrading from an older version of Avamar to a newer version.
- ◆ Postinstall mode:
 - If Avamar is already installed and the same release of Avamar is selected when running the Config Checker.

To install the Avamar Config Checker:

1. Log in to the computer where the software will be installed.

NOTICE

On Windows Vista platforms, you must log in as Administrator.

2. Open a web browser and type the following URL:

http://AVAMARSERVER

where AVAMARSERVER is the network hostname as defined in DNS or the IP address of the Avamar server.

You are redirected to the Avamar secure web server.

3. If a security alert Web page appears warning about a problem with the website security certificate, select **Continue to the website (not recommended)** to allow redirection to the Avamar secure web server.

The Secure Log On page appears.

4. Scroll down and then click the **Documents and Downloads** hyperlink.

The Documents and Downloads page appears.

5. Locate the link for the correct operating system for the client computer, and then click the corresponding install package:

- **Windows for x86 (32 bit) > Avamar_ConfigChecker_win_x86.zip**

or

- **Windows for x86 (64 bit) > Avamar_ConfigChecker_win_x64.zip**

6. Save the install package, unzip the folder, and then run the setup program.

Installing the Avamar Client for Windows

This procedure should be used to install Avamar Client for Windows software on all supported versions of Microsoft Windows except Server 2008 and 2012 Core Installations. [“Windows Server 2008 and 2012 Core Installation and maintenance” on page 28](#) provides procedures for installing Avamar Client for Windows software on Windows Server 2008 or 2012 Core.

NOTICE

For Windows clusters, you must install the Avamar Client for Windows on all nodes of the cluster. Also, you must install the client to the same directories on all cluster nodes. [Chapter 5, “Support for Microsoft Windows Clusters,”](#) provides complete cluster installation instructions.

Windows Server 2008, 2008 R2, and 2012 with User Account Control

In Windows Server 2008, Microsoft added the User Account Control (UAC) feature. UAC is designed to provide additional operating system security by preventing software from being installed with administrator privileges, unless an administrator authorizes the elevated privileges.

If you start the Avamar Client for Windows installer with normal account privileges, then the software does not install correctly on a computer with a default implementation of UAC. Instead, run the installer using **Run as Administrator**. This workaround is included in the steps listed in [“Download and install the Avamar Client for Windows” on page 25](#).

Microsoft .NET Framework 4 required

The Avamar 6.1 for Windows VSS plug-in requires Microsoft .NET Framework 4. You can download and install “Microsoft .NET Framework 4” from the Microsoft Download Center, <http://www.microsoft.com/download/en/details.aspx?displaylang=en&id=17851>.

Download and install the Avamar Client for Windows

1. Log in to the computer where the software will be installed.

NOTICE

On Windows Vista platforms, you must log in as Administrator.

2. Open a web browser and type the following URL:

http://AVAMARSERVER

where AVAMARSERVER is the network hostname as defined in DNS or the IP address of the Avamar server.

You are redirected to the Avamar secure web server.

3. If a security alert Web page appears warning about a problem with the website security certificate, select **Continue to the website (not recommended)** to allow redirection to the Avamar secure web server.

The Secure Log On page appears.

4. Scroll down and then click the **Documents and Downloads** hyperlink.

The Documents and Downloads page appears.

5. Locate the link for the correct operating system for the client computer:

- Windows for x86 (32 bit)

or

- Windows for x86 (64 bit)

6. Click the corresponding **AvamarClient-windows-x86-VERSION.msi** or **AvamarClient-windows-x86_64-VERSION.msi** install package.

7. Start the installer using one of the following methods, depending on the computer:

- **Non-UAC computer** — Open the file in place on the server, or download the file to a temporary directory on the computer and then open it.

- **UAC computer** — Download the file to a temporary directory, and do *not* open it place. Perform the following steps instead:

- a. In Windows, right-click the command prompt icon, or the .msi file, and select **Run as administrator**.

- b. In the command prompt window, change the working directory to the location of the installation package:

```
cd path
```

where *path* is the full path of the temporary directory that contains the installation package.

- c. On a single line, type the following command to launch the installer:

```
msiexec /i AvamarClient-windows-x86_64-VERSION.msi
```

where *VERSION* is the version number of the install package.

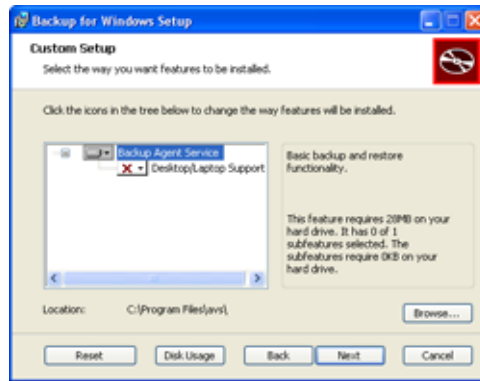
The installation wizard appears.

- 8. Follow the instructions in the wizard.

After you accept the End User Licensing Agreement, the Backup for Windows Setup page appears.

NOTICE

Do not rename client installation packages. The Avamar push upgrade mechanisms are incompatible with renamed packages.



- 9. If you are installing on a desktop or laptop machine, select **Desktop/Laptop Support** and click **Next**. Otherwise, if you are installing Avamar Client for Windows software on a server, simply click **Next**.

The Ready to install Backup for Windows page appears.

- 10. Click **Install** to begin the installation procedure.

- 11. When prompted, click **Finish** to complete the installation procedure.

The installation wizard closes, and the Avamar icon appears in the system tray.



Registering the Avamar Client for Windows

Before you can back up or restore files on this client computer, you must register it with the Avamar server.

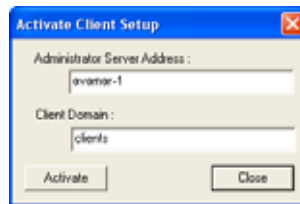


To register the Avamar Client for Windows:

1. Right-click the Avamar system tray icon, and then select **Manage**.
A menu appears.

2. On the submenu that appears, select **Activate Client**.

The Activate Client Setup dialog box appears.



3. In the **Administrator Server Address** box, type the network hostname as defined in DNS or the IP address of the Avamar server.

4. In the **Client Domain** box, type the Avamar domain for this client.

The default domain is "clients." However, the Avamar system administrator may have defined other domains and subdomains. Consult the Avamar system administrator for the domain to use when registering this client.

5. Click **OK**.

Uninstalling and upgrading the Avamar Client for Windows

You do not have to uninstall earlier versions of Avamar Client for Windows software before you install a new version. If you attempt to install the Avamar Client for Windows on a computer that already has it installed, you are prompted during installation to select one of the following choices:

- ◆ Upgrade current Avamar Client for Windows installation to the new version.
- ◆ Remove old Avamar Client for Windows installation.

If you decide to remove the old installation, you must rerun the installation file to install the new version. The current installation session becomes an uninstall session, then terminates.

You can also use the Windows Control Panel **Add/Remove Programs** feature to uninstall the Avamar Client for Windows.

NOTICE

To revert to an older version Avamar Client for Windows software, you must completely uninstall the existing version before installing the older version. You cannot revert to an older version using the upgrade process.

Windows Server 2008 and 2012 Core Installation and maintenance

If you deployed Windows Server 2008 or 2012 using the Core Installation feature, you do not have access to the traditional full GUI. Therefore, you must install and maintain the Avamar Client for Windows software entirely from a DOS prompt using the **msiexec** utility using these procedures.

Installing and registering the Avamar Client for Windows

To install and register the Avamar Client for Windows:

1. Log in to a computer that can connect to the Avamar server using a web browser (not the Windows Server 2008 or 2012 Core system).
2. Open a web browser and type the following URL:

http://AVAMARSERVER

where AVAMARSERVER is the network hostname as defined in DNS or the IP address of the Avamar server.

You are automatically redirected to the Avamar secure web server.

3. If a security alert Web page appears warning about a problem with the website security certificate, select **Continue to the website (not recommended)** to allow redirection to the Avamar secure web server.

The Secure Log On page appears.

4. Scroll down and then click the **Documents and Downloads** hyperlink.

The Documents and Downloads page appears.

5. Locate the link for the correct operating system for the client computer:

- Windows for x86 (32 bit)

or

- Windows for x86 (64 bit)

6. Click the corresponding **AvamarClient-windows-x86-VERSION.msi** or **AvamarClient-windows-x86_64-VERSION.msi** install package and save the .msi file to a local directory.

7. Use WinSCP or FTP to copy the AvamarClient-windows-x86-VERSION.msi install package to a temporary folder on the Windows Server 2008 or 2012 Core system.

-or-

Use the **net use** command from the server core machine to connect to a shared directory containing the .msi file.

8. Log in to the Windows Server 2008 or 2012 Core system and open a DOS prompt.

9. Use the **cd** command to navigate to the location where you saved the Avamar client .msi file.
10. Initiate the Avamar Client for Windows software installation by typing:

```
msiexec /i AvamarClient-windows-x86-VERSION.msi  
-or-  
msiexec /i AvamarClient-windows-x64_64-VERSION.msi
```

where VERSION is the version number of the install package.

The installation wizard appears.

11. Follow the instructions in the wizard.
12. Click **Finish** to complete the installation procedure.
13. Register the Avamar Client for Windows with the Avamar server using the **avregister.bat** program:
 - a. Switch to the DOS prompt.
 - b. Type:

```
C:\Program Files\avs\bin\avregister.bat MCS-NAME DOMAIN
```

where MCS-NAME is the network hostname as defined in DNS of the Avamar Management Server and DOMAIN is the path for this client on the Avamar server, respectively. C:\Program Files\avs\bin\ is the default installation location. If you installed to a different location, type that path in place of C:\Program Files\avs\bin\.

If DOMAIN is not supplied, the default domain of "clients" is used. However, the Avamar system administrator may have defined other domains and subdomains. Consult the Avamar system administrator for the domain to use when registering this client.

If specifying a subdomain (for example, clients/MyClients), do not include a slash (/) as the first character. Including a slash as the first character causes an error that prevents you from registering this client.

Uninstalling the Avamar Client for Windows

To uninstall the Avamar Client for Windows software, run the Avamar Client for Windows installation again, navigate to the folder location of the installation file, and type the following command at the command line:

```
msiexec /uninstall AvamarClient-windows-x86-VERSION.msi  
-OR-  
msiexec /uninstall AvamarClient-windows-x64_64-VERSION.msi
```

where VERSION is the version number of the installation package.

If you no longer have the original installation file, you can download it again as described in [“Installing and registering the Avamar Client for Windows” on page 28](#).

If you specify the same installation package, a wizard appears with options to remove or repair the current Avamar Client for Windows software.

To uninstall the current Avamar Client for Windows software, select Remove and follow the remaining instructions in the wizard.

Upgrading the Avamar Client for Windows

To upgrade the Avamar Client for Windows software, run the Avamar Windows Client installation again, navigate to the folder location of the installation file, and type the following command at the command line:

```
msiexec /i AvamarClient-windows-x86-VERSION.msi  
-OR-  
msiexec /i AvamarClient-windows-x64_64-VERSION.msi
```

where VERSION is the version number of the installation package.

If you no longer have the original installation file, you can download it again as described in [“Installing and registering the Avamar Client for Windows” on page 28](#).

If you specify a newer version installation package, a wizard appears, with an option to install the newer version Avamar Client for Windows software.

CHAPTER 2

Backup

The following topics describe how to use the Avamar Client for Windows to perform a file system backup:

- ◆ [Matching backup and recovery with data protection needs](#)..... 32
- ◆ [Backup launch methods and types](#)..... 35
- ◆ [On-demand backup](#) 39
- ◆ [Scheduled backups](#)..... 56
- ◆ [System State backup datasets for mixed Windows Server clients](#) 64

A separate chapter, "[Client System Disaster Recovery](#)" on [page 93](#) describes disaster recovery, including specific requirements for ensuring the correct backup components are installed and a proper backup set is created for disaster recovery.

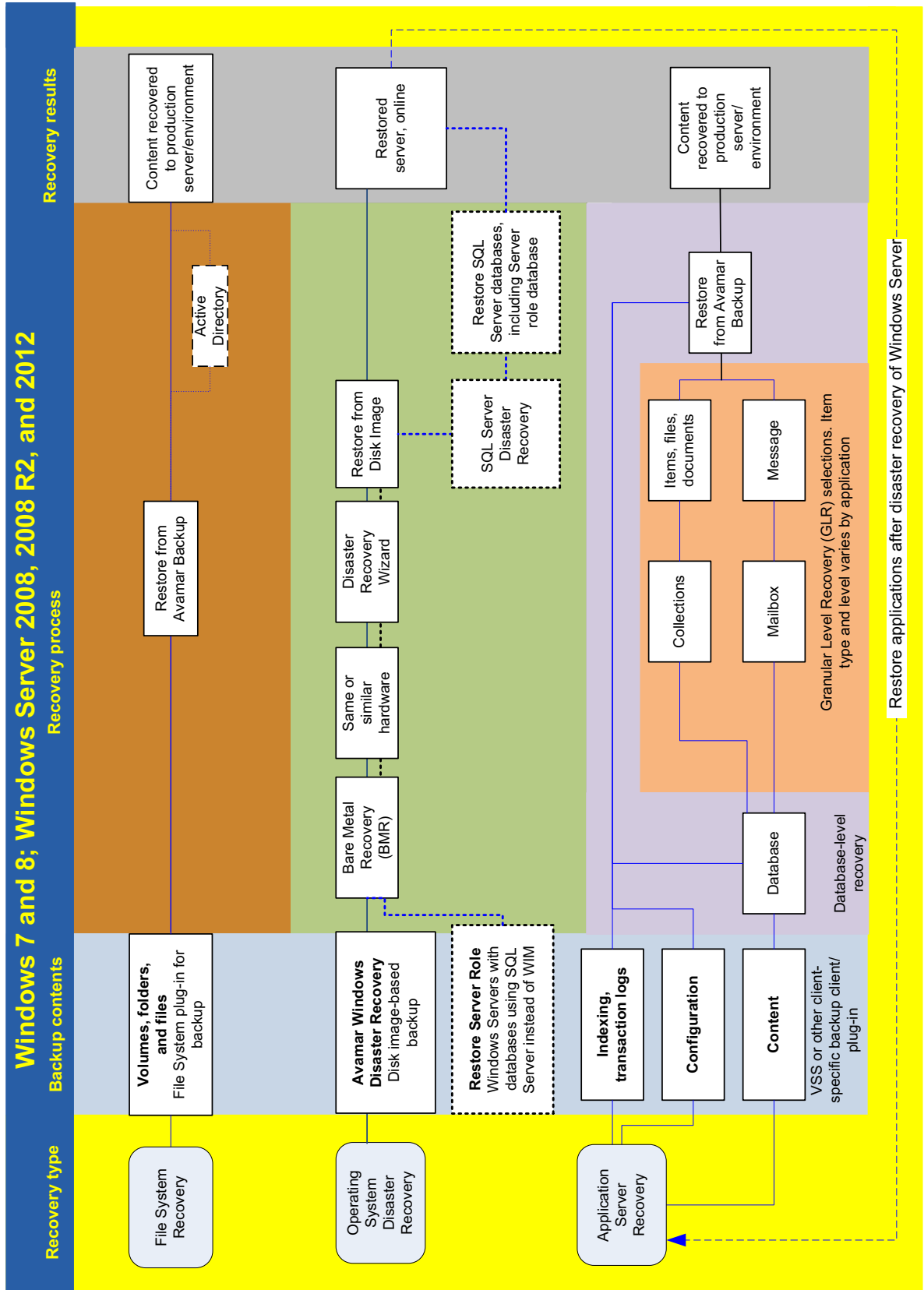
Matching backup and recovery with data protection needs

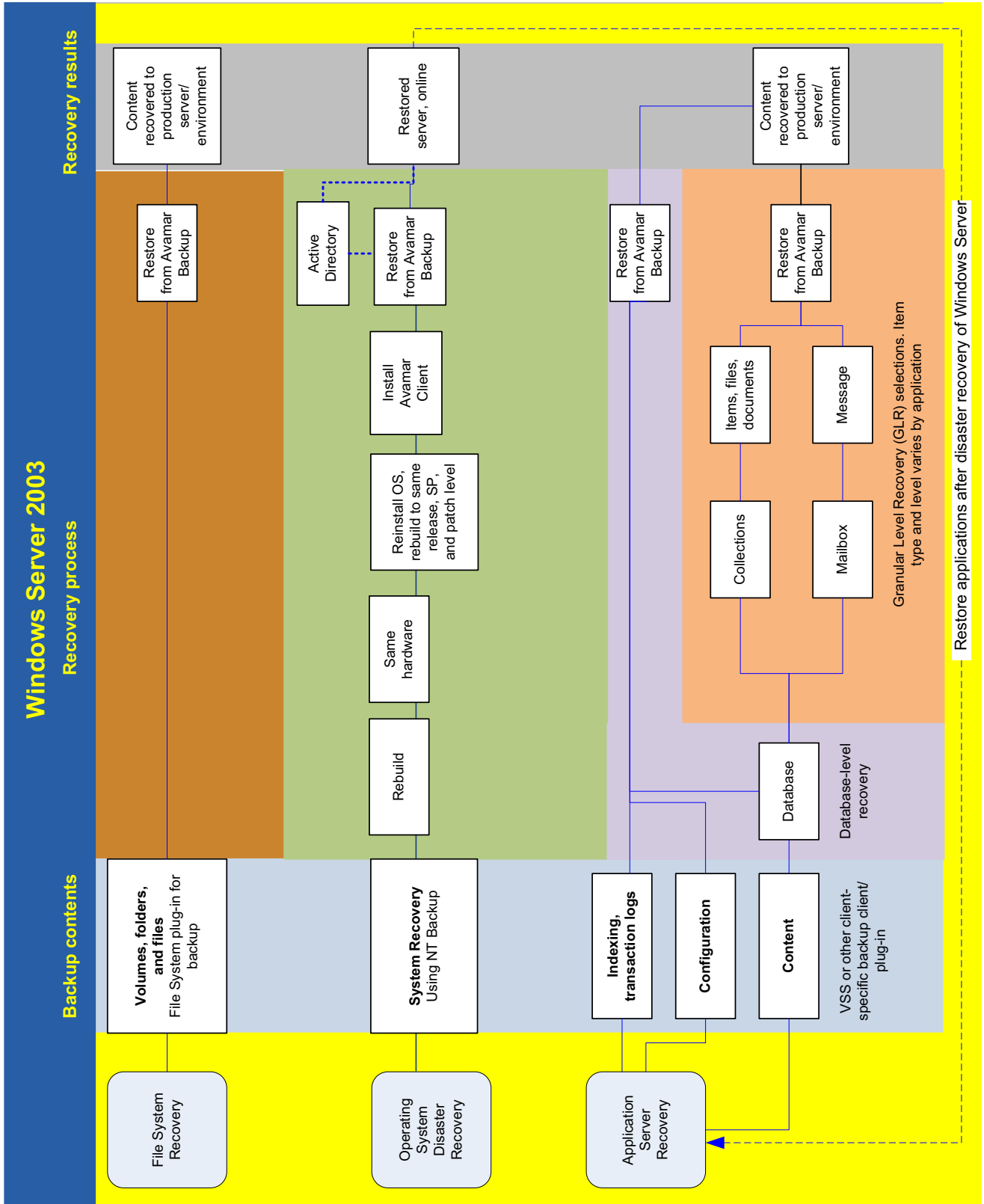
The following table describes the type of backup required depending on what type of data you want to recover..

Table 4 Backups required for different recovery types

Protect this data	With these backups	Using this recovery
Volumes, folders, and files	<ul style="list-style-type: none"> • “Backing up volumes, folders, and files” on page 42 • “Backing up Windows Storage Server 2008 SIS” on page 44 • “Restoring a system that uses DFS” on page 91 	Filesystem Recover lost, damaged, or earlier versions of files, folders, or volumes to an existing server: “Choosing a restore destination” on page 77
Distributed File Systems (DFS)	“Backing up DFS shares” on page 47	“Restoring a system that uses DFS” on page 91
Entire Server and System State, including system state, critical volumes, and Active Directory	<ul style="list-style-type: none"> • “Backing up an entire Windows client” on page 39 and • Any additional backup requirements described in the corresponding disaster recovery procedures 	Disaster Recovery In Chapter 4, “Client System Disaster Recovery”: <ul style="list-style-type: none"> • “Windows Server 2008/2012 and Windows 7/8 Bare Metal Recovery” on page 94 • “Windows Server 2008 and 2012 Active Directory backup and recovery” on page 125 • “Windows Server 2003 disaster recovery and Active Directory recovery” on page 141 • “Prerequisite: Perform system state backup” on page 144 • “Windows XP and 2000 system recovery using NTBackup” on page 154
Application configuration, databases, or files	Application Recovery Use an application-specific plug-in or client to back up and protect the application data, in addition to the Windows client to back up and recover the Windows Server hosting the application server. For example, EMC Avamar plug-ins are available for the following applications: <ul style="list-style-type: none"> • Oracle • Microsoft Exchange • IBM Lotus Domino • Microsoft SharePoint • IBM DB2 • Microsoft SQL Server • Microsoft Hyper-V • SAP • Sybase 	

The following graphics provide roadmaps for the recovery processes for Windows Server 2008 and 2012, and Windows Server 2003.





Application restores after disaster recovery

The Windows VSS plug-in disaster recovery backup includes application binaries located on critical volumes, if those files are not protected by an application plug-in. This typically applies to applications that use a Windows service. For example, Exchange executable files are included, but the database and log files are excluded from the disaster recovery backup. During disaster recovery, these applications are restored to a functional state, but it may be necessary to restore application data using the application plug-in. If an application was installed on a non-critical volume and the volume was destroyed, then you must either restore the non-critical volume from a Windows File System plug-in backup or reinstall the application.

Backup launch methods and types

After you activate a client, there are several ways to perform backups, and several types of data you can back up. Avamar clients are typically backed up automatically by way of regularly scheduled backups initiated by the Avamar server. Data can also be restored by the system administrator using Avamar Administrator. However, “on-demand” backup and restore operations can also be initiated directly from the Avamar Administrator UI.

NOTICE

The Avamar Client for Windows does not support backup and recovery of the Windows XP Mode component in Windows 7.

Backup retention

The retention settings for a backup control how long the backup data is kept on the Avamar server. Possible retention settings are:

- ◆ No end date (keep the backup indefinitely)
- ◆ Keep the backup for a specific number of days, weeks, months, or years
- ◆ Keep the backup until a specific calendar date

To support certain advanced features, Avamar Administrator automatically assigns one or more retention types to every backup. For example, the first backup created on the Avamar system is tagged as daily, weekly, monthly, and yearly. You can also manually change the retention types assigned to a backup.

Validating a backup

You can also verify that files can be restored from an existing backup. This validation initiates a “virtual” restore of all files in the backup but does not actually restore any files to the client filesystem. The EMC Avamar 6.1 Administration Guide provides complete instructions for monitoring a backup, restore, or validation.

International characters

Avamar generally supports the use of specific supported international characters in directory, folder, and filenames. However, proper display of international language characters is contingent on the client computer locale and installed system fonts being compatible with the original language. If you attempt to browse backups that were created with international characters and you do not have a compatible font installed on your system, any characters that cannot be resolved by the system will be displayed as rectangles. This is a normal limitation of that particular situation and does not affect the ability to restore these directories, folders, or files. The *EMC Avamar Release Notes* provide additional international language support information.

Backup launch methods

Avamar provides several ways to initiate a Windows Server backup or restore:

- ◆ **On-demand using Avamar Administrator**

This method enables you to perform backups of a Windows server between regularly scheduled backups directly from Avamar Administrator. It is a good practice to perform an on-demand backup before system upgrades, installations, or any major changes to the server. You may also want to perform an on-demand backup immediately after you install and register the Avamar Client for Windows. [“On-demand backup” on page 39](#) provides steps to perform this procedure.

- ◆ **Scheduled using Avamar Administrator**

This method enables you to schedule regular backups of a Windows server directly from Avamar Administrator. [“Scheduled backups” on page 56](#) provides steps to perform this procedure.

You can also automate backups by implementing a group policy to perform regularly scheduled backups for an entire group of clients. The *EMC Avamar Administration Guide* provides additional information about groups and group policies.

- ◆ **On-demand using the Avamar client interface**

Typically, this method is used by an end-user who wants to back up or restore data on an individual machine. This method supplements but does not replace regularly scheduled backups initiated by the Avamar server. The *EMC Avamar Backup Clients User Guide* provides more information about performing backup and restore of Avamar Windows Clients using on-demand backup.

Data types and files available for backup and restore

Backup and recovery for a Windows server is more than just backing up databases and data files that reside on that server. A Windows server can serve a wide variety of roles in a network, so it is essential to back up the system state as well as the filesystems on the server volumes.

The Avamar client for Windows provides two plug-ins to give you additional options for selecting what to back up.

◆ Windows VSS plug-in

This plug-in provides full backups only, not incremental or differential, which is required for disaster recovery of Windows Server 2008, Windows Server 2008 R2, and Windows 7. The default settings for this plug-in are to create a disaster recovery backup, and back up all System State and critical volumes. [“Backing up an entire Windows client” on page 39](#) provides the steps to perform a backup with this plug-in. Specific options for this plug-in are described in [“Windows VSS backup options” on page 184](#) and [“Windows VSS restore options” on page 185](#). [“Windows Server 2008/2012 and Windows 7/8 Bare Metal Recovery” on page 94](#) provides more information about performing a disaster recovery with the Windows VSS plug-in backup.

NOTICE

Leave the Windows VSS option **Create Disaster Recovery Backup** selected, which is the default setting, because it is necessary as part of the full backup required for disaster recovery. When you clear this option, backups are much faster but are not valid for disaster recovery. You should only clear the checkbox for this option when performing a backup of an Active Directory domain controller. [“Windows Server 2008 and 2012 Active Directory backup and recovery” on page 125](#) provides more information.

◆ Windows File System plug-in

This plug-in enables you to select volumes, folders, or files for backup. [“Backing up volumes, folders, and files” on page 42](#) provides the steps to perform a backup with this plug-in. Specific options for this plug-in are described in [“Windows file system backup options” on page 178](#) and [“Windows file system restore options” on page 182](#).

Files excluded in Windows File System backups

The Windows File System plug-in uses Microsoft Volume Shadow Copy Services to perform the backups described in [“Backing up volumes, folders, and files” on page 42](#). Open files are backed up since Avamar is backing up from the Shadow Copy volume instead of the original volume. However, according to Microsoft best practices, Avamar skips the files in the following table by default.

Table 5 Files excluded in Windows File System backups

Operating system	Files skipped by default	Comments
All Windows	Files listed in the “FilesNotToBackup” registry for the system and current user	This includes operating system files that are needed to restore the system.
All Windows	Temporary Internet Files	You can enable backup of these files through special flags.
All Windows	Outlook 2003 temporary cache files	You can enable backup of these files through special flags.
Windows 7 or later	all “Syscache.hve*” files under “System Volume Information”	These additional files are not listed in the “FilesNotToBackup” registry, but Microsoft indicates that they should be skipped.
Windows 7 or later	the Virtual Hard Disk (VHD) file for a mounted VHD	The expectation is that you back up the VHD filesystem, not the .vhd file.

NTFS softlinks are skipped by default in Windows VSS backups

Avamar Windows File System backups using the Avamar Client for Windows will skip NTFS softlinks (also known as symbolic links or symlinks). In addition, if an Exchange, SharePoint, or Windows Server is configured to save either database files or log files to a softlink path, backup will fail. EMC plans to fix this in a future release.

Avamar does make an exception, as noted in [“Backing up a single directory or file on a mount point, directory junction, or directory softlink” on page 18](#).

Mount points, directory junctions, and directory symbolic links

Avamar supports backup and restore of individual files and directories on a:

- ◆ Mount point
- ◆ Directory junction
- ◆ Directory symbolic link

It is recommended that you re-create the mount point, directory junction, or directory symbolic link before performing the restore. The content is restored to the original location as long as the mount point, directory junction, or directory symbolic link exists. If it does not exist, then Avamar creates a directory path that matches the backup path, and the content is restored to a local directory with the link name.

On-demand backup

This section describes how to perform an on-demand full backup of the entire Windows client computer including system state and critical volumes, or a filesystem backup of selected volumes, directories, or files. Avamar also supports backup of Windows Storage Server 2008 and Windows Storage Server 2008 R2 SIS-enabled volumes. The following procedures describe each of these types of backups:

- ◆ [“Backing up an entire Windows client” on page 39](#)
- ◆ [“Backing up volumes, folders, and files” on page 42](#)
- ◆ [“Backing up Windows Storage Server 2008 SIS” on page 44](#)

NOTICE

To successfully recover the entire system state of a Windows client, you need a “full system backup”. Therefore, you should perform these full system backups on a regular basis.

Backing up an entire Windows client

To back up an entire Windows client machine, including System State and critical volumes:

1. In Avamar Administrator, click the **Backup & Restore** launcher button.

The Backup and Restore window appears.

2. In the clients tree, select the Windows server or client that will be backed up.

You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.

3. Click the **Select for Backup** tab.

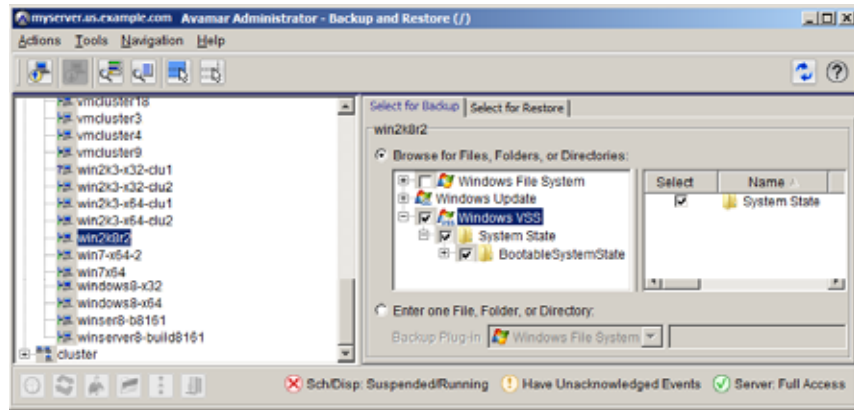
A list of plug-ins installed on the selected client appears in the left pane of the Select for Backup tab.

4. Select **Windows VSS Plug-in** and **Windows File System**.

Do not individually select items within Windows VSS Plug-in, or else backup fails with an error message that all items in the Windows VSS Plug-in must be selected. When you select Windows VSS Plug-in, it automatically selects all items underneath it.

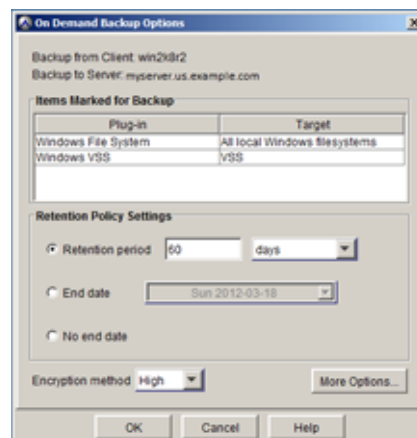
NOTICE

If you expand the Windows VSS Plug-in, it displays BootableSystemState, and the components within BootableSystemState appear in the right pane. Although there are checkboxes for the items included in the System State backup, you cannot select these items individually. These items are displayed for informational purposes only.



5. Select **Actions** > **Back Up Now**.

The On Demand Backup Options dialog box appears.

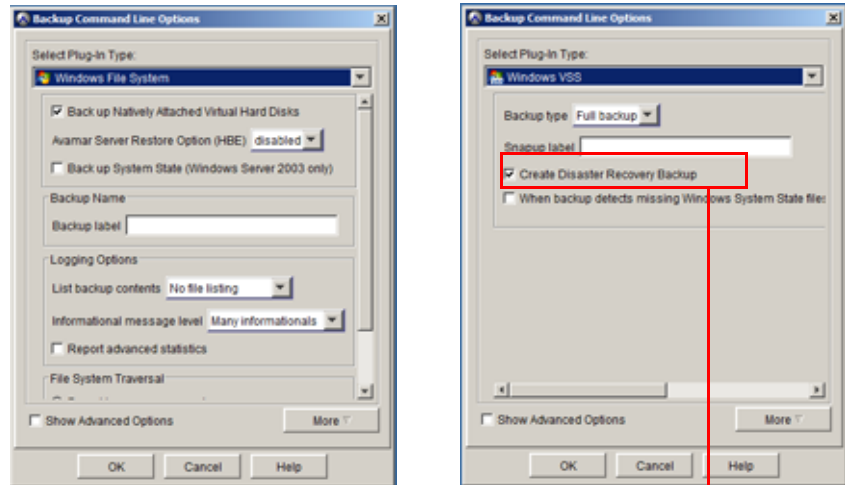


6. Select the backup retention setting:
 - To automatically delete this backup from the Avamar server after a specific amount of time, select **Retention period** and then specify the number of days, weeks, months, or years for the retention period.
 - To automatically delete this backup from the Avamar server on a specific calendar date, select **End date** and browse to that date on the calendar.
 - To keep this backup for as long as this client remains active in the Avamar server, select **No end date**.
7. Select the encryption method to use for client/server data transfer during this backup.

The exact encryption technology and bit strength used for a client/server connection depends on a number of factors, including the client platform and Avamar server version. The *EMC Avamar Product Security Guide* provides additional information.

8. Click **More Options**.

The Backup Command Line Options dialog box appears. The options vary depending on which plug-in is selected, as shown in the following figures.



Leave **Create Disaster Recovery Backup** selected.

NOTICE

Leave the Windows VSS option **Create Disaster Recovery Backup** selected, which is the default setting, because it is necessary as part of the full backup required for disaster recovery. When you clear this option, backups are much faster but are not valid for disaster recovery. You should only clear the checkbox for this option when performing a backup of an Active Directory domain controller. [“Windows Server 2008 and 2012 Active Directory backup and recovery” on page 125](#) provides more information.

9. Set the plug-in options.

[Appendix A, “Plug-in Options”](#) provides additional information about plug-in options.

If you want to specify command line flags, such as those listed in [“Command line flags” on page 184](#):

- a. Click **More**.
- b. In **Enter Attribute**, type the flag.
- c. In **Enter Attribute value**, type the value, if applicable.
- d. Click the + button.

10. Click **OK** to close the **Backup Command Line Options** dialog box.

11. Click **OK** to close the **On Demand Backup Options** dialog box.

The On Demand Backup Options dialog box closes and the On Demand Backup Request message box appears, displaying the following messages:

```
Backup request initiating
Backup initiated.
```

12. Click **Close**.

Backing up volumes, folders, and files

To back up volumes, folders, and files:

1. In Avamar Administrator, click the **Backup & Restore** launcher button.

The Backup and Restore window appears.

2. In the clients tree, select the Windows server or client.

You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.

3. Click the **Select for Backup** tab.

A list of plug-ins installed on the selected client appears in the left pane of the Select for Backup tab.

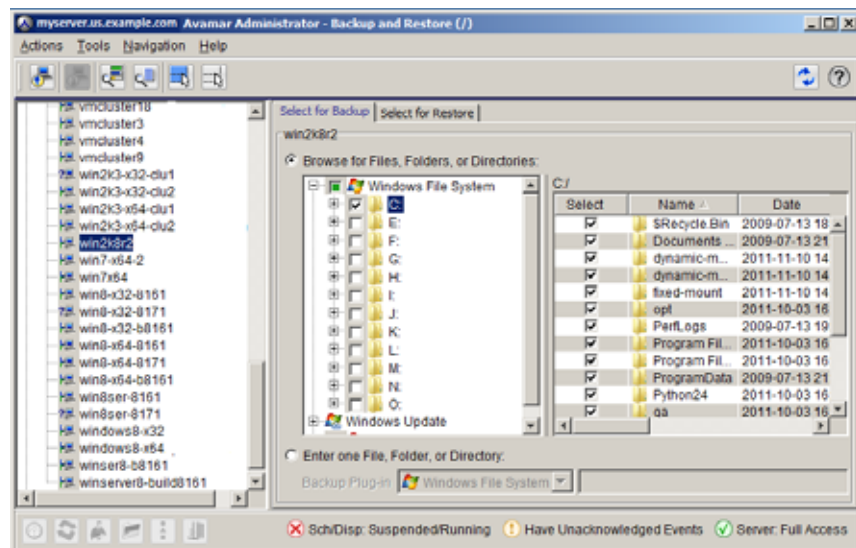
NOTICE

Avamar supports backup and restore of individual files and directories on a mount point, directory junction, or a directory symbolic link. [“NTFS softlinks are skipped by default in Windows VSS backups” on page 38](#) provides more information.

4. Select and expand the **Windows File System** plug-in.

The Windows directory tree for this client is displayed.

5. Select the checkbox next to the directories and files to back up.



6. Select **Actions > Back Up Now**.

The On Demand Backup Options dialog box appears.



7. Select the backup retention setting:

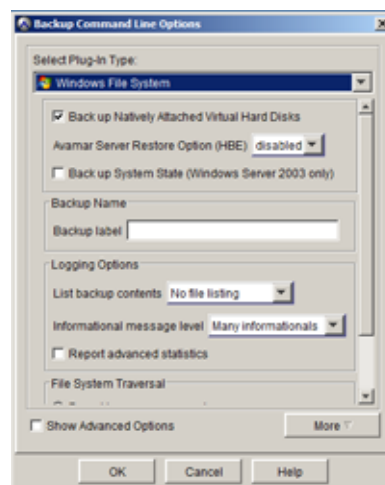
- To automatically delete this backup from the Avamar server after a specific amount of time, select **Retention period** and then specify the number of days, weeks, months, or years for the retention period.
- To automatically delete this backup from the Avamar server on a specific calendar date, select **End date** and browse to that date on the calendar.
- To keep this backup for as long as this client remains active in the Avamar server, select **No end date**.

8. Select the encryption method to use for client/server data transfer during this backup.

The exact encryption technology and bit strength used for a client/server connection depends on a number of factors, including the client platform and Avamar server version. The *EMC Avamar Product Security Guide* provides additional information.

9. Click **More Options**.

The Backup Command Line Options dialog box appears.



10. Set the plug-in options.

[Appendix A, "Plug-in Options,"](#) provides additional information about plug-in options.

If you want to specify command line flags, such as those listed in ["Command line flags" on page 184](#):

- a. Click **More**.
 - b. In **Enter Attribute**, type the flag.
 - c. In **Enter Attribute value**, type the value, if applicable.
 - d. Click the + button.
11. Click **OK** to close the **Backup Command Line Options** dialog box.
 12. Click **OK** to close the **On Demand Backup Options** dialog box.

The On Demand Backup Options dialog box closes and the On Demand Backup Request message box appears, displaying the following messages:

```
Backup request initiating
Backup initiated.
```

13. Click **Close**.

Backing up Windows Storage Server 2008 SIS

Avamar supports backup and recovery of SIS-enabled volumes on Microsoft Windows Storage Server 2008 or Windows Storage Server 2008 R2. Backup for SIS is only supported at the volume level, but recovery is supported at the volume, folder, and file level.

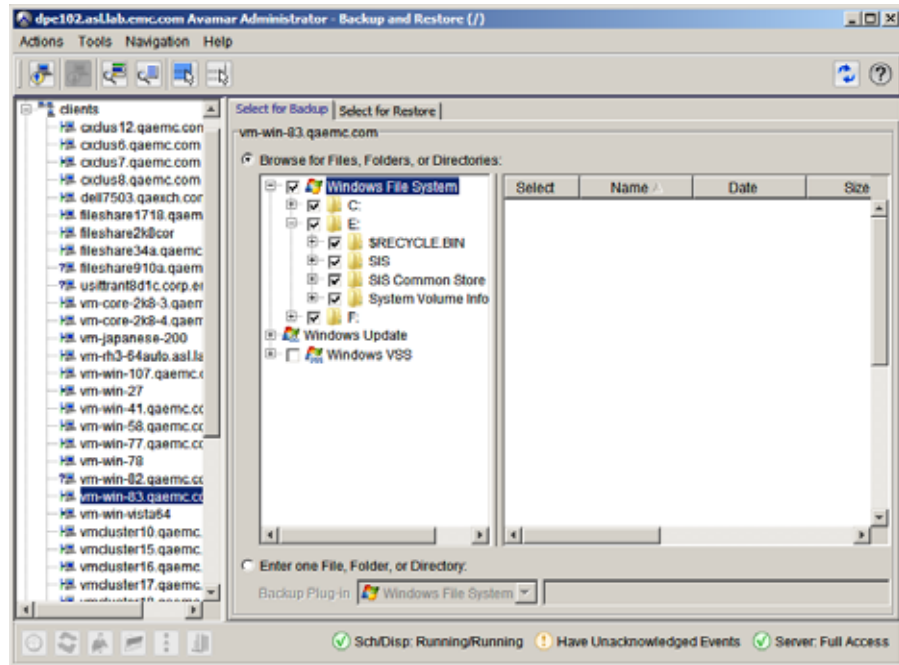
NOTICE

Backup and recovery of SIS is not supported for Microsoft Windows Storage Server 2003 or 2003 R2.

To back up SIS-enabled volumes on Microsoft Windows Storage Server 2008 or 2008 R2:

1. In Avamar Administrator, click the **Backup & Restore** launcher button.
The Backup and Restore window appears.
2. In the clients tree, select the Windows server or client.
You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.
3. Click the **Select for Backup** tab.
The client filesystem appears as a browsable directory tree in the right pane.
4. Select the checkbox next to the volume where SIS is enabled.

When the SIS-enabled volume is selected, the contents of that volume include the folder SIS Common Store, as shown in the following figure.

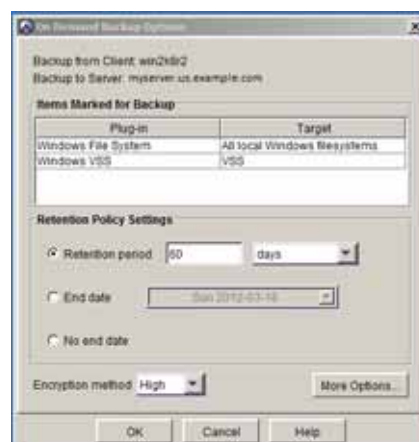


NOTICE

You cannot select items for backup within the volume, you can only select the entire volume. In recovery, you can select volumes, folders, or files for restore from the volume backup.

5. Select **Actions > Backup Now**.

The On Demand Backup Options dialog box appears.



6. Select the backup retention setting:
 - To automatically delete this backup from the Avamar server after a specific amount of time, select **Retention period** and then specify the number of days, weeks, months, or years for the retention period.
 - To automatically delete this backup from the Avamar server on a specific calendar date, select **End date** and browse to that date on the calendar.
 - To keep this backup for as long as this client remains active in the Avamar server, select **No end date**.
7. Select the encryption method to use for client/server data transfer during this backup.

The exact encryption technology and bit strength used for a client/server connection depends on a number of factors, including the client platform and Avamar server version. The *EMC Avamar Product Security Guide* provides additional information.
8. Click **More Options**.

The Backup Command Line Options dialog box appears.
9. Set the plug-in options.

[Appendix A, "Plug-in Options,"](#) provides additional information about plug-in options.

If you want to specify command line flags, such as those listed in ["Command line flags" on page 184](#):

 - a. Click **More**.
 - b. In **Enter Attribute**, type the flag.
 - c. In **Enter Attribute value**, type the value, if applicable.
 - d. Click the + button.
10. Click **OK** to close the **Backup Command Line Options** dialog box.
11. Click **OK** to close the **On Demand Backup Options** dialog box.

The On Demand Backup Options dialog box closes and the On Demand Backup Request message box appears, displaying the following messages:

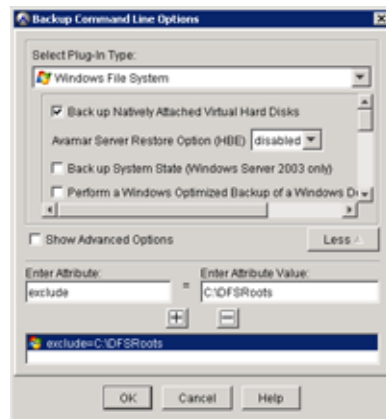
```
Backup request initiating  
Backup initiated.
```
12. Click **Close**.

Backing up DFS shares

Use a regular File System backup. You do not need to do anything special to back up the DFS shares, but you will need to add an exclusion to ignore the DFSRoots directory. DFS shares are accessed by namespace shares, not the local file system path. A File System backup will try to access the local DFSRoots directory, so excluding that directory allows the backup to ignore it.

To back up a system that contains DFS shares:

1. Follow the steps in [“Backing up volumes, folders, and files” on page 42](#) to select the client, Windows File System plug-in, and all files on the client for backup.
2. Select **Actions > Back Up Now**.
3. In the **On Demand Backup Options** dialog box, click **More Options**.
4. In the **Backup Command Line Options** dialog box, add an exclusion entry to skip "C:\DFSRoots" as shown in the following figure.



5. Click **OK** to close the **Backup Command Line Options** dialog box.
6. Click **OK** to close the **On Demand Backup Options** dialog box.

You can also add the exclusion to a dataset. [“Creating a dataset” on page 57](#) and the *Avarar Administrator 6.1 Administration Guide* provides more information about datasets.

Native VHD file backup and recovery

The Avamar client for Windows provides support for backup and recovery of the Native VHD file format introduced in Windows Server 2008 R2 and Windows 7. To use VHDs in Windows Server 2008 and earlier versions of Windows, you had to install the Hyper-V role, Microsoft Virtual Server, or Windows Virtual PC. With the introduction of Native VHD support in Windows Server 2008 R2 and Windows 7, you can use disk management tools, such as the DiskPart command-line tool and the Disk Management console, to create, attach (mount), and detach (unmount) VHDs.

The following topics provide details on using Avamar to back up and restore VHD files:

- ◆ [“How Avamar works with VHD files” on page 48](#)
- ◆ [“Backing up an attached VHD” on page 49](#)
- ◆ [“Backing up a detached VHD” on page 56](#)
- ◆ [“Restoring a system that uses DFS” on page 91](#)

How Avamar works with VHD files

VHDs exist on a physical drive as a file with the extension .vhd. When a VHD is attached, it still exists as a physical file, but the operating system sees it as separate volume (drive letter). Whether the VHD is attached or detached affects how it can be backed up. The following topics explain how Avamar works with VHD files:

- ◆ [“Backups when the VHD file is attached as a volume” on page 48](#)
- ◆ [“Backups when the VHD file is detached” on page 48](#)
- ◆ [“Attached VHDs are detached on reboot” on page 48](#)
- ◆ [“Parent volume and attached volume backups are processed separately” on page 49](#)
- ◆ [“Native boot from VHD is not supported” on page 49](#)

Backups when the VHD file is attached as a volume

If the VHD file is attached, it is treated as a separate volume and is not included in the backup of the physical volume it resides on. For example, if the VHD testimage.vhd on physical volume C: is attached as drive K:, then it is skipped in the filesystem backup of the C: volume. To back up the VHD testimage.vhd attached as drive K:, you must back up drive K:.

Backups when the VHD file is detached

If the VHD is detached, it is treated as a regular file in the filesystem when you perform a backup of the volume it resides on. For example, a detached VHD file named testimage.vhd that resides on the C: drive, such as C:\My VHDs\testimage.vhd, is included in the filesystem backup of the C: volume.

Attached VHDs are detached on reboot

An VHD is not automatically attached when you reboot, and is not available after reboot until reattached. When you reattach the VHD, the previous drive letter mappings are automatically set, unless the same settings were used for some other drive. Because Windows does not automatically reattach VHDs, you must manually keep track of VHDs on the system, and use consistent drive letter mappings in all subsequent attach and detach operations for backup data consistency.

Parent volume and attached volume backups are processed separately

When the parent volume, for example *C:*, and an attached volume, for example *K:*, are both selected for backup, Avamar processes these as separate backups. This is due to a Microsoft limitation that if a parent partition has an attached VHD with a drive letter attached to it, then both cannot be included in the same backup. However, with the Avamar Windows File System plug-in, you do not need to set up separate datasets. Avamar allows you to select both at the same time for backup, and automatically processes them as separate backups to overcome this limitation.

Native boot from VHD is not supported

The Avamar client for Windows does not support backup of a VHD configured for native boot.

Backing up an attached VHD

Backing up an attached VHD is much like backing up any other mounted physical hard drives. You can perform an on-demand backup of an attached VHD as a volume using several methods:

- ◆ Performing a single-click backup as described in the *EMC Avamar Backup Clients Guide*.
- ◆ Performing an interactive backup, as described in the *EMC Avamar Backup Clients Guide*.
- ◆ Using Avamar Administrator, as described in "[Backing up an attached VHD using Avamar Administrator](#)" on page 49.

You can also schedule backups and automate them with groups and group policies using Avamar Administrator. "[Backup launch methods and types](#)" on page 35 provides general information and steps for these backup methods.

Whichever method you use, Avamar uses the Windows File System plug-in to process the backup.

Backing up an attached VHD using Avamar Administrator

The following topics explain how to back up an attached VHD using Avamar Administrator.

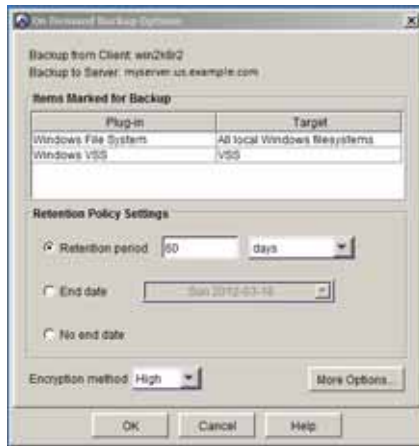
Backing up all volumes and attached VHDs

1. In Avamar Administrator, click the **Backup & Restore** launcher button.
The Backup and Restore window appears.
2. In the clients tree, select the Windows server or client.
You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.
3. Click the **Select for Backup** tab.
A list of plug-ins installed on the selected client appears in the left pane of the Select for Backup tab.
4. Select **Windows File System**. By default, this automatically includes all natively attached VHDs.



5. Select **Actions > Back Up Now**.

The On Demand Backup Options dialog box appears.



6. Select the backup retention setting:

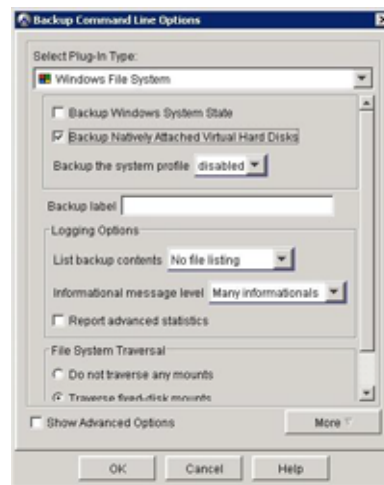
- To automatically delete this backup from the Avamar server after a specific amount of time, select **Retention period** and then specify the number of days, weeks, months, or years for the retention period.
- To automatically delete this backup from the Avamar server on a specific calendar date, select **End date** and browse to that date on the calendar.
- To keep this backup for as long as this client remains active in the Avamar server, select **No end date**.

7. Select the encryption method to use for client/server data transfer during this backup.

The exact encryption technology and bit strength used for a client/server connection depends on a number of factors, including the client platform and Avamar server version. The *EMC Avamar Product Security Guide* provides additional information.

8. Click **More Options**.

The Backup Command Line Options dialog box appears.



9. Set additional plug-in options if desired.

[Appendix A, "Plug-in Options,"](#) provides additional information about plug-in options.

If you want to specify command line flags, such as those listed in ["Command line flags" on page 184](#):

- a. Click **More**.
 - b. In **Enter Attribute**, type the flag.
 - c. In **Enter Attribute value**, type the value, if applicable.
 - d. Click the + button.
10. Click **OK** to close the **Backup Command Line Options** dialog box.
 11. Click **OK** to close the **On Demand Backup Options** dialog box.

The On Demand Backup Options dialog box closes and the On Demand Backup Request message box appears, displaying the following messages:

```
Backup request initiating
Backup initiated.
```

12. Click **Close**.

Backing up all volumes except natively attached VHDs

1. In Avamar Administrator, click the **Backup & Restore** launcher button.

The Backup and Restore window appears.

2. In the clients tree, select the Windows server or client.

You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.

3. Click the **Select for Backup** tab.

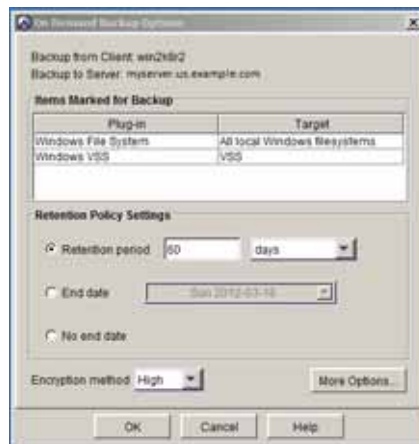
A list of plug-ins installed on the selected client appears in the left pane of the Select for Backup tab.

4. Select **Windows File System**. By default, this automatically includes all natively attached VHDs.



5. Select **Actions > Back Up Now**.

The On Demand Backup Options dialog box appears.



6. Select the backup retention setting:

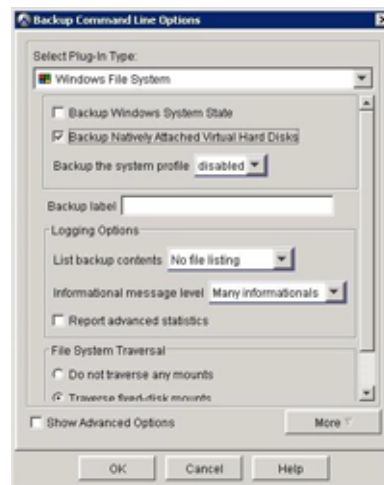
- To automatically delete this backup from the Avamar server after a specific amount of time, select **Retention period** and then specify the number of days, weeks, months, or years for the retention period.
- To automatically delete this backup from the Avamar server on a specific calendar date, select **End date** and browse to that date on the calendar.
- To keep this backup for as long as this client remains active in the Avamar server, select **No end date**.

7. Select the encryption method to use for client/server data transfer during this backup.

The exact encryption technology and bit strength used for a client/server connection depends on a number of factors, including the client platform and Avamar server version. The *EMC Avamar Product Security Guide* provides additional information.

8. Click **More Options**.

The Backup Command Line Options dialog box appears.



By default, Backup Natively Attached Virtual Hard Disks is selected. When selected, this setting specifies to back up all volumes including VHDs for the Windows File System plug-in.

9. Clear the **Backup Natively Attached Virtual Hard Disks** checkbox.
10. Set any additional plug-in options, if desired.

[Appendix A, "Plug-in Options,"](#) provides additional information about plug-in options.

11. Click **OK**.

The On Demand Backup Options dialog box closes and the On Demand Backup Request message box appears, displaying the following messages:

```
Backup request initiating
Backup initiated.
```

12. Click **Close**.

Backing up selected volumes

1. In Avamar Administrator, click the **Backup & Restore** launcher button.

The Backup and Restore window appears.

2. In the clients tree, select the Windows server or client.

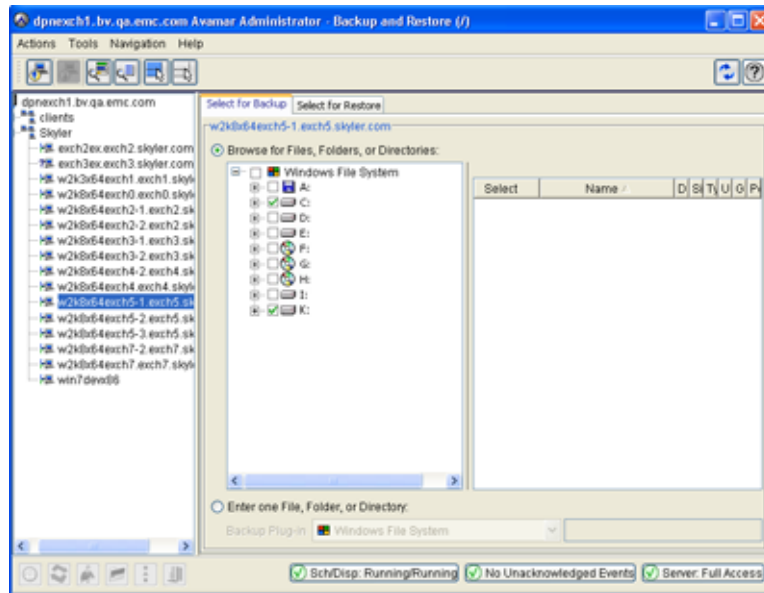
You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.

3. Click the **Select for Backup** tab.

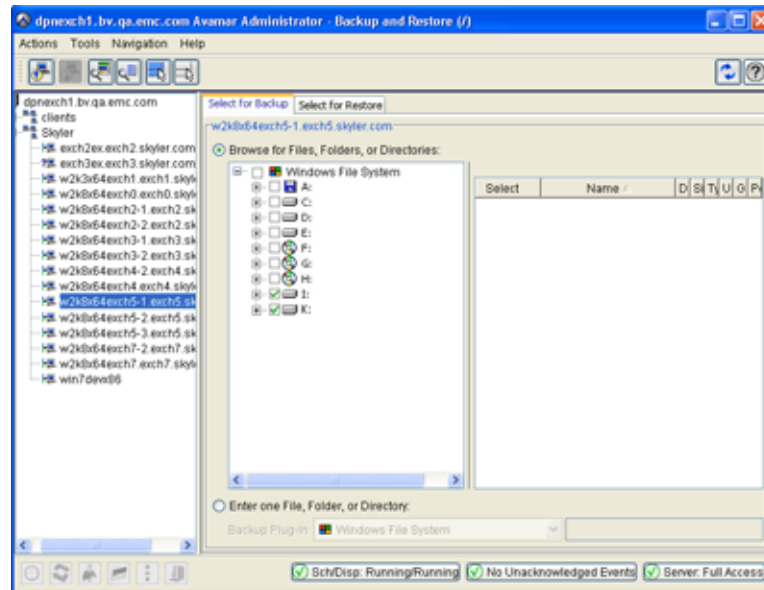
A list of plug-ins installed on the selected client appears in the left pane of the Select for Backup tab.

4. In the directory tree, expand **Windows File System**.
5. Select the volumes to include in the backup.

In the following example, the parent volume C: and the VHD attached as K: are selected.

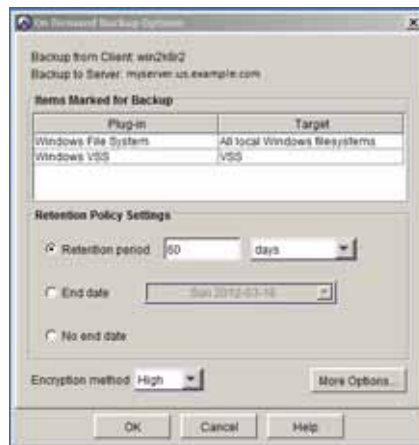


Including the parent drive to back up the natively attached VHD is not required. For example, if you have two natively attached VHDs attached to I: and K:, you can back those up without backing up C: as shown in the following example.



6. Select **Actions > Back Up Now**.

The On Demand Backup Options dialog box appears.



7. Select the backup retention setting:

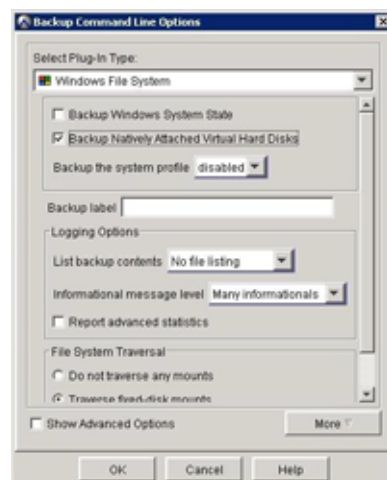
- To automatically delete this backup from the Avamar server after a specific amount of time, select **Retention period** and then specify the number of days, weeks, months, or years for the retention period.
- To automatically delete this backup from the Avamar server on a specific calendar date, select **End date** and browse to that date on the calendar.
- To keep this backup for as long as this client remains active in the Avamar server, select **No end date**.

8. Select the encryption method to use for client/server data transfer during this backup.

The exact encryption technology and bit strength used for a client/server connection depends on a number of factors, including the client platform and Avamar server version. The *EMC Avamar Product Security Guide* provides additional information.

9. Click **More Options**.

The Backup Command Line Options dialog box appears.



10. Set plug-in options, if desired.

[Appendix A, "Plug-in Options,"](#) provides additional information about plug-in options.

11. Click **OK** to close the Backup Command Line Options dialog box.
12. Click **OK** to close the Backup Options dialog box.

The On Demand Backup Options dialog box closes and the On Demand Backup Request message box appears, displaying the following messages:

```
Backup request initiating
Backup initiated.
```

13. Click **Close**.

Backing up a detached VHD

When a VHD is detached, it is treated as a regular file in a Windows File System backup. For example, the detached VHD file named `testimage.vhd`, which resides on the C: drive, such as `C:\My VHDs\testimage.vhd`, is included in the filesystem backup of the C: volume.

To back up a VHD as a file in a filesystem backup:

1. Detach the VHD using a disk management tool, such as the DiskPart command-line tool or the Disk Management console.
2. Set up a regular filesystem backup of the drive where the detached VHD file resides. For example, if the VHD filename and path is `C:\My VHDs\testimage.vhd`, then select the C: volume for backup. You can perform an on-demand backup of a volume using several methods:
 - Performing a single-click backup as described in the *EMC Avamar Backup Clients Guide*.
 - Performing an interactive backup, as described in the *EMC Avamar Backup Clients Guide*.
 - Using Avamar Administrator, as described in ["Backing up volumes, folders, and files" on page 42](#).

Scheduled backups

To perform scheduled backups for Windows servers:

1. Create a dataset for the backups, as discussed in ["Creating a dataset" on page 57](#).
2. Create a group for the backups, as discussed in ["Creating a group" on page 60](#). During the group creation process, you:
 - a. Assign the new dataset to the new group.
 - b. Assign a schedule to the new group.
 - c. Assign a retention policy to the new group.
 - d. Add the Windows client to the new group.
3. Enable scheduling for the group, as discussed in ["Enabling scheduled backups" on page 63](#).

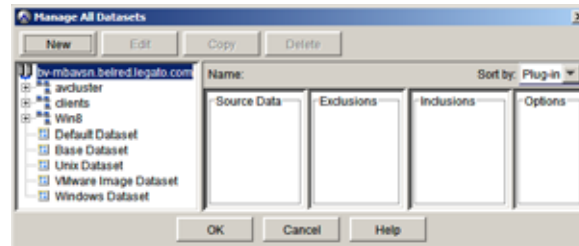
A thorough discussion of groups, group policy, datasets, schedules, and retention policies is beyond the scope of this guide. The *EMC Avamar Administration Guide* provides additional information.

Creating a dataset

To create a dataset for scheduled backups:

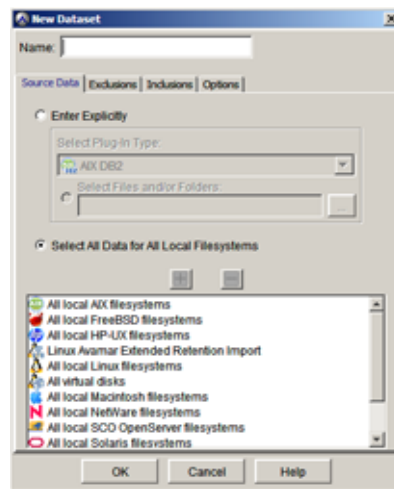
1. In Avamar Administrator, select **Tools > Manage Datasets**.

The Manage All Datasets window appears.



2. Click **New**.

The New Dataset dialog box appears.



The New Dataset dialog box lists all plug-ins installed on the client in the box below the + (Add to List) and - (Remove From List) buttons.

3. In the **Name** box, type a name for the dataset.

Do not use any of the following characters in the dataset name:

~!@\$%^&(){}[]|;#\\:*?<>'\"&

4. On the **Source Data** tab, choose whether the dataset includes data from all plug-ins installed on the client or only specific plug-ins installed on the client.

- To include data from all plug-ins installed on the client, select **Select All Data for All Local File Systems**.
- To include data from only specific plug-ins installed on the client, select **Enter Explicitly**.

5. If you chose **Enter Explicitly**, you can customize the dataset by including a subset of the installed plug-ins or by specifying individual files or directories:
 - To remove a plug-in from the dataset, select the plug-in from the list in the bottom portion of the **New Dataset** dialog box, and then click - (**Remove From List**). Repeat this step as necessary.
 - To add a plug-in to the dataset, select the plug-in from the **Select Plug-In Type** list, and then click + (**Add to List**). Repeat this step as necessary.

NOTICE

All Avamar plug-ins are listed in the **Select Plug-In Type** list, but only those plug-ins installed on the client will be invoked when the dataset is used.

- (Optional) To limit the dataset to a specific file or directory, type the full file path to the file or directory in the text box, or browse to the file or directory.

When typing a file path in the text box, do not use any of the following characters:
~!@\$%^&(){}[]|,`:#\/:*?<'"&

You can use an asterisk (*) as a wildcard character. For example, to specify the My Documents folder for all users on a Windows computer, type:

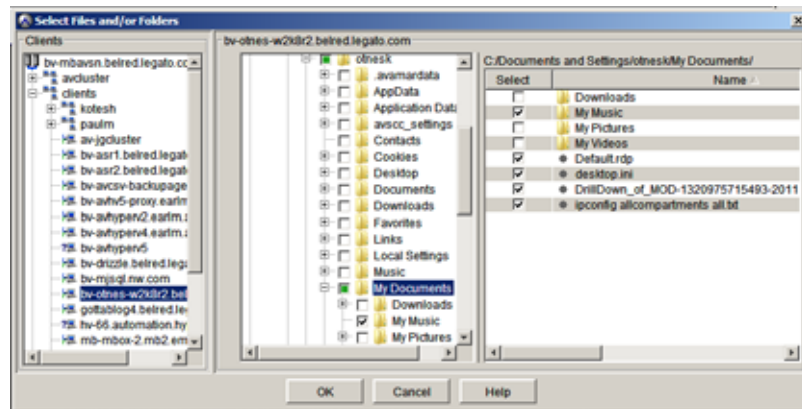
C:\Documents and Settings*\My Documents

NOTICE

When specifying a data path, only the first occurrence of an asterisk is treated as a folder wild card. Subsequent occurrences are interpreted literally. You can also type the full path to any client directory directly in this field.

To browse to the file or directory:

- a. Click the ... (**Browse for files and/or folders**) button to open the **Select Files And/Or Folders** dialog box.
- b. Select the client from the **Clients** tree.
- c. In the directory tree, select the files or folders to include in the dataset.



- d. Click **OK**.

The Select File And/Or Folder dialog box closes, and the New Dataset dialog box lists the files or folders that you selected.

6. (Optional) Define files and directories to exclude and include in the dataset on the **Exclusions** and **Inclusions** tabs, respectively. The *EMC Avamar Administration Guide* provides details.
7. Click the **Options** tab and set the plug-in options:

- a. Select the plug-in from the **Select Plug-In Type** list.

The plug-in options appear on the **Options** tab.

- b. Set the plug-in options.

[Appendix A, "Plug-in Options,"](#) provides a complete list of supported Windows plug-in options that can be executed by a dataset.

- c. To specify advanced backup options, select the **Show Advanced Options** checkbox. Otherwise, proceed to [step 8 on page 59](#).

Additional options appear in red on the **Options** tab in the **New Dataset** dialog box.

- d. Set the advanced plug-in options.

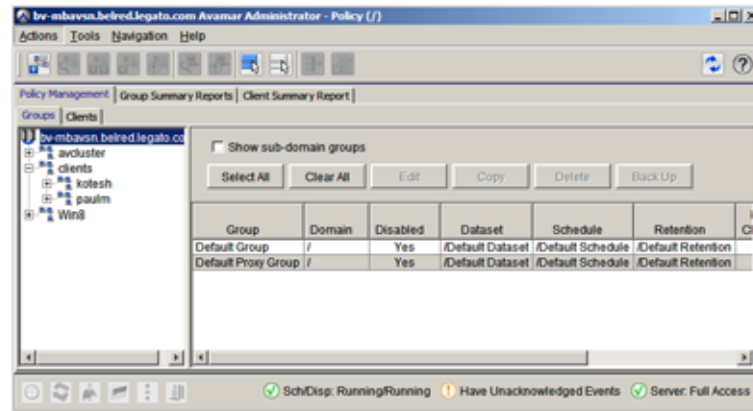
8. Click **OK** to close the **New Dataset** dialog box, and then click **OK** to close the **Manage All Datasets** dialog box.

Creating a group

To create a group for scheduled backups:

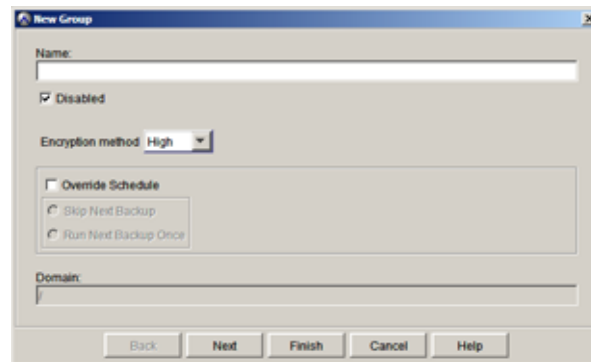
1. In Avamar Administrator, click the **Policy** launcher button.

The Policy window appears.



2. Select the **Groups** tab.
3. In the left pane, select the Avamar domain to which the group should belong.
4. Select **Actions > New Group**.

The New Group wizard appears.



5. In the **Name** box, type a name for the new group.

Do not use any of the following characters in the group name:

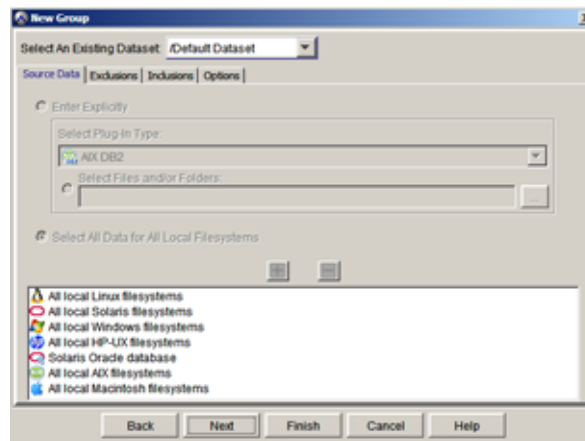
~!@\$%^&(){}[]|;`#~\:*?<>'"/&

6. Clear the **Disabled** checkbox to use this group to perform scheduled client backups. Selecting the checkbox disables backups for the group.
7. From the **Encryption method** list, select the encryption method for client/server network communications. This is the method that all clients in the group use unless the method is overridden at the client level.

The exact encryption technology and bit strength used for any given client-server connection depends on a number of factors, including the client platform and Avamar server version. The *EMC Avamar Product Security Guide* provides additional information.

8. Choose whether to use the assigned schedule for the group or override the assigned schedule:
 - To use the assigned schedule, leave the **Override Schedule** checkbox clear.
 - To override the schedule:
 - a. Select **Override Schedule**.
Selecting **Override Schedule** enables the **Skip Next Backup** and **Run Next Backup Once** options.
 - b. Choose whether to skip the next scheduled backup entirely or to perform the next scheduled backup one time only by selecting either **Skip Next Backup** or **Run Next Backup Once**.
9. Click **Next**.

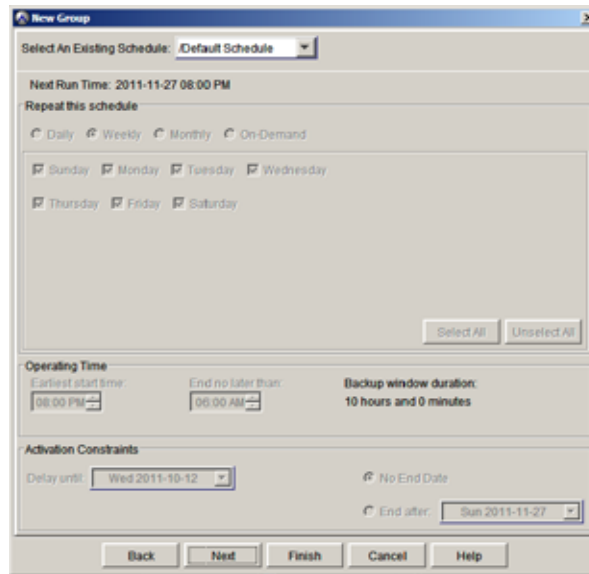
The next New Group wizard screen appears with dataset information.



10. From the **Select An Existing Dataset** list, select the dataset that you defined during [“Creating a dataset” on page 57](#).

11. Click **Next**.

The next New Group wizard screen appears with schedule information.

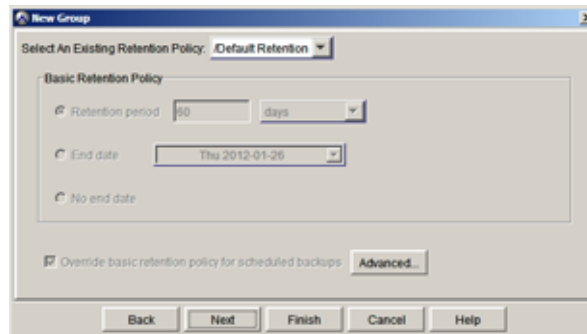


12. From the **Select An Existing Schedule** list, select a schedule for the group.

You cannot edit schedules from this screen. Detailed schedule properties are shown so that you can review them prior to making a selection. The *EMC Avamar Administration Guide* provides additional information about editing schedule properties.

13. Click **Next**.

The next New Group wizard screen appears with retention policy information.

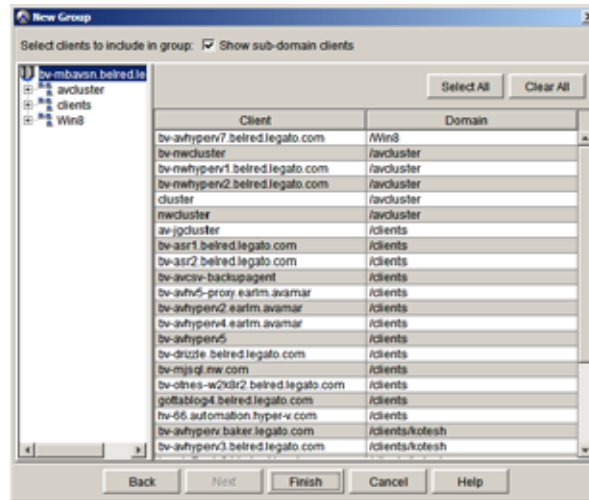


14. From the **Select An Existing Retention Policy** list, select a retention policy for the group.

You cannot edit retention policies from this screen. Detailed retention policy properties are shown so that you can review them prior to making a selection. The *EMC Avamar Administration Guide* provides additional information about editing retention policy properties.

15. Click **Next**.

The final New Group wizard screen appears with a tree of domains and clients.



16. Select the Windows client from the client list.

17. Click **Finish**.

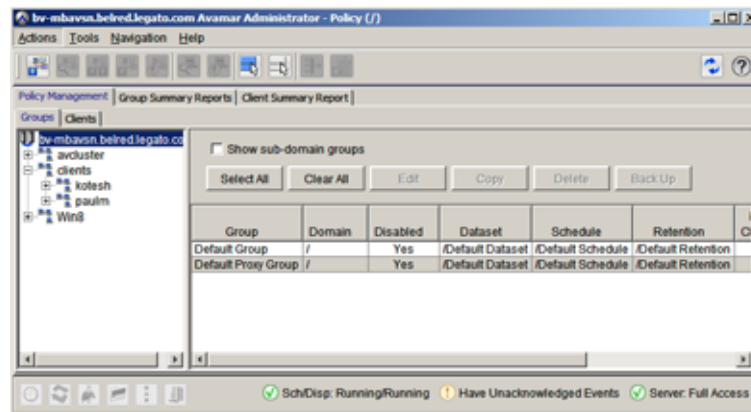
The New Group wizard closes and the new group appears in the Policy window.

Enabling scheduled backups

To ensure that the group is enabled for scheduled backups:

1. In Avamar Administrator, click the **Policy** launcher button.

The Policy window appears.



2. On the **Policy Management** tab, select the **Groups** tab.

3. Select the group that you created in “[Creating a group](#)” on page 60.

4. Select **Actions > Group > Disable Group**.

This clears the **Disable Group** option on the **Actions > Group** menu.

A confirmation message appears.

5. Click **Yes** to enable this group.

System State backup datasets for mixed Windows Server clients

Datasets are a convenient and efficient way of scheduling and managing backups of a large number of servers on your network. If your dataset includes one or more of Windows XP, and Windows Server 2003, and one or more of Windows 7, Windows 8, Windows Server 2008, Windows Server 2008 R2, and Windows Server 2012 in the same dataset, a few extra settings are required to ensure that the system state is backed up for both sets of Windows clients. Because Microsoft has changed their backup technologies, Avamar requires different plug-ins for each, as shown in [Table 6 on page 64](#):

Table 6 Different Microsoft backup technologies require different Avamar plug-ins

Windows version	Microsoft backup technology	Avamar plug-in required for system state backup
Windows XP Windows Server 2003	Windows NT Backup	Windows File System plug-in
Windows 7 Windows 8 Windows Server 2008 and 2008 R2 Windows Server 2012	Windows Volume Shadowcopy Service (VSS)	Windows VSS plug-in

Avamar provides several built-in datasets that include multiple plug-ins for different operating systems or applications. When creating a backup group, there are two built-in datasets that include all local Windows filesystems, the /Default Dataset and the /Windows Dataset. Or, you may create your own dataset that includes all local Windows filesystems.

When both the Windows Filesystem and Windows VSS plug-ins are used in the same dataset, the default settings for system state backup may conflict, resulting in backup failures of one or both Windows plug-ins.

There are two ways to accommodate backups of Windows Server versions that require using different Avamar for Windows plug-ins:

- ◆ Create two separate datasets: one dataset that backs up Windows Server 2003 and Windows XP clients with the Windows File System plug-in; and another dataset that backs up Windows 7, Windows 8, Windows Server 2008, and Windows Server 2012 clients with the Windows VSS plug-in. While this requires separate datasets, it avoids using any override flags that could lead to data loss if used improperly. The *EMC Avamar Administrative Guide* provides extensive information about creating and using datasets.
- ◆ Create a single dataset that includes both Windows File System plug-in clients and Windows VSS plug-in clients, as described in [“Setting up a dataset for mixed Windows operating system plug-ins” on page 65](#).

Requirements for backing up Windows Server 2003/Windows XP clients and Windows Server 2008/Windows Server 2012/Windows 7/Windows 8 clients in the same dataset

- ◆ Include both plug-ins in the dataset: Windows File System and Windows VSS.
- ◆ Configure each of these Windows plug-ins for disaster recovery backups of their associated Windows server versions.
- ◆ Add special flags to the Windows File System plug-in settings in the dataset.

The following procedure describes how to create the dataset with these settings.

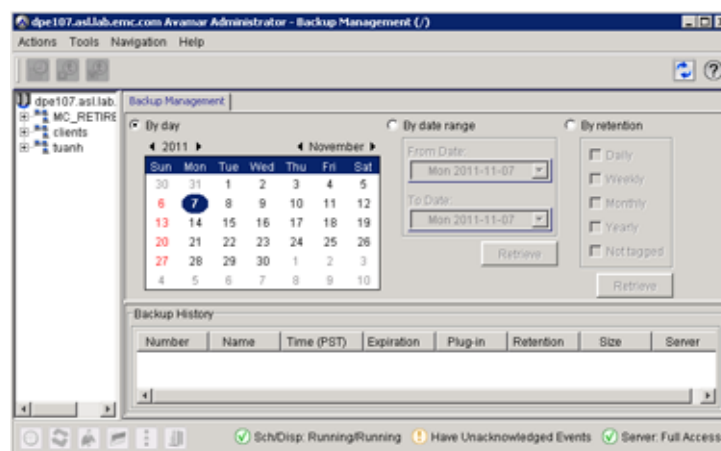
Setting up a dataset for mixed Windows operating system plug-ins

You must configure both plug-ins with their respective system state backup settings.

To configure the system state backup settings for both Windows plug-ins in the same dataset:

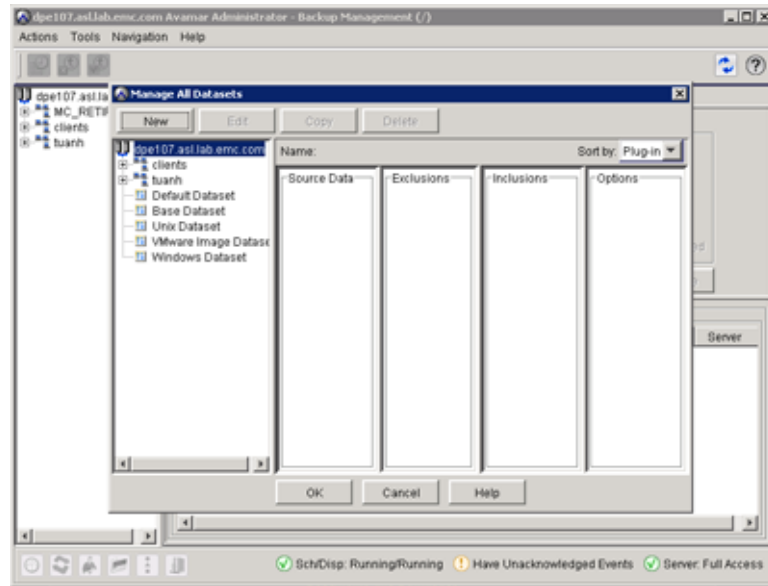
1. In **Avamar Administrator** click **Backup Management**.

The Backup Management window appears.



2. On the **Tools** menu, click **Manage Datasets**.

The Manage Datasets dialog box appears.

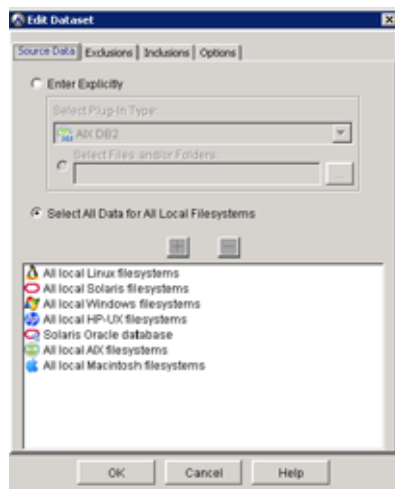


3. Select the Dataset you want to use for your Windows server backups.

The **Default Dataset** and **Windows Dataset** both include **All local Windows filesystems**. Or, you may have created your own custom dataset that contains both Windows filesystem plug-in (Windows Server 2003 and Windows XP clients) and Windows VSS plug-in (Windows Server 2008/2012 and Windows 7/8 clients).

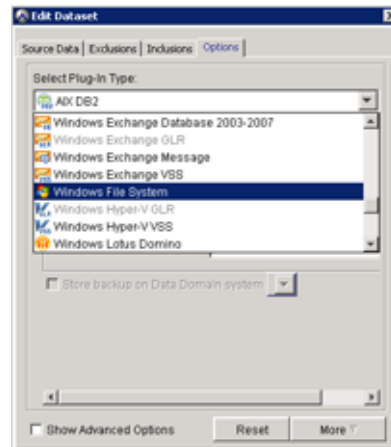
4. Click **Edit**.

The Edit Dataset dialog box appears.

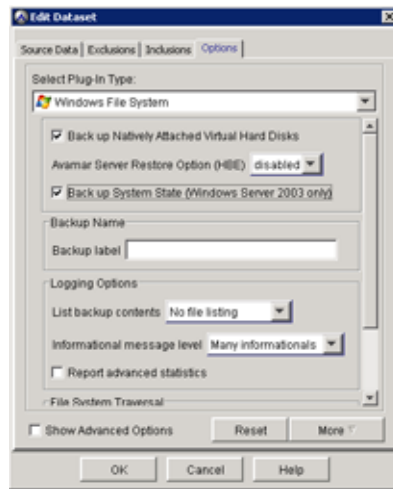


5. Click the **Options** tab.

6. In the **Select Plug-In Type** list, select **Windows File System**, as shown in the following figure.



7. Select **Back up System State (Windows Server 2003 only)**, as shown in the following figure.



8. Click **More**.

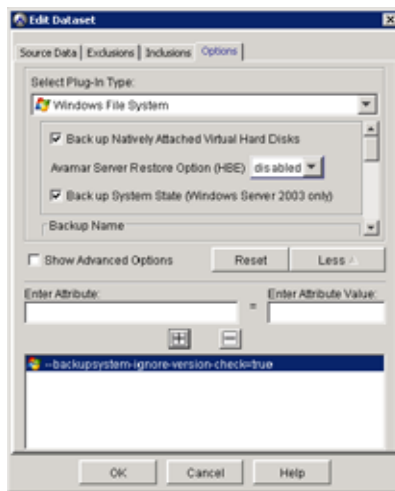
9. Add the flag `--backupsystem-ignore-version-check=true`:

IMPORTANT

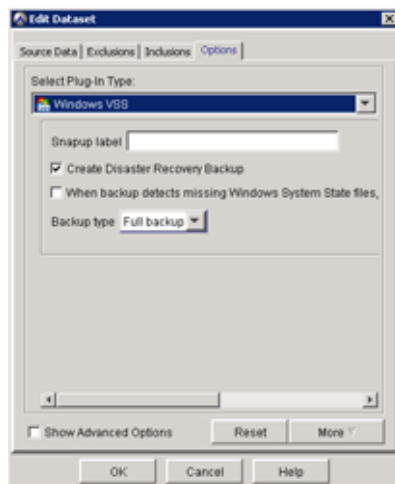
Use the `backupsystem-ignore-version-check` flag very carefully. This flag overrides an important Avamar check, and if used improperly, can lead to data loss.

- a. In **Enter Attribute**, type `--backupsystem-ignore-version-check`
- b. In **Enter Attribute value**, type `true`
- c. Click the + button

Your settings should appear similar to the following figure.



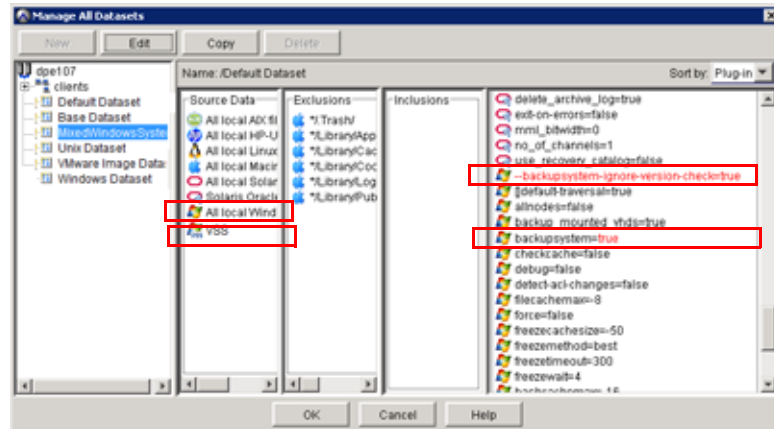
10. Click **OK**.
11. In the **Manage All Datasets** dialog box, click **Edit**.
12. In the **Edit Dataset** dialog box, click the **Options** tab.
13. In **Select Plug-in Type**, select **Windows VSS**.
14. Select **Create Disaster Recovery Backup**, as shown in the following figure.



15. Click **OK** to close the Edit Dataset dialog box.

The Manage All Datasets dialog box is displayed.

16. Verify the Windows plug-in settings you just changed are in the dataset. In the **Manage All Datasets** dialog box, scroll down the flags list in the far right column, until you reach the Windows settings. The `--backupsystem-ignore-version-check=true` and `backupsystem=true` flags are displayed, as shown in the following figure.



17. Verify that both Windows plug-ins are present in the dataset. In the **Source Data** column, both **All local Windows filesystems** and **VSS** should be listed.

18. Click **OK** to close the Manage All Datasets dialog box.

CHAPTER 3

Recovery

The following topics discuss how to use the Avamar client for Windows to recover data on a Windows server:

- ◆ Recovery types 72
- ◆ Finding a backup for restore 73
- ◆ Choosing a restore destination 77
- ◆ Restoring to the original location 78
- ◆ Restoring to a different location 81
- ◆ Restoring to multiple locations 86

Recovery types

The type of recovery that you choose depends on what you want to recover, and what was originally backed up. There are three types of recovery:

- ◆ Filesystem recovery
- ◆ Disaster recovery
- ◆ Application recovery

Filesystem recovery

Use this type of recovery to recover lost, damaged, or earlier versions of files, folders, or volumes to an existing server. The following topics explain how to recover filesystems and volumes:

- ◆ [“Finding a backup for restore” on page 73](#)
- ◆ [“Choosing a restore destination” on page 77](#)
- ◆ [“Restoring to the original location” on page 78](#)
- ◆ [“Restoring to a different location” on page 81](#)
- ◆ [“Restoring to multiple locations” on page 86](#)
- ◆ [“Restoring a system that uses DFS” on page 91](#)

IMPORTANT

When restoring a SIS volume, the SIS Groveler service activity may prevent some files from being restored or overwritten correctly. [“Restoring over corrupted SIS links” on page 91](#) provides more information about this error and how to correct it.

Disaster recovery

Use this to recover or rebuild an entire server. Disaster recovery includes restoring system state files and critical volumes. The steps for this type of recovery are described in [Chapter 4, “Client System Disaster Recovery.”](#)

Specific topics include:

- ◆ [“Windows Server 2008/2012 and Windows 7/8 Bare Metal Recovery” on page 94](#)
- ◆ [“Disaster recovery when a server role uses Microsoft SQL Server instances instead of WID” on page 120](#)
- ◆ [“Windows Server 2008 and 2012 Active Directory backup and recovery” on page 125](#)
- ◆ [“Windows Server 2003 disaster recovery and Active Directory recovery” on page 141](#)
- ◆ [“Prerequisite: Perform system state backup” on page 144](#)
- ◆ [“Windows XP and 2000 system recovery using NTBackup” on page 154](#)

Application recovery

The steps for this type of recovery depend on the application, such as Microsoft Exchange, Microsoft SQL Server, and IBM DB2. The Avamar guide for each application plug-in provides information for installation, backup, and recovery.

NOTICE

Windows Server full backups and filesystem backups typically exclude application configuration, databases, or files. Disaster recovery of a Windows Server does not restore applications. After Windows disaster recovery, reinstall the application and recover the application data. [“Windows BMR capabilities and limitations” on page 96](#) provides more information about Windows disaster recovery and application disaster recovery.

Finding a backup for restore

You can find Avamar client backups for a restore either by backup date or by files and folders. Some plug-ins, content, or restore types use only one method to locate backups. When only one method applies, it is noted within the restore procedure.

The following topics provide details on finding a backup for a restore:

- ◆ [“Finding a backup by date” on page 73](#)
- ◆ [“Finding a backup by file or folder” on page 73](#)
- ◆ [“How to find a backup by date” on page 74](#)
- ◆ [“How to find a backup by file or folder” on page 75](#)

Finding a backup by date

You should locate backups by date when:

- ◆ The content from a backup you want to restore is before a specific date or event. For example, you know approximately when a file or folder was lost or corrupted, and need to find the last backup before that date.
- ◆ The specific types of backups are known. For example, you run scheduled disaster recovery backups every Wednesday and Saturday night, and you run full volume backups daily. If you need to rebuild a server, you can select the disaster recovery backup with the date closest to the event that caused the loss of data.

Finding a backup by file or folder

You should locate backups by the specific files or folders contained within each backup when:

- ◆ Each database is backed up in a separate backup set. For example, you know that `\\Server_Name\Databases\Database_1` is backed up in one backup set and `\\Server_Name\Databases\Database_2` is backed up in another backup set. If you know the content you need is in Database_2, or is the entire Database_2 database, then you can specify the path or browse to the Database_2 folder.
- ◆ You want to see multiple versions of the same file.
- ◆ The date of the backup or what was saved in a backup is unknown, but you know the name of the file or folder.

How to find a backup by date



To find backups for a restore by date:

1. In Avamar Administrator, click the **Backup & Restore** launcher button.

The Backup and Restore window appears.

2. In the clients tree, select the Windows server or client that performed the backup.

You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.

3. Click the **Select for Restore** tab.

4. Click the **By Date** tab.

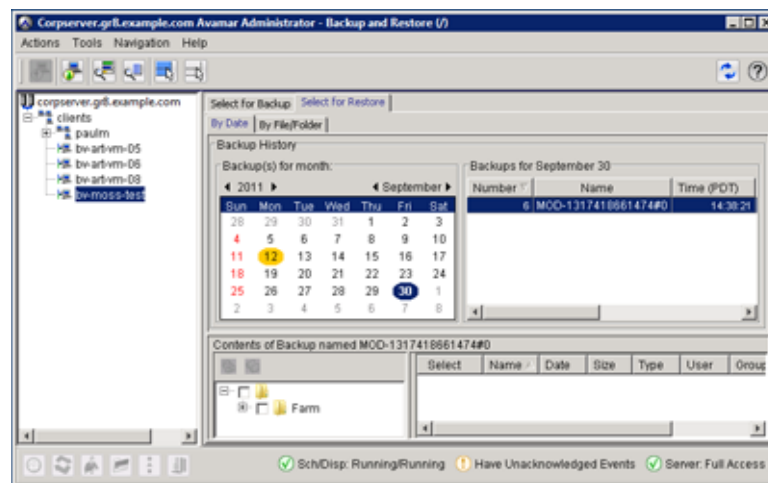
5. Select a backup from the calendar:
 - a. Use the year and month navigational arrows to browse to a backup.

Dates highlighted by yellow indicate a valid backup was performed on that date.

- b. Click a date highlighted by yellow.

A list of backups that were performed on that date appears in the Backups table next to the calendar.

6. Select the backup to browse from the **Backups** table.



7. Select the data to restore from the **Contents of Backup** pane at the bottom of the **Select for Restore** tab. You can select the entire backup, specific drives, or specific folders or files. Within any of these containers, you can also de-select individual items that you do not want restored.

8. Select **Actions > Restore Now**.

9. Choose a Restore Destination, as described in:
 - ["Restoring to the original location" on page 78](#)
 - ["Restoring to a different location" on page 81](#)
 - ["Restoring to multiple locations" on page 86](#)

How to find a backup by file or folder



To find a backup by specific files or folders in that backup:

1. In Avamar Administrator, click the **Backup & Restore** launcher button.

The Backup and Restore window appears.

2. In the clients tree, select the Windows server or client.

You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.

3. Click the **Select for Restore** tab.
4. Click the **By File/Folder** tab.
5. In the **Enter path to retrieve history for** text box, type the path or browse to the file or folder:

- Type the full path to the client directory or file in the **Enter path to retrieve history for** text box.

-or-

- Browse to the file or folder:

- a. Click **Browse**.

The Select File or Folder window appears.

- b. Select the client.
- c. Select the plug-in.

A list of folders appears in a table to the right of the plug-ins pane.

- d. Select the file or folder to restore.
- e. Click **OK**.

The selected file or folder appears in the Enter path to retrieve history for text box.

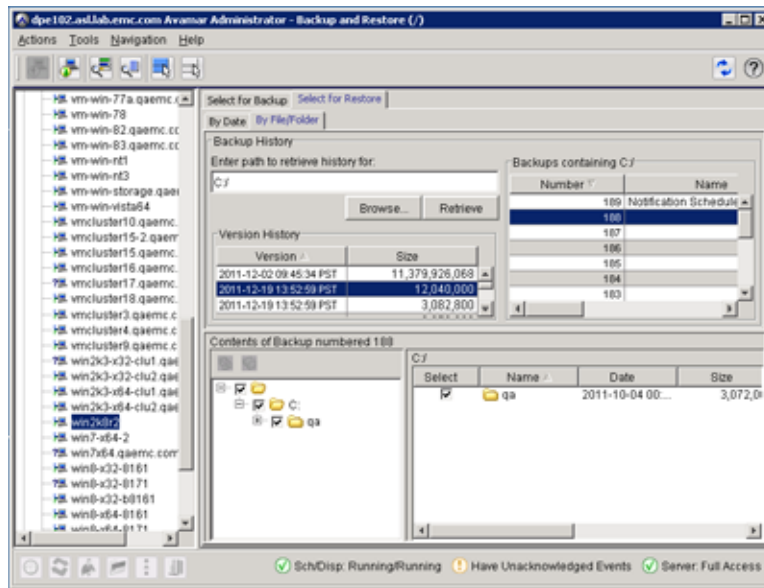
6. Click **Retrieve**.

The Version History table lists all versions and sizes for that directory or file that have been backed up from the selected client.

7. Select the directory or file version in the **Version History** table.

All backups for the selected client that contain the selected version appear in the Backups table next to the Version History table.

8. Select the backup to restore from the **Backups** table.



9. Select the data to restore from the **Contents of Backup** pane at the bottom of the **Select for Restore** tab.

You can select the entire backup, specific drives, or specific folders or files. Within any of these containers, you can also de-select individual items that you do not want restored.

10. Select **Actions > Restore Now**.
11. Choose a Restore Destination, as described in:
- ["Restoring to the original location" on page 78](#)
 - ["Restoring to a different location" on page 81](#)
 - ["Restoring to multiple locations" on page 86](#)

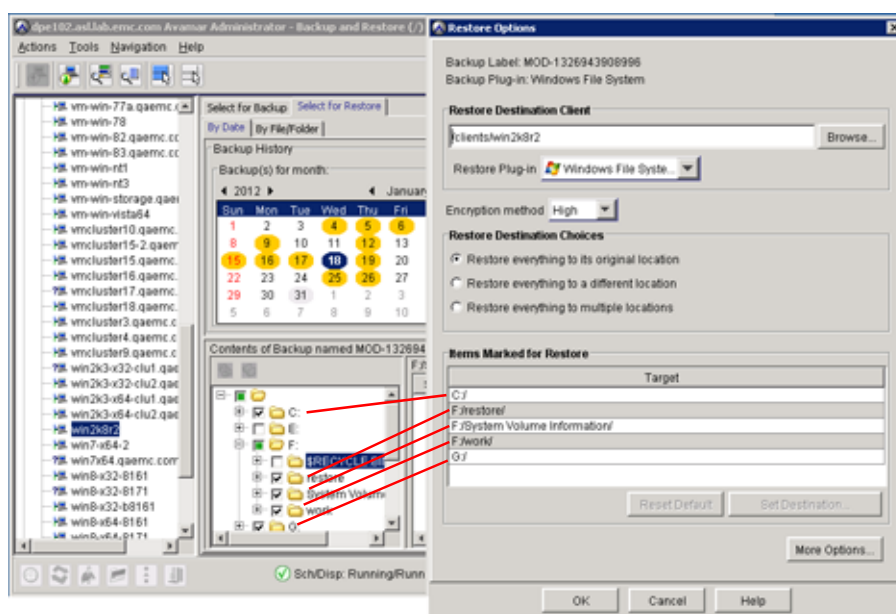
Choosing a restore destination

The following table describes several options for choosing the restore destination.

Table 7 Restore destination choices

Restore destination	Examples
“Restoring to the original location” on page 78	If you select a single item, folder, or drive from the backup, such as C:/Documents and Settings , then it will be restored to the original location on the original client, C:/Documents and Settings. If you select multiple files, folders, or volumes, for example C:/Documents and Settings , F:/Work , and G:/ , then they will be restored to C:/Documents and Settings , F:/Work , and G:/ respectively.
“Restoring to a different location” on page 81	If you select a single item, folder, or drive from the backup, such as C:/Documents and Settings , you can restore it to a different location on the original client, such as L:/ , or to a different client. If you selected multiple files, folders, or volumes, for example, C:/Documents and Settings , F:/Work , and G:/ , you could restore all of them to a different location, such as L:/ , or to a different client.
“Restoring to multiple locations” on page 86	If you select multiple items or folders from the backup, such as C:/Documents and Settings , F:/Work , and G:/ , you can restore each to a different location, such as L:/ , M:/ , and O:/ , respectively, or to different clients.

In order to restore to multiple locations, you need to select multiple targets to restore from the contents of your selected backup. In the following example, the entire C:/ and G:/ drives were selected, but within drive F:\ some but not all folders are selected. The multiple targets are then available in **Items Marked for Restore**, in **Restore Options**, as separate targets. Using the **Restore everything to multiple locations** option, you can then specify a separate destination for each target row.



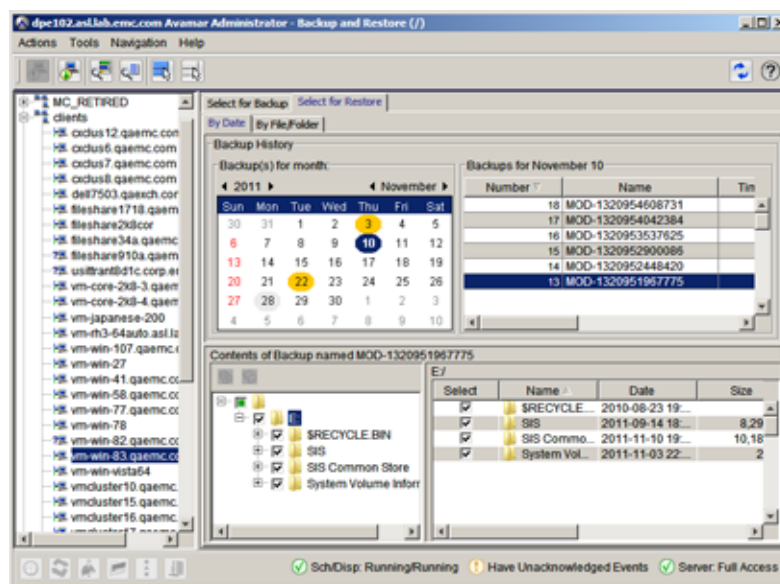
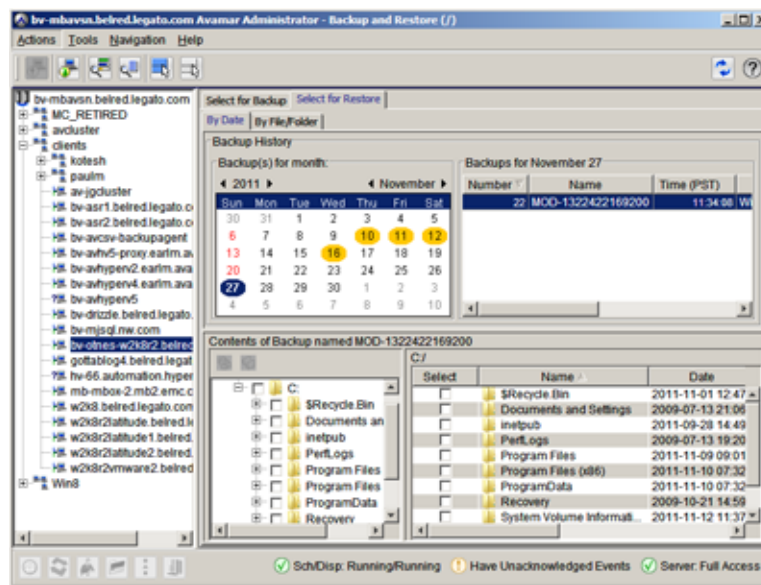
Restoring to the original location



To restore a filesystem or volume to the original location:

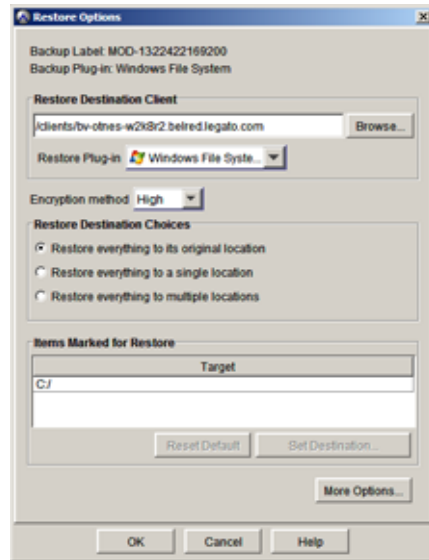
1. In Avamar Administrator, click the **Backup & Restore** launcher button.
The Backup and Restore window appears.
2. Click the **Select for Restore** tab.
3. Locate the directories or files to restore, as discussed in the following topics:
 - [“How to find a backup by date” on page 74](#)
 - [“How to find a backup by file or folder” on page 75](#)

The following figures illustrate a typical Windows file system structure, and a Windows Storage Server 2008 SIS system:



4. Select **Actions > Restore Now**.

The Restore Options dialog box appears.

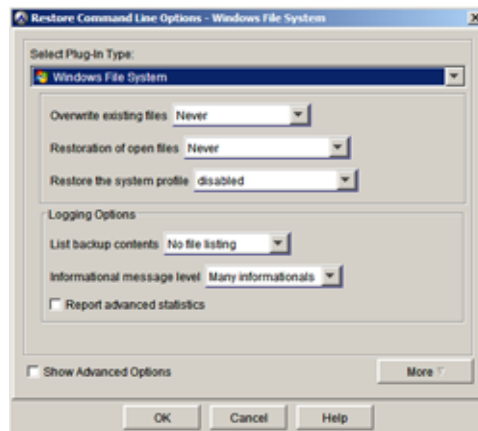


5. In the **Restore Destination Client** box, leave the default selection of the original client.
6. In the **Restore Plug-in Type** list, leave the default selection of the original backup plug-in.
7. In the **Encryption method** list, select the encryption method to use for client/server data transfer during the restore.

The exact encryption technology and bit strength used for a client/server connection depends on a number of factors, including the client platform and Avamar server version. The *EMC Avamar Product Security Guide* provides additional information.

8. In **Restore Destination Choices**, select **Restore everything to its original location**.
["Choosing a restore destination" on page 77](#) describes each of the restore destination options.
9. After specifying the restore destination, click **More Options**.

The Restore Command Line Options - Windows File System dialog box appears.



10. Set the plug-in options.

[Appendix A, "Plug-in Options,"](#) provides additional information about plug-in options.

If you want to specify command line flags, such as those listed in ["Command line flags" on page 185](#):

- a. Click **More**.
 - b. In **Enter Attribute**, type the flag.
 - c. In **Enter Attribute value**, type the value, if applicable.
 - d. Click the + button.
11. Click **OK** to close the **Restore Command Line Options** dialog box.
 12. Click **OK** to close the **Restore Options** dialog box.

The Restore Options dialog box closes and the Restore Request message box appears, displaying the following messages:

```
Restore request initiating  
Restore request initiated.
```

13. Click **Close**.

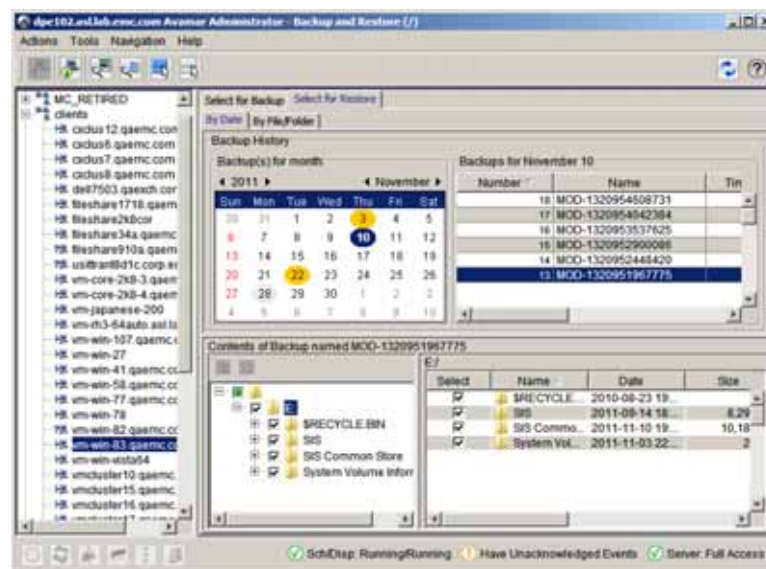
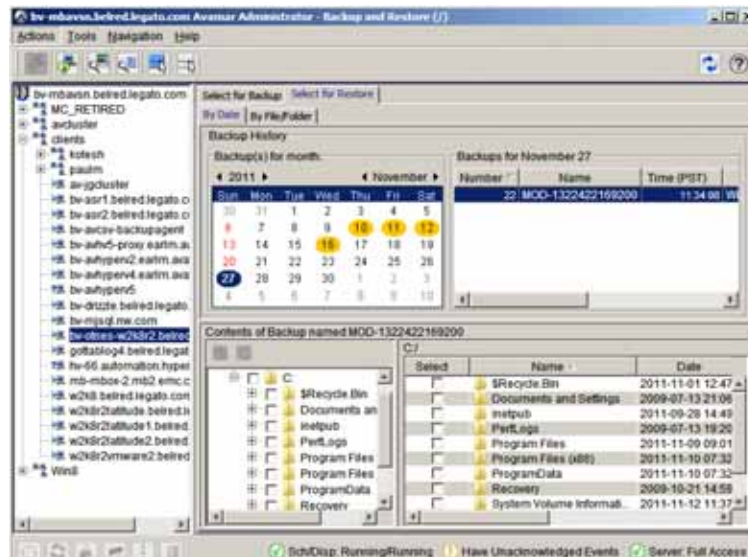
Restoring to a different location

To restore a filesystem or volume to a different location on the same server, or to a different client:



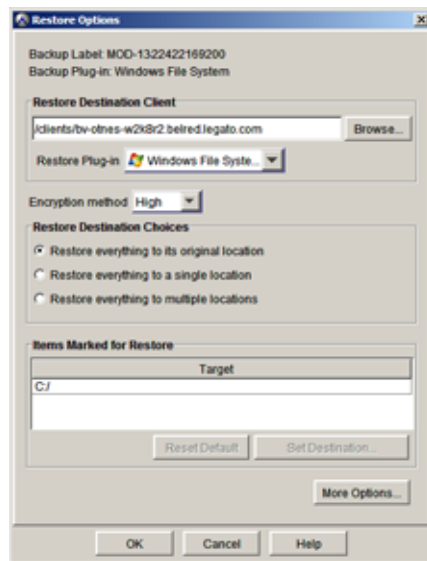
1. In Avamar Administrator, click the **Backup & Restore** launcher button.
The Backup and Restore window appears.
2. Click the **Select for Restore** tab.
3. Locate and select the directories or files to restore, as discussed in the following topics:
 - “How to find a backup by date” on page 74
 - “How to find a backup by file or folder” on page 75

The following figures illustrate a typical Windows file system structure, and a Windows Storage Server 2008 SIS system:



4. Select **Actions > Restore Now**.

The Restore Options dialog box appears.



5. Select the destination client for the data to restore:

- To restore to a different location on the same client, leave the default selection of the original client in the Restore Destination Client box.
- To restore to a different client:
 - a. Click the Browse button in the Restore Destination Client box.

The **Browse for Restore Client** dialog box appears.

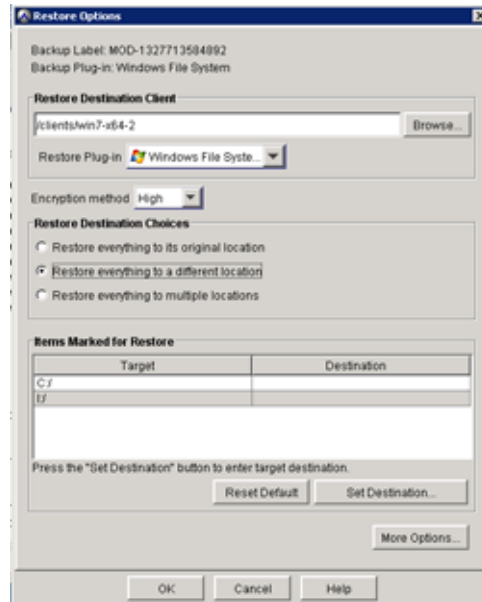


- b. Browse to and select the destination client.
 - c. Click **OK**.
6. From the **Restore Plug-in Type** list, select the plug-in to use for the restore. The default selection is the plug-in used to perform the backup.
 7. From the **Encryption method** list, select the encryption method to use for client/server data transfer during the restore.

The exact encryption technology and bit strength used for a client/server connection depends on a number of factors, including the client platform and Avamar server version. The *EMC Avamar Product Security Guide* provides additional information.

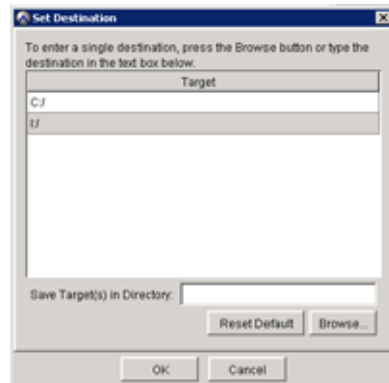
8. In **Restore Destination Choices**, select **Restore everything to a different location**.

[“Choosing a restore destination” on page 77](#) describes each of the restore destination options.



9. Click **Set Destination**.

The **Set Destination** dialog box appears.

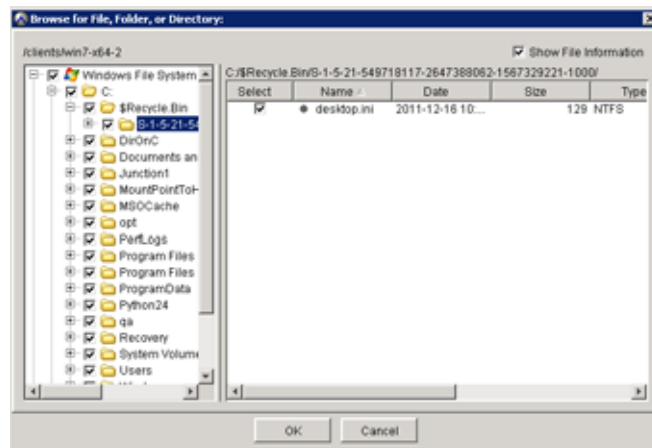


- Specify where to save the items to:

Enter the destination in **Save Target(s) in Directory**.

-or-

Click **Browse**, and in the **Browse for File, Folder, or Directory** dialog box, and select the **Windows File System** plug-in in the left pane. You can browse and select down to the folder level in the left pane, and browse and select down to the file level in the right pane.



Click **OK** to close the **Browse for File, Folder, or Directory** dialog box.

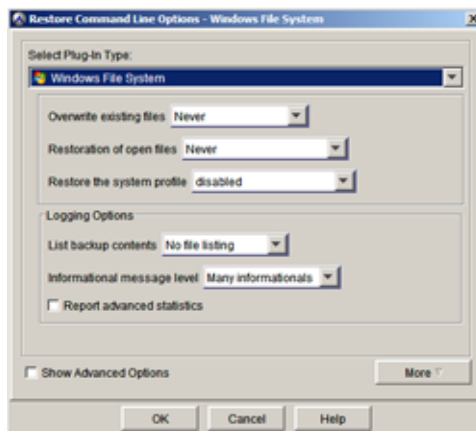
- Click **OK** to close the Set Destination dialog box.

NOTICE

When redirecting a restore to a different location, restoring a single directory to the new location only restores the contents of the directory. The original parent directory is not restored as part of this operation. However, if you restore two or more directories to a new location, then the original parent directories are restored along with the contents of those directories.

- After specifying the restore destination, click **More Options**.

The Restore Command Line Options - Windows File System dialog box appears.



- Set the plug-in options.

[Appendix A, "Plug-in Options,"](#) provides additional information about plug-in options.

If you want to specify command line flags, such as those listed in [“Command line flags” on page 185](#):

- a. Click **More**.
 - b. In **Enter Attribute**, type the flag.
 - c. In **Enter Attribute value**, type the value, if applicable.
 - d. Click the + button.
14. Click **OK** to close the **Restore Command Line Options** dialog box.
 15. Click **OK** to close the **Restore Options** dialog box.

The Restore Options dialog box closes and the Restore Request message box appears, displaying the following messages:

```
Restore request initiating  
Restore request initiated.
```

16. Click **Close**.

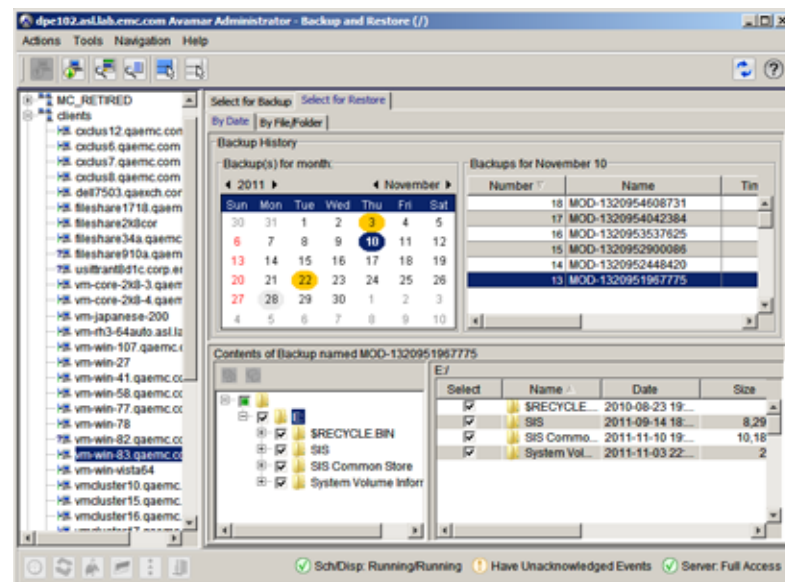
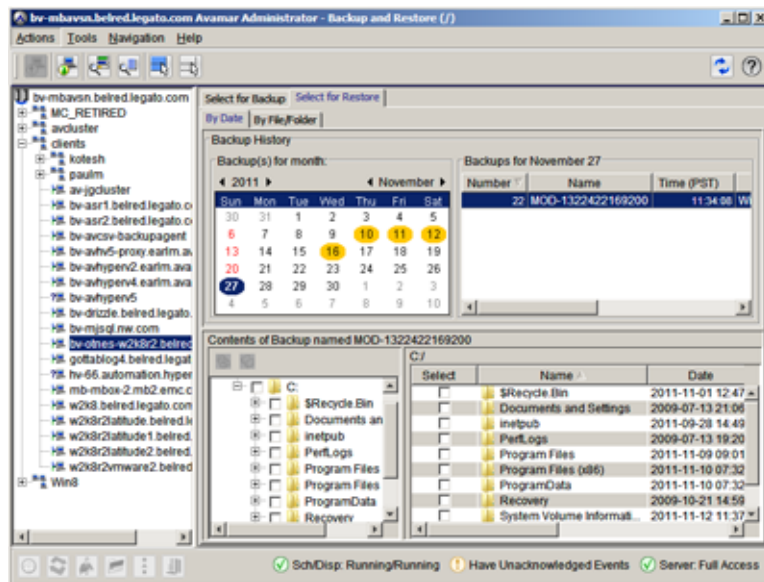
Restoring to multiple locations



To restore a filesystem or volume:

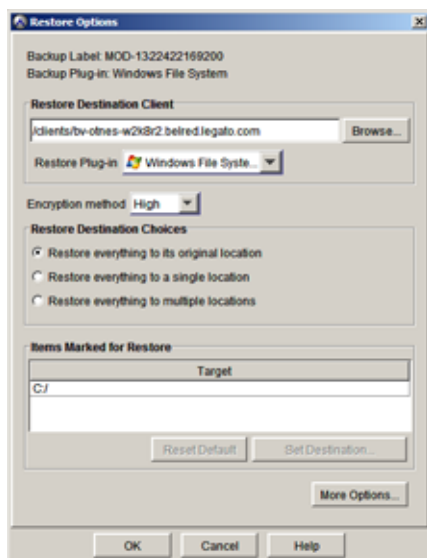
1. In Avamar Administrator, click the **Backup & Restore** launcher button.
The Backup and Restore window appears.
2. Click the **Select for Restore** tab.
3. Locate and select the directories or files to restore, as discussed in the following topics:
 - [“How to find a backup by date” on page 74](#)
 - [“How to find a backup by file or folder” on page 75](#)

The following figures illustrate a typical Windows file system structure, and a Windows Storage Server 2008 SIS system:



4. Select **Actions > Restore Now**.

The Restore Options dialog box appears.



5. Select the destination client for the data to restore:

- To restore to multiple different location on the same client, leave the default selection of the original client in the Restore Destination Client box.
- To restore to multiple locations on a different client:
 - a. Click the Browse button in the Restore Destination Client box.

The **Browse for Restore Client** dialog box appears.



b. Browse to and select the destination client.

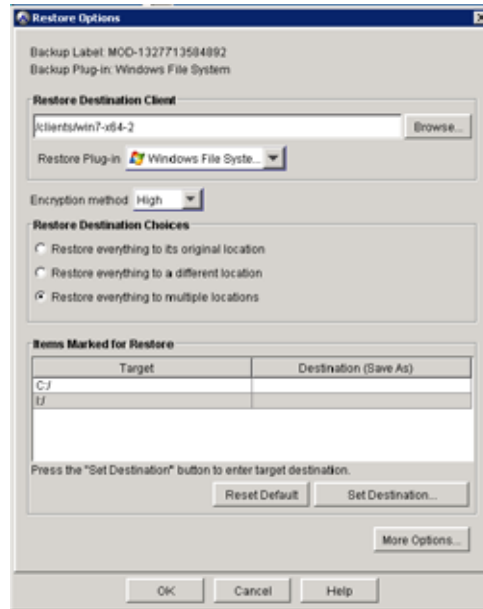
c. Click **OK**.

6. From the **Restore Plug-in Type** list, select the plug-in to use for the restore. The default selection is the plug-in used to perform the backup.

- From the **Encryption method** list, select the encryption method to use for client/server data transfer during the restore.

The exact encryption technology and bit strength used for a client/server connection depends on a number of factors, including the client platform and Avamar server version. The *EMC Avamar Product Security Guide* provides additional information.

- Select **Restore everything to multiple locations**.

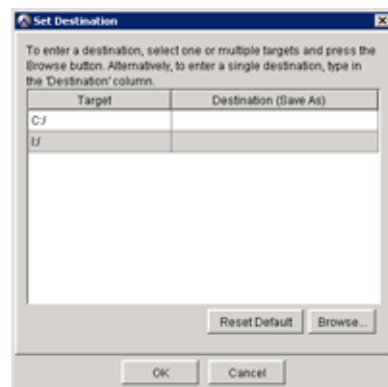


NOTICE

When redirecting a restore to a different location, restoring a single directory to the new location only restores the contents of the directory. The original parent directory is not restored as part of this operation. However, if you restore two or more directories to a new location, then the original parent directories are restored along with the contents of those directories.

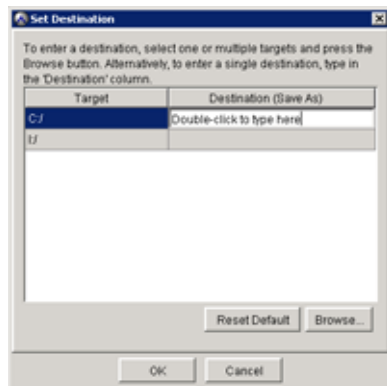
- Click **Set Destination**.

The **Set Destination** dialog box appears.



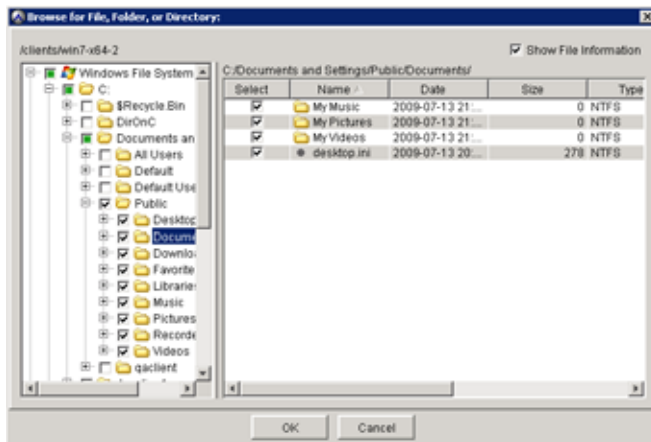
10. Specify where to save the items to:

Enter the destinations for each target by double-clicking in **Destination (Save As)**, next to the target.



-or-

Click **Browse**, and in the **Browse for File, Folder, or Directory** dialog box, and select the **Windows File System** plug-in in the left pane. You can browse and select down to the folder level in the left pane, and browse and select down to the file level in the right pane.

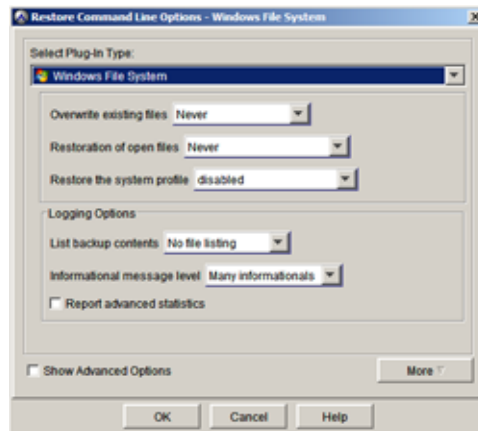


Click **OK** to close the **Browse for File, Folder, or Directory** dialog box. Repeat for each row.

11. Click **OK** to close the Set Destination dialog box.

12. After specifying the restore destination, click **More Options**.

The Restore Command Line Options - Windows File System dialog box appears.



13. Set the plug-in options.

[Appendix A, "Plug-in Options,"](#) provides additional information about plug-in options.

If you want to specify command line flags, such as those listed in ["Command line flags" on page 185](#):

- a. Click **More**.
 - b. In **Enter Attribute**, type the flag.
 - c. In **Enter Attribute value**, type the value, if applicable.
 - d. Click the + button.
14. Click **OK** to close the **Restore Command Line Options** dialog box.
15. Click **OK** to close the **Restore Options** dialog box.

The Restore Options dialog box closes and the Restore Request message box appears, displaying the following messages:

```
Restore request initiating
Restore request initiated.
```

16. Click **Close**.

Restoring over corrupted SIS links

Sometime SIS volume recovery fails because the SIS Groveler service is running and prevents some files from being restored or overwritten correctly. In the Avamar Administrator Activity Monitor, the restore will be listed as failed. In the log file the error will be listed similar to the following example, and the size of the restored/overwritten file is set to zero:

```
Error "avtar Error <5737>: I/O error: Unable to write(4) "path to file"
(code 38: Reached the end of the file)."
```

To fix this error, you do not need to perform another restore of everything. You can delete corrupted SIS links from the restored machine, and then use Avamar to select and restore the links from the backup set.



1. Delete the SIS links that were not successfully restored from the restored machine.
2. In Avamar Administrator, click the **Backup & Restore** launcher button.
The Backup and Restore window appears.
3. Find the backup to restore.
4. Navigate to and select the SIS links from the backup set.
5. Perform the restore.

Restoring a system that uses DFS

Whenever data is restored, if the data has a newer time stamp, then replication automatically replicates this data to the central DFS hub.

To restore partial data from a DFS backup:

1. Locate the backup you want to restore, as described in ["Finding a backup by file or folder" on page 73](#).
2. Restore the data to an alternate location outside of the DFS shared folders following the steps in ["Restoring to a different location" on page 81](#).

This allows you to restore data without disturbing replication operations.

To restore all data from a DFS backup to the original location:

1. Disable replication.
The Microsoft Technet article ["Managing DFS Replication"](#) [http://technet.microsoft.com/en-us/library/cc758901\(v=ws.10\).aspx](http://technet.microsoft.com/en-us/library/cc758901(v=ws.10).aspx) provides several methods for disabling replication, depending on your configuration.
2. Locate the backup you want to restore, as described in ["Finding a backup by file or folder" on page 73](#).
3. Perform a regular file system restore of all DFS shares, following the steps in ["Restoring to the original location" on page 78](#).
4. Manually run replication to sync data with replication server.

The Microsoft Technet article ["Managing DFS Replication"](#) [http://technet.microsoft.com/en-us/library/cc758901\(v=ws.10\).aspx](http://technet.microsoft.com/en-us/library/cc758901(v=ws.10).aspx) provides several methods for syncing data, depending on your configuration.

Recovering VHDs

You can recover a VHD using the standard Avamar recovery user interface in the Avamar client or Avamar Administrator. When you recover VHDs, there are a few additional steps and requirements:

- ◆ When restoring the parent partition and VHDs, you must restore the parent partition before you can restore the VHDs on it.
- ◆ If you select VHDs and non-VHDs for recovery at the same time, Avamar performs the recoveries in the correct order—non-VHDs first, then VHDs.
- ◆ After restoring the VHDs, you must reattach the VHDs in the same way that you reattach them after any reboot.
- ◆ When reattaching a VHD, use the same drive letter settings that you previously used for the drive for backup data consistency.

CHAPTER 4

Client System Disaster Recovery

This chapter describes how to completely restore a supported Microsoft Windows client system back to the original system state. The following sections describe disaster recovery for Windows Server 2008, Windows 7, Windows Server 2003, Windows XP, and Windows 2000:

- ◆ [“Windows Server 2008/2012 and Windows 7/8 Bare Metal Recovery” on page 94](#)
 - [“Windows BMR” on page 95](#)
 - [“Disaster recovery when a server role uses Microsoft SQL Server instances instead of WID” on page 120](#)
- ◆ [“Windows Server 2008 and 2012 Active Directory backup and recovery” on page 125](#)
- ◆ [“Windows Server 2008 and 2012 Cluster Disaster Recovery” on page 139](#)
- ◆ [“Windows Server 2003 disaster recovery and Active Directory recovery” on page 141](#)
- ◆ [“Windows XP and 2000 system recovery using NTBackup” on page 154](#)

NOTICE

The Avamar 6.1 Windows Client does not support backup and recovery of Windows 2000. For Windows 2000, use the Avamar 4.1 Windows Client.

Windows Server 2008/2012 and Windows 7/8 Bare Metal Recovery

Avamar provides Windows Bare Metal Recovery (BMR) for Windows Server 2008, Windows Server 2008 R2, Windows Server 2012, and Windows 7 and 8.

NOTICE

Windows BMR does not support some Windows Server 2012 features, such as ReFS volumes, uEFI partitions, and cluster shared disk data. [“Capabilities and limitations” on page 16](#) provides more information.

[“Windows BMR” on page 95](#) provides:

- ◆ Windows BMR wizard-based recovery using a customized WinPE boot disk
- ◆ BMR support to same hardware
- ◆ Support for network boot of WinPE ISO image from Windows Deployment Server (WDS)

NOTICE

If a Windows Server 2008 role uses Microsoft SQL Server instances instead of the Windows Internal Database (WID), then Avamar Windows Disaster Recovery alone will not fully recover the Windows Server role. After performing the disaster recovery, recover the SQL databases from an Avamar SQL Server plug-in backup.

[“Disaster recovery when a server role uses Microsoft SQL Server instances instead of WID” on page 120](#) describes how to use the Avamar Windows Disaster Recovery wizard and the Avamar SQL Server plug-in to restore the role.

There are several other Windows Server 2008 roles that can use Microsoft SQL Server instances instead of the Windows Internal Database (WID). For example:

- ◆ Active Directory Rights Management Services (AD RMS)
- ◆ Windows System Resource Manager (WSRM)
- ◆ Universal Description, Discovery, and Integration (UDDI)
- ◆ Windows Server Update Services (WSUS)

Disaster recovery in those roles requires installation, backup, and recovery using a separate Avamar client for SQL Server in addition to Windows Server disaster recovery.

Windows BMR

This solution provides several new Avamar features to simplify BMR of Windows Server 2008, Windows Server 2012, Windows 7, or Windows 8 client machines:

- ◆ **Customized WinPE boot disk**

Allows recovering the target machine without installing an operating system. Because the local disks are not in use by the booted operating system, files can be replaced without conflict. WinPE allows you to boot with a minimal subset of Windows features. This functionality includes access to network resources, disks, and other features through a command prompt. When you boot with the customized WinPE disk, it automatically starts the Avamar System Recovery Wizard.

- ◆ **Support for both 64-bit and 32-bit ISO**

The WinPE ISO is available in 64-bit and 32-bit images.

- ◆ **Network boot-capable**

The WinPE ISO can be added as a boot image to a Windows Deployment Services (WDS) server. With WDS and a PXE-enabled target machine you can boot the WinPE ISO image from the network instead of a local CD/DVD. [“\(Optional\) Adding the WinPE ISO boot image to a WDS server” on page 103](#) provides more information.

- ◆ **Avamar System Recovery Wizard**

Allows you to configure the network connections, connect to the Avamar server, select a backup, and restore the backup in an offline state. This makes the restore quicker because you do not need to install an OS or service packs on the target machine prior to running the Avamar System Recovery Wizard.

- ◆ **Supports BMR to physical and virtual machines**

Avamar provides BMR from physical machine to physical machine, as well as virtual machine to virtual machine.

- ◆ **Supports Microsoft Automated System Recovery**

The Avamar System Recovery Wizard provides a VSS backup-and-recovery solution that uses the Automated System Recovery (ASR) writer and the customized WinPE boot disk to backup and restore critical volumes and other components of the bootable system state. The backup application is implemented as a VSS requester. Microsoft provides more information about this technology in “Using VSS Automated System Recovery for Disaster Recovery”

[http://msdn.microsoft.com/en-us/library/windows/desktop/aa384630\(v=vs.85\).aspx](http://msdn.microsoft.com/en-us/library/windows/desktop/aa384630(v=vs.85).aspx).

NOTICE

The new target machine must be the same make, model, and hardware configuration as the original machine. The Microsoft Support article “*How to move a Windows installation to different hardware*” <http://support.microsoft.com/kb/249694> states “Microsoft does not support restoring a system state backup from one computer to a second computer of a different make, model, or hardware configuration.”

Windows BMR capabilities and limitations

- ◆ **Do not modify or remove existing files on the ISO image**

When creating the Avamar Windows Disaster Recovery bootable media, do not modify or remove any existing files on the ISO image.
- ◆ **Use 32-bit drivers with 32-bit ISO images and 64-bit drivers with 64-bit ISO images**

You cannot use a 32-bit driver with a 64-bit ISO image or a 64-bit driver with a 32-bit ISO image.
- ◆ **Use drivers that do not require a reboot during installation**

For both 64-bit and 32-bit ISOs, the wizard must use drivers that do not require a reboot during installation.
- ◆ **BitLocker Drive Encryption**

Avamar Windows Disaster Recovery is not supported for volumes encrypted with BitLocker Drive Encryption.
- ◆ **Windows XP Mode**

The Avamar Windows Client does not support backup and recovery of Windows XP Mode components in Windows 7.
- ◆ **Target disk size must be equal or greater than original disks**

Disaster recovery will fail to initialize and format the disk when the restore system's disk size is less than the initial backup system disk size, even though the restore system's disk size is sufficient for the disaster recovery backup data. All target disks on the restore system need to be as large as the original disks. After disaster recovery, there may be some unallocated space. This extra space can be used by extending the partition after the DR.
- ◆ **Network interface card and disk device drivers**

NIC and disk device drivers will be needed if the devices are not recognized during the WinPE initialization. The driver cannot require a reboot because driver installation is not persistent when WinPE is rebooted.
- ◆ **Disks may need to be imported after disaster recovery**

You may need to import disks after the disaster recovery so they are known by Windows Storage Manager.
- ◆ **Critical disks are formatted by the disaster recovery process**

The disaster recovery process restores all critical disks. Each critical disk is formatted, so any existing data will be destroyed. Application data, for example Exchange or SQL databases, should be located on non-critical volumes whenever possible. Generally, when restoring to the original system, non-critical volumes are not formatted during the disaster recovery. However, when restoring to a different system, sometimes ASR will fail if it cannot format the non-critical disks.

- ◆ **Identifying critical volumes**

A critical is a volume that contains operating system files and/or contains application services. If any volume of a dynamic disk pack is critical, all volumes in the dynamic disk pack become critical. Critical volumes can be identified by checking the ASR writer in BootableSystemState in the restore window. Avamar appends the names of critical volumes, so they will look like "ASR (C:, D:)." A disk is also critical if it contains a mount point for a critical disk

- ◆ **Back up and recover application files and data with application-specific plug-ins**

Application files and data, such as Exchange or SQL database files, should be backed up and recovered with their application-specific plug-ins. For example, back up Exchange Server 2007 and 2010 with the EMC Avamar Windows Exchange VSS plug-in.

- ◆ **Active Directory roles might not automatically start after disaster recovery**

The Active Directory RMS service is dependent on the Microsoft Message Queuing Service (MSMQ). If an Active Directory service does not restart after a disaster recovery, check if MSMQ is a service on the system and determine if it restarted correctly. You can also check the Windows Event Application Log to see if there is an Event 2078 recorded by MSMQ ("The Message Queuing service cannot start."). If the Message Queueing Service is enabled but did not start on reboot, then restart the service, as described is the Microsoft TechNet article "Event ID 2078 -- Message Queuing Logging and Checkpoint Events,"

<http://technet.microsoft.com/en-us/library/cc773632%28WS.10%29.aspx>

- ◆ **Do no create mount points to critical volumes**

A volume will be considered 'critical' if it contains a mount point to a critical volume. For example, if F: is a critical volume and is mounted on P:\MountPoint_For_F then P: will become a critical volume. Mount critical volumes to C:\, or another volume that is critical.

- ◆ **If parent volume is not a critical volume, it must be recovered separately with file system recovery after disaster recovery of critical volumes**

When a volume is mounted on a parent volume and the mounted volume is turned into a critical volume, only the critical volume will be recovered in an offline restore (disaster recovery). To recover the data on the parent volume, perform a file system recovery of the parent volume after the disaster recovery of the critical volume.

For example:

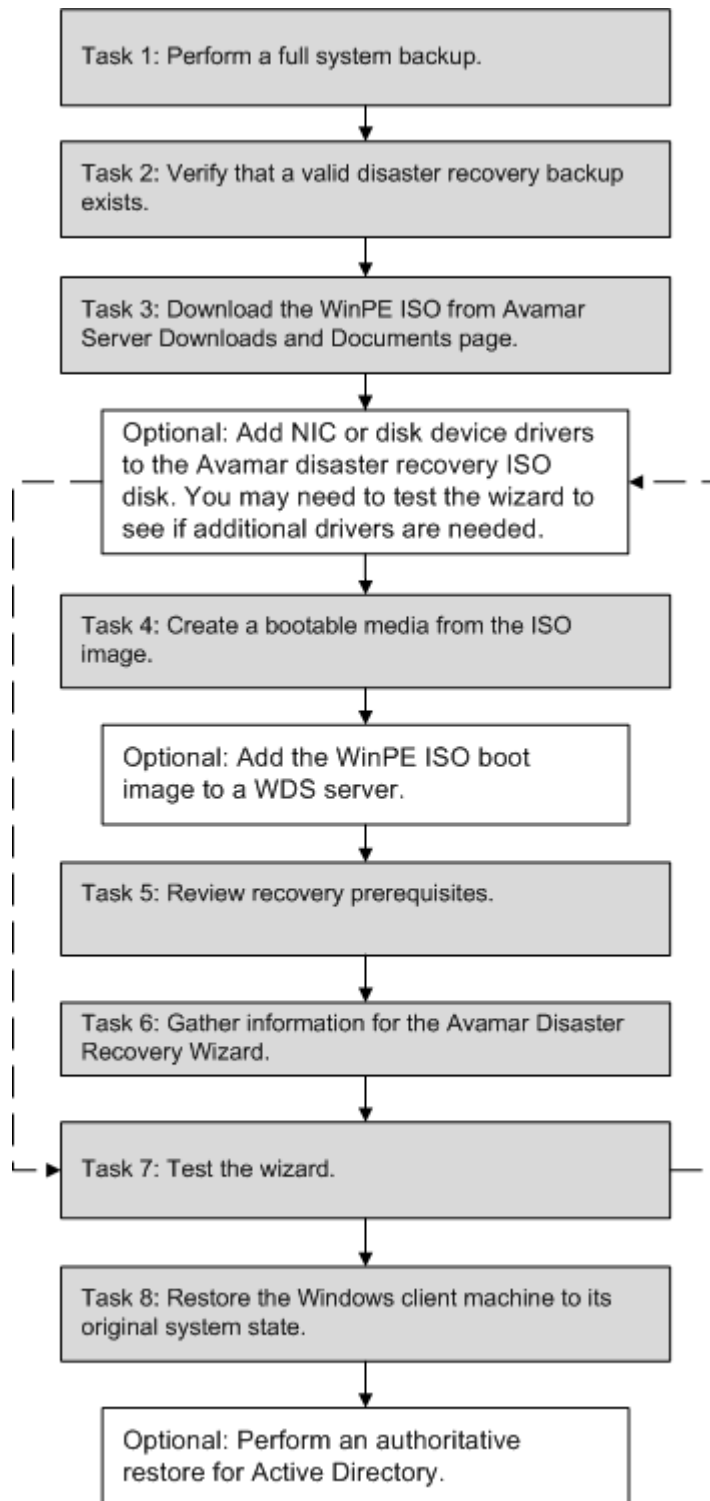
1. There exists a parent volume E:.
2. A mount point is created for a volume on E:\mountpoint.
3. The mount point becomes a critical volume when a server role with databases was installed on the mount point.
4. Files are added to E:\ (the parent volume).
5. A disaster recovery backup is performed.
6. A disaster recovery is performed to a bare metal system.
7. Result: the critical volume E:\mountpoint is recovered, but the parent volume is not.

Solution:

1. Follow the instructions in ["Offline disaster recovery task list" on page 99](#). This provides a full system backup of both the File System data (the parent volume) using the Windows File System plug-in, and System State (the critical volume) using the Windows VSS plug-in. This task list includes the disaster recovery of the critical volume.
2. After disaster recovery perform a file system recovery as described in ["Finding a backup for restore" on page 73](#).

Offline disaster recovery task list

To restore the Windows client to its original system state complete the following process:



The following topics provide the information to perform the disaster recovery:

- ◆ [“Windows BMR capabilities and limitations” on page 96](#)
- ◆ [“Task 1: Perform a full system backup” on page 100](#)
- ◆ [“Task 2: Verify that a valid disaster recovery backup exists” on page 101](#)
- ◆ [“Task 3: Download the WinPE ISO” on page 101](#)
[“\(Optional\) Adding NIC or disk device drivers to the Avamar Windows System Recovery ISO disk” on page 102](#)
- ◆ [“Task 4: Create a bootable media from the ISO image” on page 103](#)
[“\(Optional\) Adding the WinPE ISO boot image to a WDS server” on page 103](#)
- ◆ [“Task 5: Review recovery prerequisites” on page 104](#)
- ◆ [“Task 6: Gather information for the wizard” on page 104](#)
- ◆ [“Task 7: Test the wizard” on page 105](#)
- ◆ [“Task 8: Restore the Windows client machine to its original system state” on page 105](#)
[“\(Optional\) Perform an authoritative restore” on page 117](#)
- ◆ [“Post-disaster recovery notes” on page 118](#)

Task 1: Perform a full system backup

To successfully recover the Windows client, you must have performed a full system backup prior to the client needing recovery. Therefore, you should perform full system backups on a regular basis. A full system backup consists of:

- ◆ Filesystem data, which is backed up using the Windows File System plug-in
- ◆ System state and critical disks, which are backed up using the Windows VSS Plugin

Back up the full system state of the Windows client by performing one of the following:

- ◆ Scheduled full system backups. [“Scheduled backups” on page 56](#) describes how to create a new dataset for Windows backups, set up a schedule, and enable the schedule.

-or-

- ◆ An on-demand full system backup as described in [“Backing up an entire Windows client” on page 39](#).

NOTICE

Full system backups should be performed on a regular basis. Performing an on-demand backup is not a substitute for backing up the entire system state on a regular basis.

Task 2: Verify that a valid disaster recovery backup exists

Prior to performing the recovery, verify that a valid disaster recovery backup exists, and note the name or IP address of the Avamar server where it is located:

1. In Avamar Administrator, click the **Backup & Restore** launcher button.
2. Select the client from the list and then select the desired date from the calendar to display the backups.
3. Select the Windows VSS plug-in backup.

Under **BootableSystemState** it will show an entry for the ASR writer. If this exists then the backup is valid for disaster recovery.

Task 3: Download the WinPE ISO

The custom WinPE ISO is included on the Avamar server. It is installed on the utility node, and is available in the Downloads and Documents section:

1. Open a web browser and type the following URL:

http://AVAMARSERVER

where AVAMARSERVER is the Avamar server network hostname or IP address identified by the Avamar server's entry in the Windows hosts or DNS file.

The Secure Log On page appears.

NOTICE

You do not need to log in to download the ISO.

2. Scroll down and then click the **Documents and Downloads** hyperlink.

The Documents and Downloads page appears.

Navigate down the page to the correct operating system hyperlink for the client computer:

Windows for x86 (32 bit)

-or-

Windows for x86 (64 bit)
3. Click the corresponding **Windows Disaster Recovery Wizard** link to download the ISO file from the Avamar server to a workstation.
 - The ISO file name for 32 bit is
AvamarWindowsSystemRecover_x86-VERSION_WinPE3.iso
 - The ISO file name for 64 bit is
AvamarWindowsSystemRecover_x64-VERSION_WinPE3.iso
4. Add NIC or Disk Device Drivers if needed, as described in "[\(Optional\) Adding NIC or disk device drivers to the Avamar Windows System Recovery ISO disk](#)" on page 102.

NOTICE

You may have to run the wizard on your hardware to determine if you need additional drivers. [“Task 7: Test the wizard” on page 105](#) describes how to test the wizard to make sure you have the required drivers.

(Optional) Adding NIC or disk device drivers to the Avamar Windows System Recovery ISO disk

The Avamar Disaster Recovery ISO disk contains the set of NIC and disk drivers provided by Microsoft for the versions of Windows that the Windows 7 WinPE ISO supports. If the ISO does not contain the drivers for your NIC or disk devices, you will need to load them after the Avamar System Recovery Wizard is started. You can either:

- ◆ Copy the drivers to a USB flash drive and then attach the drive after booting with the Avamar System Recovery ISO disk.
- or
- ◆ Create a new Avamar System Recovery ISO disk that includes the drivers and reboot from that disk.
- ◆ Add the image to a WDS server, as described in [“\(Optional\) Adding the WinPE ISO boot image to a WDS server” on page 103](#)

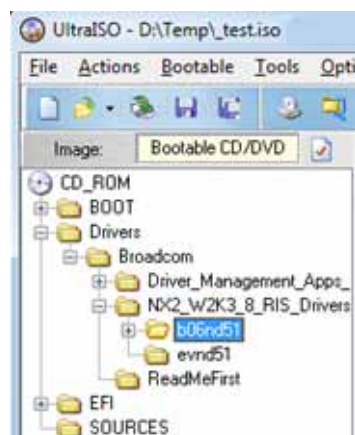
NOTICE

EMC does not provide support for modifying the Avamar Windows Disaster Recovery ISO image. Modify at your own risk.

After starting the Avamar System Recovery wizard, use the **Load Driver** button on the **Select NIC** or **Available Drives** page and then navigate to the location on the attached USB drive or the boot image to locate the corresponding drivers.

To customize and use the Avamar System Recovery ISO with added NIC or disk device drivers:

1. Open the Avamar System Recovery ISO file with a utility like UltraISO or MagicISO.
2. Create a new folder for the drivers at the top-level of the ISO image. For example, “Drivers” as shown in the following figure:



3. Copy the NIC or disk device drivers to the Drivers folder.

If you have several models of servers that require different NIC or disk device drivers, you can create subfolders in the Drivers folder of the Avamar System Recovery ISO for each device, model, or brand.

4. Save the ISO with a different name so it can be identified.
5. Create a bootable media from the ISO image.

Task 4: Create a bootable media from the ISO image

When you have customized the WinPE ISO image, including any NIC or disk device drivers you added to the image, create a bootable image, using one of the following methods:

- ◆ Burn the ISO file to a CD or DVD.
- ◆ If the target machine hardware supports it, you can also burn the WinPE image to a USB flash drive.
- ◆ Add the image to a WDS server, as described in “(Optional) Adding the WinPE ISO boot image to a WDS server” on page 103

(Optional) Adding the WinPE ISO boot image to a WDS server

Burning the WinPE image to a disk or USB flash drive allows you to boot the target machine locally. However, you can also copy the image to a WDS server to enable network boot of the target machine. Windows Deployment Services (WDS) is a role in Windows Server 2008. It replaces Remote Installation Services (RIS), a feature available in previous versions of Windows Server.

NOTICE

WDS is described here as a known example of how to boot from an ISO boot image over a network. Other network boot technologies may also work.

Using the procedures provided in the Microsoft document “Step-by-Step Guide for Windows Deployment Services in Windows Server 2008”

http://download.microsoft.com/download/b/1/0/b106fc39-936c-4857-a6ea-3fb9d1f37063/step-by-step_guide_for_windows_deployment_services_in_windows_server_2008.doc, complete the following tasks:

1. Configure a WDS server if it has not already been set up.
2. Add the WinPE ISO boot image to the boot menu.
3. Ensure that PXE booting is enabled on the WDS client.
4. Perform a network boot of the WinPE ISO boot image, Windows System Recovery, on the WDS client.

NOTICE

Once you have added the WinPE ISO boot image to the WDS server, you can reuse it each time you need to perform a disaster recovery on another machine.

When you perform the network boot, the Avamar Windows Disaster Recovery wizard will appear. Follow the instructions in “Task 8: Restore the Windows client machine to its original system state” on page 105.

Task 5: Review recovery prerequisites

Verify that all of the following prerequisites have been met:

- ◆ The hardware on the host to be recovered (target) is operational.
- ◆ The hardware configuration on the target host is similar to the hardware configuration on the host for which the Avamar System Recovery backup was done (source). Any hardware, driver, or firmware differences between the source and target computers may cause the disaster recovery to fail. For example, recovering a 64-bit host to 32-bit hardware is not supported.
- ◆ The target host has at least 512 MB of RAM.
- ◆ The target host disks are at least the same size as the source host disks.
- ◆ There are at least as many disks on the target host as there were on the source host. The disk LUN numbering on the target host must match the disk LUN numbering on the source host
- ◆ The disaster recovery boot image is accessible from the host's CD volume or from the network boot location.
- ◆ All NIC and storage device drivers are available. Although the disaster recovery boot image comes with a large number of NIC and storage device drivers, it may be necessary to load a NIC or storage device driver while running the wizard.
- ◆ Any required NIC or disk device drivers can be installed without rebooting.

Task 6: Gather information for the wizard

In the Avamar System Disaster Recovery wizard, you will need the following information:

- ◆ Network or disk drivers that may need to be installed
- ◆ The IP address and network name of the host that is being restored, and the accounting system path of the client machine, for example
/clients/mymachine.mycompany.com
- ◆ The network name or IP address of the Avamar server that will be used to restore the System Recovery Backup
- ◆ Account credentials for an Avamar Administrator account on the Avamar server. This is required to allow disaster recovery log files to be backed up successfully.

NOTICE

If DNS is not available, the Avamar System Disaster Recovery ISO includes a hosts file you can edit to add information about the Avamar server. After booting with the Windows Disaster Recovery ISO, exit the Avamar System Recovery wizard, edit the hosts file (for example X:\Windows\System32\Drivers\etc\hosts), and add the IP address and hostname for the Avamar server. Restart the wizard, and when prompted, type the client configuration details (hostname and IP configuration), but do not specify a DNS server.

Task 7: Test the wizard

Before you need to perform an Avamar System Recovery, test the wizard to ensure that you can run it and that you have the required drivers. This task is especially important for 64 bit hosts that may require additional drivers. WinPE must use drivers that do not require a reboot.

After you test the wizard, you can safely exit the wizard before completing the entire recovery process.

To test the wizard:

1. Complete steps 1 to 10 in ["Task 8: Restore the Windows client machine to its original system state" on page 105](#).

Verify the following as you step through the wizard pages:

- You can see the network interface that is required to communicate with the Avamar server. If you cannot see the network interface, use the wizard to load the required NIC driver.
 - If DNS is not available, the host can resolve the Avamar server name by some method such as a local hosts file.
 - You can see the critical and non-critical disks for the host that is to be recovered. If you cannot see all of the disks, use the wizard to load the required disk drivers.
2. When you reach the **Summary** page, click **Exit** to safely exit the wizard without performing the actual restore.

The system automatically reboots.

Task 8: Restore the Windows client machine to its original system state

To restore the Windows client machine to its original system state:

NOTICE

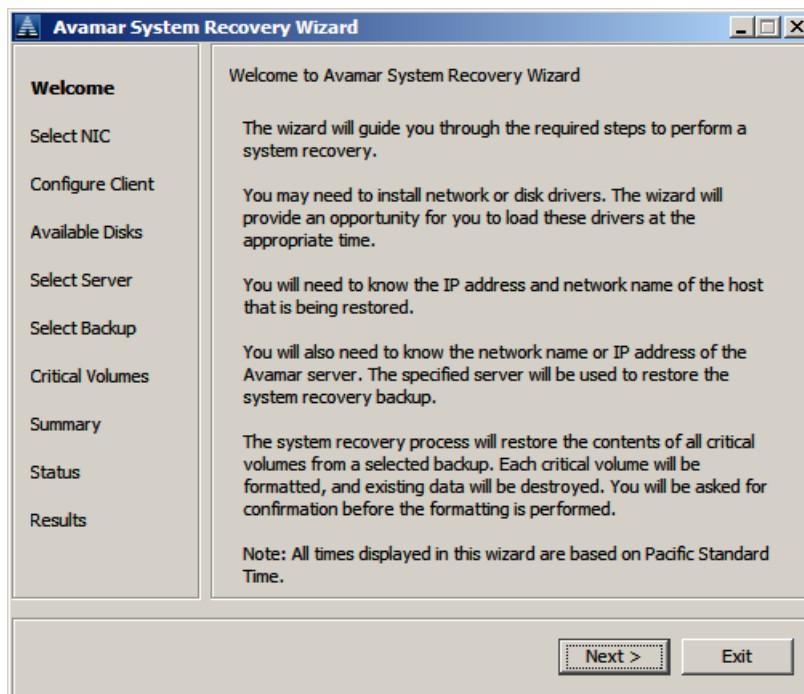
If DNS is not available, you can manually add and edit a hosts file to add information about the Avamar server. Details are provided in the following steps.

1. Boot the target machine with the WinPE boot disk.

- or -

Perform a network boot of the WinPE ISO image, Windows System Recovery. ["\(Optional\) Adding the WinPE ISO boot image to a WDS server" on page 103](#) describes how to do this using a WDS server, but other network boot technologies may also work.

2. Click **Next** when the Avamar System Recovery Wizard Welcome page appears.

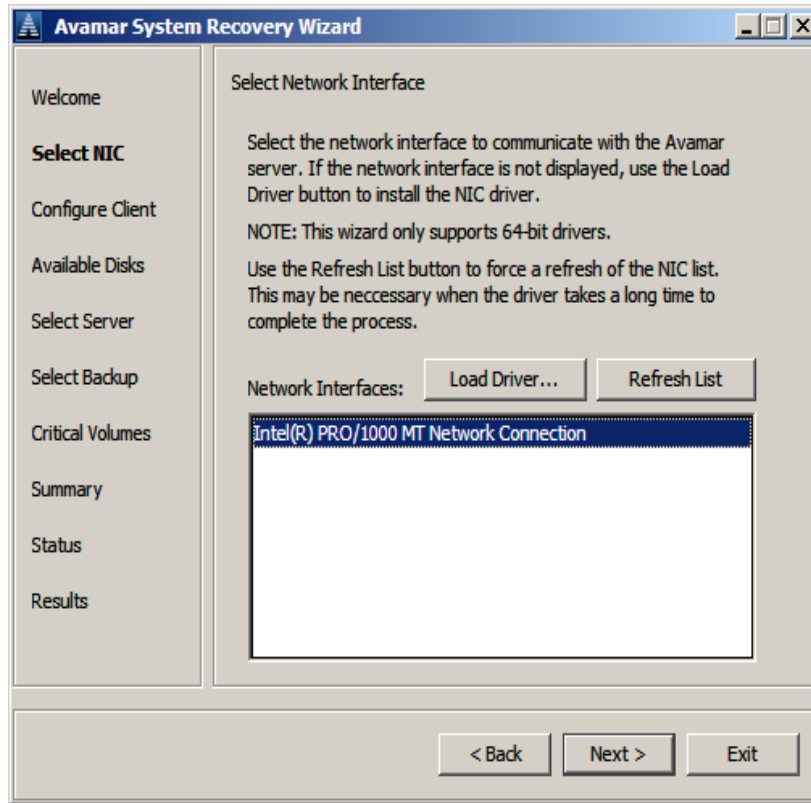


3. Perform this step only if a DNS server is not available on the network. If DNS is not available, you can manually add and edit a hosts file to add information about the Avamar server.
 - a. Exit the Disaster Recovery wizard but do not reboot the host.

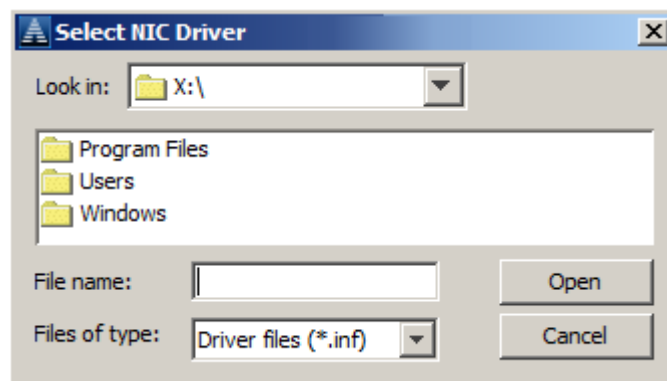
You will be returned to the WinPE command line.
 - b. Edit the hosts file (for example X:\Windows\System32\Drivers\etc\hosts) and add the IP address and host name for the Avamar Server.
 - c. Restart the wizard from the X:\Program Files\avs\wizard directory. For example:


```
X:\Program Files\avs\wizard> javaw -jar WinPEWizard.jar
```
 - d. When the wizard appears, click **Next** to continue.

- In the **Select Network Interface** page, select the **NIC (Network Interface Card)** so that the host can communicate with the Avamar server during the restore process.

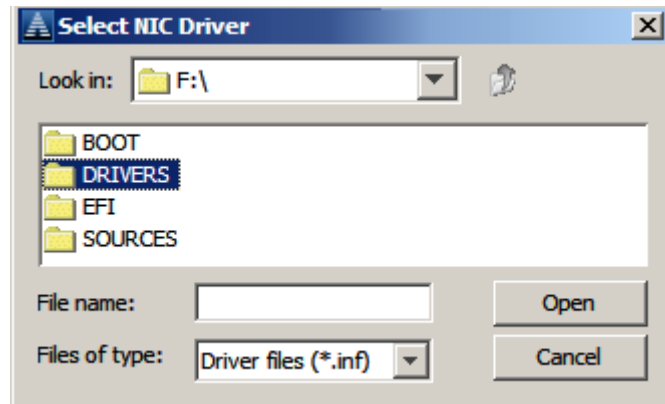


If the required NIC driver is not in the list, click **Load Driver** to browse to a location such as a CD or USB drive and locate the required driver.



If you added the driver to the ISO image, as described in “(Optional) Adding NIC or disk device drivers to the Avamar Windows System Recovery ISO disk” on page 102:

- a. Browse to the CD Drive, which appears as a drive letter, and then navigate to the Drivers folder, as shown in the following figure.



- b. Select the driver for the NIC.

To add disk device drivers, follow the same process when you reach the **Available Drives** page: click the **Load Drivers** button, and then select the appropriate disk device driver.

NOTICE

The selected driver cannot require a reboot operation. The WinPE environment is loaded in memory only and changes are not persistent across a reboot operation. Also, though some drivers prompt for a reboot operation, most modern NIC drivers are generally plug-and-play and ignoring the reboot prompt may actually work.

5. Click **Next** to display the Hostname and Network page.

- Enter the host name of the machine that you are recovering in the **Host name** field.
- Enter the name of the domain in which the host resides in the **DNS domain** field. If the host resides in a workgroup instead of a domain, this field can be left blank.
- In the TCP/IP Address fields, select **Obtain an IP address automatically (DHCP)** if host IP addresses are assigned automatically. The network must be configured to support DHCP.

If the IP address of the host to be restored is static, select **Use the following IP address** and enter the IP address in the **IP address** field. The **Subnet mask** is required. The **Default gateway** is needed if the Avamar server is on a different subnet.

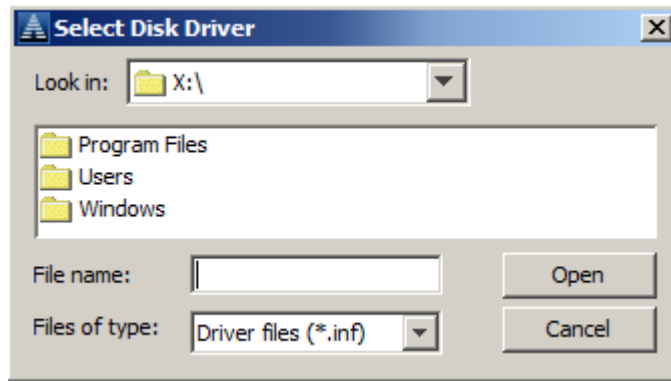
- In the **DNS Server** fields, select **Obtain DNS server address automatically** if the DNS server name is automatically assigned.

If the DNS server IP address is static, select **Use the following DNS server addresses**, and enter the IP address of the DNS server in the **Preferred DNS server** field. If applicable, enter an alternate DNS server address in the **Alternate DNS server** field.

You can ignore the DNS Server fields, if you added the Avamar server host name and IP address to the X:\Windows\System32\Drivers\etc\hosts file in step 3 earlier.

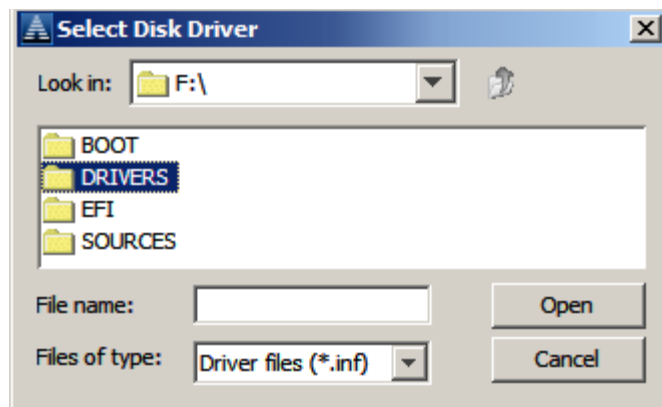
- Click **Next**.
6. All local disks that have been detected are displayed in the Available Disks page.

If the wizard fails to detect a disk, click **Load Driver** to browse to a location such as a CD or USB drive, and locate the correct driver for the disk.



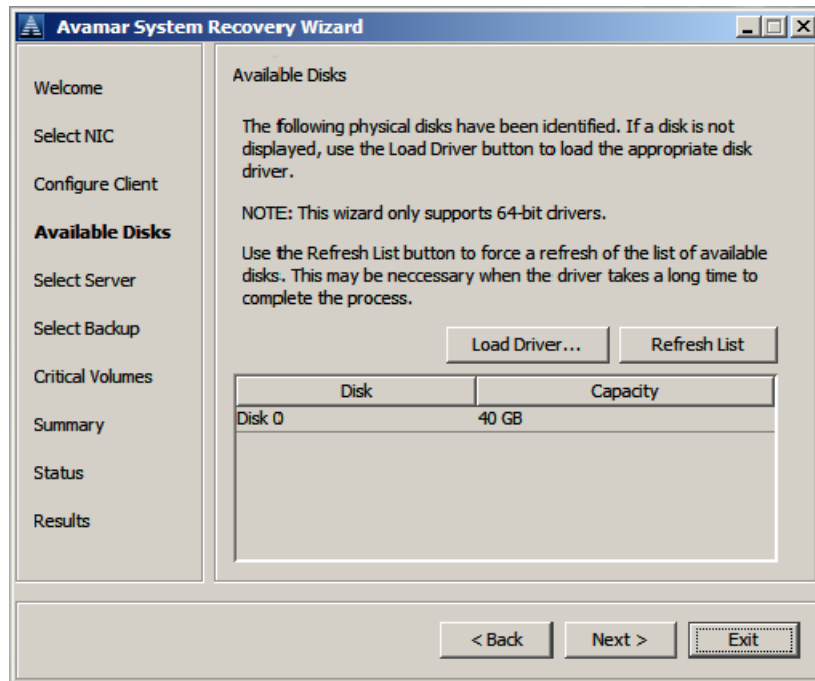
If you added the driver to the ISO image, as described in [“\(Optional\) Adding NIC or disk device drivers to the Avamar Windows System Recovery ISO disk”](#) on page 102:

- a. Browse to the CD Drive, which appears as a drive letter, and then navigate to the Drivers folder, as shown in the following figure.



- b. Select the driver for the disk device.

- After loading the required disk driver, click **Refresh List** to update the list of disks that have been detected.



NOTICE

The **Available Disks** page displays all physical disks, but not all physical disks shown may be critical disks.

NOTICE

If SAN disks are listed twice, it indicates that multi-path software is running. Disable the multi-path software and re-enable it after the restore.

- Click **Next**.

The Select Avamar Server page appears.

Note: Most of the information on this page matches the information you provide when you log on to Avamar Administrator.

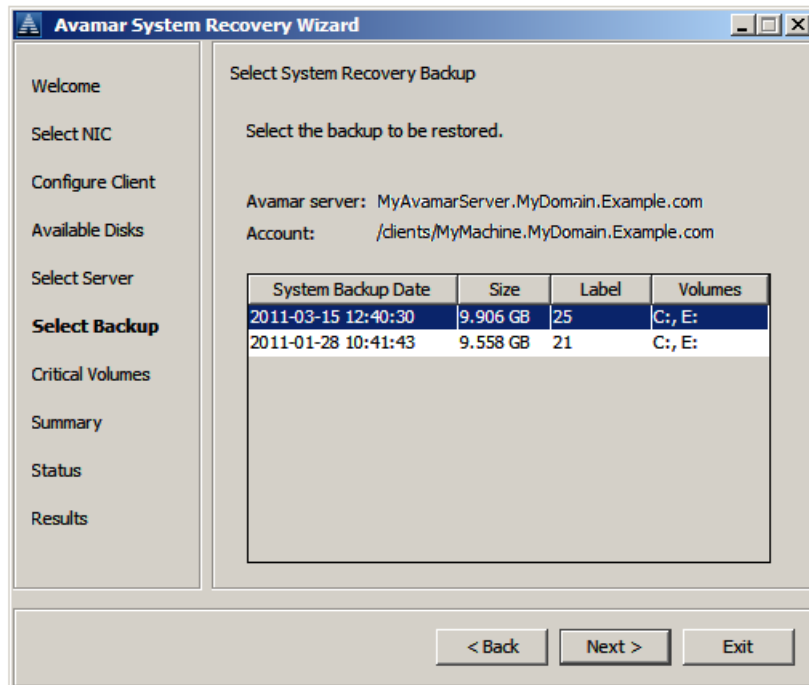
9. In **Avamar Server**, type the fully qualified domain name (FQDN) or IP address for the Avamar server.
10. In **Avamar User Name**, type the name of an “Avamar administrator” account. For an internal Avamar account provide the account name, for example “MCUser”. For an external account, specify in the form “account@external_authentication_system”, for example “UserName@domainname.company.com”.
11. In **Avamar Password**, type the password for the account specified in Avamar username.
12. In **Avamar Domain**, type the domain where the Avamar account is defined. The default Avamar domain is a forward slash “/”.
13. In **Avamar Account**, type the account path used when the machine account was created. For example, `/clients/MyGroup/hostname.example.com`. The value will depend on the Avamar domain hierarchy created on the Avamar server.

NOTICE

If you are recovering from a machine in a Replicate domain, you must specify the full client path in the /REPLICATE domain. For example,
`/REPLICATE/orig_server/clients/hostname.example.com`.

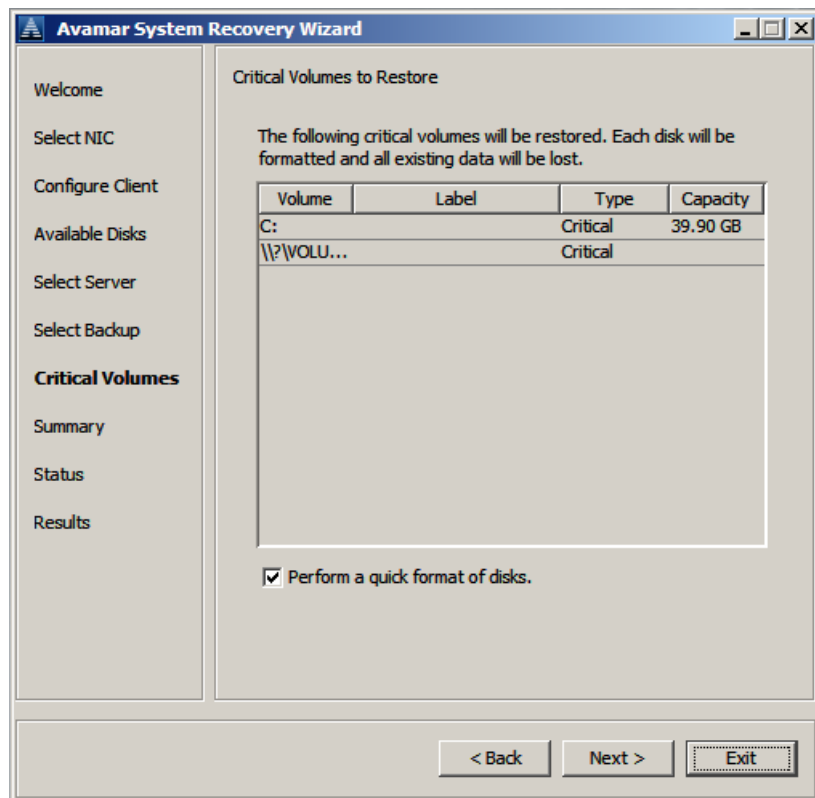
14. Click **Next**.

15. On the Select System Recovery page, select the System backup that you wish to restore to the host. System backups are listed in descending order from most recent to oldest.



16. Click **Next**.

17. The Critical Volumes to Restore page lists the volumes that will be restored to the host.



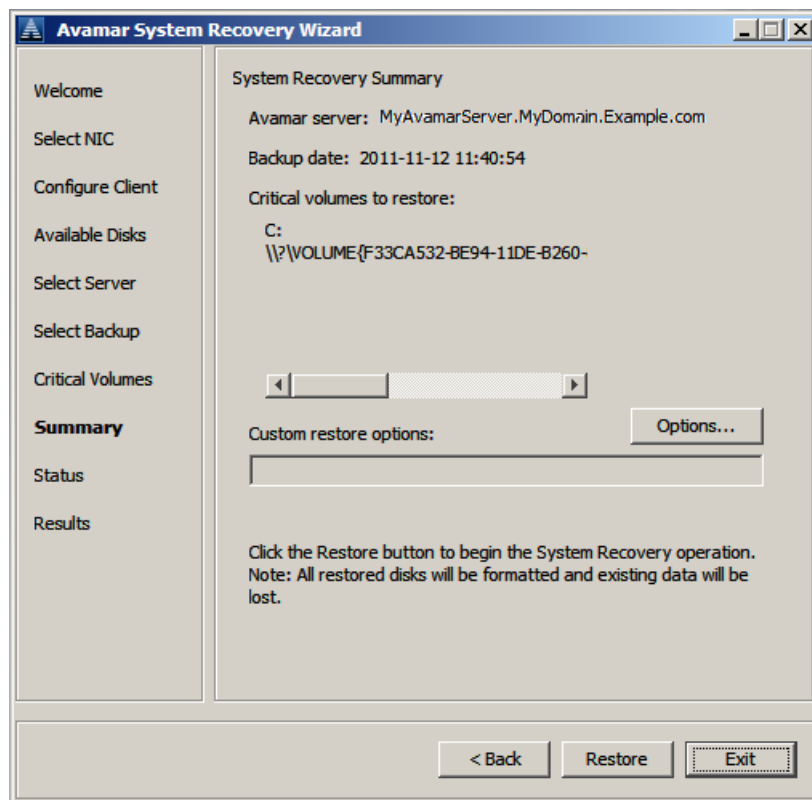
Note: In the preceding example of the Critical Volumes to Restore page, the syntax of the second volume listed `\\?\VOLUME...` indicates that it does not have an assigned drive letter.

During the restore process, critical volumes will be reformatted. Non-critical volumes will be formatted only if the disk signature is different, for instance if the disk was replaced.

To perform a “quick format” instead of a full format operation, ensure that **Perform a quick format of disks** is selected. This is the default selection. Although quick formatting is much faster than full formatting, a quick format, unlike a full format, does not verify each sector on the volume.

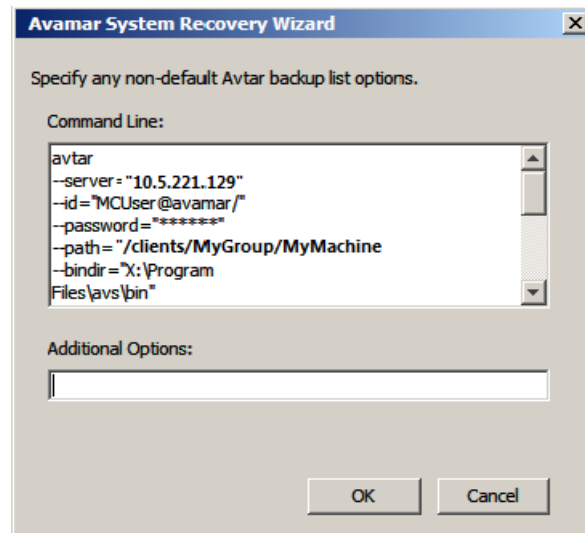
The disaster recovery process will not recover non-critical volume data even if the non-critical volume is reformatted. Non-critical volumes can be recovered by using Avamar administrator to perform a files system recover after the wizard has completed and the host has been rebooted.

18. Click **Next**.
19. The System Recovery Summary page lists the selected restore options.

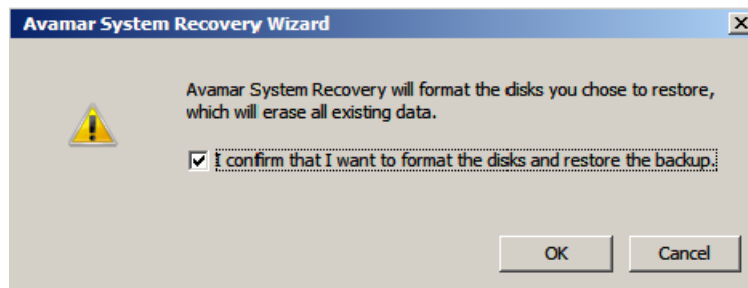


20. If you need to specify any non-default restore options, click **Options** to display non-default recovery options.

This is generally used for troubleshooting when working with Technical support. Otherwise, skip this step and proceed to step 21.



- a. Type any required non-default options with their corresponding values in the **Additional Options** field.
One option is described in "["--exclude-non-critical-disks"](#) on page 185.
 - b. Click **OK** to save and close the non-default Avtar backup list options dialog box and return to the **System Recovery Summary** page.
21. If you are only testing the wizard and do not want to perform a restore, click **Exit**. The wizard will close, and a command prompt appears. You can shut down the machine.
- If you want to proceed with the actual restore, click **Restore** to begin the restore process. The confirmation page is displayed.



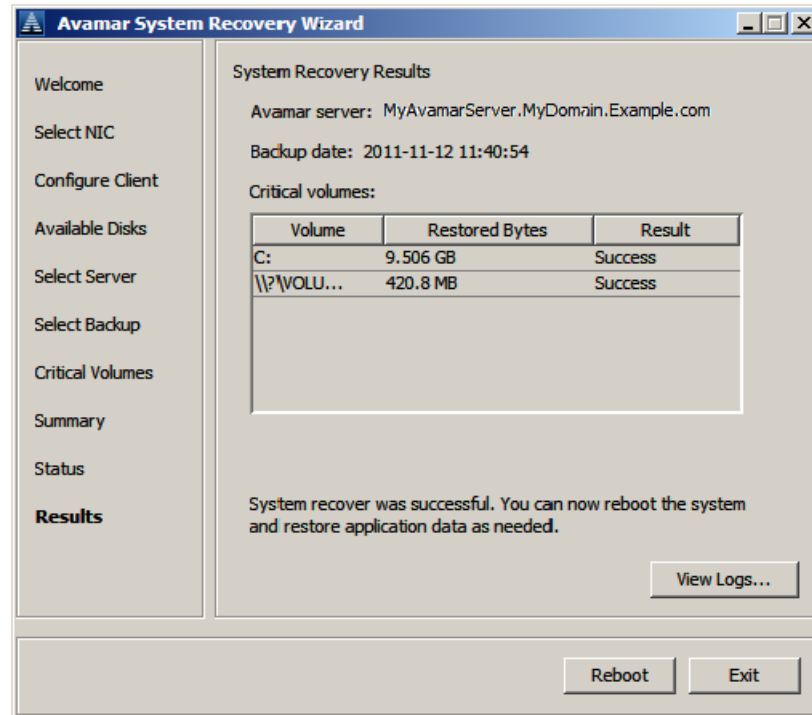
22. Confirm your choice to begin the restore process and then click **OK**.

NOTICE

All data will be lost on volumes that are being reformatted.

A progress page is displayed, indicating that the restore is in progress.

At the end of the recovery, the final page displays the results:



NOTICE

If you encounter problems with the recovery, the Avamar Windows Disaster Recovery wizard creates log files that can be used by technical support for troubleshooting. You can view these files with the **View Logs** button on the Results page, or recover the files, as described in [“Offline restore logs” on page 119](#). The log files are backed up to the Avamar server, so that they can be restored if necessary.

23. After the recovery is complete, before rebooting:

- If this is a conventional recovery or non-authoritative Active Directory restore, reboot to return the machine to normal operation. Then review [“Post-disaster recovery notes” on page 118](#).
- If this is an authoritative Active Directory restore, do not reboot, go to [“\(Optional\) Perform an authoritative restore” on page 117](#). Then review [“Post-disaster recovery notes” on page 118](#).

(Optional) Perform an authoritative restore

You will probably perform more frequent backups for Active Directory, using the procedures in “[Active Directory restore roadmap](#)” on page 125, than you will perform backups for disaster recovery, as described in the preceding “[Offline disaster recovery task list](#)” on page 99. However, if your last disaster recovery backup is more recent than your last full backup for Active Directory, you may want to use your disaster recovery backup.

To perform an authoritative restore:

1. From the last page of the wizard, titled System Recovery Results, do not select Reboot. Instead, select Exit to exit the wizard so that you can boot into Directory Services Restore Mode (DSRM). Failure to boot into DSRM mode will result in a non-authoritative restore. If this occurs, run the Windows Disaster Recovery again and ensure that you boot into DSRM mode.

- a. Exit the wizard to prevent an automatic reboot.

Only the WinPE command prompt is displayed.

- b. From the command prompt, use the following `bcdedit` commands to add a boot loader entry to force the system to boot into DSRM:

```
X:\> bcdedit /copy {default} /d "Directory Service Repair Mode"
```

Enter the command exactly as shown above.

A message similar to the following appears:

```
The entry was successfully copied to
{00000000-0000-0000-0000-000000000000}
```

The numbers in the previous message are a Globally Unique Identifier (GUID) that identifies a new entry. In this example, the GUID is a string of zeros and is for illustration purposes only. The actual GUID that is generated when you run the command will be unique.

- c. Using the generated GUID, enter the following command to set the safeboot option for the boot loader entry in the Boot Configuration Data (BCD) store.

```
X:\> bcdedit /set {GUID_value} safeboot dsrepair
```

where `{GUID_value}` is the GUID displayed by the previous `bcdedit` command.

- d. Exit the command prompt and reboot the system in DSRM.

NOTICE

Failure to boot into DSRM will result in a non-authoritative restore.

2. Run the Windows `ntdsutil` command-line utility.

The `ntdsutil` prompt appears. For help in the `ntdsutil` utility, type `?` at the `ntdsutil` prompt.

3. At the `ntdsutil` prompt, type:

```
NTDSUTIL: activate instance ntds
NTDSUTIL: authoritative restore
```

- To perform an authoritative restore of a subtree or individual object, type:

```
NTDSUTIL: restore subtree "distinguished_name"
```

For example,

```
NTDSUTIL: restore subtree  
"OU=engineering,DC=Seattle,DC=jupiter,DC=com"
```

```
NTDSUTIL: restore subtree  
"CN=mars,CN=users,DC=Seattle,DC=jupiter,DC=com"
```

The Microsoft Windows Server Resource Kit documentation on AD provides information.

- Exit the **ntdsutil** utility by typing **quit** at each successive **ntdsutil** prompt until the command-prompt appears.
- Type the following command at the command prompt so that the host does not boot into DSRM mode upon reboot.

```
C:\> bcdedit /deletevalue safeboot
```

- Restart the domain controller in normal mode and then log in and verify that the authoritative changes are replicated to the AD replication partners.

Post-disaster recovery notes

- ◆ After the disaster recovery has completed and the system is rebooted, check the host's disk and volume configuration. It is likely that all disks and volumes appear as they did on the original system. However, it is possible, if disk signatures do not match the original disks, that non-critical disks may be off-line or not mounted. In this case, you may need to use Microsoft Disk Manager to bring online or mount the disks. After the disks are online, a reboot operation should result in disk drive letter re-assignments. However if it does not, assign drive letters to non-critical disks as needed. Non-critical volumes that are accessed by mount points may have similar issues.
- ◆ If a folder has been encrypted in Windows, for example by selecting Folder Properties > Advanced > Encrypt contents to secure data, it will be recovered as encrypted. However, the encryption attribute will not be set on the folder. You can manually reset the encryption attribute after the disaster recovery operation. This is a Microsoft limitation.
- ◆ If needed, use the Windows File System backup to perform an online restore of application data or non-critical volumes, and the appropriate plug-in to restore application data for applications that have their own client such as Exchange or SQL databases.

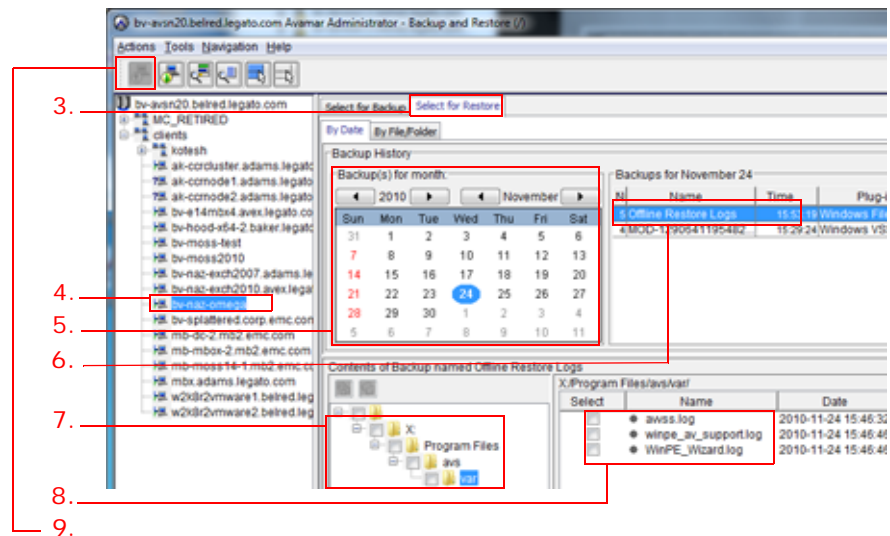
NOTICE

"If parent volume is not a critical volume, it must be recovered separately with file system recovery after disaster recovery of critical volumes" on page 98 provides additional information about disaster recovery when a critical volume is mounted on a parent volume.

Offline restore logs

The Avamar Windows Disaster Recovery wizard creates log files that can be used by technical support for troubleshooting. The “Offline Restore Logs” are created and backed up to the Avamar server when the recovery is performed. If you need to restore these files to provide them to technical support, complete the following steps:

1. Start Avamar Administrator and connect to the Avamar server that was used for the offline restore.
2. Select **Navigation > Backup and Restore** or click the **Backup & Restore** launcher button. The Backup and Restore window appears.



3. Click the **Select for Restore** tab.
4. Select the Avamar client that was used for the recovery.
5. In the **Backup History** calendar, browse to the recovery date.

NOTICE

The Offline Restore Logs are backed up when you perform the offline recovery, so the backup date for the logs is the recovery date, not the date of the Windows Server backup you restored from.

6. In the **Backups for <Date>** list, select **Offline Restore Logs**.
7. In the **Contents of Backup**, expand the X:\ drive to the location of the Offline Restore Logs backup, X:\Program Files\avs\var.

The log files are on the X: drive because the WinPE system drive is X:. There are three log files: avss.log, winpe_av_support.log, and WinPE_Wizard.log.

8. Select all three log files for recovery.
9. Select **Actions > Restore Now**.

The Restore Options dialog box appears.

10. Adjust the restore settings if needed. You will need to specify to restore to an alternate location because you probably won't have an X: drive unless it is mapped to a shared folder.

11. Click **OK**.

The Restore Options dialog box closes and the following status message appears:
Restore initiated.

Disaster recovery when a server role uses Microsoft SQL Server instances instead of WID

NOTICE

If a Windows Server 2008 role uses Microsoft SQL Server instances instead of the Windows Internal Database (WID), then Avamar Windows Disaster Recovery alone will not fully recover the Windows Server role.

The following roles can be configured to use SQL Server instances instead of WID:

- ◆ Active Directory Rights Management Services (ADRMS)
- ◆ Windows System Resource Manager (WSRM)
- ◆ Universal Description, Discovery, and Integration (UDDI)
- ◆ Windows Server Update Services (WSUS)

Disaster recovery of roles configured to use SQL Server instances requires installation, backup, and recovery using a separate Avamar client for SQL Server in addition to Windows Server disaster recovery.

Backup and recovery tasks for server roles using SQL Server instances

Successfully restoring a Windows Server 2008 machine when its role uses SQL Server instances instead of WID requires the following tasks:

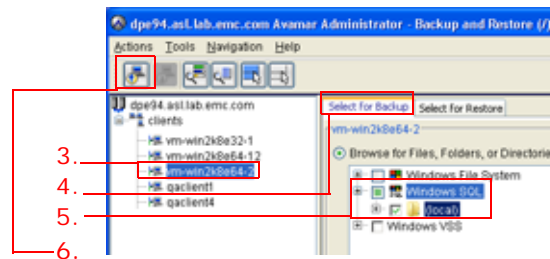
- ◆ Review: ["Windows BMR capabilities and limitations" on page 96](#)
- ◆ Task 1: ["Installing and registering the Avamar Client for Windows" on page 28](#)
- ◆ Task 2: Install and activate the Avamar SQL Server Client. The *EMC Avamar 6.0 for SQL Server Guide* provides information.
- ◆ Task 3: ["Task 1: Perform a full system backup" on page 100](#)
- ◆ Task 4: ["Back up SQL Server instances with the Avamar SQL Server Client" on page 121](#)
- ◆ Task 5: ["Task 2: Verify that a valid disaster recovery backup exists" on page 101](#)
- ◆ Task 6: ["Task 3: Download the WinPE ISO" on page 101](#)
- ◆ Task 7: ["Task 8: Restore the Windows client machine to its original system state" on page 105](#)
- ◆ Task 8: ["Perform SQL Server disaster recovery" on page 122](#)
- ◆ Task 9: ["Restore SQL Server instances used by a role in Windows Server 2008" on page 123](#)

Back up SQL Server instances with the Avamar SQL Server Client

The backup procedures for SQL Server are described in detail in the *Avamar 6.0 for SQL Server Guide*. The following example describes backup of ADRMS databases that use SQL Server, but would also work for WSRM, UDDI, or WSUS:

1. Start Avamar Administrator.
2. Select **Navigation > Backup and Restore** or click the **Backup & Restore** launcher button.

The Backup and Restore window appears.



3. In the Backup and Restore window in Avamar Administrator, select the SQL server client that contains AD RMS.
4. Click the **Select for Backup** tab.
5. Expand Windows SQL and then select the SQL server instance that contains the AD RMS databases.
6. Select **Actions > Backup Now** or click the toolbar icon.
The On Demand Backup Options dialog box appears.
7. Review the backup settings.
8. Click **More Options** and ensure **Backup Type** is set as **Full**.
9. Click **OK** to close the Backup Command Line Options dialog box.
10. Click **OK** to close On Demand Backup Options dialog box.
11. The following status message appears: Backup initiated.
12. Click **OK**.

This completes the backups of the Windows Server machine and the SQL Server database instances used for the server role, Tasks 3 and 4 in the task list in [“Backup and recovery tasks for server roles using SQL Server instances” on page 120](#). Recovery starts with the Windows Server disaster recovery, [“Task 2: Verify that a valid disaster recovery backup exists” on page 101](#).

Perform SQL Server disaster recovery

After performing a disaster recovery of the Windows Server, Tasks 2–7 in “[Backup and recovery tasks for server roles using SQL Server instances](#)” on page 120, you must now perform SQL Server disaster recovery.

NOTICE

The application files for SQL Server, and the SQL Server databases such as master, model, and msdb, are not part of VSS system state backups, and are not restored by the Windows Server Disaster recovery. In order to restore a server role that uses SQL Server database instances, you must perform a SQL Server disaster recovery.

To perform SQL Server disaster recovery:

1. Complete Microsoft’s recommended SQL Server disaster recovery procedure using the steps in the MSDN article “Recovering from a Disaster,” <http://msdn.microsoft.com/en-us/library/ms189302.aspx>
2. If you have not already done so, re-install the Avamar for SQL Server plug-in. The *Avamar 6.0 for SQL Server Guide* provides complete installation procedures.
3. Restore SQL Server's system databases. This procedure is described in *Avamar 6.0 for SQL Server Guide*, in “Restoring the System Databases.”

After system databases are restored, continue to restore the databases of AD RMS following the steps in “[Restore SQL Server instances used by a role in Windows Server 2008](#)” on page 123.

Restore SQL Server instances used by a role in Windows Server 2008

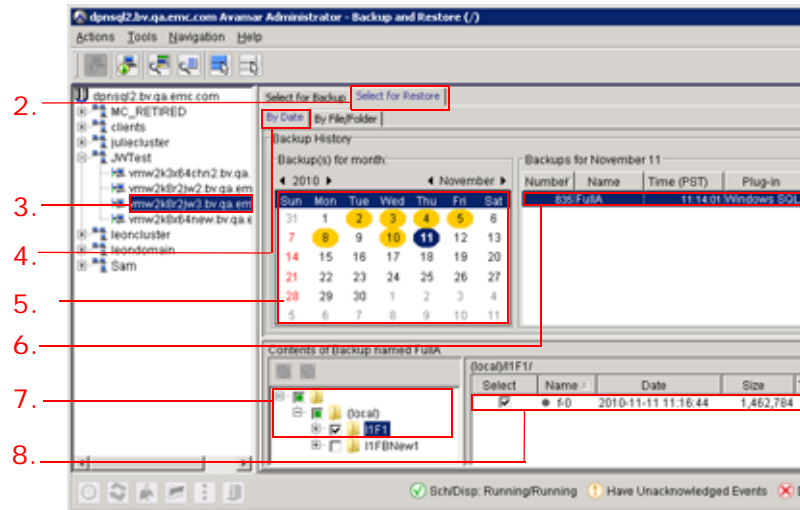
The following example describes recovery of AD RMS databases that use SQL Server, but would also work for WSRM, UDDI, or WSUS databases that use SQL Server. The following steps are based on the "Basic Restore Procedure" described in the *Avamar 6.0 for SQL Server Guide*

To restore AD RMS or other SQL Server databases used by a Windows Server 2008 role:.



1. In Avamar Administrator, click the **Backup & Restore** launcher button.

The Backup and Restore window appears.



2. Click the **Select for Restore** tab.
3. In the clients tree, select the SQL server.

You cannot view clients outside the domain. To view all clients, you must be logged in to the root domain.

4. Click the **By Date** tab to display a browsable calendar for locating backups on the Avamar server.

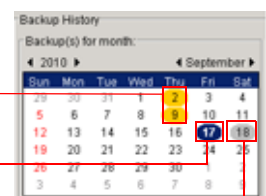
Dates in yellow indicate that a backup was performed on that date. The currently selected date is highlighted in blue. Today's date is highlighted in gray.

Valid backups

Currently

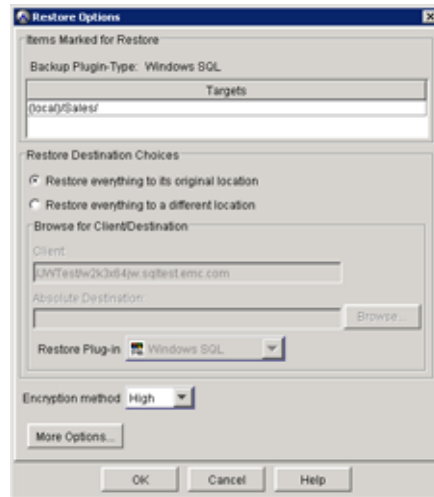
selected date

Today's date



5. In the **Backup History** pane, browse to a valid backup date (highlighted in yellow).
6. Select a backup from the backups list directly to the right of the calendar.
7. Select the AD RMS database to restore.
8. Select the backup files of the AD RMS databases to restore.
9. Select **Actions > Restore Now**.

The Restore Options dialog box appears.



10. Click **More Options**.

The Restore Command Line Options dialog box appears.

11. In the **Restore Command Line Options** dialog box, select the **Use SQL replace** check box, and ensure that the **Restore system databases** and **Log Tail backup** check boxes are cleared.

12. Click **OK**.

The Restore Command Line Options dialog box closes.

13. Click **OK**.

The Restore Options dialog box closes and the following status message appears:

Restore initiated.

Windows Server 2008 and 2012 Active Directory backup and recovery

This section outlines the procedures for performing a backup and online restore of Active Directory services in Windows Server 2008 and 2012. The steps for performing a Windows Server 2003 Active Directory backup and recovery are provided in [“Windows Server 2003 disaster recovery and Active Directory recovery” on page 141](#).

An online restore may be required for a variety of reasons such as recovering accidentally deleted organization units. This document describes how to create a backup and how to perform authoritative and nonauthoritative restores.

You can also use the process in [“Windows BMR” on page 95](#) to perform an authoritative restore of Windows Server 2008 Active Directory.

Comparing nonauthoritative and authoritative restores

This comparison applies to both Windows Server 2008 and 2012, and Windows Server 2003 Active Directory restores. The steps for performing Windows Server 2003 Active Directory are provided in [“Prerequisite: Perform system state backup” on page 144](#).

- ◆ A **nonauthoritative restore** is desirable when a domain controller can be returned to a known state by its Active Directory replication partners. Performing the restore will seed the domain controller with data at the point of backup. When restarted, other domain controllers will replicate changes made since the backup was performed back to the recovered domain controller.
- ◆ An **authoritative restore** is used to return a domain controller to a known state as the “master” copy which is then replicated to other domain controllers. An authoritative restore also allows the user to mark specific organizational units (OUs) so that Active Directory objects are replicated to other domain controllers, and the replicated objects are not overwritten by replication partners.

Active Directory restore roadmap

To restore Windows Server 2008 or 2012 Active Directory, complete the following tasks. Tasks 1 and 2 are required for both nonauthoritative and authoritative restores:

- ◆ [“Task 1: Create an online Active Directory backup” on page 126](#)
- ◆ [“Task 2: Set up the client for Active Directory restore” on page 128](#)
 - [“Option 1: Manually boot into DSRM with System Configuration” on page 128](#)
 - or-
 - [“Option 2: Add a Windows bootloader entry” on page 129](#)

At the completion of Task 2, proceed to the appropriate Task 3 for nonauthoritative or authoritative restore. Do not perform both:

- ◆ [“Task 3: Restore Active Directory with a nonauthoritative restore” on page 130](#)
- or-
- ◆ [“Task 3: Restore Active Directory with an authoritative restore” on page 134](#)

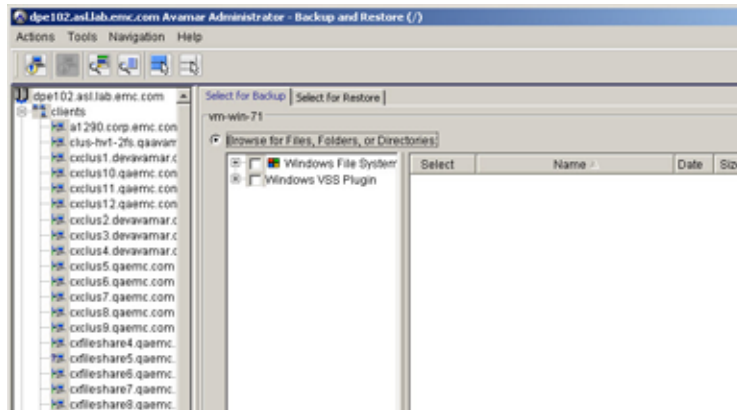
Task 1: Create an online Active Directory backup



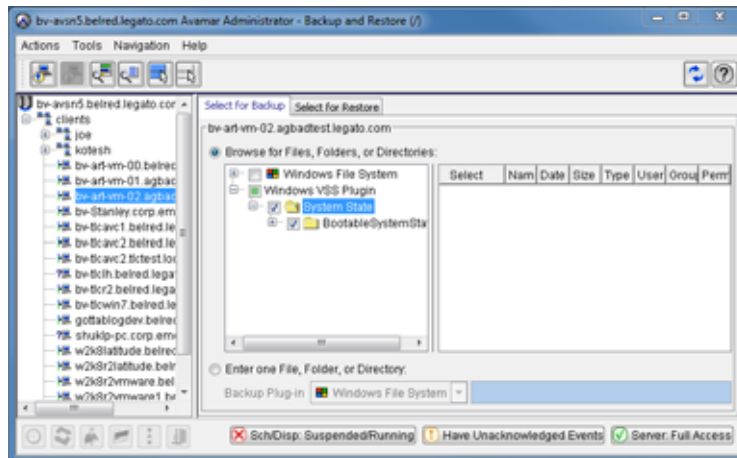
These instructions describe the steps to create a backup on demand. [“Scheduled backups” on page 56](#) provides information about how to schedule recurring periodic backups.

1. In Avamar Administrator, click the **Backup & Restore** launcher button.

The Backup and Restore window appears.

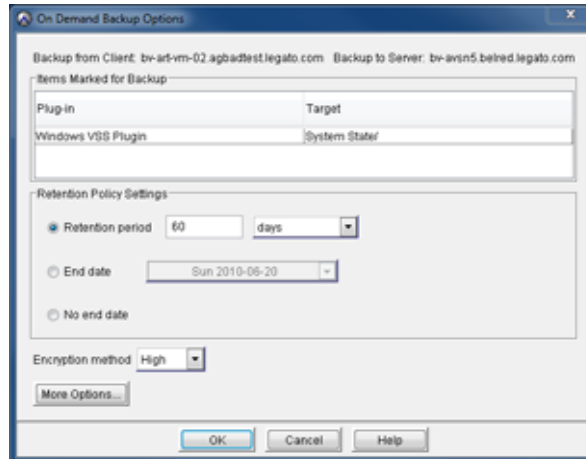


2. Select the client to be backed up, and then click the **Select for Backup** tab.
3. Expand **Windows VSS Plugin** and then select **System State** as shown in the following figure.



4. Select **Actions > Backup Now**.

The On Demand Backup Options dialog box appears.



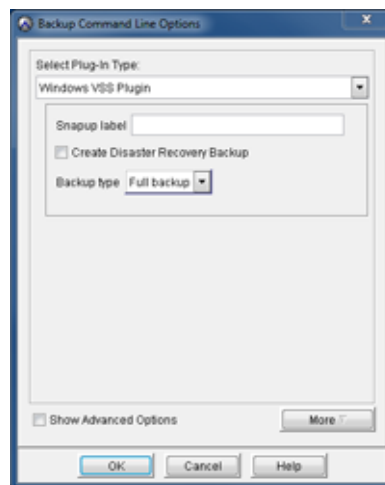
5. Select to perform only an Active Directory backup:

This backup may only be used to perform an online restore of the Active Directory state. This type of backup backs up the system state, but does not back up critical volume data:

- a. Select **More Options**.

The Backup Command Line Options dialog box appears.

- b. Clear the **Create Disaster Recovery Backup** checkbox as shown in the following figure. Clearing this checkbox specifies that the backup created can only be used for online restore:



- c. Click **OK** to close the Backup Command Line Options dialog box.
6. Click **OK** to close the On Demand Backup Options dialog box.

The following status message appears:

Backup initiated

7. Click **OK**.

Task 2: Set up the client for Active Directory restore

In order to restore the Active Directory backup, the client must boot into Directory Service Repair Mode (DSRM). You must do this for both a nonauthoritative restore and an authoritative restore. You can use System Configuration to manually set the computer to boot directly into DSRM the next time you boot the computer. Or you can add an entry to the Windows bootloader so that the option to boot into DSRM is always available when you start your computer. The following sections describe how to use either option, but you do not need to perform both procedures:

- ◆ [“Option 1: Manually boot into DSRM with System Configuration” on page 128](#)

-or-

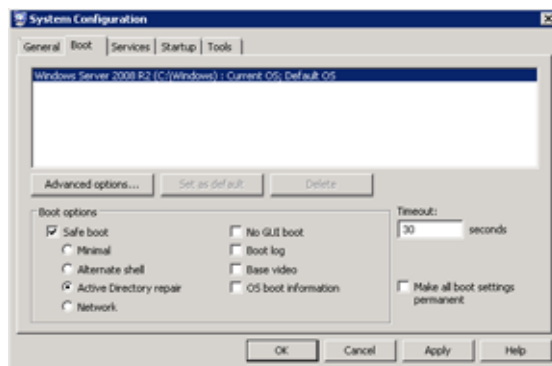
- ◆ [“Option 2: Add a Windows bootloader entry” on page 129](#)

Option 1: Manually boot into DSRM with System Configuration

The Microsoft Windows System Configuration GUI can be used to configure the system to boot directly into DSRM on the next system restart:

1. From the **Start Menu**, select **Administrative Tools > System Configuration**.

The System Configuration dialog box appears.



2. Click the **Boot** tab.
3. Select the **Safe boot** checkbox, and then select **Active Directory repair**.
4. Click **OK**.

After the system has been restored, run Microsoft Windows System Configuration again. Clear the **Safe boot** checkbox to allow the system to return to booting normally.

Option 2: Add a Windows bootloader entry

An additional Windows bootloader entry can be added to allow booting into DSRM as well as the normal boot option. Use BCDEDIT from a running Windows system to modify the Boot Configuration Data (BCD) to control the boot process.

To permanently add the DSRM boot option:

1. At the command prompt, for example C:\>, type the following:

```
bcdedit /copy {default} /d "Directory Service Repair Mode"
```

BCDEDIT will display a message similar to the following:

```
The entry was successfully copied to
{00000000-0000-0000-0000-000000000000}
```

The GUID identifies the new entry.

2. Using this GUID, set the safeboot option for the bootloader entry in the BCD using the following command:

```
C:\> bcdedit /set {00000000-0000-0000-0000-000000000000} safeboot
dsrepair
```

After you have completed ["Option 1: Manually boot into DSRM with System Configuration" on page 128](#) or ["Option 2: Add a Windows bootloader entry" on page 129](#), the client can be rebooted into DSRM to perform a nonauthoritative or authoritative restore of Active Directory.

Notes about performing the nonauthoritative or authoritative restore task

The first 14 steps for a nonauthoritative or authoritative restore of Active Directory are identical. However, the authoritative restore requires additional steps in DSRM before rebooting the client into normal Windows mode.

The steps in these tasks are self-contained. Follow the steps in one of these tasks, but not both:

- ◆ ["Task 3: Restore Active Directory with a nonauthoritative restore" on page 130](#)
- ◆ ["Task 3: Restore Active Directory with an authoritative restore" on page 134](#)

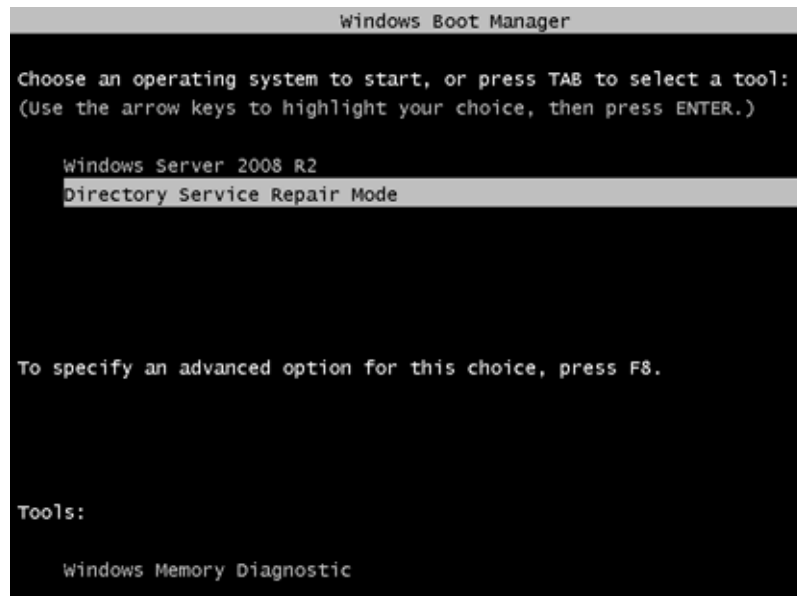
The differences between these two types of Active Directory restores are described in ["Comparing nonauthoritative and authoritative restores" on page 125](#).

Task 3: Restore Active Directory with a nonauthoritative restore

1. Reboot Windows into DSRM.

If the System Configuration method was used, the system will boot directly into DSRM.

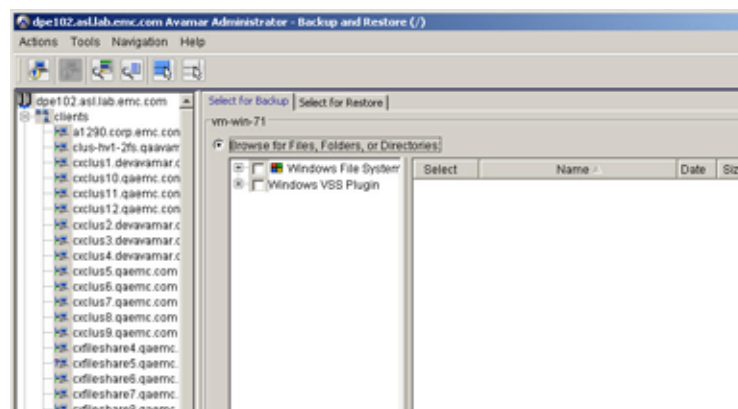
If the BCDEDIT method was used, the Windows Boot Manager screen appears. Select **Directory Service Repair Mode** to boot into DSRM.



2. After Windows boots, start Avamar Administrator. You can run Avamar Administrator locally on this machine or from any other client on the same Avamar server.

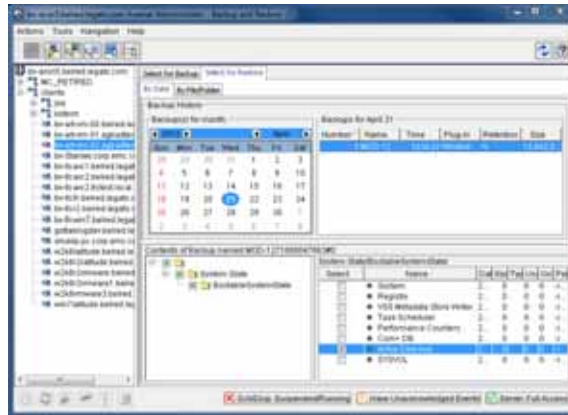
3. Click the **Backup & Restore** launcher button.

The Backup and Restore window appears.



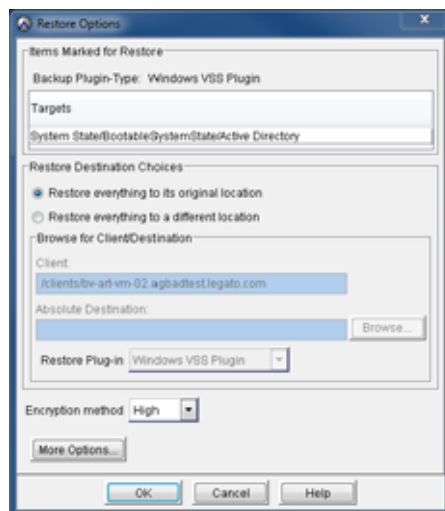
4. Select the client to be restored.
5. Click the **Select for Restore** tab.
6. Navigate to the appropriate restore point.

7. In **Contents of Backup** named, expand the **System State** tree, and then select **Active Directory**.



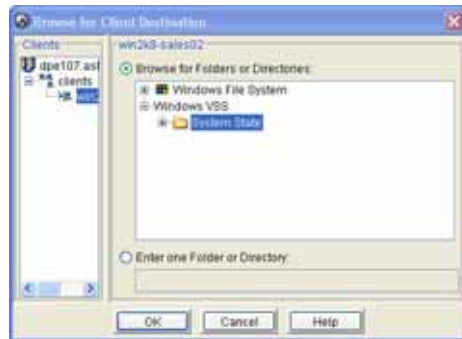
8. Select **Actions > Restore Now**.

The Restore Options dialog box appears.

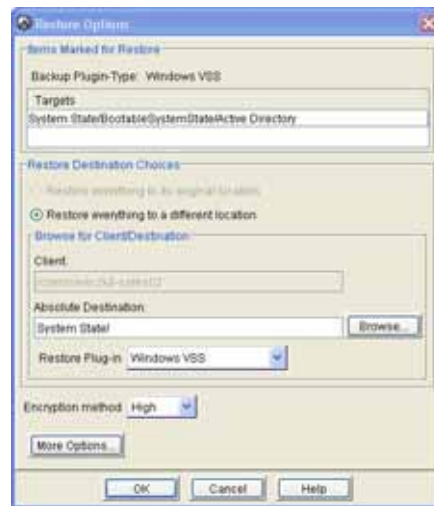


If restoring from a replicate server, go to step 9. Otherwise go to step 10.

9. For restore from a replicate server:
 - a. In the Restore Options dialog box, select **Restore everything to a different location**.
 - b. In **Absolute Destination**, select **Browse**.
 - c. In the Browse for Client Destination dialog box, expand **Windows VSS** and select **System State** as shown in the following figure.

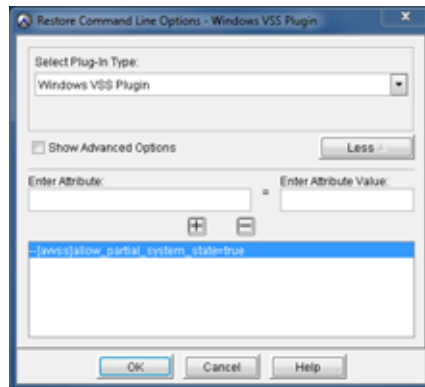


- d. Click **OK** to return to the Restore Options dialog box. Your settings should be similar to the following figure.



- e. Proceed to step 10.
10. Click **More Options**.

The Restore Command Line Options dialog box appears.



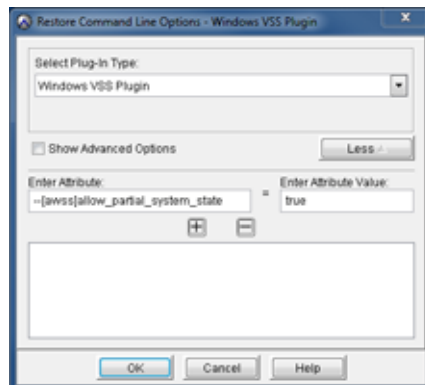
11. Click **More** to show the attribute data entry fields.
12. In **Enter Attribute**, type the following entry:


```
--[avvss]allow_partial_system_state
```
13. In **Enter Attribute Value**, type the following value:

```
true
```

NOTICE

The `allow_partial_system_state` option should only be used for an online restore of Active Directory. It should never be used for an online restore of other system state components.



14. Click the **+** key to update the display.
15. Click **OK** to close this dialog box, and then click **OK** to close the Restore Options dialog box. This will initiate the Active Directory restore.
16. To complete this restore as a nonauthoritative restore, after the Active Directory restore completes restart the client normally. When the client is restarted, other domain controllers will replicate changes to this client, the local domain controller.

Task 3: Restore Active Directory with an authoritative restore

The procedure for performing an authoritative restore is similar to the procedure [“Task 3: Restore Active Directory with a nonauthoritative restore” on page 130](#), but after the restore completes, you **do not restart the client**. Instead, after restore completes, you mark OUs as authoritative so that replication does not overwrite them when the domain controller is restarted.

You must know the distinguished names for OUs that are to be marked. Microsoft ADSIEdit can be used to display Distinguished Names for AD objects. In the following example, the OU for the user to be marked is “CN=Test User,CN=Users,DC=svr1,DC=mydomain,DC=com”.

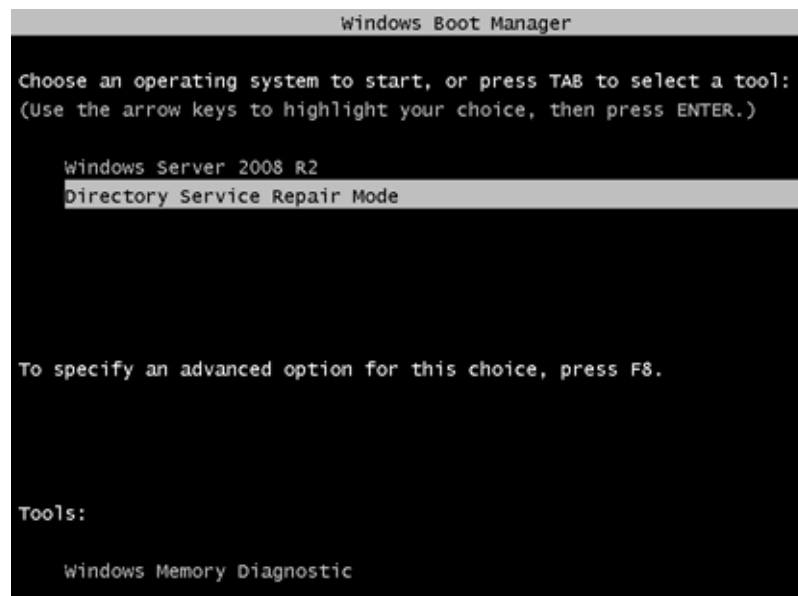
All of the required steps for authoritative restore are provided in the following procedure, you do not need to refer to the preceding nonauthoritative restore procedure.

To perform an authoritative restore of an Active Directory Backup:

1. Reboot Windows into DSRM.

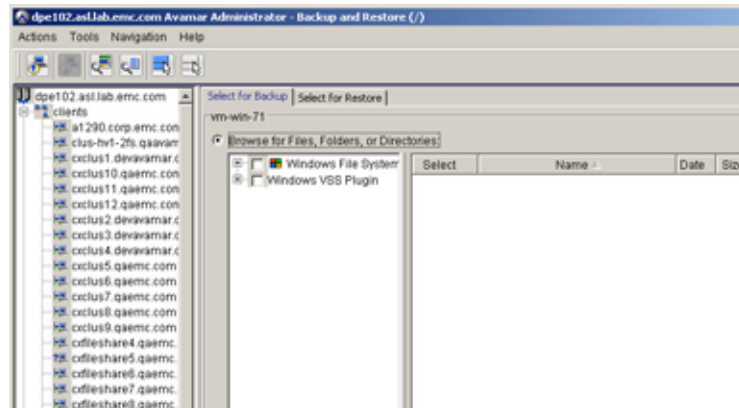
If the System Configuration method was used, the system will boot directly into DSRM.

If the BCDEDIT method was used, the Windows Boot Manager screen appears. Select **Directory Service Repair Mode** to boot into DSRM.

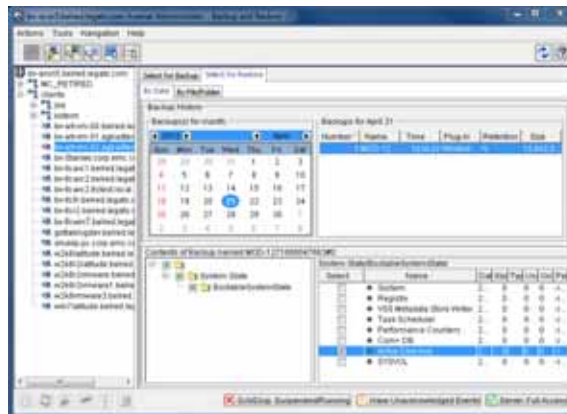


2. After Windows boots, start Avamar Administrator. You can run Avamar Administrator locally on this machine or from any other client on the same Avamar server.
3. Click the **Backup & Restore** launcher button.

The Backup and Restore window appears.

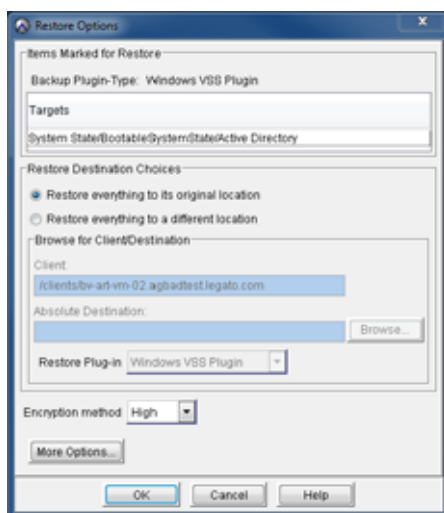


4. Select the client to be restored.
5. Click the **Select for Restore** tab.
6. Navigate to the appropriate restore point.
7. In **Contents of Backup named**, expand the **System State** tree, and then select **Active Directory**.



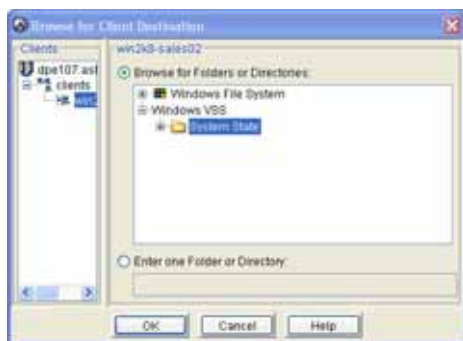
8. Select **Actions > Restore Now**.

The Restore Options dialog box appears.

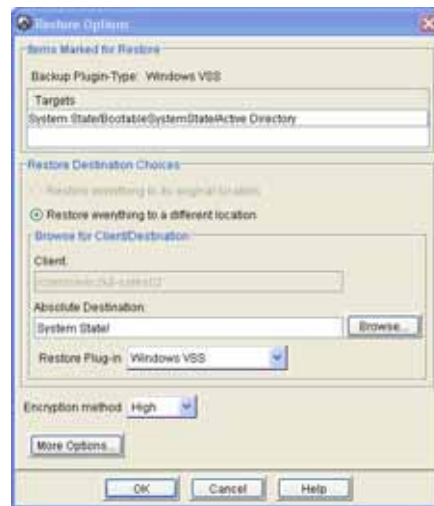


If restoring from a replicate server, go to step 9. Otherwise go to step 10.

9. For restore from a replicate server:
 - a. In the Restore Options dialog box, select **Restore everything to a different location**.
 - b. In **Absolute Destination**, select **Browse**.
 - c. In the **Browse for Client Destination** dialog box, expand **Windows VSS** and select **System State** as shown in the following figure.



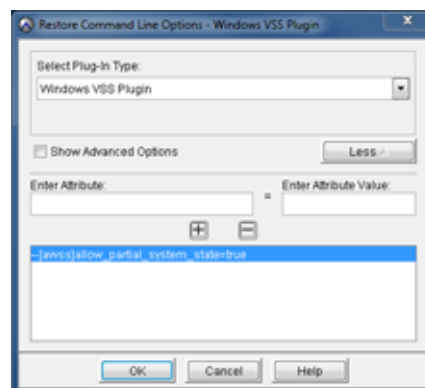
- d. Click **OK** to return to the Restore Options dialog box. Your settings should be similar to the following figure.



- e. Proceed to step 10.

10. Click **More Options**.

The Restore Command Line Options dialog box appears.

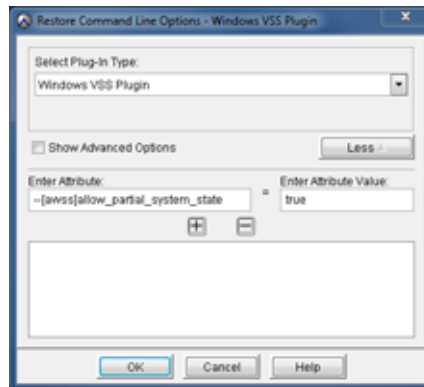


11. Click **More** to show the attributes data entry fields.

12. In **Enter Attribute**, type `--[avss]allow_partial_system_state`

13. In **Enter Attribute Value**, type **true****NOTICE**

The `allow_partial_system_state` option should only be used for an online restore of Active Directory. It should never be used for an online restore of other system state components.

14. Click the **+** key to update the display.

Click **OK** to close this dialog box, and then click **OK** to close the Restore Options dialog box. This will initiate the Active Directory restore.

15. Open a command prompt window and use `ntdsutil` to mark objects for authoritative restore:

```
C:> ntdsutil
ntdsutil: activate instance NTDS
ntdsutil: authoritative restore
authoritative restore: restore object
"CN=Test User,CN=Users,DC=svr1,DC=mydomain,DC=com"
authoritative restore: quit
ntdsutil: quit
C:>
```

16. Restart the client.

NOTICE

If System Configuration was used to configure for DSRM, then the steps need to be reversed to return to a normal boot process, or you can use the following command so that you do not reboot into DSRM again:

```
bcdedit /deletevalue safeboot
```

The preceding example marks a single user object for authoritative restore. Containers or the entire database can also be authoritatively restored. For example, if multiple users were accidentally deleted, the entire user subtree can be marked instead of marking each individual user object.

```
C:> ntdsutil
ntdsutil: activate instance NTDS
ntdsutil: authoritative restore
authoritative restore: restore subtree
"CN=Users,DC=svr1,DC=mydomain,DC=com"
authoritative restore: quit
```

```
ntdsutil: quit  
C:>
```

The Microsoft documentation provides additional information in the use of ntdsutil and Directory Service Repair Mode.

Windows Server 2008 and 2012 Cluster Disaster Recovery

Avamar supports two cluster restore scenarios:

- ◆ [“Cluster node restores” on page 139](#)
- ◆ [“Full cluster restore or disaster recovery” on page 140](#)

Note: Disaster backups skip cluster shared disk data. If the cluster disk was included in the disaster recovery backup, then disaster recovery would not be possible.

Note: Critical cluster disks will not be restored by disaster recovery. Protect critical cluster disks by performing separate file system backups.

Cluster node restores

Use this when you need to restore a node or nodes to previous state and the cluster is otherwise functional. This is a non-authoritative restore, because when the nodes are rejoined to the cluster, they are updated through cluster replication from the existing cluster and settings.

For each node you are restoring, assuming that you have at least one node still functioning in the cluster:

1. Shut down the damaged node.
2. Perform an offline disaster recovery of the node, following the tasks in [“Offline disaster recovery task list” on page 99](#).
3. Reboot the machine.
4. If the disaster recovery backup was created before a service pack was installed, you will need to reinstall the service pack.
5. If needed, rejoin the cluster.

Full cluster restore or disaster recovery

Use this when the entire cluster is down, or something happens to the cluster database. You must rebuild the cluster by restoring the first cluster node. This first node contains the cluster settings and databases that will be propagated to the other cluster nodes as they are brought online to the cluster.

Note: The system cannot prevent you from overwriting the cluster with previous cluster settings if you boot a node using the old system disk.

1. Shut down all cluster nodes.
2. On the first machine, perform disaster recovery:
 - a. Perform an offline disaster recovery of the node, following the tasks in [“Offline disaster recovery task list” on page 99](#).
 - b. Reboot the machine.
 - c. If needed, restart the cluster service.
3. On all subsequent machines (nodes) perform a disaster recovery:

IMPORTANT

You must perform disaster recovery on all nodes. If you do not perform disaster recovery on one of the nodes, and then reboot that node using the old system disk, then the [old] cluster information in the rebooted system will be used, and will replace the information on all nodes.

- a. Perform an offline disaster recovery of the node, following the tasks in [“Offline disaster recovery task list” on page 99](#).
- b. Reboot the machine.
- c. Apply any Windows service packs to the cluster node just restored to bring it up to the same service pack level as the other nodes in the cluster.

This is only required if the service packs or hotfixes were applied to the cluster nodes after the disaster recovery backup was performed.

- d. If needed, rejoin the cluster.

Windows Server 2003 disaster recovery and Active Directory recovery

Avamar supports Windows Server 2003 System Recovery using NTBackup. The following section provides complete instructions for using NTBackup to restore System State, and to recover Active Directory with an authoritative or nonauthoritative restore. This topic describes the disaster recovery process for Windows Server 2003:

- ◆ Perform a full system backup of a Windows Server 2003 machine, including server configuration data
- ◆ Restore a Windows Server 2003 machine to its original system state

NOTICE

EMC HomeBase Embedded (HBE) disaster recovery is no longer supported in Avamar 6.1 or later.

Important notes about disaster recovery and Active Directory recovery

- ◆ To successfully restore a Windows Server 2003 client system state using this process, the volume used to store the system state backup requires twice the amount of free space as the size of the system state backup until the backup completes.
- ◆ In order to successfully restore a Windows Server 2003 system state using NTBackup and Avamar, a system state backup must exist on the Avamar server. Therefore, you should perform this system state backup as soon as possible, well before the original system encounters any problems that might require a system state restore.
- ◆ An Active Directory recovery requires a full system backup and recovery, just like a disaster recovery. If the original client was on a domain controller, the backup will include Active Directory.
- ◆ However, disaster recovery will not turn the target client into a domain controller if the original client was not a domain controller.
- ◆ EMC recommends that you maintain a database or spreadsheet of machine names, FQDNs, domain names, and IP addresses for each Windows Server protected by Avamar. In the event that you need to restore a backup and rebuild a machine that was destroyed or is no longer available, you will need to specify the original machine name when you reinstall the Avamar client on the target machine. The target machine name must match the name of the source machine it replaces.

Windows Server 2003 disaster recovery roadmap

The following roadmap, and the flow chart on the following page, lists the tasks involved from installing the Avamar clients on the original machine and performing backups to restoring the backup to a new target machine. There are several alternate procedures depending on whether you are recovering from the original backup server or a replication server, and whether you are performing a regular disaster recovery, or an Active Directory authoritative or non-authoritative restore.

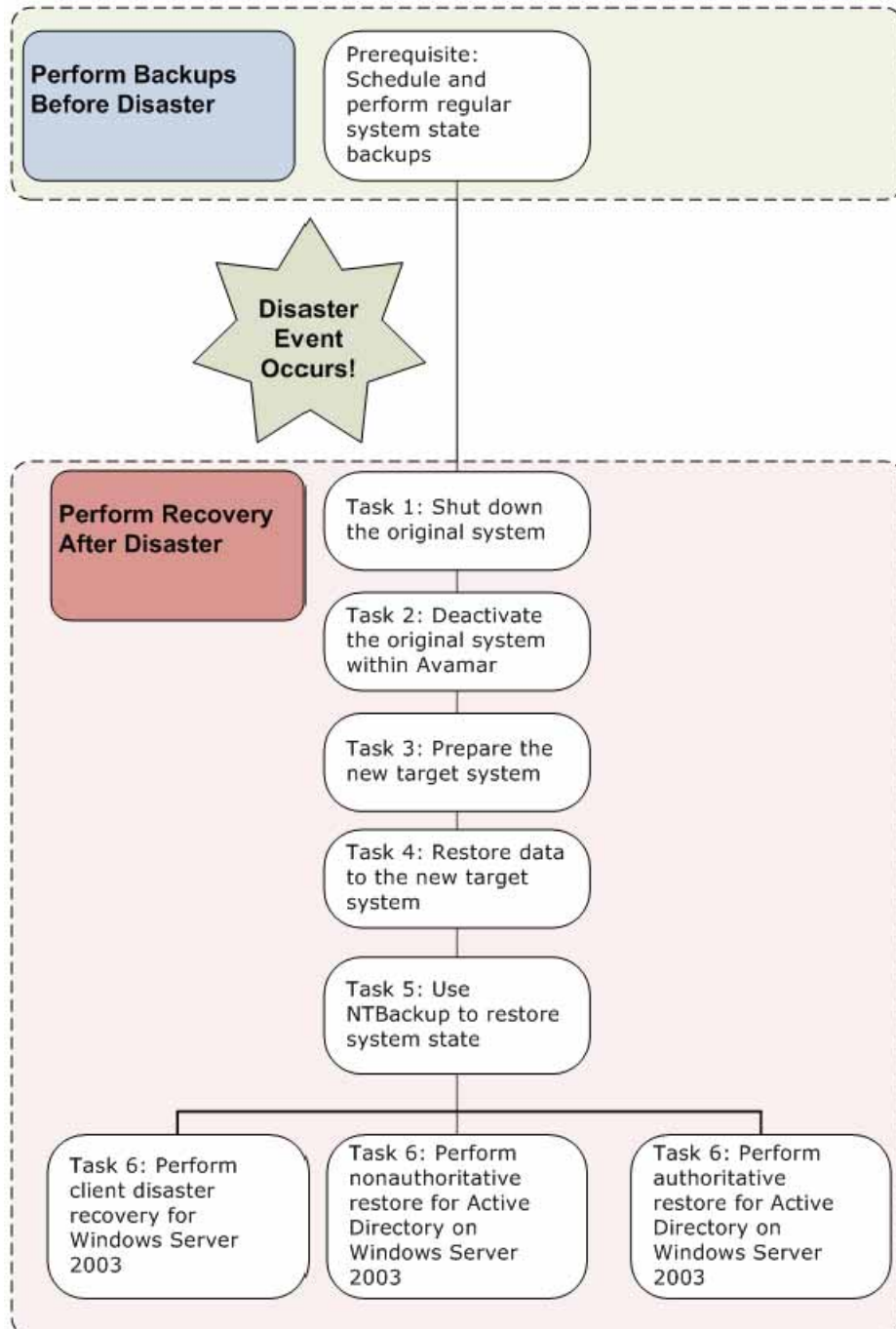
To successfully restore the system state of Windows Server 2003 clients using NTBackup and Avamar, follow these backup and recovery tasks:

- ◆ [“Prerequisite: Perform system state backup” on page 144](#)
- ◆ [“Task 1: Shut down the original system” on page 146](#)
- ◆ [“Task 2: Deactivate the original system within Avamar” on page 146](#)
- ◆ [“Task 3: Prepare the new target system” on page 146](#)
- ◆ [“Task 4: Restore data to the new target system” on page 147](#)
- ◆ [“Task 5: Use NTBackup to restore system state” on page 149](#)

At the completion of Task 5, proceed to the appropriate Task 6 for standard Windows Server 2003, Active Directory nonauthoritative restore, or Active Directory authoritative restore. Choose only one:

- ◆ [“Task 6: Complete Windows Server 2003 client disaster recovery” on page 151](#)
- or-
- ◆ [“Task 6: Restore Windows Server 2003 Active Directory with a nonauthoritative restore” on page 151](#)
- or-
- ◆ [“Task 6: Restore Windows Server 2003 Active Directory with an authoritative restore” on page 152](#)

Windows Server 2003 Disaster Recovery and Active Directory Restore Process



Prerequisite: Perform system state backup

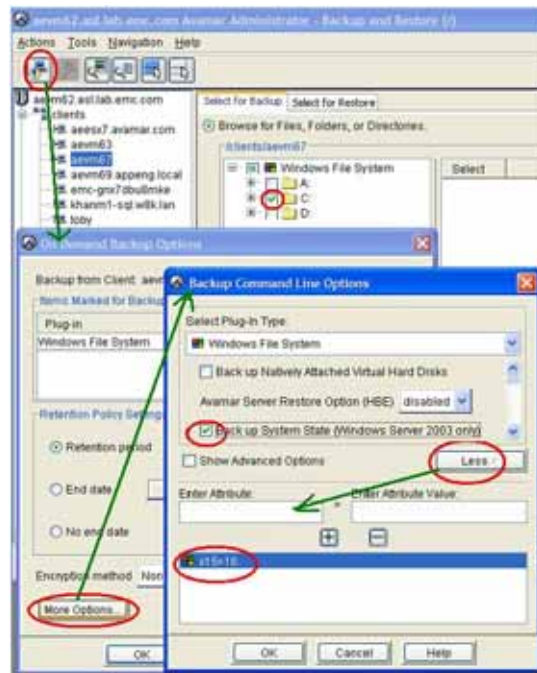
1. In Avamar Administrator, click the **Backup & Restore** launcher button.
The Backup and Restore window appears.
2. Click the **Select for Backup** tab.
3. Select the original Windows Server 2003 client in the clients tree.
4. Select the local hard disk that contains the system state information.
On most systems, this is the *C:* drive.
5. Select **Actions > Backup Now**.
The On Demand Backup Options dialog box appears.
By default, all drives are selected for backup. The minimum requirement is that the system drive (that is, the one containing the SYSTEM32 folder) be backed-up.
6. Click **More Options**.
The Backup Command Line Options dialog box appears.
7. Select the **Back up System State (Windows 2003 only)** option.
8. Click **More**.
9. In the **Enter Attribute** text box, type x15.
10. In the **Enter Attribute Value** text box, type 16.
11. Click **+**.

NOTICE

The **x15=16** plug-in option causes the System32 folder to be excluded from this backup, which improves backup performance.

Use default settings for all other fields and options.

The following screenshot shows the non-default backup options that are required in order to successfully back up Windows Server 2003 system state using NTBackup and Avamar.



12. Click **OK**.

The Backup Command Line Options dialog box closes.

13. Switch to On Demand Backup Options dialog box and click **OK**.

The On Demand Backup Options dialog box closes and the Backup initiated status message appears.

Alternative Command Line Method — Instead of using Avamar Administrator (steps 1 through 10), you could also perform a command line **avtar** backup using the following options:

```
"\Program Files\avs\bin\avtar"
--sysdir="C:\Program Files\avs\etc"
--vardir="C:\Program Files\avs\var"
--logfile="C:\Program Files\avs\var\SystemStateBackup.log"
--label="System State bkup"
--backupsystem
--x15=16
--hfsaddr=AVAMARSERVER
--path=/clients/WIN2003HOSTNAME
--id=USERNAME
--ap=PASSWORD
-c
C:\
```

where AVAMARSERVER is your actual Avamar server network hostname (as defined in DNS) or IP address, WIN2003HOSTNAME is your actual Windows Server 2003 network hostname (as defined in DNS), USERNAME is an Avamar administrative user account that has sufficient permission to perform this backup, and PASSWORD is the password for that Avamar administrative user account.

Task 1: Shut down the original system

Perform a complete and orderly shutdown of the original Windows Server 2003 system. Ensure that power is off.

Task 2: Deactivate the original system within Avamar

Because the restored system will take the place of the original system on the network, you should temporarily deactivate the original system within Avamar:

1. In Avamar Administrator, click the **Policy** launcher button.

The Policy window appears.

2. Click the **Policy Management** tab.
3. Click the **Clients** tab.
4. Select the original Windows Server 2003 client.
5. Select **Actions > Client > Edit Client**.

The Edit Client window appears.

6. Clear the **Activated** option.
7. Click **OK**.

The Edit Client window closes.

Task 3: Prepare the new target system

1. Install the Windows Server 2003 operating system.

The type and version of the new operating system must exactly match the original system. For example, if the original system ran Windows Server 2003 Enterprise Version SP2, the new target system must also run that exact operating system.

2. Rename the target system to the same name as the original system.
3. Install Avamar Client for Windows and activate it.

[“Installing the Avamar Client for Windows” on page 24](#) provides detailed installation instructions.

4. If doing an Active Directory restore:
 - a. Boot into Directory Services Restore mode.
 - b. Manually start the Avamar client.

NOTICE

The new client name might not be identical to the original client name as it was activated by Avamar. For example, if the original client was activated using the FQDN, such as server1.company.com, but the new client name is only the hostname, such as server1. Then additional steps must be completed prior to activation.

5. If the new client name is different from the original client name used when it was activated by Avamar, complete the following steps:
 - a. On the new client system, create a file named **avagent.cmd** in the Avamar var directory.
By default, this directory is C:\Program Files\avs\var
 - b. Edit the avagent.cmd file and add the following entry:
`--hostname=SERVERNAME.DOMAIN.COM`
For example: hostname=server1.emc.com
 - c. Save and close the file.
 - d. Restart the Avamar Service on the Windows Client:
 - Open **Control Panel > Administrative Tools > Services**.
 - Locate and restart the Avamar Service.
 - e. Verify that the client can correctly resolve both the simple name and the FQDN into an IP address. There are several ways to ensure that the client resolves correctly, such as DNS or a hosts file.

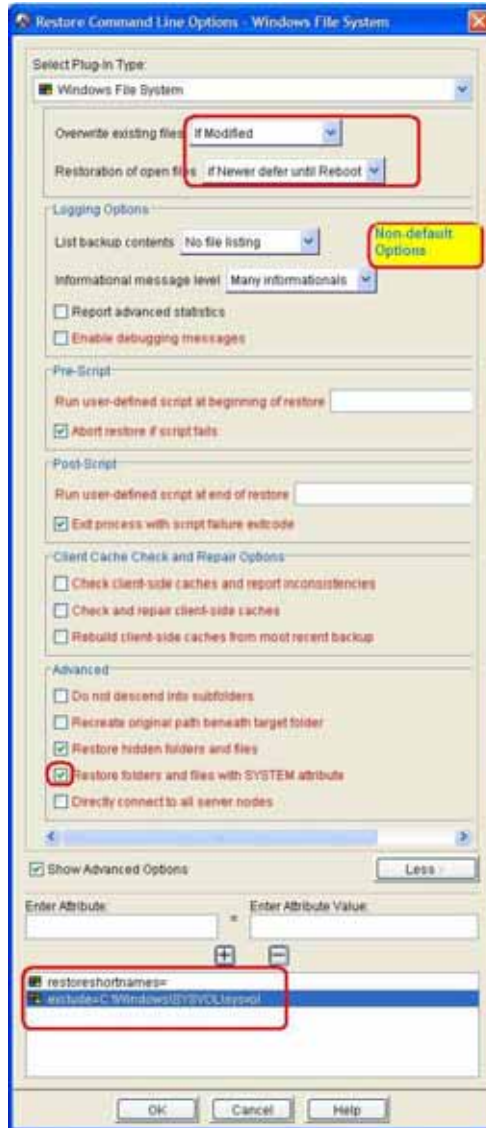
Task 4: Restore data to the new target system

1. In Avamar Administrator, click the **Backup & Restore** launcher button.
The Backup and Restore window appears.
2. Click the **Select for Restore** tab.
3. Select the original Windows Server 2003 client in the clients tree.
4. Locate and select the backup from which you want to restore system state.
5. Select the local hard disk that contains the system state information.
On most systems, this is the C: drive.
6. Select **Actions > Restore Now**.
The Restore Options dialog box appears.
7. Click **More Options**.
The Restore Command Line Options dialog box appears.
8. Select **Show Advanced Options**.
9. From the **Overwrite existing files** list, select **If Modified**.
10. From the **Restoration of open files** list, select **If Newer defer until Reboot**.
11. In the **Pre-Script** section, select **Abort restore if script fails**.
12. In the **Post-Script** section, select **Exit process with script failure exit code**.
13. In the **Advanced** section, select **Restore hidden folders and files** and **Restore folders and files with SYSTEM attribute**.
14. Click More.

15. In the **Enter Attribute** text box, type **restoreshortnames**, and then click **+**.
16. In the **Enter Attribute** text box, type **exclude**.
17. In the **Enter Attribute Value** text box, type **C:\Windows\SYSVOL\sysvol**, and then click **+**.

Use default settings for all other fields and options.

The following screenshot shows the non-default restore options that are required in order to successfully restore Windows Server 2003 system state using NTBackup and Avamar.



18. Click **OK**.

The Restore Command Line Options dialog box closes.

19. In the **Restore Options** dialog box, click **OK**.

The Restore Options dialog box closes and the `Restore initiated` status message appears.

Alternative command line method — Instead of using Avamar Administrator (steps 1 through 12), you could also perform a command line **avtar** restore using the following options:

```
"\Program Files\avs\bin\avtar"
--logfile="C:\Program Files\avs\var\SystemStateRestore.log"
--label="System State bkup"
--hfsaddr=AVAMARSERVER
--path=/clients/WIN2003HOSTNAME
--id=USERNAME
--ap=PASSWORD
--existing-file-overwrite-option=modified
--open-file-restore-option=newest
--restorehidden
--restoresystem
--restoreshortnames
--exclude=C:\Windows\SYSTEM32\sysvol
-x
C:\
```

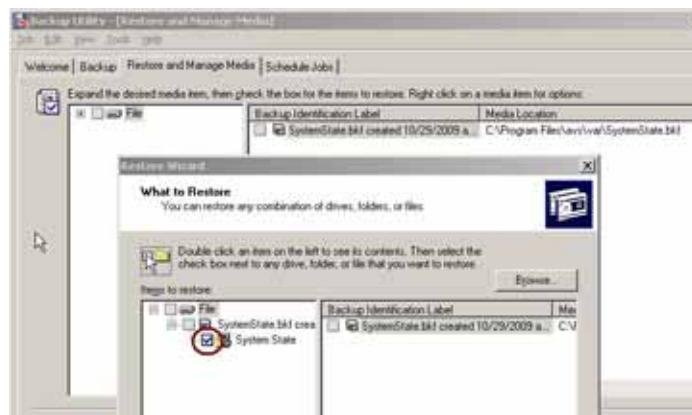
where AVAMARSERVER is the Avamar server network hostname (as defined in DNS) or IP address, WIN2003HOSTNAME is your actual Windows Server 2003 network hostname (as defined in DNS), USERNAME is an Avamar administrative user account that has sufficient permission to perform this restore, and PASSWORD is the password for that Avamar administrative user account.

NOTICE

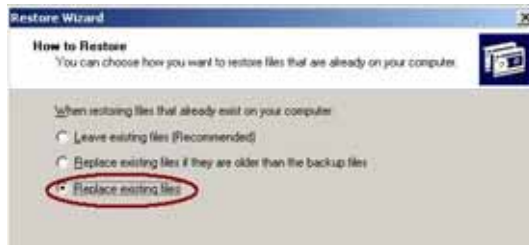
Do not reboot the Windows Server 2003 client until instructed to do so as part of the next task.

Task 5: Use NTBackup to restore system state

1. Run NTBACKUP to restore the system state from C:\Program Files\avs\var\SystemState.bkf.



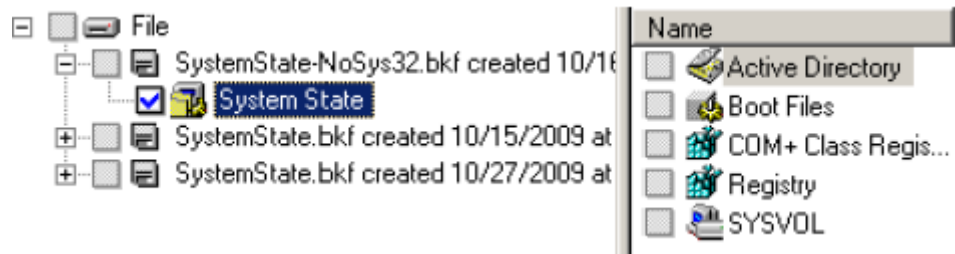
2. Click **Advanced**, and select **Replace Existing files**.



NOTICE

Domain controller restore shows a few more items as a subset of system state.

3. Select the **System State** checkbox.



Use defaults for the remaining options.

4. Reboot when requested to do so.
5. Reboot one more time to install drivers.

The restore is complete.

The ntbackup log files are located in the C:\Documents and Settings\%username%\Local Settings\Application Data\Microsoft\Windows NT\NTBackup\data folder.

6. Proceed to ["Task 5 completion: Next steps" on page 151](#).

NOTICE

Do not reboot your client into normal Windows operating system mode yet. Review the options for Task 6. Some recovery options require additional steps before rebooting into normal Windows mode.

Task 5 completion: Next steps

Proceed to the appropriate Task 6 for Windows Server 2003 client disaster recovery, Active Directory nonauthoritative restore, or Active Directory authoritative restore. Choose only one:

- ◆ [“Task 6: Complete Windows Server 2003 client disaster recovery” on page 151](#)
- or-
- ◆ [“Task 6: Restore Windows Server 2003 Active Directory with a nonauthoritative restore” on page 151](#)
- or-
- ◆ [“Task 6: Restore Windows Server 2003 Active Directory with an authoritative restore” on page 152](#)

Task 6: Complete Windows Server 2003 client disaster recovery

To complete a normal Windows Server 2003 disaster recovery:

1. After the Avamar restore has completed at the end of Task 5, reboot the target server into normal mode.
2. Validate application functionality.

Some applications, such as SQL Server and Exchange Server, may require that the restored data be imported back into the application before full functionality can be restored. The instructions provided by the application vendor provide more information.

Task 6: Restore Windows Server 2003 Active Directory with a nonauthoritative restore

A brief description of nonauthoritative and authoritative restores is provided in [“Comparing nonauthoritative and authoritative restores” on page 125](#). For more extensive information about nonauthoritative restore in Windows Server 2003, review Microsoft’s documentation, “Performing a Nonauthoritative Restore of a Domain Controller” on Microsoft TechNet at [http://technet.microsoft.com/en-us/library/cc784922\(W.S.10\).aspx](http://technet.microsoft.com/en-us/library/cc784922(W.S.10).aspx).

To complete a nonauthoritative Active Directory restore:

1. After the Avamar restore has completed at the end of Task 5, reboot the target server into normal mode.
2. Verify that the Active Directory data has been restored.
3. Validate application functionality.

Some applications, such as SQL Server and Exchange Server, may require that the restored data be imported back into the application before full functionality can be restored. The instructions provided by the application vendor provide more information.

Task 6: Restore Windows Server 2003 Active Directory with an authoritative restore

A brief description of nonauthoritative and authoritative restores is provided in [“Comparing nonauthoritative and authoritative restores” on page 125](#). For more extensive information about authoritative restore in Windows Server 2003, review Microsoft’s documentation, “Performing an Authoritative Restore of Active Directory Objects” on Microsoft TechNet at [http://technet.microsoft.com/en-us/library/cc779573\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/cc779573(WS.10).aspx). The command syntax for marking items for authoritative restore is described in “Mark the object or objects authoritative” on Microsoft Technet at [http://technet.microsoft.com/en-us/library/cc757068\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/cc757068(WS.10).aspx).

NOTICE

Microsoft recommends “Do not use an authoritative restore to restore an entire domain controller” in “Performing an Authoritative Restore of Active Directory Objects,” [http://technet.microsoft.com/en-us/library/cc779573\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/cc779573(WS.10).aspx). Microsoft recommends restoring domain controllers through nonauthoritative restore or reinstallation.

To complete an authoritative Active Directory restore:

1. After the Avamar restore has completed at the end of Task 5, do not reboot. The client should still be in DSRM.
2. Open a command prompt window.
3. Type:

```
C:> ntdsutil
```

4. At the ntdsutil prompt, type **authoritative restore**.

```
ntdsutil: authoritative restore
```

5. Mark the objects to restore using one of the following commands:

To restore a subtree, type **restore subtree** *DistinguishedName*

To restore an object, type **restore object** *DistinguishedName*

where *DistinguishedName* is the LDAP distinguished name of the subtree or object that is to be marked authoritative.

For example, if you wanted to restore a deleted OU named Developers Redmond in the svr1.mydomain.com, type:

```
restore subtree
"OU=Developers,OU=Redmond,DC=svr1,DC=mydomain,DC=com"
```

Due to page layout column width limitations, the example is displayed as two lines, but should be typed all as one line.

NOTICE

Enclose the distinguished name in quotes when there is a space or special characters within the distinguished name.

6. Click **Yes** in the message box that appears to confirm the command.

After typing these commands, the screen will display a message that the records were updated and two files were created: a .txt file and an LDIF file:

```
Successfully updated 3 records.
The following text file with a list of authoritatively restored
objects has been created in the current working directory:
<ar_filename_objects>.txt
One or more specified objects have back-links in this domain. The
following LDIF files with link restore operations have been created
in the current working directory: <ar_filename>.ldf Authoritative
Restore completed successfully.
```

7. Record the location of the LDF file that was created in the previous step.
8. Close the Command Prompt window.
9. Reboot the domain controller.
10. Synchronize replication with all partners.

This step allows all objects marked as authoritative to replicate throughout the domain.

The Microsoft TechNet article "Synchronize replication with all partners" provides additional information.

11. When replication is complete, run an LDIF file to recover backup links by typing the following:

```
ldifde -i -k -f FILENAME
```

where FILENAME is the LDF file noted previously when the restore commands were run.

This task is described on Microsoft TechNet in the article "Run an LDIF file to recover back-links" at [http://technet.microsoft.com/en-us/library/cc786564\(WS.10\).aspx](http://technet.microsoft.com/en-us/library/cc786564(WS.10).aspx).

12. Verify that Active Directory data has been restored.
13. Validate application functionality.

Some applications, such as SQL Server and Exchange Server, may require that the restored data be imported back into the application before full functionality can be restored. The instructions provided by the application vendor provide more information.

Windows XP and 2000 system recovery using NTBackup

The following procedure describes how to completely restore a Microsoft Windows XP and 2000 client system back to the original system.

NOTICE

The Avamar 5.0 Windows Client and later do not support backup and recovery of Windows 2000. For Windows 2000, use the Avamar 4.1 Windows Client.

Performing a full system backup

NOTICE

To successfully recover the entire system state of a Windows client, a special “full system backup” must be performed first. This full system backup, which uses the Windows NTBackup utility to save such critical system state information as the Windows registry and the Windows SysVol folder on servers using Active Directory, is what will be used to restore the computer at some point in the future. Therefore, these full system backups should be performed on a regular basis.

1. Install Avamar Client for Windows on the Windows client.

NOTICE

For Windows 2000, use the Avamar 4.1 Windows Client.

2. Register and activate the Windows client with the Avamar server.

“[Registering the Avamar Client for Windows](#)” on page 27 provides additional information.

3. Do one of the following:

- Create a new dataset that will be used to take full Windows system state backups. “[Creating a dataset](#)” on page 57 provides information.
- Perform an on-demand full Windows system state backup. “[On-demand backup](#)” on page 39 provides information.

NOTICE

In order to support future full system restores, this client backup must include the entire client filesystem. Therefore, do not exclude any folders or files during this backup or you might not be able to recover this client’s system state at a future date.

4. Ensure that you use the Windows File System plug-in and that you do not exclude any folders or files.

5. Select the **Back up System State (Windows 2003 only)** option.

If space on *C:* drive is low, type as free text an alternate path for the **systemstatefile** option.

- a. For **Enter Attribute**, type **systemstatefile**.
- b. For **Enter Attribute Value**, type the path in the following format:

PATH\SystemState.bkf

- c. Click the plus (+) sign.

6. Perform a scheduled or on-demand backup of this windows client using the dataset you created in steps 3 through 5.

[“On-demand backup” on page 39](#) or [“Scheduled backups” on page 56](#) provide additional information.

Restore preparation

1. Ensure that a known, good full system state backup of the original Windows client exists.

Validate this backup if necessary. The *EMC Avamar Administration Guide* provides additional information.

2. Prepare the new (or repaired) Windows client as follows:

Any replacement drive should be attached as the boot disk.

The replacement drive should be big enough to receive the contents of the entire backup plus an additional 500 MB. Additional space is required because new files are added to the base installed operating system when the restore operation is performed.

You should not overwrite files that might be removed as part of a service pack or hot fix upgrade:

- a. Create the primary boot partition *C:* as well as any other partitions that previously existed.

The partition table, boot records, and empty filesystem on the new disk can be created in several ways, including an installation from the original Windows CD and restoring a ghost image. The primary goal is to create a bootable partition. The actual filesystem contents (for instance, the Windows operating system and service packs) are not important because they will be updated during the restore process.

- b. Install the base Windows operating system on the primary boot partition.

NOTICE

Ensure that the base Windows image is at the same service pack level as the Windows operating system being restored. Otherwise, the restore operation may overwrite system files with older versions causing unpredictable system behavior.

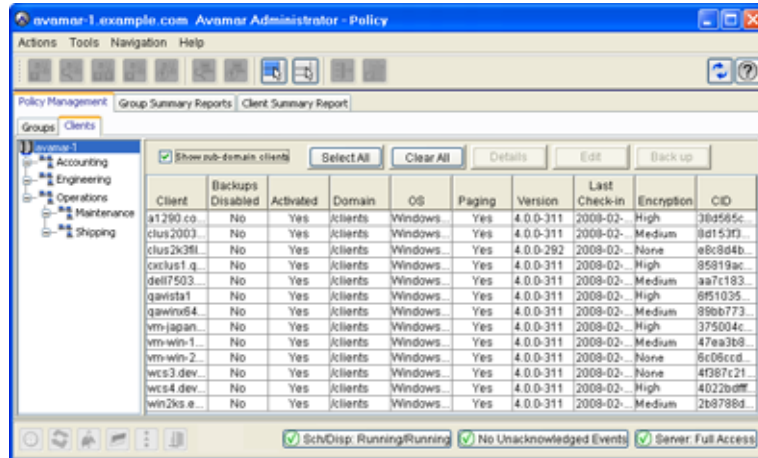
NOTICE

When you install Avamar, assign a temporary hostname and (if applicable) the same static IP address to the new host that will be restored.

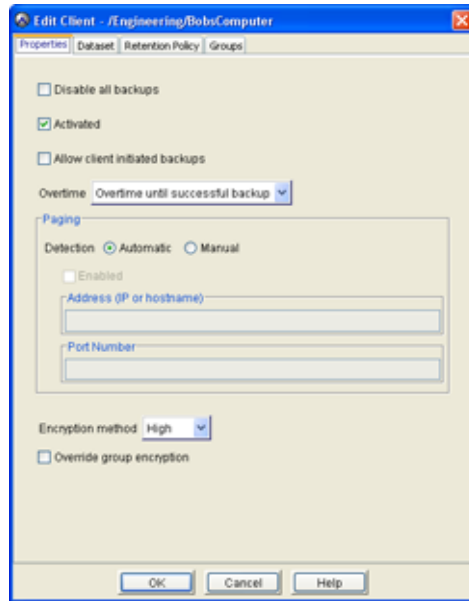
NOTICE

Due to Avamar's high random access performance and the ability to only update modified files, the closer the original image is to the final restored filesystem, the faster the restoration will proceed.

3. Install Avamar Client for Windows on the new Windows client in the same location it was installed on the original Windows client.
4. For Windows 2000 only, install the OTM software and reboot the Windows client.
5. Activate the new client.
6. In order to ensure trouble-free client activation, you must reset the activation status of the original client from Avamar Administrator by performing the following:
 - a. In Avamar Administrator, click the **Policy** launcher button.
The Policy window appears.
 - b. Click the **Policy Management** tab.
 - c. Click the **Clients** tab.



- d. In the tree, select the original Windows client.
- e. Select **Actions > Client > Edit Client**.
The Edit Client window appears.
- f. Click the **Properties** tab.



g. Clear the **Activated** option.

h. Click **OK**.

The Edit Client window closes.

7. Register and activate the Windows client with the Avamar server containing the backup from which you want to restore.

[“Registering the Avamar Client for Windows”](#) on page 27 provides additional information.

Perform full system restore

To perform a full system restore, complete these four tasks in this order:

- ◆ [“Restore Windows system state file \(SystemState.bkf\) with Avamar”](#) on page 158
- ◆ [“Restore system state and Windows System32 directory with NTBackup”](#) on page 160
- ◆ [“Restore C:\ partition with Avamar”](#) on page 162
- ◆ [“Restore other partitions \(as required\) with Avamar”](#) on page 165

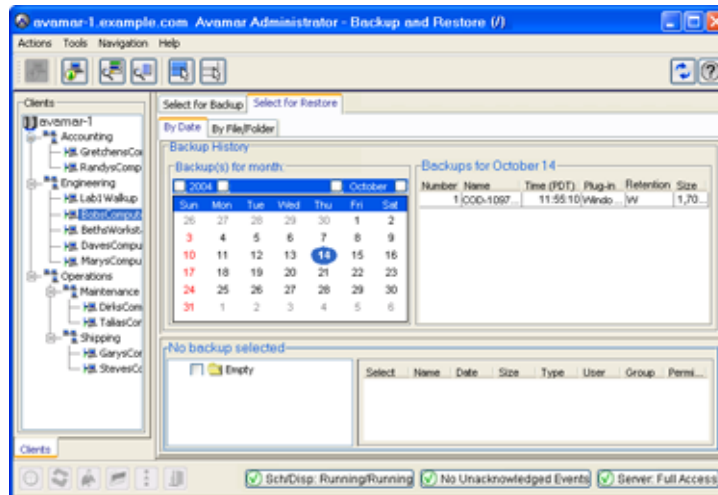
Restore Windows system state file (SystemState.bkf) with Avamar

Restore the SystemState.bkf file from the C:\Program Files\avs\var folder (or wherever the specified location is) to the temporary host using a redirected restore:

1. In Avamar Administrator, click the **Backup & Restore** launcher button.

The Backup and Restore window appears.

2. Click the **Select for Restore** tab.



3. In the Clients tree, select the original client.

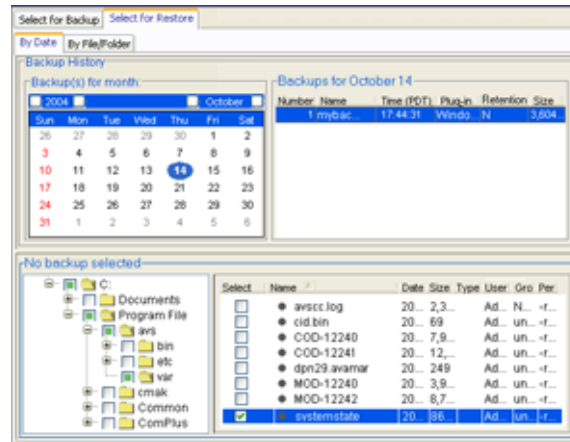
NOTICE

You cannot view clients outside your domain. To view all clients, you must be logged in to the root domain. The *Avamar Administration Manual* provides additional information.

4. Click the **By Date** tab.

Select the date the backup was made, then select the backup containing the system state. Expand the tree and select the SystemState file in the following path (by default):

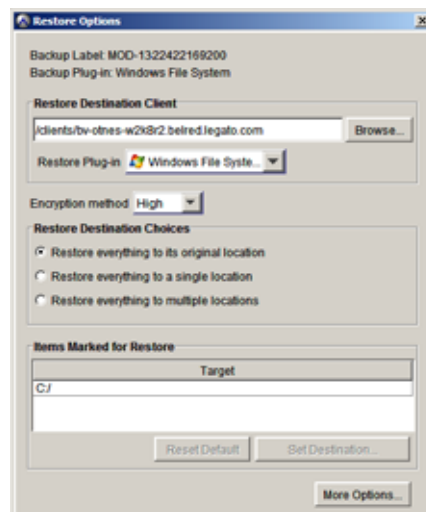
C:\Program Files\avs\var\SystemState.bkf



Hint: Note the date and backup label. You will use this same backup to restore the C: partition with Avamar in "Restore C:\ partition with Avamar" on page 162.

5. Select **Actions > Restore Now**.

The Restore Options dialog box appears.



6. Select the **Restore everything to a different location** option.
7. Click **Browse**.
The Browse for Client Destination dialog box appears.
8. Find and select the Windows client to which you will be recovering the system state.
9. Under Windows File System, select the correct restore destination for the Windows system state file (for example, C:\Program Files\avs\var) and click **OK**.
The Browse for Client Destination dialog box closes.
10. In the **Restore Options** dialog box click **OK**.
The Restore Options dialog box closes and the restore operation begins.
11. Wait for the restore operation to complete before proceeding to the next task.

Restore system state and Windows System32 directory with NTBackup

NOTICE

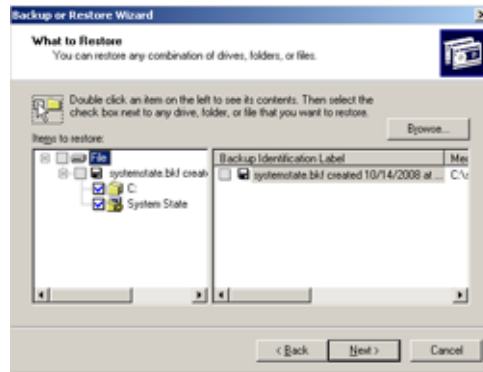
Perform this task from the Windows client to which you will be recovering the system state.

NOTICE

If Active Directory is to be restored, the system must be started in Directory Service Restore Mode by pressing **F8** during startup. The Windows SysVol folder must also be selected for restore during this process.

1. Launch Windows Backup Utility to restore the system state files by selecting **Start > Programs > Accessories > System Tools > Backup**.
2. If the utility opens in wizard mode (Welcome to the Backup or Restore Wizard), click **Advanced Mode**.
3. Enable **Detailed** logging:
 - a. Select **Tools > Options**.
The Options dialog box appears.
 - b. Click the **Backup Log** tab.
 - c. Select the **Detailed** option.
 - d. Click **OK**.
The Options dialog box closes.
4. Because NTBackup does not have a catalog for the SystemState.bkf file, you must import the file using the Restore wizard by performing the following:
 - a. Select **Tools > Restore Wizard**.
The first Restore Wizard page appears.
 - b. Click **Next** to continue.
The next Restore Wizard page (What to Restore) appears.
 - c. If you see the option to click **Import File**, then click **Import File**. Otherwise, click **Browse**, then navigate to and select the Systemstate.bkf file.
 - d. Click **Open**, then **OK**.
The next Restore Wizard page appears.

- e. Select Systemstate.bkf in the right pane.



- f. Expand **Items to Restore** in the left pane.
- g. Select the checkbox for both the drive letter (typically *C:*) and System State in the left pane.

NOTICE

If Active Directory is to be restored, also select the Windows SysVol folder at this point.

- h. Click **Next**.

NOTICE

Do not click **Finish**.

The next Restore page (Where to Restore) appears.

- i. Click **Advanced**.
- j. Select the **Restore files to: Original Location** option and click **Next**.
The next Restore Wizard page (Advanced Restore Options) appears.
- k. Select the **Replace existing files** option and click **Next**.
The final Restore Wizard page appears.
- l. Click **Finish** to start the restore.

If prompted, specify the path of the SystemState.bkf file.

The Restore Wizard closes and the system state restore is initiated.

NOTICE

Do not restart the system if an Authoritative Restore of Active Directory is required. *Microsoft Knowledge Base article Q241594* provides additional information.

5. After the restore operation completes, switch to the Restore Progress window and click **Close**.
The Restore Progress window closes.
6. Click **Yes** to restart the system.

NOTICE

When restoring under Windows 2000 Professional, situations have been observed where NTBackup generates errors during the restore operation, then stops the restore process. If this occurs, you can reboot the Windows client and then perform the restore operation again. The restore operation has always succeeded on the second attempt. Alternatively, we have found that the NTBackup restore performs reliably if the system is booted in Safe Mode when performing the system state restore. We have not seen any issues when using NTBackup to restore the system state on a Windows 2000 server.

Restore C:\ partition with Avamar

Restore the Windows filesystem C:\ partition using Avamar Administrator. Also restore any application data to additional partitions (for example, Winnt\NTDS):

1. First, create a temporary user account for this portion of the restore process by performing the following:
 - a. Select **Start Menu > Settings > Control Panel > Administrative Tools > Computer Management**.
 - b. Select Local Users and Groups, then Users.
 - c. Select **Action > New User**.
The New User dialog box appears.
 - d. Supply a name and password for the temporary user account.
 - e. Clear the **User must change password at next logon** option.
 - f. Click **Create**, then **Close**.
The New User dialog box closes.
 - g. Select the temporary user account and select **Actions > Properties**.
 - h. Click the **Member Of** tab, and then click **Add**.
 - i. Click **Administrators**, and then click **Add** and **OK**.
 - j. Click **OK**.
The temporary user properties window closes.
2. If restoring Active Directory, use the Active Directory Users and Computers snap-in as follows:
 - a. Select **Start > Run > MMC > OK**.
 - b. Select **Console > Add/Remove Snap-In**.
 - c. Click **Add**.
The Add Standalone Snap-Ins window appears.
 - d. Click **Active Directory Users and Computers**, then **Add**.
 - e. Click **Close**, then **OK**.
 - f. Switch to the **Console** window and expand the domain under **Console Root** and select **Users**.

- g. Select **Actions > Select New > User**.
- h. Type the Full name and User logon name, and then click **Next**.
- i. Type a password and then click **Next**.
- j. Click **Finish**.
- k. Select the temporary user account, and then select **Actions > Properties**.
- l. Click the **Member Of** tab, and then click **Add**.
- m. Click **Administrators**, and then click **Add** and **OK**.
- n. Click **OK**.

The temporary user properties window closes.

3. Close all programs and log off.
4. Log in to the Windows client using the new temporary user account.
5. Activate the client with the Avamar server.

This step is required because the client's hostname and IP address have reverted to the original hostname in use when the client was backed up.

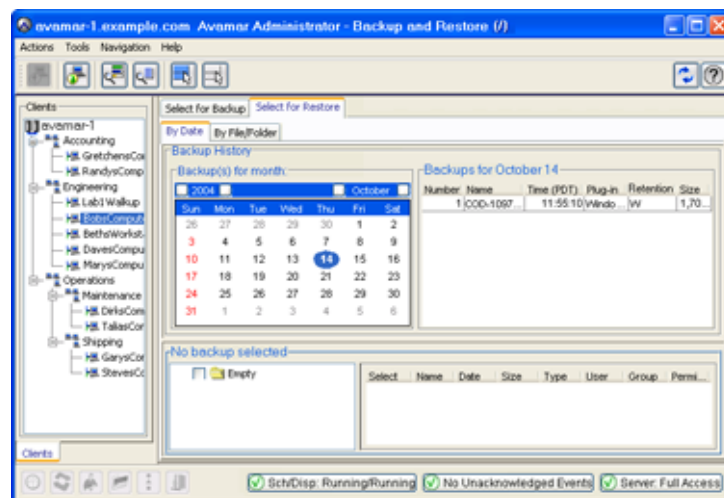
NOTICE

The activation setting for this client must be cleared in the Avamar Administrator. Otherwise, the client cannot successfully reactivate. This should have been done as part of the previous restore preparation.

6. Restore the *C:* partition and any application-specific data on other partitions by performing the following:
 - a. In Avamar Administrator, click the **Backup & Restore** launcher button.

The Backup and Restore window appears.

- b. Click the **Select for Restore** tab.

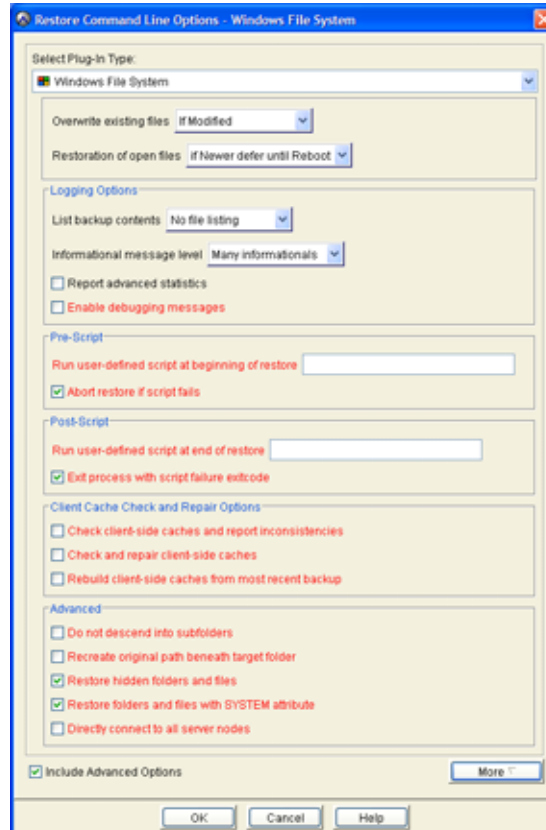


- c. In the Clients tree, select the original Windows client.

- d. Find and select the backup you previously used to restore the Windows system state file in “Restore Windows system state file (SystemState.bkf) with Avamar” on page 158.
- e. Select the entire C:\ partition and any application-specific data on other partitions.
- f. Select **Actions > Restore Now**.

The Restore Command Line Options dialog box appears.

- g. Select **Include Advanced Options** to expand the displayed options.



- h. From the **Overwrite existing files** list, select **If Modified**.
- i. From the **Restoration of open files** list, select **If Newer defer until Reboot**.
- j. In the **Advanced** section, select **Restore hidden folders and files** and **Restore folders and files with SYSTEM attribute**.

NOTICE

Ensure that the **Recreate original path beneath target folder** option remains cleared (the default setting).

- k. Click **OK**.

The Restore Options dialog box closes and the restore operation begins.

7. Wait for the restore operation to complete.
8. Reboot this Windows client.

NOTICE

You might need to reinstall some device drivers following the restore. To do this, open Windows Device Manager, look for any device driver problems (indicated by an icon with a black exclamation mark on a yellow background), and right-click **Update driver...** Windows should be able to locate the proper driver in the restored filesystem and update it.

Restore other partitions (as required) with Avamar

After the system successfully reboots:

1. If there are additional partitions that need to be restored, restore them at this point.
2. Change EMC Client Service to run as previously configured.
3. Disable or delete the temporary restore account.

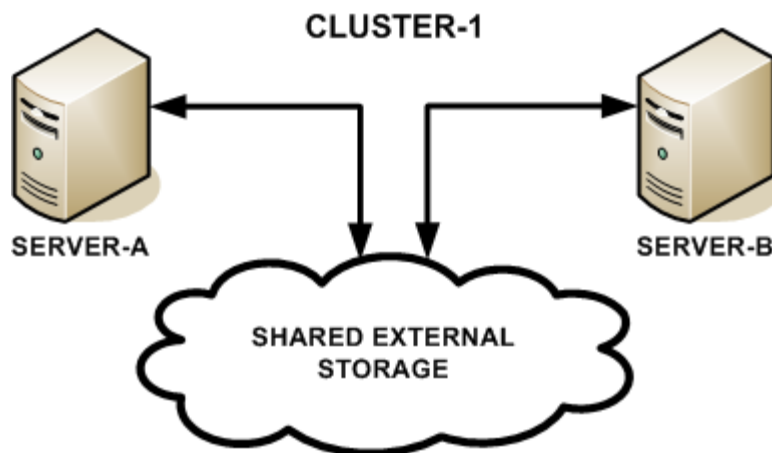
Support for Microsoft Windows Clusters

The following topics explain how to protect Microsoft Windows cluster environments:

- ◆ [Windows cluster concepts](#)..... 168
- ◆ [Roadmap for setting up Avamar on a Microsoft Windows cluster](#) 169
- ◆ [Capabilities, limitations, and best practices](#) 169
- ◆ [Configuring the Avamar Client for Windows Clusters](#) 171
- ◆ [Upgrading the Avamar for Windows Cluster Client](#) 174
- ◆ [Advanced information for multi-homed clusters](#) 176

Windows cluster concepts

For clarity, consider a greatly simplified Microsoft Windows cluster comprising two servers (SERVER-A and SERVER-B) and some amount of shared external storage. Further consider that this cluster hosts an SQL Server database.



Cluster groups and resources. — For purposes of this discussion, a cluster group (CLUSTER-1) is defined with cluster nodes SERVER-A and SERVER-B, the SQL Server database instance and a designated area of the shared external storage (for example, drive S:) declared as resources.

Online and offline cluster groups. — SERVER-A is activated as the owner of CLUSTER-1. Users now transparently access that SQL Server database instance which is running on SERVER-A by way of a virtual IP address and hostname assigned to the cluster group. Data is written to and read from the designated area of the shared external storage (for example, drive S:). SERVER-B is not the owner at this time and cannot access drive S: at all.

In a virtual cluster group, at any given time only one server in each cluster can access the shared external storage for a single shared application; that server is called the *active* node. The other server will be offline or standing by; that server is sometimes referred to as the *passive* node. In normal day-to-day operations, the active and passive roles are frequently rotated between the servers.

Required resources. — In order to properly protect data residing on this Microsoft cluster, the following resources must be defined for it:

- ◆ IP address
- ◆ Network name
- ◆ Shared external storage

The Quorum disk must be in the default cluster group.

The Microsoft cluster documentation provides additional detailed technical information.

Roadmap for setting up Avamar on a Microsoft Windows cluster

To properly protect data residing on this Microsoft cluster, you must:

1. Install the standard Avamar Client for Windows on all nodes in the cluster (SERVER-A and SERVER-B in the example) according to the instructions found in [“Installing the Avamar Client for Windows” on page 24](#).

NOTICE

The Avamar Windows Client must be installed to the same directories on all cluster nodes. For example, if you install the Avamar client to C:\AVS1 on the first node SERVER-A, you must install the Avamar client to the same directory C:\AVS1 on SERVER-B and all other nodes in the cluster.

2. Register the Avamar Client for Windows on each machine according to the instructions found in [“Registering the Avamar Client for Windows” on page 27](#).

This protects data residing on the internal hard disk drives of both SERVER-A and SERVER-B.

NOTICE

Each node (SERVER-A and SERVER-B in the example) will be managed as individual clients in Avamar Administrator and this will allow you to schedule backups of data residing on each server’s internal hard disk drive.

3. Configure the Avamar Client for Windows Clusters on the active node (the server that currently has access to the shared external storage) according to the instructions found in [“Configuring the Avamar Client for Windows Clusters” on page 171](#).

NOTICE

The Avamar Cluster Client only needs to be configured on the active node of the cluster.

Capabilities, limitations, and best practices

Avamar supports the following server platforms and applications in both active-passive and active-active configurations.

32-bit clusters on Windows Server 2003 (x86):

- SQL Server 2005 and 2008 (x86)
- Exchange 2003 (x86)
- Lotus Domino 6.5, 7.0, and 8.0x (x86)

64-bit clusters on Windows Server 2003 (x64):

- SQL Server 2005 and 2008 (x64)
- Exchange 2007 (x64)

32-bit clusters on Windows Server 2008 (x86):

- SQL Server 2008 (x86)
- Oracle 11g(x86)

64-bit clusters on Windows Server 2008 (x64):

- SQL Server 2008 (x64)
- Exchange 2007 (x64)
- Oracle 11g(x64)

NOTICE

Exchange 2003 is only available as a 32-bit application and is therefore not supported on 64-bit server platforms.

Do not mix individual client filesystem data with shared cluster data in the same dataset

If you access one of the cluster clients in Avamar Administrator, it will be possible to view shared external storage belonging to the cluster. However, you should not under any circumstances allow that data to be backed up with that client. In fact, you should explicitly exclude any shared cluster directories from the Avamar dataset that will be used to back up the individual client internal hard disk drive.

Conversely, if you access the cluster client in Avamar Administrator, it will be possible to view the internal filesystem of each client. However, you should not under any circumstances allow that data to be backed up as part of shared cluster data. In fact, you should explicitly exclude any internal client directories from the Avamar dataset that will be used to back up the cluster shared external storage.

Mixing individual client filesystem data with shared cluster data might compromise the ability to properly restore shared cluster data in the future.

Microsoft “Windows Compute Clusters” is not supported

Microsoft now offers two different products with the word “cluster” in the name:

- ◆ Windows Clustering is the term applied to the cluster product supported by the cluster-enabled Avamar Client for Windows software. Microsoft also refers to this product as a “server cluster.”
- ◆ Another Microsoft product called a “Windows Compute Cluster” is a relatively recent offering and is not supported by the cluster-enabled Avamar Client for Windows software.

Do not back up the Quorum drive

Microsoft explicitly advises that no attempts should ever be made to back up or restore the Quorum drive. This cluster resource must always remain under exclusive control of the cluster. Therefore, examine any Avamar datasets to ensure that the resource is not being backed up. Explicitly excluding the Quorum drive is the surest way to accomplish that.

NOTICE

Drive *Q:* is commonly mapped to the Quorum drive in many Microsoft Windows cluster environments. If this is the case in your environment, do not under any circumstances install any Avamar software on drive *Q:*. Also ensure that drive *Q:* is excluded from any backup dataset.

Activate physical nodes of the cluster on the Avamar server before configuring the Avamar Cluster Client

When configuring a Windows cluster with the Avamar Cluster Configuration tool, all physical nodes of the cluster must be activated on the Avamar server before running the tool.

Configuring the Avamar Client for Windows Clusters

The Avamar Windows Cluster Client only needs to be configured on the active node of the cluster.

NOTICE

For Windows clusters, you must install the Avamar Client for Windows on all nodes of the cluster. Also, they must be installed to the same directories on all cluster nodes. For example, if you install the Avamar client to C:\AVS1 on the first node, you must install the Avamar client to the same directory C:\AVS1 on all other nodes in the cluster.

Before you can configure the Avamar Windows Cluster Client, you must complete the following prerequisites:

1. Install the Avamar Client for Windows on all nodes in the cluster according to the instructions found in [“Installing the Avamar Client for Windows” on page 24](#).
2. Register each Avamar Client for Windows according to the instructions found in [“Registering the Avamar Client for Windows” on page 27](#).

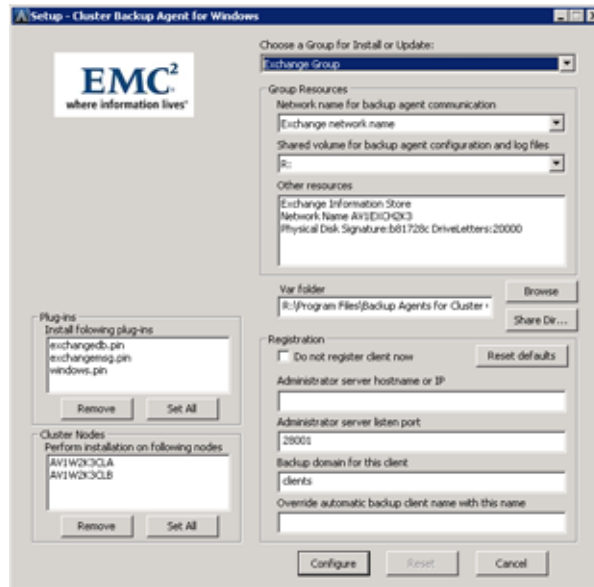
If you have already installed and registered the Avamar Windows Client on each node in the cluster, then complete the following steps on the active node only:

1. Determine which server in the cluster currently has access to the shared external storage for that cluster.

This server is the active node for that cluster.

2. Log in to the active node in the Windows cluster.
3. From the avs\bin directory, run **AvamarClusterConfiguration.exe**.

The Setup - Cluster Backup Agent for Windows dialog box appears.



4. Complete the settings as described in [Table 8 on page 172](#):

Table 8 Cluster Backup Agent for Windows settings (page 1 of 3)

Setting	Description
Choose a Group for Install or Update	Select the correct cluster group, on which you want to install this software, from this list box
Group resources	
Network name for backup agent communication	Select the network name to use for Avamar client and server communication. Note: This list contains all network names (hostnames) assigned to the cluster group.
Shared volume for backup agent configuration and log files	Select the shared external storage drive on which to install this software. Note: This list contains all shared external storage drives assigned to this cluster group.
Var folder	Specify the path to a shared network folder where the configuration and log files are to be placed. If a shared volume is available, this field is automatically filled in by default. Type the UNC path or click Browse to specify an existing folder, or click Share Dir to create a shared folder. Note: All nodes of the cluster must have write access to the shared network folder.

Table 8 Cluster Backup Agent for Windows settings (page 2 of 3)

Setting	Description
Registration	
Do not register client now	Select to prevent client registration with the Avamar server. You must manually register and activate the client before you can back up any data.
Administrator server host name or IP address	Type the Administrator server network hostname as defined in DNS.
Administrator server listen data port	Use the default data port of 28001 for Avamar client-server communication unless you are using a different data port. Consult the Avamar system administrator for the specific data port to use when registering this client.
Backup domain for this client	Type the name of the Avamar domain for this client. The default domain is "clients." However, the Avamar system administrator might have defined other domains and subdomains. Consult the Avamar system administrator for the specific domain to use when registering this client. If typing a subdomain (for example, clients/MyClients), do not include a slash (/) as the first character. A slash as the first character causes an error and prevents you from registering this client.
Override automatic backup client name with this name	To use a name other than the cluster group name, type another name in this field for this Avamar backup client.

Table 8 Cluster Backup Agent for Windows settings (page 3 of 3)

Setting	Description
Plug-ins	
Install following plug-ins	<p>Displays all plug-ins currently installed that will work on clusters. Usually, changing the defaults is not necessary. To prevent Avamar from using a particular plug-in, select it and click Remove.</p> <p>To reload the complete list of plug-ins that were displayed when you opened this window, click Set All.</p> <hr/> <p>Note: The plug-in avmoss.pin must be included in this list.</p> <hr/>
Cluster nodes	
Perform installation on following nodes	<p>Displays a list from Windows cluster services of all nodes that are part of the cluster. Usually, changing the defaults is not necessary.</p> <p>If there is a node on the cluster that you do not want the cluster backup agent service installed on, select the item and then click Remove.</p> <p>To reload the complete list of nodes that are part of this cluster, click Set All.</p>

5. Click **Configure**.

You will be prompted for credentials to run the Avamar service.

When installation is complete, a message box will confirm that the configuration of the client is complete, and will list the plug-ins that were configured. After you click **OK**, the setup dialog box appears, and the **Configure** button will be unavailable.

NOTICE

If the Var folder is on a network share, you must start the backup cluster agent from an account that has full access permissions to the folder where Avamar log files are written.

Upgrading the Avamar for Windows Cluster Client

The steps for upgrading the Avamar for Windows Cluster Client depend on which version of Avamar you are upgrading from:

- ◆ To upgrade a Windows Cluster Client that was installed from Avamar 5.x or later, up to the current version, you do not need to uninstall the old version, you just need to reset Windows Cluster Client. Follow the steps in [“Resetting the Avamar Client for Windows Clusters” on page 175](#).
- ◆ To upgrade a Windows Cluster Client that was installed from Avamar 4.x or earlier, you must uninstall the old Windows Cluster Client, and then install the new cluster client. Follow the steps in [“Upgrading an older version of Windows Cluster Client from Avamar 4.x or earlier” on page 175](#).

Resetting the Avamar Client for Windows Clusters

Resetting the Avamar Windows Cluster Client, like configuring the Avamar Windows Cluster Client, is performed on the active node in the cluster. You do not perform the reset steps on every node in the cluster.

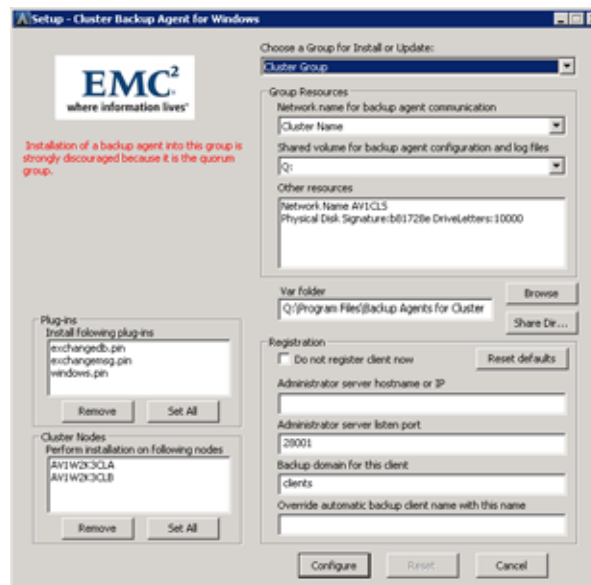
NOTICE

EMC recommends that all cluster nodes are operational during the reset process.

To upgrade or reset the Windows Cluster Client that was installed from Avamar 5.x or later, or the current version of Avamar:

1. Log in to the active node in the Windows cluster.
2. From the avs\bin directory, run **AvamarClusterConfiguration.exe**.

The Setup - Cluster Backup Agent for Windows dialog box appears.



3. In **Choose a Group for Install or Update**, select the cluster group that you want to uninstall.
4. Click **Reset**.

Upgrading an older version of Windows Cluster Client from Avamar 4.x or earlier

When upgrading a cluster client installed from Avamar 4.x or earlier:

1. Complete the steps in ["To uninstall a cluster client previously installed from Avamar 4.x or earlier" on page 176](#)
2. Complete the steps in ["To upgrade to Avamar Cluster Client" on page 176](#)

To uninstall a cluster client previously installed from Avamar 4.x or earlier

1. Take the cluster offline with the cluster administration tool that corresponds with the version of Windows Server:
 - a. In Windows Server 2008, open **Fallover Cluster Management**.
-or-
In Windows Server 2003, open **Administrator Tools > Cluster Administrator**.
 - b. Right-click the Backup Agent service and take it offline.
2. On the passive node, in Add/Remove Programs, uninstall all Avamar clients: Windows Client and Windows Cluster Client.
3. On the active node, in Add/Remove Programs, uninstall all Avamar clients: Windows Client and Windows Cluster Client.
4. Using the cluster administration tool again, delete the Backup Agent resource.
The uninstall of all Avamar clients on the passive and active nodes is complete.

To upgrade to Avamar Cluster Client

NOTICE

When installing the clients, use the same Var folder as the previous Avamar installation. Uninstall does not remove this folder, so your config and log files will still be available there.

1. Install the Windows Client on each node, following the steps in [“Installing the Avamar Client for Windows” on page 24](#) and [“Registering the Avamar Client for Windows” on page 27](#).
2. Configure the Avamar Cluster Client on the active node, following the steps in [“Configuring the Avamar Client for Windows Clusters” on page 171](#).

Advanced information for multi-homed clusters

Plug-ins connect to their corresponding services using the IP address to which the plug-in is bound. If the service is not configured to listen on that IP address, the plug-in will not be able to connect.

For example, on a multi-homed cluster, if the Avamar backup agent is bound to one IP, and Exchange or SQL is bound to a different IP, many key Avamar features such as browsing, backup, and restore will not work.

Therefore, to properly configure multi-homed cluster environments for use with Avamar, you must modify the primary network name such that it depends on both IP addressees.

APPENDIX A

Plug-in Options

The following topics provide information about backup and restore plug-in options for the Avamar client for Windows:

- ◆ [How to set plug-in options](#) 178
- ◆ [Windows file system backup options](#)..... 178
- ◆ [Windows file system restore options](#) 182

How to set plug-in options

Plug-in options enable you to control specific actions for on-demand backups, restores, and scheduled backups. The plug-in options that are available depend on the operation type and client plug-in type.

You specify plug-in options in Avamar Administrator for on-demand backup or restore operations, or when you create a dataset for a scheduled backup. You can set options by using the graphical user interface (GUI) controls (text boxes, check boxes, radio buttons, and so forth). In addition to using the GUI controls for the options, you can type an option and its value in the Enter Attribute and Enter Attribute Value fields.

NOTICE

The Avamar software does not check or validate the information you type in the Enter Attribute and Enter Attribute Value fields. In addition, the values in the Enter Attribute and Enter Attribute Value fields override settings that you specify with the GUI controls for the options.

Detailed instructions on how to access and set plug-in options during a backup or restore are available in [Chapter 2, "Backup,"](#) [Chapter 3, "Recovery,"](#) and [Chapter 4, "Client System Disaster Recovery."](#)

Windows file system backup options

The following options are available for the Avamar plug-in for the Windows file system when you perform an on-demand backup or when you configure a dataset for scheduled backups.

Table 9 Windows file system plug-in options for backup (page 1 of 4)

Option	Description
Back up Natively Attached Virtual Hard Disks	Specifies to back up natively attached Virtual Hard Disks for Windows 7 and Windows Server 2008 R2 clients.
Avamar Server Restore Option (HBE)	Create a Windows system profile for inclusion in backup, for use with HomeBase Embedded (HBE) recoveries. Note: This feature is unsupported in Avamar 6.1 or later.
Back up System State (Windows 2003 only)	If selected, include Windows 2003 and XP system state information so that this backup can be used for future disaster recovery.
Backup label	Assigns a descriptive label to the backup.
Logging Options	
List backup contents	Specifies how much information about the backup contents should be included in the log files. One of the following: <ul style="list-style-type: none"> • No file listing • List file names • List files and dates

Table 9 Windows file system plug-in options for backup (page 2 of 4)

Option	Description
Informational message level	Specifies how many informational messages should be included in the log files. Select one of the following: <ul style="list-style-type: none"> No informationals — All informational messages are suppressed. However, errors and warnings are included in the log files. Some informationals — Some informational messages are included in the log files. Many informationals — Additional status information is included in the log files. All informationals — Provides maximum information. In addition to errors and warnings, all informational messages are included in the log files.
Report advanced statistics	If selected, advanced timing and deduplication statistics are written to log files.
Enable debugging messages	If selected, maximum information is written to log files, and very large log files are created.
File System Traversal	
Do not traverse any mounts	If selected, no mount points are traversed during this backup.
Traverse fixed-disk mounts	If selected, only fixed-disk filesystem mount points are traversed during this backup.
Traverse fixed-disk and remote network mounts	If selected, both fixed-disk and NFS network mount points are traversed during this backup.
File System Traversal Overrides	
Force traversal of specified file system type(s)	Accepts a comma-separated list of one or more filesystem types (for example, nfs, ext2, jfs, xfs) that should be traversed during this backup.
Force non-traversal of specified file system type(s)	Accepts a comma-separated list of one or more filesystem types (for example, nfs, ext2, jfs, xfs) that should not be traversed during this backup.
Pre-Script	
Run user-defined script at beginning of backup	Runs a user-defined script at the beginning of the backup session. Note: The script must be located in C:\Program Files\avs\etc\scripts on Windows and must have a .bat, .js, or .vbs extension.
Abort backup if script fails	If selected, stop the backup if the script returns a non-zero status code.

Table 9 Windows file system plug-in options for backup (page 3 of 4)

Option	Description
Script After Freeze	
Run user-defined script after volumes have been frozen	Runs a user-defined script after volumes have been frozen. Note: The script must be located in C:\Program Files\avs\etc\scripts on Windows and must have a .bat, .js, or .vbs extension.
Abort backup if script fails	If selected, stop the backup if the script returns a non-zero status code.
Post-Script	
Run user-defined script at end of backup	Runs a user-defined script at the end of the backup session. Note: Script must be located in C:\Program Files\avs\etc\scripts on Windows and must have a .bat, .js or .vbs extension.
Exit process with script failure exitcode	If selected, avtar exits with the exit code of the script instead of a standard avtar exit code.
Volume Freezing Options	
Method to freeze volumes	One of the following: <ul style="list-style-type: none"> • Best • Microsoft VSS • OTM • None
OTM freezewart: File activity quiescent time	OTM only: Number of seconds that volume(s) must be quiescent to establish a freeze.
OTM freezetimeout: Maximum time to wait when trying to freeze volume(s)	OTM only: Maximum number of seconds to wait for volumes to freeze.
OTM freezecachesize: Size in MBs of OTM transaction cache	OTM only: Size of the disk transaction cache. A negative value is a fraction of used disk space. For example, -50 is 1/50th or 2%.
OTM freezecachedir: Folder to use for the OTM transaction cache	OTM only: Path of a folder to store the OTM transaction cache. The default location is the Avamar VAR folder.
Freeze exclude devices	Comma separated list of devices (for example, \Device\mydevice*) to exclude from volume freezing.
Freeze exclude volumes	Comma separated list of volume names (for example, C:) to exclude from freezing.

Table 9 Windows file system plug-in options for backup (page 4 of 4)

Option	Description
Client Cache Options	
Check client-side caches and report inconsistencies	If selected, a backup is not performed. Instead, it forces a validation check of the client-side cache with the Avamar server.
Check and repair client-side caches	If selected, a backup is not performed. Instead, it forces a validation check of the client-side cache with the Avamar server, and repairs inconsistencies.
Maximum client file cache size (MBs)	Specifies the maximum client file cache size in MBs. A negative value indicates a fraction of RAM. For example, -8 specifies that no more than 1/8th of physical RAM be allocated to the client file cache.
Maximum client hash cache size (MBs)	Specifies the maximum client hash cache size in MBs. A negative value indicates a fraction of RAM. For example, -8 specifies that no more than 1/8th of physical RAM be allocated to the client hash cache.
Advanced Options	
Client-side flag file	Specifies the path to a flag file on the client that contains additional option settings.
Network rate throttle (Mbps)	Specifies a setting that reduces network usage to a specified rate, expressed as megabits/second (for example, 0 = unrestricted, 50% of a T1 = 0.772).
Directly connect to all server nodes	If selected, establish multiple connections to the server. This can improve backup performance under certain circumstances.
Use Last Access Time to detect ACL-only changes	If selected, it forces a rescan of any files in which the Access Time has changed since the previous backup.
Run as user name	Specifies the user name to run this plug-in on this client.
Enter Attribute	Allows you to specify a command or attribute.
Enter Attribute Value	Allows you to specify a flag or value for the attribute.

Windows file system restore options

The following options are available when you perform a restore using the Avamar plug-in for the Windows file system.

Table 10 Windows file system plug-in options for restore (page 1 of 2)

Option	Description
Overwrite existing files	Controls behavior when file to be restored already exists. Select one of the following: <ul style="list-style-type: none"> • Never • Always • Generate New Name • If Modified • If Newer
Restoration of open files	Select one of the following: <ul style="list-style-type: none"> • Never — Do not restore. • Defer until reboot — Defer restore until the system is rebooted. • Generate new name — Restore the file with a different name. • If newer defer until reboot
Logging	
List backup contents	Specifies how much information about the backup contents should be included in the log files. Select one of the following: <ul style="list-style-type: none"> • No file listing • List file names • List files and dates
Informational message level	Specifies how many informational messages should be included in the log files. Select one of the following: <ul style="list-style-type: none"> • No informationals — All informational messages are suppressed. However, errors and warnings are included in the log files. • Some informationals — Some informational messages are included in the log files. • Many informationals — Additional status information is included in the log files. • All informationals — Provides maximum information. In addition to errors and warnings, all informational messages are included in the log files.
Report advanced statistics	If selected, advanced timing and deduplication statistics are written to log files.
Enable debugging messages	If selected, maximum information is written to log files. Note: If selected, very large log files are created.

Table 10 Windows file system plug-in options for restore (page 2 of 2)

Option	Description
Pre-Script	
Run user-defined script at beginning of restore	Runs a user-defined script at the beginning of the restore session. Note: The script must be located in C:\Program Files\avs\etc\scripts on Windows and must have a .bat, .js, or .vbs extension.
Abort restore if script fails	If selected, stop the restore if the script returns a non-zero status code.
Post-Script	
Run user-defined script at end of restore	Runs a user-defined script at the end of the restore session. Note: The script must be located in C:\Program Files\avs\etc\scripts on Windows and must have a .bat, .js, or .vbs extension.
Exit process with script failure exitcode	If selected, avtar exits with the exit code of the script instead of a standard avtar exit code.
Client Cache and Repair Options	
Check client-side caches and report inconsistencies	If selected, a restore is not performed. Instead, it forces a validation check of the client-side cache with the Avamar server.
Check and repair client-side caches	If selected, a restore is not performed. Instead, it forces a validation check of the client-side cache with the Avamar server, and repairs inconsistencies.
Rebuild client-side caches from most recent backup	Does not restore data. If selected, the contents of the last backup are used to re-create the client-side file cache.
Advanced Options	
Do not descend into subdirectories	If selected, restore only the specified top-level directory; do not restore any subdirectories.
Recreate original path beneath target directory	If selected, re-create the original path to files and directories beneath the specified target directory. For example, if you restore F:\Temp\MyFile.txt to C:\Temp and you select this option, then the full path to the restored file is C:\Temp\F\Temp\MyFile.txt.
Restore hidden folders and files	If selected, also restore folders and files that have the HIDDEN attribute set in the backup.
Restore folders and files with SYSTEM attribute	If selected, also restore folders and files that have the SYSTEM attribute set in the backup.
Directly connect to all server nodes	If selected, establish multiple connections to the server. This can improve restore performance under certain circumstances.
Run as user name	Specifies the user name to run this plug-in on this client.
Enter Attribute	Allows you to specify a command or attribute.
Enter Attribute Value	Allows you to specify a flag or value for the attribute.

Windows VSS backup options

The following options are available for the Avamar plug-in for Windows VSS when you perform an on-demand backup or when you configure a dataset for scheduled backups.

Table 11 Windows VSS plug-in options for backup

Option	Description
Backup Type	Sets the backup level. Note: Full is the only backup level supported by the Avamar plug-in for Windows VSS.
Create Disaster Recovery Backup	Selected by default. If the checkbox is cleared, a disaster recovery backup is not performed when the system state backup is processed. Note: Do not disable this option. Disabling this option makes backups faster. However, the backups are not valid for performing a disaster recovery. One exception is when you perform a backup of Active Directory. For Active Directory backups, you can clear this checkbox.
Backup label	Assigns this descriptive label to the backup.
Ignore third-party services when identifying critical volumes	The Windows Server 2012 System Writer has a new component called "Win32 Services Files". This component is used to identify third-party services that Microsoft does not consider to be part of system state. This option allows the Windows VSS plug-in to classify a volume containing third-party services as non-critical.
Advanced Options	
Temporary directory for the plug-in	User-defined temporary directory.
Enable debugging messages	If selected, maximum information is written to log files. Note: If selected, very large log files are created.
Command line flags	
--exclude-non-critical-dynamic-disks	According to Microsoft Best Practices, if any dynamic disk is critical then the entire dynamic disk pack should be treated as critical and included in the backup. Set this flag to 'true' if non-critical dynamic disks should be excluded from the backup. If this option is used it may be necessary to use --exclude_non_critical_disks during the offline disaster recovery. You can specify this option in the Backup Command Line Options dialog box, in a scheduled backup dataset definition, or in the avvss.cmd file.
--vss-ignore-missing-windows-files	Setting this option to 'true' will allow the backup to ignore any missing VSS writer files. The backup will fail if VSS writers contain files that do not exist on the computer. You can specify this option in the Backup Command Line Options dialog box, in a scheduled backup dataset definition, or in the avvss.cmd file.

Windows VSS restore options

The following options are available when you perform a restore using the Avamar plug-in for Windows VSS.

Table 12 Windows VSS plug-in options for restore

Option	Description
Advanced Options	
Temporary directory for the plug-in	User-defined temporary directory.
Enable debugging messages	If selected, maximum information is written to log files. Note: If selected, very large log files are created.
Command line flags	
--allow_partial_system_state	Allows partial system state to be restored online. Currently only supported for Active Directory. You can specify this option in the Restore Command Line Options dialog box.
--exclude-non-critical-disks	By default non-critical disks are always excluded from disaster recovery preparation so that they will not be reformatted. Setting this flag to 'false' provides a workaround if the disaster recovery fails because of configuration changes. For example, if the dynamic disk configuration has changed. This flag is used only during offline disaster recovery. You can specify this option in the Avamar System Recovery Wizard on the System Recovery Summary page, Options.

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