

EMC Avamar and EMC HomeBase Windows Server 2003 Recovery

Best Practices Planning

Abstract

This white paper describes an efficient, media-less, rapid application recovery solution enabling automated recoveries even to dissimilar hardware for Microsoft Windows 2003 servers. The EMC[®] Avamar and HomeBase solutions provide organizations with the ability to efficiently protect critical data, to any location, as well as completely recover the server, storage, and application configurations to similar or dissimilar hardware.

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Executive summary

Companies have recognized the need to ensure that mission-critical data is always available regardless of hardware or site location. Many have deployed realtime or near realtime data replication solutions to insulate themselves from prolonged outages. However at the time of server, site, or regional disasters these companies are still faced with the daunting task of quickly recovering application servers, as applications are the portal between the users and the data. The fact that these recoveries will most likely be to dissimilar hardware adds another level of complexity.

Introduction

This white paper describes a media-less, automated, application recovery solution to similar or dissimilar hardware for Microsoft Windows 2003 servers. The paper begins with an overview of the EMC® Avamar and EMC HomeBase solutions, and then detailed instructions are provided for a Windows Server 2003 recovery.

Audience

This white paper is intended for system and storage professionals working in the following areas:

- Technology management and administration
- Technology design and architecture
- Backup, recovery, and disaster recovery
- Systems support
- Windows Server administration

To understand this paper and perform the operations herein, the reader should be familiar with:

- Windows Server administration
- EMC's Avamar solution
- EMC's HomeBase solution
- General backup and recovery operations and principles

Overview of the problem and opportunity

In today's competitive business environment, the value of electronic information is increasing every day. A major directive around the board room is to ensure that critical data and systems are protected against outages, data loss, corporate espionage, and site or regional disasters. As application servers are the traditional portals to corporate data, it is imperative that they be as recoverable as the data they create. Where most businesses have deployed some form of data protection, few have given the proper thought to the protection and recoverability of the server, storage, and application configurations. As server and storage hardware technologies are always changing, application recoveries have become even more challenging. In addition, no company can be assured of identical hardware in a recovery event. Business resilience must provide the ability to rapidly recover from data, hardware, site, and regional outages even to dissimilar hardware environments in alternate locations. Yet, the traditional cost of this level of resilience has been outside the budgets of most companies.

EMC Avamar

EMC Avamar backup and recovery software with integrated source/global data de-duplication solves the challenges associated with traditional backup, enabling fast, efficient protection for remote offices, VMware environments, and data center LANs. Unlike traditional backup solutions, Avamar identifies redundant data segments at the source — before transfer across the network. By moving only new, unique

sub-file data segments, Avamar delivers fast daily full backups while reducing the required daily network bandwidth by up to 500x. This allows companies to utilize existing network bandwidth for backup and disaster recovery of remote offices and data centers, despite slow or congested networks and infrastructure. Data can be encrypted both in flight and at rest for added security, and centralized management makes protecting hundreds of remote offices easy and efficient.

By storing just a single instance of each sub-file data segment globally, Avamar also reduces total back-end storage by up to 50x for cost-effective disk-based recovery over extended periods of time. While EMC Avamar backs up data to disk, it can also work with existing tape and traditional backup software such as EMC NetWorker®. Finally, Avamar's grid architecture provides online scalability, and patented redundant array of independent nodes (RAIN) technology provides high availability.

EMC Avamar and EMC HomeBase solutions

The EMC Avamar and HomeBase solutions provide the ability to protect critical data and completely recover the server, storage, and application configurations, even to dissimilar hardware.

By combining Avamar's backup, recovery, and integrated data de-duplication technology and economical replication capabilities with HomeBase's ability to capture and recover server, storage, and application configurations, companies can meet their business resilience requirements.

The HomeBase Server works in conjunction with Avamar to capture and recover the complete server stack configuration and associated data, as illustrated in Figure 1.

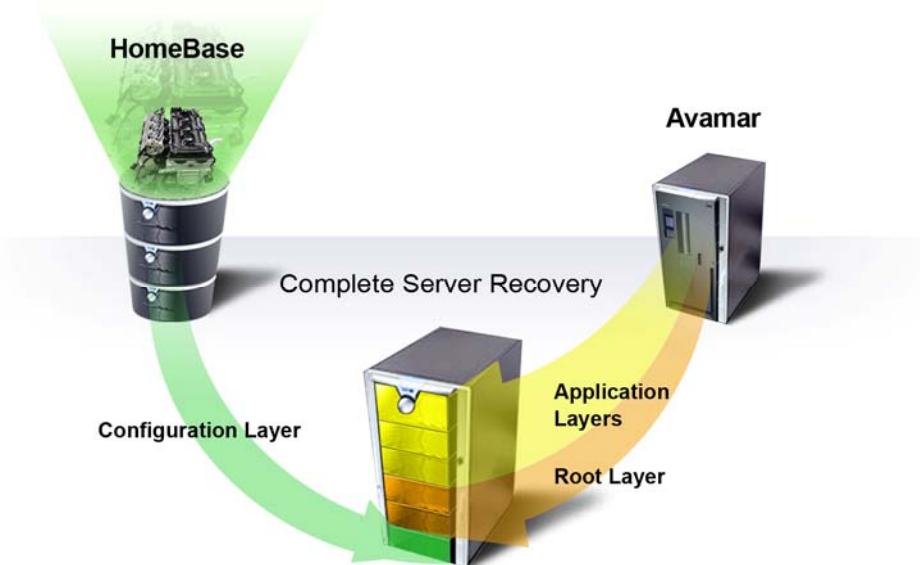


Figure 1. EMC Avamar and HomeBase capture and recover the complete server stack

Avamar and HomeBase procedure overview

The Windows Server recovery procedure is broken down into four simple steps. If correctly followed, these steps will help you recover the full functional capability of the source server described in the profile being used. The four recovery steps are shown in Figure 2.

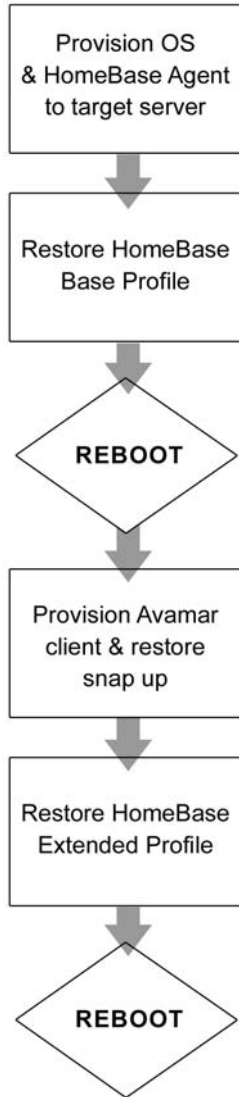


Figure 2. Four recovery steps

This diagram illustrates the typical flow and steps required to recover a server. Please consult the *EMC HomeBase Agent for Microsoft Windows Recovery and Migration Guide* for specific information to recover certain classes of applications. Specific instructions are provided for Active Directory, SQL Server, and Exchange Server.

Detailed instructions

Required EMC software

File name	Purpose
HomeBase Windows Agent version 6.1.4 or later	HomeBase software used to action profile recovery
HomeBase Server version 6.1.4 or later	Software used to control and automate recovery
Avamar Windows Client version 4.0.3-18 or later	Avamar software used to initiate data restore

Automatic provisioning of the target server operating system

The bare target server must be provisioned with the operating system and service packs that match the profile of the server being recovered.

The HomeBase Server can be configured to automatically deploy the base operating system with PXE boot (available with PXE-compatible network cards) or with a pre-created Boot-CD/TFTP. The *EMC HomeBase Server Installation and Administration Guide* provides details of how to set-up HomeBase to automatically install the Windows Server operating system.

With HomeBase, a Deployment Template is created, which can be used repeatedly to install the same configuration of an operating system to a new target as many times as required. If configured, the deployment process will also push and install the HomeBase Agent at the same time.

For this deployment template to install an operating system the system must be loaded into HomeBase. Instructions on how to prepare and upload an operating system into the HomeBase Server can be found in the *EMC HomeBase Server Installation and Administration Guide*.

Manual provisioning of the target server operating system

If manual installation of the operating system is preferred, the new target server must be provisioned with enough disk space to recover all of the partitions detailed in the profile. It is important that all disks are converted to be dynamic. To do this:

1. Right-click **My Computer** and select **Manage**.
2. Click **Disk Management**.
3. Right-click the disk and select **Upgrade to Dynamic Disks**.
4. Reboot the system twice.

The operating system should be installed in the same location on the target server as the source server, which is typically **C:\Windows** or **C:\WINNT**.

Once the operating system and HomeBase Agent are installed, the HomeBase Agent application will validate that the base operating system on the target server is correct for the profile being applied. If an incorrect base operating system is detected, HomeBase will report an error and stop running the recovery.

Installation of the EMC HomeBase Agent

The EMC HomeBase Agent can be automatically installed with the operating system on the target server with a Deployment Template. Instructions for creating and using a Deployment Template are in the *EMC HomeBase Server User Guide*.

Instructions for uploading the HomeBase Agent to the HomeBase Server for this process are in the *EMC HomeBase Server Installation and Administration Guide*.

The HomeBase Agent can also be installed manually.

Restoring the HomeBase base profile

The HomeBase base profile contains the key operating system elements needed to recover or migrate a Windows server. The base profile file is used to restore the system settings and configuration of the original server to the new server, including:

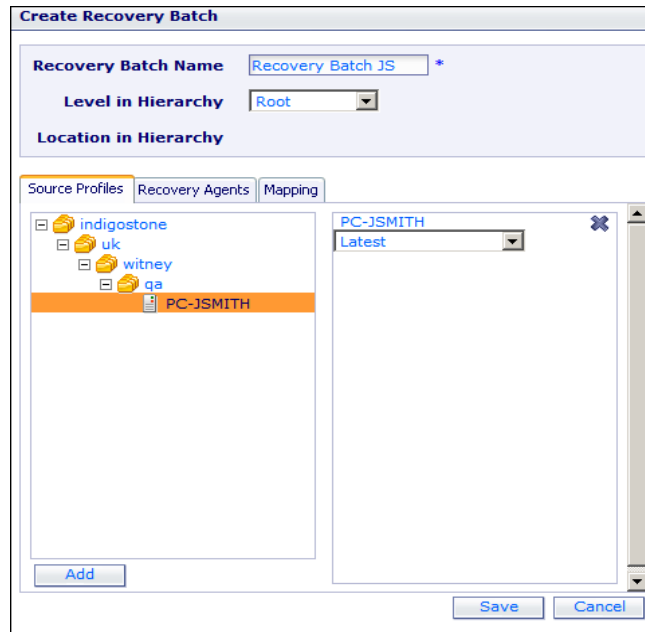
- Network interface settings
- IP configuration
- Storage structures
- Routing tables
- Locale settings
- Name service settings
- Swap and IPC configuration
- Detailed kernel settings
- User and group settings

Restore the base profile on the recovery server prior to any data restore. The user can use a Web browser to configure a batch job that defines the source profile to be restored onto the target server.

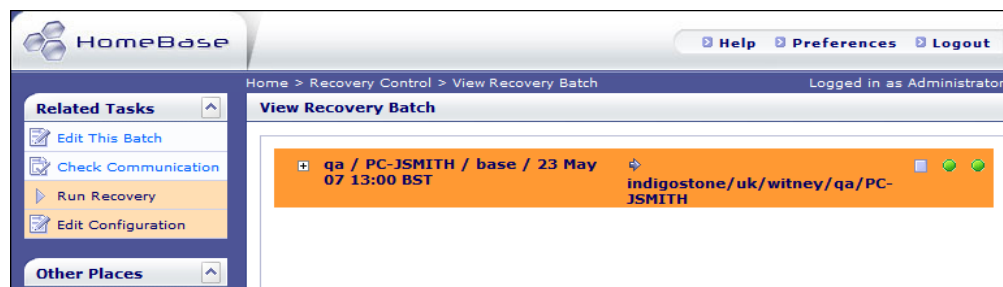
1. Log in to the HomeBase Server web interface and click **Recovery Control**.
2. Browse to the source server.



3. Select **Create Batch** in the **Related Tasks** list. The **Create Recovery Batch** page appears.



4. Create the batch job according to the instructions in the *EMC HomeBase Server User Guide*.
5. Select **Check Communication** from the **Related Tasks** list. Communication with the target server must be established before the recovery starts.
6. Highlight the recovery batch in the hierarchy and select **Run Recovery**.

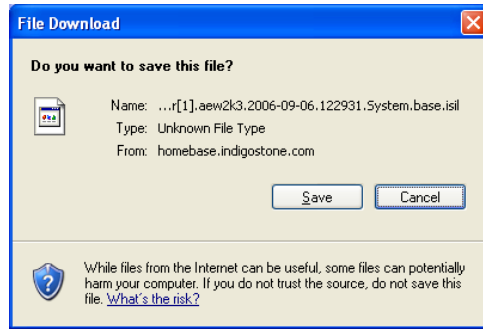


Manual restore of the HomeBase base profile

The base profile can be restored manually, if necessary.

Perform the following steps to manually restore the Base Profile:

1. Log in to the HomeBase web interface at the target machine.
2. Browse to the desired profile and select **From**. The **File Download** window appears.
3. Select **Save** to save the base profile to a convenient location on the target server.



After the base profile is downloaded, it can be applied.

1. On the target server, open a command window.
2. Type the following to begin the recovery. Please see EMC documentation for optional command line arguments.

```
hba recover <path\base_profile_file>
```
3. The recovery application will start to apply the selected base profile to the target server. The process will take a few minutes and can be monitored via the output produced on the console window.

Reboot

As the base profile has been successfully applied, the target server should be rebooted normally in preparation for the data recovery and application of the extended profile.

Note: The server *must* be booted into Directory Services restore mode.

Installation of the Avamar client

This step is required if the Avamar client has not already been automatically deployed/installed. The Avamar client needs to be installed to permit the reloading of application binaries and data that were present and backed up on the original server. To install the Avamar client on the target server:

1. Place the Avamar server name in the Windows host file `c:\Windows\system32`.
2. On the target server, open a web browser to point to the Avamar server:

```
https://AVAMARSERVER
```

where `AVAMARSERVER` is the Avamar server network hostname (as defined in DNS) or IP address.
3. The Secure Log On page appears. Log in to the Avamar server.
4. Page down and click the **Downloads and Documents** link.
The Downloads and Documents page appears.
5. Under Windows, click **NT, 2000, XP**.
A directory listing appears in the browser.
6. Click **AvamarClient-version.Windows.exe**.
The browser will prompt to either open the file in-place (on the server) or save it. If the file is saved, it must be opened for the installation to start.
7. Start the installation on the server.
The InstallShield Wizard appears.

8. Follow the on-screen instructions and click **Finish** to complete the installation.
9. Go to **Start > Programs > Avamar > Client** to load the client.
10. The Avamar icon appears in the system tray.



11. Copy the **exclude.AVAMAR** file from the HomeBase Agent installation directory (typically **C:\program files\EMC\HomeBase Agent\exclude**) to the **C:\Program Files\avs\var** directory on the target server.

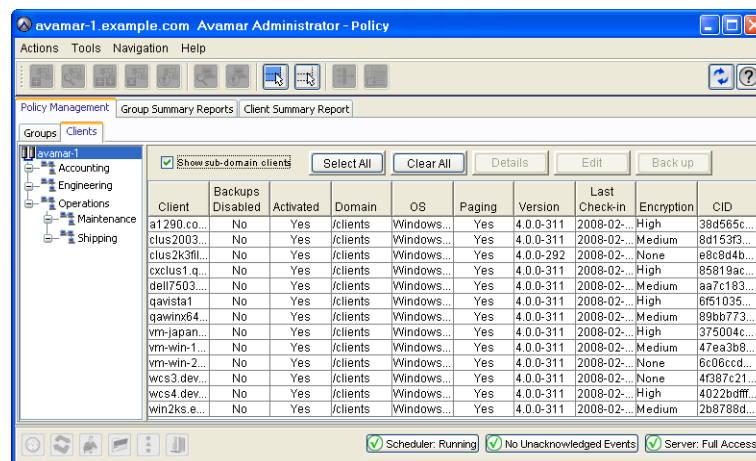
This file is created during the HomeBase base profile application process, and will be used by Avamar to dynamically exclude certain unwanted files from the data recovery.

Re-registering the Avamar client

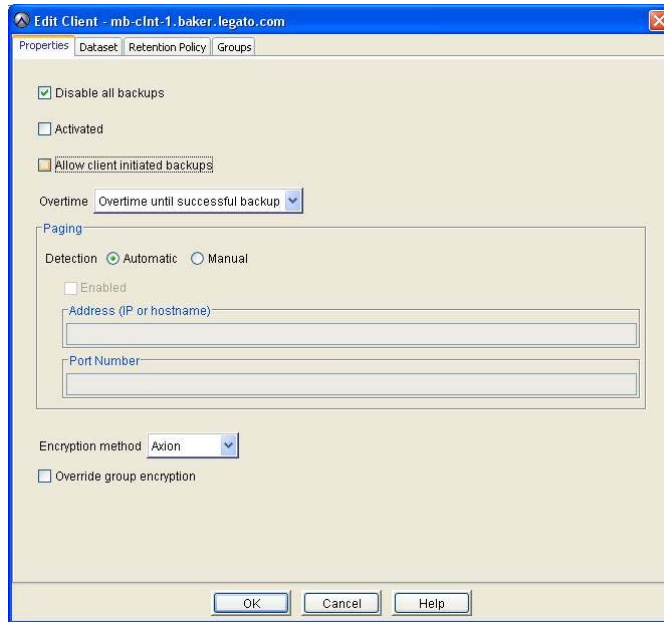
Before you can restore any data to the target server, the Avamar client must be re-registered with the Avamar server.

Because the target server name is now the same as the original source server name (now that the base profile has been applied), you cannot register it with the Avamar server until the existing **Activated** flag is cleared in the Avamar Administrator interface.

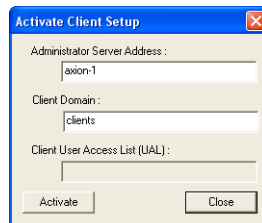
1. Open the Avamar Administrator.
2. Log in to the Avamar server to which the source server client is registered.
3. From the **Administrator** window, click the **Policy** button.
4. From the **Policy** window, click the **Clients** tab.
5. Expand the domain of the source client and click on the source client name.



6. From the menu, click **Actions > Client > Edit Client**.
7. Clear the **Activated** checkbox and click **OK**.



8. Close the Avamar Administrator.
9. Right-click the Avamar system tray icon.
A menu appears.
10. Choose **Activate**.
The **Activate Client Setup** dialog box appears.



11. Enter the following:
Administrator Server Address — Administrator server DNS hostname
Client Domain — Avamar domain where you want this client to reside
The default domain is **Clients**. However, the Avamar system administrator may have defined other domains and sub-domains. Consult your Avamar system administrator for the specific domain to use when registering this client.
IMPORTANT: If entering a sub-domain, such as *clients/windows*, do not include a slash (/) as the first character. Including a slash as the first character causes an error and will cause registration to fail.
Client User Access List (UAL) — Not used
12. Click **OK**.
13. A message is sent indicating registration was successful.

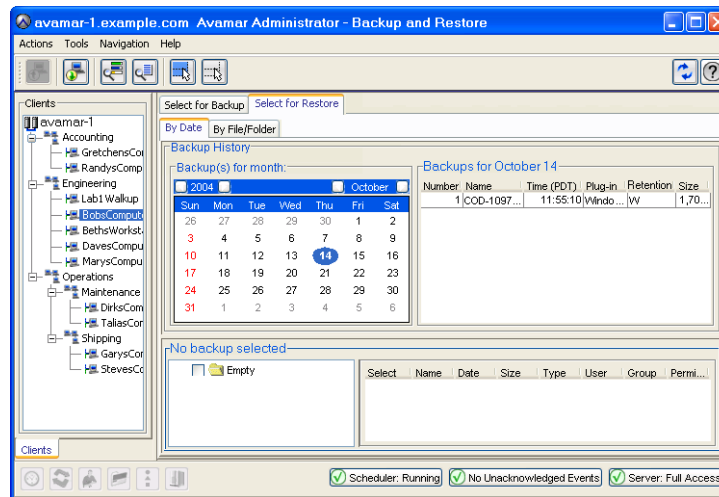
Restoring applications, binaries, and data with the Avamar client

Before data is restored, make sure that the following conditions are met:

- The following restore procedures are performed on the hard disk drives that contain the operating system information. Any hard disk restorations performed without operating system information are to be restored to their original locations with the standard default restoration options and without any exclusions or custom settings.
- Before performing any restore operations, open one command prompt window; failing to do so results in the opening of a command prompt window that is blank and has no characters.

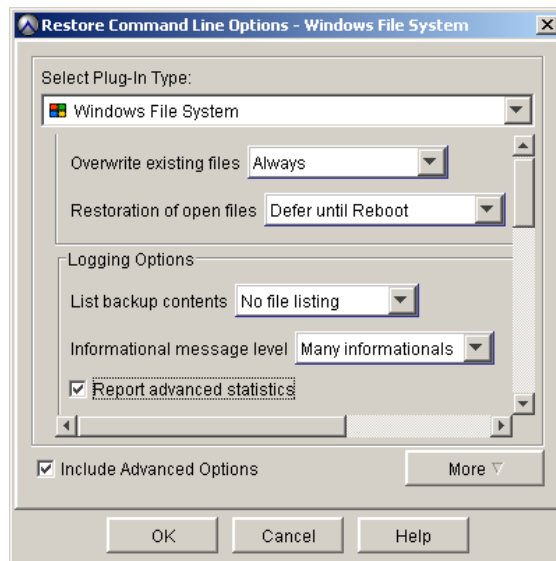
Perform the following to start the restore:

1. Start Avamar Administrator.
2. Click **Backup & Restore**.
The **Backup & Restore** window appears.
3. Click the **Select for Restore** tab.
4. In the Clients tree, select the source server client.
5. Click the **By Date** tab.
6. In the **Backup History** pane, browse to a valid backup date in the calendar.
7. Select a backup from the list directly to the right of the calendar.
8. In the **Contents of Backup** window, put a checkmark in the box next to the **C:** directory. A gray check appears in all of the directories and files below this to indicate that everything under this directory will be restored.

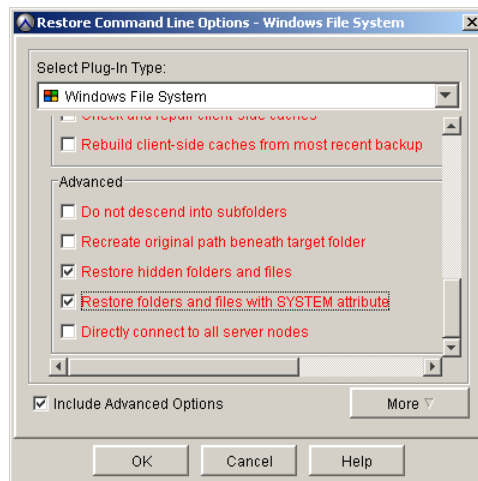


9. Make sure that the partition on the target server has enough free space to accept the data from the partition of the source server.
10. Select **Actions > Restore Now**. The **Restore Options** dialog box appears.
11. Select the **Restore everything to original location** radio button.

-
12. Click **Browse** to locate the target client for the restore, or enter this information in the **Absolute Destination** field.
 13. From the **Overwrite existing files** drop-down list, select **Always**.
 14. From the **Restoration of open files** drop-down list, select **Defer until reboot**.
 15. Select the **Report advanced statistics** and **Include Advanced Options** checkboxes.



16. Under the Advanced Options section, select **Advanced** and select the **Restore hidden folders and files** and **Restore folders and files with SYSTEM attribute** checkboxes.



17. Click **More**.
18. In the **Enter Attribute** field, type **exclude-from**.
19. In the **Enter Attribute Value:** field, type **exclude.AVAMAR** and click +.
20. In the **Enter Attribute field**, type **avamaronly**.

21. Leave the **Enter Attribute Value** field empty, and click +.

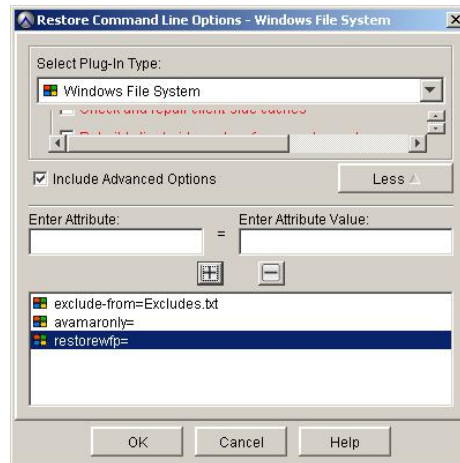
22. In the **Enter Attribute** field, type **restorewfp**.

23. Leave the **Enter Attribute Value** field empty, and click +.

For Windows 2003 and Windows XP restores only, complete this additional attribute.

24. In the **Enter Attribute** field, type **restoreshortnames**.

25. Leave the **Enter Attribute Value** field blank, and click +.



26. Click **OK** to save the **Advanced Options** settings.

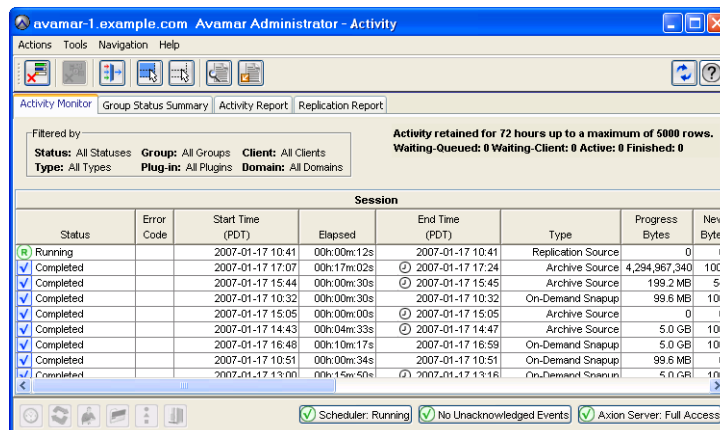
27. Click **OK** again to begin the restore.

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

Restore initiated

29. From the main menu, choose **Navigation > Activity**.

30. Click on the restore activity that was just initiated and make sure it completes successfully (double-click the entry for detailed logging).



Applying the HomeBase extended profile

The extended profile contains the elements of the Windows Registry from the original source server that need to be restored to the new target server to re-link application binaries located on the Avamar snapup to the new target server.

NOTE: The extended profile *must* have been restored onto the target server by the Avamar client as a part of the data restore.

1. On the target server, open a command line window.
2. Type the following command to begin the recovery. The HomeBase product documentation lists additional optional command line arguments.

```
hba recover <path\extended_profile_file> -e
```
3. The recovery application starts to apply the extended profile to the target server. The process will take a few minutes and can be monitored through the output in the command window.

Applying the restored system state files

After the Avamar backup has been restored for the system state files, perform the following:

1. Open a program such as Regedt32, and navigate to the following registry entry:
`HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Session Manager`
2. Add a new attribute at this entry by selecting **Edit > New > DWORD Value**.
3. Type **AllowProtectedRenames**.
4. Right-click this attribute and select **Modify**. In the **Value** field, add **1**.
5. Reboot the server into normal mode.

The server will have the full functional capability of the original server.

Troubleshooting

The following are basic tests to confirm full functionality. This is just a sample list.

- Log in to the server
- Launch and test applications.
- Check Add/Remove Programs to ensure all applications and hotfixes are represented.
- Add new users.
- Add users to new groups.
- Change file permissions.
- Launch an Internet browser.

Conclusion

IT professionals look to data protection solutions for data recovery and bare metal restore capabilities. EMC provides a better, more robust solution.

Traditional disaster recovery implementations start and stop with multiple copies of the same hardware. This is very difficult to maintain and expensive. From a process perspective, most IT professionals use some form of standard cloning software to add typical system operating systems and software to new

hardware. The difficulty comes in ensuring that the system and applications have all the proper settings necessary to quickly recover the data and begin working. Also, similar hardware is not always available in the event of an emergency. This means that IT may have to improvise.

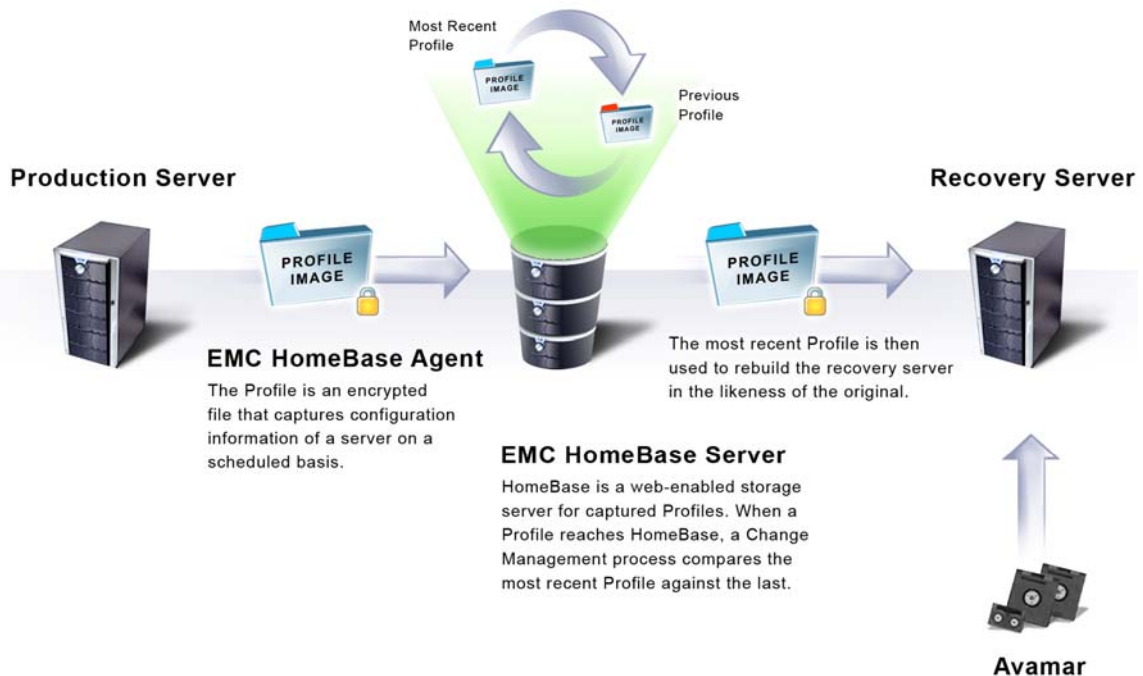


Figure 3. EMC Avamar and HomeBase automate the complete server stack recovery

EMC helps IT professionals recover systems, applications, and data to any hardware quickly and efficiently. Together EMC Avamar and HomeBase decrease recovery point objectives (RPOs) and recovery time objectives (RTOs), which can significantly increase an organization's productivity and profitability.

References

For more information, go to www.emc.com or consult the Avamar and HomeBase product documentation.