



PS Series Best Practices

Using the Microsoft® Backup Utility (NTBackup) to Backup NTFS in an iSCSI SAN

Abstract

This Technical Report describes how to backup and restore Windows® Server™ 2003 NTFS volumes in a PS Series SAN using the Microsoft Backup utility (NTBackup) and the EqualLogic Auto-Snapshot Manger for Windows VSS provider.



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October 2005

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PS Series Firmware Version 2.2.3 or later.

Table of Contents

Technical Report and Software Revision Information.....	iv
Introduction	1
VSS Components	1
NTBackup Limitations as a VSS Requestor	2
NTBackup VSS Backup Process	2
Deploying NTFS Backup and Recovery	4
Basic Steps	4
PS Series Group Requirements	4
Server Requirements	5
Backing Up NTFS	6
Restoring NTFS.....	12
Summary	15
Documentation and Customer Support	16

Technical Report and Software Revision Information

The following table describes the release history of this Technical Report.

Technical Report Revision	Date	Change
1.0	10/6/2005	Initial release.

The following table shows the software versions used in the preparation of this Technical Report.

Vendor	Model	Software Revision
Microsoft®	Windows® Server™ 2003 Enterprise Edition	Service Pack 1 Hotfix 891957
Microsoft	iSCSI Software Initiator	Version 2.0
EqualLogic®	PS Series Firmware	Version 2.2.3
EqualLogic	Auto-Snapshot Manager	Version 1.1

Introduction

This Technical Report describes how to use the built-in Microsoft Backup utility, commonly referred to as NTBackup, with EqualLogic Auto-Snapshot Manager for Windows to back up and restore NTFS volumes in a PS Series SAN, leveraging the capabilities of Microsoft's Volume Shadow Copy Service (VSS).

VSS delivers a framework for backing up and restoring data in a Windows Server 2003 environment. Auto-Snapshot Manager for Windows—used in conjunction with VSS and a PS Series SAN—simplifies and improves the performance of backup and restore operations by enabling you to instantly create a point-in-time copy of data, called a *shadow copy* or *snapshot*, while the application remains online and with no impact on performance.

Grouping together one or more PS Series storage arrays connected to an IP network delivers the benefits of consolidated storage in an intelligent iSCSI SAN that provides highly-available and scalable storage. A PS Series SAN can store the original data and also the data snapshots, providing high-performance and space-efficient backups.

The audience for this Technical Report should have administrator-level knowledge of PS Series storage arrays and VSS. Visit the EqualLogic and Microsoft websites for more information.

VSS Components

The following table outlines the components of the VSS configuration and the software or hardware used to implement each component in this Technical Report.

VSS Components When Using the Microsoft Backup Utility

Component	Description	HW/SW
Volume Shadow Copy Service (VSS)	Coordinates activity among drivers, applications and storage to create consistent point-in-time copies of data.	Microsoft Windows Server 2003
VSS requestor	Requests the creation of shadow copies. An example of a VSS requestor is a backup application that supports VSS.	Microsoft Backup Utility (ntbackup.exe)
VSS writer	Prepares an application or file system for shadow copy creation. This can include closing files or flushing buffers, as needed. A VSS writer is integrated with the application or file system software. Examples include NTFS, database applications like SQL Server and Exchange Server, and system services like Active Directory.	Microsoft NTFS
VSS provider	Creates the shadow copies. The VSS provider must have comprehensive knowledge of the storage subsystem that will store the shadow copies. Examples are the VSS provider included in the operating system and Auto-Snapshot Manager.	Auto-Snapshot Manager for Windows
Storage subsystem	Stores the data to be backed up and the shadow copies if being used as disk backup media. An example is a PS Series group, consisting of one or more PS Series storage arrays.	PS Series group
Data volume	Volume that contains data to be backed up.	PS Series volume

NTBackup Limitations as a VSS Requestor

The built-in Microsoft Backup utility, NTBackup, can be used as a VSS requestor to backup NTFS volumes, as described in this Technical Report. NTBackup interacts with the NTFS VSS writer and the Auto-Snapshot Manager VSS provider, which in turn utilizes the PS Series SAN to store the snapshots.

There are limitations to using NTBackup as a VSS requestor. For example, you cannot use the NTBackup as a VSS requestor to backup network shares, but you can use NTBackup for *non*-VSS backups of network shares.

In addition, you cannot use NTBackup as a VSS requestor to backup Exchange or SQL. However, you can use NTBackup for *non*-VSS backups of Exchange Server 2003 running on Windows Server 2003, as described in *Exchange 2003 Backup and Restore with NTBACKUP*:

<http://www.msexchange.org/tutorials/Exchange-2003-Backup-Restore-NTBACKUP.html>

If you want to utilize VSS to backup Exchange or SQL data in a PS Series SAN, you can use the Auto-Snapshot Manager VSS provider and a backup application that supports VSS, such as Veritas Backup Exec, CA Brightstare ARCserve, or CommVault QiNetix. Refer to the backup application documentation for more information about its use as a VSS requestor or check the EqualLogic Customer Support website for solutions:

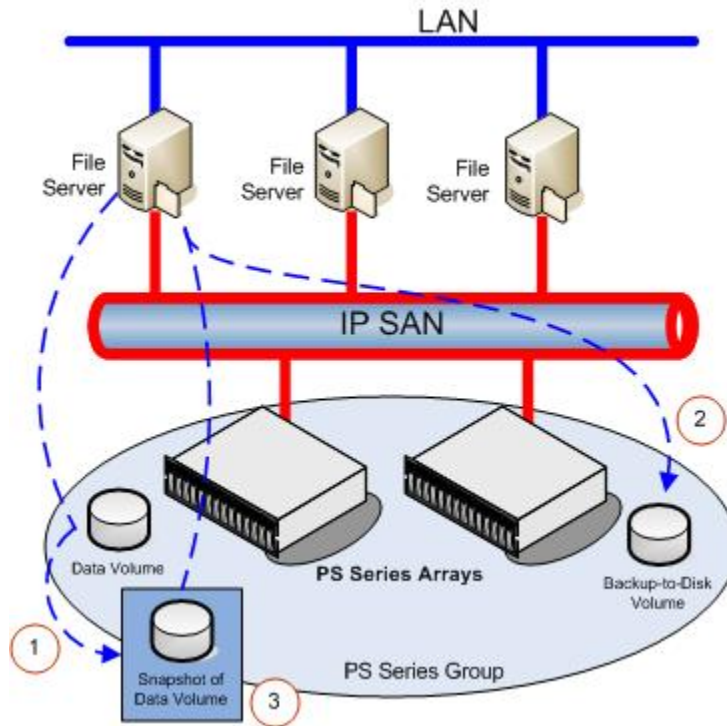
<http://www.equallogic.com/pages/support.htm>

NTBackup VSS Backup Process

The process for a VSS backup of NTFS using NTBackup, Auto-Snapshot Manager, and a PS Series SAN is as follows:

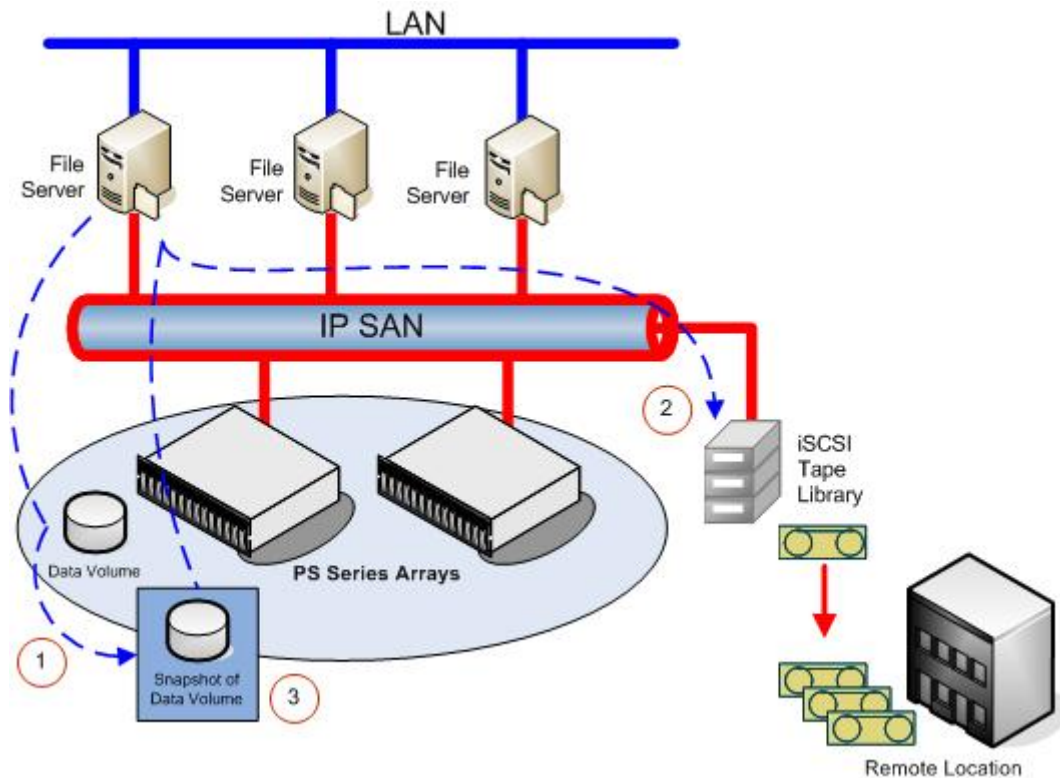
1. On the server, NTBackup begins the backup process, which can be initiated manually or through a schedule:
 - a. NTBackup notifies VSS that the data should be backed up.
 - b. VSS notifies NTFS to prepare for the backup (for example, quiesce and flush the buffer cache).
 - c. VSS notifies the PS Series group to create a snapshot.
 - d. PS Series group creates the snapshot.
 - e. VSS notifies NTFS to resume operation.
2. NTBackup backs up the data to backup media using the snapshot:
 - a. VSS notifies the server to import (mount) the snapshot and then NTBackup copies the data from the snapshot to backup media, either disk or tape, such as a PS Series volume located in the SAN or a tape device that is separate from the SAN.
 - b. NTBackup notifies VSS that the backup is complete.
3. VSS notifies the PS Series group to delete the snapshot.

Figure 1: NTBackup VSS Backup Process – Backup to Disk



Alternatively, instead of using disk backup media, you can backup to iSCSI tape. This enables you to move the tape media to a remote location for disaster recovery.

Figure 2: NTBackup VSS Backup Process – Backup to iSCSI Tape



Deploying NTFS Backup and Recovery

The following sections describe how to backup and restore Windows Server 2003 NTFS volumes using NTBackup and Auto-Snapshot Manager. With this procedure, the original data volumes and the data snapshots are stored in the PS Series SAN. The procedure also shows how to use volumes as disk backup media. Tape backup media is also supported.

Basic Steps

This section provides an overview of the basic steps for backup and recovery operations. Refer to the specified sections for detailed information.

1. Set up the PS Series group and create the following volumes:
 - Volumes for the data to be backed up. Be sure to reserve snapshot space for each volume.
 - VSS control volume (required by Auto-Snapshot Manager).
 - Volumes to act as backup media. Not required if you are only backing up to tape.

Note that, for each volume, you must create one or more access control records that allow only authorized host access to the volume and its snapshots.

See *PS Series Group Requirements* for more information.

2. Set up the Windows Server 2003 server as described in *Server Requirements*.
3. Start the Backup utility and backup NTFS using VSS, as described in *Backing Up NTFS*.
4. Verify backup integrity by restoring data from a backup, as described in *Restoring NTFS*.

PS Series Group Requirements

PS Series group requirements are as follows:

- PS Series Firmware Version 2.2.3 or a higher version.
- One or more volumes that will contain the data to be backed up. Be sure to reserve snapshot space for each volume. Also, for each data volume, create one or more access control records to allow the server access to the volume and its snapshots.

Before creating volumes, be sure to fully understand the requirements of the applications that will use the volumes, so you can size the volumes appropriately. Note that volumes can be expanded easily online.

- One or more volumes for the disk backup media. (Not required if you are only backing up to tape.) The volume size depends on the frequency and amount of data to be backed up.

Also, for each backup volume, create one or more access control records that will allow the server access to the volume.

- VSS control volume. Auto-Snapshot Manager requires you to create a volume named `vss-control`, which must be at least 15 MB.

In addition, create one or more access control records that will allow the server access to the `vss-control` volume. Never maintain a server connection to the VSS control volume. However, you can temporarily connect to it to test the server's ability to access the volume.

See the PS Series *Quick Start* or the *Group Administration* manual for information about creating a group, volumes, and access control records.

See the Auto-Snapshot Manager *Installation and Administration* manual for additional Auto-Snapshot Manager requirements and installation information.

In addition, it is recommended that you consult the *Network Connection and Performance Guidelines* Technical Report on the EqualLogic Customer Support website for information about how to improve network performance when using a PS Series SAN.

Server Requirements

The NTBackup utility comes with Windows server 2003 and is installed by default. Note that you can only use NTBackup to perform VSS backups of local drives, not network shares.

A server requires the following:

- Microsoft Windows Server 2003 family of operating systems.
- Microsoft Windows Server 2003 SP1.
- Industry-standard iSCSI initiator, either:
 - Microsoft iSCSI Software Initiator Version 2.0 or later
 - iSCSI host bus adapter (HBA) initiator *plus* the Microsoft iSCSI Software Initiator Version 2.0 or later (for VSS support).

For installation information, consult the initiator vendor documentation.

- Connection to the PS Series volumes to be backed up. Configure the server and applications to use the volumes.
- Connection to the PS Series volumes that will act as disk backup media. (Not required if you are only backing up to tape.)
- Auto-Snapshot Manager for Windows Version 1.1.0 or later. For operating system, iSCSI initiator, and other requirements, see the Auto-Snapshot Manager *Release Notes* and the *Installation and Administration* manual.
- Ability to access the VSS control volume, `vss-control`. Although you can temporarily connect to this volume to test access, do not maintain an iSCSI connection to the volume.

See the Technical Report *PS Series Best Practices: Deploying Microsoft® Windows® Server 2003 in an iSCSI SAN* for additional information about setting up your Windows server.

In addition, see the *Network Connection and Performance Guidelines* Technical Report on the EqualLogic Customer Support website for information about improving network performance between PS Series storage arrays and servers.

Backing Up NTFS

The NTBackup utility can be launched with the Backup and Restore wizard, which provides a graphical user interface, or from the command line. There are many parameters and options when using the NTBackup command line. A complete description of these parameters and options is available in the Microsoft Knowledge Base at:

<http://support.microsoft.com/default.aspx?scid=kb;en-us;814583>.

This Technical Report will focus on how to use the GUI to perform backup and restore operations.

To backup an NTFS volume or a specific directory or files using VSS, perform these steps on the server:

1. Start the NTBackup utility by clicking **Start > Programs > Accessories > System Tools > Backup**. The Backup or Restore Wizard – Welcome dialog box appears. You can also launch it from `C:\Windows\System32\ntbackup.exe`.

Figure 3: Backup or Restore Wizard – Welcome

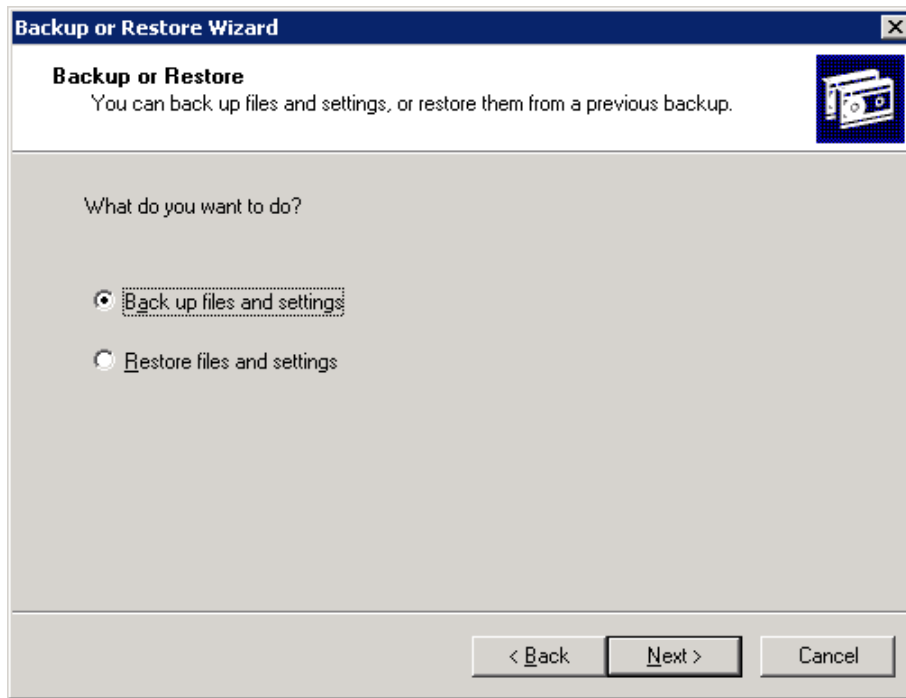


2. Click **Next** in the welcome dialog box.

Note: Optionally, click **Advanced Mode** to make your selections manually. This Technical Report uses the wizard for simplicity.

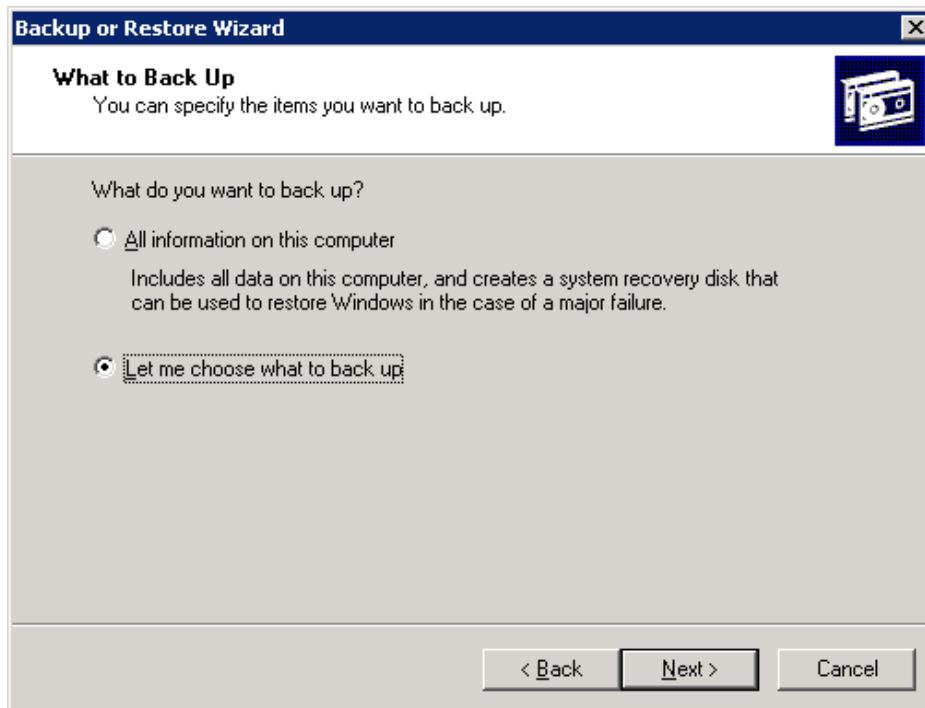
3. Click **Back up files and settings** in the Backup or Restore Option dialog box and click **Next**.

Figure 4: Backup or Restore Wizard – Backup or Restore Option



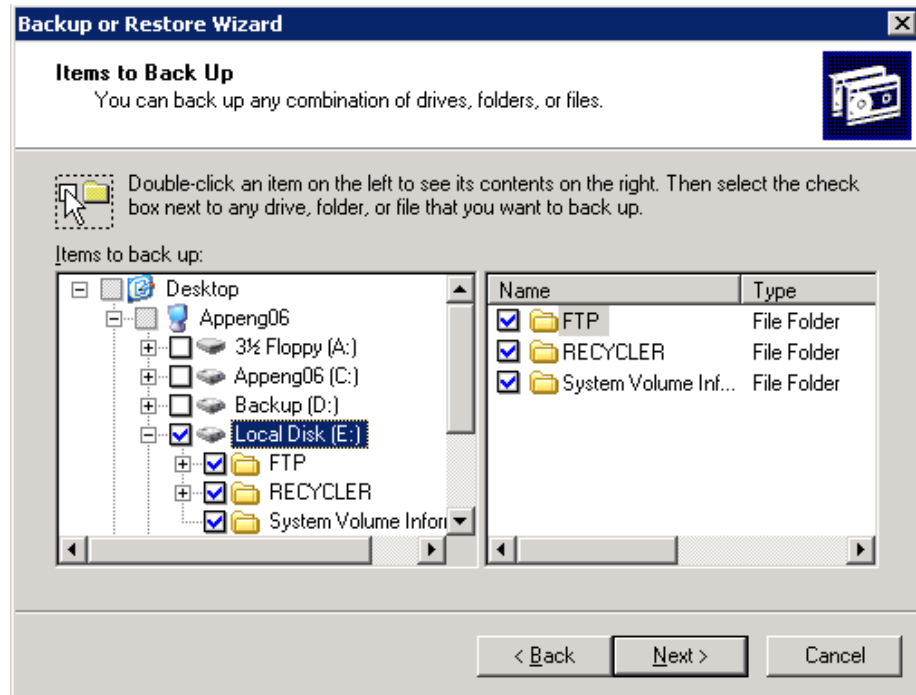
4. Click **Let me choose what to back up** and then click **Next**.

Figure 5: Backup or Restore Wizard – What to Back Up



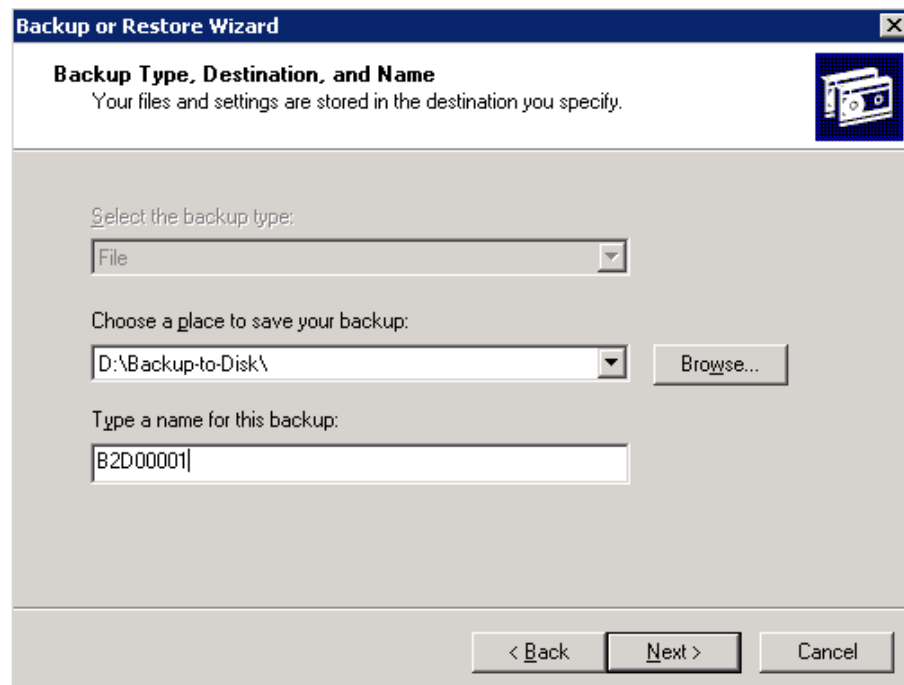
- Expand items in the left panel and select what you want to back up (for example, a locally connected data volume). Click a volume to automatically select the entire contents of the volume. Then, click **Next**.

Figure 6: Backup or Restore Wizard – Items to Back Up



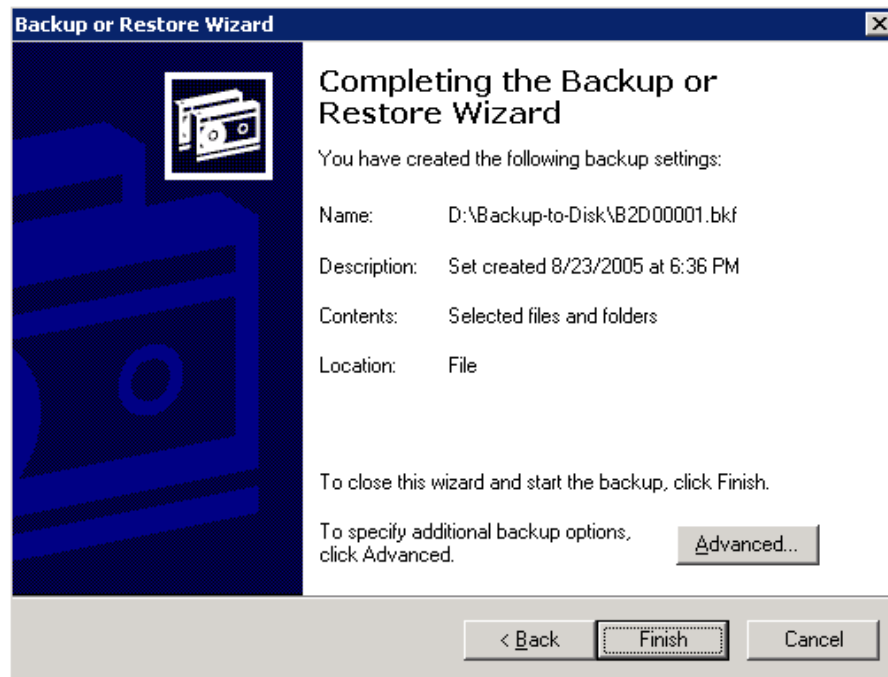
- Select the destination for the backed up data (for example, one of the PS Series volumes you configured as disk backup media) and specify a name for the backup. Then, click **Next**.

Figure 7: Backup or Restore Wizard – Backup Type, Destination and Name



7. Click **Finish** to start the backup job (NTBackup will use VSS by default) or click **Advanced** to make selections specific to the backup operation and type of backup.

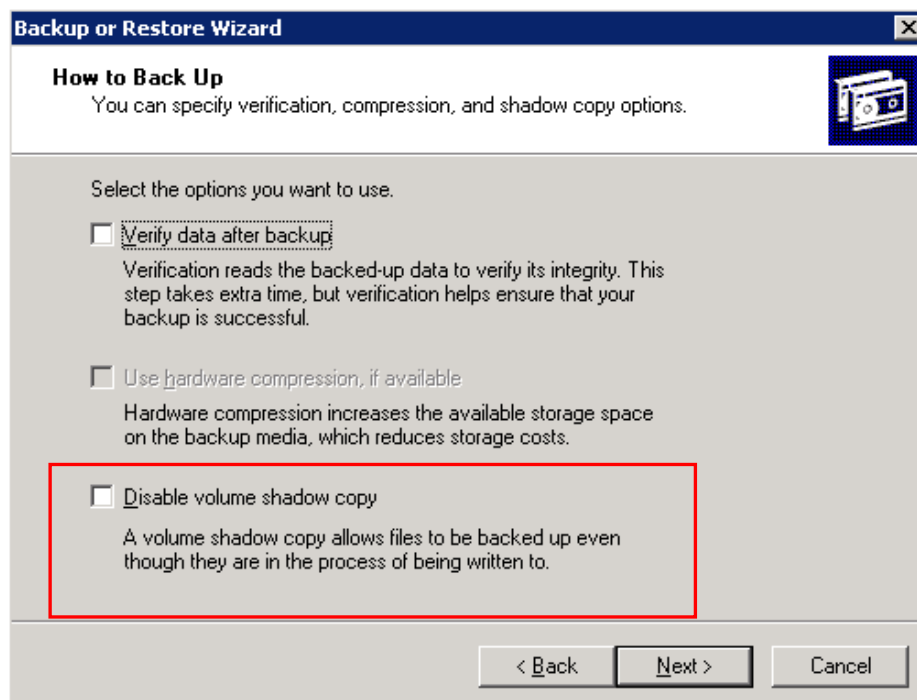
Figure 8: Backup or Restore Wizard – Completing the Wizard



If you click **Advanced**, the first advanced backup option you can specify is the type of backup, either Normal, Copy, Incremental, Differential, or Daily.

Click **Next** to specify how to back up the data. Note that NTBackup will use VSS, unless the **Disable volume shadow copy** option is selected.

Figure 9: Backup or Restore Wizard (Advanced) – How to Back Up



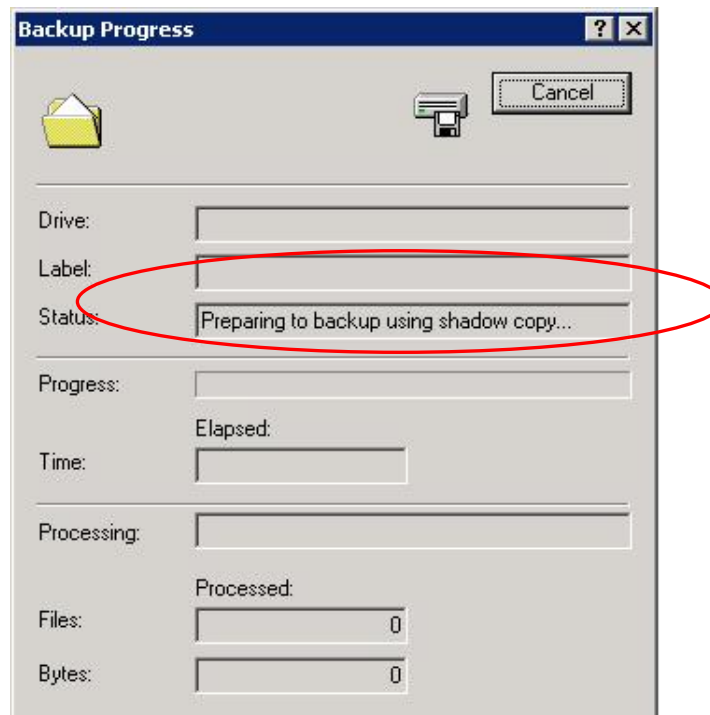
Click **Next** to specify whether to append the backup to existing backups or replace the backups.
Click **Next** to specify when to back up the data, either now or later.
Once you have selected the desired options, click **Finish** to start the backup job.

Figure 10: Backup or Restore Wizard (Advanced) – Completing the Wizard



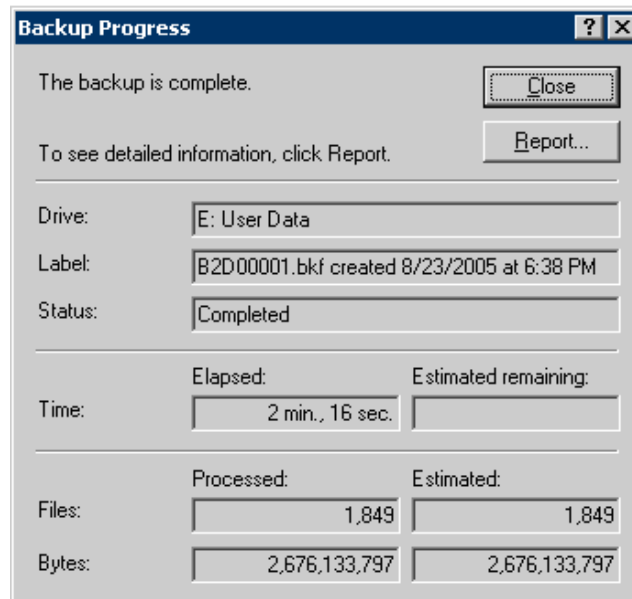
Once the backup job is submitted, a dialog box showing the progress of the operation appears.

Figure 11: Backup Progress – In Progress



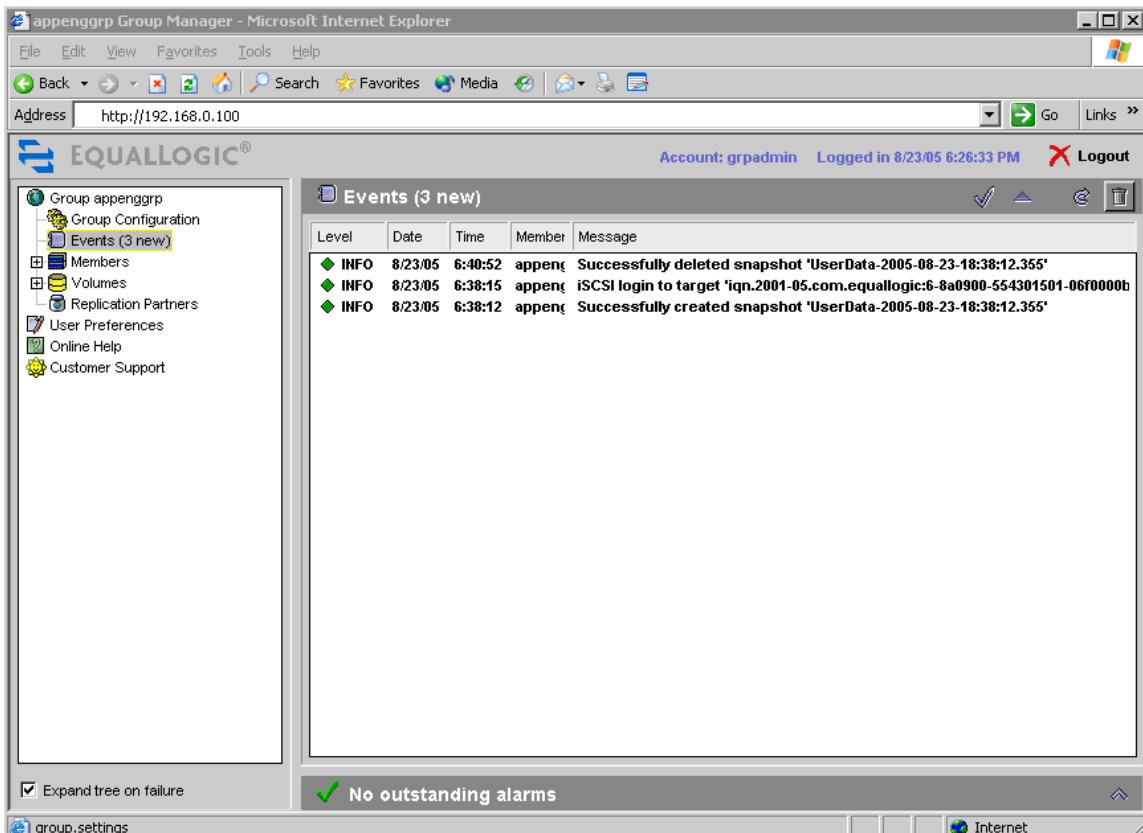
Once the backup operation completes, you can view a detailed report or close the backup job.

Figure 12: Backup Progress – Complete



Verify that the backup (snapshot) was created in the PS Series group. Use a web browser to connect to the group IP address and log in to the group using an account such as `grpadmin`. In the Group Manager GUI, click **Events** in the leftmost panel.

Figure 13: PS Series Group Manger GUI – Event Log

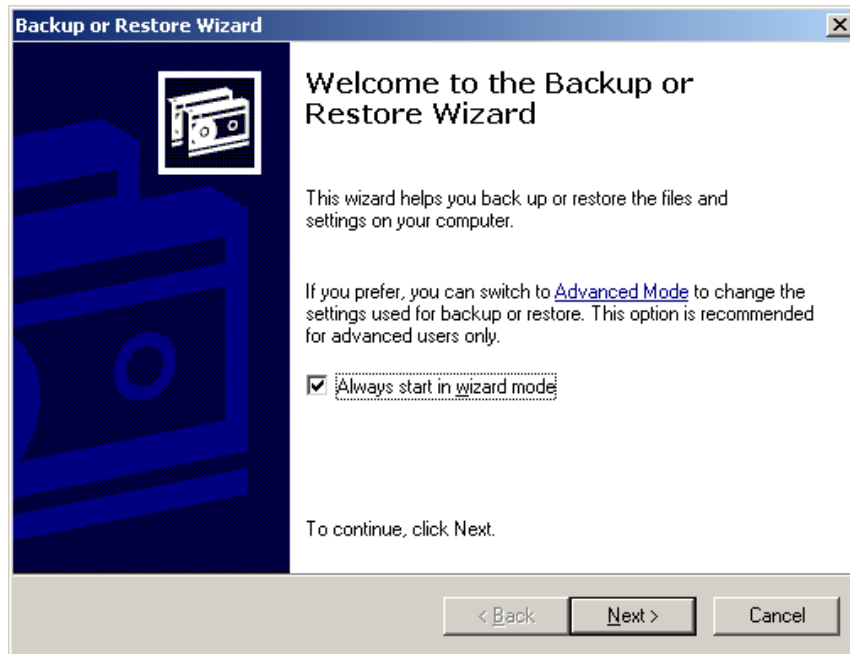


Restoring NTFS

To restore an NTFS volume or a specific directory or files from a VSS backup created with NTBackup, perform these steps on the server:

1. Start the NTBackup utility by clicking **Start > Programs > Accessories > System Tools > Backup**. The Backup or Restore Wizard – Welcome dialog box appears.

Figure 14: Backup or Restore Wizard – Welcome

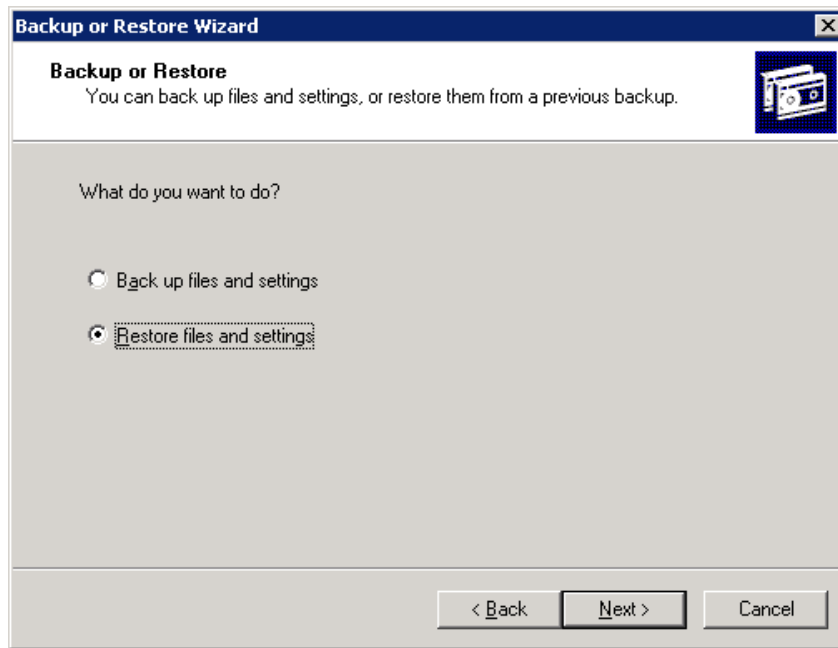


2. Click **Next** in the welcome dialog box.

Note: Optionally, click **Advanced Mode** to make your selections manually. This Technical Report uses the wizard for simplicity.

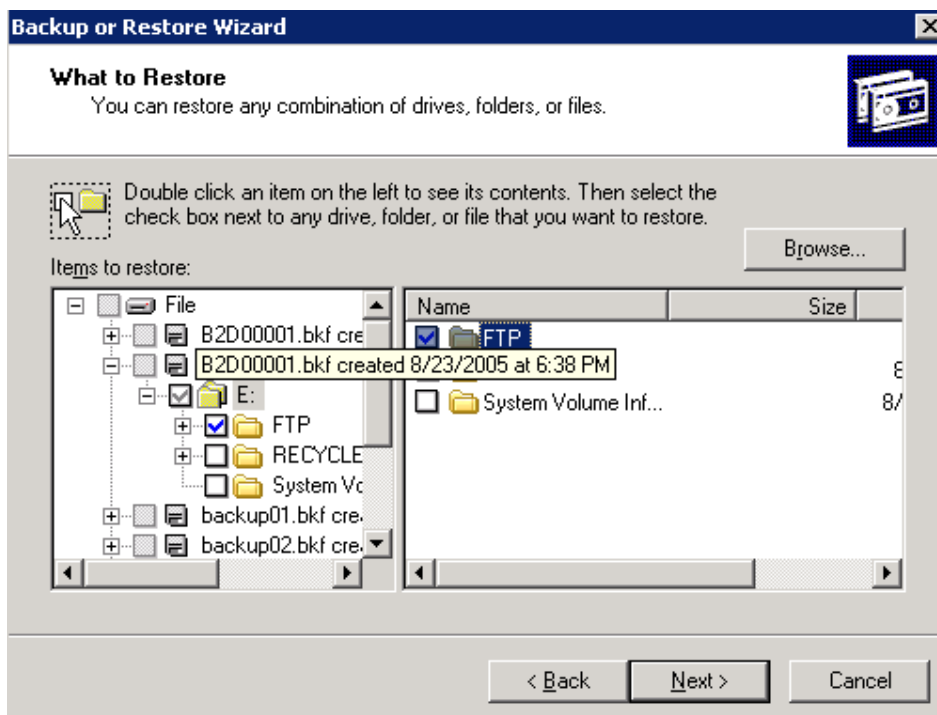
3. Click **Restore files and settings** in the Backup or Restore Option dialog box and click **Next**.

Figure 15: Backup or Restore Wizard – Back Up or Restore Option



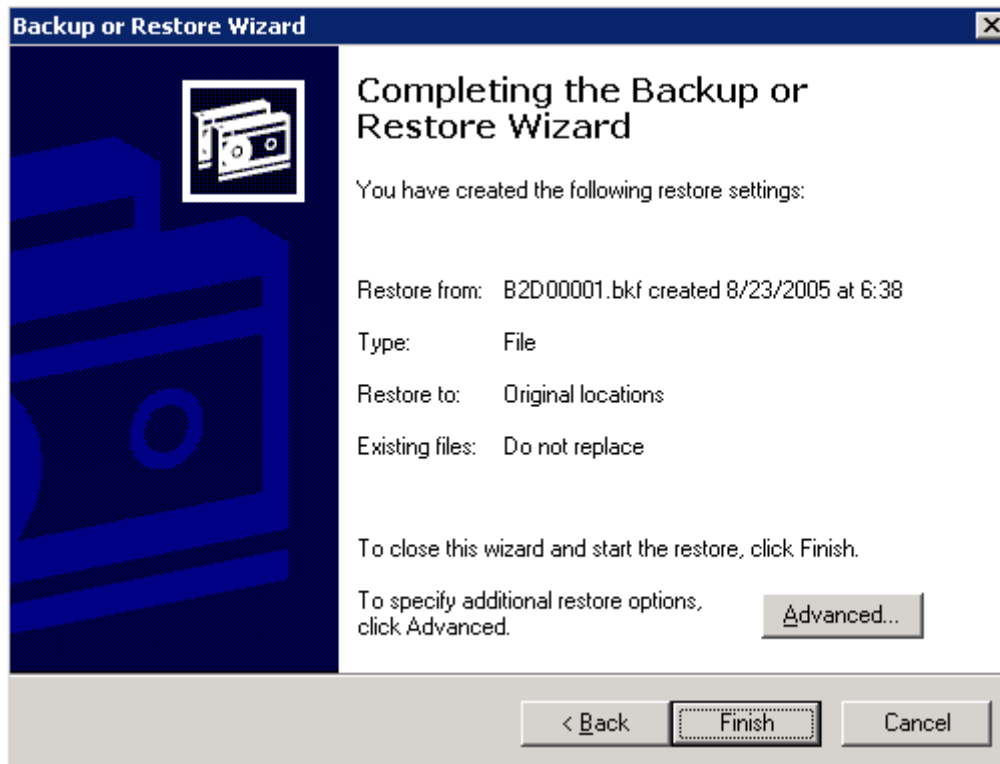
4. In the What to Restore dialog box, the backup jobs created by the server are listed in the right panel. Locate the backup job with the date and data you want to restore. Select the box next to the object to restore the entire backup. You can also expand the object to view the contents of the backup and select specific directories or files to restore. After you select the items to restore, click **Next**.

Figure 16: Backup or Restore Wizard – What to Restore



5. Click **Finish** to begin the restore or click **Advanced** for additional restore options.

Figure 17: Backup or Restore Wizard – Completing the Wizard



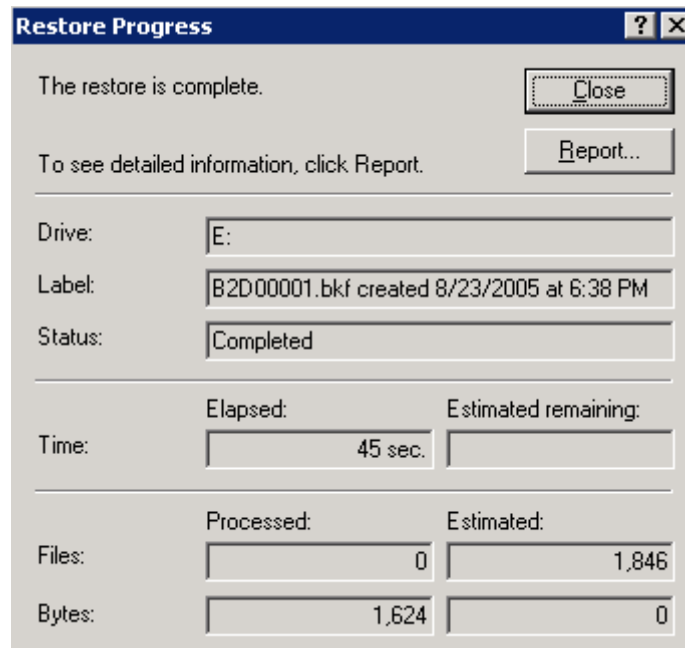
If you click **Advanced**, a number of dialog boxes appear (click **Next** to navigate through the dialog boxes). You can specify:

- Where to restore the data, either in the original location, an alternate location, or a single folder.
- How to restore, either leave the existing files (recommended), replace the existing files if they are older than the backup files, or replace the existing files.
- Advanced restore options for security, restoring junction points, and preserving mount points.

After you select the desired advanced options, click **Finish** to start the backup job.

Once you click **Finish**, the restore job will be submitted and a dialog box will appear, displaying the progress of the job.

Figure 18: Restore Progress



Summary

You can back up and restore NTFS volumes residing in a PS Series SAN by using NTBackup and Auto-Snapshot Manager for Windows, enabling you to leverage the capabilities of VSS. Shadow copies or snapshots—point-in-time copies of data—are created instantly. They can then be used by the backup application to complete the backup operation. This improves backup and restore operations by off-loading the backup operation from the live data.

The VSS requestor capability of NTBackup is only suitable for backing up NTFS volumes, directories, or files. If you want to use VSS to backup applications like Exchange or SQL, you must use a third-party backup application as a VSS requestor.

<http://www.msexchange.org/tutorials/Exchange-2003-Backup-Restore-NTBACKUP.html>

Documentation and Customer Support

Visit the EqualLogic Customer Support website (<http://www.equallogic.com>), where you can download the latest documentation and firmware. You can also view FAQs, the Knowledge Base, and Technical Reports and submit a service request.

EqualLogic PS Series storage array documentation includes the following:

- *Release Notes*. Provides the latest information about PS Series storage arrays and groups.
- *QuickStart*. Describes how to set up the hardware and start using a PS Series storage array.
- *Group Administration*. Describes how to use the Group Manager GUI to manage a PS Series group. This manual provides comprehensive information about product concepts and procedures.
- *CLI Reference*. Describes how to use the Group Manager command line interface to manage a group and individual arrays.
- *Hardware Maintenance*. Provides information on maintaining the PS Series storage array hardware.

To access the Customer Support website, from the EqualLogic website, click `Support` and log in to a support account. If you do not have an account, create one by clicking the link under the login prompt.

To contact customer support, send e-mail to support@equallogic.com. If the issue is urgent, call 1-877-887-7337 to speak with a member of the customer support team.