



## PS Series Best Practices

# Deploying VERITAS™ Backup™ Exec 10 and Auto-Snapshot Manager

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### **Abstract**

This Technical Report describes how to back up and restore NTFS volumes, Microsoft Exchange e-mail, and SQL databases using VERITAS Backup Exec 10, the EqualLogic Auto-Snapshot Manager for Windows VSS provider, and PS Series storage arrays.

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PS Series Firmware Version 2.1 or later.

## Table of Contents

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Technical Report and Software Revision Information.....	iv
Introduction .....	1
Common Backup and Recovery Configurations .....	2
Backup and Recovery Media .....	3
Backup to Disk and Restore from Disk Operations .....	3
Backup to Tape and Restore from Tape Operations .....	3
VSS Snapshots and Backup .....	3
Exchange Backup Levels .....	5
SQL Backup Levels .....	5
VERITAS Application Agents and AOFO .....	5
Deploying VERITAS Backup Exec 10.....	6
Basic Steps.....	6
PS Series Group Requirements .....	7
Backup Server and Backup Client Requirements .....	8
Launching the Backup Exec Management Interface.....	10
Creating Disk Backup Media .....	11
Creating a Backup-to-Disk Job for an NTFS Volume .....	14
Creating a Backup-to-Disk Job for Microsoft Exchange 2003 .....	20
Creating a Backup-to-Disk Job for a Microsoft SQL Server 2000 Database.....	24
Restoring NTFS Files from a VSS Backup.....	29
Restoring Microsoft Exchange 2003 from a VSS Backup.....	30
Restoring Microsoft SQL from a VSS Backup .....	32
Summary .....	34
Documentation and Customer Support .....	35

## **Technical Report and Software Revision Information**

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

<b>Technical Report Revision</b>	<b>Date</b>	<b>Change</b>
1.0	8/16/2005	Initial release.

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

<b>Vendor</b>	<b>Model</b>	<b>Software Revision</b>
VERITAS™	Backup Exec™ for Windows Servers	10.0
VERITAS	Backup Exec Advanced Open File Option	10.0
VERITAS	Backup Exec Advanced Disk Based Backup Option	10.0
VERITAS	Backup Exec Exchange Agent	10.0
VERITAS	Backup Exec SQL Agent	10.0
Microsoft®	Windows Server™ 2003 Enterprise Edition	Hotfix – KB 831464 Hotfix – KB 833167
Microsoft	Exchange Server 2003	Version 6.5.7226.6 Service Pack 1
Microsoft	SQL Server 2000 Enterprise Edition	Service Pack 3a
Microsoft	iSCSI Software Initiator	Version 1.05a
EqualLogic®	Auto-Snapshot Manager for Windows	Version 1.0.0
EqualLogic	PS Series Firmware	Version 2.1

This Technical Report describes how to use VERITAS Backup Exec 10 for Windows Servers with PS Series storage arrays from EqualLogic to back up and restore local and remote NTFS volumes, Exchange e-mail, and SQL databases. This report also describes how to use Microsoft Volume Shadow Copy Service (VSS), the EqualLogic Auto-Snapshot Manager for Windows VSS provider, and VERITAS Backup Exec 10 to improve backup and restore operations through point-in-time copies of data called shadow copies or snapshots.

Note that PS Series storage arrays can be used with traditional (non VSS) backup operations and require no special configuration.

VERITAS Backup Exec 10 for Windows Servers provides comprehensive data protection for Windows, Linux, and UNIX servers—as well as for desktops and laptops—and supports the following features:

- Online (“hot”) backup and restore
- Support for VSS and hardware-based snapshots
- Advanced disk-based backup option
- Device pooling, cascading, and dynamic load balancing
- Automated media management

PS Series storage arrays deliver the benefits of consolidated storage in an intelligent iSCSI storage area network (SAN) that provides highly-available and scalable storage to backup and recovery servers and clients running VERITAS Backup Exec. The iSCSI SAN—called a PS Series group—consists of one or more arrays connected to an IP network. As your storage needs grow, simply add more arrays to the group; capacity and performance increase linearly and on demand.

Key features for a PS Series SAN include the following:

- Easy setup
- Redundant, hot-swappable hardware
- Highly scalable, virtualized storage
- Integrated, self-managing software
- Automatic RAID configuration and management
- High-end features like snapshots and replication
- Auto-Stat Disk Monitoring System
- Automatic data and network I/O load balancing

A PS Series volume is seen on the network as an iSCSI target and can be accessed by an iSCSI initiator installed on a host. This storage can play two roles in backup operations:

- Store the application data that will be backed up. For example, you can create volumes to store Exchange databases.
- Act as backup media (instead of tape) for storing the backed up data. For example, you can create volumes to store the backup of an Exchange database.

In addition, EqualLogic delivers the following host solutions:

- Auto-Snapshot Manager for Windows is a VSS provider that enables you to create flexible, space-efficient volume snapshots.
- Multipath I/O DSM for Windows enables you to set up redundant network paths between servers and PS Series storage, improving performance and increasing availability.

## Common Backup and Recovery Configurations

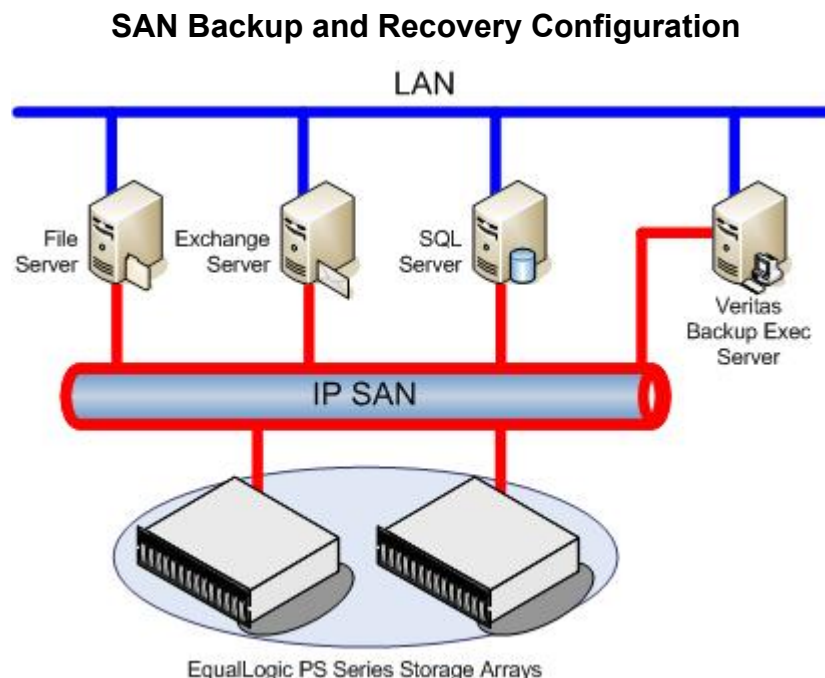
VERITAS Backup Exec 10 can be used in a variety of backup and recovery configurations, including the following:

- **Local backup and recovery.** The backup media is directly (locally) attached to the server that is being backed up, and each server runs its own version of the backup software.
- **LAN backup and recovery.** A centralized backup server runs the backup software and backs up other servers (backup clients) by using software agents. The data movement is over a LAN.
- **SAN backup and recovery.** A centralized backup server runs the backup software and backs up other servers (backup clients) by using software agents. The data movement is over a SAN.

For an overview of backup methods and capabilities, refer to the Technical Report, *Backup and Recovery Overview*, available on the EqualLogic Customer Support website.

Although PS Series storage arrays can be used in a LAN backup and recovery configuration, the more likely configuration is to use a PS Series SAN with VERITAS Backup Exec. Backing up using a SAN can improve backup performance because all data movement is through the SAN. IN addition, technologies such as backup-to-disk and VSS are best implemented using a SAN.

This Technical Report focuses on a SAN backup and recovery configuration, as shown in the following figure.



In the SAN configuration described in this Technical Report, the **backup server** runs the backup software and schedules and runs the backup jobs. The **backup clients** run backup agent software and run the applications (for example, Exchange or SQL) or host the file systems whose data you want to back up. In some cases, the backup server can also act as a backup client when backing up its own data. All data to be backed up resides in the same PS Series group that provides the disk backup media for storing the backed up data.

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## Backup and Recovery Media

Backup media refers to the device that stores backed up data. Backup media can be fixed, such as disk, or removable, such as tape or compact disk. VERITAS Backup Exec 10 supports backup to tape, as well as backup to disk, and PS Series storage arrays are ideally suited for disk backup media.

Traditionally, tape has been the backup media of choice, because tapes can be easily transported to a separate facility for storage and retrieved in the event of a disaster. However, disk backup media is becoming more commonplace because it improves backup performance, provides online recovery capabilities, and supports the use of advanced operations such as snapshot-based backups.

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### Backup to Disk and Restore from Disk Operations

Not only can you back up data stored in a PS Series volume, you can create a volume and use it as backup media for disk-to-disk (D2D) backups. This Technical Report describes how to create a Backup-to-Disk folder and map it to a volume, which is a quick way to create backup media.

On Windows Server 2003, VSS can be part of the backup process. Auto-Snapshot Manager uses VSS to coordinate application operation with the creation of snapshots in a PS Series group.

If the disk backup media is located in the same storage subsystem as the data that is being backed up (for example, the same PS Series group), you may want to perform an additional disk-to-disk or disk-to-tape backup and secure the backed up data at a different geographic location for increased data protection.

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### Backup to Tape and Restore from Tape Operations

Data stored in a PS Series volume can be backed up using any of the traditional disk-to-tape (D2T) backup methods. Simply follow the VERITAS Backup Exec recommended procedures for your environment.

You can also backup to tape using VSS. To do this, follow the instructions in the backup-to-disk sections in this report, except select a tape for the backup device (backup media). Note that you do not have to create disk backup media if you are only backing up to tape.

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## VSS Snapshots and Backup

Snapshots (also called shadow copies) are point-in-time copies of data. A snapshot enables you to quickly copy data at the disk volume level. This volume copy can then be used as the source for backup operations. Snapshot creation does not disrupt access to the volume. The copy is created, typically in less than a few seconds, and maintained in disk storage (for example, in a PS Series group), providing high performance and low space utilization.

When using snapshots to backup data, the snapshot capability must be integrated with the backup application, the applications and file systems to be backed up, and the storage devices. Historically, this integration has required using scripts, which are difficult to create and maintain for proper operation over time. These requirements have severely restricted the adoption of snapshot-based backups.

Microsoft has created a technology in Windows Server 2003 called Volume Shadow Copy Service (VSS). VSS provides a framework for creating snapshots that integrates VSS-aware disk storage (for example, PS Series storage arrays) and applications (for example, Exchange or SQL) with operating system drivers, delivering a turn-key backup solution to IT departments without the need for scripting.

There are three required components in the VSS framework:

- **VSS requestor.** Requests the creation of snapshots, typically for backup operations. VERITAS Backup Exec 10 can be used as a VSS requestor.
- **VSS writer.** Business application(such as a database application, e-mail, or file system(that prepares the application for the snapshot creation or data restoration (for example, by flushing buffers, switching logs, etc.). NTFS, Exchange, and SQL are examples of VSS writers.
- **VSS provider.** Mechanism that actually creates and maintains the snapshot in the storage hardware. For example, Auto-Snapshot Manager for Windows is a VSS provider that can create snapshots in a PS Series group.

Thus, you can use Auto-Snapshot Manager (VSS provider) with VERITAS Backup Exec 10 (VSS requestor) to backup NTFS, Exchange, and SQL applications (VSS writers)(providing an end-to-end backup and restore solution.

A snapshot provides a stable copy of volume data for backups. There are three types of VSS snapshots:

- **Local software-based VSS snapshots.** The backup application is responsible for creating and storing the snapshot of a backup client's volume. Then, the backup client mounts the snapshot, and the backup server backs up the snapshot.
- **Local hardware-based VSS snapshots.** The backup application requests that the storage hardware create and store the snapshot of a backup client's volume. Then, the backup client mounts the snapshot, and the backup server backs up the snapshot.
- **Transportable hardware-based VSS snapshots.** The backup application requests that the storage hardware create and store the snapshot of a backup client's volume. Then, the backup server mounts the snapshot and backs up the snapshot. This moves (offloads) backup processing from the backup client and moves it to the backup server.

**Note:** VERITAS Backup Exec 10 includes a transportable hardware-based VSS snapshot feature called offhost backup. However, they have disabled transportable operation in their code for arrays they have not qualified. At the time of the publishing of this report, VERITAS only supported offhost backup on the Hitachi HDS9970V storage array. Although EqualLogic has successfully tested transportable snapshots with a PS Series group, it is recommended that you wait for VERITAS to either formally certify this capability or enable the feature for all hardware-based VSS providers, such as Auto-Snapshot Manager.

## Exchange Backup Levels

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VERITAS Backup Exec 10 supports two levels of backup for Microsoft Exchange 2003:

- **Database Level.** The backup software gives you the option of backing up each Exchange Storage Group Mailbox Store or each Storage Group Public Folder Store to backup media. This allows the Message Store or Public Folder Store to be restored and the transaction log data re-applied, bringing the Group Mailbox Store or Public Folder Store back to the state that existed just prior to the failure.
- **Brick Level (single mailbox).** The backup software logs into each mailbox and then backs up the contents of the mailbox to backup media. This allows you to restore individual user mailboxes; however, it significantly increases the amount of backup media space required.

Each backup level has its advantages and disadvantages. This report focuses on leveraging the VSS capabilities of VERITAS Backup Exec 10, which only supports backing up entire Exchange Storage Groups.

## SQL Backup Levels

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VERITAS Backup Exec 10 supports three levels of backup for Microsoft SQL 2000:

- **Instance Level.** Captures the entire SQL Server instance, including all database and transaction logs. This level of backup enables the complete SQL Server instance to be restored and the transaction log data re-applied, bringing the SQL server back to the state that existed prior to a failure.
- **Database Level.** Performs a backup of each SQL database. This level of backup enables you to backup an individual database with logs. It also provides the ability to reapply the transaction log, bringing the SQL server back to the state that existed prior to a failure.
- **Filegroup Level.** When databases grow too large to be backed up at the same time, you can backup individual filegroups, which require less storage space. Filegroups can be backed up at different times and frequencies. Using a combination of filegroup and log backups provides complete database protection.

Each backup level has its advantages and disadvantages. This report focuses on leveraging the VSS capabilities of VERITAS Backup Exec 10, which only supports Instance Level backups.

## VERITAS Application Agents and AOFO

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The following text is important information regarding VERITAS Backup Exec Agents and the Advanced Open File Option (AOFO). It was taken from the following URL:

<http://seer.support.veritas.com/docs/263784.htm>

“OFO and AOFO can be used for backing up database type files that Backup Exec does not offer an agent for.

What database applications does Backup Exec have agents for? Microsoft Exchange, Microsoft SharePoint, Microsoft SQL, Lotus Domino, and Oracle all have database agents.

These applications do not require the use of OFO or AOFO to back up their data nor is it recommended. Microsoft Word and Excel documents will not benefit from OFO and AOFO unless the document is being saved at the point in time when it is being backed up. When open, these types of files are temporarily locked and backed up on the fly and do not prevent users from accessing the file.

Jet Engine Database files, such as Microsoft Access databases, Dynamic Host Configuration Protocol (DHCP) databases, and Windows Internet Naming Service (WINS) databases, will benefit from OFO and AOFO. Microsoft Outlook Personal Folders (PST) files will benefit from OFO and AOFO should an Outlook client be left open on the user's desktop. Other database types that Backup Exec does not provide a database agent for may benefit from OFO and AOFO.

Sometimes, the file types mentioned above are found on servers where Backup Exec database agents are in use, and therefore, OFO or AOFO is required to be on those servers. Be sure to clear, from all backup jobs, the data locations for the applications that use a database agent when configuring a backup job unless the application's services are stopped during the time of the backup.”

Therefore, as described in the previous text, to realize the complete benefits of VSS, it is important that you install the Backup Exec Exchange Agent and SQL Agent on the backup server (VERITAS uses the term media server) when performing VSS backups of a backup client (VERITAS uses the term remote server) that have Exchange or SQL installed.

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## Deploying VERITAS Backup Exec 10

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The following sections describe how to backup and restore NTFS volumes, Exchange e-mail, and SQL databases using VERITAS Backup Exec 10, a PS Series group, and Auto-Snapshot Manager.

The procedures focus on the use of VSS and transportable snapshots. However, traditional backup and recovery methods and vendor-specific backup techniques that do not support VSS can also be used to back up the data residing on PS Series volumes.

See the Backup Exec 10 documentation for application installation and configuration details. See the PS Series *QuickStart* or *Group Administration* manual for information about setting up a group and volumes. See the Auto-Snapshot Manager *Installation and Administration* manual for detailed requirements and installation information.

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### Basic Steps

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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:
  - Backup client volumes that will contain the application data to be backed up. For each volume, create one or more access control records that allow the backup client access to the volumes. In addition, be sure to reserve snapshot space for each client volume.
  - One or more backup volumes for the disk backup media. (Not required if you are only backing up client volumes to tape.) For each volume, create one or more access control records that allow the backup server access to the volumes.
  - VSS control volume (required by Auto-Snapshot Manager). Create one or more access control records that allow the backup server and client server access to the volume.

See *PS Series Group Requirements* in this document for more information.

2. Ensure that the backup server (media server) and backup clients (remote servers) meet the requirements described in *Backup Server and Backup Client Requirements* in this document.

In summary:

- a. On the backup server, install Windows Server 2003, the required hot fixes and service packs, and an iSCSI initiator. Persistently connect to the backup volumes for the disk backup media (not required if you are only backing up client volumes to tape), configure the volumes for multipath I/O (optional), initialize them as basic disks, align disk sectors, and format the new disks. Also, ensure that the backup server can access the VSS control volume; however, do not maintain a connection to this volume. Then, install the VERITAS Backup Exec software and the VERITAS application-specific agents.
  - b. On each backup client, install Windows Server 2003, the required hot fixes and service packs, and an iSCSI initiator. Persistently connect to the backup client volumes, configure the volumes for multipath I/O (optional), initialize them as basic disks, align disk sectors, and format the new disks. Ensure that the backup client can access the VSS control volume; however, do not maintain a connection to this volume. Install the applications (for example, SQL or Exchange) and configure the applications to use the new disks.
3. Install Auto-Snapshot Manager on the backup clients and backup servers.
  4. Perform these tasks on the backup server:
    - a. Launch the VERITAS Backup Exec management interface.
    - b. Create one or more backup-to-disk folders for disk backup media. (Not required if you are only backing up to tape.) Optionally, you can create device pools for disk backup media.
    - c. Push the VERITAS Backup Exec AOFO and Agent from the backup server to the clients.  
**Note:** The VERITAS Backup Exec Exchange and SQL agent software is only installed on the backup (media) server.
    - d. Backup and restore the backup client volumes or applications (for example, SQL database or Exchange storage group).

When specifying job properties, *be sure* to specify that the backup operation use Microsoft Volume Shadow Copy Service.

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## PS Series Group Requirements

PS Series group requirements are as follows:

- PS Series Firmware Version 2.1 or a higher version.
- One or more backup client volumes that will contain the data to be backed up. Be sure to reserve snapshot space for each volume. Also, for each backup client volume, create one or more access control records to allow the backup client access to the volume.

Before creating volumes, be sure to fully understand the individual application requirements (for example, e-mail, database, or file system), so you can allocate a sufficient amount of storage space to each volume. Note that volumes can be expanded easily online.

- One or more backup 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 backup 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 backup server and the backup client 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 installation information and additional Auto-Snapshot Manager requirements.

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.

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## Backup Server and Backup Client Requirements

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There are two types of servers involved in backup and recovery operations:

- **Backup server** (VERITAS uses the term **media server**). The backup server schedules, catalogs, and runs the backup and restore jobs.
- **Backup client** (VERITAS uses the term **remote server**). A backup client hosts the file system and application data (for example, NTFS file system or Exchange or SQL data) that you want to back up and, through a software agent, provides the backup server with access to the data.

Note that the backup server can also act as a backup client when backing up its own data.

See the VERITAS Backup Exec documentation for detailed information about backup server and backup client hardware and software requirements.

### Backup Server Requirements

The backup server (media server) requires the following:

- Microsoft Windows Server 2003 Enterprise or Datacenter Edition.
- VERITAS Backup Exec 10.0 for Windows Servers.
- VERITAS Backup Exec 10.0 Advanced Open File Option.
- VERITAS Backup Exec Advanced Disk Based Backup Option.
- VERITAS Backup Exec Microsoft Exchange Agent (if Microsoft Exchange Server 2003 clients will be backed up).

- VERITAS Backup Exec Microsoft SQL Agent (if Microsoft SQL Server 2000 clients will be backed up).
- Microsoft Windows Server 2003 Hotfix KB 833167 or a subsequent service pack.
- Microsoft Exchange System Manager (in order to detect Exchange servers via Backup Exec's Resource Discovery feature)
- Industry-standard iSCSI initiator, either:
  - Microsoft iSCSI Software Initiator Version 1.05a or later
  - iSCSI host bus adapter (HBA) initiator *plus* the service portion of the Microsoft iSCSI Software Initiator Version 1.05a or later (for VSS support).

For installation information, consult the initiator vendor documentation.

- Auto-Snapshot Manager for Windows Version 1.0.0 or later (VSS provider). For operating system, iSCSI initiator, and other requirements, see the Auto-Snapshot Manager *Installation and Administration* manual.
- For each backup volume for disk backup media:
  - Persistently connect the server to the volume.
  - If you want to use multipath I/O, set up redundant paths between servers and storage. See the EqualLogic Multipath I/O DSM for Windows *Installation and Administration* manual for information.
  - Initialize the volume as a basic disk.
  - For the best performance, align disk sectors. See the Technical Report, *Aligning Disk Sectors for Optimal Performance*, on the EqualLogic Customer Support website for more information.
  - Format the new disk.
  - Point the backup application to use the new disk for a backup-to-disk device, as described in *Creating Disk Backup Media*.
- Access to the VSS control volume, `vss-control`. Although you can connect to this volume to test access, do not maintain an iSCSI connection to this volume.
- Consult the *Network Connection Guidelines* Technical Report on the EqualLogic Customer Support website for information about improving network performance between PS Series storage arrays and servers.

## Backup Client Requirements

Each backup client (or remote server) requires the following:

- Microsoft Windows Server 2003 Enterprise or Datacenter Edition.
- Microsoft Exchange Server 2003 Service Pack 1 (if Microsoft Exchange Server 2003 is installed).
- Microsoft SQL Server 2000 Service Pack 3a (if Microsoft SQL Server 2000 is installed).
- VERITAS Backup Exec 10.0 Advanced Open File Option (if you are backing up NTFS on the server). Note that you can perform the backup client software installation from the Backup Server by using the Backup Exec Assistant.

- VERITAS Backup Exec 10.0 Remote Agent for Window Servers (AOFO automatically installs the Remote Agent).
- VERITAS Backup Exec Advanced Disk Based Backup Option.
- Microsoft Windows Server 2003 Hotfix KB 833167 or a subsequent service pack.
- Industry-standard iSCSI initiator, either:
  - Microsoft iSCSI Software Initiator Version 1.05a or later
  - iSCSI host bus adapter (HBA) initiator *plus* the service portion of the Microsoft iSCSI Software Initiator Version 1.05a or later (for VSS support).

For installation information, consult the initiator vendor documentation.

- Auto-Snapshot Manager for Windows Version 1.0.0 or later (VSS provider). For operating system, iSCSI initiator, and other requirements, see the Auto-Snapshot Manager *Installation and Administration* manual.
- For each client volume that will be backed up:
  - Persistently connect the server to the volume.
  - If you want to use multipath I/O, set up redundant paths between servers and storage. See the EqualLogic Multipath I/O DSM for Windows *Installation and Administration* manual for information.
  - Initialize the volume as a basic disk.
  - For the best performance, align disk sectors. See the Technical Report, *Aligning Disk Sectors for Optimal Performance*, on the EqualLogic Customer Support website for more information.
  - Format the new disk.
  - Point the client application to use the new disk.
- Access to the VSS control volume, `vss-control`. Although you can connect to this volume to test access, do not maintain an iSCSI connection to this volume.
- Consult the *Network Connection Guidelines* Technical Report on the EqualLogic Customer Support website for information about improving network performance between PS Series storage arrays and servers.

See the VERITAS Backup Exec documentation for more information on backup server and backup client hardware and software requirements, including the requirements for VSS.

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## Launching the Backup Exec Management Interface

The VERITAS Backup Exec management interface is run on the backup server and is used to identify backup devices, configure backup and restore jobs, monitor job progress, and restore data.

To launch the Backup Exec management interface on the backup server, click:

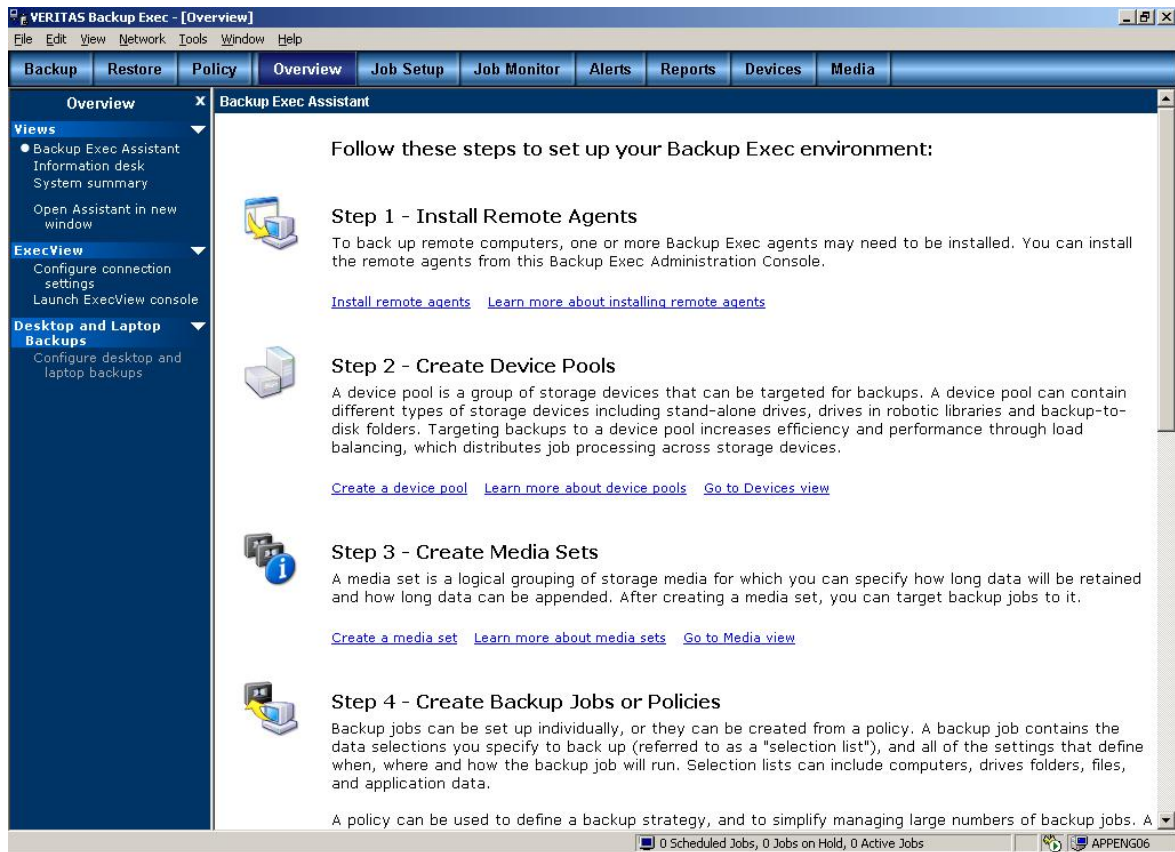
**Start → Programs → VERITAS Backup Exec 10.0 for Windows Servers**

To display the Backup Exec Assistant, which provides access to wizards that can help you perform common tasks, click **Overview** in the tool bar at the top of the screen and then click **Backup Exec Assistant** in the leftmost panel.

The Backup Exec Assistant Overview window appears (shown below). You can deploy remote agents, create devices pools, create media sets, create backup and restore jobs, and monitor jobs.

You can also use the Assistant to install Backup Exec software on the backup clients. For example, under Step 1 in the Overview window, click **Install remote agents**. Refer to the Backup Exec 10 for Windows Servers *Administrators Guide* for instructions on installing the correct Agent for your specific environment. Note that you must install the Advanced Open File Option to use the Microsoft VSS functionality.

## Backup Exec Assistant Overview



## Creating Disk Backup Media

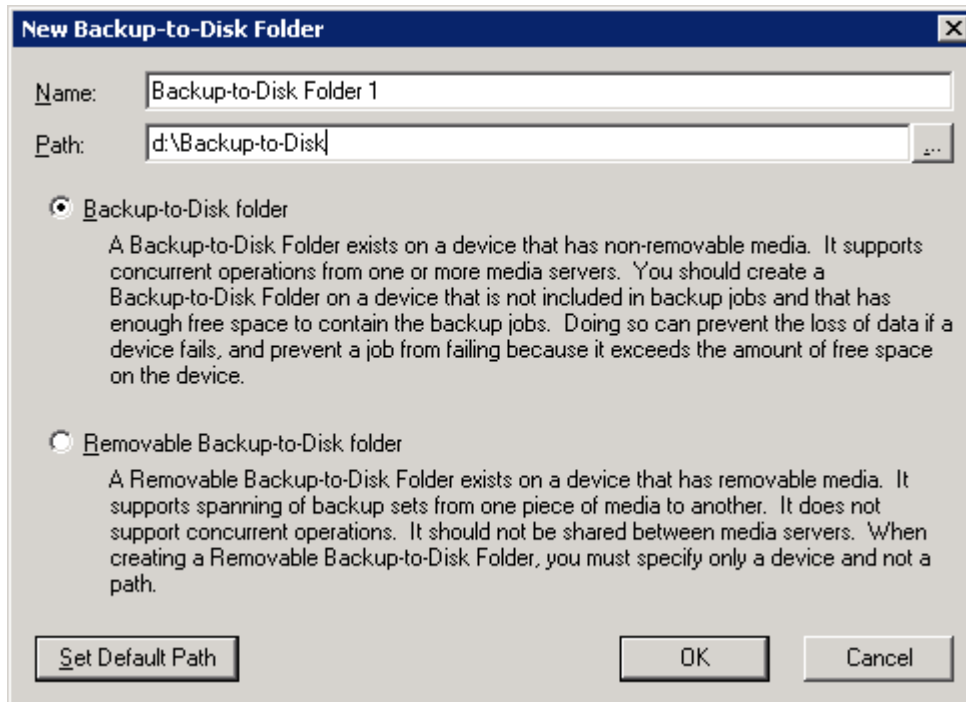
To perform a disk-to-disk backup or a disk-to-disk-to-tape backup, you must configure the backup volumes you set up in *PS Series Group Requirements* as disk backup media.

Backup Exec allows you to backup data to a “folder” which maps to a backup volume. Alternately, you can set up a device pool, which is a group of storage devices (for example, backup-to-disk folders) that can be used as disk backup media.

To create disk backup media, follow these steps on the backup server:

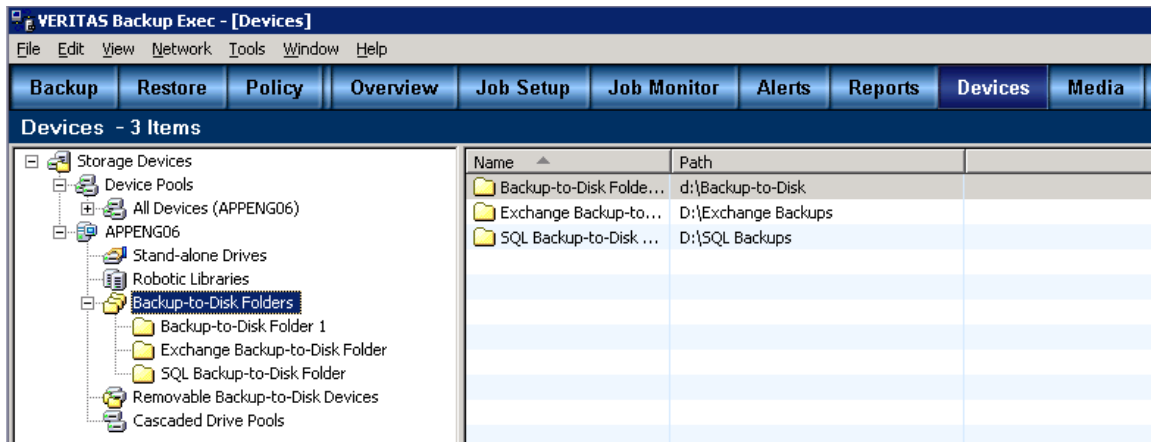
1. Be sure the backup server meets the requirements and recommendations in *Backup Server and Backup Client Requirements* this report.
2. In the Backup Exec tool bar, click **Devices**. In the Storage Devices tree, right-click **Backup-to-Disk Folders** and then select **New Backup-to-Disk Folder**. In the New Backup-to-Disk Folder dialog box, enter a unique name and then use the navigate button for the **Path** field to specify the mount point of a backup volume. Ensure that the **Backup-to-Disk folder** option is selected and click OK.

### New Backup-to-Disk Folder



After you create a folder, it will appear under **Backup-to-Disk Folders** in the Storage Devices tree (shown below). Repeat this step to create another backup-to-disk folders on that backup volume or another backup volume you created.

### Backup-to-Disk Folders



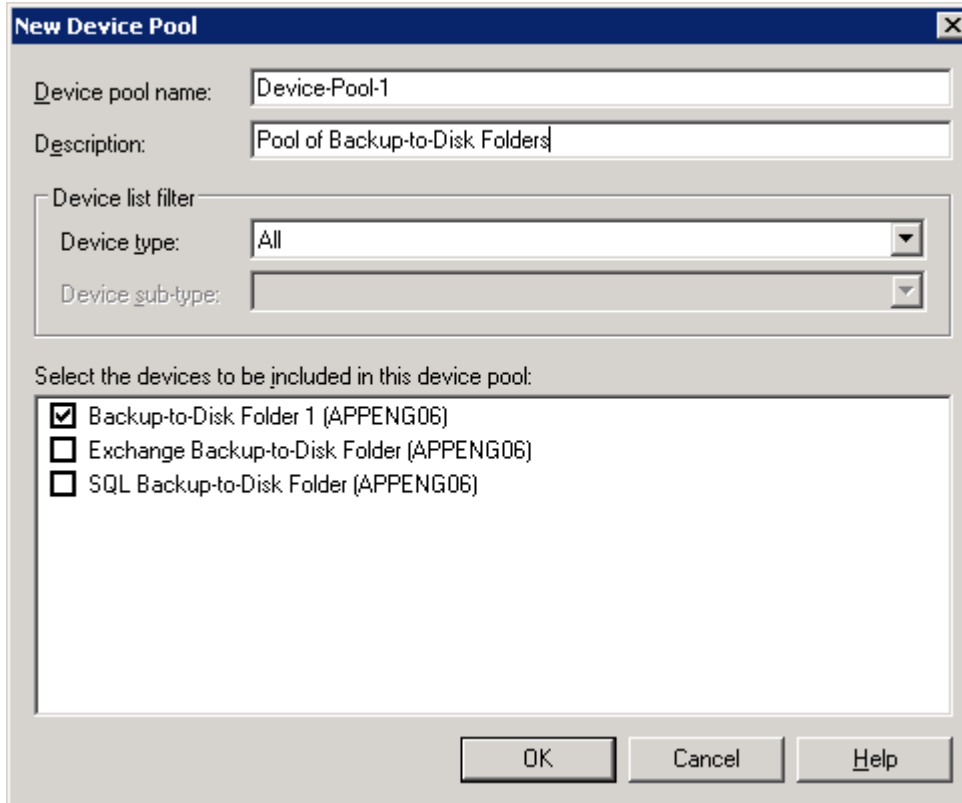
- To create an optional device pool, from the tool bar, click:

**Overview → Backup Exec Assistant → Create a device pool**

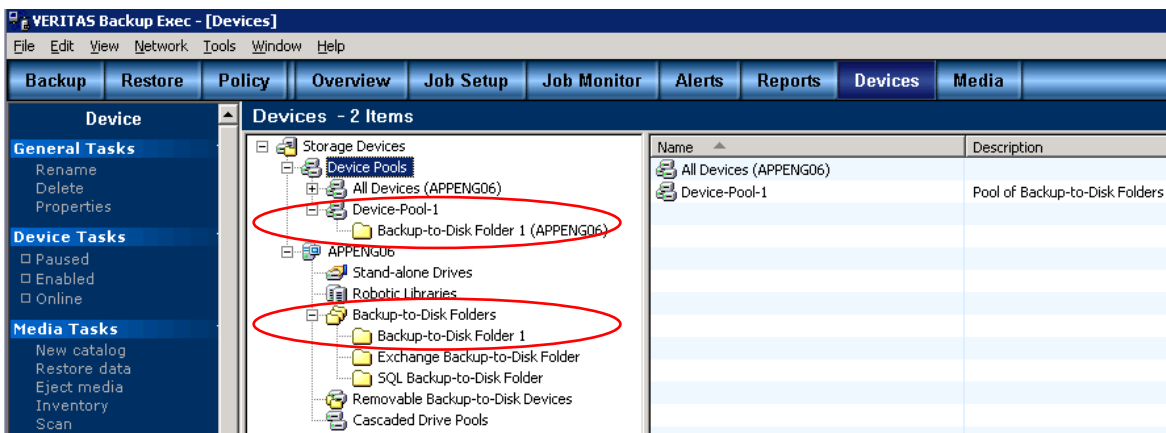
The New Device Pool dialog box appears, as shown below. Enter a **Device pool name** and **Description**. The backup-to-disk folders you created in Step 2 will be displayed. Select the checkbox next to the folders you want to include in the device pool.

Once the backup-to-disk folders (and device pools, if used) have been created and mapped to the backup volumes in the PS Series group, you can use them as backup media.

### New Device Pool



### Device Pools

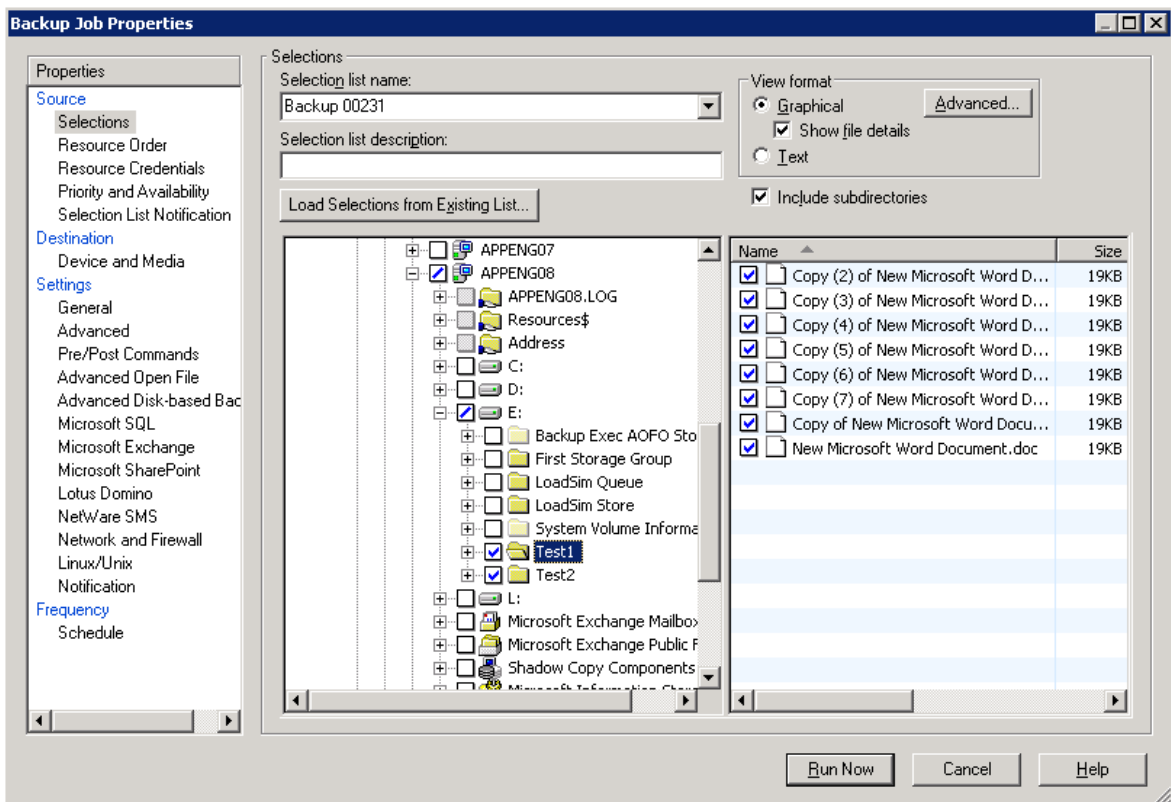


## Creating a Backup-to-Disk Job for an NTFS Volume

To backup an NTFS volume to disk using VSS, follow these steps on the backup server:

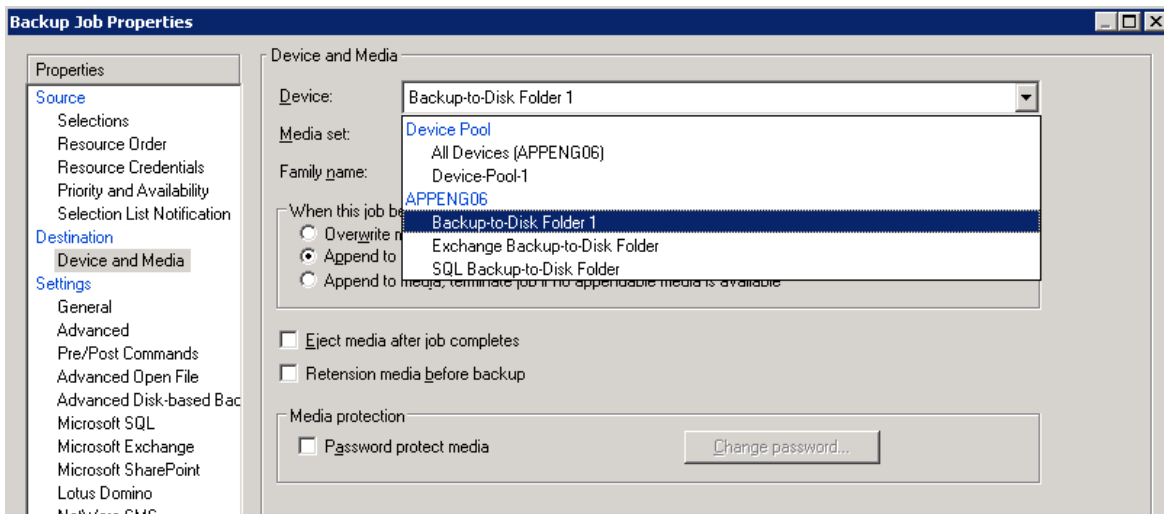
1. In the Backup Exec toolbar, click **Backup**.
2. Specify the file system to back up (this is a PS Series volume connected to and mounted on the backup client). Under **Source** in the leftmost panel, click **Selections**. The Backup Job Properties – Selections window appears. The backup server itself (under **Local Selections**) will be first in the resource list, along with all the available local objects. To backup data on a backup client that is running an agent, expand **Remote Selections** and then expand a client to display all available remote objects. Select the NTFS objects to backup.

### Backup Job Properties – Selecting an NTFS File System



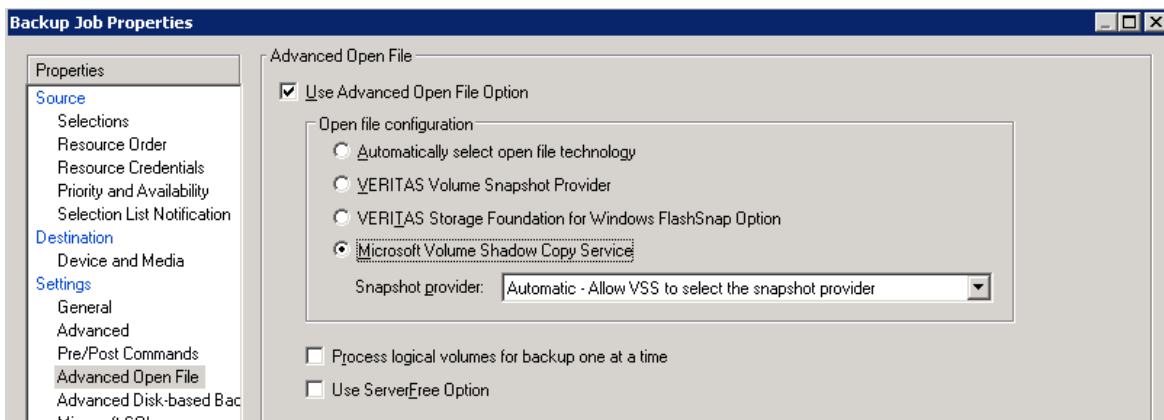
3. Specify the backup media for the objects you selected in Step 2. In the leftmost panel of the Backup Job Properties window, under **Destination**, select **Device and Media**. The Backup Job Properties – Device and Media window appears. In the **Device** field, select one of the Backup-to-Disk folders or device pools you set up in *Creating Disk Backup Media*. Then, enter a unique, meaningful name in the **Media set** field.

## Backup Job Properties – Device and Media



- Specify that the backup job use VSS. In the leftmost panel of the Backup Job Properties window, under **Settings**, select **Advanced Open File**. The Backup Job Properties – Advanced Open File window appears. Then, select **Use Advanced Open File Option** and select **Microsoft Volume Shadow Copy Service**. Ensure that the **Snapshot provider** field is set to “Automatic – Allow VSS to select the snapshot provider.”

## Backup Job Properties – Advanced Open File



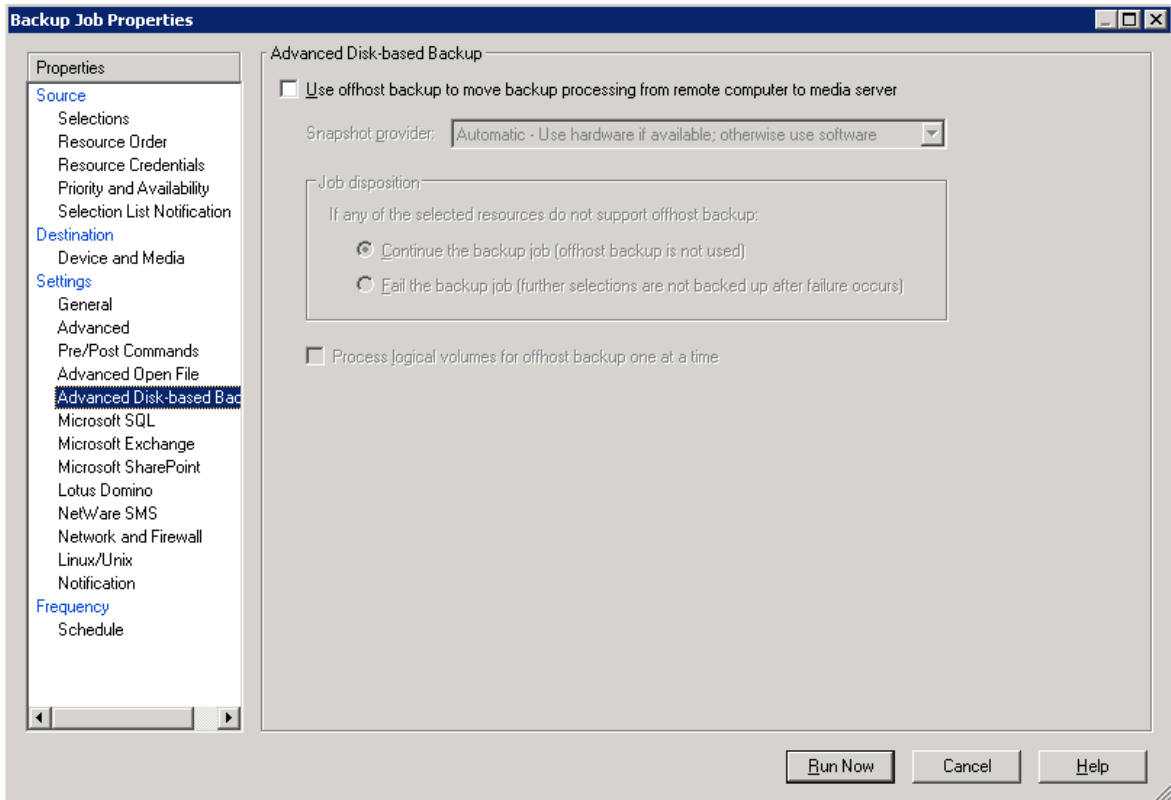
- When supported, you can enable Advanced Disk-Based Backup. This step is *not* applicable until VERITAS Backup Exec 10 supports offhost backup for PS Series storage.

**Note:** Advanced Disk-Based Backup enables the use of transportable hardware-based VSS snapshots to offload backup operations from the host. For more details, see the “About the Offhost Backup Feature” section in the VERITAS Backup Exec 10 for Windows Servers *Administrator’s Guide*.

VERITAS Backup Exec 10 has disabled offhost (transportable) backup in their code for storage devices they have not qualified. EqualLogic has successfully tested transportable snapshots; however, VERITAS must formally qualify it. Therefore, you *must* keep Advanced Disk-Based Backup unselected; otherwise, the job will fail.

When Advanced Disk-Based Backup *is* supported, in the leftmost panel of the Backup Job Properties window, under **Settings**, you will select **Advanced Disk-Based Backup**. The Backup Job Properties – Advanced Disk-Based Backup window appears. Then, you will select **Use offhost backup to move backup processing from remote computer to media server**.

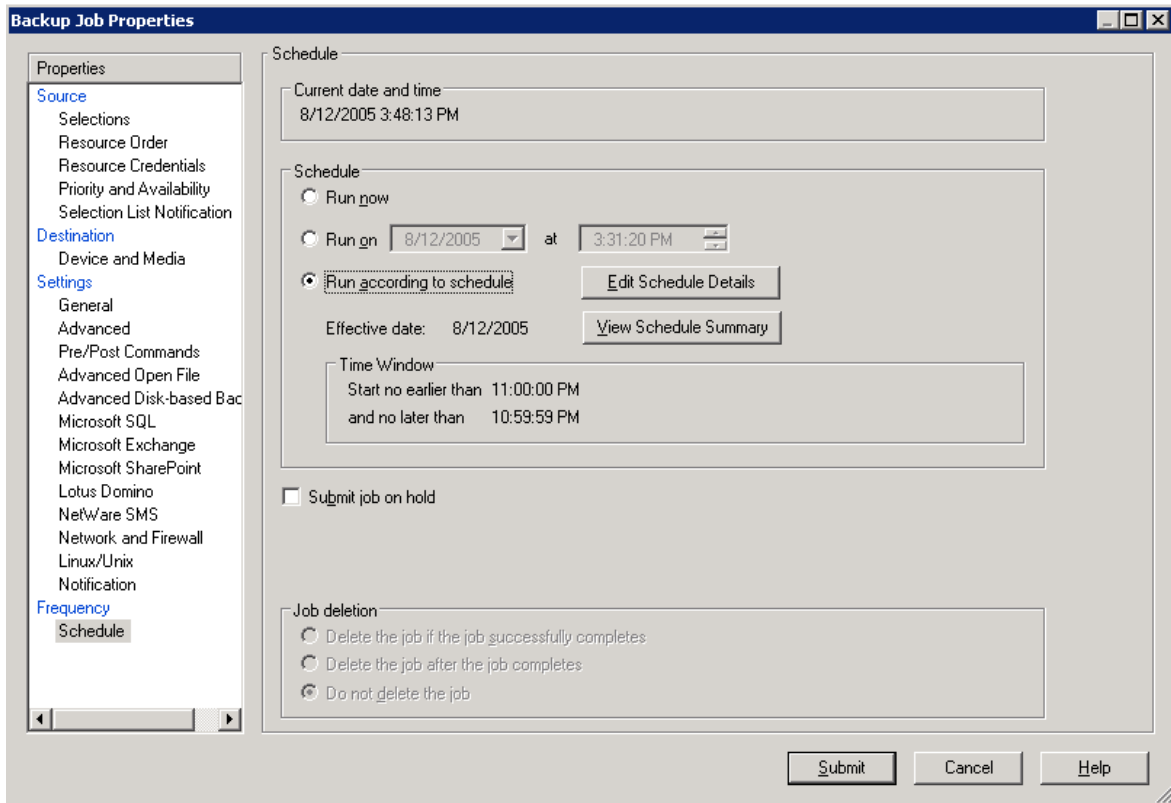
## Backup Job Properties – Advanced Disk-Based Backup



6. Start the backup job. To start the job immediately, in the Backup Job Properties window, click **Run Now**.

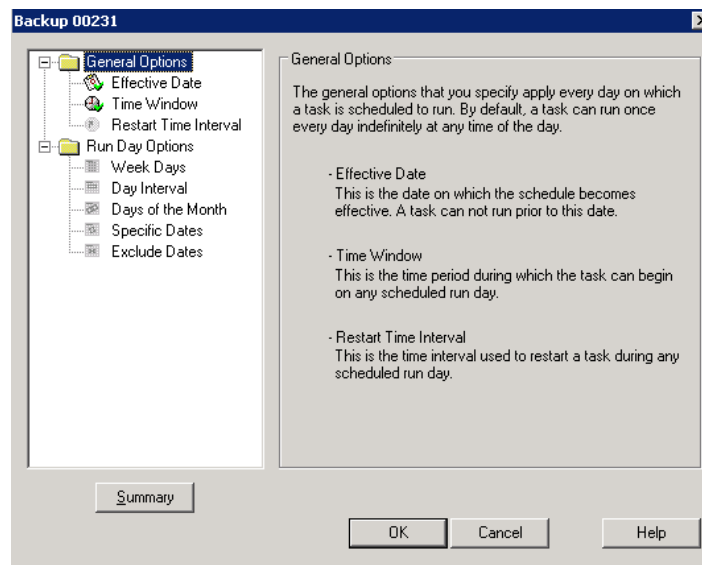
Alternatively, you can schedule the job so that the backup is performed at a specific date and time and repeated. In the leftmost panel of the Backup Job Properties window, under **Frequency**, select **Schedule**. The Backup Job Properties – Schedule window appears.

## Backup Job Properties – Schedule



Select the **Run according to schedule** button to display the Backup Job Scheduling dialog box, where you can set the options for the backup schedule. Click **OK** to create and activate the schedule. Click the **Edit Schedule Details** button if you need to make further changes to the schedule.

## Backup Job Scheduling



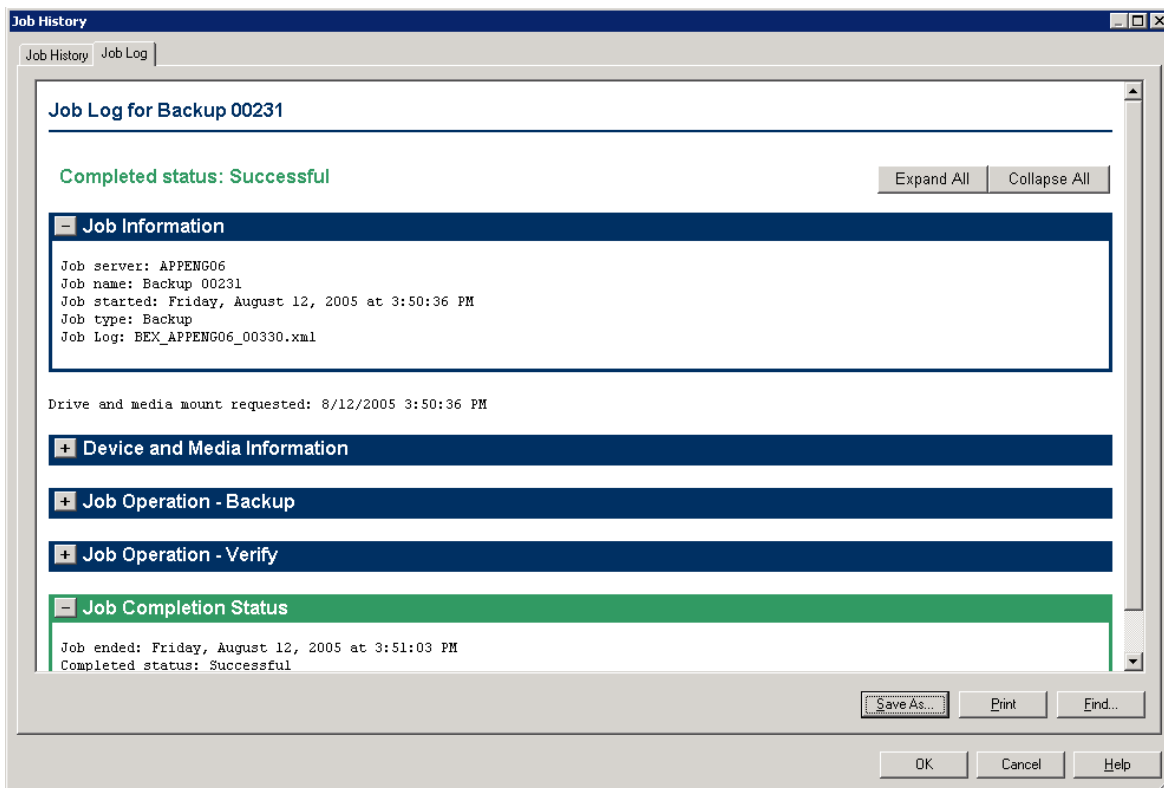
- Monitor the backup job. You can monitor both running and scheduled jobs. In the Backup Exec tool bar, click **Job Monitor**. The Backup Job Monitoring and Status window appears.

## Backup Job Monitoring and Status

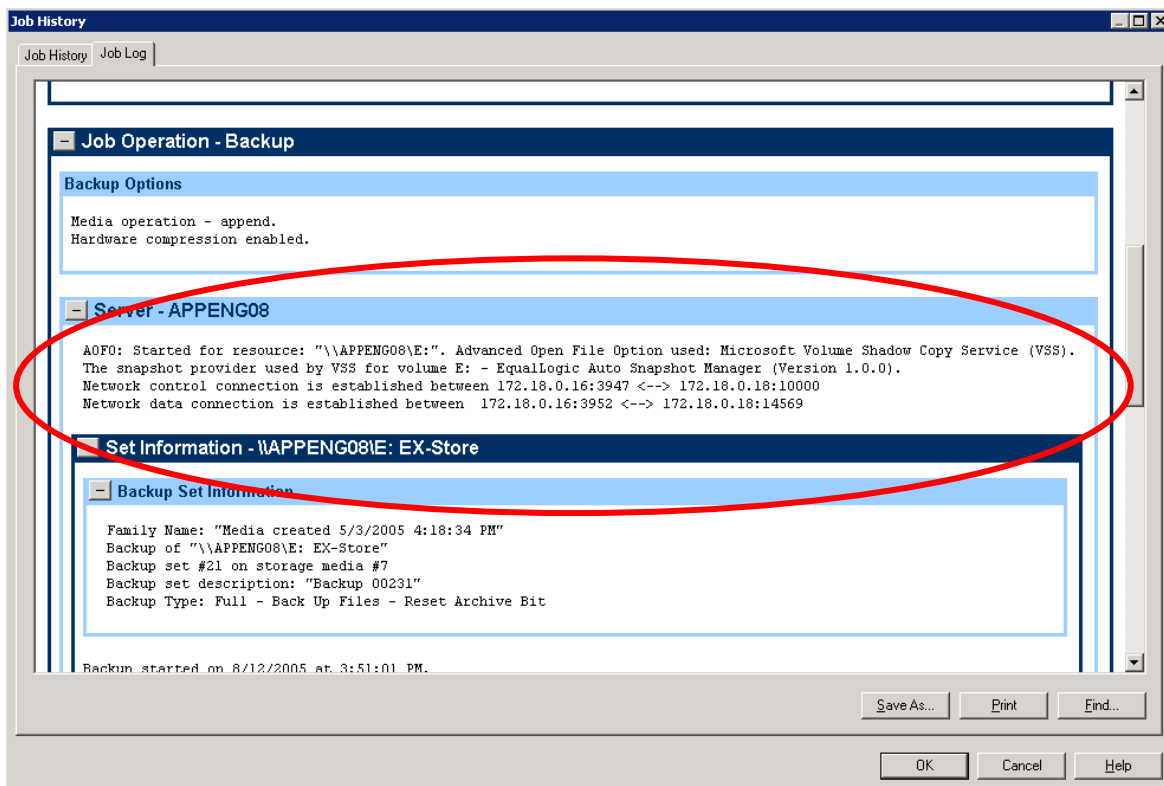
Right-click a backup job in the **Current Jobs** or **Job History** panel and then select **Properties** to display the Job History window.

Click the **Job Log** tab and scroll down to and then expand **Job Operation – Backup**. Locate the correct server name and ensure that the job is using the Microsoft Shadow Copy Service and the EqualLogic Auto Snapshot Manager VSS provider.

## Job History – Job Log



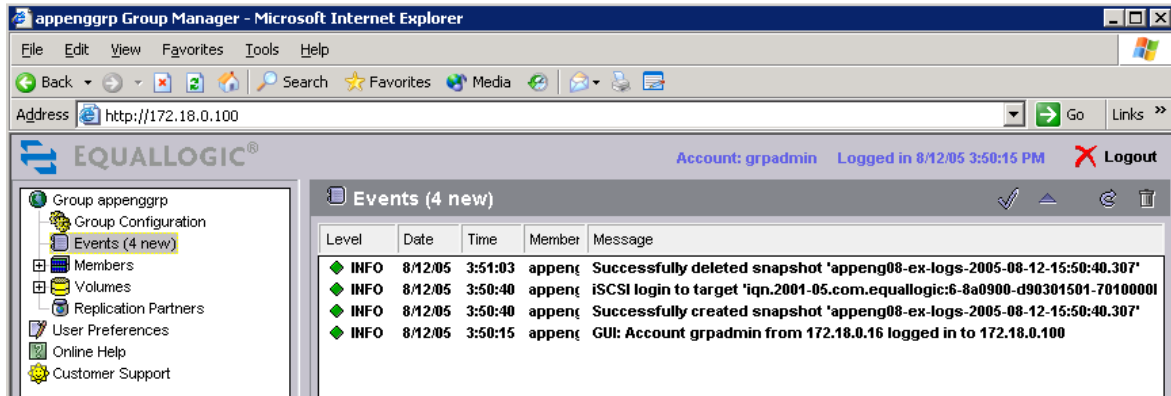
## Job Log – VERITAS AOFO with VSS and Auto-Snapshot Manager



- Verify that the snapshot has been created in the PS Series group by using the Group Manager GUI. From a Web browser, connect to the group IP address and log in to the group. Click **Events** in the leftmost panel to display the Event Log window and locate the snapshot events.

**Note:** The event log example below, resulting from VERITAS Backup Exec initiating a backup, confirms that that VSS told the PS Series group to create a snapshot of the client volume. Then, the backup client connected to the volume so that the backup application could perform the backup. Finally, VSS told the PS Series group to delete the snapshot after the backup was completed.

### PS Series Group Manger GUI – Event Log



## Creating a Backup-to-Disk Job for Microsoft Exchange 2003

Follow the Microsoft Exchange Server 2003 installation instructions to install the application and configure it to use the PS Series volumes that will be backed up.

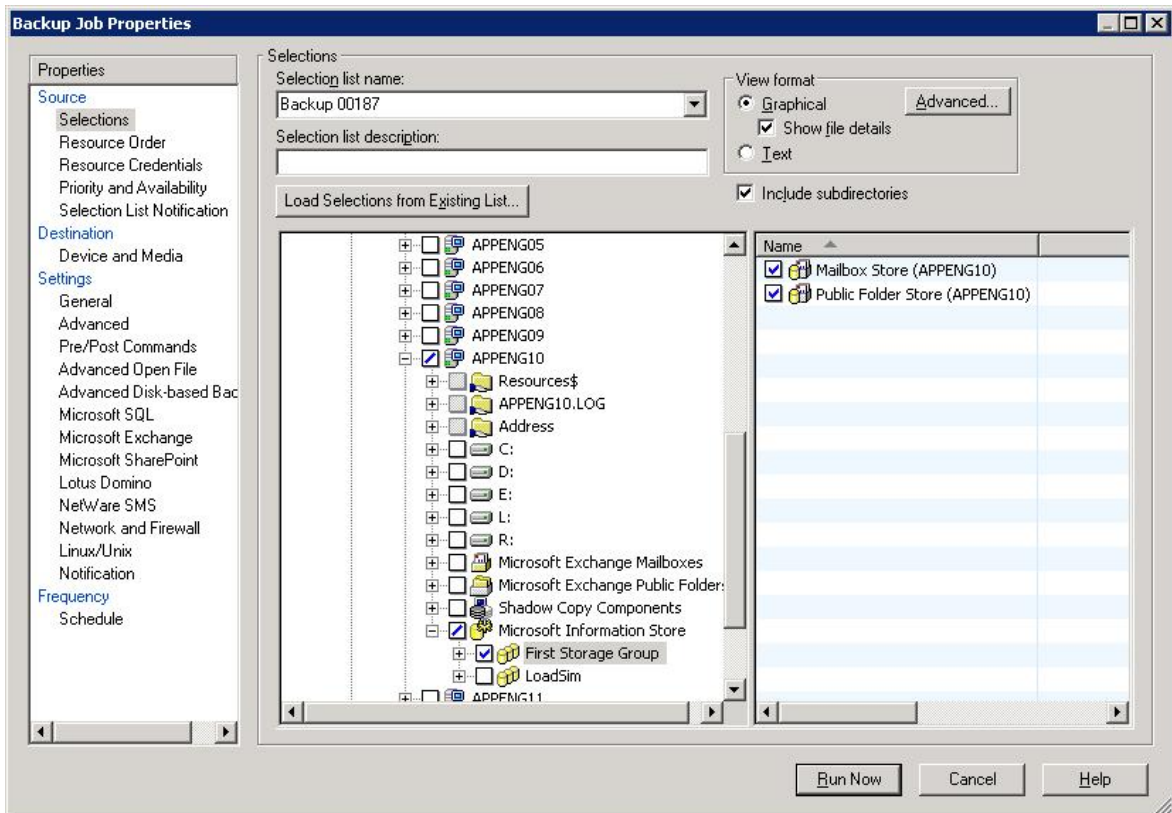
**Note:** According to the VERITAS Backup Exec 10 for Windows Servers *Administrator's Guide*, VERITAS VSS backups only support backing up Exchange Storage Groups. Using VSS to backup individual mailbox stores, public folder stores, mailboxes, a specific mailbox, or the message level of a specific user's mailbox is not supported or recommended by VERITAS. Instead, you must use the VERITAS Backup Exec Exchange Agent *without* the VSS option enabled. The procedures below focus on leveraging the VSS capabilities of VERITAS Backup Exec 10, which only supports backing up Exchange Storage Groups.

It is recommended that you read the section "Using Snapshot Technology With the Exchange Agent" in the VERITAS Backup Exec 10 for Windows Servers *Administrator's Guide* before proceeding with this section.

Follow the steps below on the backup server to backup Exchange using VSS. Note that screen shots that are the same as those shown previously have been intentionally left out.

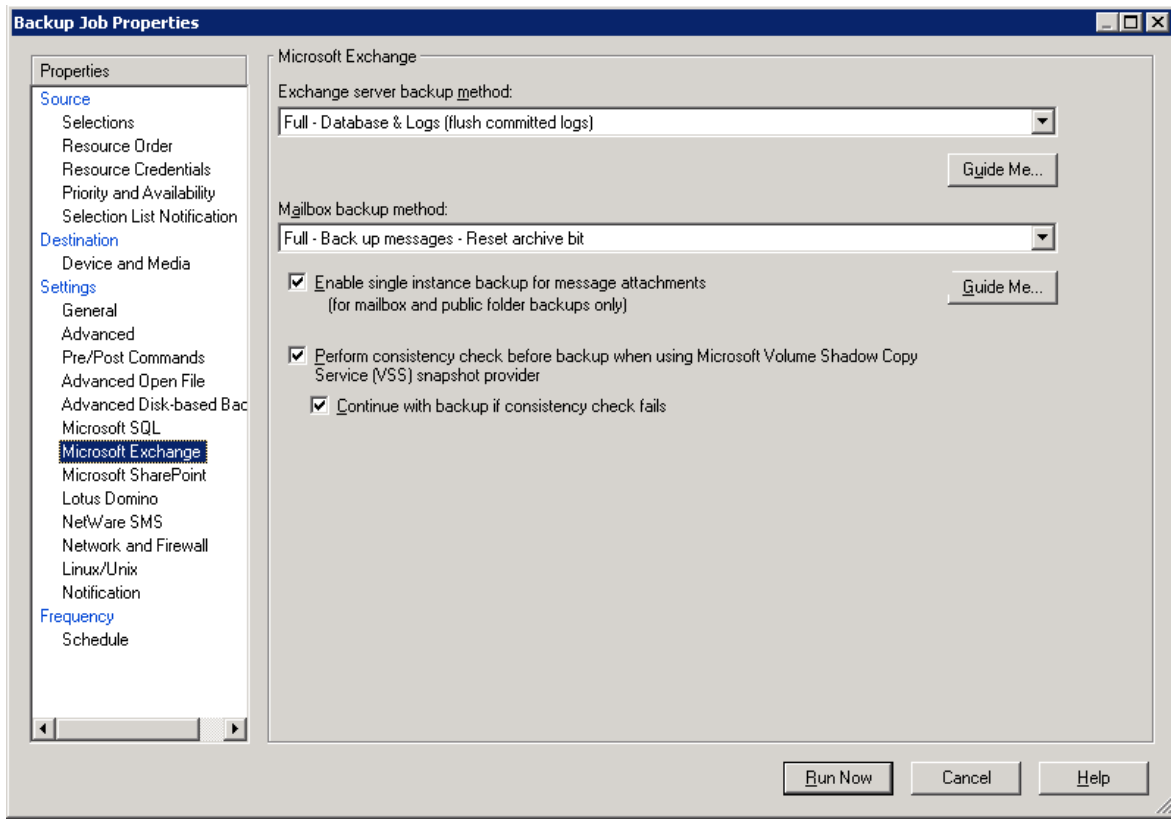
- In the Backup Exec tool bar, click **Backup**.
- Specify the Exchange data that you want to back up. Under **Source** in the leftmost panel, click **Selections**. The Backup Job Properties – Selections window appears. Then, expand **Remote Selections**, **Microsoft Windows Network**, and the desired Exchange server. Under the Exchange server, expand **Microsoft Information Store** and select the Storage Group objects you want to back up.

## Backup Job Properties – Selecting an Exchange Storage Group



3. Specify the backup media for the objects you selected in Step 2. In the leftmost panel of the Backup Job Properties window, under **Destination**, select **Device and Media**. The Backup Job Properties – Device and Media window appears. In the **Device** field, select one of the Backup-to-Disk folders or device pools you set up in *Creating Disk Backup Media*.
4. Specify that the backup job use VSS. In the leftmost panel of the Backup Job Properties window, under **Settings**, select **Advanced Open File**. The Backup Job Properties – Advanced Open File window appears. Then, select **Use Advanced Open File Option** and select **Microsoft Volume Shadow Copy Service**. Ensure that the **Snapshot provider** field is set to “Automatic – Allow VSS to select the snapshot provider.”
5. Specify the Exchange options. In the leftmost panel of the Backup Job Properties window, under **Settings**, select **Microsoft Exchange**. The Backup Job Properties – Exchange Backup Options window appears. Choose the desired options.

## Backup Job Properties – Exchange Backup Options



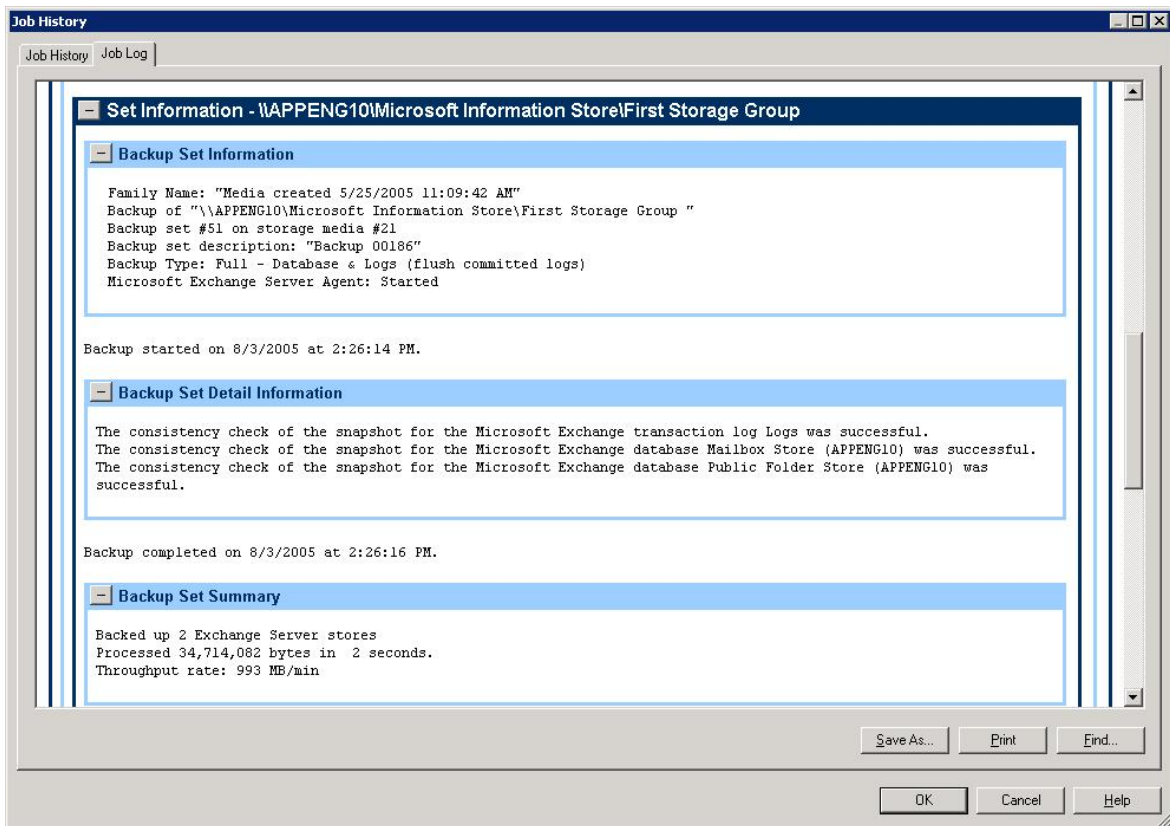
6. Start the backup job. To start the job immediately, click **Run Now**.

Alternatively, you can schedule the job so that the backup is performed on a specific date and time and repeated. In the leftmost panel of the Backup Job Properties window, under **Frequency**, select **Schedule**. The Backup Job Properties – Schedule window appears.

Select the **Run according to schedule** button to display the Backup Job Scheduling dialog box, where you can set the options for the backup schedule. Click **OK** to create and activate the schedule. Click the **Edit Schedule Details** button if you need to make further changes to the schedule.

7. Monitor the backup job. You can monitor both running and scheduled jobs. In the Backup Exec tool bar, click **Job Monitor**. The Backup Job Monitoring and Status window appears. Right-click a backup job in the **Current Jobs** or **Job History** panel and select **Properties** to display the Job History window.

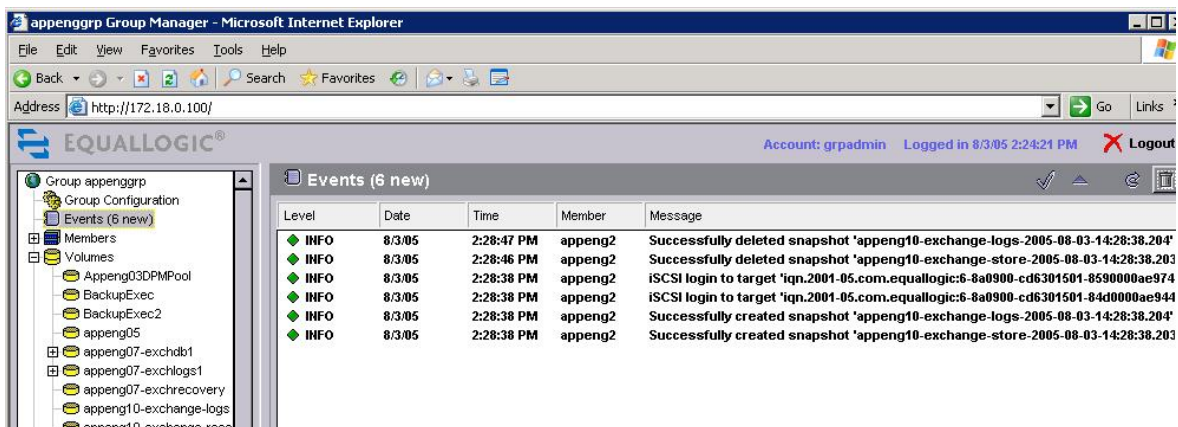
## Job History – Completed Exchange Backup Job



- Verify that the snapshot has been created in the PS Series group by using the Group Manager GUI. From a Web browser, connect to the group IP address and log in to the group. Click **Events** in the leftmost panel and locate the snapshot events in the log.

**Note:** The event log example below, resulting from VERITAS initiating a backup, confirms that that VSS told the PS Series group to create a snapshot of the Exchange database and log volumes. Then, the backup client connected to the volumes so that the backup application could perform the backup. Finally, VSS told the PS Series group to delete the snapshot after the backup was completed.

## PS Series Group Manger GUI – Event Log



## Creating a Backup-to-Disk Job for a Microsoft SQL Server 2000 Database

Follow the Microsoft SQL Server 2000 installation instructions to install the application and configure it to use PS Series volumes.

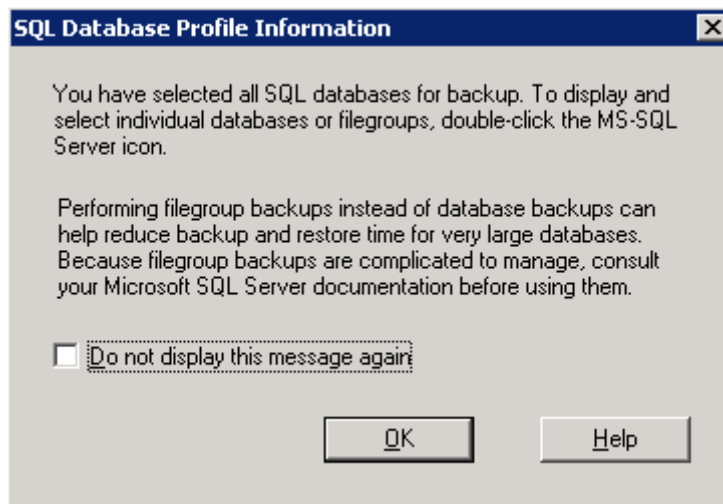
**Note:** According to the VERITAS Backup Exec 10 for Windows Servers *Administrator's Guide*, VERITAS VSS backups only support full SQL Server instance snapshots. Using VSS to backup individual databases, filegroups, or logs is not supported or recommended by VERITAS. Instead, you must use the VERITAS Backup Exec SQL Agent *without* the VSS option enabled. The procedure below focuses on leveraging the VSS capabilities of VERITAS Backup Exec 10, which only supports Instance Level backups.

It is recommended that you read the section “Using Snapshot Technology With the SQL Agent” in the VERITAS Backup Exec 10 for Windows Servers *Administrator's Guide* before proceeding.

Follow the steps below on the backup server to backup SQL using VSS. Note that screen shots that are the same as those shown previously have been intentionally left out.

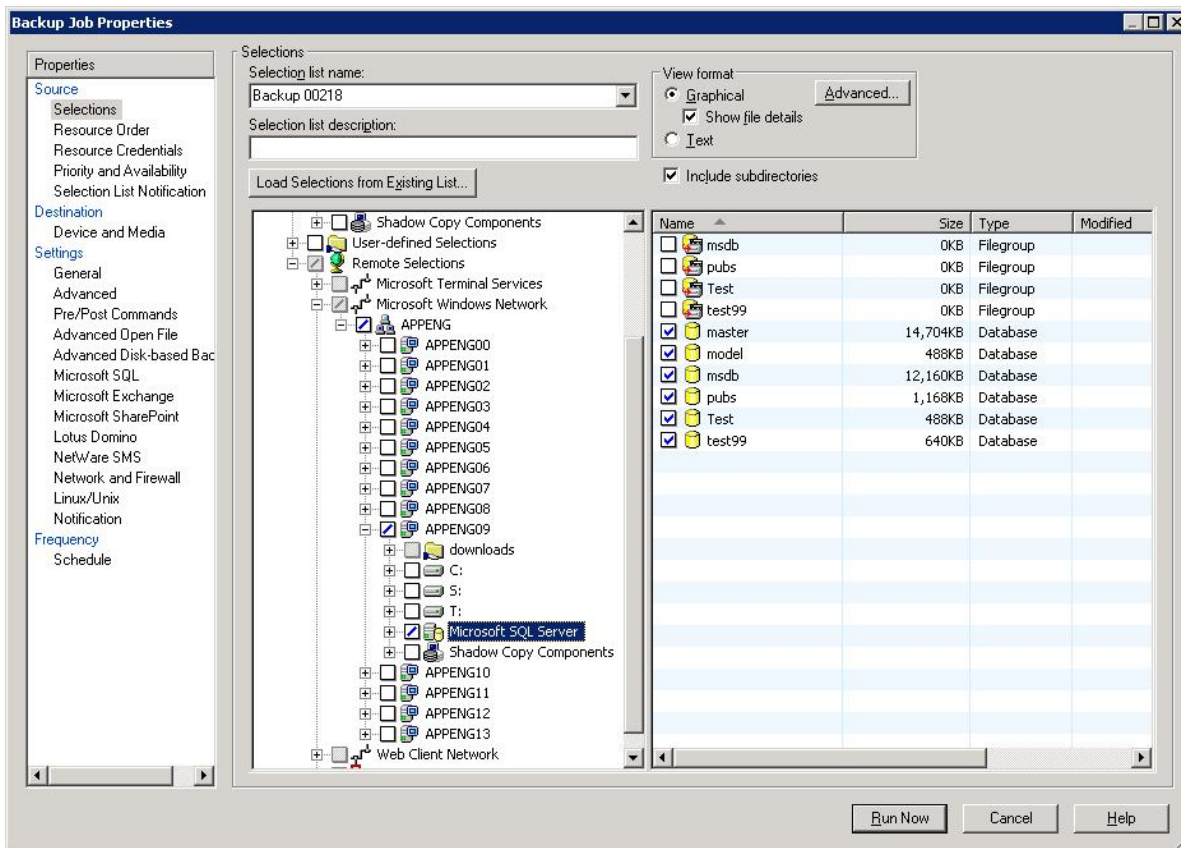
1. In the Backup Exec tool bar, click **Backup**.
2. Specify the SQL Server instance to back up. Under **Source** in the leftmost panel, click **Selections**. The Backup Job Properties – Selections window appears. Expand **Remote Selections** and **Microsoft Windows Network**. Then, navigate to the Windows domain and server holding the SQL Server instance you want to back up. Under the desired SQL server, select **Microsoft SQL Server**. The following informational dialog box may appear.

### Backup Job Properties –SQL Database Profile Information



**Note:** As previously stated, VSS backups only support full SQL Server instance snapshots. Although, at this point, you *could* selectively uncheck individual databases and select individual filegroups, the backup job would not be able to use VSS. Therefore, for this example, the entire SQL Server instance will be backed up.

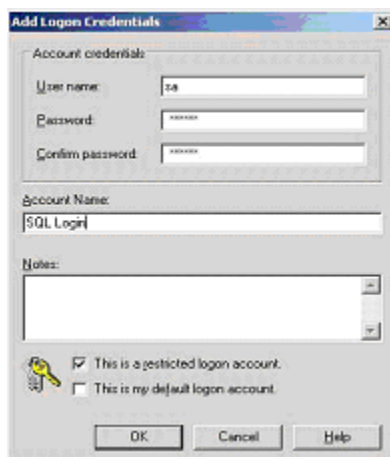
## Backup Job Properties – Selecting SQL Databases



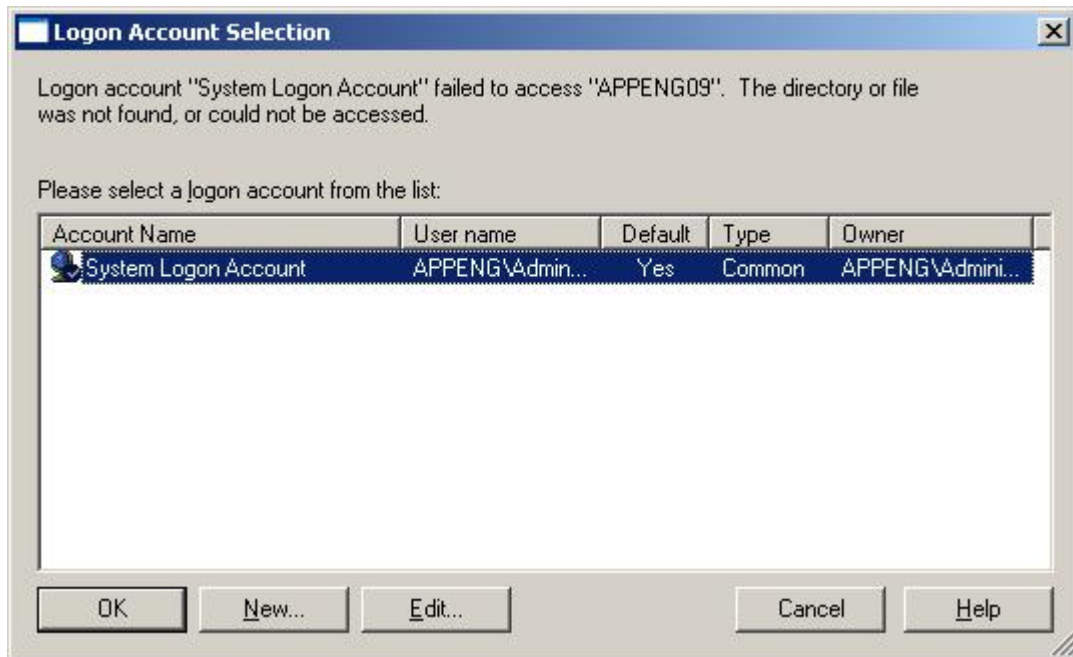
3. If needed, create a logon account. If your SQL server instance has a set of Domain credentials that differ from the credentials your Backup Exec service uses, or if you are using an “sa” account, create a logon account to allow Backup Exec to authenticate to the SQL database.

To create a logon account, expand **Remote Selections**, **Microsoft Windows Network**, then navigate to the Windows domain and server holding the SQL Server instance you want to back up. Under the desired SQL server, select **Microsoft SQL Server**. If the Add Logon Credentials dialog box appears, enter the proper credential information in the dialog box and then click **OK**. If the Logon Account Selection dialog box appears instead, click **New**. The Add Logon Credentials dialog box will appear and you can now enter the account information.

### SQL Add Logon Credentials

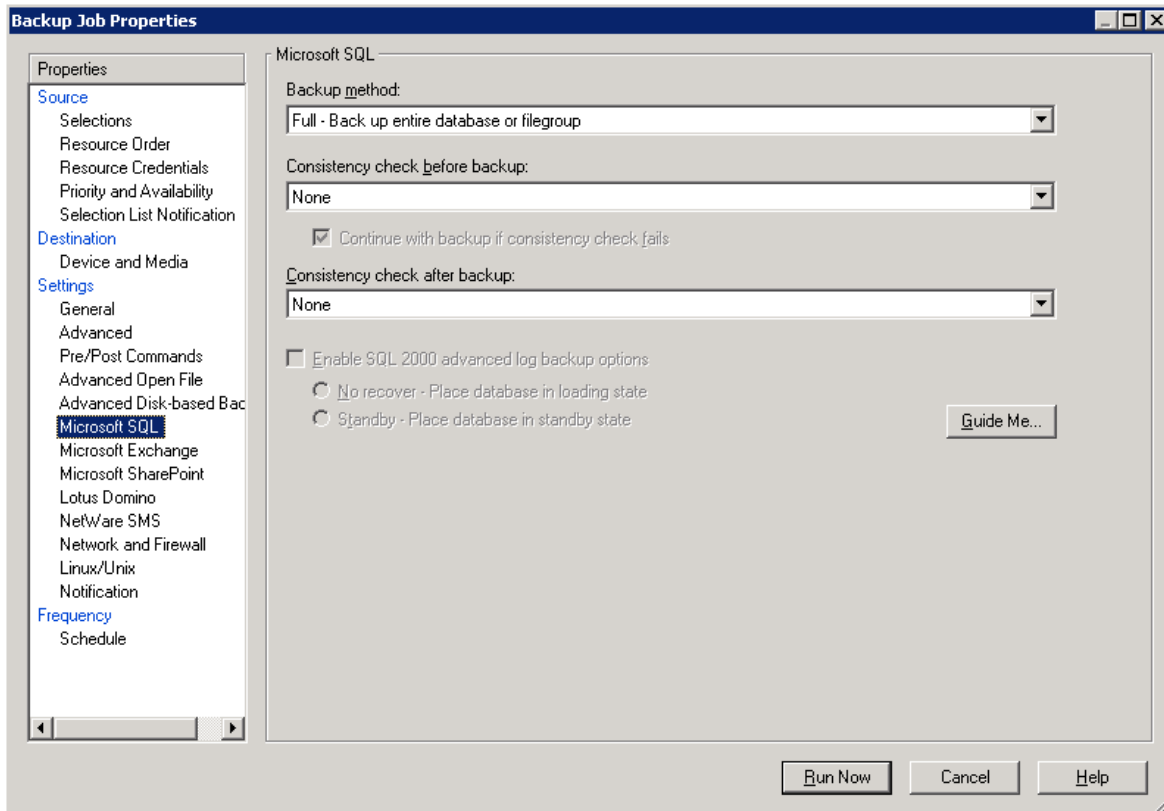


## SQL Logon Account Selection



4. Specify the backup media for the objects you selected in Step 2. In the leftmost panel of the Backup Job Properties window, under **Destination**, select **Device and Media**. The Backup Job Properties – Device and Media window appears. In the **Device** field, select one of the Backup-to-Disk folders or device pools you set up in *Creating Disk Backup Media*. Then, enter a unique, meaningful name in the **Media set** field.
5. Specify that the backup job use VSS. In the leftmost panel of the Backup Job Properties window, under **Settings**, select **Advanced Open File**. The Backup Job Properties – Advanced Open File window appears. Select **Use Advanced Open File Option** and select **Microsoft Volume Shadow Copy Service**. Ensure that the **Snapshot provider** field is set to “Automatic – Allow VSS to select the snapshot provider.”
6. Specify the SQL options. In the leftmost panel of the Backup Job Properties window, under **Settings**, select **Microsoft SQL**. The Backup Job Properties – Exchange Backup Options window appears. Choose the desired options.

## Microsoft SQL Backup Options



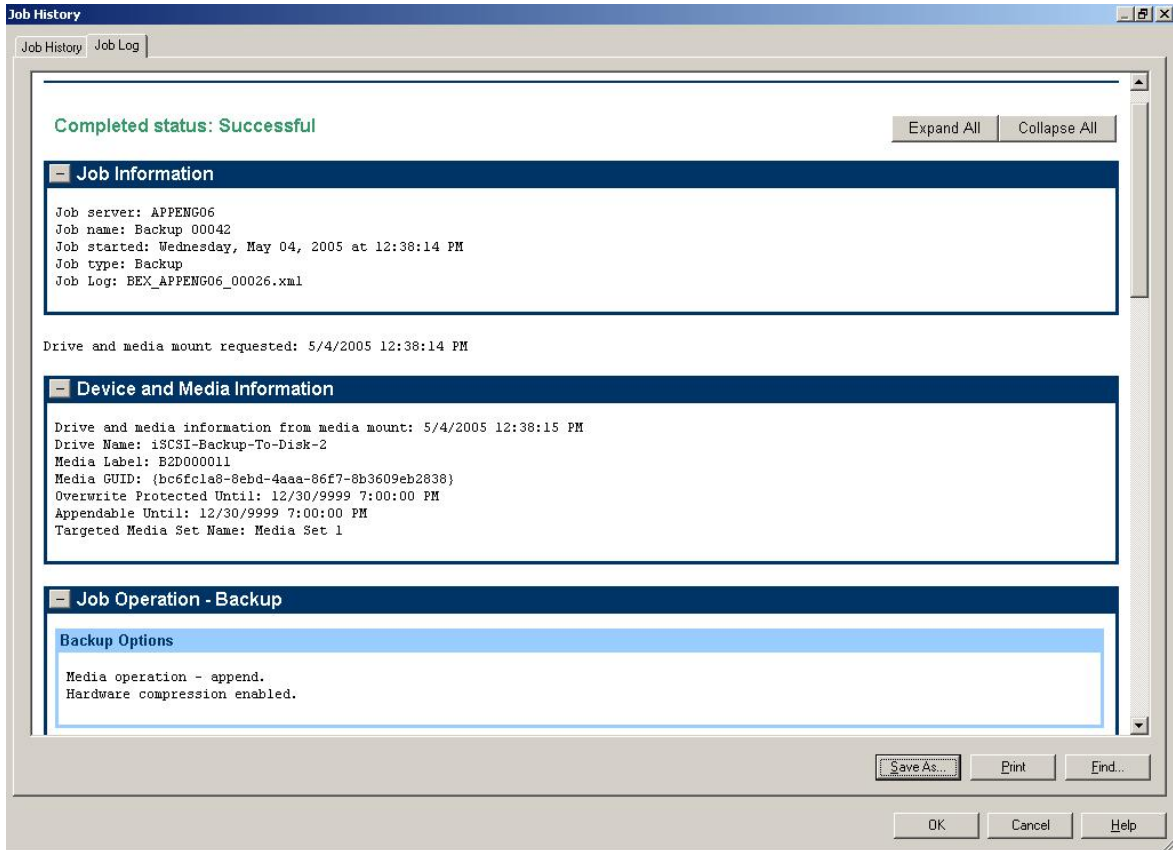
7. Start the backup job. To start the job immediately, click **Run Now**.

Alternatively, you can schedule the job so that the backup is performed on a specific date and time and repeated. In the leftmost panel of the Backup Job Properties window, under **Frequency**, select **Schedule**. The Backup Job Properties – Schedule window appears.

Select the **Run according to schedule** button to display the Backup Job Scheduling dialog box, where you can set the options for the backup schedule. Click **OK** to create and activate the schedule. Click the **Edit Schedule Details** button if you need to make further changes to the schedule.

8. Monitor the backup job. You can monitor both running and scheduled jobs. In the Backup Exec tool bar, click **Job Monitor**. The Backup Job Monitoring and Status window appears. Right-click a backup job in the **Current Jobs** or **Job History** panel and select **Properties** to display the Job History window.

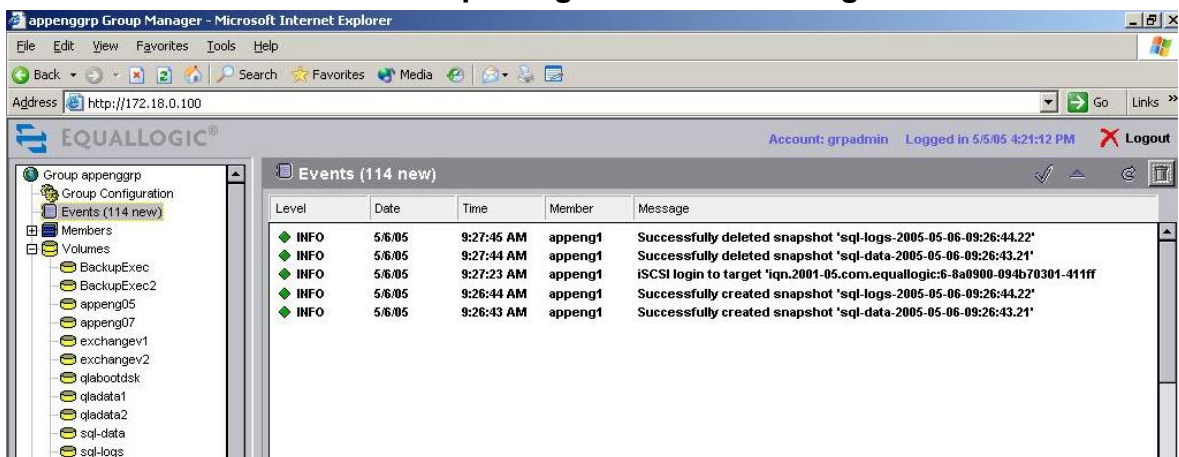
## Job History – Completed SQL Backup Job



- Verify that the snapshot has been created in the PS Series group by using the Group Manager GUI. From a Web browser, connect to the group IP address and log in to the group. Click **Events** in the leftmost panel and locate the snapshot events in the log.

**Note:** The event log example below, resulting from VERITAS Backup Exec initiating a backup, confirms that that VSS told the PS Series group to create a snapshot of the SQL database and log volumes. Then, the backup client connected to the volumes so that the backup application could perform the backup. Finally, VSS told the PS Series group to delete the snapshot after the backup was completed.

## PS Series Group Manger GUI – Event Log

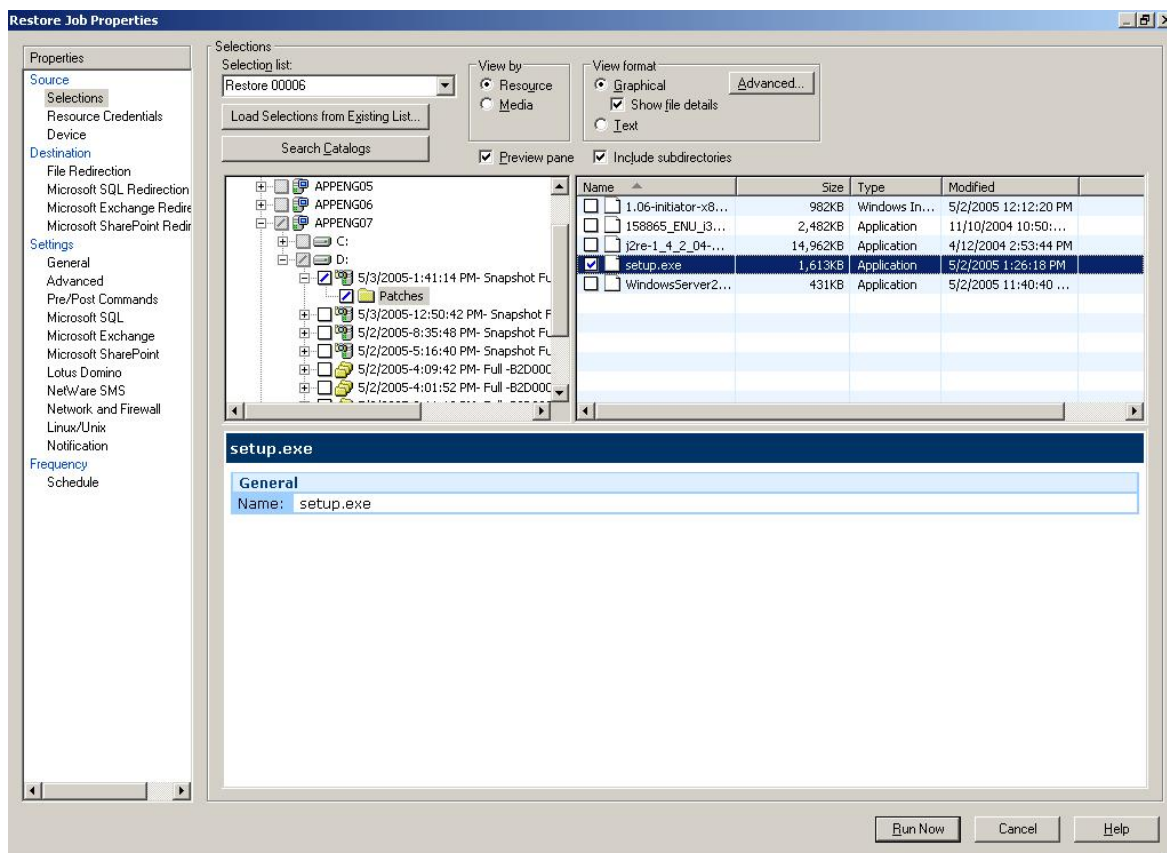


## Restoring NTFS Files from a VSS Backup

To restore NTFS files from a backup, follow these steps on the backup server:

1. In the Backup Exec tool bar, click **Restore**.
2. Select the data to restore. In the leftmost panel under **Source**, click **Selections**. The Backup Job Properties – Selections window appears. Expand **Remote Selections** and **Microsoft Windows Network**. Then, navigate to the Windows domain and server holding the NTFS data that was originally backed up. Examine the catalog listing and locate the catalog that corresponds to the date and data you want to restore. Then, select the date if you want to do a full restore or expand the date and select the folders or navigate further to select the folders and files to restore.

### Restore Job Properties – Selecting the Restore Source



3. Select the restore destination. By default, the restore operation will restore to the original location of the files.

To restore with redirection (that is, to a different location), in the leftmost panel, under **Destination**, click **File Redirection** and navigate to the desired “Restore to” drive. Then, enter the “Restore to” path.

4. Click the **Run Now** button. Then, click **OK** in the Session User Name and Password window and click **OK** to start the restore job.
5. Monitor the backup job. You can monitor both running and scheduled jobs. In the Backup Exec tool bar, click **Job Monitor**. The Backup Job Monitoring and Status window appears. Right-click a backup job in the **Current Jobs** or **Job History** panel and select **Properties** to display the Job History window.
6. Verify the restored files.

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## Restoring Microsoft Exchange 2003 from a VSS Backup

The VSS backup procedures described in this report enable you to restore data up to the time of the backup. Depending on the type of backup and restore performed, you may need to use Microsoft Exchange's software recovery techniques for log playback to return Exchange to a consistent and up-to-date state. This is detailed in the document *Design Companion Microsoft Exchange 2003 Backup Applications: Using the Volume Shadow Copy Service*.

**Note:** According to the VERITAS Backup Exec 10 for Windows Servers *Administrator's Guide*, the Exchange Agent snapshot does *not* support the Exchange 2003 Recovery Storage Group (RSG) feature. Therefore, you cannot use Recovery Storage Groups with backups created using VSS snapshots. However, you can use Recovery Storage Groups with an Exchange Agent backup that was created *without* using VSS snapshots, a process described in the VERITAS *Administrator's Guide* and the following support document:

<http://seer.support.veritas.com/docs/264815.htm>

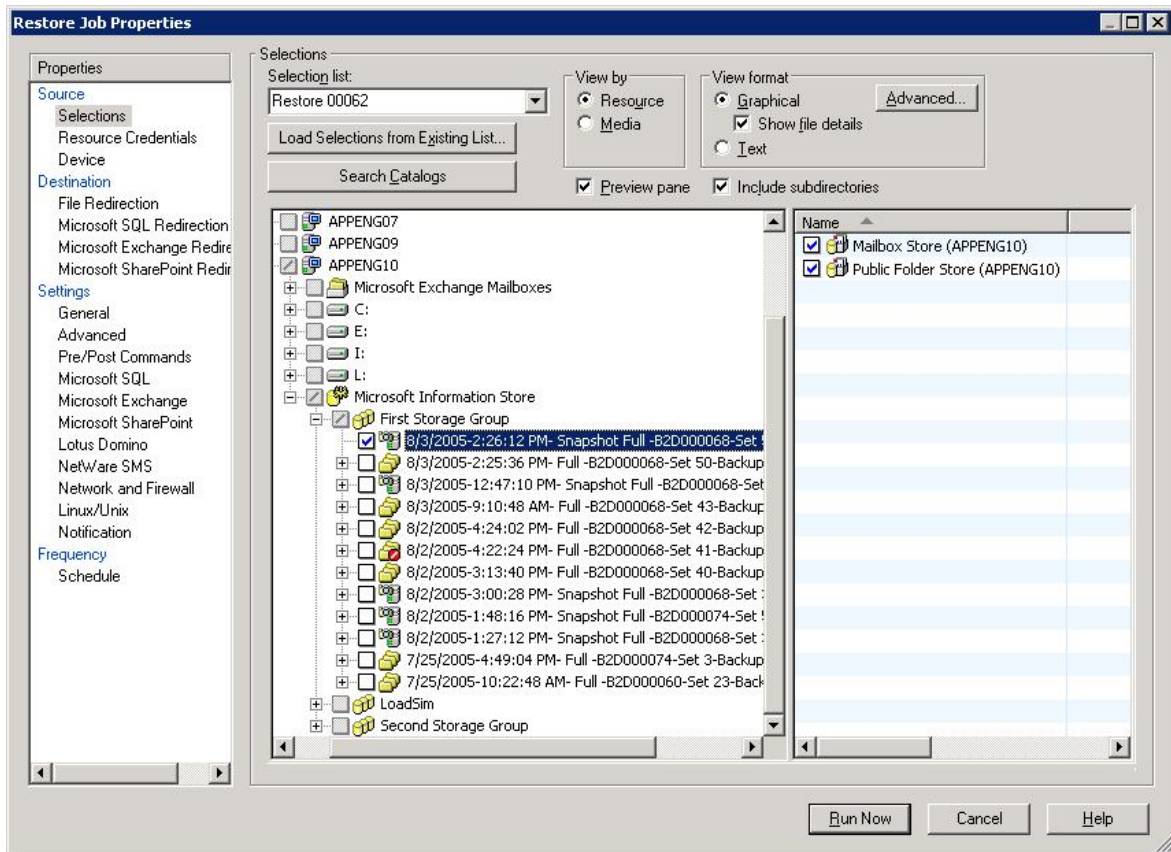
For general information on using Recovery Storage Groups, refer to the Microsoft Exchange documentation and the following Microsoft Knowledge Base article:

<http://support.microsoft.com/default.aspx?scid=kb;%5BLN%5D;824126>

To restore an Exchange Information Store or Storage Group, follow these steps on the backup server:

1. In the Backup Exec tool bar, click **Restore**.
2. Select the Exchange Storage Group to restore. In the leftmost panel under **Source**, click **Selections**. The Backup Job Properties – Selections window appears. Expand **Remote Selections** and **Microsoft Windows Network**. Then, navigate to the Windows domain and server holding the Exchange Storage Group that was originally backed up. Under **Microsoft Information Store**, select the desired Exchange Storage Group and examine the catalog listing to locate the catalog that corresponds to the date from which you want to restore. Then, either select the date if you want to do a full restore or expand the date and select a specific Mailbox Store or Public Folder Store to restore.

## Restore Job Properties – Selecting the Exchange Restore Source



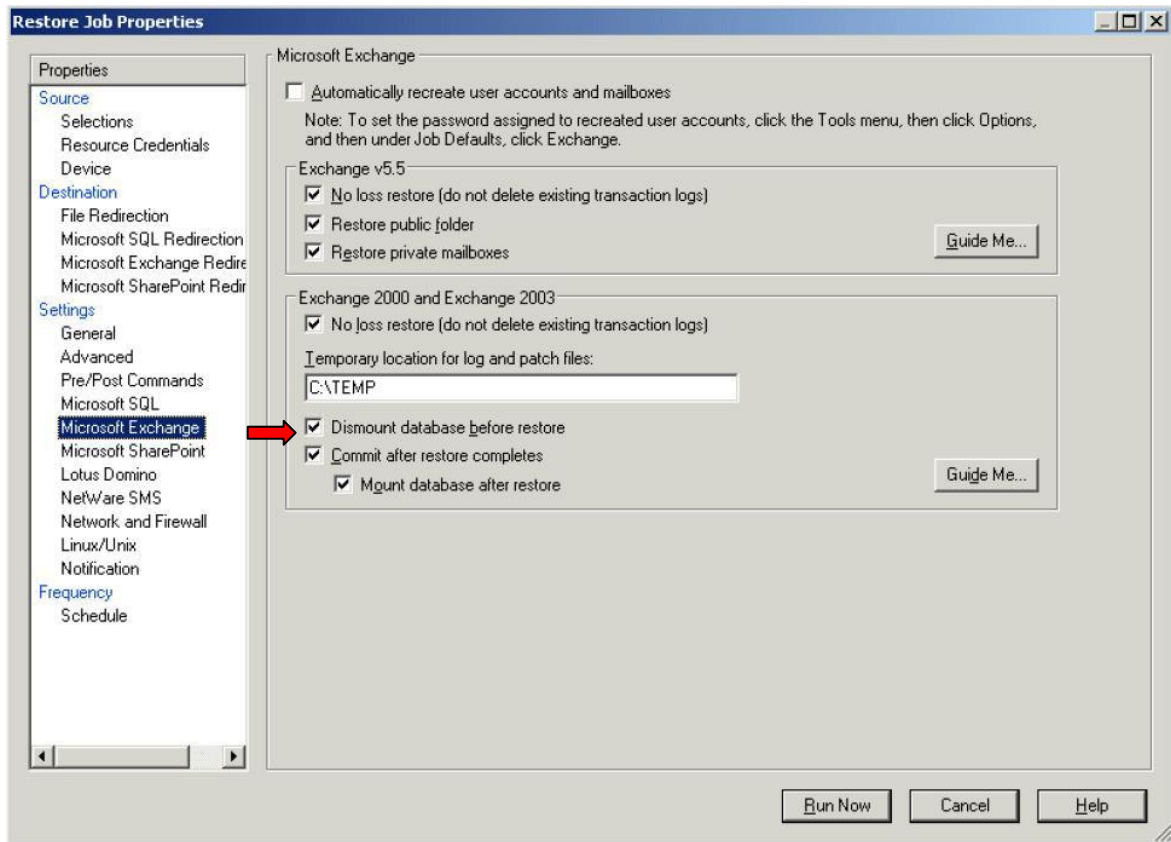
3. Select the restore destination. When restoring from a VSS backup, you have two options. The first option is the default and will replace the original storage group on the original server, as we are doing in this example.

The second option is to restore with redirection (that is, restore to a different server). You may want to restore to a different server if you are upgrading hardware or in a disaster recovery situation in which the entire Exchange infrastructure must be recreated. You may also want to restore to a different server to recover an individual mail store (instead of the entire storage group) by manually copying only its log and database files from the redirected restore location to the original location. To restore with redirection, in the leftmost panel under **Destination**, click **Microsoft Exchange Redirection**. In the Restore Job Properties – Microsoft Exchange Redirection window that appears, select **Redirect Exchange sets** and specify the “Restore to” server and the “Restore to” mailbox to which you want to restore.

4. Specify the Exchange restore job options. In the leftmost panel under **Settings**, click **Microsoft Exchange**. The Restore Job Properties – Exchange Settings window appears.

Note that when restoring a snapshot backup, all databases in a storage group must be set offline (dismounted) unless you are restoring with redirection. Therefore, if the storage group is not offline, select the **Dismount database before restore** option.

## Restore Job Properties - Exchange Settings



5. Start the restore job. Click **Run Now** and then click **OK** in the Session User Name and Password window. Click **OK** to start the restore job.
6. Monitor the backup job. You can monitor both running and scheduled jobs. In the Backup Exec tool bar, click **Job Monitor**. The Backup Job Monitoring and Status window appears. Right-click a backup job in the **Current Jobs** or **Job History** panel and select **Properties** to display the Job History window.
7. Verify the restored Exchange Storage Group.

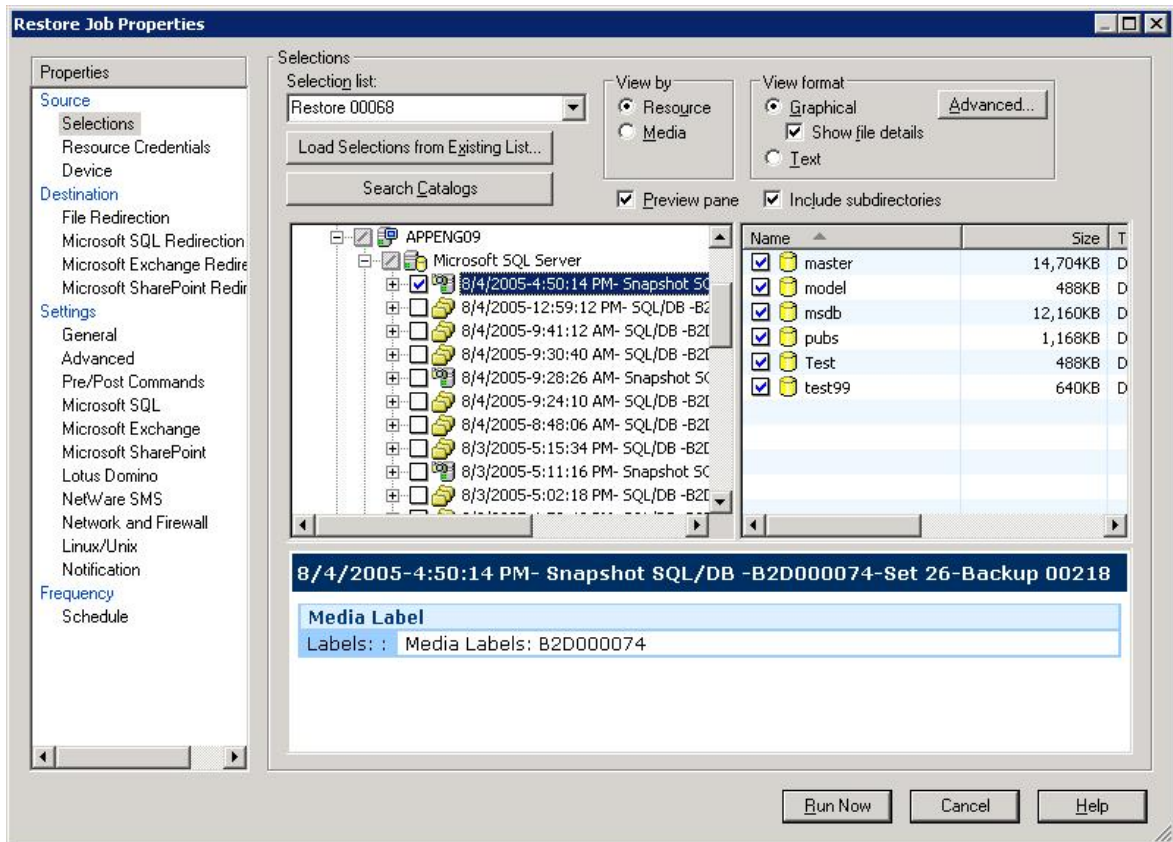
## Restoring Microsoft SQL from a VSS Backup

To restore Microsoft SQL from a VSS backup, follow these steps on the backup server:

1. In the Backup Exec tool bar, click **Restore**.
2. Select the SQL Server instance to restore. In the leftmost panel under **Source**, click **Selections**. The Backup Job Properties – Selections window appears. Expand **Remote Selections** and **Microsoft Windows Network**. Then, navigate to the Windows domain and server holding the Exchange Storage Group that was originally backed up. Under **Microsoft SQL Server**, select the desired Exchange Storage Group and examine the catalog listing to locate the catalog that corresponds to the date from which you want to restore. Then, either

select the date if you want to do a full restore or expand the date and select a database to restore.

## SQL Restore Catalog Listing



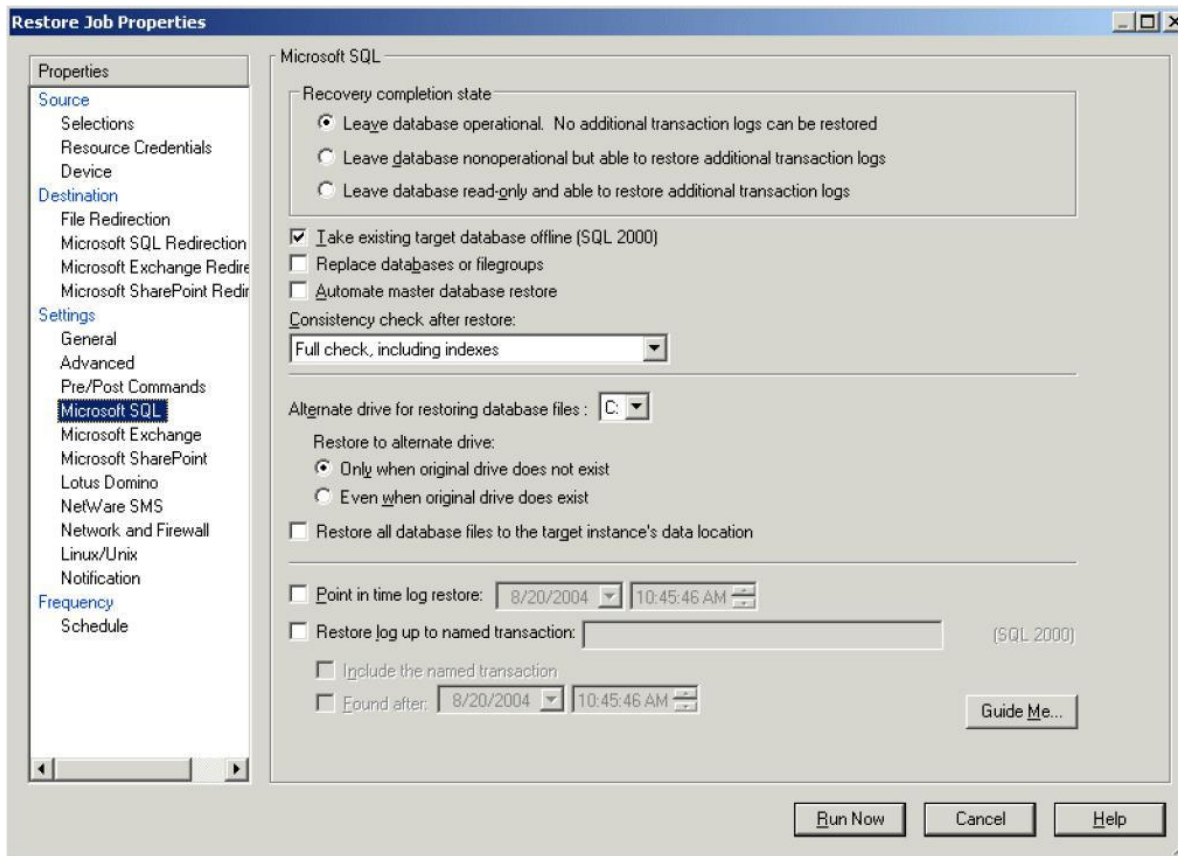
3. Select the restore destination. When restoring from a VSS backup, you have two options. The first option is the default and will replace the original database instance or database on the original server, as we are doing in this example.

The second option is to restore with redirection (that is, to a different server). You may want to restore to a different server if you are upgrading hardware or in a disaster recovery situation in which the entire SQL infrastructure must be recreated. You may also want to restore to a different server to recover an individual database (instead of the entire database instance) by manually copying only its log and database files from the redirected restore location to the original location. To restore with Redirection, in the leftmost panel under **Destination**, click **Microsoft SQL Redirection**. In the Restore Job Properties – Microsoft SQL Redirection window that appears, select **Redirect Microsoft SQL sets** and specify the Restore to server and Restore to named instance (SQL 2000) to which you want to restore.

4. Specify the SQL database restore job options. In the leftmost panel under **Settings**, click **Microsoft SQL**. The Restore Job Properties – SQL Settings window appears.

Note that when restoring a snapshot backup, all databases must be set offline unless you are restoring with redirection. Be sure to select the **Take existing target database offline (SQL 2000)** option. If this option is not selected and there are active connections to the SQL database, the restore job will fail.

## Restore Job Properties - SQL Settings



5. Start the restore job. Click **Run Now** and then click **OK** in the Session User Name and Password window. Click **OK** to start the restore job.
6. Monitor the backup job. You can monitor both running and scheduled jobs. In the Backup Exec tool bar, click **Job Monitor**. The Backup Job Monitoring and Status window appears. Right-click a backup job in the **Current Jobs** or **Job History** panel and select **Properties** to display the Job History window.
7. Verify the restored database.

## Summary

You can back up and restore local and remote NTFS volumes, Exchange e-mail, and SQL databases using VERITAS Backup Exec 10 with PS Series storage arrays from EqualLogic. In addition, the VSS capabilities of EqualLogic Auto-Snapshot Manager for Windows and Backup Exec allow you to create an integrated, scalable, high-performing, and highly-reliable backup and recovery solution for Microsoft environments.

VSS backups solve many backup problems; however, there are tradeoffs in backup and restore functionality that you must evaluate to determine the best solution for your environment.

## Documentation and Customer Support

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Visit the EqualLogic Customer Support website, 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 ([www.equallogic.com](http://www.equallogic.com)), 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 [supportnp@equallogic.com](mailto:supportnp@equallogic.com). If the issue is urgent, call 1-877-887-7337 to speak with a member of the customer support team.