Symantec NetBackup™ AdvancedDisk Storage Solutions Guide

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North America and Latin America	supportsolutions@symantec.com

Contents

Chapter 1

Introducing AdvancedDisk

This chapter includes the following topics:

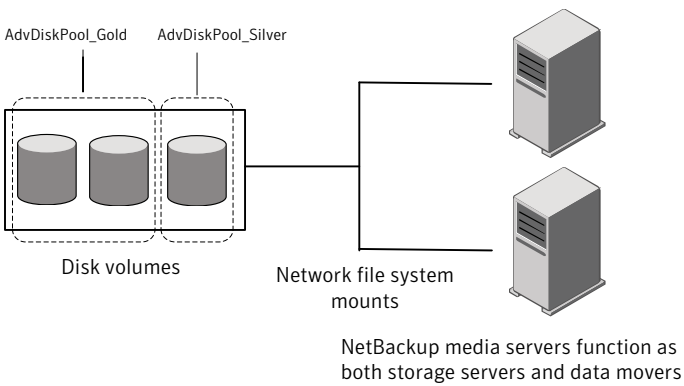
About the AdvancedDisk option

The NetBackup AdvancedDisk storage option lets you use the disk storage that is exposed to NetBackup as a file system for backups. Storage can be direct attached storage (DAS), network attached storage (NAS), or storage area network (SAN) storage. NetBackup aggregates the disks into pools of storage you can use for backups. NetBackup manages the storage as logical entities (disk pools).

NetBackup requires exclusive access to the storage for capacity management and load balancing.

Figure 1-1 shows a media server and attached disks.

Figure 1-1 AdvancedDisk storage components



The NetBackup AdvancedDisk storage option provides the following benefits:

- Is easy to deploy and use. NetBackup discovers the storage and uses familiar NetBackup storage units and backup policies to use the storage.
- Allows multiple file systems to be used in a single storage unit.
- Allows user to increase storage unit capacity by adding disks. Only add the capacity required, then update the NetBackup disk pools. Logical units of storage span physical boundaries, so you do not have to create new NetBackup storage units or change the backup policies.
- Reduces the level of administrator attention. Automatic policies distribute job load and intelligently manage capacity so that jobs do not fail because of out of space conditions.

New features and enhancements for NetBackup 7.5

The following are new features and enhancements in the NetBackup 7.5 release for AdvancedDisk:

- Support for the Common Internet File System is now included in the **Disk Pool Configuration Wizard**.
  See "About AdvancedDisk file system requirements" on page 15.
- Data encryption.
  See "About data encryption for AdvancedDisk storage" on page 20.

Chapter 2

Licensing AdvancedDisk

This chapter includes the following topics:

About the AdvancedDisk license key

AdvancedDisk is a feature that is licensed separately from base NetBackup. The Flexible Disk Option license key activates AdvancedDisk.

You may have a single license key that activates both NetBackup and the Flexible Disk Option. Alternatively, you may have one license key that activates NetBackup and another key that activates the Flexible Disk Option.

See "Licensing AdvancedDisk" on page 12.

If you remove the Flexible Disk Option license key or if it expires, the following restrictions apply:

- You cannot create the disk pools or the storage units that reference AdvancedDisk disk pools.
- NetBackup jobs that attempt to use the disk pools or the storage units that are based on disk pools fail. The error message indicates that the feature is not licensed.

NetBackup does not delete the disk pools or the storage units that reference the disk pools. You can use them again if you enter a valid license key.

Licensing AdvancedDisk

No special installation is required for the NetBackup components of AdvancedDisk. However, you must enter a license key. If you installed the license key when you installed or upgraded NetBackup, you do not need to perform this procedure.

Enter the license key on the NetBackup master server. The following procedure describes how to use the **NetBackup Administration Console** to enter the license key.

To license AdvancedDisk

1. To add a license to a specific server, select **File** > **Change Server** and then select the server.
2. In the **NetBackup License Keys** dialog box, click **New**.
3. In the **Add a New License Key** dialog box, enter the license key and click **Add** or **OK**.
4. Click **Close**.
5. Restart all the NetBackup services and daemons.

Chapter 3

Configuring AdvancedDisk

This chapter includes the following topics:

Configuring the AdvancedDisk option

This section provides an overview of how to configure the NetBackup AdvancedDisk option.

Table 3-1 describes the configuration tasks.

To configure a base NetBackup environment, see the following guides:

- The *NetBackup Administrator's Guide for Windows, Volume I.*
- The *NetBackup Administrator's Guide for UNIX and Linux, Volume I.*

Table 3-1 AdvancedDisk configuration tasks

Step	Task	Section
Step 1	Learn about file system requirements	See "About AdvancedDisk file system requirements" on page 15.
Step 2	Learn about storage servers and data movers	See "About AdvancedDisk storage servers" on page 17. See "About AdvancedDisk data movers" on page 18.
Step 3	Optionally, configure the Key Management Service	The Key Management Service is required if you use data encryption for the AdvancedDisk storage. See "About data encryption for AdvancedDisk storage" on page 20. See "About key management for AdvancedDisk encryption" on page 21. See "Configuring the Key Management Service for AdvancedDisk encryption" on page 22.
Step 4	Configure a storage server	See "Configuring an AdvancedDisk storage server" on page 26.
Step 5	Learn about disk pools	See "About AdvancedDisk disk pools" on page 28.
Step 6	Optionally, configure CIFS disk volumes	For the **AdvancedDisk_crypt** disk type, you must configure CIFS volumes before you can add them to the disk pool. See "Configuring a CIFS disk volume for AdvancedDisk encryption" on page 29.
Step 7	Configure a disk pool	See "Configuring an AdvancedDisk disk pool" on page 30.

Table 3-1 AdvancedDisk configuration tasks *(continued)*

Step	Task	Section
Step 8	Configure a storage unit	See "Configuring an AdvancedDisk storage unit" on page 35.
Step 9	Create a storage lifecycle policy	See "Creating a storage lifecycle policy" on page 39.
Step 10	Create a backup policy	See "Creating a policy using the Policy Configuration Wizard" on page 44. See "Creating a policy without using the Policy Configuration Wizard" on page 44.

About AdvancedDisk file system requirements

AdvancedDisk can read and write any nonshared file system that NetBackup supports. However, AdvancedDisk is subject to any operating system or file system requirements or limitations. Requirements and limitations may exist beyond those mentioned in this topic.

For supported file systems, see the NetBackup operating system compatibility list at the Symantec support Web site, as follows:

http://entsupport.symantec.com/

The following are additional requirements for file systems:

CIFS Windows Common Internet File System (CIFS) requirements:

- You must configure two Windows services to use the same credentials. See "Configuring credentials for CIFS and disk storage units" on page 16.
- In the **Disk Pool Configuration Wizard**, you must use the Windows Universal Naming Convention to specify the CIFS volumes that you want to use for AdvancedDisk disk pools. (Networked mapped devices are not visible to Windows services; therefore, NetBackup cannot discover CIFS disk volumes.)
- You cannot delete a disk pool that is created by specifying volumes (such as for CIFS volumes). The disk pool exists until you delete its storage server.

NFS Network File System (NFS) requirements:

- You must use manual mount points. Automatic mount and unmount can change mount points, which may cause disk resources to be unavailable.
- The NFS server that exports the mount points must be configured to allow root access to the file systems.
- NetBackup does not filter out common file system mount points, such as `/` and `/usr`. Therefore, carefully choose the volumes to include in a disk pool.

Note: Symantec recommends that you do not span backup images across NFS volumes in an AdvancedDisk disk pool. File system full conditions cannot be detected adequately. Therefore, a disk pool based on NFS volumes should be comprised of only one volume.

Disk pool configuration may affect how you configure your file systems.

See "Configuring an AdvancedDisk disk pool" on page 30.

Configuring credentials for CIFS and disk storage units

For Common Internet File System (CIFS) storage with AdvancedDisk, two NetBackup services on Windows computers require matching credentials.

The following NetBackup services on Windows media servers to which the CIFS storage is attached must use the same credentials:

- NetBackup Client Service
  The NetBackup Client Service is either `bpcd.exe` or `bpinetd.exe`, depending on NetBackup release level. Regardless of the binary file name, the service requires the credentials.
- NetBackup Remote Manager and Monitor Service
  The NetBackup Remote Manager and Monitor Service binary file name is `nbrmms.exe`.

The credentials must be valid Windows credentials that allow read and write access to the storage. Configure the credentials on the media server or media servers that have a file system mount on the CIFS storage.

If credentials are not configured, NetBackup marks all CIFS AdvancedDisk storage units that use the UNC naming convention as DOWN.

To configure service credentials

1. In Windows, open the **Services** dialog box. How you open **Services** depends on the Windows version.
2. Double-click the service name to open the **Properties** dialog box for the service.
3. In the **General** tab, select the service that requires additional credentials. Click **Stop** to stop the service.
4. Select the **Log On** tab.
5. Select **This account** and then enter the credentials. Click **Apply**.
6. Select the **General** tab.
7. Click **Start** to start the service.
8. Repeat the steps 2 to 7 for each service that requires additional credentials.

About AdvancedDisk storage servers

A storage server is a NetBackup media server that mounts the disk storage and writes data to and reads data from the disk storage.

For AdvancedDisk, NetBackup media servers function as both storage servers and data movers.

See "About AdvancedDisk data movers" on page 18.

Multiple storage servers can exist. The storage servers share the storage equally.

If you configure more than one storage server, be aware of the following:

- Each media server must mount the file systems of all the disk volumes within a disk pool.
- The mount points must be the same on each media server.
  NetBackup does not validate mount points, so you must ensure that the mount points are the same for each media server. You also must ensure that the mount points are valid.
- To obtain a consolidated list of disk volumes, NetBackup queries every media server. For large sets of servers, queries may affect performance.
- Disk volume status is monitored on a single media server. Which server monitors the status can change. Therefore, a change in disk volume availability on one media server may not be reflected in the disk volume status NetBackup reports.

Storage servers are either **AdvancedDisk** type or **AdvancedDisk_crypt** type.

Whether or not you want to use encryption or specify storage server attributes determines how you configure the storage servers.

See "About data encryption for AdvancedDisk storage" on page 20.

See "About AdvancedDisk preferred or required read servers" on page 18.

See "Configuring an AdvancedDisk storage server" on page 26.

About AdvancedDisk data movers

A data mover transfers data from primary storage (a NetBackup client) to secondary storage during backups. It also can move data back to primary storage during restores and from secondary storage to tertiary storage during duplication.

You do not configure data movers separately. For AdvancedDisk, NetBackup media servers function as both storage servers and data movers. Data movers are configured when you configure storage servers.

About AdvancedDisk preferred or required read servers

When you configure a storage server, you can specify that you want it to be preferred or required for restore jobs. You also can specify whether a server should be required for the read side of duplication jobs. These attributes can help manage the restore and the duplication traffic.

Table 3-2 Preferred or required read server descriptions

Server attribute	Description
PrefRestore	The server is preferred for the read side of restore operations. You can configure more than one server as preferred for restore. If you configure preferred for restore but not required for restore, NetBackup considers preferred storage servers for jobs first. If none are available, NetBackup considers any configured storage server. Normal NetBackup load balancing occurs among all storage servers marked PrefRestore.

Table 3-2 Preferred or required read server descriptions *(continued)*

Server attribute	Description
ReqRestore	The server is required for the read side of restore operations. You can configure more than one server as required for restore. If you configure required servers for restore but not preferred servers, jobs queue until a required server is available to execute the job. Other servers are never considered for restore jobs. Normal NetBackup rules for job retry apply. If you configure both preferred and required storage servers and a required server is not available, NetBackup considers preferred servers for jobs. If none are available, jobs queue until a required or preferred server is available. Other servers are never considered for restore jobs. Normal NetBackup load balancing occurs for all required servers. Load balancing does not occur between the required and preferred servers.
ReqDuplicate	The server is required for the read side of duplication operations. You can configure more than one server as required for duplication. If any server is configured as required for duplication, NetBackup considers only required for duplication servers for jobs. If a required server is unavailable, jobs queue until a required server is available to execute the job. Normal NetBackup rules for job retry apply. Required for duplication also applies to storage server allocation for synthetic backup operations.

Only the media servers that are configured in the storage unit are considered for jobs. Therefore, if you configure a subset of the disk pool media servers in a storage unit, NetBackup selects from those servers only.

If you use the preferred or required restore or duplication attributes for a storage server, the following may occur:

- A restore operation uses a storage server that does not have a `PrefRestore` or `ReqRestore` attribute. Reasons may be as follows:
  - The destination disk pool does not include a storage server with a restore or a duplication attribute.
  - A preferred or required storage server cannot be used because it is unavailable (NetBackup considers it DOWN).
- A restore or a duplication operation is queued.
  The reason may be that a preferred or required storage server cannot be used because it is unavailable (NetBackup considers it DOWN).

If you do not configure preferred or required restore servers, NetBackup uses normal criteria to select a media server for restore or duplication. (That is, if you configure more than one storage server.)

Information about how NetBackup balances storage unit and media server load is available.

See "Maximum concurrent jobs" in the following guides:

- *NetBackup Administrator's Guide for UNIX and Linux, Volume I*
- *NetBackup Administrator's Guide for Windows, Volume I*

You can use preferred or required restore servers rather than the **Media host override** host property.

Information about the **Media host override** property is available.

See the following guides:

- *NetBackup Administrator's Guide for UNIX and Linux, Volume I*
- *NetBackup Administrator's Guide for Windows, Volume I*

To enable preferred or required servers for restore or duplication, do the following:

- Upgrade the NetBackup master server and the NetBackup EMM server to NetBackup 6.5.2 or later. (Normally, the master server and the EMM server are on the same computer.)
- Optionally, to enable command-line support on media servers, upgrade the media servers that are used for AdvancedDisk operations to NetBackup 6.5.2 or later.
  You do not have to upgrade the media servers. You can configure and manage the restore and the duplication storage servers by invoking the commands on the master server.

About data encryption for AdvancedDisk storage

You can encrypt your data on the storage. To use encryption, you must use the **AdvancedDisk_crypt** type when you configure the storage servers and the disk pools. You also must use the `nbdevconfig` command to configure the storage servers and the disk pools.

NetBackup uses the Key Management Service to manage encryption keys. You must configure KMS so that NetBackup can use AdvancedDisk encryption.

See "About key management for AdvancedDisk encryption" on page 21.

After you configure KMS and **AdvancedDisk_crypt** storage servers and disk pools, NetBackup uses encryption for backup jobs to those **AdvancedDisk_crypt** disk pools.

AdvancedDisk encryption is supported on a subset of operating systems that are supported by NetBackup. For supported systems, see the NetBackup compatibility lists on the NetBackup support landing page.

ttp://www.symantec.com/

About key management for AdvancedDisk encryption

NetBackup uses the Key Management Service (KMS) to manage the keys for the data encryption. KMS is a NetBackup master server-based symmetric key management service. To use encryption, you must first configure the Key Management Service on the NetBackup master server.

Setting up the KMS database requires the following:

- A Host Master Key passphrase and ID. The Key Management Service can create a random HMK passphrase for you.
- A Key Protection Key passphrase and ID. The Key Management Service can create a random KPK passphrase for you.

KMS for AdvancedDisk storage requires the following:

- Each storage server and volume combination requires a key group. The key group name is of the following format:

  storage_server_name:*volume_name*

  The following is the criteria for *volume_name*:

  - The *volume_name* must be the last directory name in the pathname to the volume. For example, if the pathname is `/mnt/disk/hdd1`, the *volume_name* must be `hdd1`.
  - The *volume_name* must not contain forward or backward slash characters. Therefore, on Windows hosts you must specify a directory name not a drive letter.
- Each key group you create requires a key record. KMS requires a passphrase when you create the key record.

  A key record name is optional. If you use a key record name, you can use any name for the key record name. Symantec recommends that you use a descriptive name.

See "Configuring the Key Management Service for AdvancedDisk encryption" on page 22.

More information about KMS is available.

See the *NetBackup Security and Encryption Guide*.

Configuring the Key Management Service for AdvancedDisk encryption

To use AdvancedDisk encryption, you must first configure the Key Management Service.

See "About key management for AdvancedDisk encryption" on page 21.

Table 3-3 KMS configuration tasks

Step	Task	Instructions
Step 1	Set up the KMS database	See "Setting up the KMS database for AdvancedDisk encryption" on page 22.
Step 2	Create the key groups	For AdvancedDisk, each storage server and volume combination requires a key group. See "Creating a KMS key group for AdvancedDisk encryption" on page 24.
Step 3	Create the key records	Each key group requires a key record. The key record contains the encryption key. See "Creating a KMS key record for AdvancedDisk encryption" on page 25.

Setting up the KMS database for AdvancedDisk encryption

You must set up the Key Management Service database so that you can use encryption for AdvancedDisk storage.

To set up the KMS database

1 On the NetBackup master server, create the KMS database by running the `nbkms` command with the `-createemptydb` option, as follows:

UNIX: `/usr/openv/netbackup/bin/nbkms -createemptydb`

Windows: *`install_path`*`\Veritas\NetBackup\bin\nbkms.exe -createemptydb`

The following prompt appears:

```
Enter the Host Master Key (HMK) passphrase (or hit ENTER to use a
randomly generated HMK). The passphrase will not be displayed on
the screen.
Enter passphrase :
```

2 Enter a passphrase for the host master key (HMK) or press **Enter** to create a randomly generated key.

After you enter the Host Master Key passphrase, the following prompt appears:

```
An ID will be associated with the Host Master Key (HMK) just
created. The ID will assist you in determining the HMK associated
with any key store.
Enter HMK ID :
```

3 Enter an ID for the HMK. This ID can be anything descriptive that you want to use to identify the HMK.

After you enter the Host Master Key ID, the following prompt appears:

```
Enter the Key Protection Key (KPK) passphrase (or hit ENTER to
use a randomly generated KPK). The passphrase will not be
displayed on the screen.
Enter passphrase :
```

4 Enter a passphrase for the key protection key.

After you enter the Key Protection Key passphrase, the following prompt appears:

```
An ID will be associated with the Key Protection Key (KPK) just
created. The ID will assist you in determining the KPK associated
with any key store.
Enter KPK ID :
```

5 Enter an ID for the KPK. The ID can be anything descriptive that you want to use to identify the KPK.

6 Start the NetBackup Key Management Service on the master server. You can do so in the **Activity Monitor** of the **NetBackup Administration Console**.

After you start the service, the initial database setup is complete.

7 After you set up the database, create key groups for the volumes in the disk pool.

See "Creating a KMS key group for AdvancedDisk encryption" on page 24.

Creating a KMS key group for AdvancedDisk encryption

A key group is a container for key records. A key group name for AdvancedDisk is in the following format:

storage_server_name:*volume_name*

For AdvancedDisk, each storage server and volume combination requires a key group. For example, if you have two storage servers and two volumes in the disk pool, four key groups are required, as follows:

`host1:volume1`, `host1:volume2`, `host2:volume1`, and `host2:volume2`.

To create a KMS key group

1 On the master server, create a key group by using the `nbkmsutil` command and the `-createkg` option. The following is an example of the command line:

UNIX: `/usr/openv/netbackup/bin/admincmd/nbkmsutil -createkg -kgname` *storage_server_name*`:`*volume_name*

Windows: *install_path*`\Veritas\NetBackup\bin\admincmd\nbkmsutil -createkg -kgname` *storage_server_name*`:`*volume_name*

The following is the criteria for *volume_name*:

- The *volume_name* must be the last directory name in the pathname to the volume. For example, if the pathname is `/mnt/disk/hdd1`, the *volume_name* must be `hdd1`.
- The *volume_name* must not contain forward or backward slash characters. Therefore, on Windows hosts you must specify a directory name not a drive letter.

The following is a usage example:

```
nbkmsutil -createkg -kgname StorageServerA.symantecs.org:AdvDisk
New Key Group creation is successful
```

2 After you create the key groups, create at least one key record for each group.

See "Creating a KMS key record for AdvancedDisk encryption" on page 25.

Creating a KMS key record for AdvancedDisk encryption

Each key group requires at least one key record. The key record contains the encryption key itself and information about the key. The key is used to encrypt and decrypt data.

A key record name is optional. If you use a key record name, you can use any name for the key record name. Symantec recommends that you use a descriptive name.

Note: If you create more than one key record for a key group, only the last key remains active.

To create a KMS key record

1 On the master server, create a key record by using the `nbkmsutil` command and the `-createkey` option.

UNIX: `/usr/openv/netbackup/bin/admincmd/nbkmsutil -createkey -kgname storage_server_name:volume_name [-keyname keyname] -activate`

Windows: `install_path\Veritas\NetBackup\bin\admincmd\nbkmsutil -createkey -kgname storage_server_name:volume_name [-keyname keyname] -activate`

You are prompted to enter a passphrase.

The following is an example:

```
nbkmsutil -createkey -keyname dp_key -kgname StorageServerA.symantecs.org:AdvDisk -activate

Enter a passphrase: ********
Re-enter the passphrase: ********

New Key creation is successful
```

2 Enter a passphrase; this passphrase should differ from any passphrases you entered already.

Configuring an AdvancedDisk storage server

Configure in this context means to configure as a storage server a NetBackup media server that can mount the storage.

See "About AdvancedDisk storage servers" on page 17.

Two methods exist to configure an AdvancedDisk storage server, as follows:

The **Storage Server Configuration Wizard**.	Symantec recommends that you use the wizard to configure the **AdvancedDisk** type of storage server. See "To configure an AdvancedDisk storage server by using the wizard" on page 27.
The `nbdevconfig` command.	You must use the command line to configure the following: ■ The **AdvancedDisk_crypt** type of storage server that uses encryption. For **AdvancedDisk_crypt**, you must specify the `-st` option with a value of **5**. (Usually, the `-st` option is optional.) See "About data encryption for AdvancedDisk storage" on page 20. ■ Preferred or required attributes for the storage server. See "About AdvancedDisk preferred or required read servers" on page 18. You also can use the command line to configure the **AdvancedDisk** type of storage server. See "To configure an AdvancedDisk storage server by using the command line" on page 27.

When you configure an AdvancedDisk storage server, it also is configured as a data mover.

See "About AdvancedDisk data movers" on page 18.

You can configure multiple storage servers for the same storage, as follows:

- Invoke the wizard or the `nbdevconfig` command for each storage server that you want to configure.
- If you use the wizard, exit the wizard (on the **Finished** panel) after you create each storage server except for the last one.
- After you create the last storage server, do the following:
  - If you used the **Storage Server Configuration Wizard**, continue to the **Disk Pool Configuration Wizard**.

If you used the `nbdevconfig` command to configure **AdvancedDisk_crypt** storage servers, use the `nbdevconfig` command to configure the disk pool.

See "Configuring an AdvancedDisk disk pool" on page 30.

To configure an AdvancedDisk storage server by using the wizard

1. Determine if the storage server is configured already.

   See "Viewing AdvancedDisk storage servers" on page 50.

2. In the **NetBackup Administration Console**, in the left pane, expand **Media and Device Management > Configure Disk Storage Servers**.

3. Follow the wizard screens to configure a storage server.

To configure an AdvancedDisk storage server by using the command line

1. Determine if the storage server is configured already.

   See "Viewing AdvancedDisk storage servers" on page 50.

2. Run the following command on the NetBackup master server or the media server:

   ```
   nbdevconfig -creatests -storage_server hostname -stype server_type
   -st 5 -media_server hostname [-setattribute attribute]
   ```

   The following is the path to the `nbdevconfig` command:

   - UNIX: `/usr/openv/netbackup/bin/admincmd`
   - Windows: *install_path*`\NetBackup\bin\admincmd`

   See "AdvancedDisk storage server options" on page 27.

3. To verify that the storage server was configured correctly, run the following command:

   ```
   nbdevquery -liststs -u
   ```

   The following is an excerpt of the command output that shows the proper storage type for AdvancedDisk (Formatted Disk, Direct Attached):

   ```
   Storage Server      : AdvDiskServer.symantecs.org
   Storage Server Type : AdvancedDisk_crypt
   Storage Type        : Formatted Disk, Direct Attached
   State               : UP
   ```

AdvancedDisk storage server options

The following are the `nbdevconfig` command options that are used to configure storage servers.

Table 3-4 Options to configure AdvancedDisk storage server

Option	Description
`-storage_server` *storage_server*	The name of the NetBackup media server that has a file system mount on the storage.
`-stype` *server_type*	For AdvancedDisk with encryption, use **AdvancedDisk_crypt**, otherwise use **AdvancedDisk**. **Note:** If you specify **AdvancedDisk_crypt** as the `-stype`, you must specify an **-st** value of **5** on the command line.
`-st` *storage_type*	A numeric value that specifies the storage server properties. For AdvancedDisk, the default value is 5 (direct attached, formatted disk). **Note:** For an **AdvancedDisk_crypt** `-stype`, you must specify **-st 5** on the command line.
`-media_server` *hostname*	Use the same name as the storage server name.
`-setattribute` *attribute*	An attribute to apply to the storage server for the read side of restore or duplication operations. The following are the attributes: ■ `PrefRestore`. The storage server is preferred for the read side of restore operations. More than one storage server can have the `PrefRestore` attribute. ■ `ReqRestore`. The storage server is required for the read side of restore operations. More than one storage server can have the ReqRestore attribute. ■ `ReqDuplicate`. The storage server is required for the read side of duplication operations. More than one storage server can have the `ReqDuplicate` attribute. See "About AdvancedDisk preferred or required read servers" on page 18.

About AdvancedDisk disk pools

A disk pool represents disk volumes on the underlying disk storage. NetBackup aggregates the disk volumes into pools of storage you can use for backups.

A disk pool is the storage destination of a NetBackup storage unit.

For AdvancedDisk, NetBackup assumes exclusive ownership of the disk resources that comprise the disk pool. If you share those resources with other users, NetBackup cannot manage disk pool capacity or storage lifecycle policies correctly.

When NetBackup sends backup data to a disk pool, NetBackup selects disk volumes based on available capacity and predicted size of the backup. NetBackup tries to write backup data to a single volume. If necessary, backup images span disk volumes in a disk pool. Backup images do not span across multiple disk pools.

Note: Symantec recommends that you do not span backup images across NFS volumes in an AdvancedDisk disk pool. File system full conditions cannot be detected adequately. Therefore, a disk pool based on NFS volumes should be comprised of only one volume.

Symantec recommends that disk volume and disk pool names be unique across your enterprise.

Disk pools are either **AdvancedDisk** type or **AdvancedDisk_crypt** type.

See "About data encryption for AdvancedDisk storage" on page 20.

For the **AdvancedDisk_crypt** disk type, you must configure the disk volumes before you configure the disk pool.

See "Configuring a CIFS disk volume for AdvancedDisk encryption" on page 29.

See "Configuring an AdvancedDisk disk pool" on page 30.

Configuring a CIFS disk volume for AdvancedDisk encryption

AdvancedDisk_crypt and CIFS only.

For the **AdvancedDisk_crypt** disk type, you must use the NetBackup `nbdevconfig` command to specify each CIFS disk volume for the disk pool.

(Alternatively, for the **AdvancedDisk** disk type, the **Disk Pool Configuration Wizard** lets you specify the CIFS volumes.)

Symantec recommends that disk volume and disk pool names be unique across your enterprise.

You must first configure storage servers.

See "Configuring an AdvancedDisk storage server" on page 26.

To configure an AdvancedDisk disk volume by using the command line

1 On the NetBackup master server, configure the volume by using the following command:

```
nbdevconfig -createdv -storage_server hostname -stype server_type
-dv disk_volume_name -dp disk_pool_name
```

The following is the path to the `nbdevconfig` command:

- UNIX: `/usr/openv/netbackup/bin/admincmd`
- Windows: *install_path*`\NetBackup\bin\admincmd`

The following describe the options:

`-storage_server` *hostname*	The name of the NetBackup media server that has a file system mount on the storage.
`-stype` *server_type*	For AdvancedDisk with encryption, use **AdvancedDisk_crypt**, otherwise use **AdvancedDisk**.
`-dv` *disk_volume_name*	The name of the disk volume; use UNC notation.
`-dp` *disk_pool_name*	The name of the disk pool for the volume.

2 Repeat step 1 for each disk volume that you want to add.

Configuring an AdvancedDisk disk pool

Two methods exist to configure an AdvancedDisk disk pool, as follows:

The **Disk Pool Configuration Wizard**.	Use the wizard to configure the **AdvancedDisk** type of disk pool. See "To configure an AdvancedDisk disk pool by using the wizard" on page 31. When you configure a storage server, that wizard continues to the disk pool wizard; therefore, you may not need to invoke the disk pool wizard separately.
The `nbdevconfig` command.	Use the command line if you configured an **AdvancedDisk_crypt** type of storage server. See "To configure an AdvancedDisk storage server by using the command line" on page 27.

When you create an AdvancedDisk disk pool, you specify or select the following:

- The NetBackup media servers that share the storage.
  The media servers must be configured as storage servers. They also function as data movers.
  When you specify the storage servers, you associate them with the disk pool. Only those storage servers can access the disk pool.
  See "About AdvancedDisk storage servers" on page 17.
- The disk volumes to include in the pool. If you use multiple storage servers for the same disk pool, you must use the same mount point on all storage servers for each volume.

Normally, NetBackup discovers the volumes and you select the ones that you want to include in the disk pool. However, NetBackup cannot discover Common Internet File System (CIFS) disk volumes. (Networked mapped devices are not visible to Windows services.) Therefore, you must use the Windows Universal Naming Convention to specify the CIFS volumes that you want to use for AdvancedDisk disk pools.

For **AdvancedDisk**, the **Disk Pool Configuration Wizard** lets you specify the CIFS volumes.

For **AdvancedDisk_crypt**, you must use the `nbdevconfig` command to specify the CIFS volumes.

See "Configuring a CIFS disk volume for AdvancedDisk encryption" on page 29.

- The disk pool properties.
  See "AdvancedDisk disk pool properties" on page 33.

Symantec recommends that disk volume and disk pool names be unique across your enterprise.

You must first configure storage servers.

See "Configuring an AdvancedDisk storage server" on page 26.

To configure an AdvancedDisk disk pool by using the wizard

1. In the NetBackup Administration Console, in the left pane, select **Media and Device Management**.
2. From the list of wizards in the right pane, click **Configure Disk Pool** and follow the wizard instructions.

   For help, see the wizard help.

To configure an AdvancedDisk disk pool by using the command line

1. On one of the storage servers, write the volumes that are available to a text file by using the following command:

   ```
   nbdevconfig -previewdv -storage_server hostname -stype server_type
   > filename
   ```

   The following is the path to the `nbdevconfig` command:

   - UNIX: `/usr/openv/netbackup/bin/admincmd`
   - Windows: *install_path*`\NetBackup\bin\admincmd`

   The following describe the options:

`-storage_server` *hostname*	The name of the NetBackup media server that has a file system mount on the storage.

`-stype` *server_type*	For AdvancedDisk with encryption, use **AdvancedDisk_crypt**, otherwise use **AdvancedDisk**.
`>` *filename*	The name of the file into which to write the volume information. Symantec recommends that you use a name that describes its purpose.

2. Copy the file that you created in step 1 to the master server.
3. In a text editor, delete the line for each volume that you do not want to be in the disk pool.

   Each volume listed in the file must be exposed to each AdvancedDisk storage server on the same mount point.
4. Configure the disk pool by using the following command:

   ```
   nbdevconfig -createdp -dp disk_pool_name -stype server_type
   -storage_servers hostname... -dvlist filename [-reason "string"]
   [-lwm low_watermark_percent] [-max_io_streams n] [-comment
   comment] [-M master_server] [-reason "string"]
   ```

   The following is the path to the `nbdevconfig` command:

   - UNIX: `/usr/openv/netbackup/bin/admincmd`
   - Windows: *install_path*`\NetBackup\bin\admincmd`

`-dp` *disk_pool_name*	The name of the disk pool. Use the same name that you used when you configured the disk volumes.
`-stype` *server_type*	For AdvancedDisk with encryption, use **AdvancedDisk_crypt**, otherwise use **AdvancedDisk**.
`-storage_servers` *hostname*	The name of each storage server that has a file system mount on the storage. Specify all NetBackup media servers that are storage servers for this disk pool.
`-dvlist` *filename*	The name of the file that contains the information about the volumes for the disk pool.
`-hwm` *high_watermark*	See "AdvancedDisk disk pool properties" on page 33.

`-lwm low_watermark`	See "AdvancedDisk disk pool properties" on page 33.
`-max_io_streams n`	See "AdvancedDisk disk pool properties" on page 33.
`-comment comment`	See "AdvancedDisk disk pool properties" on page 33.
`-M master_server`	The name of the master server.
`-reason "string"`	The reason that you create the disk pool.

AdvancedDisk disk pool properties

Table 3-5 describes the disk pool properties.

Table 3-5 AdvancedDisk disk pool properties

Property	Description
Name	The disk pool name.
Storage server	The storage server name. The storage server is the same as the NetBackup media server to which the storage is attached.
Disk volumes	The disk volumes that comprise the disk pool.
Total size	The total amount of space available in the disk pool.
Total raw size	The total raw, unformatted size of the storage in the disk pool.
Comment	A comment that is associated with the disk pool.

Table 3-5 AdvancedDisk disk pool properties *(continued)*

Property	Description
High water mark	The **High water mark** setting is a threshold that triggers the following actions: ■ When an individual volume in the disk pool reaches the **High water mark**, NetBackup considers the volume full.NetBackup chooses a different volume in the disk pool to write backup images to. ■ When all volumes in the disk pool reach the **High water mark**, the disk pool is considered full. NetBackup fails any backup jobs that are assigned to a storage unit in which the disk pool is full. NetBackup also does not assign new jobs to a storage unit in which the disk pool is full. ■ NetBackup begins image cleanup when a volume reaches the **High water mark**; image cleanup expires the images that are no longer valid. For a disk pool that is full, NetBackup again assigns jobs to the storage unit when image cleanup reduces any disk volume's capacity to less than the **High water mark**. If the storage unit for the disk pool is in a capacity-managed storage lifecycle policy, other factors affect image cleanup. See the *NetBackup Administrator's Guide for UNIX and Linux, Volume I*. See the *NetBackup Administrator's Guide for Windows, Volume I*. The default is 98%.
Low water mark	The **Low water mark** is a threshold at which NetBackup stops image cleanup. The**Low water mark** setting cannot be greater than or equal to the **High water mark** setting. The default is 80%.
Limit I/O streams	Select this option to limit the number of read and write streams (that is, jobs) for each volume in the disk pool. A job may read backup images or write backup images. By default, there is no limit. When the limit is reached, NetBackup chooses another volume, if available. If not available, NetBackup queues jobs until a volume is available. Too many jobs that read and write data may degrade disk performance because of disk thrashing. (Disk thrashing is when the read and write heads move between the cylinders excessively as they seek the data for competing jobs.) Fewer streams can improve throughput, which may increase the number of jobs that complete in a specific time period.
per volume	Select or enter the number of read and write streams to allow per volume. Many factors affect the optimal number of streams. Factors include but are not limited to disk speed, CPU speed, and the amount of memory.

Configuring an AdvancedDisk storage unit

Create one or more storage units that reference the disk pool.

The **Disk Pool Configuration Wizard** lets you create a storage unit; therefore, you may have created a storage unit when you created a disk pool. To determine if storage units exist for the disk pool, see the **NetBackup Management > Storage > Storage Units** window of the **NetBackup Administration Console**.

See "About AdvancedDisk storage unit recommendations" on page 37.

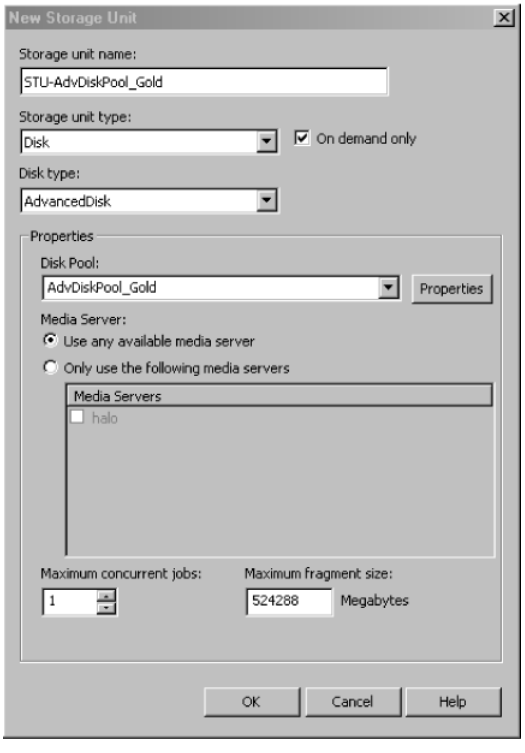
More information about storage units is available.

See the *NetBackup Administrator's Guide for Windows, Volume I*.

See the *NetBackup Administrator's Guide for UNIX and Linux, Volume I*.

To configure a storage unit from the Actions menu

1. In the **NetBackup Administration Console**, in the left pane, select **NetBackup Management > Storage > Storage Units**.
2. Click **Actions** > **New > Storage Unit**.



3 Complete the fields and set the options in the **New Storage Unit** dialog box.

See "AdvancedDisk storage unit properties" on page 36.

4 Click **OK**.

AdvancedDisk storage unit properties

The following are the configuration options for a disk pool storage unit.

Table 3-6 AdvancedDisk storage unit properties

Property	Description
Storage unit name	Enter a unique name for the new storage unit. The name can describe the type of storage. The storage unit name is the name used to specify a storage unit for policies and schedules. The storage unit name cannot be changed after creation.
Storage unit type	Select **Disk** as the storage unit type.
Disk type	Select **AdvancedDisk** for the disk type.
Disk pool	Select the disk pool that contains the storage for this storage unit. All disk pools of the specified **Disk type** appear in the **Disk pool** list. If no disk pools are configured, no disk pools appear in the list.
Media server	Specify the NetBackup media servers that can move data to and from the disk pool for this storage unit. Only the media servers that are configured as storage servers appear in the media servers list. Specify the media server or servers as follows: ■ To allow any server in the media server list to access the disk storage (default), select **Use any available media server**. ■ To restrict the media servers that can access the disk storage, select **Only use the following media servers**. Then, select the media servers to allow. The selection list includes only the media servers that are configured as storage servers for the disk pool. NetBackup selects the media server to use when the policy runs.

Table 3-6 AdvancedDisk storage unit properties *(continued)*

Property	Description
Maximum fragment size	Specify the largest fragment size that NetBackup can create to store backups. The default maximum fragment size for a disk storage unit is 524,288 megabytes. To specify a maximum fragment size other than the default, enter a value from 20 megabytes to 524,288 megabytes. Backups to disk are usually fragmented to ensure that the backup does not exceed the maximum size that the file system allows. If an error occurs in a backup, the entire backup is discarded. The backup restarts from the beginning, not from the fragment where the error occurred. (An exception is for backups for which checkpoint and restart are enabled. In that case, fragments before and including the last checkpoint are retained; the fragments after the last checkpoint are discarded.)
Maximum concurrent jobs	Specify the maximum number of jobs that NetBackup can send to a disk storage unit at one time. (Default: one job. The job count can range from 0 to 256.) This setting corresponds to the Maximum concurrent write drives setting for a Media Manager storage unit. NetBackup queues jobs until the storage unit is available. If three backup jobs are scheduled and **Maximum concurrent jobs** is set to two, NetBackup starts the first two jobs and queues the third job. If a job contains multiple copies, each copy applies toward the **Maximum concurrent jobs** count. **Maximum concurrent jobs** controls the traffic for backup and duplication jobs but not restore jobs. The count applies to all servers in the storage unit, not per server. If you select multiple media servers in the storage unit and 1 for **Maximum concurrent jobs**, only one job runs at a time. The number to enter depends on the available disk space and the server's ability to run multiple backup processes. **Warning:** A Maximum concurrent jobs setting of 0 disables the storage unit.

About AdvancedDisk storage unit recommendations

You can use storage unit properties to control how NetBackup moves backup and duplication data.

For example, you can configure a favorable client-to-server ratio for important clients by using the storage unit **Media server** setting.

See "About configuring a favorable client-to-server ratio" on page 38.

You also can use the storage unit **Maximum concurrent jobs** setting to control the backup or the duplication traffic that is sent to the media servers.

See "About throttling traffic to the media servers" on page 38.

About configuring a favorable client-to-server ratio

For a favorable client-to-server ratio, you can use one disk pool and configure multiple storage units to separate your backup traffic. Because all storage units use the same disk pool, you do not have to partition the storage.

For example, assume that you have 100 important clients, 500 regular clients, and four media servers. You can use two media servers to back up your most important clients and two media servers to back up your regular clients.

The following example describes how to configure a favorable client-to-server ratio:

- Configure the media servers for AdvancedDisk and configure the storage.
- Configure a disk pool.
- Configure a storage unit for your most important clients (such as STU-GOLD). Select the disk pool. Select **Only use the following media servers**. Select two media servers to use for your important backups.
- Create a backup policy for the 100 important clients and select the STU-GOLD storage unit. The media servers that are specified in the storage unit move the client data to the storage server.
- Configure another storage unit (such as STU-SILVER). Select the same disk pool. Select **Only use the following media servers**. Select the other two media servers.
- Configure a backup policy for the 500 regular clients and select the STU-SILVER storage unit. The media servers that are specified in the storage unit move the client data to the storage server.

Backup traffic is routed to the wanted data movers by the storage unit settings.

Note: NetBackup uses storage units for media server selection for write activity (backups and duplications) only. For restores, NetBackup chooses among all media servers that can access the disk pool.

About throttling traffic to the media servers

You can use the **Maximum concurrent jobs** settings on disk pool storage units to throttle the traffic to the media servers. Effectively, this setting also directs higher loads to specific media servers when you use multiple storage units for the same disk pool. A higher number of concurrent jobs means that the disk can be busier than if the number is lower.

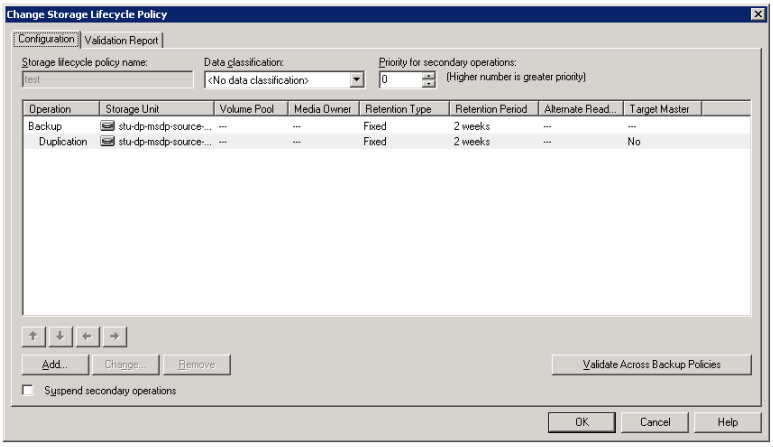
For example, two storage units use the same set of media servers. One of the storage units (STU-GOLD) has a higher **Maximum concurrent jobs** setting than the other (STU-SILVER). More client backups occur for the storage unit with the higher **Maximum concurrent jobs** setting.

Creating a storage lifecycle policy

A storage lifecycle policy can be selected as the **Policy storage** within a backup policy.

To create a storage lifecycle policy

1. In the **NetBackup Administration Console**, select **NetBackup Management > Storage > Storage Lifecycle Policies**.
2. Click **Actions > New > Storage Lifecycle Policy** (UNIX) or **Actions > New > New Storage Lifecycle Policy** (Windows).



3. In the **New Storage Lifecycle Policy** dialog box, enter a **Storage lifecycle policy name**.
4. Select a **Data classification**. (Optional.)
5. Select the **Duplication job priority**. This number represents the priority that duplication jobs have in relationship to all other jobs. In duplication jobs, NetBackup duplicates data from a backup destination to a duplication destination within a lifecycle.

   See "Storage Lifecycle Policy dialog box settings" on page 40.

6 Click **Add** to add operations to the SLP. The operations act as instructions for the data.

See "Adding a storage operation to a storage lifecycle policy" on page 42.

7 Click **OK** to create the storage lifecycle policy.

Storage Lifecycle Policy dialog box settings

A storage lifecycle policy consists of one or more operations.

The **New Storage Lifecycle** dialog box and the **Change Storage Lifecycle Policy** dialog box contains the following settings.

Figure 3-1 Configuration tab of the Storage Lifecycle Policy dialog box

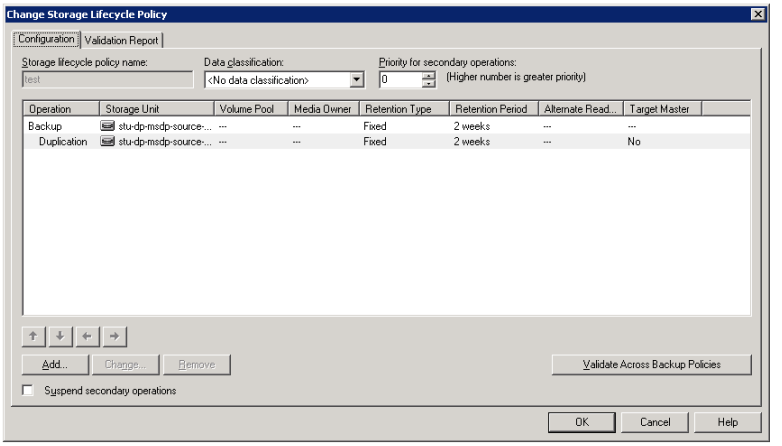


Table 3-7 Configuration tab of the Storage Lifecycle Policy dialog box

Setting	Description
Storage lifecycle policy name	The **Storage lifecycle policy name** describes the SLP. The name cannot be modified after the SLP is created.

Table 3-7 Configuration tab of the Storage Lifecycle Policy dialog box *(continued)*

Setting	Description
Data classification	The **Data classification** defines the level of data that the SLP is allowed to process. The **Data classification** drop-down menu contains all of the defined classifications. The **Data classification** is an optional setting. One data classification can be assigned to each SLP and applies to all operations in the SLP. An SLP is not required to have a data classification. If a data classification is selected, the SLP stores only those images from the policies that are set up for that data classification. If no data classification is indicated, the SLP accepts images of any classification or no classification. The **Data classification** setting allows the NetBackup administrator to classify data based on relative importance. A classification represents a set of backup requirements. When data must meet different backup requirements, consider assigning different classifications. For example, email backup data can be assigned to the silver data classification and financial data backup may be assigned to the platinum classification. A backup policy associates backup data with a data classification. Policy data can be stored only in an SLP with the same data classification. Once data is backed up in an SLP, the data is managed according to the SLP configuration. The SLP defines what happens to the data from the initial backup until the last copy of the image has expired.
Priority for secondary operations	The **Priority for secondary operations** setting is the priority that secondary jobs (for example, duplication jobs), have in relationship to all other jobs. Range: 0 (default) to 99999 (highest priority). For example, the **Priority for secondary operations** for a policy with a gold data classification may be set higher than for a policy with a silver data classification. The priority of the backup job is set in the backup policy on the **Attributes** tab.
Operations	The **Operations** list contains all of the operations in the SLP. Multiple operations imply that multiple copies are created. The list also contains the columns that display information about each operation. Note that not all columns display by default. For column descriptions, see the following topic:
Suspend secondary operations	Enable **Suspend secondary operations** to stop the operations in the SLP. A selected SLP can also be suspended from the **Actions** menu and then activated again (**Activate**).

Table 3-7 Configuration tab of the Storage Lifecycle Policy dialog box *(continued)*

Setting	Description
Validate Across Backup Policies button	Use this button to see how changes to this SLP can affect the policies that are associated with this SLP. The button generates a report that displays on the **Validation Report** tab. This button performs the same validation as the `-conflict` option performs when used with the `nbstl` command.
Arrows	Use the arrows to indicate the indentation (or hierarchy) of the source for each copy. One copy can be the source for many other copies. Many operations can be hierarchical or non-hierarchical:

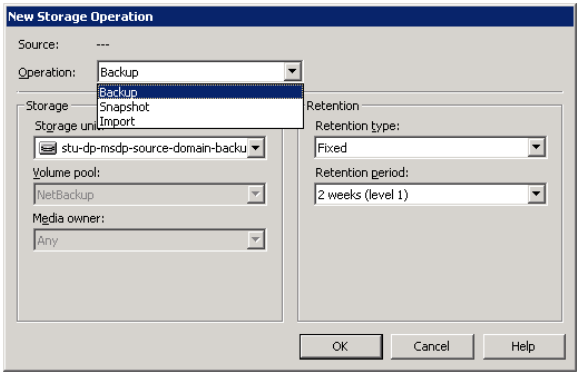
Adding a storage operation to a storage lifecycle policy

Use the following procedure to add a storage operation to a storage lifecycle policy:

To add a storage operation to a lifecycle policy

1. In the **NetBackup Administration Console**, select **NetBackup Management > Storage > Storage Lifecycle Policies**.
2. Click **Actions > New > New Storage Lifecycle Policy** (Windows) or **Actions > New > Storage Lifecycle Policy** (UNIX).
3. Click **Add** to add operations to the SLP. The operations are the instructions for the SLP to follow and apply to the data that is eventually specified in the backup policy.

   To create a hierarchical SLP, select an operation to become the source of the next operation, then click **Add**.



4 In the **New Storage Operation** dialog box, select an **Operation** type. The name of the operation reflects its purpose in the SLP:

- **Backup**
- **Backup From Snapshot**
- **Duplication**
- **Import**
- **Index From Snapshot**
- **Replication**
- **Snapshot**

5 Indicate where the operation is to write the image. Depending on the operation, selections may include storage units or storage unit groups.

No BasicDisk, SnapVault, or disk staging storage units can be used as storage unit selections in an SLP.

Note: In NetBackup 7.5, the **Any_Available** selection is not available for new SLPs. In an upgrade situation, existing SLPs that use **Any_Available** continue to work as they did before NetBackup 7.5. However, if the NetBackup administrator edits an existing SLP, a specific storage unit or storage unit group must be selected before the SLP can be saved successfully.

---

6 If the storage unit is a tape device or virtual tape library (VTL)., indicate the **Volume pool** where the backups (or copies) are to be written.

7 Indicate the **Media owner** if the storage unit is a Media Manager type and server groups are configured.

By specifying a **Media owner**, you allow only those media servers to write to the media on which backup images for this policy are written.

8 Select the retention type for the operation:

- **Capacity managed**
- **Expire after copy**
  If a policy is configured to back up to a lifecycle, the retention that is indicated in the lifecycle is the value that is used. The **Retention** attribute in the schedule is not used.
- **Fixed**
- **Maximum snapshot limit**

- **Mirror**
- **Target retention**

9 Indicate an **Alternate read server** that is allowed to read a backup image originally written by a different media server.

10 Click **OK** to create the storage operation.

Creating a policy using the Policy Configuration Wizard

The easiest method to set up a backup policy is to use the **Policy Configuration Wizard**. This wizard guides you through the setup process by automatically choosing the best values for most configurations.

Not all policy configuration options are presented through the wizard. For example, calendar-based scheduling and the **Data Classification** setting. After the policy is created, modify the policy in the **Policies** utility to configure the options that are not part of the wizard.

Use the following procedure to create a policy using the Policy Configuration Wizard.

To create a policy with the Policy Configuration Wizard

1 In the **NetBackup Administration Console**, in the left pane, click **NetBackup Management**.

2 In the right pane, click **Create a Policy** to begin the **Policy Configuration Wizard**.

3 Click **Next** to start the wizard and follow the prompts.

Click **Help** on any wizard panel for assistance while running the wizard.

Creating a policy without using the Policy Configuration Wizard

Use the following procedure to create a policy without using the Policy Configuration Wizard.

To create a policy without the Policy Configuration Wizard

1 In the **NetBackup Administration Console**, in the left pane, expand **NetBackup Management > Policies**.

2 Type a unique name for the new policy in the **Add a New Policy** dialog box.

3 If necessary, clear the **Use Policy Configuration Wizard** checkbox.

4 Click **OK**.

5 Configure the attributes, the schedules, the clients, and the backup selections for the new policy.

Chapter 4

Managing AdvancedDisk

This chapter includes the following topics:

Managing AdvancedDisk storage servers

After you configure AdvancedDisk, you can perform various tasks to manage storage servers.

See "Deleting an AdvancedDisk storage server" on page 47.

See "Determining AdvancedDisk storage server state" on page 48.

See "Removing an AdvancedDisk storage server from disk pool access" on page 49.

See "Removing AdvancedDisk storage server attributes" on page 48.

See "Viewing AdvancedDisk storage servers" on page 50.

See "Viewing AdvancedDisk storage server attributes" on page 50.

Deleting an AdvancedDisk storage server

If you delete a storage server, NetBackup removes the storage server only from your configuration.

The media server is not deleted from your configuration. To delete the media server, use the NetBackup `nbemmcmd` command.

If a disk pool is configured from the disk volumes that the storage server manages, you cannot delete the storage server.

Warning: Do not delete a storage server if its storage contains unexpired NetBackup images. If you do, data loss may occur.

To delete an AdvancedDisk storage server

1. In the **NetBackup Administration Console**, expand **Media and Device Management > Credentials > Storage Server**.
2. On the **Edit** menu, select **Delete**.
3. Click **Yes** in the confirmation dialog box.

Determining AdvancedDisk storage server state

Use the NetBackup `nbdevquery` command to determine the state of an AdvancedDisk storage server.

The following is the path to the `nbdevquery` command:

- UNIX: `/usr/openv/netbackup/bin/admincmd`
- Windows: *`install_path`*`\NetBackup\bin\admincmd`

To determine AdvancedDisk storage server status

- Run the following command:

  ```
  nbdevquery -liststs -stype AdvancedDisk -storage_server
  server_name -U
  ```

  The `State` field shows either UP or DOWN.

Removing AdvancedDisk storage server attributes

Use the `nbdevconfig` command to remove the following storage server attributes:

- Preferred restore server (`PrefRestore`)
- Required restore server (`ReqRestore`)
- Required duplication server (`ReqDuplicate`)

See "About AdvancedDisk preferred or required read servers" on page 18.

Attributes are added when you use the `nbdevconfig` command to configure a storage server.

See "Configuring an AdvancedDisk storage server" on page 26.

The following is the path to the `nbdevconfig` command:

- UNIX: `/usr/openv/netbackup/bin/admincmd`
- Windows: *`install_path`*`\NetBackup\bin\admincmd`

To remove AdvancedDisk storage server attributes

- Run the following command on the NetBackup master server or on a storage server:

  ```
  nbdevconfig -changests -storage_server storage_server -stype
  AdvancedDisk -clearattribute attribute
  ```

Removing an AdvancedDisk storage server from disk pool access

Use the `nbdevconfig` command to remove a storage server so that it no longer can access a disk pool. If NetBackup jobs exist that use that storage server, you cannot remove the storage server.

Warning: If you remove the only storage server, data may be lost. NetBackup cannot access the disk pool and the backup images on the disk pool.

The following is the path to the `nbdevconfig` command:

- UNIX: `/usr/openv/netbackup/bin/admincmd`
- Windows: *`install_path`*`\NetBackup\bin\admincmd`

To remove an AdvancedDisk storage server from disk pool access

1. For every storage unit that specifies the storage server (media server) in **Use one of the following media servers,** clear the check box that specifies the media server.

   This step is not required if the storage unit is configured to use any available media server.

2. If only one storage server exists, change the state of all disk pools on the array to DOWN. To do so, use the following command:

   ```
   nbdevconfig -changestate -stype AdvancedDisk -dp disk_pool_name
   -state DOWN
   ```

3. Remove the storage server. The following is the command syntax:

   ```
   nbdevconfig -changedp -stype AdvancedDisk -dp disk_pool_name
   -del_storage_servers storage_server
   ```

Viewing AdvancedDisk storage servers

Use the **NetBackup Administration Console** to view a list of storage servers already configured.

To view AdvancedDisk storage servers

- In the **NetBackup Administration Console**, in the left pane, expand **Media and Device Management > Credentials > Storage Server**.

  The right pane, labeled **All Storage Servers** , shows all configured storage servers. AdvancedDisk storage servers show AdvancedDisk in the **Disk Type** column.

Viewing AdvancedDisk storage server attributes

Use the NetBackup `nbdevquery` command to view the storage server attributes.

The following is the path to the `nbdevconfig` command:

- UNIX: `/usr/openv/netbackup/bin/admincmd`
- Windows: *`install_path`*`\NetBackup\bin\admincmd`

To view AdvancedDisk storage server attributes

- Run the following command on the NetBackup master server or a storage server:

  ```
  nbdevquery -liststs -storage_server storage_server -stype
  AdvancedDisk –U
  ```

  The following is example output:

  ```
  Storage Server      : advdsk_server.symantecs.com
  Storage Server Type : AdvancedDisk
  Storage Type        : Formatted Disk, Direct Attached
  State               : UP
  Flag                : PrefRestore
  ```

  This example output is shortened; more flags may appear in actual output.

Managing AdvancedDisk disk pools

After you configure AdvancedDisk, you can perform various tasks to manage your AdvancedDisk disk pools.

See "Adding volumes to an AdvancedDisk disk pool" on page 51.

See "Changing AdvancedDisk disk pool properties" on page 52.

See "Changing AdvancedDisk disk pool state" on page 53.

See "Changing AdvancedDisk disk volume state" on page 54.

See "Deleting an AdvancedDisk disk pool" on page 54.

See "Determining AdvancedDisk disk pool state" on page 55.

See "Determining AdvancedDisk disk volume state" on page 55.

See "Merging AdvancedDisk disk pools" on page 56.

See "Removing a volume from an AdvancedDisk disk pool" on page 57.

See "Viewing AdvancedDisk disk pools" on page 57.

Adding volumes to an AdvancedDisk disk pool

You can expand a disk pool's capacity by adding disk volumes to the disk pool. The names of the new volumes must differ from the names of the volumes in the current disk pool.

The NetBackup storage units that use the disk pool use the additional storage capacity automatically. You do not have to change the storage units.

(By default, NetBackup automatically increases disk pool capacity if the capacity of the underlying disk volumes increases. Similarly, NetBackup decreases the capacity of a disk pool if the underlying disk volume capacity decreases.)

Table 4-1 Add volumes process for an AdvancedDisk disk pool

Task	Procedure
Create a disk pool from the new disk volumes on the storage server.	See "Configuring an AdvancedDisk disk pool" on page 30.
Merge the disk pools.	When you merge the disk pools, specify the original disk pool as the primary one. NetBackup deletes the secondary disk pool after the merge. See "Merging AdvancedDisk disk pools" on page 56.

Changing AdvancedDisk disk pool properties

You can change the storage server for a disk pool and change the properties of a disk pool.

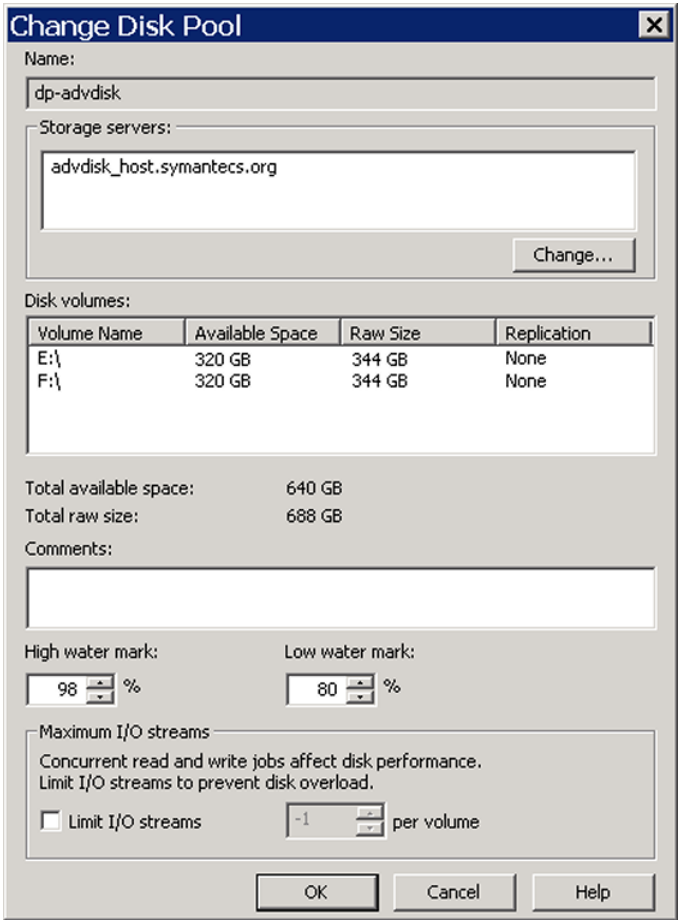
To add volumes to a disk pool, you must use a different procedure.

See "Adding volumes to an AdvancedDisk disk pool" on page 51.

To change disk pool properties

1. In the **NetBackup Administration Console**, in the left pane, expand **Media and Device Management > Devices > Disk Pools**.
2. In the right pane, select the disk pool that you want to change.

3 Click **Edit** > **Change**.



4 In the **Change Disk Pool** dialog box, change storage servers or the properties.

See "AdvancedDisk disk pool properties" on page 33.

5 Click **OK**.

Changing AdvancedDisk disk pool state

Disk pool state is UP or DOWN.

To change the state to DOWN, the disk pool must not be busy. If backup jobs are assigned to the disk pool, the state change fails. Cancel the backup jobs or wait until the jobs complete.

To change AdvancedDisk disk pool state

1. In the **NetBackup Administration Console**, in the left pane, select **Media and Device Management > Device Monitor**.
2. Select the **Disk Pools** tab.
3. Select the disk pool.
4. Select either **Actions > Up** or **Actions > Down**.

Changing AdvancedDisk disk volume state

Use the NetBackup commands to change disk volume state. The state is UP or DOWN.

To change the state to DOWN, the disk pool in which the volume resides must not be busy. If backup jobs are assigned to the disk pool, the state change fails. Cancel the backup jobs or wait until the jobs complete.

NetBackup jobs still read from and write to a disk pool that has a downed volume, but the downed volume is unavailable.

The `nbdevconfig` command and the `nbdevquery` command reside in the following directory:

- UNIX: `/usr/openv/netbackup/bin/admincmd`
- Windows: *`install_path`*`\netbackup\bin\admincmd`

To change the AdvancedDisk disk volume state

1. Determine the name of the disk volume. The following command lists all volumes in the specified disk pool:

   ```
   nbdevquery -listdv -stype AdvancedDisk -dp disk_pool_name
   ```

   To display the disk volumes in all disk pools, omit the `-dp` option.

2. Change the disk volume state. The following is the command syntax:

   ```
   nbdevconfig -changestate -stype AdvancedDisk -dp disk_pool_name
   -dv vol_name -state state
   ```

   The *state* is either UP or DOWN.

Deleting an AdvancedDisk disk pool

If you delete a disk pool, NetBackup removes it from your configuration.

If a disk pool is the storage destination of a storage unit, you must first delete the storage unit.

Warning: Do not delete a disk pool that contains unexpired NetBackup images; if you do, data loss may occur.

To delete an AdvancedDisk disk pool

1. In the **NetBackup Administration Console**, in the left pane, select **Media and Device Management > Devices > Disk Pools**.
2. Select a disk pool
3. Click **Edit** > **Delete**.
4. In the **Delete Disk Pool** dialog box, verify that the disk pool is the one you want to delete and then click **OK**.

Determining AdvancedDisk disk pool state

Disk pool state is UP or DOWN.

To determine AdvancedDisk disk pool state

1. In the **NetBackup Administration Console**, in the left pane, select **Media and Device Management > Device Monitor**.
2. Select the **Disk Pools** tab.
3. The state is displayed in the **Status** column.

Determining AdvancedDisk disk volume state

Use the NetBackup `nbdevquery` command to determine the state of the volumes in AdvancedDisk disk pools.

The following is the path to the `nbdevquery` command:

- UNIX: `/usr/openv/netbackup/bin/admincmd`
- Windows: *`install_path`*`\NetBackup\bin\admincmd`

To determine AdvancedDisk disk volume state

1. Determine the name of the disk volume. The following command lists the volumes in the specified disk pool:

   ```
   nbdevquery -listdv -stype AdvancedDisk -dp disk_pool_name
   ```

   To display the disk volumes in all AdvancedDisk disk pools, omit the `-dp` option.

2. Display the volume state by using the following command:

   ```
   nbdevquery -listdv -dv disk_volume -stype AdvancedDisk
   ```

   The *state* is either UP or DOWN.

Merging AdvancedDisk disk pools

Use the NetBackup `nbdevconfig` command to merge existing disk pools.

NetBackup updates the catalog records to show the correct location of the backup images in those disk pools.

If the secondary disk pool is referenced by storage units, you must first delete those storage units.

The following is the path to the nbdevconfig command:

- UNIX: `/usr/openv/netbackup/bin/admincmd`
- Windows: *install_path*`\netbackup\bin\admincmd`

To merge AdvancedDisk disk pools

1. Change the state of each disk pool to DOWN.

   See "Changing AdvancedDisk disk pool state" on page 53.

   If backup jobs are assigned to a disk pool, the state change fails. Cancel the backup jobs or wait until the jobs complete.

2. Merge the disk pools. The following is the command syntax. The primary disk pool is the one you want to retain; `nbdevconfig` deletes the secondary disk pool after the merge.

   ```
   nbdevconfig –mergedps –stype AdvancedDisk -primarydp
   disk_pool_name -secondarydp disk_pool_name
   ```

3. Change the state of the primary disk pool to UP.

   See "Changing AdvancedDisk disk pool state" on page 53.

Removing a volume from an AdvancedDisk disk pool

Use the `nbdevconfig` command to remove a volume from a disk pool. The following are the prerequisites:

- NetBackup image fragments cannot exist on the disk volume.
- NetBackup jobs cannot be active on the disk volume.

By default, NetBackup automatically decreases disk pool capacity if you remove a disk volume.

The following is the path to the `nbdevconfig` command:

- UNIX: `/usr/openv/netbackup/bin/admincmd`
- Windows: *`install_path`*`\NetBackup\bin\admincmd`

To remove a volume from an AdvancedDisk disk pool

1. Change the disk volume state to DOWN.

   See "Changing AdvancedDisk disk volume state" on page 54.

2. Change the disk pool state to DOWN.

   See "Changing AdvancedDisk disk pool state" on page 53.

3. Remove the volume by using the `nbdevconfig` command. The following is the command syntax:

   ```
   nbdevconfig -deletedv -stype AdvancedDisk -dp disk_pool_name -dv vol_name
   ```

4. Change the disk pool state to UP.

   See "Changing AdvancedDisk disk pool state" on page 53.

Viewing AdvancedDisk disk pools

Use the **NetBackup Administration Console** to view configured disk pools.

To view disk pools

- In the **NetBackup Administration Console** tree, in the left pane, select **Media and Device Management > Devices > Disk Pools**.

  The list appears in the right pane.

Monitoring AdvancedDisk storage capacity and usage

To monitor storage capacity and usage, see the following:

The NetBackup Administration Console **Disk Pools** window.	The **Disk Pools** window displays a value that was stored when NetBackup polled the disk pools. The value may not be as current as the value that is displayed in the **Storage Server** window. To display the window, select **Media and Device Management > Devices > Disk Pools**.
The NetBackup Disk Pool status report.	See "Viewing disk reports" on page 59.
NetBackup Administration Console **Storage Server** window	The storage server view displays real-time values. To display the window, select **Media and Device Management > Credentials > Storage Servers**.
The **NetBackup License Keys** dialog box.	The summary of active capacity-based license features in the **NetBackup License Keys** dialog box. The summary displays the storage capacity for which you are licensed and the capacity used. It does not display the amount of physical storage space. To open the dialog box, select **Help** > **License Keys** in the NetBackup Administration Console.

The NetBackup OpsCenter also provides information about storage capacity and usage.

See the *NetBackup OpsCenter Administrator's Guide*.

Monitoring NetBackup disk activity

You can monitor NetBackup disk-related activity and status by viewing the NetBackup log files.

Some NetBackup commands or processes write messages to their own log files. Other processes use Veritas unified log (VxUL) files. VxUL uses a standardized name and file format for log files. An originator ID (OID) identifies the process that writes the log messages.

Table 4-2 shows the NetBackup logs for disk-related activity.

The messages that begin with a `sts_` prefix relate to the interaction with the storage vendor software plug-in. Most interaction occurs on the NetBackup media servers.

Table 4-2 NetBackup logs

Activity	VxUL OID	Processes that use the ID
Backups and restores	N/A	Messages appear in the log files for the following processes: ■ The `bpbrm` backup and restore manager ■ The `bpdbm` database manager ■ The `bpdm` disk manager ■ The `bptm` tape manager for I/O operations
Backups and restores	117	The `nbjm` job manager.
Device configuration	111	The `nbemm` process.
Device configuration	178	The Disk Service Manager process that runs in the Enterprise Media Manager (EMM) process.
Device configuration	202	The Storage Server Interface process that runs in the Remote Manager and Monitor Service. RMMS runs on media servers.
Device configuration	230	The Remote Disk Service Manager interface (RDSM) that runs in the Remote Manager and Monitor Service. RMMS runs on media servers.

To view and manage VxUL log files, you must use NetBackup log commands. Information about how to use and manage logs on NetBackup servers is available.

See the *NetBackup Troubleshooting Guide*.

Viewing disk reports

The NetBackup disk reports include information about the disk pools, disk storage units, disk logs, images that are stored on disk media, and storage capacity.

Table 4-3 describes the disk reports available.

Table 4-3 Disk reports

Report	Description
Images on Disk	The Images on Disk report generates the image list present on the disk storage units that are connected to the media server. The report is a subset of the Images on Media report; it shows only disk-specific columns. The report provides a summary of the storage unit contents. If a disk becomes bad or if a media server crashes, this report can let you know what data is lost.
Disk Logs	The Disk Logs report displays the media errors or the informational messages that are recorded in the NetBackup error catalog. The report is a subset of the Media Logs report; it shows only disk-specific columns.
Disk Storage Unit	The Disk Storage Unit Status report displays the state of disk storage units in the current NetBackup configuration. For disk pool capacity, see the disk pools window in **Media and Device Management > Devices > Disk Pools**. Multiple storage units can point to the same disk pool. When the report query is by storage unit, the report counts the capacity of disk pool storage multiple times.
Disk Pool Status	The Disk Pool Status report displays the state of disk pool storage units. This report displays only when an Enterprise Disk Option license is installed.

To view disk reports

1. In the **NetBackup Administration Console**, in the left pane, expand **NetBackup Management > Reports > Disk Reports**.
2. Select the name of a disk report.
3. In the right pane, select the report settings.
4. Click **Run Report**.

Displaying KMS key information for AdvancedDisk encryption

You can use the `nbkmsutil` command to list the following information about the key groups and the key records:

- Key groups

See "To display KMS key group information" on page 61.

- Keys
  See "To display KMS key information" on page 62.

Note: Symantec recommends that you keep a record key information. The key tag that is listed in the output is necessary if you need to recover keys.

the following are the directories in which the `nbkmsutil` command resides:

- UNIX: `/usr/openv/netbackup/bin/admincmd`
- Windows: *`install_path`*`\Veritas\NetBackup\bin\admincmd`

To display KMS key group information

- To list all of the key groups, use the `nbkmsutil` with the `-listkgs` option. The following is an example:

```
nbkmsutil -listkgs

Key Group Name        : StorageServerA.symantecs.org:AdvDisk
Supported Cipher      : AES_256
Number of Keys        : 1
Has Active Key        : Yes
Creation Time         : Wed Nov 30 16:53:48 2011
Last Modification Time: Wed Nov 30 16:53:48 2011
Description           : -
```

To display KMS key information

- To list all of the keys that belong to a key group name, , use the `nbkmsutil` with the `-listkgs` and `-kgname` options. The following is an example:

```
nbkmsutil -listkeys -kgname StorageServerA.symantecs.org:AdvDisk

Key Group Name        : StorageServerA.symantecs.org:AdvDisk
Supported Cipher      : AES_256
Number of Keys        : 1
Has Active Key        : Yes
Creation Time         : Wed Nov 30 16:53:48 2011
Last Modification Time: Wed Nov 30 16:53:48 2011
Description           : -

  Key Tag    : 867d710aa7f4c64dcdd2cec6...cced0c831c1812c510acd05
  Key Name              : dp-key
  Current State         : ACTIVE
  Creation Time         : Wed Nov 30 17:06:26 2011
  Last Modification Time: Wed Nov 30 17:06:26 2011
  Description           : -

Number of Keys: 1
```

Chapter 5

Toubleshooting AdvancedDisk

This chapter includes the following topics:

AdvancedDisk troubleshooting

The following may help you troubleshoot AdvancedDisk:

Table 5-1 AdvancedDisk troubleshooting

Problem	Solution
Unable to access storage	If NetBackup cannot access the storage, one possible cause is that the storage server was created with the incorrect `nbdevconfig` storage type (`-st`) value. An AdvancedDisk storage server `-st` value is 5 (formatted disk, directly attached); values other than 5 are incorrect. More procedural information is available about resolving this problem. See "Resolving an incorrect storage type problem" on page 64.
Multiple storage servers on Windows	AdvancedDisk does not support Common Internet File System (CIFS). If you try to configure multiple storage servers, NetBackup returns the following message: `DSM does not support to use multiple Windows Storage Servers for server type: AdvancedDisk.`
Volume state changes to DOWN when volume is unmounted	If a volume becomes unmounted, NetBackup changes the volume state to DOWN. NetBackup jobs that require that volume fail. To change the volume state to UP, mount the file system

Table 5-1 AdvancedDisk troubleshooting *(continued)*

Problem	Solution
Disk failure - AdvancedDisk	If recovery mechanisms do not protect a disk that fails, the backup images on that disk are lost. Operating system read and write errors may occur for the volume that represents the disk. NetBackup cannot use that volume because of the errors, and NetBackup jobs may fail. To prevent NetBackup from trying to read from or write to the disk, you must change the volume state to DOWN in NetBackup. If the volume represents other disks that still function, those disks are not available because the volume state is DOWN. You may be able to read from the volume by mounting it manually. If so, you may be able to recover image fragments from any disks that did not fail. If you replace a failed disk, you can use the same mount point for the replacement disk. Change the volume state to UP, and NetBackup uses that volume again. Any valid backup images on that volume are available for restores.

Resolving an incorrect storage type problem

First determine the storage server value to verify that the storage server was created with the incorrect `nbdevconfig` storage type value. Then proceed to resolving the problem if necessary.

To determine the storage server value

- Invoke the following command on the master server or a media server that functions as a storage server:

  The following output shows an incorrect value for AdvancedDisk:

```
Storage Server      : halo
Storage Server Type : AdvancedDisk
Storage Type        : Formatted Disk, Network Attached
```

To resolve an incorrect storage type problem

1. Delete all disk pools that use the storage server.
2. Delete the storage server.
3. Reconfigure the storage server.
4. Recreate the disk pools.
5. If necessary, specify the new disk pools in the storage units.

   If you recreated the disk pools with the same names as the ones you deleted, this step is not necessary.

See “AdvancedDisk troubleshooting” on page 63.

Index

U

V

W