VERITAS NetBackup FlashBackup™ 4.5

System Administrator's Guide

for UNIX

VERITAS

Contents

About This Guide

This guide explains how to install, configure, and use VERITAS NetBackup FlashBackup™. In this publication, VERITAS NetBackup is referred to as NetBackup and VERITAS NetBackup FlashBackup is referred to as FlashBackup.

Audience

This guide is intended for the system administrator responsible for configuring FlashBackup and assumes a thorough working knowledge of NetBackup administration.

Organization

◆ The "Introduction" is an overview of the product's capabilities.

◆ The "Installation" chapter explains how to install and deinstall FlashBackup.

◆ The "Configuration" chapter explains how to configure your system to use FlashBackup. This chapter supplements the information in the *NetBackup System Administrator's Guide for UNIX*.

◆ The "Using FlashBackup" chapter explains how to back up clients in a FlashBackup policy and how to restore files from FlashBackup backups.

◆ The "Solaris snapctl Driver" appendix provides information about the `snapctl` driver.

Related Manuals

◆ *NetBackup Release Notes for UNIX and Windows*

Describes supported platforms and operating systems and provides operating notes that may not be in the manuals or the online help.

◆ *NetBackup System Administrator's Guide for UNIX*

Explains how to configure and manage NetBackup on a UNIX platform.

◆ *NetBackup ServerFree Agent System Administrator's Guide for UNIX*

Explains how to install and configure NetBackup for frozen image and offhost backup.

◆ *NetBackup User's Guide for UNIX*

Explains how to perform user-directed backups, restores, and archives on a UNIX client.

◆ *NetBackup Media Manager System Administrator's Guide for UNIX*

Explains how to configure and manage the storage devices and media that UNIX NetBackup servers use for backups.

◆ *NetBackup Media Manager Device Configuration Guide*

Provides information about configuring storage devices on UNIX systems.

◆ *NetBackup Troubleshooting Guide for UNIX*

Provides troubleshooting information for NetBackup.

Accessibility

NetBackup contains features that make the user interface easier to use by people who are visually impaired and by people who have limited dexterity. Accessibility features include:

◆ Support for assistive technologies such as screen readers and voice input (Windows servers only)

◆ Support for keyboard (mouseless) navigation using accelerator keys and mnemonic keys

For more information, see the NetBackup system administrator's guide.

Conventions

The following explains typographical and other conventions used in this guide.

Type Style

Typographic Conventions

Typeface	Usage
Bold fixed width	Input. For example, type `cd` to change directories.
`Fixed width`	Paths, commands, filenames, or output. For example: The default installation directory is `/opt/VRTSxx`.
Italics	Book titles, new terms, or used for emphasis. For example: *Do not* ignore cautions.
Sans serif (italics)	Placeholder text or variables. For example: Replace *filename* with the name of your file.
Serif (no italics)	Graphical user interface (GUI) objects, such as fields, menu choices, etc. For example: Enter your password in the **Password** field.

Notes and Cautions

Note	This is a Note. Notes are used to call attention to information that makes using the product easier or helps in avoiding problems.

Caution	This is a Caution. Cautions are used to warn about situations that could cause data loss.

Key Combinations

Some keyboard command sequences use two or more keys at the same time. For example, holding down the **Ctrl** key while pressing another key. Keyboard command sequences are indicated by connecting the keys with a plus sign. For example:

Press Ctrl+t

Command Usage

The following conventions are frequently used in the synopsis of command usage.

brackets [ ]

> The enclosed command line component is optional.

Vertical bar or pipe (|)

> Separates optional arguments from which the user can choose. For example, when a command has the following format:
>
> `command` *arg1* | *arg2*
>
> the user can use either the *arg1* or *arg2* variable.

Terms

The terms listed in the table below are used in the VERITAS NetBackup documentation to increase readability while maintaining technical accuracy.

Term	Definition
Microsoft Windows, Windows	Terms used as nouns to describe a line of operating systems developed by Microsoft, Inc.
	A term used as an adjective to describe a specific product or noun. Some examples are: Windows 95, Windows 98, Windows NT, Windows 2000, Windows servers, Windows clients, Windows platforms, Windows hosts, and Windows GUI.
	Where a specific Windows product is identified, then only that particular product is valid with regards to the instance in which it is being used.
	For more information on the Windows operating systems that NetBackup supports, refer to the VERITAS support web site at `http://www.support.veritas.com`.
Windows servers	A term that defines the Windows server platforms that NetBackup supports; those platforms are: Windows NT and Windows 2000.
Windows clients	A term that defines the Windows client platforms that NetBackup supports; those platforms are: Windows 95, 98, ME, NT, 2000, XP (for 32- and 64-bit versions), and LE.

Getting Help

For updated information about this product, including system requirements, supported platforms, supported peripherals, and a list of current patches available from Technical Support, visit our web site:

```
http://www.support.veritas.com/
```

VERITAS Customer Support has an extensive technical support structure that enables you to contact technical support teams that are trained to answer questions to specific products. You can contact Customer Support by sending an e-mail to support@veritas.com, or by finding a product-specific phone number from the VERITAS support web site. The following steps describe how to locate the proper phone number.

1. Open `http://www.support.veritas.com/` in your web browser.

2. Click **Contact Support**. The *Contacting Support Product List* page appears.

3. Select a product line and then a product from the lists that appear. The page will refresh with a list of technical support phone numbers that are specific to the product you just selected.

FlashBackup Information on the Web

The VERITAS support web site includes information on NetBackup FlashBackup, including an up-to-date list of supported operating systems. To locate this information, do the following:

1. Go to `www.support.veritas.com`.

2. In the left margin, click **Patches and Updates**.

3. Select **NetBackup Products** from the Product List. Then select **NetBackup DataCenter**.

4. In the filter wizard, enter the following:

   - **Keyword**: FlashBackup

   - **File type**: PDF (or ALL)

   - **Language**: English

   - **Version**: 4.5

   - **Platform**: All

5. Click **Find Files**.

The files relating to FlashBackup will be listed along with their descriptions. Do the following to download a file:

a. Click on the file-name link for more information about the file.

b. Right-click on the file's download link to download and save the file.

Introduction 1

FlashBackup is a separately priced option that combines the increased performance of raw-partition backups with the ability to do individual file restores. FlashBackup supports ufs or VxFS file systems on Solaris operating systems and Online JFS or VxFS file systems on HP-UX operating systems.

This chapter provides an introduction to FlashBackup and contains the following topics.

◆ Requirements

◆ Features

◆ Restrictions

◆ FlashBackup and Frozen Images: A Little History

◆ FlashBackup Overview: Backup Methods

Note FlashBackup is not supported for HSM-managed file systems.

Requirements

FlashBackup requires the following components:

◆ A UNIX master server with NetBackup 4.5 or later installed.

◆ NetBackup clients that have Solaris 2.6, Solaris 7, or Solaris 8, and NetBackup 4.5 or later client software installed, or NetBackup clients that have HP-UX 11.0 or 11i and NetBackup 4.5 or later installed.

◆ The FlashBackup dynamic shared library (`libbpfsmap.so` for Solaris or `libbpfsmap.sl` for HP-UX) must be installed on the clients.

◆ If you are using VxFS file systems, VxFS 3.3.2 or later must be installed on the clients. If you are using Online JFS file systems on HP-UX, Online JFS 3.3 or higher must be installed on the clients.

◆ A raw disk partition or VERITAS Volume Manager volume to act as the cache device.

Features

The features that distinguish FlashBackup from other raw-partition backups and standard file system backups are:

◆ Provides increased performance

FlashBackup provides increased backup performance over other backup methods. For example, a FlashBackup of a file system will complete in substantially less time than other types of backup, if the file system contains a very large number of files and most of the file system blocks are allocated.

◆ FlashBackup backs up the following file systems: ufs (Solaris), VxFS (Solaris and HP-UX), and Online JFS (HP-UX)

◆ Allows individual file restores

FlashBackup provides a file system mapping capability that allows individual files to be restored from FlashBackup raw-partition backups.

◆ Also uses standard NetBackup utilities for raw partition restores

You can restore raw partitions from FlashBackup backups by using the Backup, Archive, and Restore interface (jbpSA), or by using the standard `xbp` or `bp` restore raw partitions mechanism on the FlashBackup client.

◆ Supports multiple data streams

It is possible to split a backup into multiple data streams in order to further increase the performance of FlashBackup raw-partition backups.

◆ The file system remains mounted during the backup.

It is not necessary to unmount the file system or mount it read only, as with standard raw-partition backups. FlashBackup works with several online backup utilities, such as the NetBackup snap driver `snapctl` (on Solaris), the VxFS snapshot driver (on HP-UX), or the frozen image methods in ServerFree Agent. These utilities allow file systems mounted on disk devices to be modified while the backup is in progress. For more information, refer to "FlashBackup and Frozen Images: A Little History" on page 4.

◆ By default, FlashBackup uses `snapctl` on Solaris or the VxFS snap driver on HP-UX to create a frozen image of the disk device and thus ensure a reliable backup.

◆ Works with the NetBackup ServerFree Agent "Core Frozen Image Services," "Offhost and SAN Data Movement Services," and "Extended Frozen Image Services" products for making frozen image and offhost backups. For more information on these products, refer to the *NetBackup ServerFree Agent System Administrator's Guide*.

Restrictions

◆ FlashBackup does not support file systems managed by HSM.

◆ FlashBackup supports tape storage units only (does not support disk storage units).

◆ FlashBackup does not support VxFS storage checkpoints (referred to as the **fsclone** frozen image method) included in the "Core Frozen Image Services" option of ServerFree Agent.

◆ By default, FlashBackup uses `snapctl` on Solaris to map the underlying file system and volume structure that are being backed up. This mapping has been verified for the following I/O system components: ufs and VxFS file systems, VxVM volumes, and raw disks. The use of other components in the I/O system (such as non-VERITAS volume managers or storage replicators) is not supported.

FlashBackup and Frozen Images: A Little History

It is worth taking a moment to review the development of FlashBackup and to compare it with ServerFree Agent.

Development of FlashBackup

The basic features of FlashBackup are the increased performance of raw-partition backups combined with the ability to do individual file restores from the backup. Originally, these features were intended for backing up local data, and in particular, for backing up large file systems composed of many files.

Prior to FlashBackup, the administrator had to unmount (or otherwise restrict access to) the file system during the backup, to prevent corruption of the backup image by other applications. This meant taking the file system offline for the duration of the backup. For example, while a client backup was in progress, no user access to the client's data was allowed.

To address the offline backup issue, a snapshot mechanism was included with FlashBackup. The snapshot allowed NetBackup to make a "hot" or "online" backup image of the data, permitting users to access the client data while NetBackup simultaneously extracted a consistent backup image from the snapshot data image. When a client backup was launched in a FlashBackup policy, NetBackup automatically created a snapshot, using the `snapctl` driver for Solaris systems or the VxFS snapshot for HP-UX.

Note that offhost backups over a fibre channel SAN were not supported. Combining the hot backup capability with its rapid backup and individual file restore features, FlashBackup was limited to handling local client data.

Advent of ServerFree Agent

The 4.0V release of NetBackup separated the snap driver from FlashBackup and introduced additional methods for creating consistent or stable backup images. These methods are collectively referred to as *frozen image methods*. Consequently, FlashBackup can now work with a number of frozen image methods, which are described in the *NetBackup ServerFree Agent System Administrator's Guide*.

The 4.0V release of NetBackup also introduced offhost backup, for off-loading backup processing from the client to the media server.

Now a vital point: ServerFree Agent and FlashBackup remained (and still remain) separate products for different purposes. NetBackup 4.5 ServerFree Agent provides a variety of methods for making frozen images and offhost backups, while FlashBackup continues to provide high-speed raw-partition backups with individual file restores.

Combining FlashBackup and ServerFree Agent

The following features of ServerFree Agent can enhance FlashBackup:

◆ Offhost backup: ServerFree Agent's offhost backup methods further increase the speed of FlashBackup by off-loading backup I/O processing from the client to a media server. (The client supplies a relatively small amount of mapping information, but the NetBackup media server does the bulk of the work by sending the client's actual data to the storage device). Thus, FlashBackup's speed with large file systems and flexibility in individual file restore can now be applied to clients on a SAN.

◆ Selectable frozen image methods: you can select the frozen image method best suited to your backup environment. For example: if backups must be performed during periods of intense client activity, a mirror frozen image method such as vxvm (or one of the Extended Frozen Image Services methods) might dramatically improve backup performance.

Selecting the Frozen Image Method

A frozen image method is selected in one of two ways:

◆ FlashBackup automatically uses the snapctl driver (Solaris) or VxFS snapshot (HP-UX). No user configuration is allowed for these drivers.

◆ If you install ServerFree Agent, you can select a frozen image method. For in-depth descriptions of the frozen image methods, refer to the *NetBackup ServerFree Agent System Administrator's Guide.*

Selecting the Backup Method

A backup method is selected in one of two ways:

◆ FlashBackup automatically sets the backup method to Local Host (no offhost backup).

◆ If you install ServerFree Agent, you can choose an offhost backup method (either NetBackup Media Server or Third-Party Copy Device). Note that additional configuration is required, as explained in Chapter 4 of the *NetBackup ServerFree Agent System Administrator's Guide.*

FlashBackup Overview: Backup Methods

Without ServerFree Agent, FlashBackup performs local backups only (called Local Host). When combined with ServerFree Agent, FlashBackup supports two offhost backup methods: NetBackup Media Server and Third-Party Copy Device. This section describes all three backup methods.

Local Host

A FlashBackup image can be backed up from locally attached disks to a storage device on the media server, using the Local Host backup method. If ServerFree Agent is not installed, the snap driver is used to create the frozen image. If ServerFree Agent is installed, a different frozen image method can be selected. In either case, a fibre channel network or SAN is not required for a local backup.

The following diagram shows a network configuration sufficient for a Local Host backup. The network configuration is identical to that for normal NetBackup.

FlashBackup with Local Host Backup Method (No Fibre channel/SAN Required)
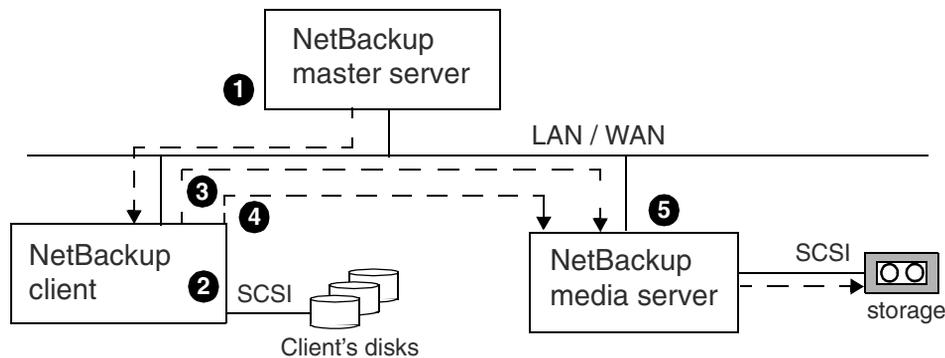
1. Client backup is initiated by master server, which tells the NetBackup client to create the frozen image data on the disk.

2. Client creates file system map over the frozen image.

3. Client sends the file system map to the media server.

4. Client sends the backup data to the media server.

5. Media server writes data to local storage.

NetBackup Media Server

In this offhost backup method, the NetBackup media server performs the backup I/O processing (data movement). Choose this option if processing time on the NetBackup client is critical and off-loading backup processing to the media server would save time. The figure below shows the basic components used in the NetBackup Media Server method.

Note If you have a multi-ported SCSI disk array, a fibre channel SAN is not required. See "Offhost Backup Without a SAN" in the *NetBackup ServerFree Agent System Administrator's Guide*.

FlashBackup with NetBackup Media Server Offhost Method
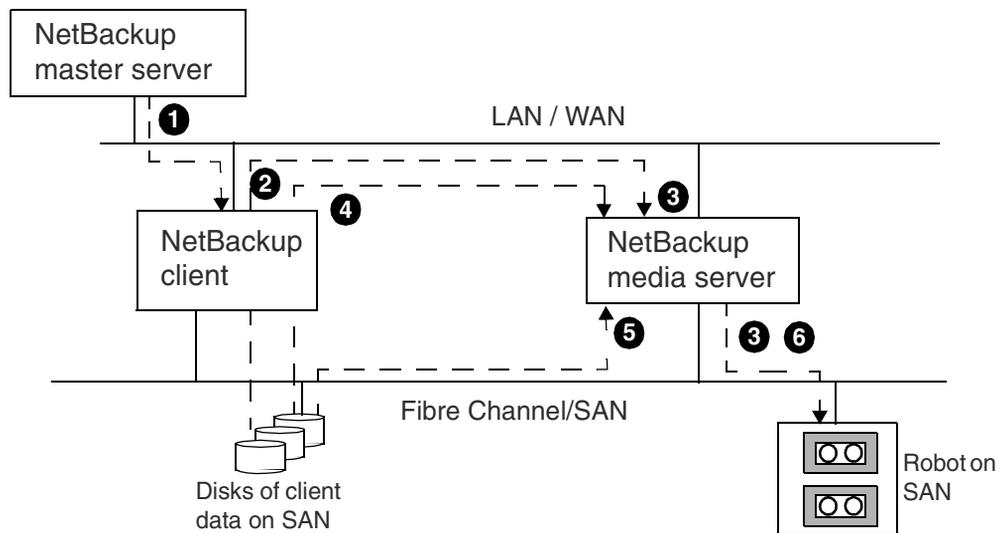

1. Client backup is initiated by master server, which tells the NetBackup client to create the frozen image data on the disk.

2. Client creates file system map over the frozen image and sends the file system map over the LAN to the media server.

3. Media server reads the file system map over the LAN and writes it to tape storage.

4. Client creates the disk block map over the frozen image and sends the disk block map over the LAN to the media server.

5. Media server reads the data over the SAN from the disk block map provided by the client.

6. Media server writes data across the SAN to storage.

Third-Party Copy Device

In this offhost backup method, a third-party copy device (not a component of NetBackup) performs the backup I/O processing (data movement). Choose this option if processing time on the NetBackup client is critical and off-loading backup processing to a third-party copy device would save time. The figure below shows the basic components used in the Third-Party Copy Device method.

FlashBackup with Third-Party Copy Device Offhost Method
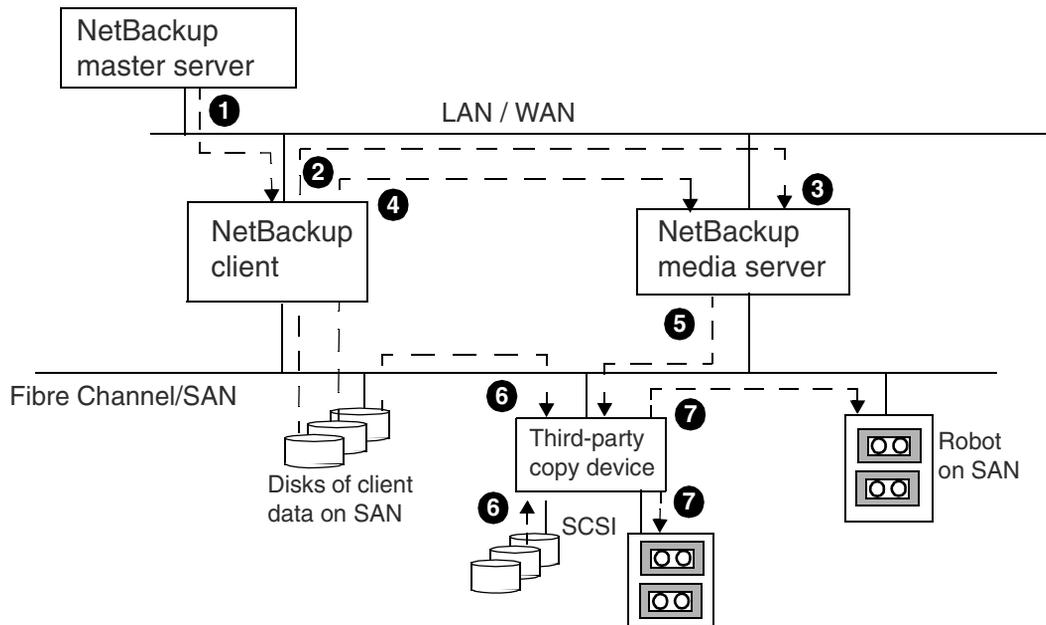

1. Client backup is initiated by master server, which tells the NetBackup client to create the frozen image data on the disk.

2. Client creates file system map over the frozen image and sends the file system map over the LAN to the media server.

3. Media server reads the file system map over the LAN and writes it to tape storage.

4. Client creates the disk block map over the frozen image and sends the disk block map over the LAN to the media server.

5. Media server creates third-party copy commands based on disk block map and sends the commands to the third-party copy device over the SAN.

6. The third-party copy commands instruct the third-party copy device to read the client data from either SAN-attached or SCSI-attached disk.

7. The third-party copy commands instruct third-party copy device to write the client data to SAN-attached or SCSI-attached storage.

Installation 2

This chapter explains how to install and deinstall FlashBackup.

Prerequisites

◆ A UNIX master server with NetBackup DataCenter 4.5 or later installed.

◆ NetBackup FlashBackup Solaris clients must have Solaris 2.6, 7, or 8 installed.
  NetBackup FlashBackup HP clients must have HP-UX 11.00 or 11i installed.
  FlashBackup provides the necessary libraries and drivers for these clients.

Note The Solaris snap driver is included in the core NetBackup software, not in
FlashBackup.

◆ NetBackup 4.5 or later client software must also be installed.

◆ To perform VxFS backups, you must have VxFS 3.3.2 or later installed on the clients.
  For Online JFS backups on HP-UX, Online JFS 3.3 or higher must be installed on
  clients.

Installing FlashBackup

Load From Media

1. Log in as root on the master server.

2. Make sure a valid license key for NetBackup FlashBackup has been registered by
   entering the following command to list and add keys:

   `/usr/openv/netbackup/bin/admincmd/get_license_key`

3. Insert the CD-ROM containing the FlashBackup software in the drive.

4. Change your working directory to the CD-ROM directory:

   `cd /cd_rom_directory`

   Where *cd_rom_directory* is the path to the directory where you can access the CD-ROM. On some platforms, it may be necessary to mount this directory.

5. To install NetBackup FlashBackup, execute the following:

   `./install`

   Since other NetBackup products are included on the CD-ROM, a menu appears.

6. Select **NetBackup Add-On Product Software**.

   a. Select the `NetBackup FlashBackup` option.

   b. Enter **q** to quit the menu.

   c. When asked if the list is correct, answer **y**.

On all platforms, FlashBackup software is installed in:

   `/usr/openv/lib/client/`*hardware*`/`*os*

Where:

◆ *hardware* is Solaris, HP9000-800, or HP9000-700

◆ *os* is Solaris2.6 or HP-UX11.00

Installing NetBackup 4.5 on Clients

You must install NetBackup 4.5 (DataCenter) client software on the clients before performing the next procedure. For instructions, refer to the *NetBackup DataCenter Installation Guide for UNIX*.

Distribute FlashBackup to the Clients

Note If the master server is a Solaris or HP-UX system and the master server is also a client, you do not have to distribute FlashBackup client software to the master. This distribution is done automatically when you load the software from the media. However, you must distribute the software as explained below to all other clients that will be using FlashBackup.

Execute the following as the root user on the NetBackup 4.5 master server.

1. Check whether `bprd` is running by executing:

   `/usr/openv/netbackup/bin/bpps`

   If only one `bprd` shows up in the `bpps` output, there are no active backups or restores. In that case, terminate the `bprd` daemon by executing:

   `/usr/openv/netbackup/bin/admincmd/bprdreq -terminate`

   If more than one `bprd` appears, wait until the backups or restores are complete and then run the `/usr/openv/netbackup/bin/bpps` command again. When only one `bprd` shows up, terminate the `bprd` daemon.

2. You can distribute the FlashBackup software to Solaris and HP-UX clients in either of two ways:

   a. Distribute the software to all currently defined clients by executing the following command:

      `/usr/openv/netbackup/bin/update_flashclients`

   b. Distribute the software to specific clients.

      - Create a file that lists the specific clients. For each client, enter a line in the file containing the following three parameters:

        hardware_type operating_system clientname

        For example:

        ```
        Solaris Solaris2.6 mysparc
        ```

        or

        ```
        Solaris Solaris7 othersparc
        ```

        or

        ```
        Solaris Solaris8 othersparc
        ```

        or

```
HP9000-800 HP-UX11.00 myhp
```

- Execute the following command (all on one line):

   `/usr/openv/netbackup/bin/update_flashclients -ClientList` **file**

   Where *file* is the name of the file that you created in the previous step.

Note FlashBackup software cannot be distributed to clients by means of the NetBackup Administration Console.

Note If you have a large number of clients using FlashBackup, you may want to redirect the output of the command to a file:

   `/usr/openv/netbackup/bin/update_flashclients >` **filename**

---

3. After FlashBackup client software has been distributed to the desired clients, start the NetBackup daemons as the root user on the master server by executing:

   `/usr/openv/netbackup/bin/initbprd`

Deinstalling FlashBackup

Server Deinstall

On the master server where you initially loaded the FlashBackup software, do the following:

1. Check the Activity Monitor in the NetBackup Administration Console to make sure no FlashBackup backups are active or running (the **State** field should read `Done`).

2. Execute the following:

   For Solaris NetBackup servers, execute:

   `pkgrm VRTSnbfsh`

   For other UNIX NetBackup servers, delete the following:

   `/usr/openv/lib/client/*/libbpfsmap.*`

Client De-install

For each NetBackup client that uses FlashBackup:

1. On the master server, check the Activity Monitor in the NetBackup Administration Console to make sure no FlashBackup backups are active or running (the **State** field should read `Done`).

2. On the NetBackup client, execute the following command to de-install the client software:

    ```
    /usr/openv/netbackup/bin/driver/fb_snap.install -d
    ```

3. This step applies to Solaris systems only:

Note Do not execute the following (to de-install the snap driver) if your NetBackup installation also includes Core Frozen Image Services. The following procedure removes the snapshot software; Core Frozen Image Services, however, requires the snapshot software.

If your NetBackup installation does not include Core Frozen Image Services, remove the snap driver by executing the following on the client:

```
/usr/sbin/rem_drv snapctl
rm -rf /dev/rdsk/snap /dev/dsk/snap
rm -f /usr/kernel/drv/snapctl
rm -f /usr/kernel/drv/snapctl.conf
```

If the client is running Solaris 7 or 8, also execute the following:

```
rm -f /usr/kernel/drv/sparcv9/snapctl
```

Configuration 3

This chapter explains how to configure FlashBackup policies in two ways: for the "default" FlashBackup environment (where ServerFree Agent is not installed), and for FlashBackup in combination with ServerFree Agent.

Only the configuration requirements unique to FlashBackup are described here. For a detailed discussion of configuring NetBackup policies, see the *NetBackup System Administrator's Guide for UNIX* and the *NetBackup ServerFree Agent System Administrator's Guide*.

The following topics are covered in this chapter:

◆ Basic FlashBackup Capabilities

◆ Using Default FlashBackup

◆ Using FlashBackup with ServerFree Agent

Basic FlashBackup Capabilities

This section describes capabilities and configuration items that are common to default FlashBackup and FlashBackup with ServerFree Agent.

Storage Unit

FlashBackup supports tape storage units only (not disk storage units). If a disk storage unit is selected, the backup will fail.

Client List

The client list specifies the clients on which you installed the FlashBackup software. The clients must be Solaris 2.6, 7, or 8, or HP-UX 11.0 or 11i.

It is strongly advised that you configure only one client per policy. This is because raw devices are typically unique to a particular client.

> **Note** For backups to succeed, each client in the client list must contain *all* the raw partitions that are specified in the file list. You cannot use exclude and include lists to circumvent this requirement.

Schedules

FlashBackup supports only full and incremental schedule types. User backup and archive schedule types are not allowed.

Policy Attributes

Note the following:

◆ To create a FlashBackup policy, set the **Policy type** to **FlashBackup**.

◆ The FlashBackup policy type automatically enables **Individual file restore from raw**, which allows you to restore individual files from raw-partition backups. For more information, see the Individual File Restore From Raw discussion in the *NetBackup System Administrator's Guide for UNIX*.

For a FlashBackup policy, the following attributes are disabled. You cannot change them.

◆ **Follow NFS**

◆ **Cross mount points**

◆ **Collect true image restore information**

◆ **Compression**

◆ **Encryption**

◆ **Collect disaster recovery information**

◆ **Block level incremental**

If you have not installed ServerFree Agent, the following are also disabled:

◆ **Allow frozen image clients**

◆ **Offhost backup method**

Using Default FlashBackup

If FlashBackup is installed but ServerFree Agent is not, FlashBackup is pre-set as follows:

◆ FlashBackup automatically uses a copy-on-write snapshot driver as the frozen image method (the snapctl driver for Solaris clients or VxFS snapshot for HP-UX). In the NetBackup Administration Console, the **Allow frozen image clients** box on the Change Policy dialog is grayed out (see example display below).

◆ FlashBackup performs local backups only (no offhost). In the NetBackup Administration Console, the **Offhost backup method** picklist is grayed out with **Local Host** selected.

This pre-set configuration is referred to as *default FlashBackup,* and has the same functionality as that provided in the previous release of FlashBackup. If you do not need offhost backup (such as for backing up clients on a SAN), and if the snap driver works well for your environment, default FlashBackup is a good choice.

Default FlashBackup: Available Policy Attributes

Offhost backup method is disabled and set to Local Host

**Allow frozen image clients** is disabled
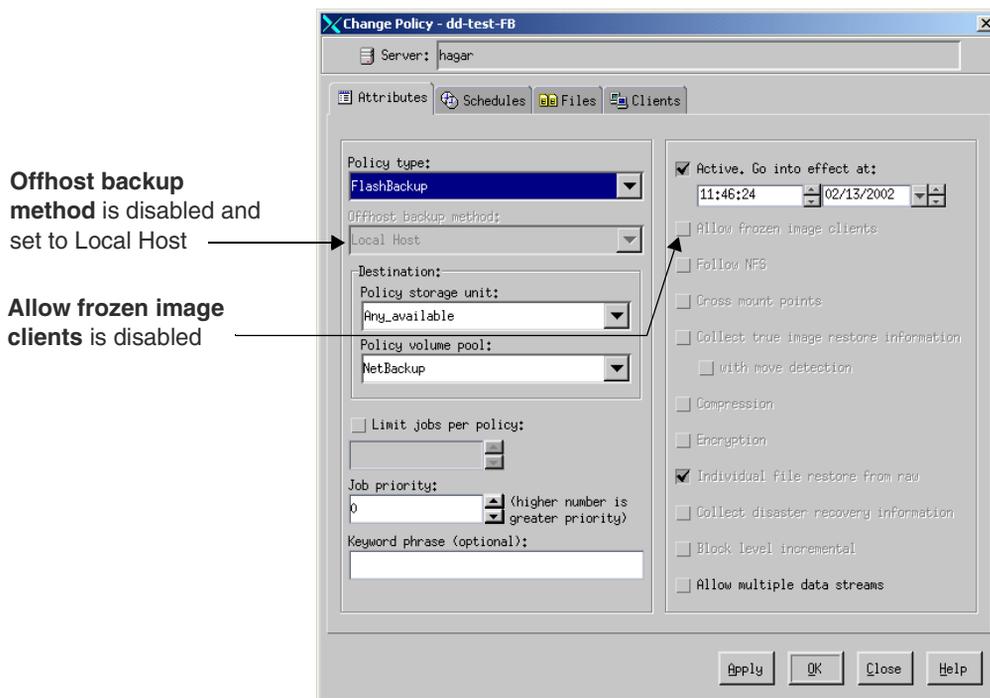
File List

Because FlashBackup is designed to perform raw partition backups, the policy's file list must specify the raw (character) device corresponding to the block device over which the file system is mounted. For example, if you want to back up `/usr`, mounted on `/dev/dsk/c1t0d0s6`, enter `/dev/rdsk/c1t0d0s6`. Do not enter `/dev/dsk/c1t0d0s6`. This applies to the default version of FlashBackup and to FlashBackup with ServerFree Agent.

Note The raw device entry (such as `/dev/rdsk/c1t3d0s3`) is in fact a symbolic link to the actual device file.

For default FlashBackup only, you must specify at least one cache device by means of the `CACHE=` directive. This directive specifies the cache partition to be used for storing any updates to the raw-partition while the backup is in progress. The cache device entry (`CACHE=`) must precede the raw device entries. (See example display below.)

Default FlashBackup: File list
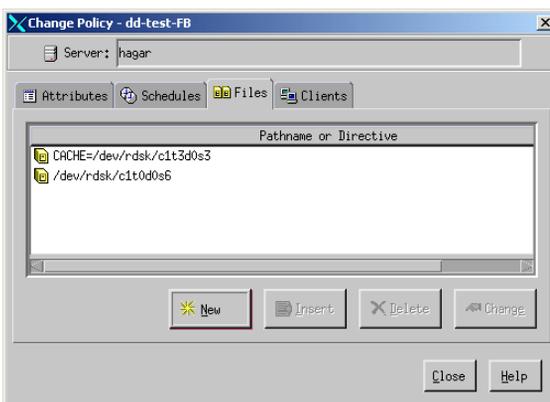
◆ For all entries in the file list, enter the full path name of the raw device. Do not specify wildcards (such as `/dev/rdsk/c0*`) as paths for any entry.

◆ You can include multiple entries in the same file list.

For example:

```
CACHE=/dev/rdsk/c1t4d0s0
/dev/rdsk/c1t4d0s7
CACHE=/dev/rdsk/c1t4d0s1
/dev/rdsk/c1t4d0s3
/dev/rdsk/c1t4d0s4
```

◆ The cache partition is part of the snapshot mechanism that preserves a consistent view of the raw partition for NetBackup.

The basic requirements for the cache partition are:

- Must reside on the same host as the raw partitions that you are backing up.

- Cannot be the raw partition being backed up.

- Must not have a mounted file system. Any data configured on this device will be overwritten by the snap driver.

- On Solaris, the same cache partition can be used simultaneously by multiple backups (two policies can use the same cache partition at the same time). On HP-UX, multiple backups cannot use the same cache partition simultaneously. If multiple policies list the same cache partition on HP-UX systems, backups naming those policies must be run at different times to prevent a failure.

- Must have enough space to hold all the writes to the partition that may occur during the backup. Note that backups during nonworking hours normally require a smaller cache than a backup during peak activity. Also see the introductory section in the "Solaris snapctl Driver" appendix.

Allow Multiple Data Streams

If you select the **Allow multiple data streams** attribute for the policy, you can include directives in the file list that start multiple backups for each client that is backed up:

◆ The number of backups started depends on the directives in the file list.

◆ The number of backups that can run concurrently depends on the number of available drives in the storage units and the maximum jobs parameters (for example, **Limit jobs per policy**).

Note The directives are not needed if you are using FlashBackup with ServerFree Agent.

Allow multiple data streams is useful for reducing the backup time for very large backups. This is achieved by using multiple drives, multiplexing, or a combination of the two for processing the streams concurrently. For detailed information on **Allow multiple data streams**, see the *NetBackup System Administrator's Guide for UNIX*.

Note For best performance, use only one data stream to back up each physical device on the client. Multiple concurrent streams from a single physical device can adversely affect backup times.

The directives that you can use in the file list for a FlashBackup policy are:

NEW_STREAM

CACHE=*value* (see "File List" earlier in this chapter)

UNSET

UNSET_ALL

Each backup begins as a single stream (or job). In other words, the start of the file list up to the first NEW_STREAM directive (if any) is the first stream. Each NEW_STREAM entry causes NetBackup to start an additional stream or backup.

Note that all file paths listed between NEW_STREAM directives are in the same stream.

The file list in the following example generates four backups:

On Solaris systems:

```
CACHE=/dev/rdsk/c1t3d0s3
/dev/rdsk/c1t0d0s6
NEW_STREAM
/dev/rdsk/c1t1d0s1
NEW_STREAM
UNSET CACHE
CACHE=/dev/rdsk/c1t3d0s4
/dev/rdsk/c1t2d0s5
/dev/rdsk/c1t5d0s0
NEW_STREAM
UNSET CACHE
CACHE=/dev/rdsk/c0t2d0s3
/dev/rdsk/c1t6d0s1
```

On HP-UX systems:

```
CACHE=/dev/cache_group/rvol1c
/dev/vol_grp/rvol1
NEW_STREAM
UNSET CACHE
CACHE=/dev/cache_group/rvol2c
/dev/vol_grp/rvol2
NEW_STREAM
UNSET CACHE
CACHE=/dev/cache_group/rvol3c
/dev/vol_grp/rvol3
/dev/vol_grp/rvol3a
NEW_STREAM
UNSET CACHE
CACHE=/dev/cache_group/rvol4c
/dev/vol_grp/rvol4
```

◆ The first stream is generated automatically and a backup is started for /dev/rdsk/c1t0d0s6 (Solaris) or /dev/vol_grp/rvol1 (HP-UX). The CACHE= entry sets the cache partition to /dev/rdsk/c1t3d0s3 (Solaris) or /dev/cache_group/rvol1c (HP-UX).

◆ The first NEW_STREAM directive starts a second stream to back up /dev/rdsk/c1t1d0s1 (Solaris) or /dev/vol_grp/rvol2 (HP-UX). On Solaris systems, this backup uses the same cache partition. On HP-UX systems, a different cache partition must be defined for each stream (CACHE=/dev/cache_group /rvol2c).

◆ The second `NEW_STREAM` starts a backup for `/dev/rdsk/c1t2d0s5` and `/dev/rdsk/c1t5d0s0` (Solaris) or `/dev/vol_grp/rvol3` and `/dev/vol_grp/rvol3a` (HP-UX). These two partitions are backed up serially within the stream. In addition, the `UNSET CACHE` directive unsets the previous cache setting and the `CACHE=` directive sets a new cache partition for this backup.

◆ The last `NEW_STREAM` directive starts a backup for `/dev/rdsk/c1t6d0s1` (Solaris) or `/dev/vol_grp/rvol4` (HP-UX). Like the third stream, this one also unsets the cache directive and defines a new cache partition.

As shown in the example, policy-specific directives such as `CACHE` are passed to the client with the current stream and all subsequent streams, until the directive is redefined or unset.

If the directive is encountered again, its value is redefined.

An `UNSET` or `UNSET_ALL` directive unsets a directive that was previously defined in the file list.

◆ `UNSET` unsets a policy-specific directive so it is not passed with additional streams. The directive that was unset can be defined again later in the file list so it is included in the current or a later stream.

◆ `UNSET_ALL` has the same effect as `UNSET` but affects all policy-specific directives that have been defined up to this point in the file list. If used, `UNSET_ALL` must appear directly after the second or later `NEW_STREAM` directive.

Using FlashBackup with ServerFree Agent

A FlashBackup policy can be configured with ServerFree Agent features as follows:

◆ You can select from several frozen image methods. With ServerFree Agent, FlashBackup is not limited to the default snap driver.

In the NetBackup Administration Console, the **Allow frozen image clients** box on the Change Policy dialog is now available (see display below).

◆ You can perform offhost backups. By off-loading the backup I/O to a NetBackup media server, FlashBackup operates even faster and more efficiently.

In the NetBackup Administration Console, the **Offhost backup method** picklist is available.

Note For detailed instructions on configuring frozen image methods and offhost backup, refer to the *NetBackup ServerFree Agent System Administrator's Guide.*

FlashBackup with ServerFree Agent: Available Policy Attributes

Policy type is still FlashBackup

Offhost backup method is selectable

Allow frozen image clients is selected

Individual file restore from raw is still selected

Please note the following:

◆ If you select an **Offhost backup method** (NetBackup Media Server or Third-Party Copy Device), or if you enable **Allow frozen image clients**, you must configure a frozen image method for the client. There is no default.

Note Chapter 5 of the *NetBackup ServerFree Agent System Administrator's Guide* describes the correct procedure for configuring a frozen image method.

As described in the *NetBackup ServerFree Agent System Administrator's Guide,* frozen image methods are configured by means of the Frozen Image Client Configuration dialog (see display below).

◆ To use an offhost backup method (**Third-Party Copy Device** or **NetBackup Media Server**), you must create special configuration files. Refer to Chapter 4 of the *NetBackup ServerFree Agent System Administrator's Guide.*

FlashBackup with ServerFree Agent: Frozen Image Client Configuration

NetBackup FlashBackup System Administrator's Guide

◆ On Solaris, the ServerFree Agent equivalent of the snap driver is the **nbu_snap** frozen image method (**nbu_snap** uses the snapctl driver to make a frozen image). If you want FlashBackup to create the backup image in the same manner as it did prior to ServerFree Agent, select **nbu_snap**. On HP-UX, select **vxvm**.

◆ If you choose **nbu_snap**, specify a raw partition for the snapshot cache by entering the partition's full path name in the **Parameter Value** field.

For example: /dev/rdsk/c2t0d3s3

Do not specify wildcards (such as /dev/rdsk/c2*). Note that the partition's contents will be overwritten by the **nbu_snap** snapshot process.

Note For FlashBackup with ServerFree Agent, the raw partition specified on the Frozen Image Client Configuration dialog takes the place of the CACHE= entry in the file list.

File list

With ServerFree Agent: when configuring a frozen image method, do not place any CACHE= entries in the file list. The cache partition is specified in the Frozen Image Client Configuration dialog (see previous section).

FlashBackup with ServerFree Agent: File list

CACHE= entries not allowed.
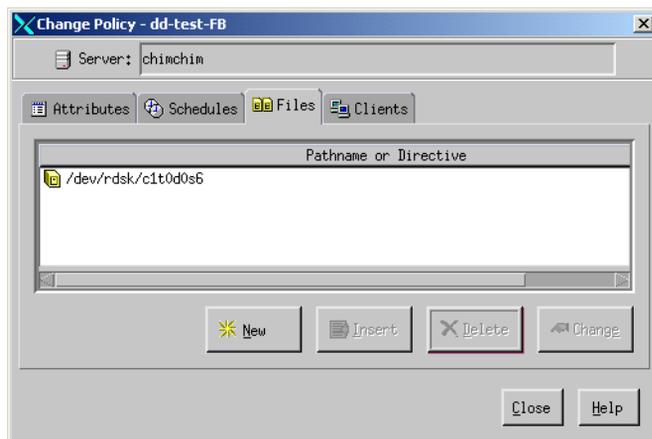
Allow Multiple Data Streams

With ServerFree Agent: For multiple data streams, enable **Allow multiple data streams** on the Change Policy display. No further configuration or file list directives are required.

Refer to the *NetBackup System Administrator's Guide for UNIX* for detailed assistance in using multiple data streams.

Note Since CACHE= must not be included in the file list, the SET and UNSET directives are not needed.

To configure the backup with a ServerFree Agent offhost backup method, or to select a frozen image method other than the default snap driver, refer to "Using FlashBackup with ServerFree Agent" on page 23.

Using FlashBackup   4

The following topics are covered in this chapter:

- Performing a Backup
- Performing a Server-Directed Restore
- Performing a Client-Directed Restore
- Troubleshooting

Performing a Backup

Automatic Backup of a FlashBackup Policy

The most convenient way to back up raw partitions with FlashBackup is to configure a FlashBackup policy and then set up schedules for automatic, unattended backups. To add new schedules or change existing schedules for automatic backups, follow the guidelines in the *NetBackup System Administrator's Guide for UNIX*.

Manual Backup of a FlashBackup Policy

The administrator can use the NetBackup Administration Console on the master server to execute a backup for a FlashBackup policy. See the *NetBackup System Administrator's Guide for UNIX* for instructions.

Performing a Server-Directed Restore

As root user on the master server, you can perform a server-directed restore to a client. Using the server's NetBackup Administration Console, you can restore individual directories or files (or an entire raw partition) backed up by FlashBackup. The procedure is the same as that for restoring from a regular file system backup as described in the *NetBackup User's Guide for UNIX.* However, note the following before starting the restore.

Note on Restoring Individual Directories or Files

◆ In order to restore individual directories or files from a raw partition backup, the client must be in a FlashBackup policy and the server must be configured to allow for individual file restores from raw partition backups.

Notes on Restoring Raw Partitions

◆ To restore a raw partition, you must have administrator capabilities on the NetBackup server.

◆ An entire raw partition can only be restored from a full backup. FlashBackup incremental backups only support individual file restores. (NetBackup does not distinguish between full and incremental backups when performing a standard raw partition backup.)

◆ Ensure that the partition is not mounted and not in use (if the partition is being used by a database, make sure to shut down the database). The partition must be the same size as when it was backed up. Otherwise, the results of the restore are unpredictable.

◆ Ensure that the device file for the raw partition exists prior to the restore.

◆ The overwrite option is ignored during raw partition restores. The device file must exist and the disk partition is overwritten whether this option is set or not.

◆ To avoid overwriting the entire partition, redirect the restore to another raw partition of the same size, and then copy individual files to the original file system.

Performing a Client-Directed Restore

You can use the NetBackup xbp user interface on a FlashBackup client to restore individual directories or files (or an entire raw partition) from a FlashBackup backup, as follows.

To Restore Individual Directories or Files with xbp

1. Start `xbp`. For example, execute:

    /usr/openv/netbackup/bin/xbp

2. In the **Directory to Search** field, specify the file path.

3. On the **File** menu, click **Browse backups (restore)**.

Note Do not choose **Browse backups (restore raw partitions)**.

---

4. In the **Backup Images** pane, select the desired FlashBackup backup and update the display (choose **Update Display** on the **Edit** menu).

    The list of directories and files appears in the **Directory Structure** and **Files** panes in the same way as if you had chosen a regular file system backup.

5. Select the desired directory or files.

To Restore an Entire Raw Partition with xbp

Note To restore an entire raw partition, select a FlashBackup full backup. You cannot restore the partition from FlashBackup incremental backups because those incrementals support only individual file restores.

---

1. Start `xbp`. For example, execute:

    /usr/openv/netbackup/bin/xbp

2. In the **Directory to Search** field, specify the raw partition.

    Specify the device file name (for example, `/dev/rdsk`), not the file system name.

3. On the **File** menu, click **Browse backups (restore raw partitions)**.

4. In the **Backup Images** pane, select the desired FlashBackup full backup and update the display (choose **Update Display** on the **Edit** menu).

    The list of device paths appears in the **Directory Structure** and **Files** panes.

5. Select the desired directory or device paths and start the restore.

Troubleshooting

This section addresses issues encountered when using FlashBackup.

Gathering Information and Checking Logs

You can resolve many problems on your own by setting up the appropriate logs, reproducing the problem, and then checking the logs.

◆ To create more log information, put VERBOSE in the `bp.conf` file on the NetBackup master and client.

Note The directories under `/usr/openv/netbackup/logs` can eventually require a lot of disk space, so delete them when you are finished troubleshooting.

◆ Backup Messages

During a backup, FlashBackup messages are logged to the `bpbkar` log directory on the client: `/usr/openv/netbackup/logs/bpbkar`. If necessary, create this directory (use access mode of 777 so the client can write to the logs).

◆ Restore Messages

During a restore, FlashBackup messages are logged to the `bprd` log directory on the master server: `/usr/openv/netbackup/logs/bprd`. If necessary, create this directory (use access mode of 777 so the client can write to the logs).

◆ snapctl Driver Messages

Messages from the `snapctl` driver are logged in the client's `/var/adm/messages` file along with other kernel messages.

Before Contacting VERITAS Customer Support

Before calling customer support, please gather as much log information as possible. Be sure to have the following information ready:

◆ NetBackup version

◆ Operating system version of the FlashBackup client

◆ Note whether or not the action that failed had ever worked, and whether the problem is repeatable

◆ Log information (see "Gathering Information and Checking Logs")

For the customer support phone number, refer to "Getting Help" on page xi.

FlashBackup Errors

Some of the following items pertain only to Solaris-based systems, as noted.

On Solaris: the backup failed with status code 12

This error can occur if the snap driver is not installed. Make sure that the following files exist on the client.

32-bit system	64-bit system
/usr/kernel/drv/snapctl.conf	/usr/kernel/drv/snapctl.conf
/usr/kernel/drv/snapctl	/usr/kernel/drv/sparcv9/snapctl

If the snap driver files do not exist, install the snap driver as described in the "Installation" chapter under "Distribute FlashBackup to the Clients."

Status code 13 occurs during backups

This status can result from any of the following:

◆ The FlashBackup cache partition may have run out of space. In that case, the cache partition may not be large enough for the backup requirements.

If the cache partition is full, you will see messages such as the following in the system log:

```
WARNING: sn_alloccache: cache /dev/vx/rdsk/flash1dg/f full - all
snaps using this cache are now unusable
WARNING: sn_failsnap: snapshot id 5 failed error 28
```

Specify a larger cache partition, or designate additional cache partitions in the file list. See the "Configuration" chapter in this guide for cache partition requirements.

◆ **On Solaris:** If your cache partition runs out of space, there may be "stale" snapshots taking up space on the cache partition. Stale snapshots are those that were not automatically deleted by FlashBackup.

    a. Determine if there are stale snapshots on your Solaris client by executing the following:

        /usr/openv/netbackup/bin/driver/snaplist

    b. For each snapshot listed, execute the following to make sure there is a bpbkar process associated with it:

```
ps -eaf |grep ident
```

where *ident* is the snapshot process id displayed by the snaplist command.

   c. Remove snapshots that do not have an associated `bpbkar` process by entering the following:

```
/usr/openv/netbackup/bin/driver/snapoff snapn
```

where *snapn* is the snapshot id displayed by the `snaplist` command.

The restore failed with status code 5 after a NetBackup patch was installed

If you receive status code 5 when attempting to restore a FlashBackup file after a NetBackup patch was installed, the patch may not have been installed properly. Follow the installation instructions in the patch README file and make sure the `libsfr.so` file is copied as instructed.

On HP-UX: the backup failed with status code 20

The HP-UX VxFS snapshot mechanism requires a dedicated cache partition for each snapshot. A check is made in the mount table to make sure the cache partition is not already in use. If the cache partition is already in use, status code 20 will occur.

Check the `/usr/openv/netbackup/logs/bpbkar` log for a message similar to the following:

```
bpfsmap: FTL - bpfsmap: snapshot cache already in use, /dev/arrayvg/vol4c
bpbkar Exit: ERR - bpbkar FATAL exit status = 20: invalid command parameter
bpbkar Exit: INF - EXIT STATUS 20: invalid command parameter
```

If the snapshot cache partition is already in use, you will have to set up your policy schedules to run at different times, or use different cache partitions for each backup.

If the **Allow multiple data streams** option is enabled, each stream must have its own dedicated cache partition.

Technical Overview

The following figure shows the major NetBackup components involved in FlashBackup backups.
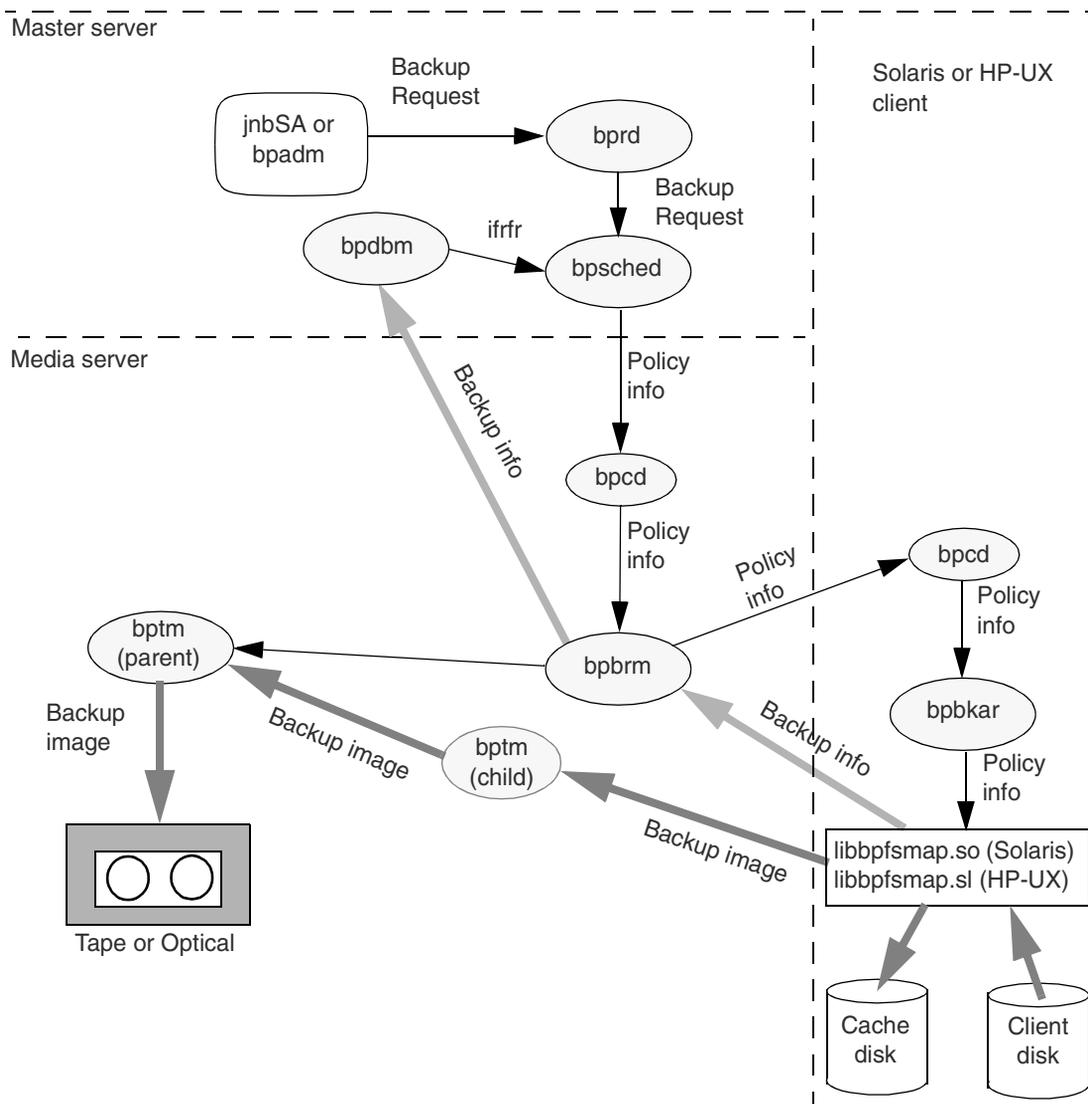
Scheduled backups and immediate backups of FlashBackup policies are initiated and processed in the same manner as standard policy backups. However, the **Individual file restore from raw** (ifrfr) attribute, which defines FlashBackup policies, causes bpsched

to send the special `-ifrfr` flag to `bpbrm` along with the other policy information. `bpbrm` starts `bpbkar` with the `-ifrfr` flag, which causes `bpbkar` to invoke the FlashBackup dynamic shared library (`libbpfsmap.so` on Solaris, `libbpfsmap.sl` on HP-UX).

During the backup, the dynamic shared library (`libbpfsmap.so` or `libbpfsmap.sl`) performs the following tasks:

◆ If a ServerFree Agent frozen image method is configured: the dynamic shared library uses the frozen image method that is configured for the raw partition entry in the backup policy's file list.

◆ If a ServerFree Agent frozen image method is *not* configured: by default, the dynamic shared library turns on the FlashBackup raw-partition snapshot mechanism (nbu_snap on Solaris or VxFS snapshot on HP-UX). When a block is updated in the partition, the previous contents of the block are written to the cache partition.

◆ Creates a file system map that represents files contained in the raw partition.

◆ If the backup type is a file incremental, the dynamic shared library creates a bit map that associates blocks belonging to selected files with their physical addresses in the partition. Note that block level incrementals are not supported.

◆ Sends the backup information to `bpbrm`, which in turn directs the backup information to `bpdbm`. The backup information is composed of:

   - File system map name

   - Bit map name (if incremental)

   - Individual file names

   - Raw-partition name

◆ Transmits the backup image to `bptm`. The backup image is composed of:

   - File system map data blocks

   - Bit map data blocks

   - Raw-partition data blocks (raw-partition extents, if this is an offhost backup)

◆ If a ServerFree Agent frozen image method is not configured: the dynamic shared library turns off the FlashBackup snapshot mechanism.

The following figure shows the major components involved in restoring files from
FlashBackup backup images.
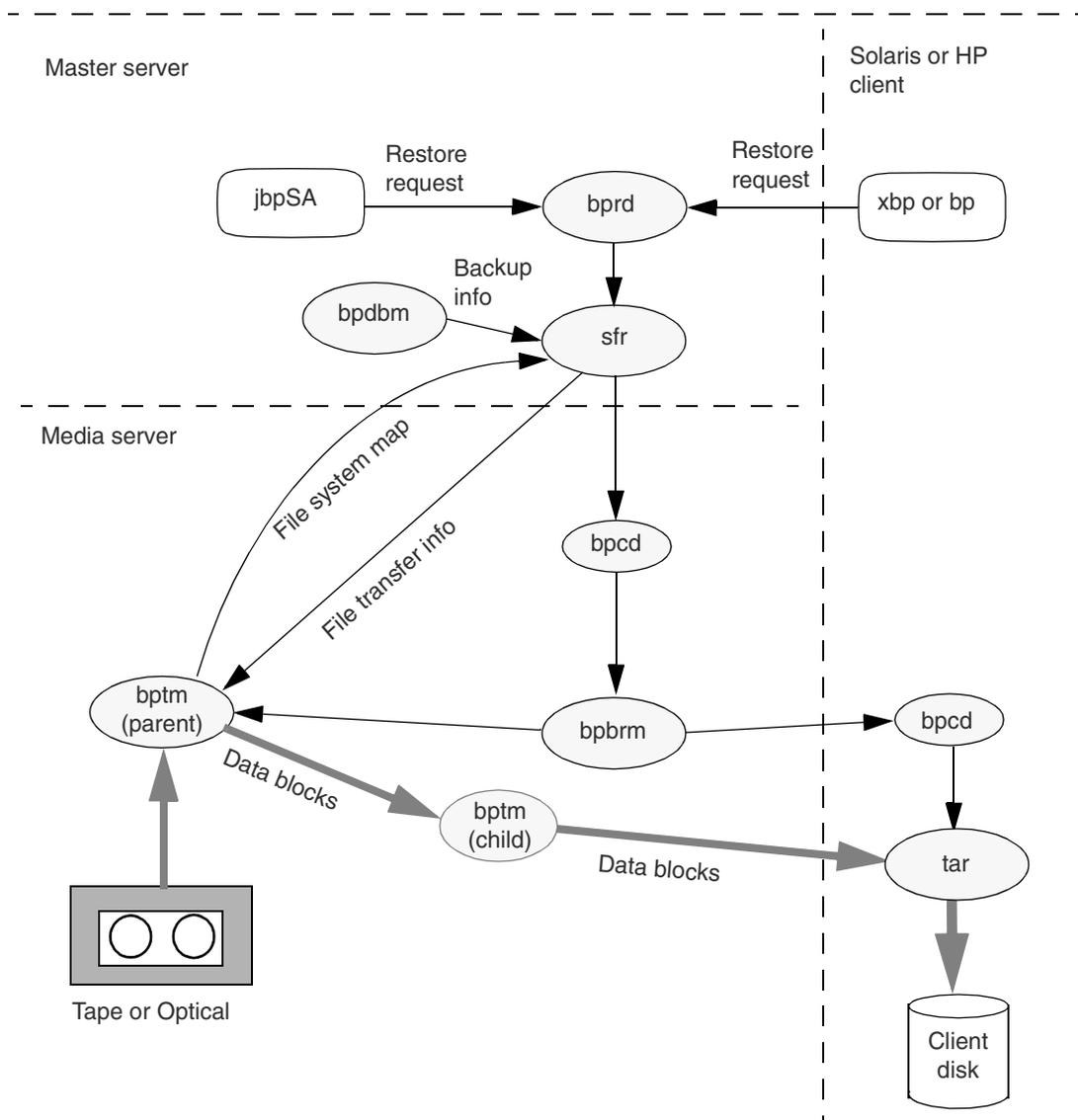
During a restore, the user browses for and selects files from FlashBackup images in the
same manner as standard backup images. The difference is that bprd calls the single file
restore (sfr) program when processing FlashBackup images. During a restore, the sfr
program performs the following tasks:

◆ Retrieves information about the backup from `bpdbm`. The backup information is composed of:

  - File system map name and its media location.

  - Bit map name and its media location.

  - Raw-partition name and its media location.

◆ Using the backup information, `sfr` retrieves the file system map data by directing `bptm` to the location of the file system map on the tape and then reading from the tape. A similar procedure is followed to position `bptm` to obtain the bit map data when restoring from incremental backup images and to obtain the raw-partition data when restoring the raw partition.

◆ Then, using the information contained in the file system map, `sfr` directs `bptm` to the location of the individual file data blocks on the tape.

  `bptm` then reads the file data blocks from the tape and writes them to the client's `tar` program. Finally, `tar` writes the file data to the client disk.

Solaris snapctl Driver   **A**

Under normal conditions, the snap driver is invoked only by NetBackup.

When not configured with a ServerFree Agent frozen image method, each FlashBackup backup requires that a cache partition be specified in the policy file list by using a `CACHE=` entry (see "File List" on page 19). On Solaris systems, the same cache can be used by any number of concurrent backups, as long as it is big enough. For HP-UX systems, each concurrent backup must have a dedicated cache partition.

The cache size should be approximately 10% to 15% of the total of all partitions that are associated with the specific cache. This assumes no more than a moderate level of write activity during backups.

If a cache overflows, all snapshots that are using the cache will become unreadable and the backups that are reading the snapshots will fail.

Command Usage

snapoff

`snapoff` terminates a snapshot that was previously initiated by a backup that failed abnormally. `snapoff` must be invoked as:

```
/usr/openv/netbackup/bin/driver/snapoff snap1 ... snapn
```

If `snapoff` is successful, a message of the following form will be displayed:

```
snap 1 disabled
snap 2 disabled
...
snap n disabled
```

If `snapoff` fails, an explanatory message is displayed. Error codes are identified in `/usr/include/sys/errno.h`.

snaplist

This command must be invoked as:

    `/usr/openv/netbackup/bin/driver/snaplist`

`snaplist` displays information about all active snapshots in the following form:

```
 id  device             size    cached  cache            err time
 1   /dev/rdsk/c0t3d0s0  72560   16450   /dev/rdsk/c0t4d0s0 0   12/19/99 13:23:48
```

Where:

◆ `size` is the size of the snapped partition in 512-byte blocks.

◆ `cached` is the number of 512-byte blocks that have been cached (written to) for this snapshot since it was initiated.

◆ `err` is an error code; 0 indicates no error.

   If a snapshot has encountered an error, then `err` will be non-zero and the snapshot will be inaccessible. It can be terminated using `snapoff`. Error codes are identified in `/usr/include/sys/errno.h`. Also, error messages may be found in `/var/adm/messages`.

snapcachelist

This command must be invoked as:

    `/usr/openv/netbackup/bin/driver/snapcachelist`

`snapcachelist` displays information about all partitions currently in use as snapshot caches. It is useful for monitoring the extent to which caches are full. Displayed output is of the form:

```
device            free      busy
/dev/rdsk/c0t4d0s0  238528    264472
```

Where:

- ◆ `free` is the number of 512-byte blocks available.

- ◆ `busy` is the number of 512-byte blocks that have been written to.

When a cache is full, any write to a snapped partition or snapped file system associated with that cache will cause the snapshot to fail and the snapshot will no longer be readable or writable. Reads or writes to the snapped partition will remain unaffected. The failed snapshot will not be terminated automatically and must be terminated using `snapoff` in the usual way.

Note Snapshots used by the FlashBackup mechanism in NetBackup are initiated and terminated by NetBackup. While a FlashBackup backup is in progress, `snaplist` and `snapcachelist` can be used to monitor the snapshot.

Caution Do not terminate a NetBackup snapshot using `snapoff` because corruption of the backup image may result.

---

snapstat

The snapstat command must be invoked as:

    /usr/openv/netbackup/bin/driver/snapstat

`snapstat` displays diagnostic information about the snap driver.

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